

Instructions for the installation of a EPro Commercial multiple tank setting-up kit in a CARAT S tank

EPro Commercial set-up kit

10 EP	1,8 kL
12 EP	2,0 kL
15 EP	2,5 kL
20 EP	3,5 kL
30 EP	5,0 kL
40 EP	7,0 kL
70 EP	12 kL
100 EP	18 kL

The points described in these instructions must be observed in all cases. Failure to do so shall invalidate the warranty. For any additional items purchased through GRAF, you will receive separate installation instructions in the transport packaging.

The components must be checked for any damage before the system is assembled & installed.

You will receive separate instructions for operation and maintenance of the system.



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1. Shipment

1. Shipment

1.1 The following items are included in the shipment:



EP	12	15	20	30	40	70	100
Pc.	1	1	1	1	1	2	2

Lifter to feed the SBR reactor



EP	12	15	20	30	40	70	100
Pc.	1	1	1	1	1	2	2

Lifter for clear water extraction



EP	12	15	20	30	40	70	100
Pc.	1	1	1	2	2	3	4

Lifter for excess sludge return



EP	12	15	20	30	40	70	100
Pc.	1	1	1	2	2	3	4

Air distributors, as disc diffusers or pipe aerators, stainless steel pipes, concrete weights



Pipes for lower tank connection (with 4 or more tanks)



EP	12	15	20	30	40	70	100
Pc.	1	1	1	2	2	3	4

Holding plates for securing the lifters in the SBR reactors



Seals for the inlet and outlet and all tank connections

EP	12	15	20	30	40	70	100
roll length	10	10	10	20	20	20	20
red	1x 13	1x 13	1x 13	1x 13	1x 19	2x 19	2x 19
blue	1x 19	1x 19	1x 19	2x 19	2x 19	3x 19	4x 19
black	1x 13	1x 13	1x 13	1x 13	1x 19	1x 19	2x 19
white	1x 13	1x 13	1x 13	2x 13	2x 19	3x 19	3x 19

Air Hoses on roll, colour coded.

1. Shipment

- Outdoor Switch cabinet with control unit, solenoid valves and compressor
- Fastenings comprising pipe clamps, threaded rods, screws, nuts, washers and gaskets to mount the lifter

As Option

- Tablet Chlorine Tablet Feeder,
- Float switch
- PAC dosing
- External Audio-Visual strobe (Large)

The following items are not included in the shipment:

- Lubricant, sealant, tread tape etc.
- Hole Saws for lip seals. This can be purchased from Otto Graf GmbH using article numbers:
202003 DN 110, Ø 124 mm
332002 DN 150, Ø 175 mm

2. Important information

2.1 Safety

All work should be undertaken in compliance with national accident prevention regulations. A second person is required for safety reasons when inspecting the tank.

In addition, the applicable national regulations and standards must be adhered to during installation, assembly, maintenance, repairs etc.

The entire system must always be switched off and secured against unauthorised person switching the system on during any maintenance on the system or system components.

The tank cover must always be kept closed, except during work inside the tank, to reduce the risk of accidents or injury. Only original GRAF covers, or covers approved in writing by GRAF are to be used.

GRAF provides an extensive range of accessories, which are all coordinated and can be combined to form complete systems. The use of non-GRAF accessories may result in restrictions of the system's functionality and to liability being revoked for damage incurred.

2.2 Ventilation

All tanks must be ventilated. Additional ventilation ducts or openings can be installed if required. If this occurs, the ventilation ducts should be arranged so that natural ventilation is possible (chimney effect).

2.3 Assembling tools

The tools used to install the stainless-steel bolts and hose clips must themselves be of stainless steel. Otherwise, the stainless-steel parts may corrode after contacting the non-stainless-steel tools.

3. Installation and operating principle

3. Installation and operating principle

The wastewater treatment system operates according to the SBR process. A precise description of the process can be found in the operating Manual accompanying the Control cabinet of the wastewater treatment system.

The system fundamentally consists of a preliminary cleaning/ settlement tank and an SBR basin (four-tank systems each include two preliminary cleaning/ settlement tanks and two SBR basins).

The connection for feeding between the preliminary cleaning/sludge storage tank and the SBR basin passes through the end faces at the tops of the tanks. The feed lifter is attached directly to the connecting pipe.

The sludge return is attached to the dome shafts. It passes into the preliminary cleaning/sludge storage tank on an incline.

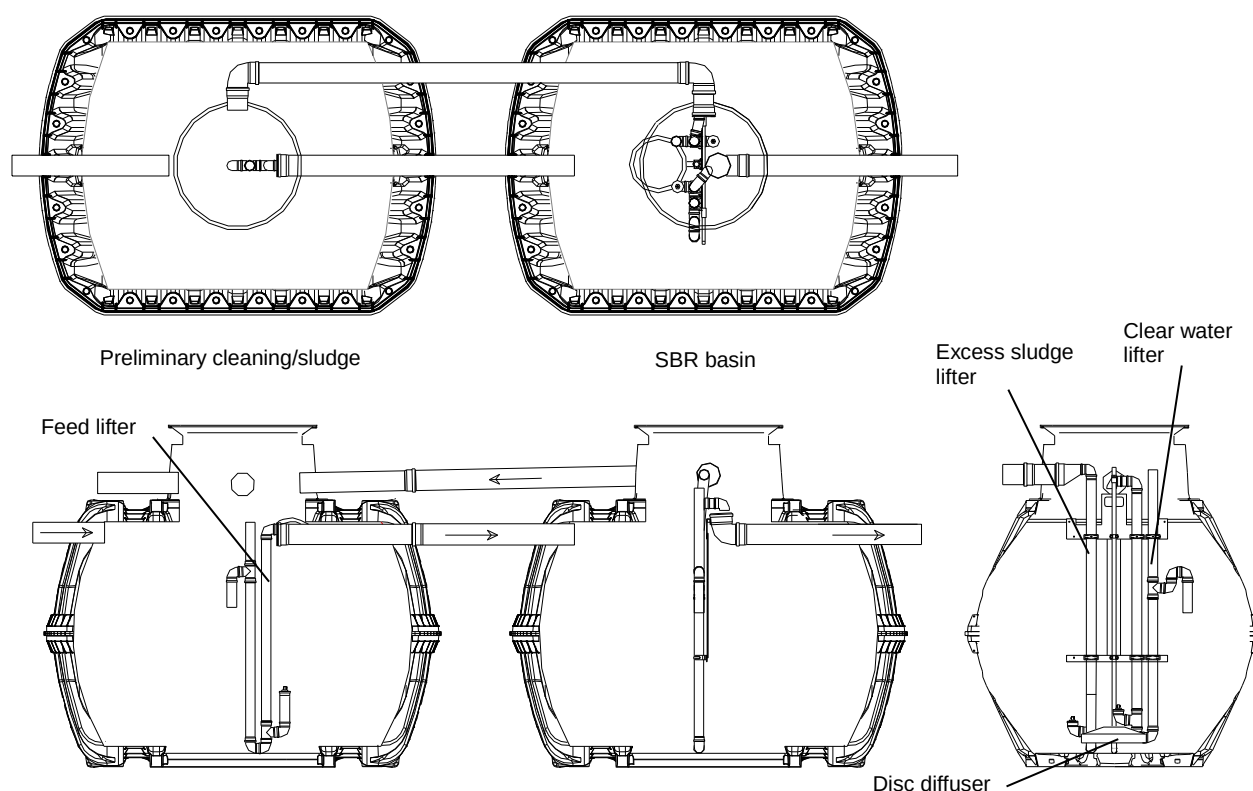


Figure 1: Two-tank system with mini tank dome, without sampler. Aeration of the SBR basin is carried out using disc diffusers.

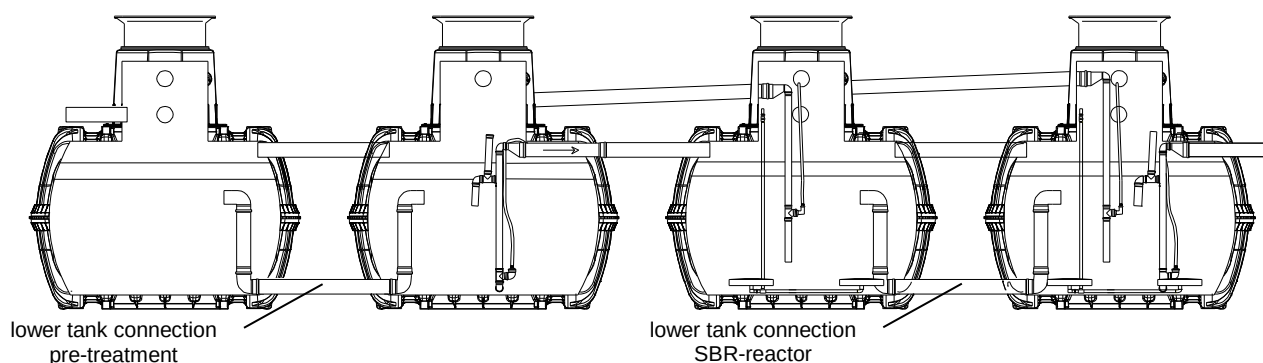
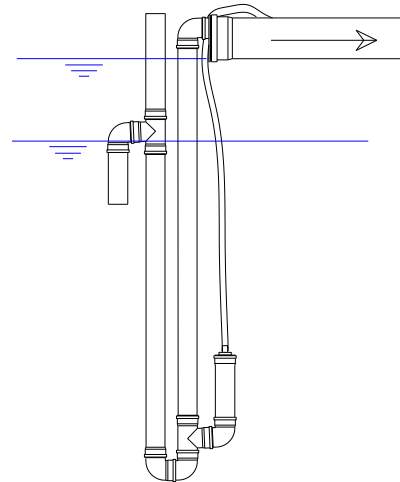


Figure 2: Four-tank system with maxi tank dome, without sampler. Aeration of the SBR basin is carried out using disc diffusers.

All primary cleaning/sludge reservoir tanks are equalised at the bottom in such a way that all preliminary cleaning/sludge reservoirs have the same water level. All SBR reactors are also interconnected at the bottom so that the water level in all the tanks is the same.

3. Installation and operating principle

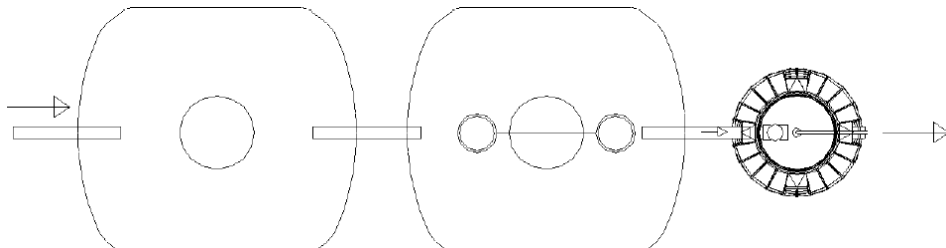
The transfer processes are carried out using air lift pumps (or "mammoth" pumps). The special construction of the lifter ensures that the minimum water level is defined precisely (see adjacent diagram). If the water level drops below the T-piece, no more water will be extracted. When installing the lifter, make sure the T-piece is installed at the height of the minimum water level.

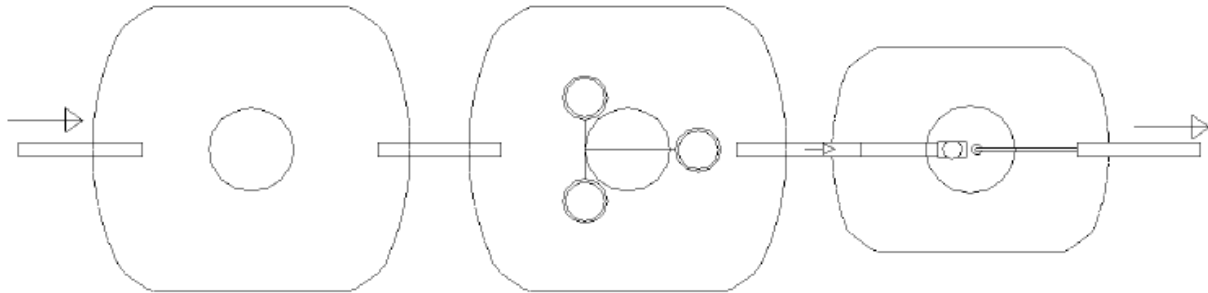


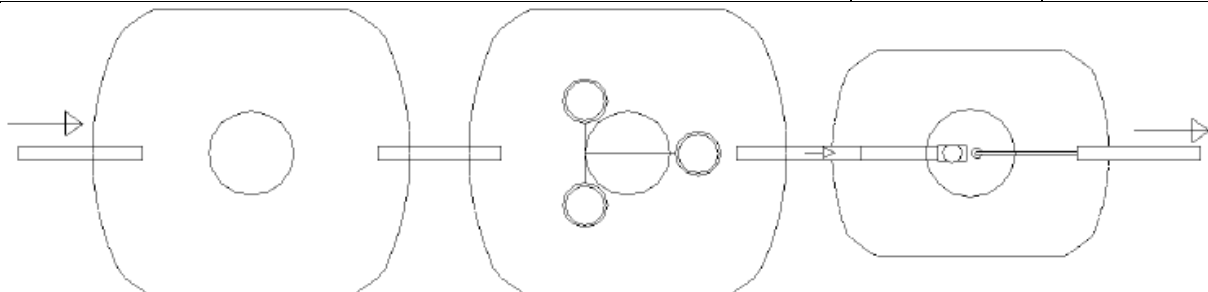
Operating principle for the feed and clear water lifter

4. Product Range

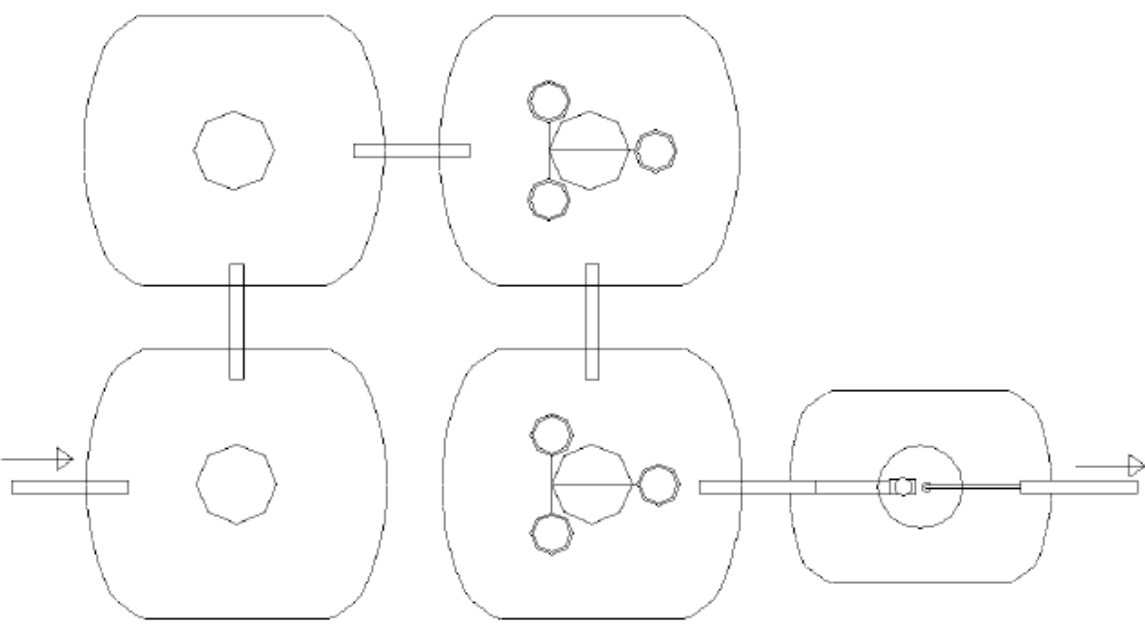
4. Product Range

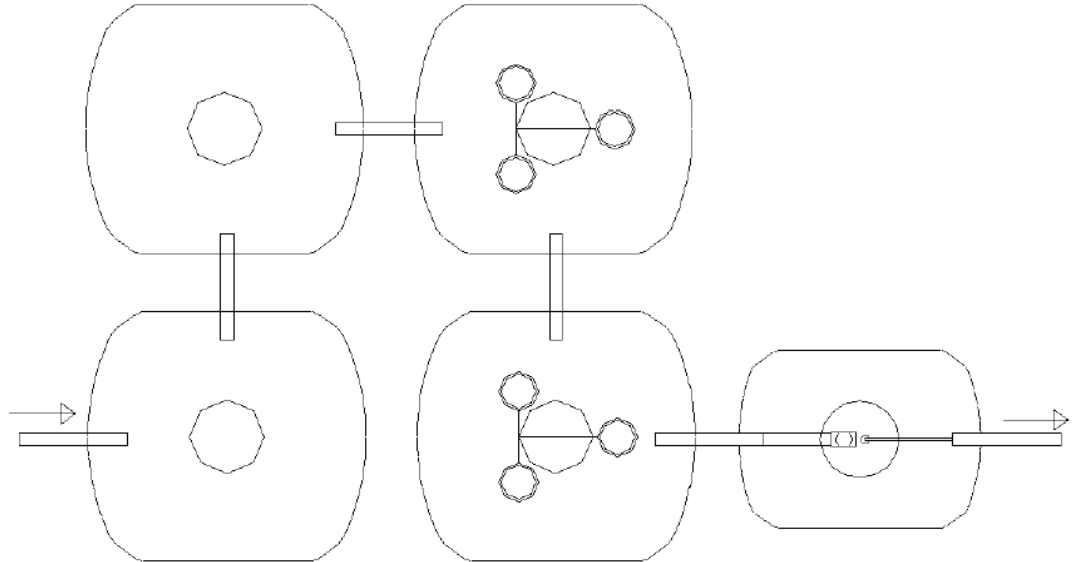
12 EP, 2,16 kL/d			Inflow	DN 110	
					
stage	number	tanks	Air compressor	Motor power	Motor design
Pre-treatment	1	Carat 3750 l			
SBR	1	Carat 3750 l	LA 120	0,13 kW	50 Hz, 1~230 V
Disinf. / Pump out	1	Sapphire 900 L			

15 EP, 2,70 kL/d			Inflow	DN 110	
					
stage	number	tanks	Air compressor	Motor power	Motor design
Pre-treatment	1	Carat 4800 l			
SBR	1	Carat 4800 l	LAM 200	0,22 kW	50 Hz, 1~230 V
Disinf. / Pump out	1	Carat 2700 l			

20 EP, 3,60 kL/d			Inflow	DN 110	
					
stage	number	tanks	Air compressor	Motor power	Motor design
Pre-treatment	1	Carat 6500 l			
SBR	1	Carat 6500 l	LAM 200	0,22 kW	50 Hz, 1~230 V
Disinf. / Pump out	1	Carat 2700 l			

4. Product Range

30 EP, 5,40 kL/d				Inflow	DN 160
					
stage	number	tanks	Air compressor	Motor power	Motor design
Pre-treatment	2	Carat 4800 l			
SBR	2	Carat 4800 l	DT 4.16	0,74 kW	50 Hz, 1~230 V
Disinf. / Pump out	1	Carat 2700 l			

40 EP, 7,20 kL/d				Inflow	DN 160
					
stage	number	tanks	Air compressor	Motor power	Motor design
Pre-treatment	2	Carat 6500 l			
SBR	2	Carat 6500 l	DT 4.25	1,10 kW	50 Hz, 1~230 V
Disinf. / Pump out	1	Carat 2700 l			

4. Product Range

70 EP, 12,60 kL/d				Inflow	DN 160
stage	number	tanks	Air compressor	Motor power	Motor design
Pre-treatment	3	Carat 6500 I			
SBR	3	Carat 6500 I	DTN 41	1,50 kW	50 Hz, 3~380 V
Disinf. / Pump out	1	Carat 6500 I			

100 EP, 18,00 kL/d				Inflow	DN 160
stage	number	tanks	Air compressor	Motor power	Motor design
Pre-treatment	4	Carat 6500 I			
SBR	4	Carat 6500 I	KDT 3.60	2,40 kW	50 Hz, 3~380 V
Disinf. / Pump out	1	Carat 6500 I			

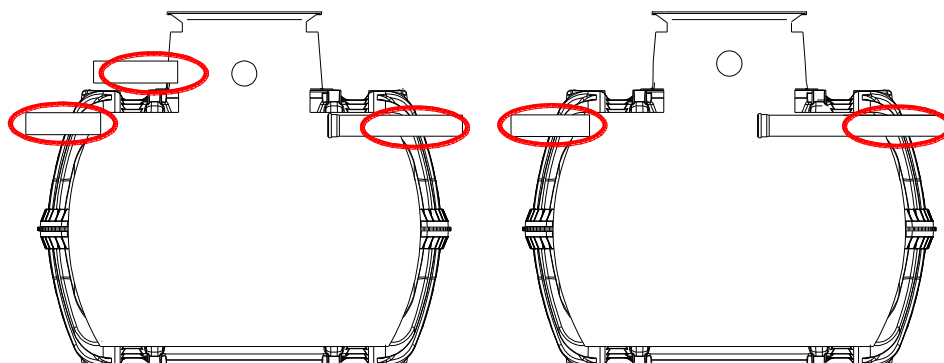


The drawings in the previous tables are only schematic diagrams. The detailed technical drawings for the individual systems are available from Graf

5. Holes in the Carat S tank

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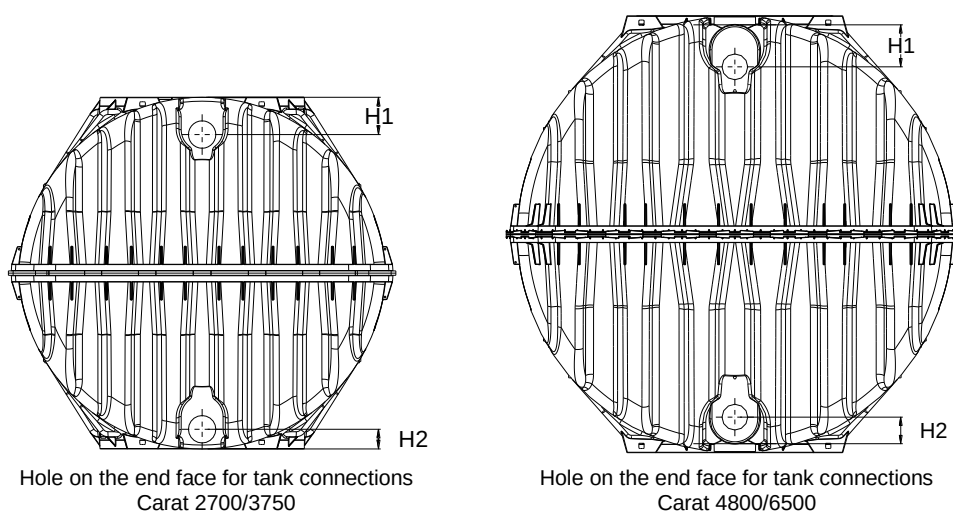
5.1 Holes for the upper tank connections



Holes for DN 110 inlet and drain pipes are to be drilled in all tanks and fitted with GRAF DN 110 lip seals. A hole saw ($\varnothing$ 124 mm) is required for drilling.

Alternatively, inflow to the first tank can lead through the tank dome.

The height of the hole on the end faces of the tank can be found in the table below.

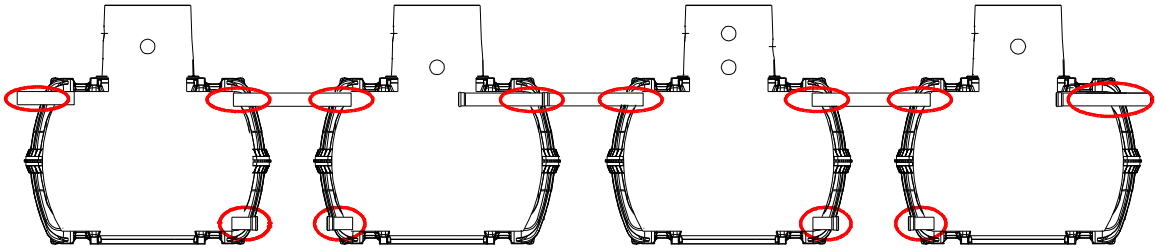


Tank	2700 L	3750 I	4800 I	6500 I
Height ₁ DN110	145 mm	145 mm	190 mm	205 mm
Height ₂ DN110	145 mm	145 mm	190 mm	205 mm
Height ₁ DN160	-	-	150 mm	180 mm
Height ₂ DN160	-	-	150 mm	180 mm

5. Holes in the Carat S tank

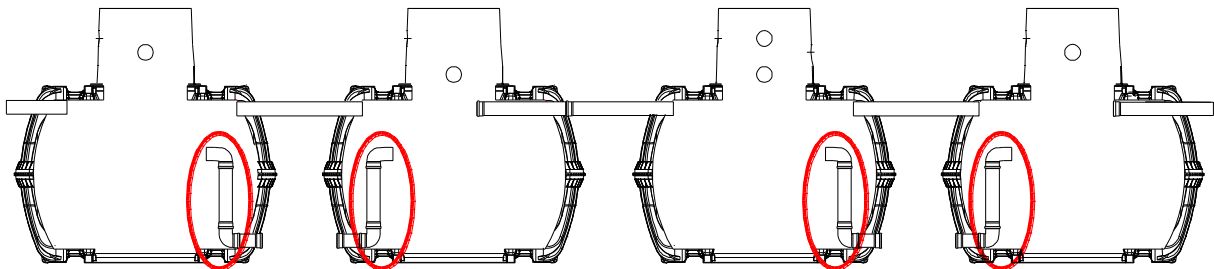
5.2 Lower tank connections (only for 30 EP – 100 EP))

5.2.1 Holes for the lower tank connections



The preliminary cleaning/sludge storage tanks are connected to one another via the end faces. The relevant drilling height can be found in the table above, yet this distance must be measured from below.

5.2.2 Overflow baffles for the lower tank connections

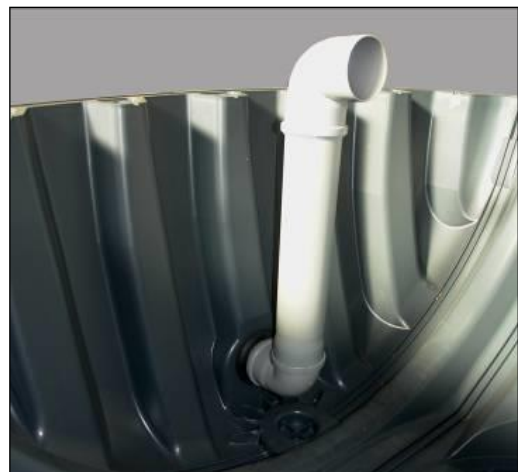


The lower tank connections are connected to both preliminary cleaning tanks and the SBR basin via the lower end faces of the tank (warning: the preliminary cleaning and SBR basin must only be linked together at the top), see the diagram above.

In order to ensure that the deposited sludge is retained in the tanks, the tank connection must be extended to the top. The extended pipe must lie below the minimum water level.

Assembly involves inserting a short pipe section (DN 110, L = 150 mm; DN 160, L = 160 mm) into the tank from the outside to the inside and then fitting the equalizing elbow.

The connection sockets must be secured using SS self-tapping screws. The complete tank connection is shown in the adjacent figure.



Tank connection consisting of pipes and elbows

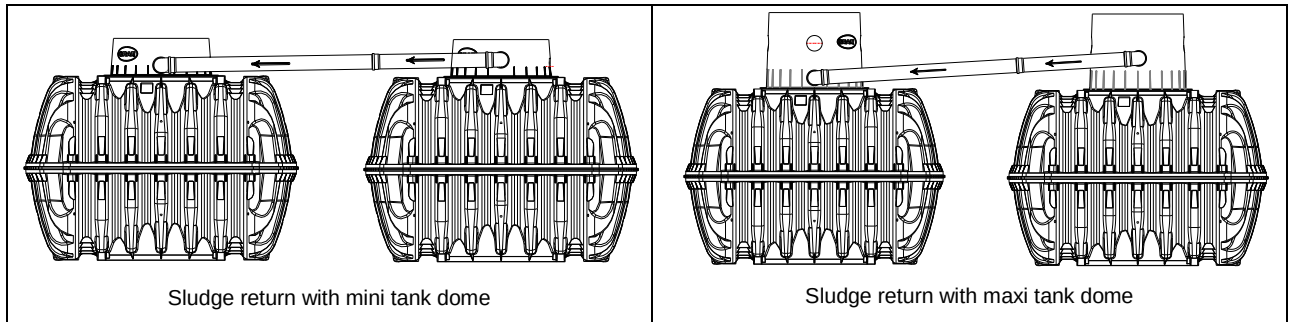
5.3 Tank connection for excess sludge return

The tank connection for sludge return is attached to the dome shaft.

For the mini tank dome, the sludge return is to be attached to the upper hole and is to be laid with an incline to the first tank (to the second tank for four-tank systems).

For the maxi tank dome, the sludge return is to be attached to the middle hole and is to be attached to the lower hole in the first tank.

5. Holes in the Carat S tank



5.4 Information only for 30 EP – 100 EP:

Each SBR basin has its own sludge return. The individual sludge returns are merged into one pipe and routed into the first preliminary cleaning tank. Details can be found in the technical drawing.

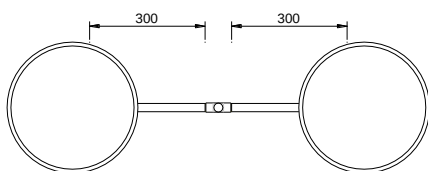
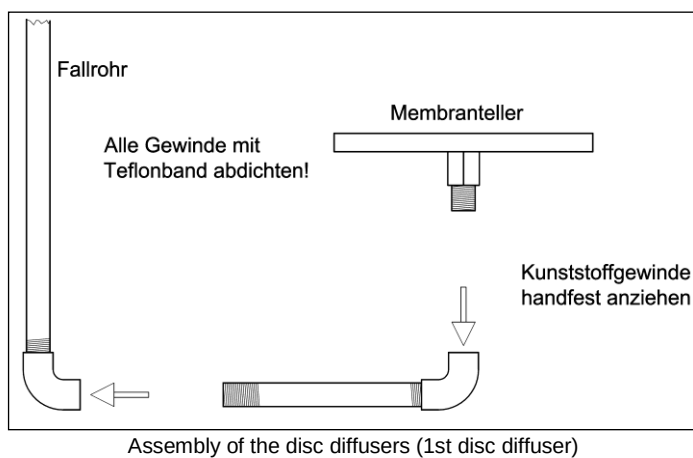
6. Installation of the setting-up kit

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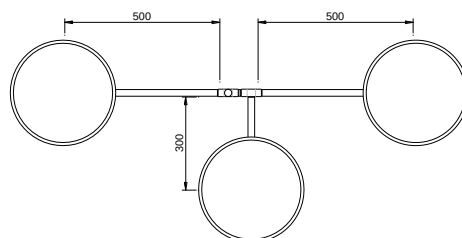
6.1 Assembling the disc diffusers

The stainless-steel pipes for ventilation are to be assembled in the tank according to their installation size in line with the drawings below.

All connections are to be sealed using tread tape. Finally, the concrete weight supplied is to be placed on to the downpipe.



Assembly of the 2-disc diffuser



Assembly of the 3-disc diffuser

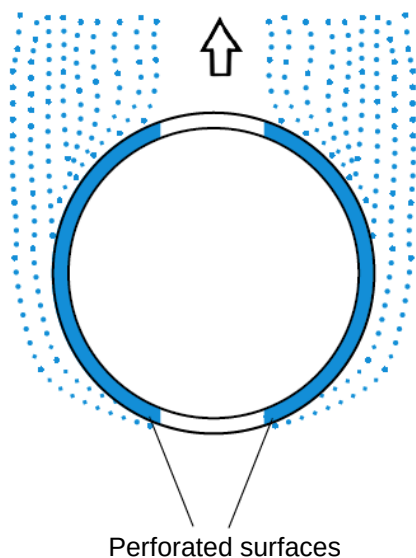
6.2 Assembling the pipe diffusers

The stainless-steel feet are bolted to the stainless-steel air distributor.



The membrane pipe aerator and the downpipe are installed later in the tank.

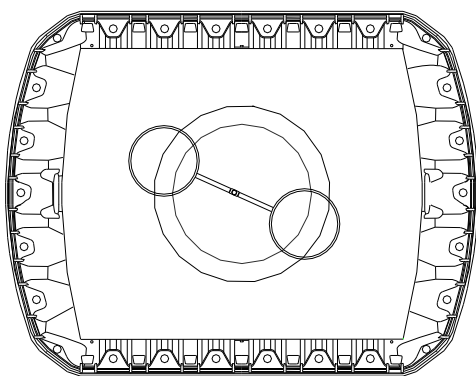
6. Installation of the setting-up kit



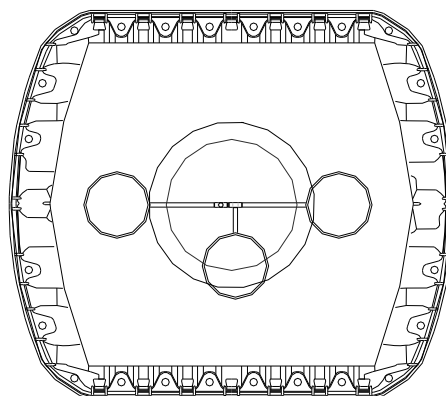
- Wind stainless steel threads with ample Tread tape
- Cover unused connections with a cap
- Screw membrane tubes hand-tight
- Non-perforated surfaces must be aligned upwards and downwards
- Do not install damaged membrane tubes
- Screw membrane tubes last of all to avoid risk of damage

6.3 Insert the diffuser in the tank / tanks

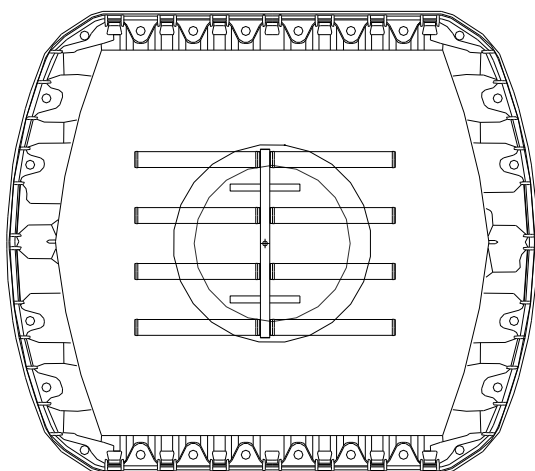
The pre-assembled diffusers are to be inserted in the SBR tank / tanks.



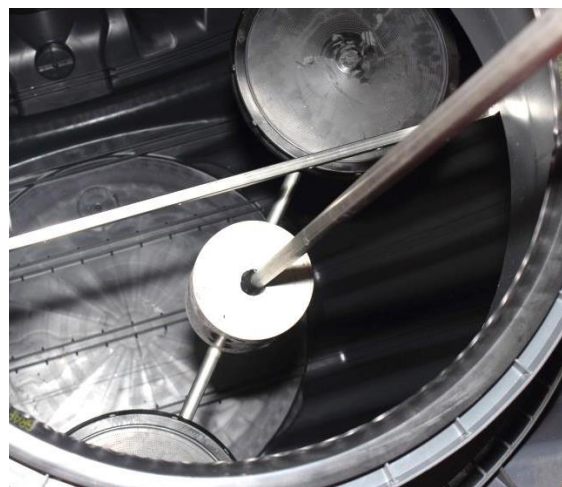
Positioning of the two-disc diffuser



Positioning of the three-disc diffuser



Positioning of the membrane pipe aerator



The diffusers are weighted down with concrete blocks. These are lowered over the downpipe.

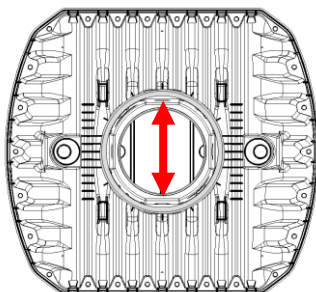
To avoid damage, the membrane diffuser pipes should be fitted to installations only when access is no longer needed to the tanks!

6. Installation of the setting-up kit

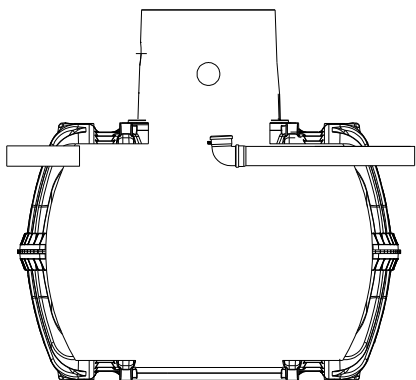
6.4 Installation of the crossbar

To fix the crossbar in the tank, holes are drilled through the opposing ribs in the access area using an 8-mm drill. The correct separation distance can be marked out with the aid of the crossbar.

The crossbar is then fixed into these holes using the M8 screws (2x M8x45), nuts (2x) and washers (4x). The crossbar is then used to receive the airlift holding plate from section 6.2.



6.5 Outlet pipe



The outlet pipe is pushed with the pointed end foremost through the outlet seal from the inside to the outside. A 90° elbow is attached to the outlet pipe.



The 90° elbow is secured in place through an 8.5 mm hole drilled through it. The 90° elbow is then bolted firmly to the crossbar through this hole.

6. Installation of the setting-up kit

6.6 Holding plate for the SBR Tank for 2 tank systems

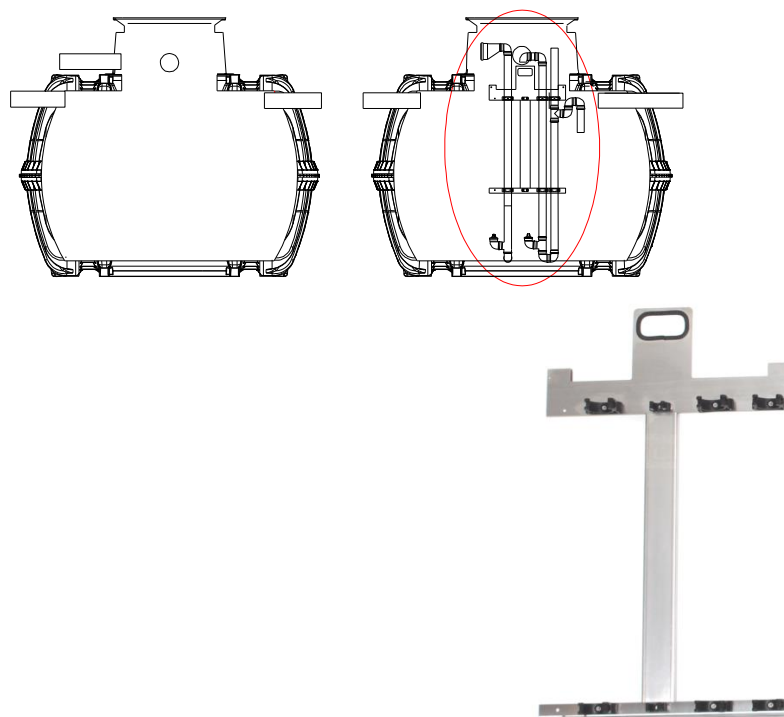


Figure 3: Holding plate 2nd SBR basin

In 2 tank systems a holding plate is installed in the SBR tank for securing the lifters. The installation of the holding plate is described in the following sections.

6.7 Holding plate for the SBR Tank for 4-6 tank systems

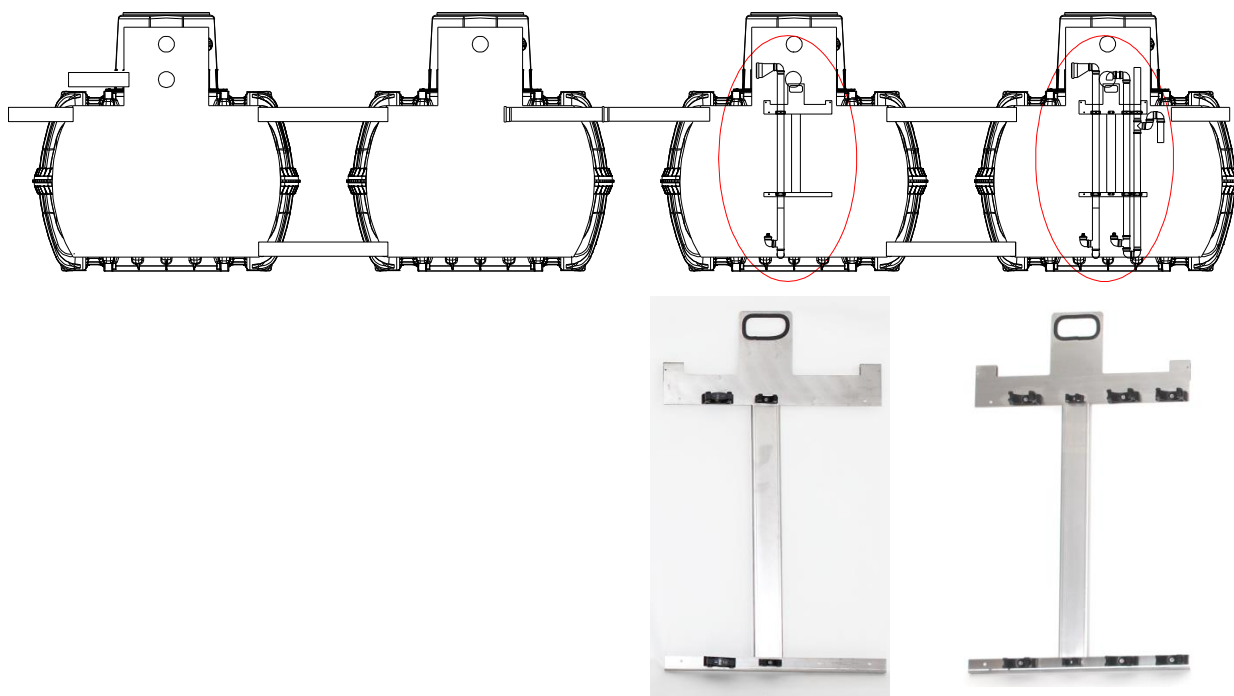


Figure 4: Holding plate
1st SBR tank

Figure 5: Holding plate
2nd SBR tank

In 4 and 6 tank systems a holding plate is installed in the first SBR tanks which only has clips for securing the sludge return and the aeration. In the last SBR tanks (with clear water lifter) a holding plate is installed which has clips for securing the sludge lifter, the clear water lifter and the aeration

6. Installation of the setting-up kit

6.8 Connecting the holding plate and the lifters in the SBR basin

The lifters are then clamped to the holding plate. In doing so, the excess sludge lifter (**J**) is mounted on the left (short) side and the clear water extraction lifter (**I**) is mounted on the right (long) side of the holding plate.

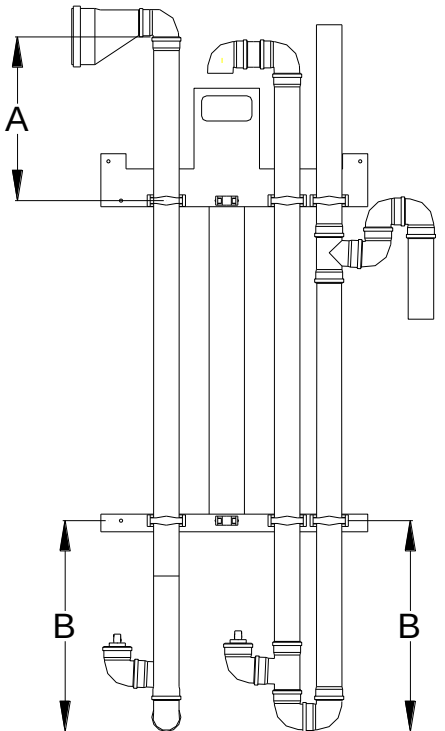


The locking height of the lifters depends on the system type and can be found in the table shown below.

			
Tank size	A mm	A* mm	B mm
with disc diffusers			
2,700L	400	500	455
3,750L	400	500	645
4,800L	400	500	880
6,500L	400	500	1155
with pipe diffusers			
6500	400	500	885

A - use of mini tank dome

A* - use of maxi tank dome



The clips of the PVC pipe clamps are then closed to secure.

6. Installation of the setting-up kit

6.9 Air barrier connection

The air barrier of the clear water lifter must be connected to the sludge return. This involves disconnecting the sludge return's air pipe at a suitable point and integrating the air barriers' air pipe (8 mm) into the sludge return's air pipe using a T-piece



6. Installation of the setting-up kit

6.10 Installing the holding plate in the SBR basin

6.10.1 Inserting the holding plate

The complete holding plate assembly is pushed onto the ventilation downpipe and fitted onto the crossbar. The holding plate is fitted on the inflow side.

The stainless steel hose connector with $\frac{1}{2}$ " or $\frac{3}{4}$ " thread is then screwed on to the aeration pipe - make sure to use a tread tape.

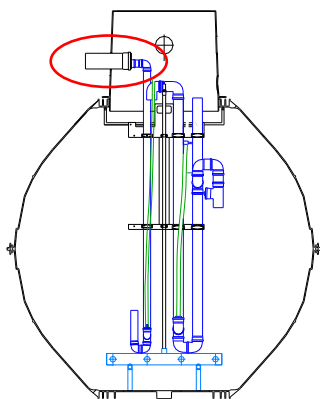


6.10.2 Connecting the clear water extraction

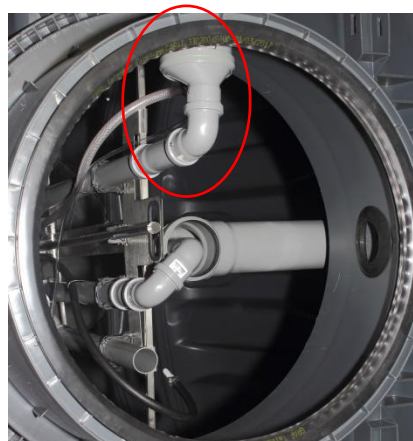
The outlet of the clear water lifter is routed into the 90° bend or into the internal sampler.



6.10.3 Connecting the excess sludge lifter



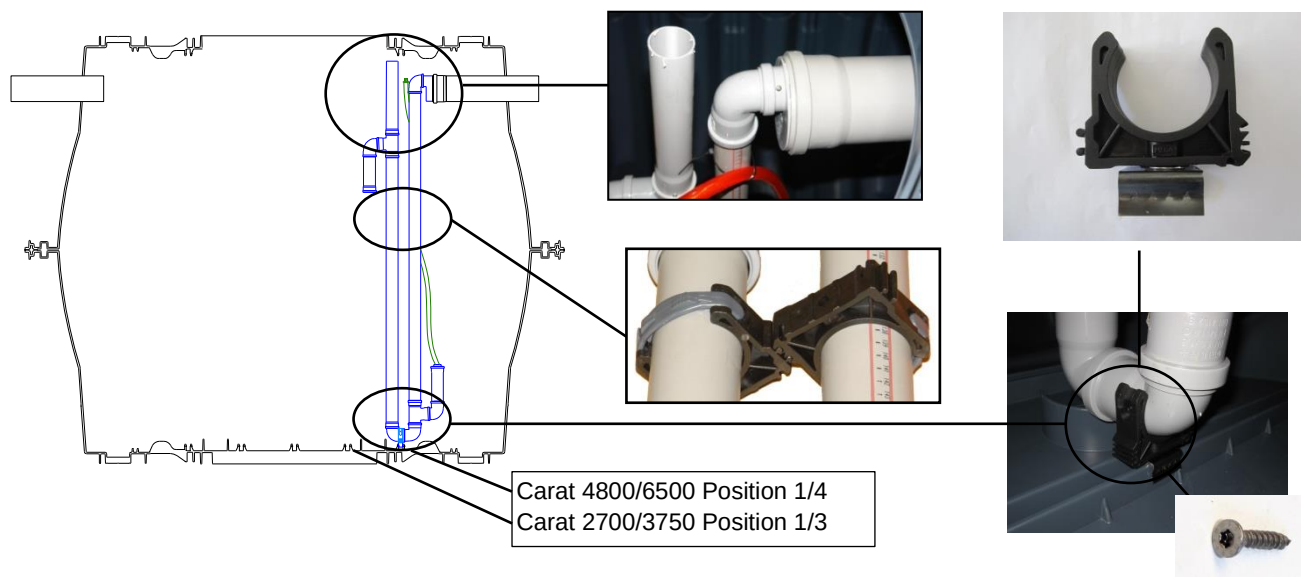
An HT pipe (DN 110, L = 150 mm) is pushed from the inside to the outside through the seal at the opening (see Section 5.3) for the sludge return.



The sludge return line is connected to the socket of the fitted HT pipe.

6. Installation of the setting-up kit

6.11 Installing the feed lifter in the preliminary cleaning system



The two vertical pipes of the feed lifter are stabilised directly under the middle socket connector using two PVC pipe clamps and clips.

The third PVC pipe clamp is prepared for tank installation using the clamp supplied (see top right-hand image). This is then clamped onto the floor rib. Ensure that the clamp is flush on the rib and is not sitting on a small cross strut.

The lower bend of the feed lifter is then placed in this PVC pipe clamp and can be additionally secured using self-tapping screws.

The feed lifter outlet is pushed into the 110 mm pipe to the SBR basin. These pipe connections are also secured using self-tapping screws.

7. Assembling the external switch cabinet

7. Assembling the external switch cabinet

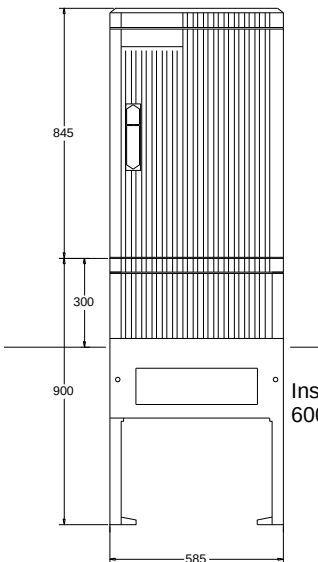
7.1 Selecting the location

The location must be cool and protected from direct sunlight during the summer months. The rear side of the round column/the sides of the cabinet must be installed with at least 10 cm clearance from the nearest wall. If shading is provided for on-site, this must be located on the rear side or on the sides, leaving open space so that the column/cabinet is sufficiently ventilated in order to avoid trapped heat.

- Height above the highest water level in the tank in order to avoid overflow and water intake in the open channel in the case of damage.
- The switch cabinet requires an electrical Isolator Switch with 16 amps, slow blow. Additional electrical appliances must not be connected to the Isolator Switch as electrical failure may disrupt operation.
- The system generates noise! The solenoid valves located in the cabinet generate a clicking noise when they open, and the air compressor located in the system generates a longer continuous noise.
- The maximum length for each air hoses is 20 meters.

7.2 Installation and assembly

7.2.1 Plastic cabinet for EPro18 Commercial

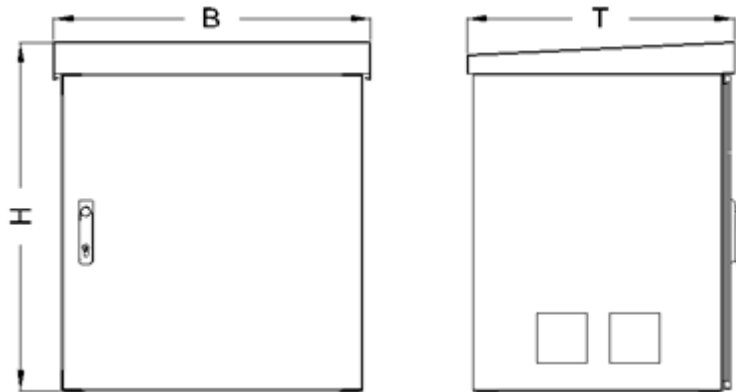
 • Assemble bottom part and fix to top part according to instructions included <u>Excavations:</u> Length approx 585 mm Width approx 315 mm Depth approx 600–640 mm	<u>Conduit pipe:</u>  
<u>Electric cable:</u> Can go directly into the cabinet through open bottom	<u>Filling up:</u> • Make sure cabinet stands levelled and upright before filling up the pit • Filling up the inside of bottom part with filling granulate (GRAF 107607). The granulate reduces humidity coming from soil which can lead to corrosion damage in long run. The granulate does not need to be replaced.

7. Assembling the external switch cabinet

7.2.2 External steel cabinet L

Technical data

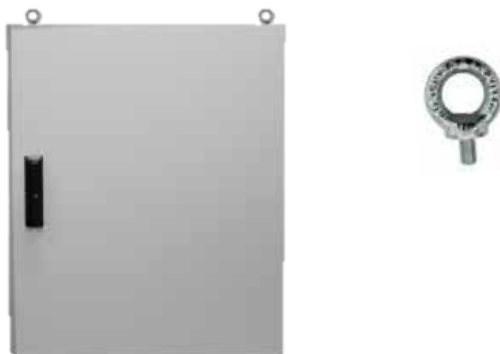
Version:	IP44
Material:	Sheet steel 1.5 mm, powder coated
Colour:	RAL 7032
Dimensions: W x H x D [mm]:	800 x 880 x 675
Foundation:	Full foundation, customer provided



Foundation and Relocation



no.	Part	Number
1	Metal cabinet	1
2	M8 bolt	2
3	M10 dowel	2
4	Washer	2
5	M16 eye bolt	4

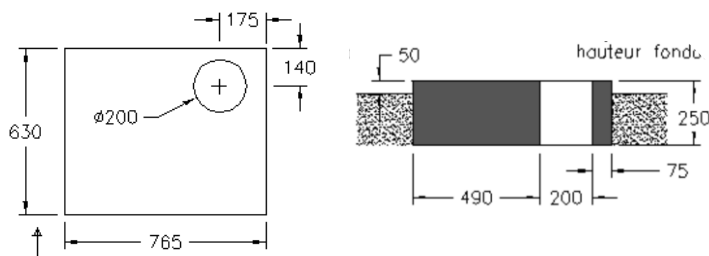


Four M16 eye bolts are provided for relocating the cabinet. Before fitting the eye bolts to the cabinet, the fitted canopy and the poly plugs must be removed from the eye bolt holders. After relocating, the poly plugs must be reinserted, and the canopy screwed on. The switch cabinet should be secured to the foundation with four M8 bolts (included in scope of delivery).

7. Assembling the external switch cabinet



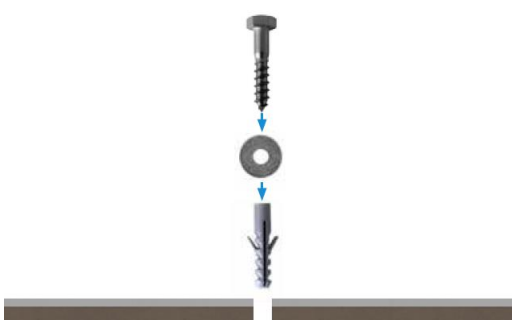
Before installation a proper foundation must be prepared.



When the foundation is being cast, the drawn dimensions must be adhered to, particularly the position of the hole through which the hoses will be led later



Two holes with a diameter of 10 mm must be made in the bottom of the cabinet central to the side walls. These holes must be continued in the concrete foundation below.



Inserting the M10 dowels into the holes. Securing the switch cabinet with the aid of the two M8 screws (together with washers).

7. Assembling the external switch cabinet

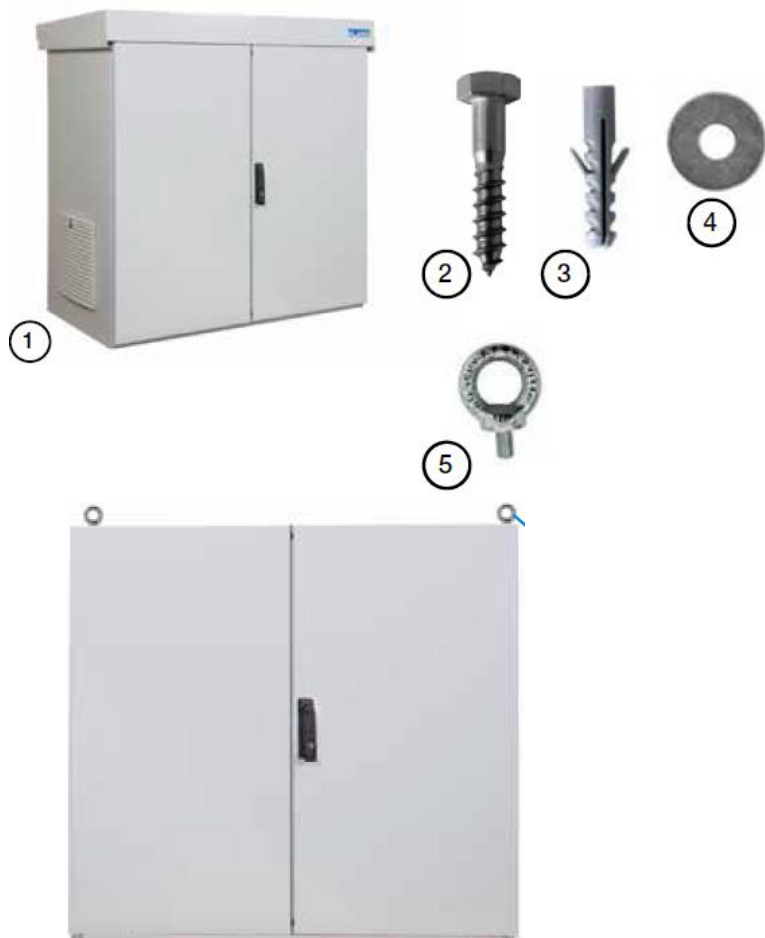
7.2.3 External steel cabinet XL

Technical data

Version: IP44
Material: Sheet steel 1.5 mm, powder coated
Colour: RAL 7032
Dimensions: 1200 x 1110 x 800
W x H x D [mm]:
Foundation: Full foundation, customer provided



Foundation and Relocation



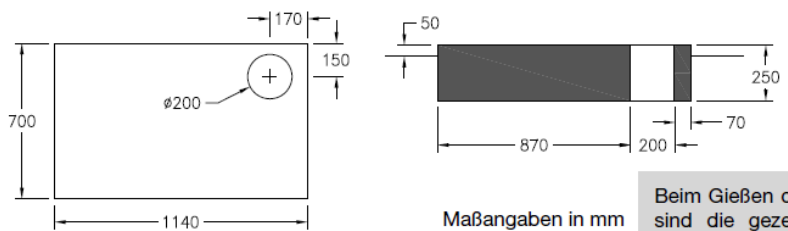
No.	Part	Number
1	Metal cabinet	1
2	M8 bolt	4
3	M10 dowel	4
4	Washer	4
5	M16 eye bolt	4

Four M16 eye bolts are provided for relocating the cabinet. Before fitting the eye bolts to the cabinet, the fitted canopy and the poly plugs must be removed from the eye bolt holders. After relocating, the poly plugs must be reinserted and the canopy screwed on. The switch cabinet should be secured to the foundation with four M8 bolts (in scope of delivery).

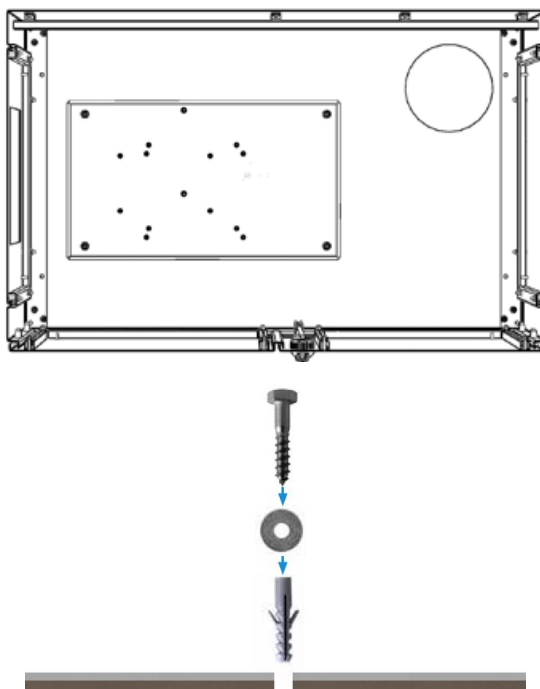
7. Assembling the external switch cabinet



Before installation a proper foundation must be prepared.



When the foundation is being cast, the drawn dimensions must be adhered to, particularly the position of the hole through which the hoses will be led later



In the bottom of the cabinet there are four holes with a diameter of 10 mm. These holes must be continued in the concrete foundation below.

Inserting the M10 dowels into the holes. Securing the switch cabinet with the aid of the four M8 bolts (together with washers).

7. Assembling the external switch cabinet

7.3 Electrical connection



Fuse
connections

The electrical connection of the switch cabinet must only be carried out by a qualified electrician.

An underground cable must be laid to supply power to the cabinet. **This cable must be protected by a 16-amp fuse via the building installation and must be able to be isolated from the mains.**

The underground cable is connected to the pre-assembled power socket for single-phase systems or to the connectors for 3-phase systems in the cabinet. See wiring diagram for details (Can be requested from Graf).

Surge protection is recommended

8. Connecting the air hoses

8. Connecting the air hoses

The ventilation system and the three air lift pumps must be connected to the solenoid valve strip in the switch cabinet.

To avoid leakage, we recommend warming the hoses and additionally sealing the feed hose connection (red) with Tread tape.

In order to avoid confusion, the lifters, the ventilation downpipe and the four connectors on the switch cabinet are all colour coded:

Feed lifter	→	red hose
Stainless steel ventilation	→	blue hose
Outflow lifter	→	black hose
Excess sludge lifter	→	white hose

As a general rule, the connections with the same colours are to be attached to one another and fixed with hose clamps. Hoses can be supplied in the relevant colours.



Seal empty
pipe

Once the hoses have been laid and attached, the empty pipe must be sealed in order to avoid gas exchange between the wastewater treatment system and the surroundings of the cabinet (moisture, odours).

8.1 Conduit pipe sealing with GRAF sealing cap (only 10 EP – 20 EP)



Insert the hoses from the thin side of the sealing cap



Push the hoses through the thin top layer. A plug of material remains stuck in the end of the hose.

8. Connecting the air hoses



Cut off the end of the hose to remove this plug.



Push the sealing cap into the conduit pipe to seal it tightly.

8.2 Conduit pipe sealing with PU foam



The hose surfaces and pipe walls must be roughly cleaned with water and wetted with a little water.

When the PU foam is being added, make sure that each hose is covered on all sides. For better filling with foam and **better** covering of the hoses, move the hoses in the longitudinal direction slightly when adding the foam.

9. Commissioning

Please read and understand the operating manual before start-up!

- Finish all installation work described in this installation instruction
- Fill up the treatment tank with fresh water; otherwise a test run and system check are not possible. You can stop filling up when water level is approx. 20 cm below bottom of the outlet pipe
- Connect electric cable to Power Supply – double socket (licensed electrician only!)
- Plug the power plug of the Auxiliary Alarm Controller into the GPO, If optioned
- Plug power plug coming from control unit into Power supply. The control unit of an Epro15 will then start automatically. At Epro18 Commercial, you have to turn main switch to position “I”. If the system goes on alarm and shows “Set Date and Time”, you can quit the alarm by pressing ESC twice. Then you should enter the correct date and time in the control units’ Operation Area.
- Go to “manual operation” in Operation Area and test all valves and the cooling fan. Turn them on by pressing “1” button and off by “0” button. You should always turn the previous off before jumping to the next. See if all air lifts are working and aeration on valve 2 shows fine bubbles. Finally leave “manual operation” with ESC.
- The cabinet is then ready to operate and will count down until the start of its first treatment cycle.
- Find more information in “Start-up, operation and maintenance manual” inside the cabinet. Especially read the dos and don’ts.