

Short Description

Solido

SMART C

Compact Two-way Compressor with Integrated Control Unit

for Complete Systems and Retrofit Kits for 1-10 PE

as part of Fully Biological SBR Small Wastewater Treatment Systems
without Pretreatment



Specialist advice by telephone: +49 (0) 30-44 01 38 30 (9.00-16.00 h)

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Note:

- This document primarily explains the components and assembly steps which differ from the Solido SMART E system (with technology capsule and separate S40 control).
- Please note therefore the technical documentation for Solido SMART (DOKK5110) included in the scope of the delivery.
- Notes on the tank installation can also be found in the installation instructions supplied with the documentation.

1. Product features

The new **Solido SMART Compact** small wastewater treatment plant combines all of the benefits of proven SOLIDO technology in an extremely compact space. For this purpose, **a two-way membrane compressor with integrated valve and control** is used.

The SBR method used operates – comparable to a municipal treatment plant – with direct aeration of the incoming waste water without a primary treatment chamber. This ensures very effective wastewater purification and prevents the build-up of bad odours.

The benefits compared to a conventional two-chamber system:

- 10-20% less tank volume is required
- 20-25% less sludge accumulation
- less odour formation, since there is no primary treatment



The proven SOLIDO technology offers the following benefits:

- compact:** minimal space requirement in respect of tank and technology, shallow installation depth
- easy to install:** lifters and hoses in treatment tank preinstalled in the factory, only two hoses to be placed between the tank and the installation site of the compressor
- reliable:** extremely robust and guaranteed sealed treatment tank, seamless in one part (tank M2 also usable for heavy soils and high ground water) patented compressed air lifter with back-flush function avoids sludge wash-out; therefore clearly optimised effluent quality
- simple:** light tank for easy installation and optimal handling integrated sampling container
- economical:** low energy consumption of only approx. 49 kWh/EW/a
- clean:** excellent purification capacity in accordance with CE test EN12566-3
- proven:** 15,000 times proven SOLIDO “Made in Germany” quality

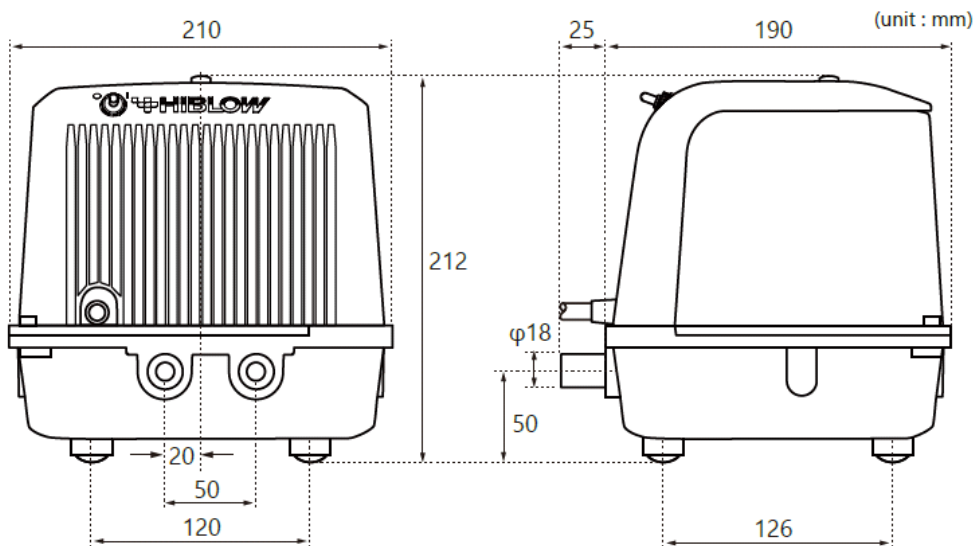
2. DUO-80 Two-way Membrane Compressor

The DUO-80 two-way membrane compressor produced specifically for Solido SMART C carries out all essential process steps of a modern SBR small waste water treatment plant and at the same time is also extremely compact.

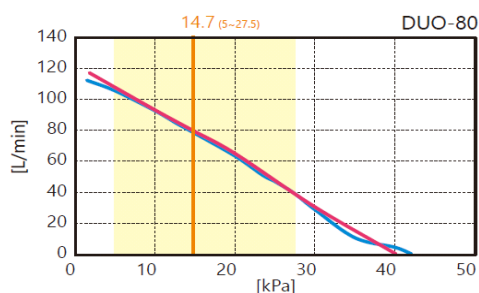
Equipment:

- two compressed air outlets (inside diameter = 12 mm)
- Switch valve
- Integrated control unit with display and three operating buttons
- Optical and acoustic alarm when failure compressor or valve
- Power failure recognition with acoustic alarm
- Mains connection cable with shockproof plug
- Software for two time-controlled SBR cycles per day including back-flush function for the clearwater lifter

Technical data and dimensions:



Model:	DUO-80
Operating pressure (mbar)	147
Applicable pressure range (mbar)	80 to 260
Air feed rate at operating pressure (l/min)	80
Power consumption	58 W
Weight (kg)	6.0
Dimensions (mm x mm x mm)	210 x 215 x 212
Protection class	IP45
Noise emission (dBA)	35
Up to	10 PE



3. Functional characteristics

3.1 Basic principle of treatment

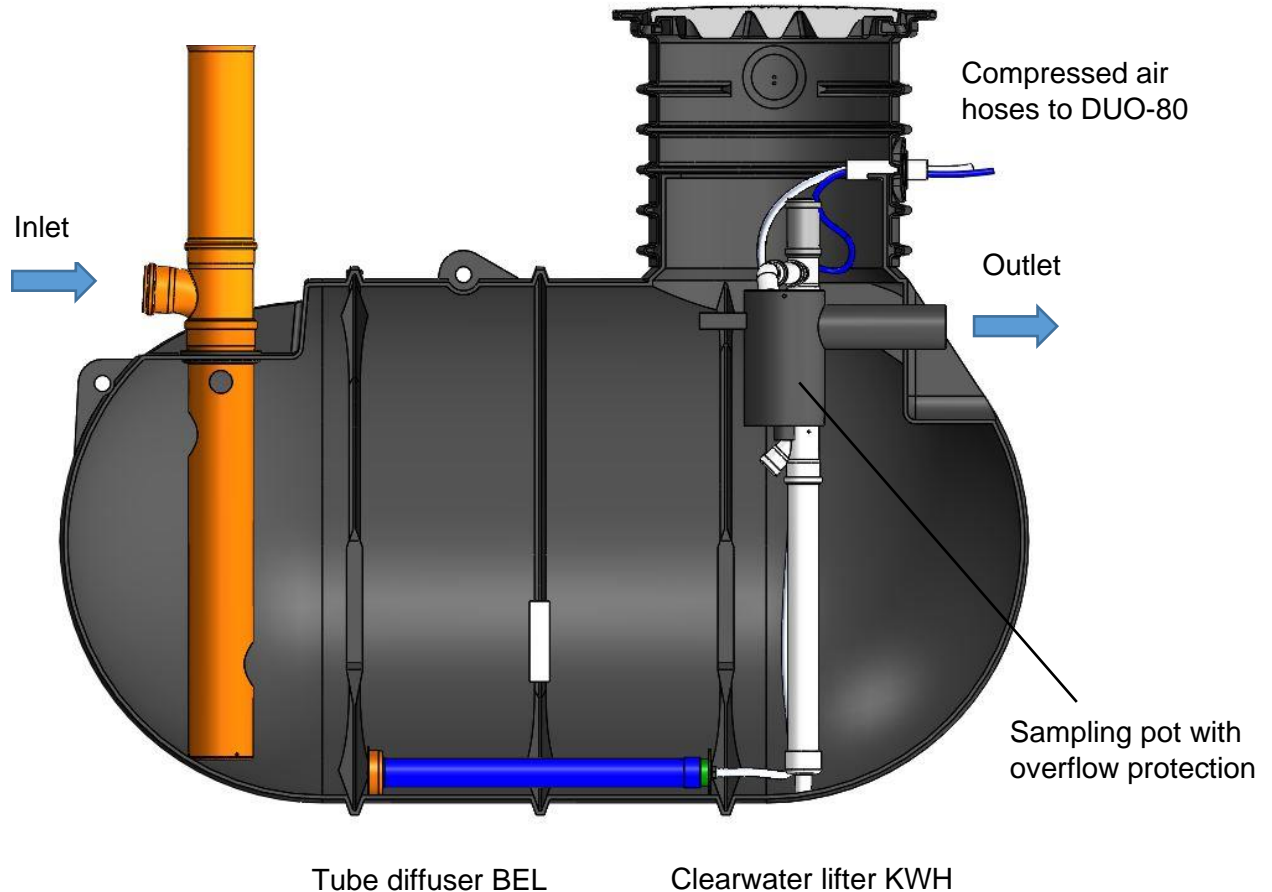
The specific approach of Solido SMART is abandoning traditional septic tanks before the reactor. All of the inflowing wastewater is being intermittently aerated by tube diffusers in **one** chamber (resp. two connected chambers) resulting in simultaneous aerobic stabilization / aerobic biodegradation of primary and secondary sludge. The overall sludge production as well as bad smells are being significantly reduced whereas settleability of activated sludge is being improved compared to traditional activated sludge systems. Multiple usage of available tank volume is allowed for by sticking to the principle of SBR (sequencing batch reactor) running the plant in a time-bound 12h cycle ending with sedimentation and clearwater discharge. The total volume of the tank is being used as reactor, sludge storage and buffer at different times within the 12h-cycle. The one chamber concept contributes to the simplicity of the system and increases its compactness by reducing required overall volume by 15% at same or better levels of performance.

Solido SMART can be run with two or more chambers as long as they are being interconnected resulting in same water levels in all chambers.

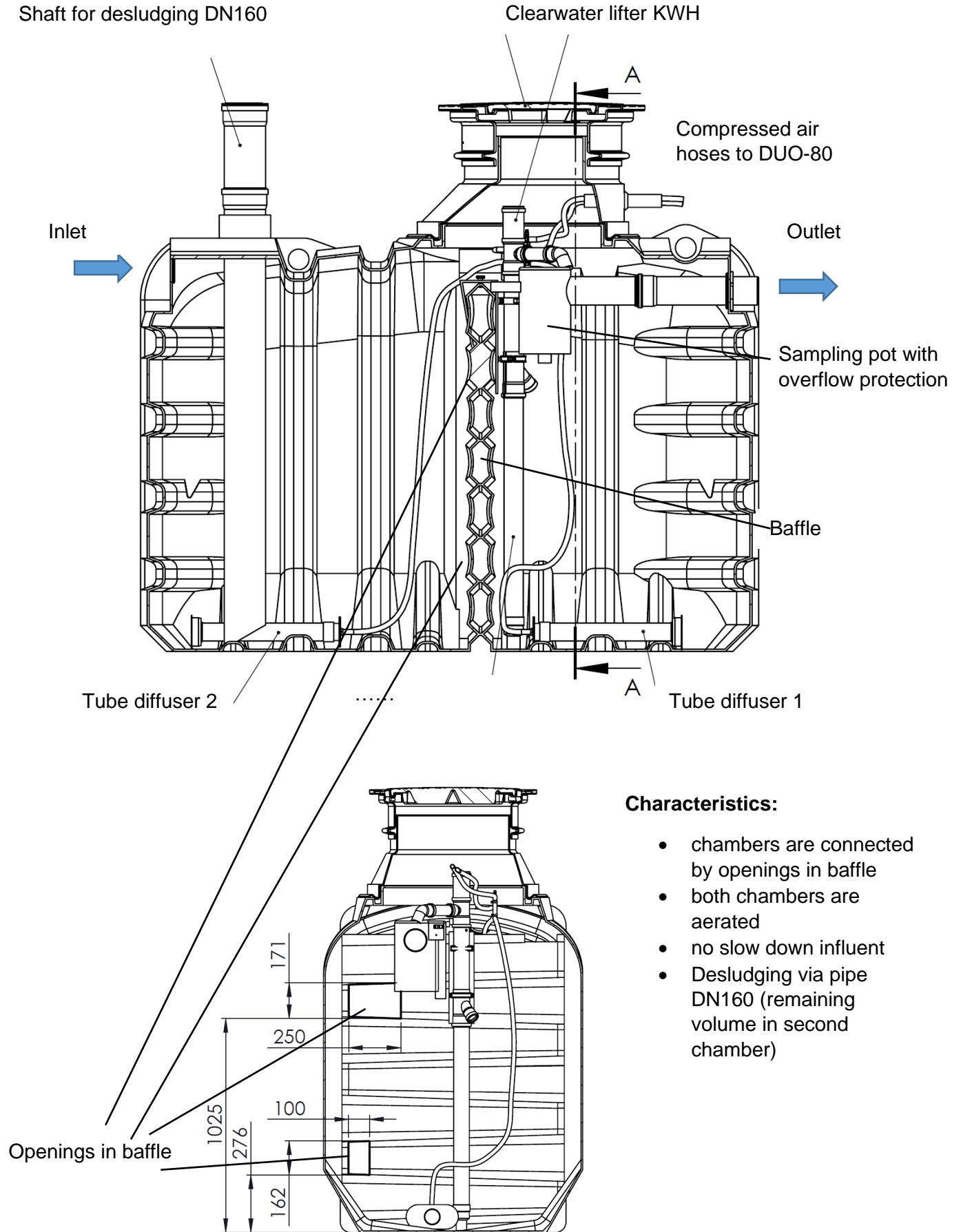
The Solido SMART C does have alarm indicators for failure of compressor, power failure and keeps track of operating hours. High water-levels / overflow are detected by a separate float switch as sensor.

3.2 Setup Solido SMART CBL in round tank BL

Shaft for desludging DN160



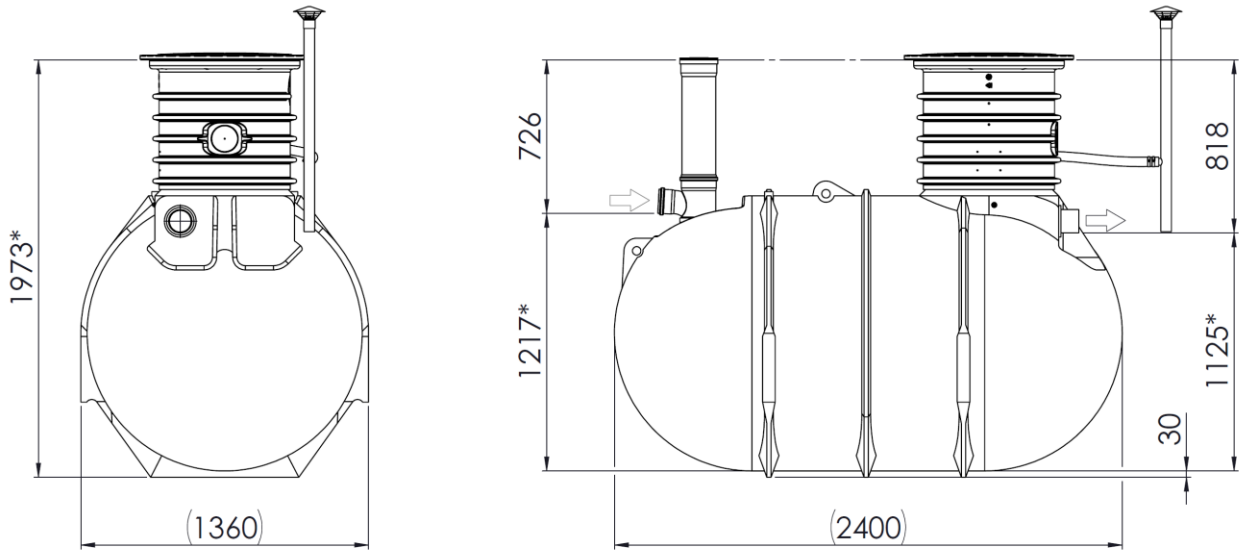
3.3 Setup Solido SMART CM2 in rectangular tank M2



4. Productline and drawings

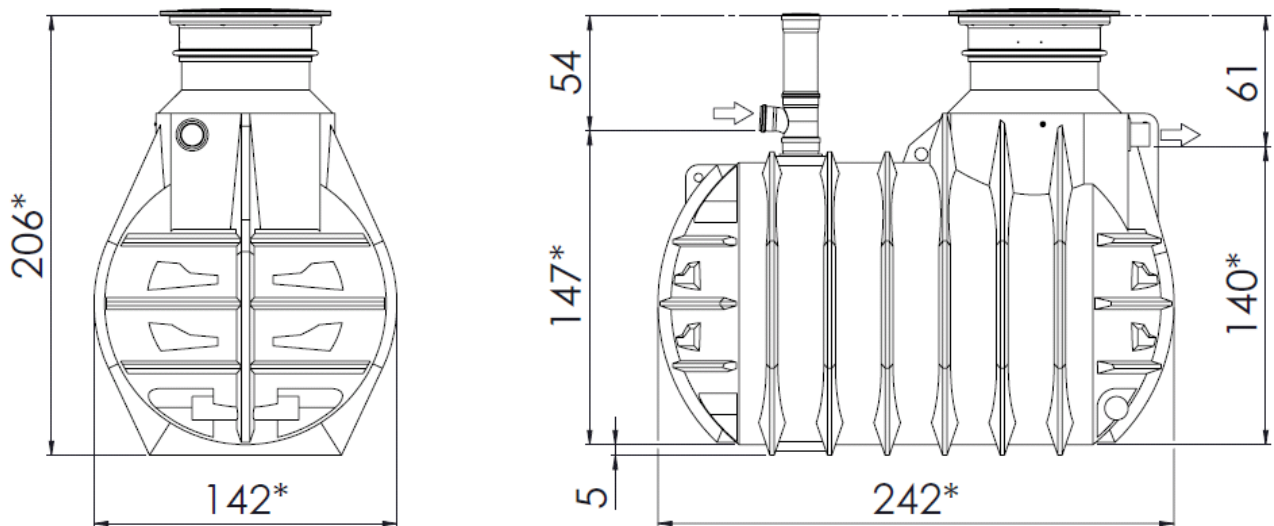
4.1 Solido SMART CBL in round tank BL

Solido SMART CBL-26 (5 PE)



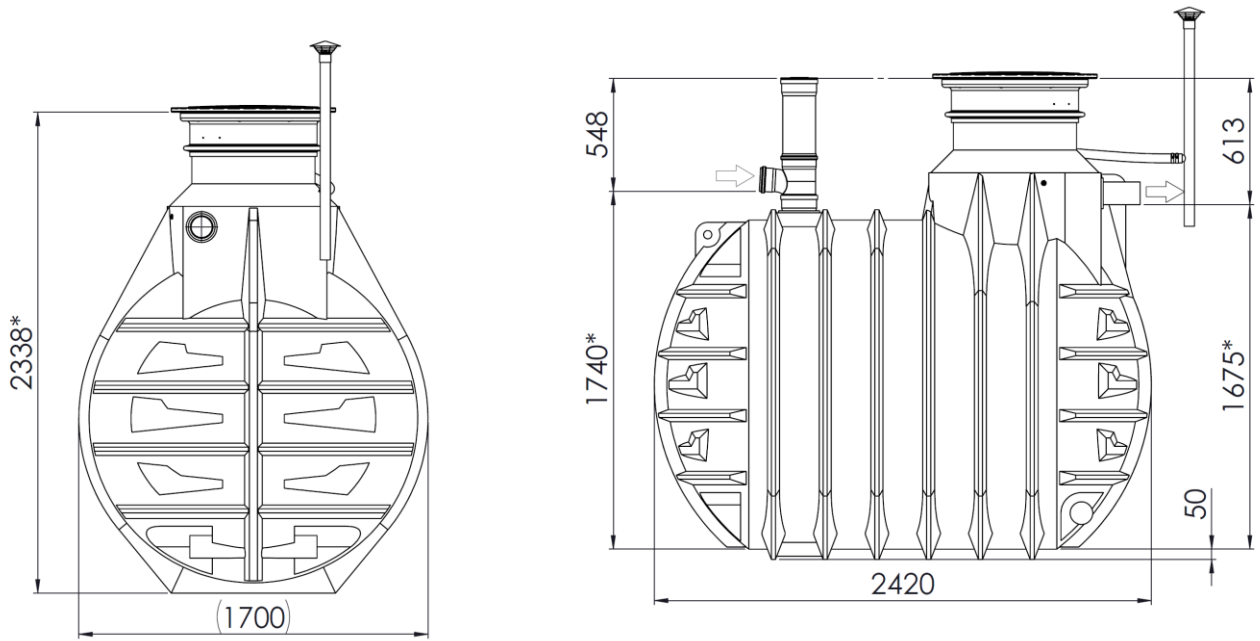
* Produktionsbedingt schwankend
im Bereich -40/+10 mm

Solido SMART CBL-30 (6 PE)



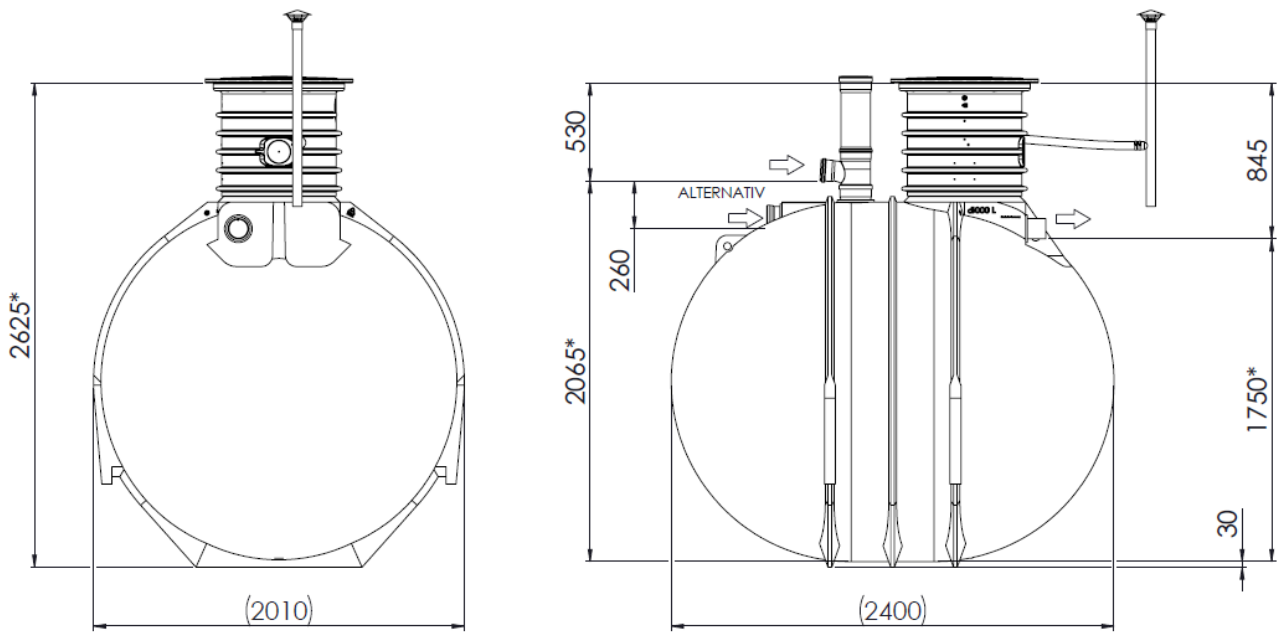
* Produktionsbedingt schwankend
im Bereich -4 /+1 cm

Solido SMART CBL-45 (8 PE)



* Produktionsbedingt schwankend im Bereich -40/+10 mm

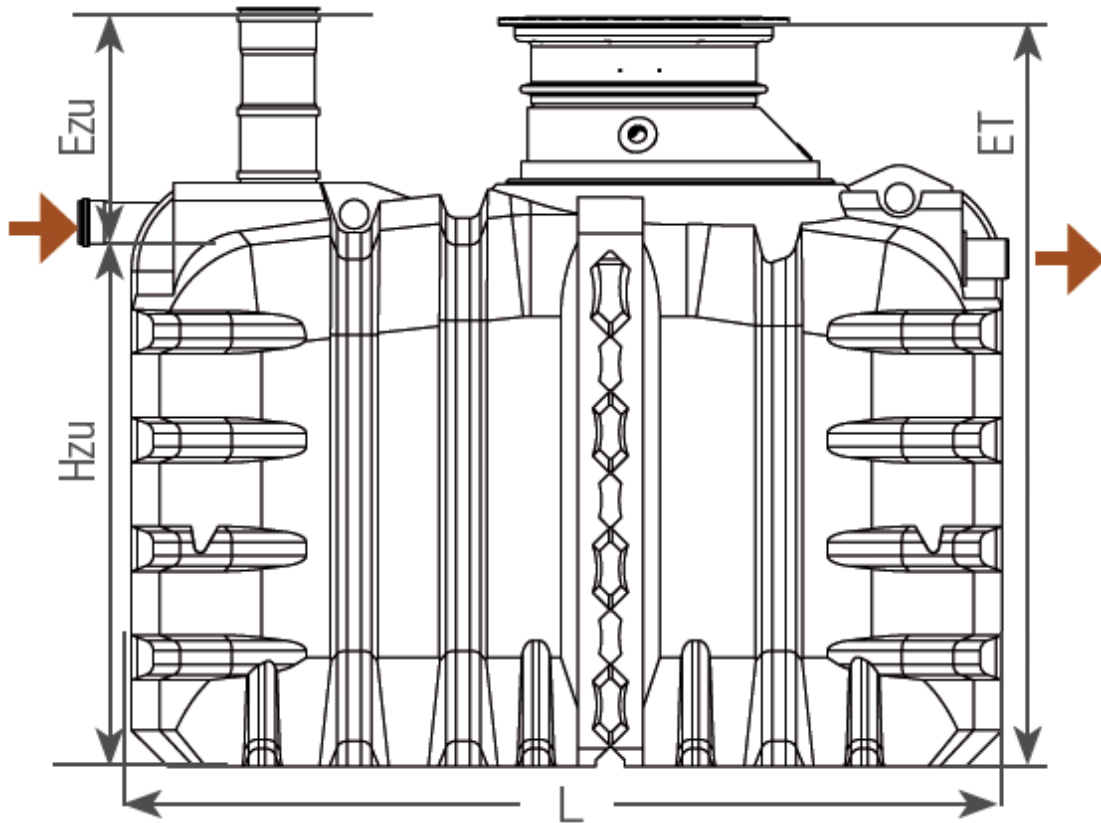
Solido SMART CBL-52 (10 PE)



* Verfahrensbedingt schwankend im Bereich -40/+10 mm

4.2 Solido SMART CM2 in two-chamber rectangular tank M2

Advice: for installation in groundwater up to shoulder of tank


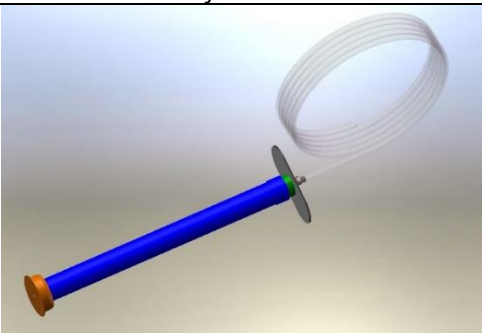



Tank M2 (MONOLITH-2)			3500	4500	6000
PE			8	10	10
Weight	kg		195	286	366
Length (L)	cm		240	307	340
Width	cm		124	122	122
Height (ET)	cm	min.	206	206	235
		max	220	220	249
Inlet to ground level (Ezu)	cm	min.	61	61	62
		max	75	75	76
Inlet to bottom (Hzu)	cm		145	145	168
Inlet – Outlet (level difference)	cm		10	10	10
Diagonal length	cm		240	305	336

5. Installation

5.1 Checking the system components for completeness

Scope of delivery:

<p>DUO-80 two-way compressor</p> <ul style="list-style-type: none"> - with integrated control unit - small parts to connect the hoses: 2x reduction DN19-DN13 (black) 2x elbow nozzle DN13 (bend protection) 1x reduction with bore DN13-DN10 (blue) connectors, hose clamps 	
<p>15 m hose, white, DN13</p>	
<p>15 m hose, blue, DN10</p>	
<p>Clearwater lifter KWH and sampling container</p>	<p>preinstalled in the tank in complete systems</p>
<p>Tube diffuser</p> <p>(depending on number and size of the chambers: 1 to 4 pieces)</p>	
<p>Overfill alarm</p> <p>(float switch with battery-operated, acoustic alarm transmitter in a junction box, 4 screws and retaining clip)</p> <p>Technical data: 5 m cable Changer with 3 wires (without PE, do not use grey wire) Miniature buzzer 82 dB(A) Battery 9V block (replace once a year) Junction box IP66</p> <ul style="list-style-type: none"> • <i>Mounting on-site</i> 	
<p>optional: Console for compressor or kiosk</p>	

5.2 Installation Steps



Note:

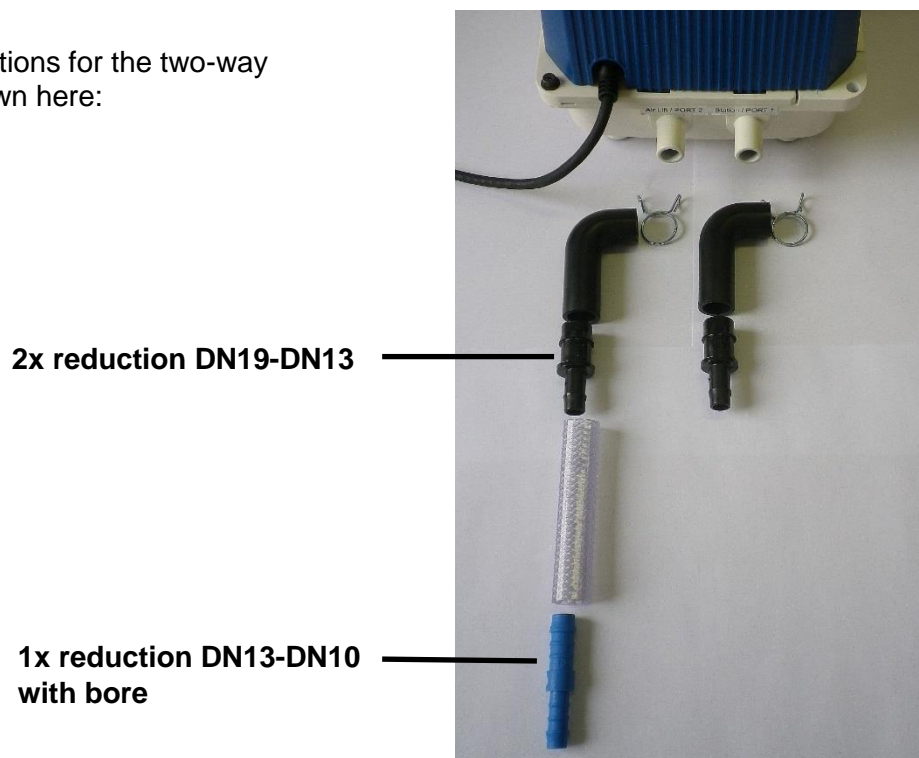
You must fill the lifter with water using a hose before you fill the tank. If the lifter is completely empty, there is a risk of high buoyancy.

5.2.1 Design: Standard

- Setting up of the two-way compressor in the building (optional: on the console) or outside (protected from rain or sun).
- Pull both air hoses (white and blue) through an duct pipe which has been laid on-site from the shaft to the location of the two-way compressor.
- Connect the blue air hose to the clearwater lifter.
- Connect the white air hose to the tube diffuser or to the air distributor.
- Lower the tube diffuser(s) from the white air hose onto the tank floor and position it/them in the centre of the tank.
- Install the overfill alarm at a suitable place in the tank
(in case of complete systems, the clip is preinstalled to the sampling container)

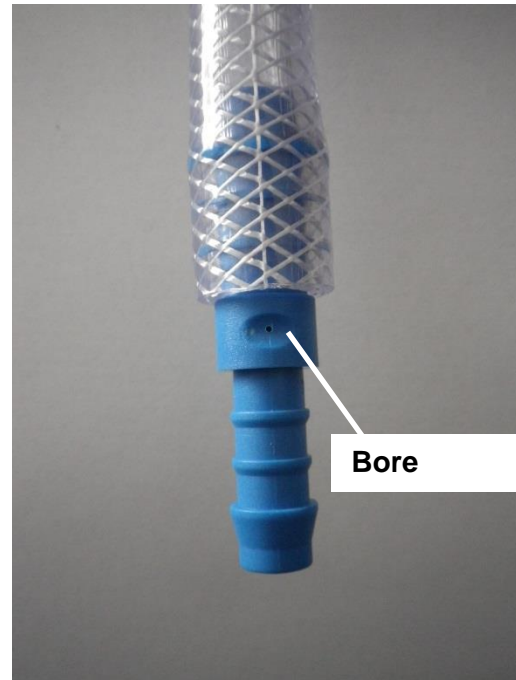
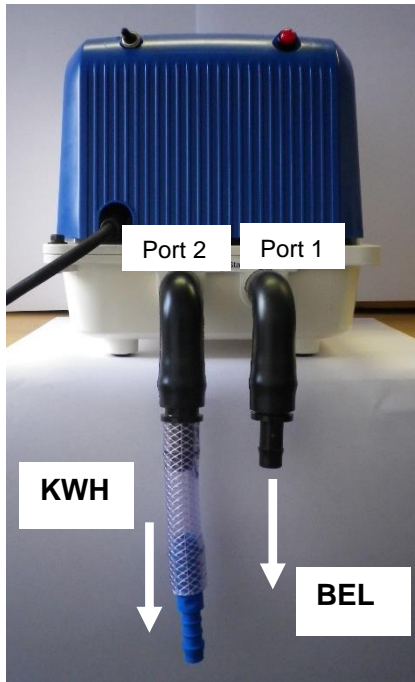
Preparation of the DUO-80 two-way compressor:

Prepare the connections for the two-way compressor as shown here:



alternative: with bend protectione, see chapter 5.2.2

Connection to DUO-80 two-way compressor:



Connect the **blue hose** (DN10) from the clearwater lifter KWH to the reduction at the **left outlet** (Port 2).

Reduction to connect the blue hose of the clearwater lifter (with small bore for the backwash surge)

Connect the **white hose** (DN13) from the tube diffuser BEL to the **right outlet** (Port 1).

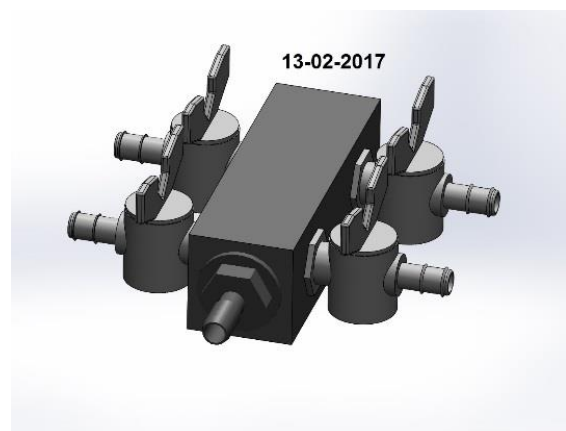
Two or more tube diffusers are supplied for larger or chambered tanks.

Connection of two tube diffusers:

These are connected via the supplied t-piece. For the optimisation of the air distribution to both tube diffusers, please use the stop cocks.

Connection of three or four tube diffusers:

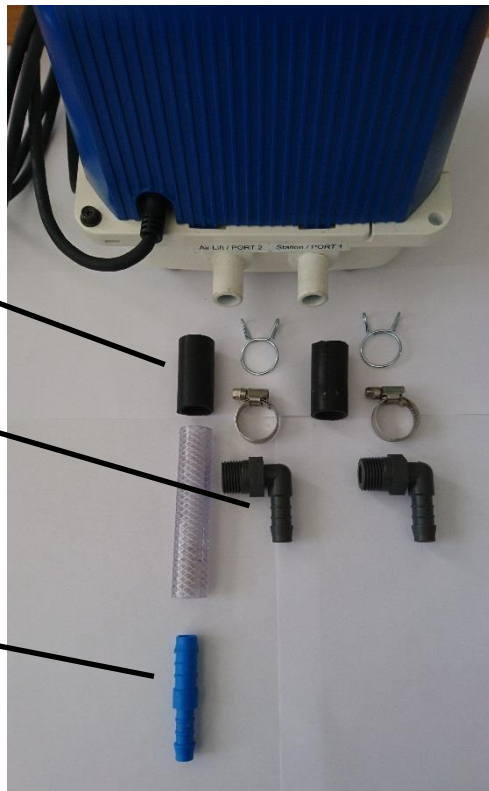
Connect the hoses to the air distributor. Hang the air distributor in the shaft by means of the included clamp. In order to optimise the air distribution, please use the stop cocks.



5.2.2 Alternative: bend protection

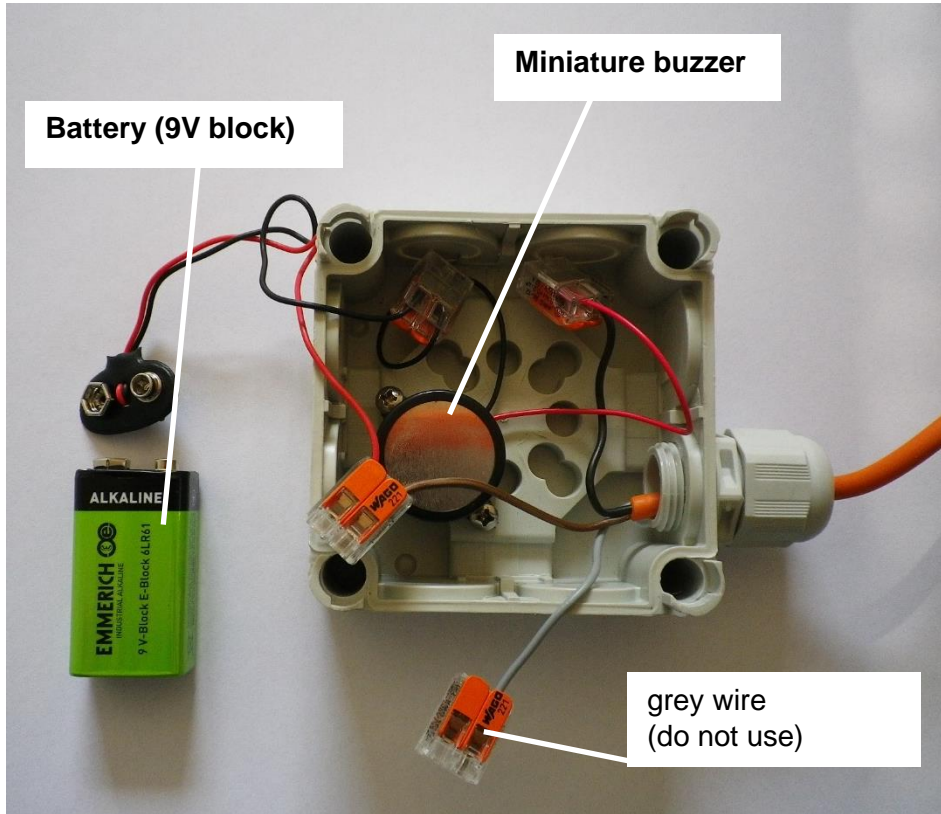
Prepare the connections for the two-way compressor as shown here:

- 2x hose pieces (cut, ca. 4.5cm)
- 2x angle nozzle DN13 stick into hose piece
- 1x reduction DN13-DN10 with bore

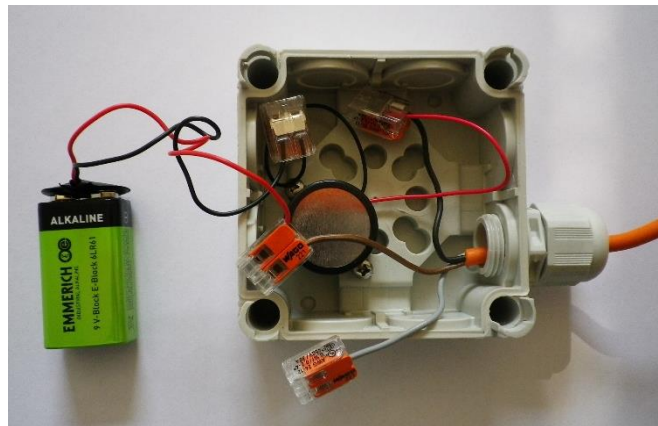


5.2.3 Overfill alarm

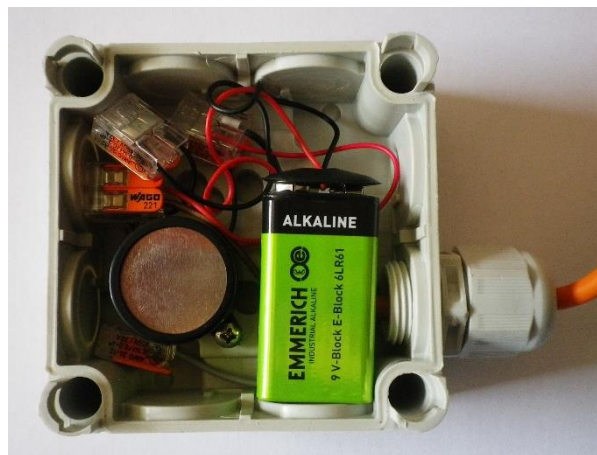
Open box to put into operation:



- Connect battery (9V block) and place it back into the box



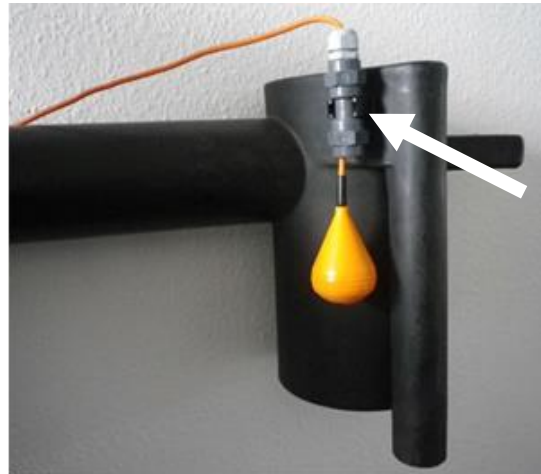
- Attach box at a suitable location (e.g. in the shaft with the screws supplied or outside the tank)
- If required: Disconnect cable for installation (WAGO clamps)
- Close box (IP66)



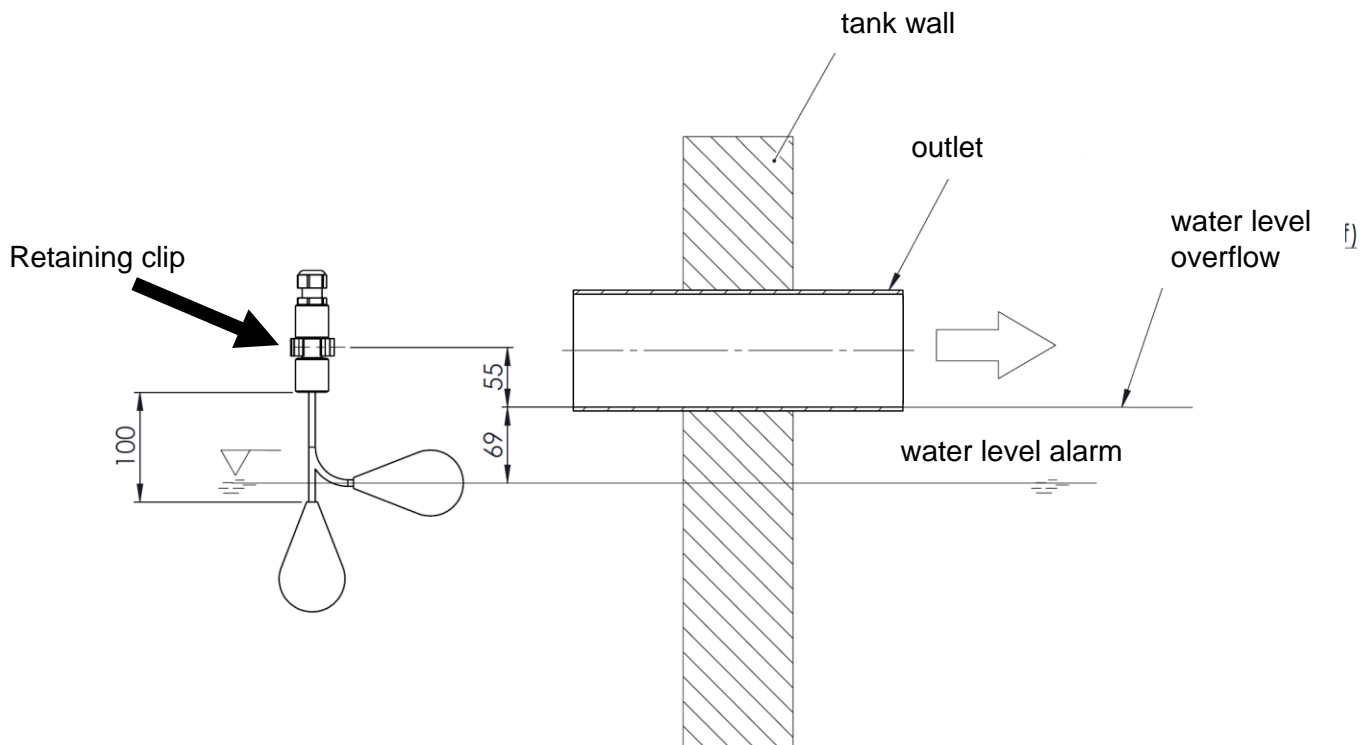
Installation of the float switch:

In **PE complete systems**, the retaining clip for the float switch is preinstalled on the sampling container:

- Lock the float switch SWS in place on the preassembled retaining clip on the sampling container.
- Please ensure that the retaining clip locks between the two sleeves (white arrow).



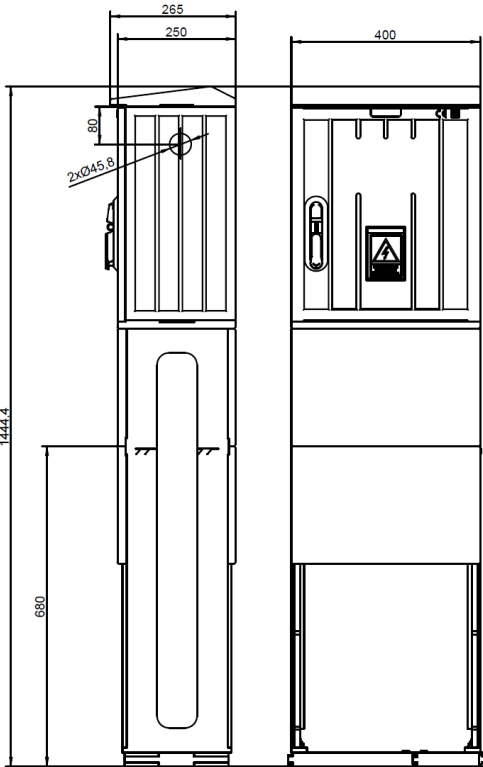
For **retrofits**, we recommend mounting the retaining clip at the height specified in the following drawing, e.g. at the tank wall:



5.2.4 Design: in kiosk (optional, example)



Dimensions:



5.2.5 Design: DUO-80 in technology capsule (optional)



- Wire configuration: This has to be performed only by a specialist electrical company!
- Make sure to use a **separate electric circuit** with a **separate fuse** when connecting to mains power allowing to use the separate fuse as **emergency stop switch**. Without separate fuse and separate electric circuit you must install a separate emergency stop switch for the plant.



- open junction box in capsule



- insert mains power cable (3x 1,5 mm²) through black cable gland into the capsule

*Note:
underground cable to capsule
(3x 1,5 mm²) done by client (on site)*





- insert mains power cable through grey cable gland into junction box



- connect cables according to colours in cable connectors (WAGO clamps)

brown: phase
blue: neutral
green/yellow:
protective earth / ground



- ready !

6. Operation of Solido SMART C

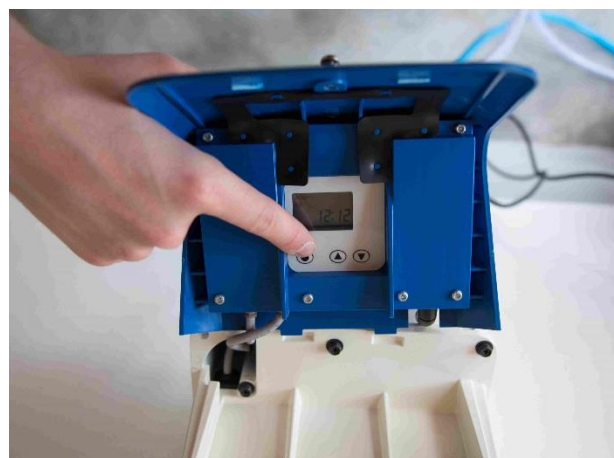
Housing: On/Off button (0 / I)
Red alarm indicator
Port 1 (right): Connection of white air hose to tube diffuser(s)
Port 2 (left): Connection of blue air hose to clearwater lifter KWH
Mains plug



Important Note:

Please ensure that the button is on "0" (off), when you connect the compressor to the mains for the first time (before start-up).

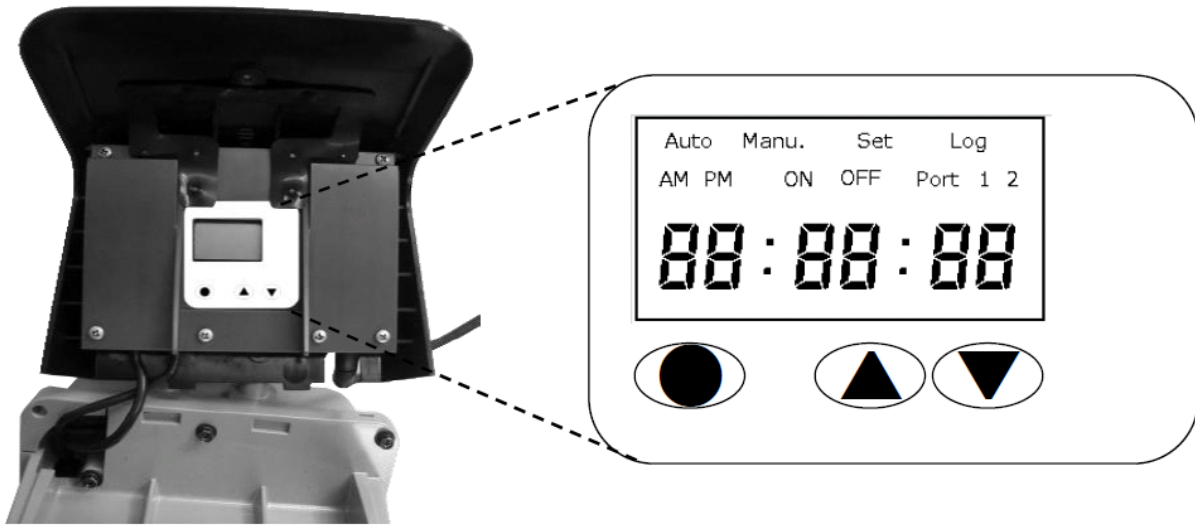
After loosening the central screw of the cover, this can be folded forward and enables access to the control unit.



6.1 About the Solido SMART C control unit

The control unit integrated in the compressor has a display and three operating buttons. English is used exclusively.


The service password can be obtained by qualified specialist companies at Premier Tech.



Button		Command
	Pressed briefly	Selection
	Pressed briefly	Increase value
	Pressed briefly	Reduce value
+	Pressed briefly	Process
	Pressed and held	Enter (confirm)
+	Pressed and held	Option
+	Pressed for 5 seconds	Set Clock

Press briefly: less than 1 second
 Press and hold: more than 1 second

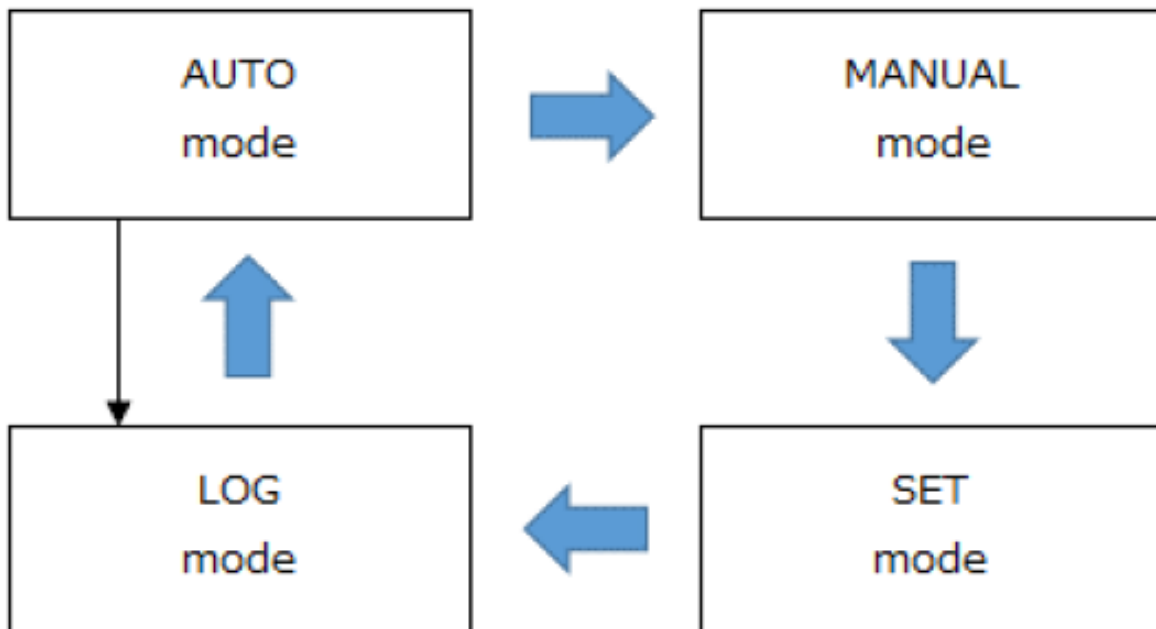
6.2 Menu structure

The operation is performed in four levels, which are shown cyclically one after another (briefly press button ):

- Cycle time display
- Time display
- Set clock
- Port 1 manual mode (aeration)
- Port 2 manual mode (KWH)

Notes:

- Manual mode is only possible with service password
- Manual mode will go back to automatic mode after 1 min in items delivered in 2019/2020!



Read operating hours

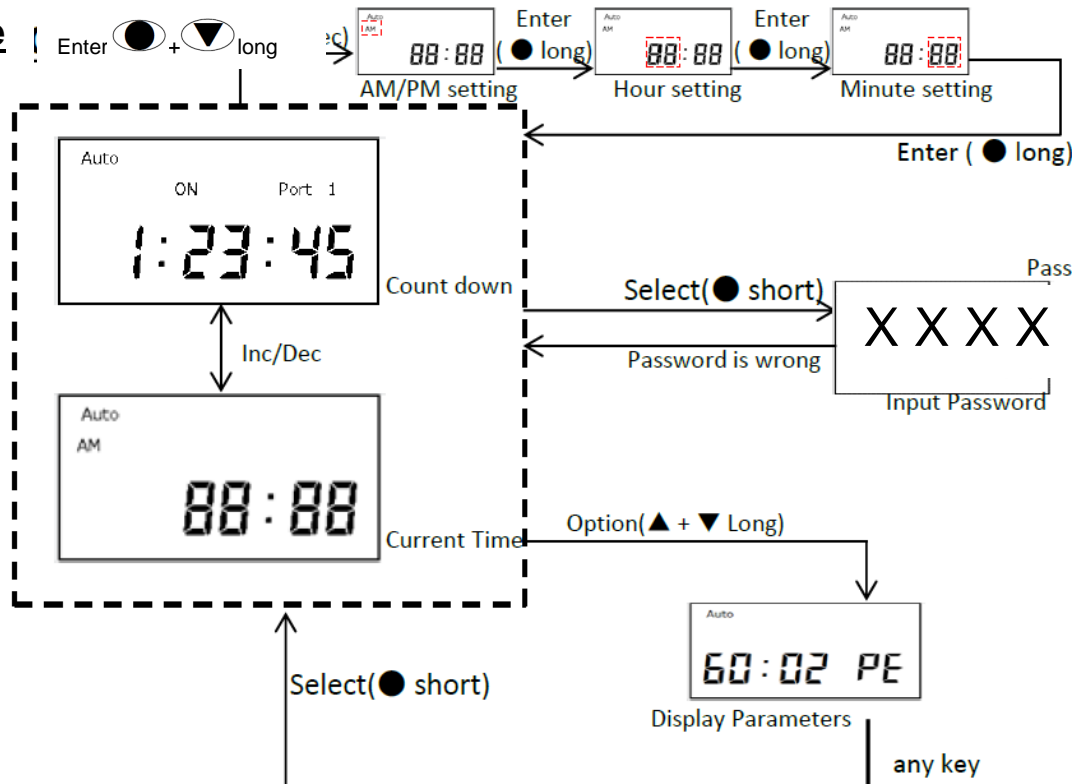
- Port 1 (aeration)
- Port 2 (KWH)
- Port 1+2 (Compressor)
- Total hours connected to the mains supply








Settings:

- Compressor type (always select 80 L)
- Change PE number (number of residents)

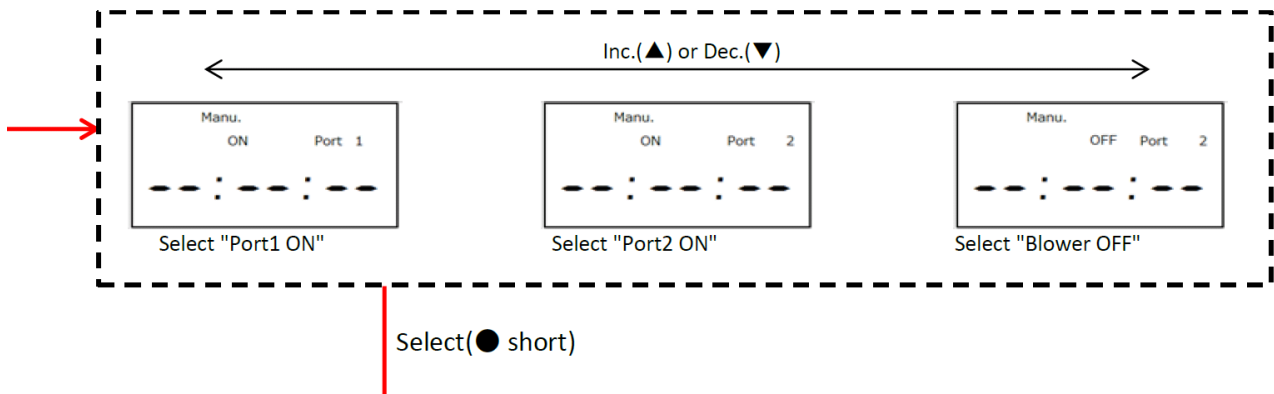
Note: only possible with service password

Auto mode






Button		Command
  or	Pressed briefly	Switch between cycle time display and time display
  +	Pressed and held (5sec)	Set time AM = morning PM = afternoon
	Pressed briefly	Continue to the next menu or password request
  +	Pressed and held	Request settings and operating hours

Manu mode



Manual mode

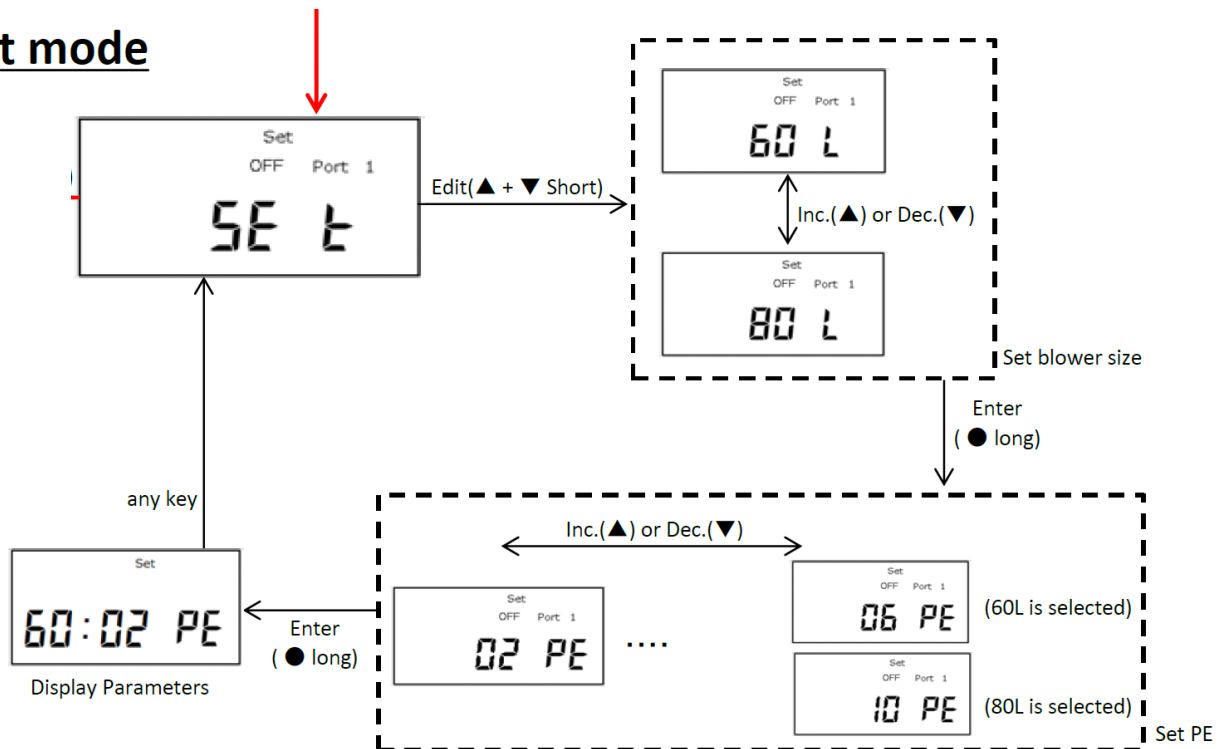
Button		Command
  <p>and</p>	Pressed briefly	Switch between the individual ports or OFF (all off)
	Pressed briefly	Go to next menu












Notes:

- Manual mode is only possible with service password
- Manual mode will go back to automatic mode after 1 min in units delivered in 2019/2020!

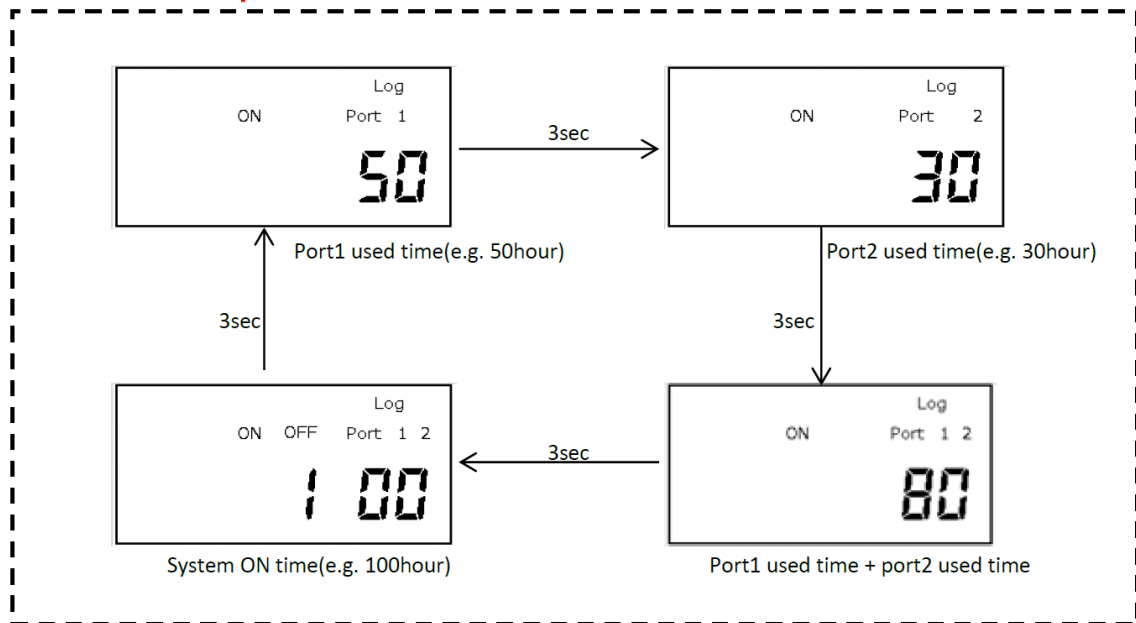
Set mode





Settings

Button		Command
 + 	Pressed briefly	To selection of compressor type
 and 	Pressed briefly	Compressor type always select 80 L
	Pressed and held	Continue to PE selection
 and 	Pressed briefly	Setting PE number 2, 3, 4, 5, 6, 7, 8, 10 PE is possible
	Pressed and held	Continue to display of set values
	pressed briefly	Go to next menu

Log mode



Access from „Auto mode“ (without service code):

 	Pressed briefly	Request settings and operating hours
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------	--------------------------------------

Operating hours are displayed in alternation (3 seconds), in hours:

Port 1: Aeration (BEL, tube diffuser)

Port 2: Clearwater lifter (KWH)

Port 1+2: Compressor run time total

Total hours connected to the mains

6.3 Start-Up

To use the keys please see chapter 6.1



Important Note:

Please ensure that the button is on “0”(off), when you connect the compressor to the mains for the first time (before start-up).

	<ul style="list-style-type: none">• Connect to mains• Outside switch on compressor on I for “on” <hr/> <ul style="list-style-type: none">• Set clock• Select compressor size 80 L always• Set PE number
--	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Once start-up is complete, the control unit starts with a clearwater drainage process. Then the control switches to the current cycle in accordance with the time of day.



Note:

- Please check if the system has been commissioned correctly with the correct settings!
- **Test:** switch On-Off-button on compressor to “0”(off) for some seconds and back to “I” (on) again. If the display shows flashing AM (or PM) and time, it is **NOT commissioned completely!**
- Please carry out the start-up according to manual (DOKK5206E)

6.4 Special features

- Aerating times etc. cannot be set, ONLY the PE number can be changed
- No fault memory

6.5 Time-controlled SBR-cycle and running times

- Two cycles per day, start times 02:00 und 14:00 (not adjustable)
- Sedimentation: 90 min (not adjustable)
- Several backwash flushes before starting clearwater discharge to remove deposits inside the airlift (prevention of sludge drift)

Set PE values:	Aerating time BEL in min/20min	Runtime KWH/Cycle
2	5.0	15.0
3	6.5	15.0
4	7.2	16.5
5	9.0	20.6
6	10.8	24.8
7	12.6	28.9
8	14.4	33.0
10	18.0	41.3

Preset runtimes result in the following daily operating hours:

resulting operating hours for DUO-80 hours per day			
PE	Port 1 aeration (BEL) [h/d]	Port 2 clearwater lifter (KWH) [h/d]	Port 1 2 compressor total [h/d]
2	4,88	0,50	5,38
3	6,34	0,50	6,84
4	6,97	0,55	7,52
5	8,65	0,69	9,33
6	10,29	0,83	11,12
7	12,60	0,96	13,56
8	14,40	1,10	15,50
10	18,00	1,38	19,38

6.6 Recommended settings for full nitrification

PE-number for carbon degradation:	with full nitrification would correspond to PE:	aeration time BEL in min per 20min	operating time KWH per cycle
2	-	5,0	15,0
3	-	6,5	15,0
4	2	7,2	16,5
5	3	9,0	20,6
6	4	10,8	24,8
7	5	12,6	28,9
8	6	14,4	33,0
10	7	18,0	41,3

Example: 4 PE are connected, if full nitrification is required put the settings to 6 PE

Note: with full nitrification the maximum possible PE number is 7

6.7 Alarm Messages

In case of an alarm, the red lamp blinks and there is an acoustic warning signal.

The following alarm messages can occur on the control unit:

Err 01 → Microswitch has triggered → check membrane

Err 02 → Valve defective

6.8 Power failure recognition

The control unit has a power failure recognition function. If the power supply is interrupted, a recurring audible alarm is emitted.

The alarm signal can be turned off by operating the switch on the compressor.



Note:

- After a network interruption of > 45 min, the control restarts with a clearwater drainage.
- After a network interruption of < 45 min, the controller resumes at the respective point in the cycle.

6.9 Battery Change

Inside the compressor is a longlife coin cell battery, which is responsible for a restart with all settings after a power cut.

If “**bat**” is displayed, the battery has to be changed (type CR2450 lithium battery). To open the housing a screwdriver for safety torx TX20, (with bore) is needed.

7. CE declaration of performance



Declaration of Performance (according to Construction Product Regulation CPR No. 305/2011)

No.DOKK5455E 050520

- | | | |
|---|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Name of product | Solido SMART CBL-xx / CM2-xx: Packaged domestic SBR-wastewater treatment plants made of PE rotomoulding |
| 2 | Product Identification | CBL-26 / -30 / -45 / -52: one-tank plants BL-type
CM2-35 / -45 / -60: one-tank plants M2-type |
| 3 | Intended use | Underground treatment (no vehicle load, outside of buildings) of faecal water and organic effluent for up to 50 PE |
| 4 | Manufacturer | Premier Tech Water and Environment GmbH
Am Gammgraben 2, D-19258 Boizenburg, Germany |
| 5 | Authorized person | Marco Rumberg (managing director), rumm@premiertech.com |
| 6 | System of assessment | 3 |
| 7 | Harmonized standard | EN 12566-3:2005+A1:2009+A2:2013 first year of CE-declaration: 2016 |
| 8 | Notified body | PIA GmbH (NB 1739) performed the initial inspection in the system of assessment 3 and created several test report, e.g. No PIA2015-239B22.e |

9	treatment efficiency	%	effluent	influent	EBL-26 was tested at 0.30 kg BOD ₅ /d and 0.90 m ³ /d NOTE: treatment efficiency in the field depends on quality and flow pattern of raw wastewater			
		COD	95,1%	39 mg/l				796 mg/l
		BOD ₅	98,5%	5 mg/l				333 mg/l
		suspended solids	97,1%	13 mg/l				448 mg/l
		NH ₄ -N	98,0%	0,7 mg/l				35 mg/l
		N _{tot}	83,1%	10 mg/l				59 mg/l
	P _{tot}	68,5%	2,3 mg/l	7 mg/l				
	model Solido SMART	Treatment capacity	daily load* (kg BOD₅/d):	daily flow* (m³/d)	peak flow (m³/12h)	Power consumption* (kWh/d)	max. H water table from base of plant (m)	max. H backfill (m)
	CBL-26	5 PE	0,30	0,75	0,80	0,68	WET 0,70m	1,00 m
	CBL-30	6 PE	0,36	0,90	0,80	0,80	WET 0,70m	1,00 m
	CBL-45	8 PE	0,48	1,20	1,10	1,04	WET 0,85m	1,00 m
	CBL-52	10 PE	0,60	1,50	1,60	1,48	WET 1,00m	1,00 m
	CM2-35	8 PE	0,48	1,20	0,90	1,04	WET 1,40m	1,00 m
	CM2-45	10 PE	0,60	1,50	1,10	1,28	WET 1,40m	1,00 m
	CM2-60	10 PE	0,60	1,50	1,50	1,48	WET 1,65m	1,00 m
11	Water tightness (test with water)	pass						
12	Structural behaviour (pit-test)	pass (WET conditions)						
13	Durability	pass						
14	Reaction to fire	E						
15	Release of hazardous materials	pass						

The manufacturer according to nr. 4 is solely responsible for this declaration.

* at full PE load every day, all year around

This declaration confirms compliance with the named regulations, directives and standards. It does not guarantee for product properties.

All provided safety advices and technical documentations for installation, commissioning, operation and maintenance must be regarded.

Signed for and on behalf of the manufacturer by:

Boizenburg, May 2020



Premier Tech Water and Environment GmbH May 2020

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The contents of the installation and assembly instructions are part of the warranty conditions.