BINDER

Operating Manual

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1. General information

1.1. Important information

Operation and warranty

Observance of these operating instructions is essential to ensure trouble-free operation and in order for any warranty entitlements to be honored. Therefore, please carefully read through the operating instructions before working with the counter current unit!

Intended use

The counterflow unit is intended for use in privately used swimming pools in accordance with DIN EN 16582. It may only be used in public swimming pools in special solutions.

Note

This operating manual includes instructions on storage, assembly, operation and maintenance of the HydroStar counterflow units BGA 160, BGA 215, BGA 275, BGA 320, BGA 430 and BGA 550.

Start-up, maintenance and installation

The personnel entrusted with the handling, storage, installation, start-up, inspection and maintenance of the system must be qualified for industrial, mechanical and electrical equipment.

Disposal

The current and regional regulations must be observed for disposal. Grease and oil must be disposed of in accordance with applicable environmental protection regulations.

Note

This device is not intended to be used by persons (including children) with limited physical, sensory or mental aptitude or lack of experience and/or knowledge unless they are supervised by a person responsible for their safety or have received instruction from this person as to how the device is used. Children should be supervised to ensure that they do not play with the device.



Warning!Dangerous electrical voltage
Failure to observe this can result in death, serious injury or property damage.

- Isolate supply voltage before installation or removal work as well as in case of fuse replacement or modifications of the setup.
- Observe the accident prevention and safety regulations that apply to the specific area of use.
- Before putting the machine into operation, check whether the rated voltage coincides with the local mains voltage.
- Emergency stop devices must remain operational in all modes of operation. Disabling the emergency stop devices may not cause an uncontrolled restart.
- Ground wire connections must be checked for fault-free function after installation!
- The conditions described in DIN VDE 0100-702 must be observed.

1.5. Validity

This document applies to the HydroStar counterflow units from the BGA product line.

Safety information
Adherence to this information is the prerequisite for trouble-free operation and the fulfilment of any guarantee claims.

1.6. Intended use

Note: The devices described here are electrical equipment for use in swimming pools and other pools and may only be used under the following conditions.

Exceptions: The manufacturer has designed the product specifically for other applications and conditions.

Intended use

- HydroStar must only be used for the intended purposes and those confirmed in the shipping documents.
- HydroStar must only be operated under the operating conditions stipulated in the operating instructions and within the power limits
- HydroStar is a component for use in privately-used swimming pools with a salt content of $\leq 0{,}4\,\%$ (see note below).
- HydroStar complies with the valid standards and regulations.

Improper use

- Use in potentially explosive areas
- Use in aggressive environments (gases, acids, vapours, dusts, oils, etc.)
- Use in a sewage area
- Use of the turbine above water

Improper surrounding

- Note the surrounding material (filling material) of the installation shaft.
- Depending on the filling material, the installation shaft must be protected
- If filling material with high chloride and sulfate content is used, the stainless steel installation shaft must be protected from these harmful substances with a PE lining (protection film) on the rear side.



Note
The Hydrostar is a component for use in swimming pools with a salt content of $\leq$0,4 %.
It is absolutely necessary that the salt is added to the pool dissolved. Do not add salt to the swimming pool within 2 m of the HydroStar. When used in salty water, the unit must be switched on at least once a day for at least 60 minutes at a low level to avoid stagnant water! For applications with a salt content of $\geq$0,4 % contact Binder. See also Appendix Water Values!

1.7. Operating conditions

Control cabinet

Ambient temperature: 0 °C to 30 °C

Turbine

Water temperature: 5 °C to 40 °C

Immersion depth: 0,30 m to the lower edge of the turbine, a maximum 0.5 m below the water surface.

The turbine may only be operated in water. The water lubricates the bearings and cools the turbine. If the turbine is operated in air, the manufacturer's warranty is void.

1.8. General safety and application notes

At the time of delivery, the counterflow unit and its components are considered to be state of the art and fundamentally safe to operate.

All transport, storage, installation/assembly, connection, commissioning, maintenance and servicing work may only be performed by qualified personnel.

During such work, qualified personnel must observe:

- the supplementary safety instructions in the individual chapters of this documentation.
- the safety instructions in attached supplementary sheets and further documents from subcontractors.
- this documentation and the circuit diagrams in the control box.
- the warning and safety signs on the devices.
- the machine-specific regulations and requirements.
- the national and regional safety and accident prevention regulations.

The counterflow unit can pose a risk to persons, the machine itself and other property belonging to the operator

- . . . if unqualified personnel work on or with the drive system.
- . . . if the drive system is used improperly.
- . . . if the drive system is installed and operated incorrectly.
- . . . if the following information is disregarded:
  - Only operate the counterflow unit if it is in perfect working order.
  - As a general rule, any retrofitting, changes or reconstruction of the drive system is prohibited. The above work may only be performed after consultation with the manufacturer.
  - During operation and for an extended period afterwards, the components may have live parts, moving parts and hot surfaces.
  - Start-up (start of proper operation) may only be carried out once it has been confirmed that the machine complies with EMC Directive 2014/30/EU and that the machine conforms to Machinery Directive 2006/42/EC.
  - Observe DIN EN 60204-1.

Should you have any questions or problems, please contact your representative.

1.9. Disposal

The drive unit must be disposed of in compliance with the currently applicable regulations of the respective country. Grease and oil contained in it must be disposed of in accordance with applicable environmental protection regulations. Electronic parts and components must be disposed of through a certified specialised company.

2. HydroStar installation in the swimming pool

This section deals with the installation of the HydroStar counter-current unit using the Binder installation shaft.

For this purpose, the Binder installation shaft is integrated into the pool wall. The HydroStar turbines are mounted in the installation shaft.

The installation of the piezo switch is also described.

2.1. The best position for HydroStar

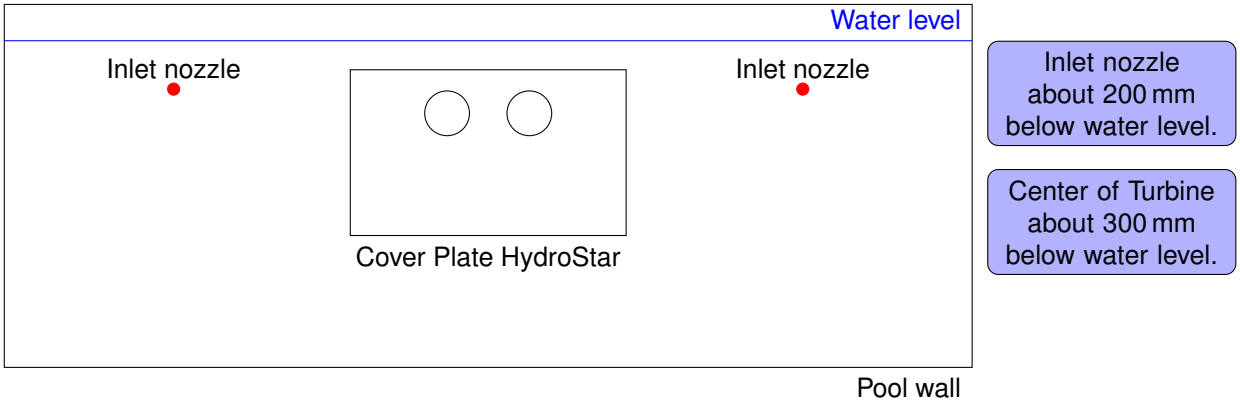


Figure 1: Figure 1 shows the recommended installation situation of the counter current system HydroStar on the (short) pool side. In order to achieve a flow pattern that is as symmetrical as possible, the counterflow system should be mounted in the center of the pool wall. We recommend on this pool wall two adjustable inlet nozzles about 20 centimeters below the water line. Further inlet nozzles are possible. The skimmer should be mounted on the opposite side.

A counter current system creates a current in a pool that enables the swimmer to swim in one place. In addition to the desired flow (starting from about SI 1.5 meters to SI 2 meters away) in front of the countercurrent system, there is also a backflow in the pool towards the countercurrent system. So that this backflow does not disturb the desired flow too much, the following should be considered when planning the pool:

- Install the counter current system as symmetrically as possible in the pool. One-sided stairs are not symmetrical.
- Install adjustable inlet nozzles on the side of the counterflow system. You can influence the flow pattern with these nozzles.
- Install the skimmer (for a skimmer pool) on the pool wall opposite the counter current system.

2.2. Scope of delivery

The HydroStar installation shaft comes complete with all required accessories.

- Installation shaft
- Spring-loaded flange with gasket and M6 screws
- Cover plate with M5 fastening bolts
- Additional accessories as listed in the accompanying papers

After receiving the delivery, check the delivery contents against the accompanying papers to make sure they are complete.

2.3. Other items required

- PVC flexible hose as empty conduit for outgoing cables (motor cable, LED)
- Sleeve with 1 ½" internal thread and the possibility to connect the flexible hose in a watertight manner (e.g. by gluing).

2.4. General installation instructions

Installation shaft	Suitable BGA	Distance d (see fig. 2)	Drawing(see page)
Single combination installation shaft	160, 215, 275	120 mm	43
Single flat installation shaft	160, 215	140 mm	44
Single flat installation shaft	275	100 mm	45
Double flat installation shaft	320, 430, 550	120 mm	46
Double flat installation shaft	320, 430	140 mm	47
Double flat installation shaft	550	100 mm	48

Table 1: Overview of installation shafts from Binder. For details on the shafts, please refer to the corresponding technical drawings in the appendix.

Figure 2 shows an overview of the installation of the HydroStar counter-current unit using the Binder installation shaft. Binder offers various installation shafts for different installation situations. Installation is generally similar for all installation shafts.

The optimum swimming experience is achieved when the installation shaft is mounted so that the centre of the turbine is 300 millimetres below the waterline.

Table 1 shows the recommended distance between the top edge of the installation shaft and the waterline for all currently available installation shafts.



please Note
For sloping swimming pools and use of a flat installation shaft (with stay bolts), the shaft must be installed rotated by 180°. This means that the stay bolts are at the bottom of the shaft and not at the top. In the case of flat shafts with a guide slot for adjusting the turbine (without stay bolts), it is not necessary to rotate the shaft.

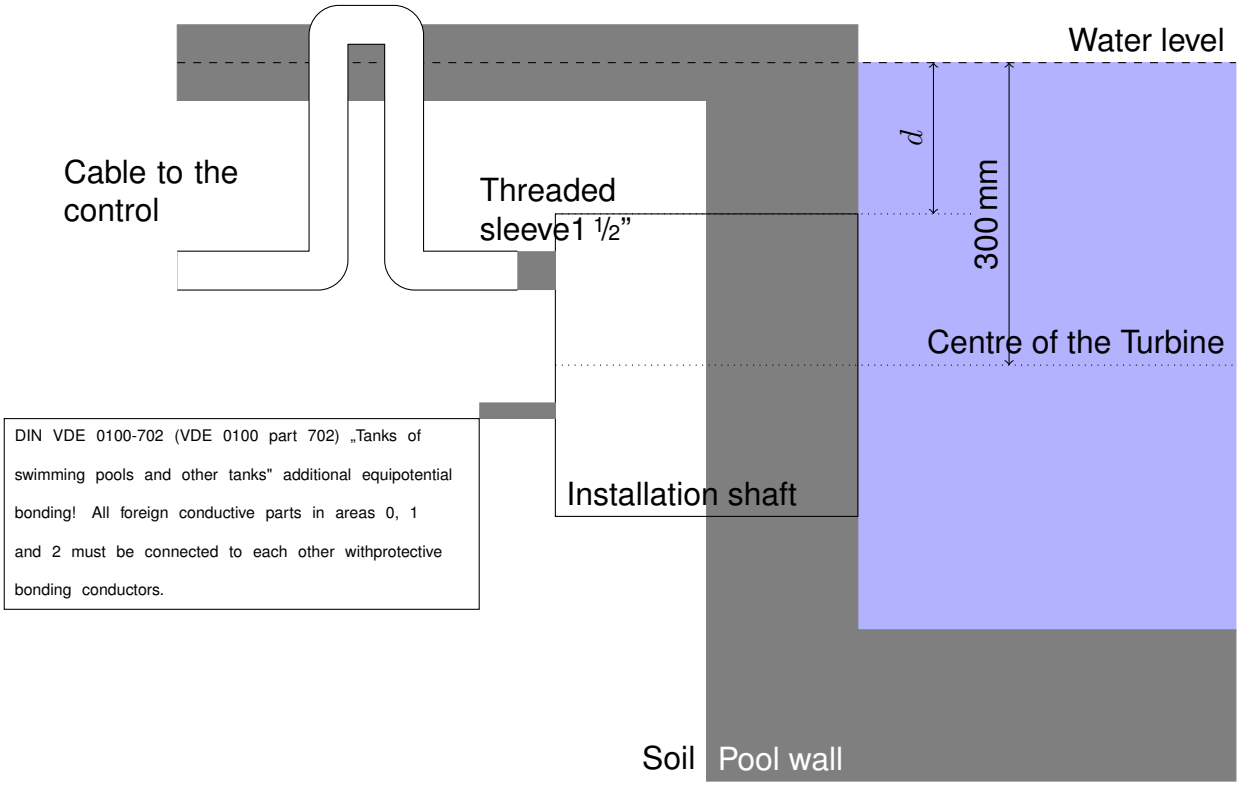


Figure 2: Installation sketch for installing the installation shaft in a pool. The height of the installation shaft in the pool wall must be chosen so that the distance between the waterline and the centre of the turbine is approximately 300 mm. To achieve this, it is best to measure the distance d and compare the value with Table 1. On the back of the installation shaft there is a cable inlet for the motor cable (in a system with several turbines there is one cable inlet per turbine). In addition, the installation shaft has a cable inlet for potential LED lighting, as well as the possibility to connect a circulating pump.

2.5. Installing the installation shaft in lined pools

- Set the installation shaft in concrete in the swimming pool wall. Follow the instructions in chapter 2.4 for the correct position.
- Clean the flange facing of the installation shaft of any sand and concrete residues.
- Clean the flange facing of the installation shaft with suitable cleaning agents[1] until free of grease.
- Insert silicone seal from the inside (see figure 3)!
- Put the pool liner on top of the seal and poke holes for the screws.
- Insert screws with a suitable lubricant[2].
- Put spring-loaded flange in place and attach with the M6 screws. Insert screws by hand to avoid thread damage. Observe the specified tightening torque (7 - 10 Nm)!
- Only use tools for stainless steel.

[1] Do not use cleaning agents that have a hydrochloric acid base, also see notes on stainless steel care
[2] Fully synthetic without metallic additives, e.g. Weicon Anti-Seize High-Tec

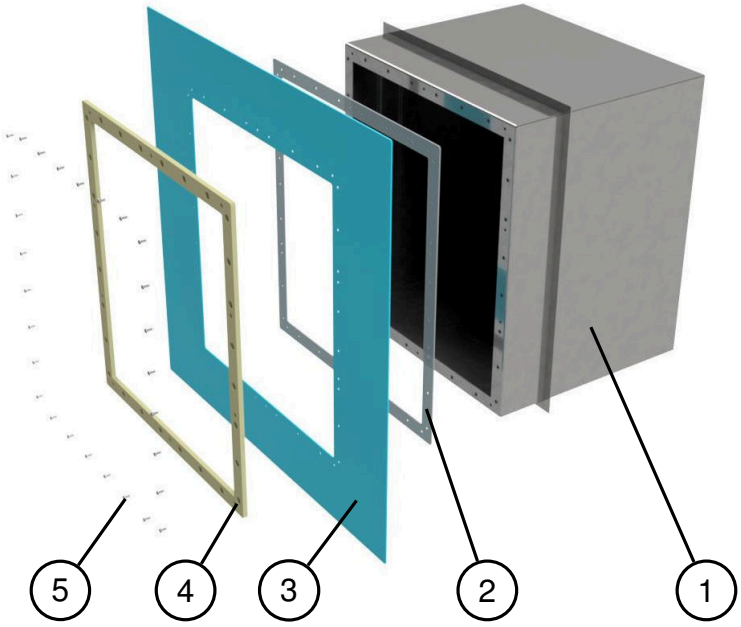


Figure 3: Diagram of the installation of the spring-loaded flange in a lined concrete pool. The installation shaft ① is embedded in the concrete wall . The seal ② is placed (glued) on the cleaned contact surface. Next comes the liner ③ and then the spring-loaded flange ④ By tightening the screws ⑤, the seal is squeezed and the installation shaft is sealed against the liner.

2.6. Installation and alignment of the turbine in the installation shaft

There are two variants of the HydroStar installation shafts. In the newer variant, the angle of the turbine is adjusted with a guide slot. In the second variant, the turbine is mounted on an bracket, which is mounted in the shaft with stay bolts.

2.6.1. Cable installation

The installation shaft has three (the double-turbine system has five) 1 ½" double nipples that lead the cable for the turbine and LED lamp (optional) out of the shaft to the control unit. The middle double nipple is for the connection to a circulation pump (in order to prevent water stagnation in the installation shaft if the HydroStar in not used over a longer period).

Inside the installation shaft:

- If the shaft is not attached to the circulation pump (not recommended), screw the cap appropriately sealed (e.g. with Teflon tape) onto the double nipple in the middle of the shaft. Nothing needs to be done inside the installation shaft if it is to be attached to the circulation pump.

- If no lamp cable is to be led out of the shaft, screw the cap appropriately sealed (e.g. with Teflon tape) onto the outer double nipple of the shaft (double turbine shafts have two outer double nipples). If a lamp is installed:
  - Screw the screw cap (M20) appropriately sealed (e.g. with Teflon tape) onto the outer double nipple.
  - Feed the lamp cable through the cable connection (M20).
  - Screw the cable connection into the screw cap.
  - Screw the cable connection together.
- In order to lay the motor cable:
  - Waterproof the screw cap (M25), e.g. with Teflon tape, and screw on to the second double nipple from the outside.
  - Feed the motor cable through the cable connection (M25).
  - Screw the cable connection into the screw cap.
  - Screw the cable connection together.

Make sure not too much cable is left in the installation shaft (less than 50 cm per turbine). Otherwise, the cable could be pulled into the propeller by the current and be damaged. Fasten the cable with zipties, if necessary.

Back of the installation shaft:

On the back of the installation shaft, the cables should be fed through a flexible pipe (PVC flex pipe) above the waterline (overflow protection, see figure 2).

We suggest you use a PVC sleeve with 1 ½" internal thread and 50 mm adhesive surface. In addition, you will need a PVC flex pipe (outer diameter 50 mm) and a suitable PVC glue.

2.6.2. Adjusting with a guide slot

If you receive the turbine and installation shaft delivered together, the turbine is already pre-installed at an angle of 4° to 5°. In this case only a fine adjustment of the angle should be necessary.

- Remove the cover plate.
- Insert the motor into guide ① (see figure 4). The guide slot serves as a guide for the stay bolts at the rear end of the motor.
- Loosely screw the washer and nut onto the stay bolt.
- Start aligning the turbine by tightening the nut accordingly.
- An optimum turbine angle is about 4° to 5° to the water surface. For pools with sloped walls, the slant of the wall must also be taken into account.
- The distance between the outflow opening (turbine) and the top of the installation shaft is approximately 95 mm for the standard installation shaft. This distance must be set correctly, otherwise the cover plate cannot be fitted.

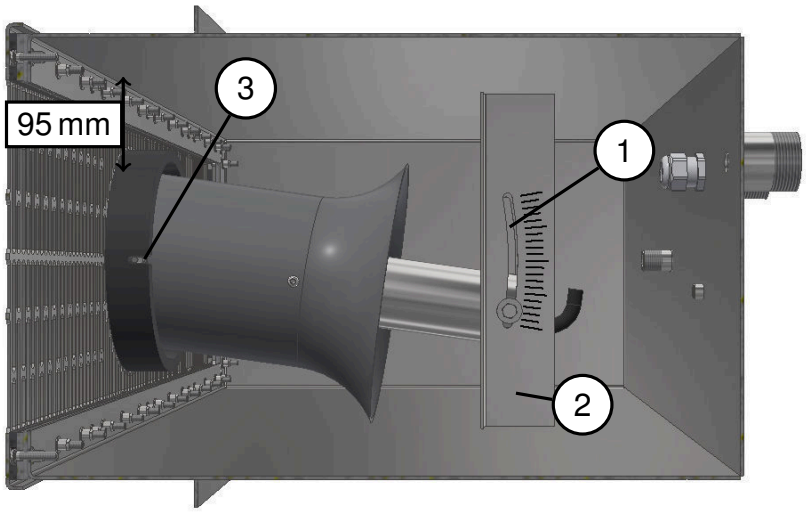


Figure 4: The angle of the turbine is changed via the guide ① slot in the bars ② . The angle can be adjusted 10° upwards or 10° downwards. The turbine is fixed in place by the slots in the flow aid ③.

- Insert the cover plate in front of the installation shaft. Slide the mounting bracket into the flow aid guide ③.
- Mount the cover plate using the screws supplied. Use a copper-free lubricant for the screws (e.g. Weicon Anti-Seize High-Tec)!
- Guide the turbine cable through the cable connection to the outside.
- Leave the turbine cable in the installation shaft with enough length that the turbine could still be placed on the edge of the pool above the installation shaft.
- Tighten the cable connection[3].
- Pull the motor cable through the PVC flex pipe with an outside diameter of 50 mm.
- Connect PVC flex pipe with suitable connecting piece. For example with a 1 ½" internal thread sleeve, glue together the flexible pipe and the sleeve.

2.6.3. Adjusting with stay bolt and bracket

- The turbine is installed suspended from an adjustment bracket.
- Attach the adjustment bracket with the turbine to the stay bolts.
- The upper nuts determine the positioning and thus also the flow of the turbine.
- A outflow angle of approx. 4° is set at the factory. In most cases, the angle does not have to be changed.
- Based on pool size, depth, and user requirements, the angle can be adjusted by means of stay bolts.

[3]Cable connections do not fully prevent water from flowing out. The cable must therefore be laid in a flexible pipe above the waterline.

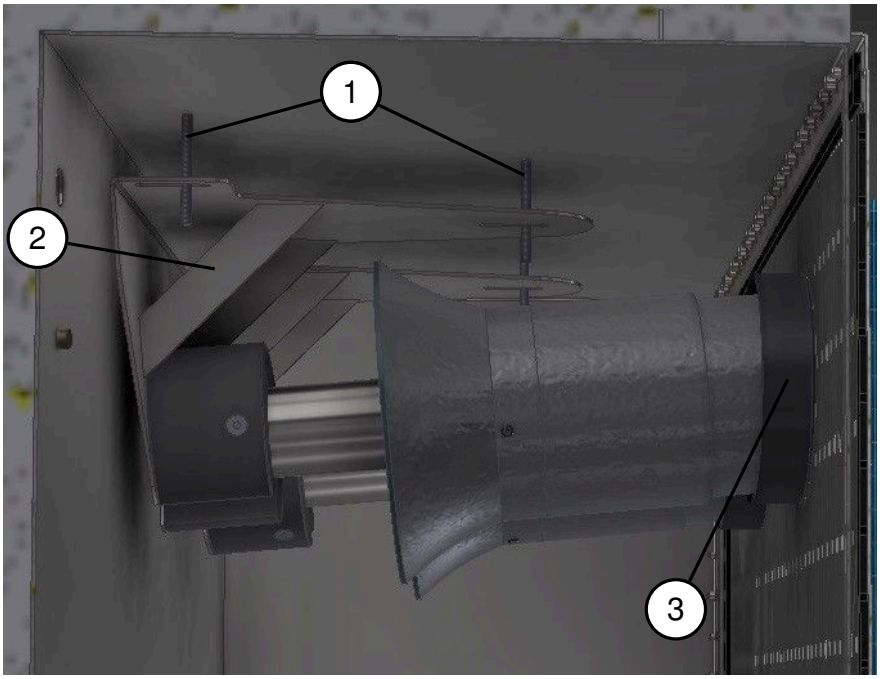


Figure 5: Cut-out of an installation shaft with stay bolts ①. To install the turbine, the turbine is screwed onto the bracket ②. The bracket is mounted on the stay bolts with nuts. Make sure that the turbine is later guided through the flow aid ③ in the cover plate.

- Then, adjust the height of the turbine.
- Tighten and lock all nuts securely.
- The flow plate with the flow aid can only be installed when the turbine is correctly aligned.

2.7. LED lighting (optional)

As an option, Binder offers LED lighting for the installation shaft. When installing the LED lighting in the installation shaft, observe the following points:

- Press the LED lighting into the designated holders.
- Feed the cable of the LED lighting through the cable connection to the outside.
- Feed the cable through a PVC flex pipe.

  Like the motor connection cables, the LED lighting cable must be guided to the control cabinet.

2.8. Installing the cover plate

- Align the turbine and do a trial run.
- Do not install the cover plate until the turbine is correctly aligned.

- There is a flow aid attached to the inside of the cover plate.
- The cover plate cannot be installed until the turbine is correctly aligned and protrudes into the flow aid.
- Place the cover plate on the frame of the spring-loaded flange and fix it with the M5 countersunk screws (moisten the screws with a suitable lubricant [4]) ,while supporting the cover plate with one hand or slightly lifting, it to prevent the thread of the countersunk screws from being destroyed.
- Observe the specified tightening torque (4 - 6 Nm)!

2.9. Installation of the piezo switch

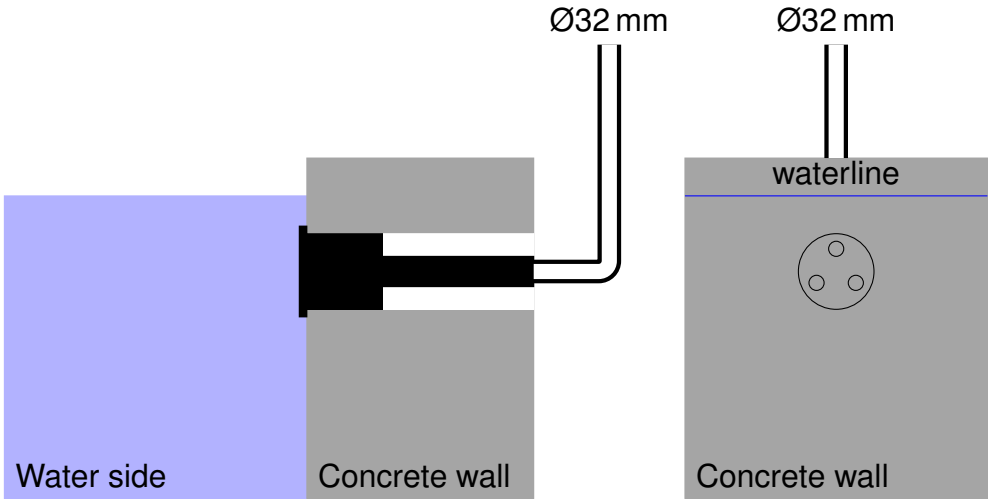


Figure 6: Sketch of installation of PIEZO Tri in the pool wall. Left: Section through the piezo switch. Right: Front view of the piezo switch. For the dimensions of the built-in parts, please refer to the drawing in the appendix (from page 49).

figure 6 schematically shows the installation of the piezo switch. The piezo installation shaft is integrated into the pool wall. The spring-loaded flange is used to seal the pool to the water side. A ∅32 mm hose is mounted on the back. The hose carries the control cables for the piezo switch and must be guided above the waterline. Detailed drawings of the piezo switch can be found in Appendix E.

In addition to the variant of the piezo switch with a round cover plate, we also offer a piezo switch with a rectangular cover plate. Drawings can be found in Appendix E.

Please also observe the following points:

- Install the piezo switch either completely above or completely below the waterline.
- For tiled or natural stone pools we offer an installation housing with an additional circular flange. Please indicate when ordering!
- For stainless steel pools we offer an installation housing made of stainless steel. Please indicate when ordering!

[4] fully synthetic without metallic additives

2.10. Installing the piezo switch in lined pools

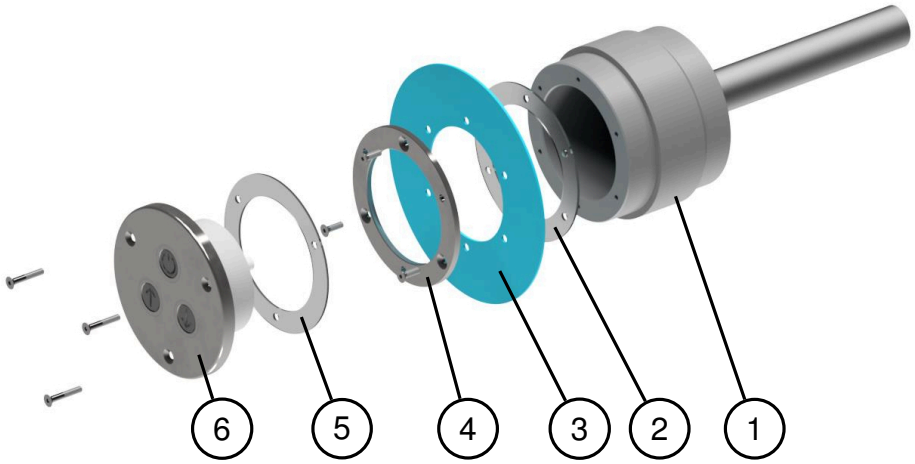


Figure 7: Exploded view of the piezo switch.

Figure 7shows the order in which the piezo switch is assembled. The housing ① is set in concrete into the concrete wall. The seal (with six holes) ② is placed / glued between the contact surface of the housing and the swimming pool liner ③. The spring-loaded flange ④ presses the liner and the housing together. A further seal ⑤ (three holes) is placed between the spring-loaded flange and control panel ⑥.

3. EasyStar Installation

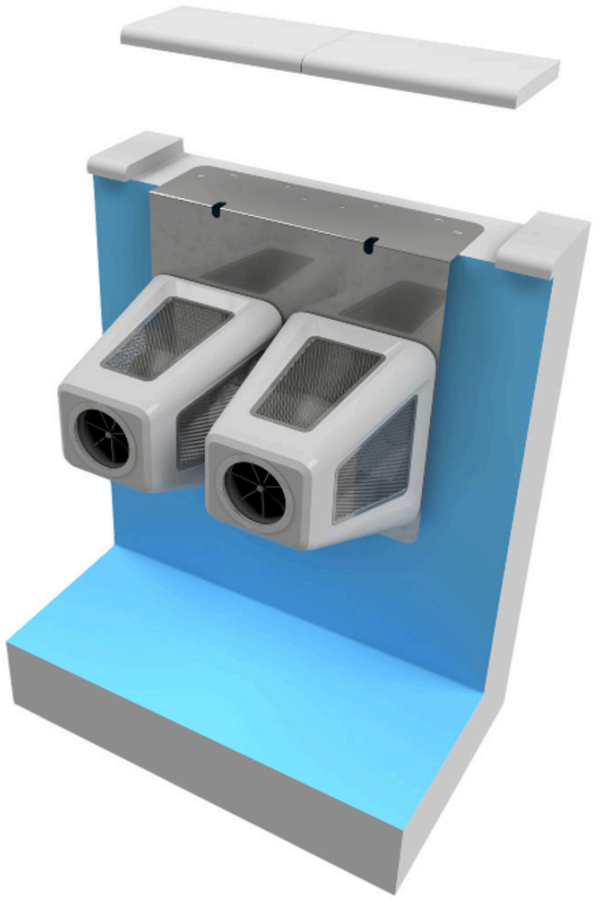


Figure 8: Installation diagram for the EasyStar retrofit system Here you see a double unit with two turbines. Installation of a single-turbine unit works the same way. Installation of the mounting bracket on the edge of the pool depends on on-site conditions.

The EasyStar retrofit system is delivered on a bracket. Mount the bracket with the turbine on the edge of the pool. Ensure that the centre of the turbine is roughly 30 centimetres below the waterline (see Section 3.1 for further information). The electrical connection of the turbines to the control system is described in Section 4.

- These units are ready for installation and manufactured according to order instructions.
- The mounting bracket/suspension device must be securely attached to the edge of the pool.
- No attachment at the pool floor is necessary.
- The motor cable must be installed so that it cannot be damaged.
- The housing must be completely under water.
- Suction is performed from the sides of the unit. It must be ensured that the suction slits are never clogged and that water flow is guaranteed.

! NOTE
Do not use the frame or suspension device for gymnastics or climb on the installation shaft! Do not use the installation shaft as a “starting block”. Do not push-off from the unit with your feet.

3.1. Setting the height and angle of the turbine

We recommend spacing the centre of the turbine and the waterline around 30 centimetres apart. The recommended upward angle for the turbine is about 5.

At these settings, the water jet will break the water’s surface at about 1.5 to 2 metres behind the turbine outlet. If the turbine angle is too steep, the water surface will be rough. If the turbine is angled too flat or even downwards, perceptible performance is greatly reduced. If the turbine is clearly too low, a higher position can increase the perceptible performance. Setting the distance:

- Hang the turbine at the desired position in the pool.
- Measure the distance between the turbine centre and the water surface. The distance should be around 30 centimetres.
- Remove the hood.
  - To do so, open locking mechanism ① with a hex key (see Figure 9).
  - Tip the hood upwards and then remove it.
- Adjusting the height
  - Loosen the screws (see Figure 9 ②) and vary the distance accordingly.
- Adjusting the bracket
  - Loosen nut ③ and adjust the turbine to the angle desired.
  - Fasten nut ③ so that the turbine is held in place.
  - Put the hood back in place and align the turbine so that the hood fits.
  - Remove the hood again and fully tighten nut ③.
- Put the hood back on the bracket again and fasten the locking mechanism with hex key ①.

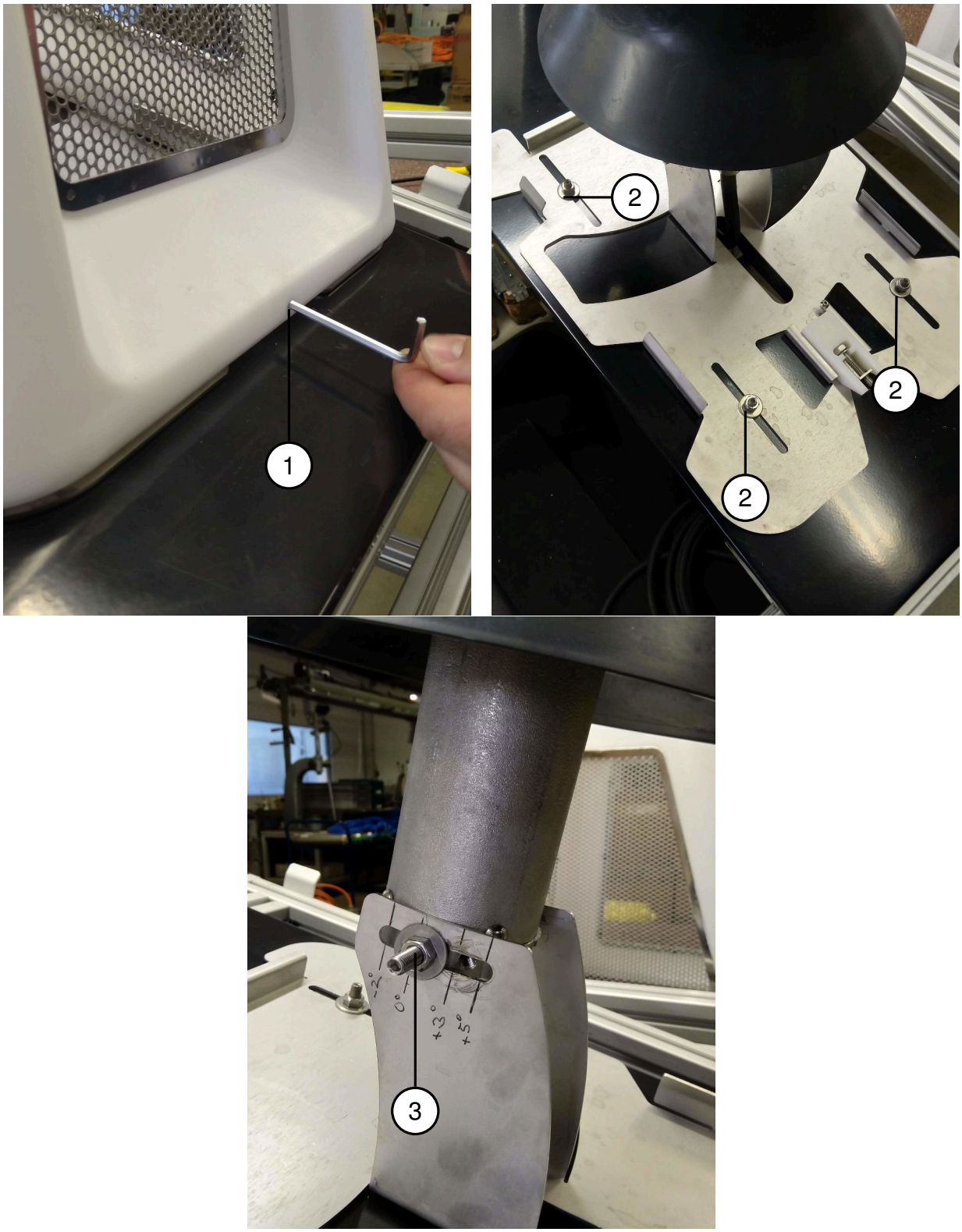


Figure 9: Left: Opening the locking mechanism with hex key ①. Right: EasyStar with the hood removed. Loosen all four number ② screws and move the bracket to the desired height. Then retighten the screws. Below: To adjust the angle of the turbine, loosen nut ③ a little and adjust the angle accordingly.

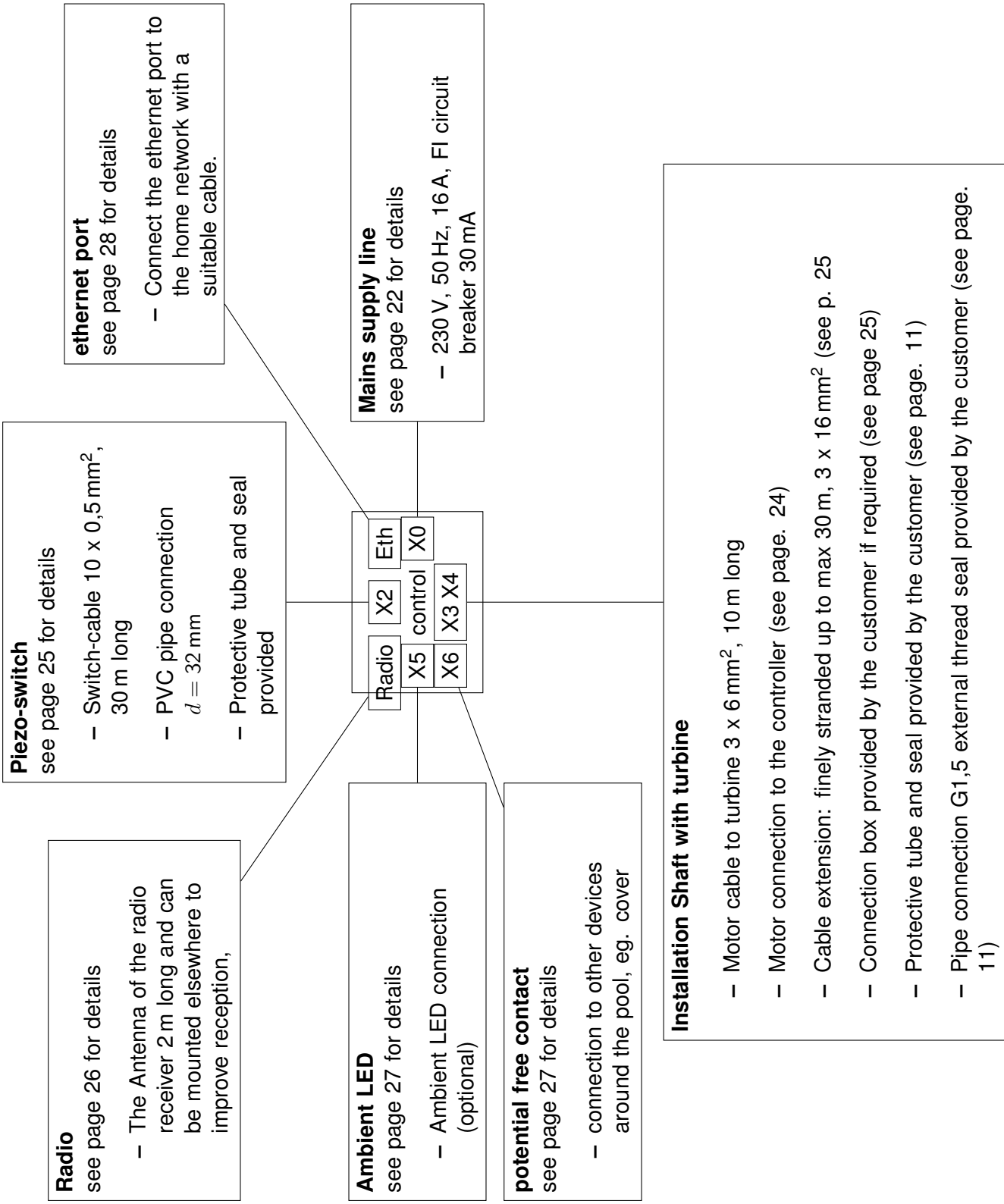
4. Control unit

- DIN VDE 0100-702 (Installation of low voltage equipment, section 702: Swimming pools and other basins) must be observed.
- The control unit must be installed in area 2 as per DIN VDE 0100-702. The power lead-in must be equipped with residual current protection (RCD) with a rated residual operating current of $\leq$30 mA.
- The system must have a 16 A inert fuse installed.
- Installation in a dry room in which other technical equipment for operating the swimming pool is installed. The room should be a maximum of 10m from the pool.
- The control unit is designed for wall mounting. It is mounted with 4 screws ∅8 mm mm (not included in delivery). It must be fixed in such a way that the cable entries are on the bottom.

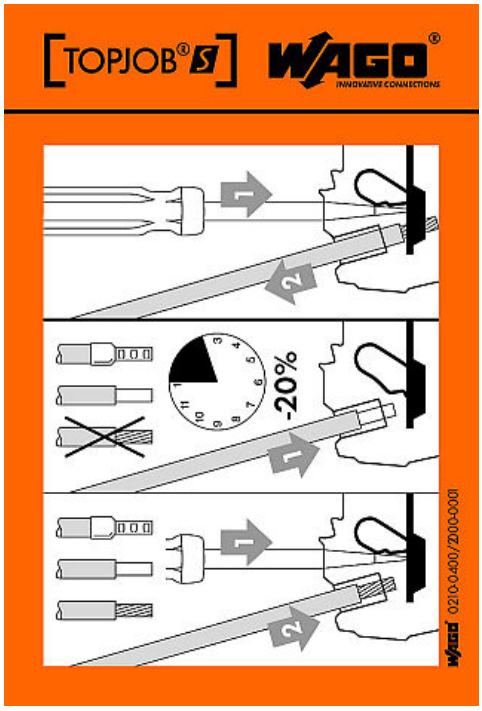


Note!
Please also observe the circuit diagrams included in delivery!

4.1. Connection block diagram



4.2. Terminals



– Connection takes place by means of screwless WAGO terminals.
– Please observe the information in the figure on the left.
– Do not use wire end ferrules.

Please
The wires for motor supply line have a transparent foil sleeve! Remove the foil sleeve completely!

4.3. Connecting the cables

All connection cables of the HydroStar counter-current unit are distributed from the control cabinet (see Fig. 10). The following sections describe the connection to the control cabinet. The block diagram on page 23 provides a good overview.

4.4. Motor connection

– Insert the motor cables into the M25 cable connection in the control cabinet so that the sheathing is pushed through approx. 50 mm.
– Securely tighten the cable connection.
– Connect the motor supply line to the X3 terminal blocks according to the colour coding, in the case of a double system, connect the second turbine to the X4 terminal blocks.

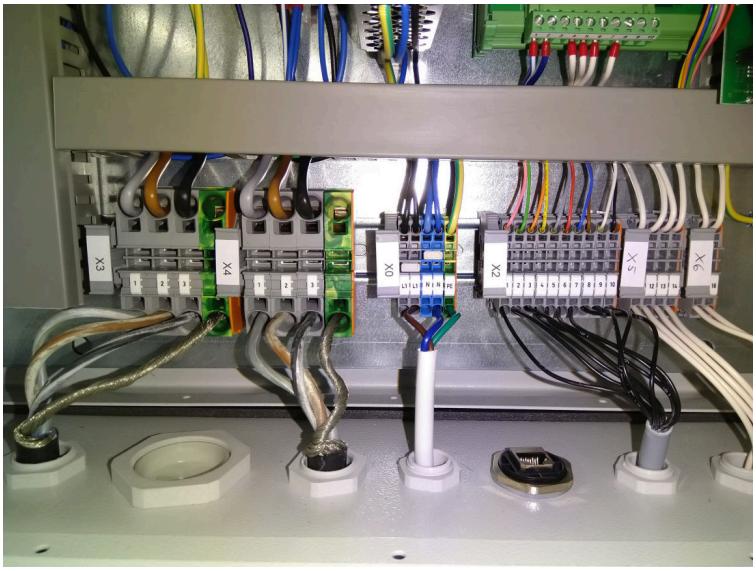


Figure 10: Terminal strip in the control cabinet of the HydroStar counter-current unit (here a double system, in a system with only one turbine the X4 terminals are missing).

4.4.1. Lengthening the motor supply line

> **Note:Ensure minimum cross-section of 16 mm² finely stranded!**
> If a cable extension is required, the correct connection between the two cables must be ensured. Both cables must be extended colour to colour to avoid mixing up the individual wires. The junctions must offer the best possible conductivity. A higher resistance in the line reduces the performance of the turbine!

- Shorten the original motor supply line (3 x 6 mm²) to ≤5 m (minimum 2 m)
- Extension up to total length of 30 m with cable cross-section 16 mm² finely stranded!
- The original Binder 3x16 mm² cable is expressly recommended for extending the turbine cable! (Item no.: 5300115)
- The junction box must remain freely accessible.
- The junction box must be sealed watertight.

4.5. Connecting the HydroStar PIEZO Tri

- The connecting cable is a finely stranded 4- or 10-core cable with a cross-section of 0,5 mm².
- In order to make the correct connection, the wire number must be the same as the terminal number.

Terminal-number Control X2	Function	Wire-number	
Piezo Switch		10-core	4-core
1	Masse	1	1
2	Button On/Off	2	2
3		3	
4		4	
5	(Button down)	5	3
6		6	
7		7	
8	(Button up)	8	4
9		9	
10		10	
Lighting		Color code	Numbered
11	red	white	1
12	+24 V	brown	2
13	green	green	3
14	blue	yellow	4
External enabling			
15 16	for operation the contacts has to be bridged		

Table 2: Terminal assignment for the piezo switch. In order to make the correct connection, the wire number must be the same as the terminal number. The standard piezo has no illuminated buttons. When connecting the standard piezo switch, only contacts 1, 2, 5 and 8 need to be connected.

- The connection is made to terminal strip X2.
- The function of the cables can be found in Table 2!

In the appendix (see page **??**) you will find information on how to connect the piezo switch if the number of wires or the number of connectors in the controller vary.

4.6. Connecting the radio

The radio is installed at the factory. If the control with the radio remote control at the swimming pool does not work well, it is possible to mount the antenna (mounted on the left side of the control box) in a more convenient place. To do this, unscrew the antenna from the control box and remove the antenna cable from the cable duct. The antenna cable is at least 2 m long. If the antenna cable is not long enough, you can order a longer cable from us.

4.7. Connecting an external operating device

The following functions can be operated via electronic push-buttons additionally connected to terminal strip X2 (pulse duration less than 500 ms):

- Turn system on/off by closing terminals 1-2
- Speed up turbine by closing terminals 1-8
- Slow down turbine by closing terminals 1-5
- Switching capacity: 24 VDC/20 mA, maximum cable length 30 m
- Please also refer to Table 2.

4.7.1. Connecting a higher-level control unit

The X2 terminal strip can be used as an interface to a higher-level control unit (e.g., Loxone). The assignment of the terminals is shown in Table 2.

The power setting of the counter-current unit is transmitted similarly (via a voltage of 1,5 V (lowest setting) to 4,6 V(highest setting)) to the motor electronics. If you want to read out the power setting externally, measure the voltage between terminals 1 and 4 at terminal 1A1 X2 of the control card (see also 40).

4.7.2. Connecting external enabling

The counter-current unit can be enabled and disabled by an external device via terminal strip X6. Terminals 15 and 16 are bridged with a comb bridge ex works and the system is ready for operation. As soon as the connection between 15 and 16 is disconnected, the turbine stops and can no longer be switched on. Once the connection is established again, it can be switched on again. If a device or switch for external enabling is connected to terminals 15 and 16, the comb bridge must be removed by pulling it out (e.g. with a pair of needle- nose pliers).

4.8. LED lighting

Installation shaft	Performance	Luminous flux
BGA Single Standard	22 W	850 lm
BGA Single Flat	43 W	1700 lm
BGA Double Standard	43 W	1700 lm
BGA Double Flat	86 W	3400 lm

Table 3: Output and luminous flux of the various LED lighting variants.

The optionally available LED light is permanently waterproof and cannot be opened. The built-in illuminants are high-power RGB LEDs. Depending on the installation shaft, several lighting variants with different outputs are available (see Table 3).

The lighting can be operated via the supplied radio remote control or optionally and more conveniently via the HydroStar app.

4.9. Connecting to a home network (optional)

If HydroStar is to be controllable with the HydroStar app, a Raspberry Pi can optionally be attached to the control board. To use the functions, please connect the control cabinet with a network cable to the home network (the same network to which your mobile devices are connected).

4.9.1. Retrofitting HydroStar for operation with the app

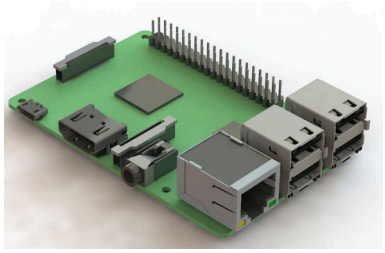


Figure 11: The figure depicts the mini computer Raspberry Pi.

Check which control card is installed in the control cabinet. In order to upgrade HydroStar to app control, it is necessary that an up-to-date control card has been installed. See Appendix C.2 (Page 40 (page 40) for which control card is installed. Even after the upgrade, the previous control options will be retained.

To upgrade, proceed as follows:

- The upgrade kit includes a mini computer (see Fig. 11) with SD card, RPI connector and patch cable.
- First disconnect the system from the power supply via the main switch.
- Plug the RPI connector into the GPIO connector (40-pin male connector) on the mini computer, then plug the mini computer into the 40 pin female connector on the control card.
- Remove the filler plug from the control cabinet and insert the RJ45 panel jack.
- Connect the mini computer and the panel jack with the patch cable.
- Integrate the controller into the house network via the panel jack on the outside using a patch cable (not included).

The mini computer starts up automatically when the system is put into operation or switched on. If the end device (tablet or smartphone) and the installed HydroStar app are on the same network, the devices automatically connect to each other and the system can be operated via the app.

5. Start-up

Turn the unit on using the rotary switch on the front side of the control unit!



Warning!Danger due to electrical current
Before starting the machine up, check the operation of the residual current device (RCD) on the machine side! Check all lines for damage and make sure the electrical connections are secure !



Note
Do not perform any trial runs unless the turbine is completely under water! Operating it above water or only partly in water will cause the drive motor to fail!

5.1. Radio remote control operation



Warning!Danger
The radio transmitter and receiver are pre-set to match at the factory and programmed for the operation of the HydroStar counterflow unit. Any reprogramming or using a second or third-party radio transmitter may damage the machine or harm people! Before starting the turbine, make sure that no one is in the outflow area of the turbine. The sudden flow of water may lead to unpredictable reactions.



P1 On/Off LED (optional)

P2 Colour change LED (optional)

P3 LED darker (optional)

P4 LED brighter (optional)

↑ Turbine faster

↓ Turbine slower

Turbine On / Off

Keyboard illumination (10 s)

Note
When the turbine is switched on, it always runs at the lowest speed!

5.1.1. Switching the turbine on and off

- Switch it on by briefly pressing the button . After a delay of about 7 seconds, the turbine starts running at the minimum motor speed.
- Switch it off by briefly pressing the button . The speed of the turbines is reduced and after approx. 5 to 6 seconds the unit is switched off.

The operation of a switch on the radio remote control is indicated by a green/red LED above button P1/P2!

Note
After pressing the buttons on the hand-held transmitter, it takes about 2 seconds for the signal to reach the radio receiver. If you press several keys one after the other hectically or repeatedly, malfunctions may occur.

Note
The range of the radio transmitter under ideal conditions is 50 m. The range may be severely limited because of local conditions. If the range is insufficient, an external antenna with an antenna cable of up to 16 m can be connected and installed in a more favourable position in the building.

Note
The radio transmitter complies with protection class IP66 and IP67. Permanent immersion of the remote control under water is therefore not possible.

5.1.2. Water jet control

By pressing the buttons ↑ or ↓ , the flow rate can be changed between the minimum and maximum speed.

5.2. Optional operation by PIEZO Tri

If the HydroStar conterflow unit has a PIEZO Tri switch, the HydroStar counterflow unit can be operated by radio remote control and via the PIEZO Tri switch.

The system is switched on by pressing the On/Off button ⏻ . The water quantity can be adjusted by pressing the ↑ or ↓ button.

Pressing the ⏻ button again switches the unit off.

Note
The unit can be switched on with the radioremote control, and switched back off by using the PIEZO Tri switch. Activation of the radio remote control is also indicated on the PIEZO Tri. Both operating modes work in parallel.

5.3. Operator feedback

If the LED light is installed, optical feedback is given via the light as soon as the HydroStar receives a signal via the radio remote control, the piezo push-button or an externally connected control unit. When a signal is received, the lighting briefly flashes once (see Table 4). There is only feedback if an action can be executed by pressing a key. If the brightness is changed via the radio remote control, no feedback is given.

Action	State	Feedback
via Radio or Piezo	Lighting Off	red LED
via Radio or Piezo	Lighting On	white LED
via Radio P3 (darker)	Lighting On	no Feedback
via Radio P4 (brighter)	Lighting On	no Feedback

Table 4: Operator feedback.

5.4. Operation via app

The Binder HydroStar can optionally be ordered from the factory with an app control system or this can be retrofitted on systems from April 2019. The system can then be operated via a mobile device (mobile phone or tablet). The prerequisite for this is a network connection in the vicinity of the counter-current unit control cabinet. Directly connecting the HydroStar to the WLAN is not possible.

The app extends the scope of operation and the ease of use of the counter-current unit. The app is available for free in the AppStore as well as in the PlayStore and is updated regularly.

5.4.1. Lighting

In the main display of the app, the LED can be switched on and off using the *Light*button. The Binder LED lighting is equipped with high-performance RGB LEDs which can be set to the desired colour and light intensity. The lighting can be switched on and off with the *Light* button, with the Change *colour* button it is possible to activate an automatic colour change with soft transition. The app also has two sliders with which the colour and brightness of the light can be adjusted manually.

5.4.2. Counter-current unit

After starting the app, swipe right once. In this window you can press the *ON/OFF* button to start and stop the unit. The output of the counter-current unit can be adjusted with the slider. In the left window you can tap to display the output in different units. By swiping further to the right, several training programs can be set up, these can be assigned different colours for easy overview. The corresponding buttons can be used to set the duration and the slider to set the unit output.

5.5. End of operation

At the end of operation and overnight, the machine should be switched off using the power switch on the control unit.

6. Shutdown / hibernation



Warning!Risk of damage
The turbine must not be allowed to freeze under any circumstances. Please observe the following instructions.

Two cases are considered when storing the HydroStar counterflow unit for the winter. In the first case, the water is drained from the pool and the turbine is completely above water. In the second case, the water is not drained from the pool and the turbine is completely under water.

Case 1

- Turn off the control unit.
- Attach a sign.
- Drain the water from the pool so that the water line is at least 5 cm below the lower edge of the installation shaft
- Remove residual water from the installation shaft. Dry the turbine, installation shaft and cover plate. Protect the turbine, installation shaft and cover plate from rain, snow and dirt with a suitable insulating material.
- Only a dry turbine will be safe from frost damage.

After the frost period:

- Remove insulating material from the turbine completely.
- Make sure that there is no residual material on the impeller or in the flow straightener.
- Refill the pool completely with water.
- Start as described in section 5 , Start-up (see page 29).

Case 2:

- The turbine must be completely under water.
- The water must be prevented from freezing all the way to the turbine (300 mm below water level).
- The turbine can be used during the winter to prevent the water from freezing.
- Turbine runs at low speed over a period of time.
- The pool should be cleaned after winter.
- Make sure that the impeller and the flow channel are free of excessive dirt or foreign objects.
- Start as described in section 5 , Start-up (see page 29).

7. Maintenance and repair

All work on the HydroStar counterflow unit must be carried out by trained personnel. Before working on the control unit, disconnect it from the mains and secure it against being accidently switched back on.

7.1. Maintenance

- The turbine of the HydroStar counterflow unit is maintenance-free.
- The underwater motor has no seals that have to be maintained or replaced
- Make sure that no objects of pieces or clothing are caught on any protective equipment in the intake area. Remove those items when the turbine is switched off.
- The installation shaft and the cover plate are made of high-quality stainless steel. Clean the installation shaft and cover plate with a suitable cleaning agent.
- Remove dirt, deposits and patina on the stainless steel parts with a suitable cleaning agent.
- The control unit can be cleaned with a damp cloth. Do not spray it.

7.2. Repair

- Repairs are only to be performed by suitably trained specialists or in the manufacturer's factory.
- Only use original BINDER spare parts for repairs.

8. Troubleshooting



Warning!Danger
In accordance with the Accident Prevention Regulations (Unfallverhütungsvorschriften, UVV), interventions or repairs to the device may only be carried out by qualified technicians. Otherwise there is danger to people and equipment!

8.1. Turbine does not start

8.1.1. Maintenance

- Does the battery in the remote control still have a charge?
  - Press one of the assigned buttons on the remote control. Two LEDs light up in the upper section. Another test: Now press the lowest button of the remote control printed with a lamp symbol. The background lighting of the remote control is switched on for a few seconds. If nothing lights up, the battery of your remote control is probably flat. Replace it. The remote control requires a CR123A battery.
- Does the radio signal reach the radio receiver?
  - Observe the LEDs on the radio receiver (to be found on control card in the switch cabinet). If several LEDs switch on in the remote control, a signal is received. If no LED switches on, the battery in the remote control may be too weak after all. Is the antenna properly connected? Has the radio remote control been programmed? See Chapter D on page 40.
- Is the turbine free? Or is something perhaps blocking it? To check Switch installation off!

8.1.2. Connection leads

Is the switch cabinet connected to the mains (230 V)? Does any LED in the switch cabinet light up?

8.1.3. Detecting a defective component in the switch cabinet

Go through the block diagram of the control (see 42) and check the troubleshooting path from top to bottom.

- Is terminal X0 (230 V AC) live? No, the connection lead is dead.
- Is terminal X1 (230 V AC) live? No, then there could be a problem with the switch, relay 2K1 (only in the case of double installations) or the suppression filter.

– Is 230 V AC present at the input of the small power supply unit (1T1) and 24 V DC at the output? If no voltage is present at the input, then the error must be in the switching power supply unit. If there are 230 V at the input, but no 24 V at the output, the switching power supply unit must be defective.
– Is the status LED on the control card (1A1) illuminated? If not, the fuse is (F1) defective.
– Does the signal of the remote control reach the receiver card? LED on the receiver card lights up briefly after actuating the remote control (see also Section D).
– Is the signal passed on by the receiver card to the control card? Test: Do the relays on the control card switch? For example, do you hear a clicking noise when switching on and off with the remote control or switch?
– Is 230 V AC present at the input of the large power supply unit? Is the status LED green lit?
– Is 24 V DC present at the output of the switching power supply unit (T2, T3)?
– If the status LED on the switching power supply unit is red lit, there is a fault in the switching power supply unit.
– Is the LED on the motor control device illuminated (Q1, Q2)?

8.2. Turbine does not always start reliably

The motor control device supplies the motor of the turbine with fluctuating direct current. In addition, the motor control device is also responsible for starting. The resistance of the motor connecting lead plays an especially decisive role in the starting phase.

8.2.1. Check the cable and connection points

Actuating the motor during starting depends on the resistance of the cable and terminals. Consequently, you should check these first.

– Remove the motor cable from the X3, X4 terminals.
– The cable should be stripped 18 – 20 mm.
– The film must be removed. The film is sometimes hard to see!
– The cable may not be too strongly twisted and should be inserted as flat as possible (to ensure the biggest contact surface possible exists) into the terminals.
– Has the motor cable been extended? Was fine-wired cable with the correct cross-section used for this (see 4.4.1)? Fine-wired cable has a better connection in the terminal. How good is the connection of the two cables in the conduit box?

8.2.2. Adjusting the motor control device

If you have checked the cable as described above and reconnected it, but there are still starting problems, you can change the settings in the motor control device Q1, Q2. For further steps, please contact BINDER.

8.3. The performance of the turbine is unsatisfactory

Is the turbine properly aligned? The alignment of the turbine should ensure the following:

- The outlet opening may not be covered by the cover plate.
- The turbine jet breaks the water surface about 1,5 to 2 m from the outlet opening. If you do not see any breaking of the water surface, the turbine setting is not set steep enough. If the water surface is too disturbed, you could set the turbine to be flatter.
- At high outside temperatures (higher than 30 °C), the switch cabinet adjusts the performance downwards. If the problems occur at high temperatures, this might be the reason.

8.4. Turbine switches off

The installation switches off for safety reasons after 180 minutes. The installation can be switched on again immediately.

This value can be changed (optionally) with the app.

Appendices

A. Water values

- pH value: 7,0 – 7,2
- bound chlorine: $\leq$0,5 mg/l (vorzugsweise nahe 0,0 mg/l)
- free chlorine: 0,3 mg/l to 2,0 mg/l (3000 ppm to 20 000 ppm)
- cyanuric acid: $\leq$100 mg/l
- salt concentration: $\leq$0,4 % (4000 ppm) (4 g/l)
- metals: $\approx$0 mg/l
- carbonate hardness: $\geq$2 °dH
- ozon: 0 mg/l
- $\sum$ chlorite + chlorate: $\leq$30 mg/l
- Redox – potential: $\geq$700 mV
- Water temperatures above 30 °C should be avoided.
- Ideally, the pool water should be treated according to DIN (19643 - 1) or the recommendations of the Federal Environment Agency. See also: Hygiene requirements for pools and their monitoring.
- A regular check of the hygiene parameters is necessary. This applies in particular to the pH value and the salt concentration.
- When refilling with salt, it is essential to ensure that the salt concentration does not exceed 0,4 %.
- Please note that a sufficient quantity of fresh water must be fed into the pool in order to prevent excessive salinity. This is best achieved by sufficient filter backwashing at regular intervals.
- Your swimming pool dealer will be glad to assist you with questions regarding water treatment and care.
- We use only premium quality materials that are optimally suited for use in swimming pools under the aforementioned conditions. However, in the event that one or more of the aforementioned parameters are not adhered to over an extended time period, or insufficient quantities of fresh water/no fresh water are/is fed into the pool, we will not accept liability for any damage incurred!

B. Care instructions for stainless steel

The installation shaft, motor and cover plate of the Binder counter-current unit are made of stainless steel alloys commonly used in swimming pools.

Cleaning agents must be selected according to the intended use and taking into account the materials, surfaces or equipment.

The limit values described in Appendix A must also always be observed when adding substances into the pool water in order to avoid damage and corrosion. In particular, solid substances must be dissolved before adding.

Under no circumstances may cleaners containing hydrochloric acid be used on stainless steel!

C. Switch Cabinet

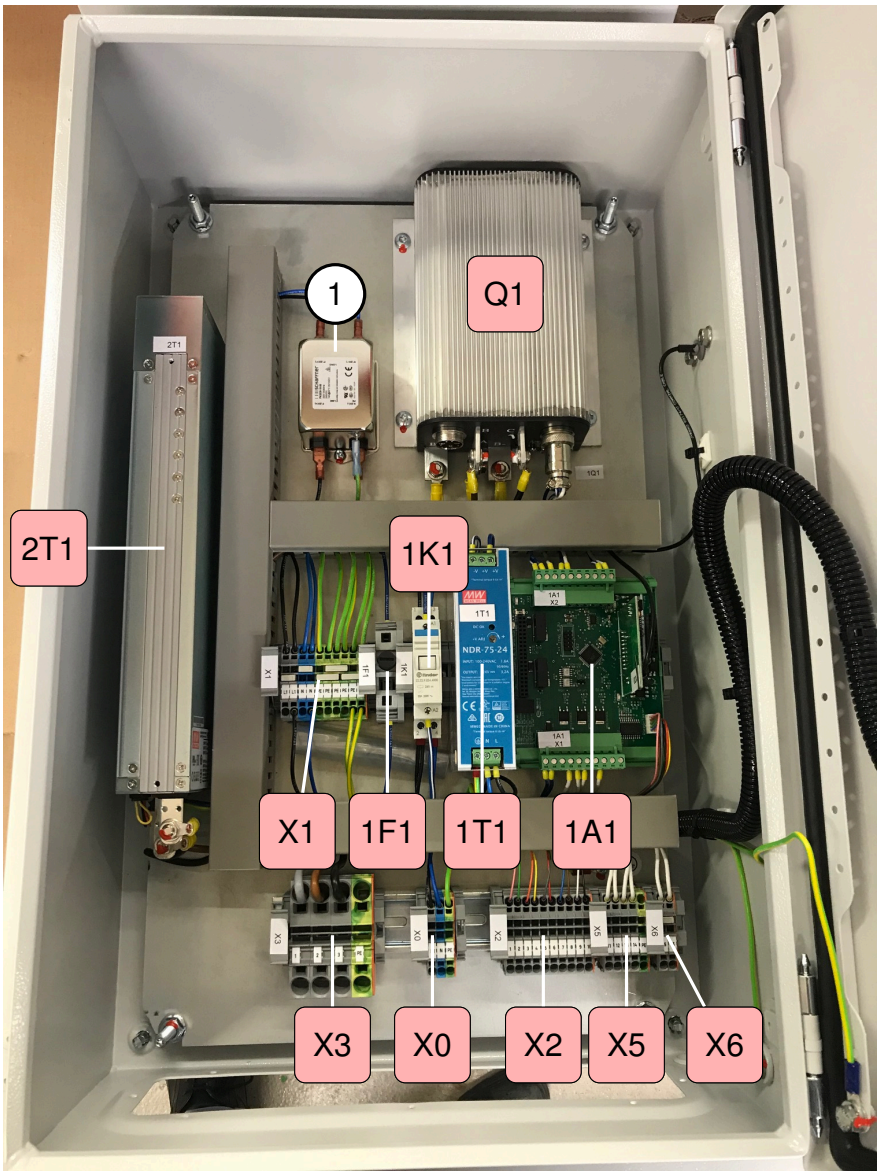


Figure 12: Interior of a single-turbine switch cabinet. ① shows the grid filter. The other components are abbreviated as in the block diagram 13 on page 42.

C.1. Block Diagram of Switch Cabinet

C.2. The control card (1A1)

You can tell whether the control card of the HydroStar is working correctly by the status LED. The following cases occur:

- During operation, the LED flashes briefly every second.
- The LED flashes once in addition if data is received via the app card (optionally).
- If the LED is permanently illuminated, the release is deactivated (see chapter 4.7.2 page 27).
- If the LED is illuminated permanently and briefly interrupted every second, there is a problem with the piezo switch. Please check the piezo switch and if necessary disconnect from the control!

If you switch with the piezo button, you can recognise on the control card whether the signal has arrived. There is an LED on the control card for each of the three buttons. These LEDs are permanently illuminated. If the corresponding button is pressed, the associated LED goes out briefly.

D. Programming the radio remote control

Deleting the old programming

Since it is possible to connect several radio remote controls to the receiver card, the program in the receiver card should first be deleted if the old radio remote control is lost.

Activating a new remote control

A new remote control is equipped with transport protection. Before the remote control can be used for the first time, the remote control must be activated. To activate, press and hold the bottom right grey button until the remote control's light lights up. Now you can connect the radio receiver.

Press and hold the button on the radio receiver until all four LEDs light up simultaneously (duration approx. 30 seconds).

Programming the individual channels

The individual buttons on the remote control have a right and a left side. Power, Up and Down each occupy one button on the radio remote control. Therefore, these keys must be programmed once for the left side and once for the right side.

Press the button on the receiver card once. The LED lights up to indicate which channel will be programmed. Now press the corresponding button on the radio remote control. If successful, the LED starts flashing.

E. Technical drawings

Our products undergo continuous technical development. As a result, the associated technical drawings also change over time. The following drawings should therefore be seen as a guide. Changes are possible at any time.

If you need an up-to-date drawing for a project, please contact us by phone or e-mail. We are happy to provide you with up-to-date drawings.

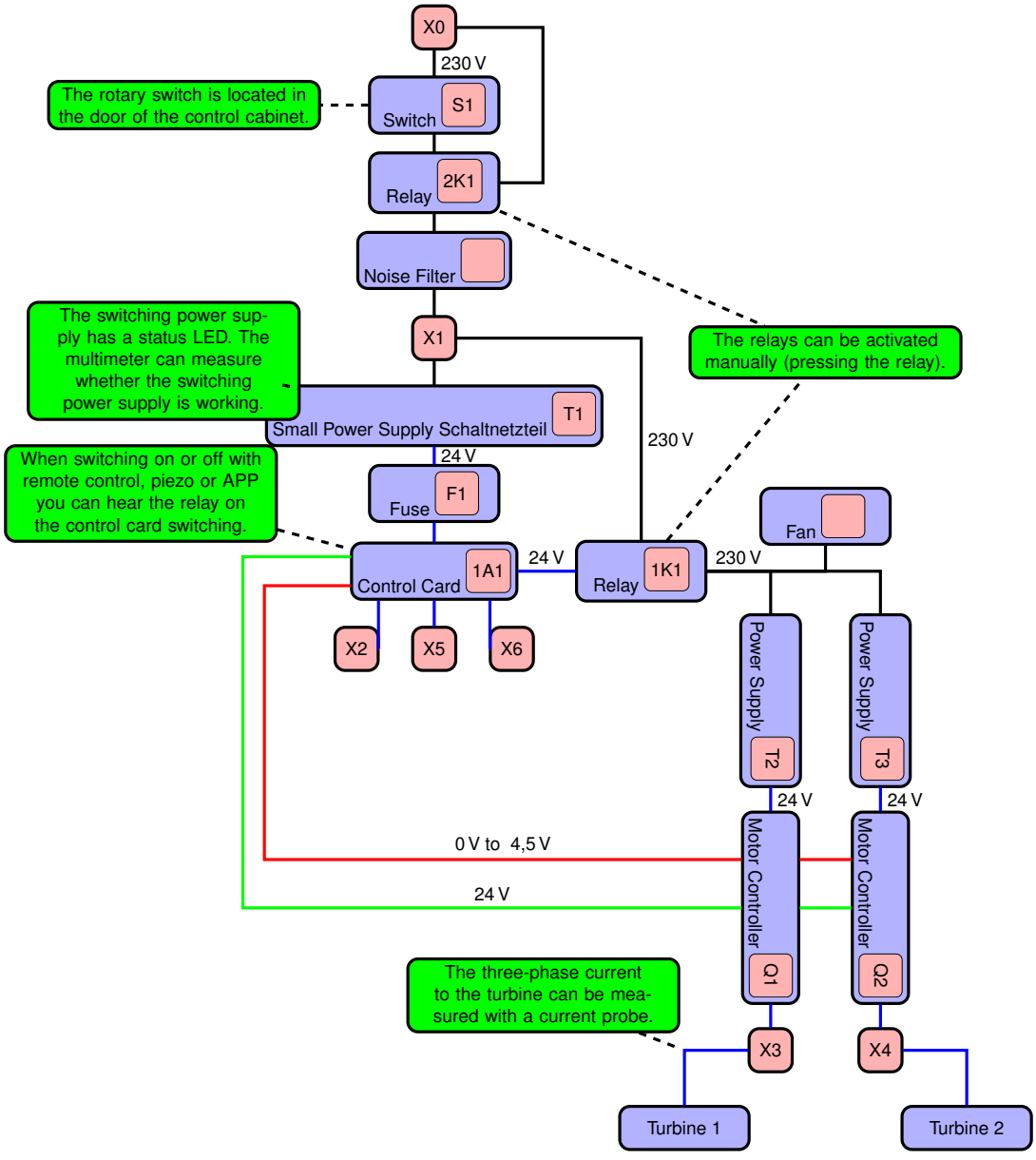
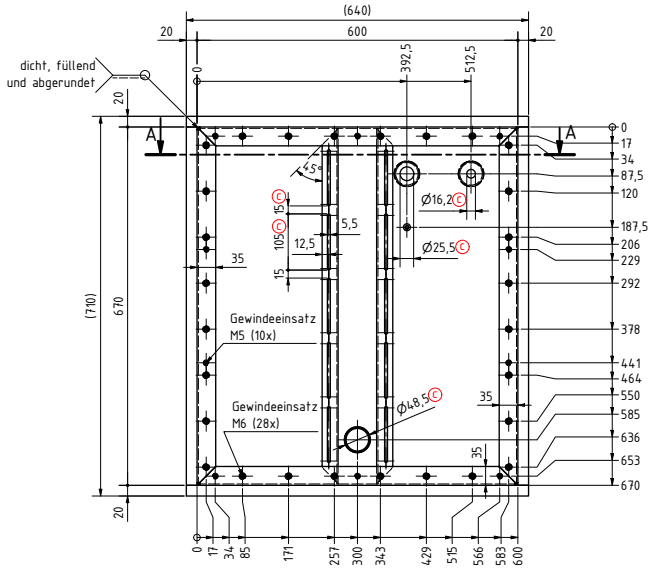
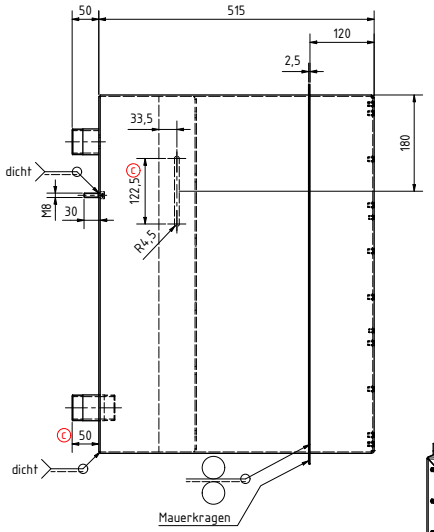
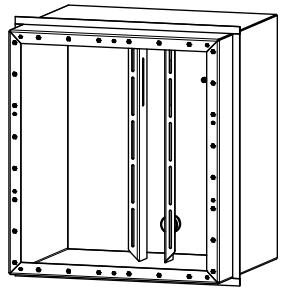


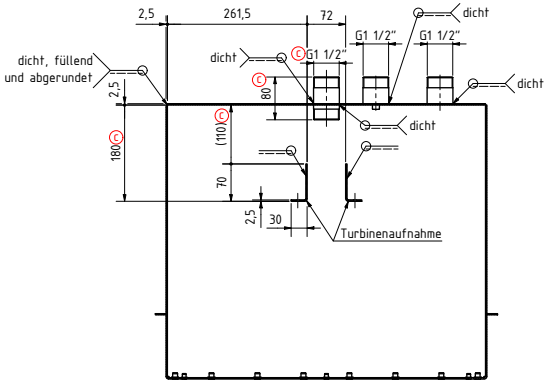
Figure 13: Block diagram of the HydroStar control box.







A-A (1 : 5)

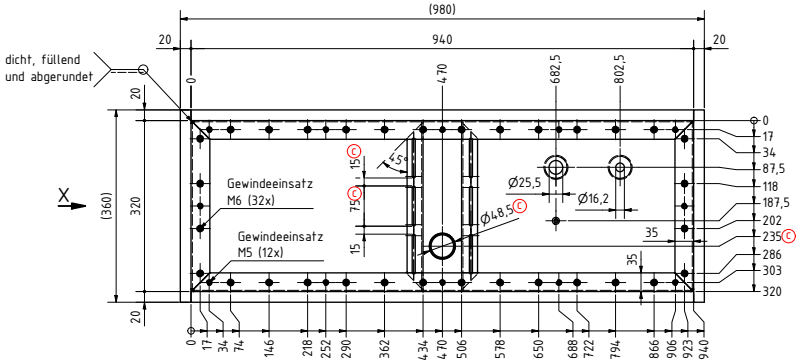


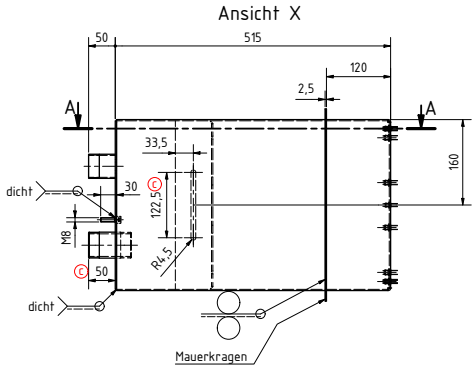
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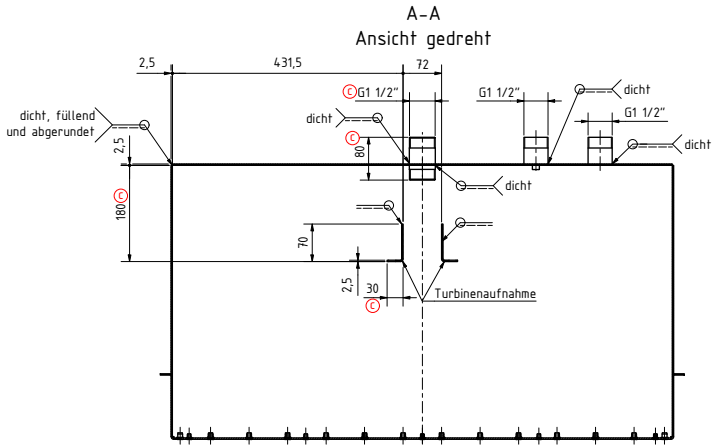
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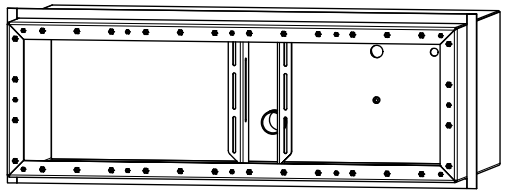
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	Toleranz	Material	Maßstab 1:5	39,720 kg	
	DIN ISO 2768-mH	1.4571/ 1.4404	BGA160/215/275		
	Datum	Name			
Gezeichnet	20.02.2019	Wesolowski	Einbauschacht		
Kontrolliert					
Norm					
c konstruktiv geändert 25.06.2019 Voith			Zeichnungsnummer		1
b Langlöcher geändert 20.03.2019 Wes.	BINDER MecaTec HydroStar		4872728c		A2
a Halt. Bl. vor 19, Halt. 25, vor 21 28.02.2019 Voith			ersetzt:		
Status Änderungen	Datum	Name			





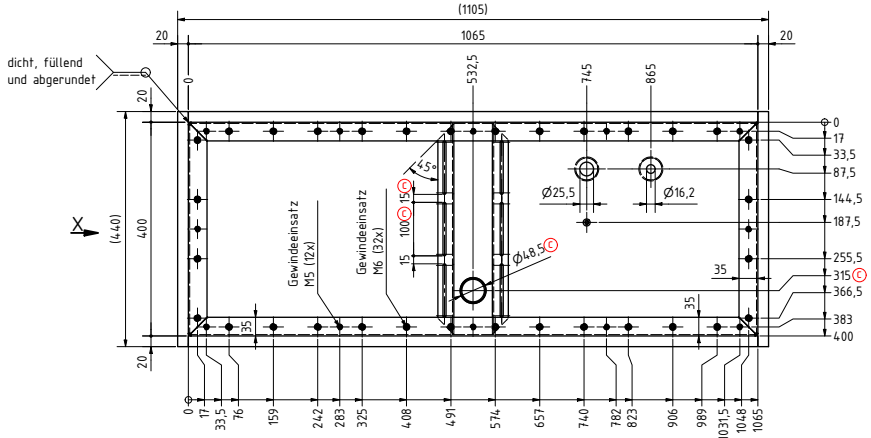


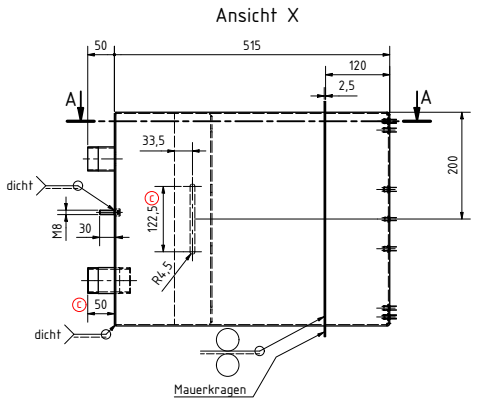


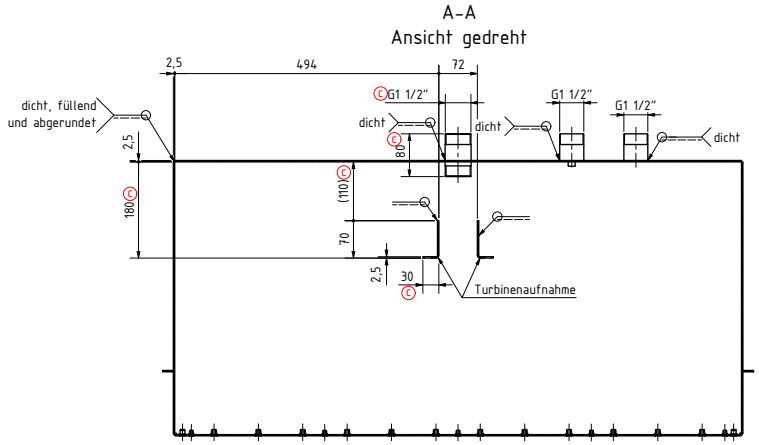
Alle Schweißnähte dicht und ringsumverlaufend,
mit Außnahme des Mauerkragens,
hier ringsum geheftet.

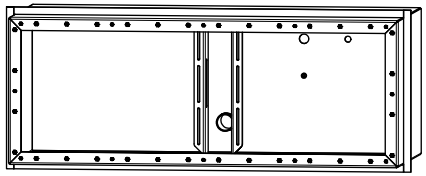
⌖ 0,2 für Gewindeeinsätze — Zur Herstellung CAD-Modell heranziehen.

Toleranz: DIN ISO 2768-mH	Material: 1.4571/ 1.4404	Maßstab: 1:5	36,039 kg		
		BGA160/215 flach			
		Einbauschacht			
BINDER MecaTec HydroStar		Zeichnungsnummer: 4872635c	1		
		ersetzt:	A2		





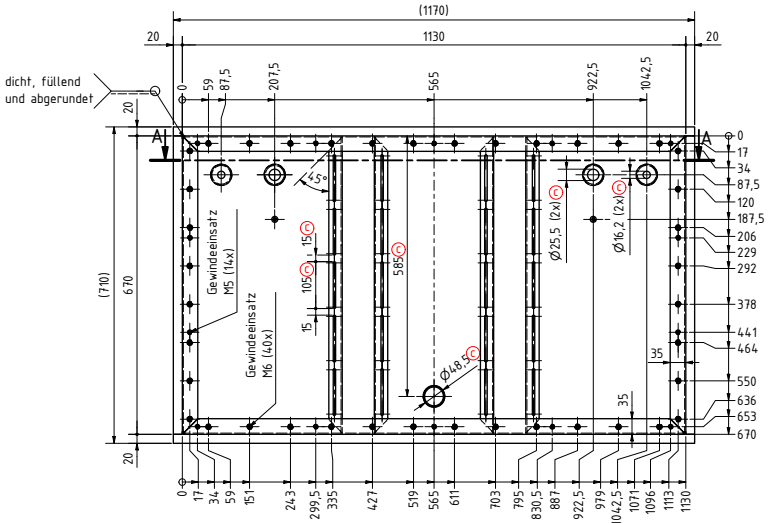


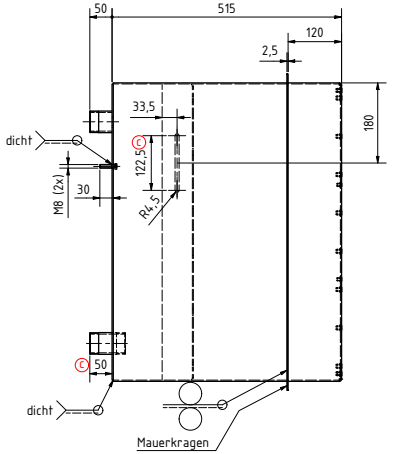


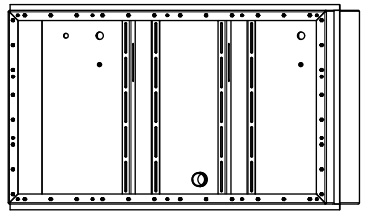
Alle Schweißnähte dicht und ringsumverlaufend,
mit Außnahme des Mauerkragens,
hier ringsum geheftet.

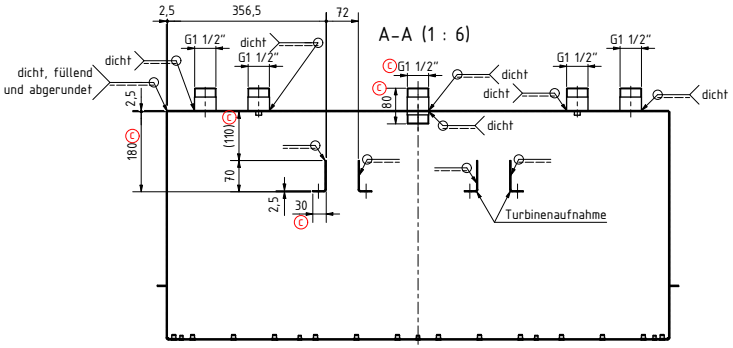
0,2 Zur Herstellung CAD-Modell heranziehen.
für Gewindeeinsätze

Toleranz: DIN ISO 2768-mH	Material: 1.4571/ 1.4404	Maßstab 1:5	43,506 kg		
		BGA 275 flach			
Gezeichnet: 27.02.2019 Voihk		Einbauschacht			
c konstruktiv geändert 25.07.2019 Voihk	BINDER MecaTec HydroStar	Zeichnungsnummer 4872744c	1		
b Langlöcher geändert 27.03.2019 Mes.			A2		
a Halt.Bl. vor 15 Halt.Bl. vor 25 28.02.2019 Voihk		ersetzt:			
Status Änderungen Datum Name					





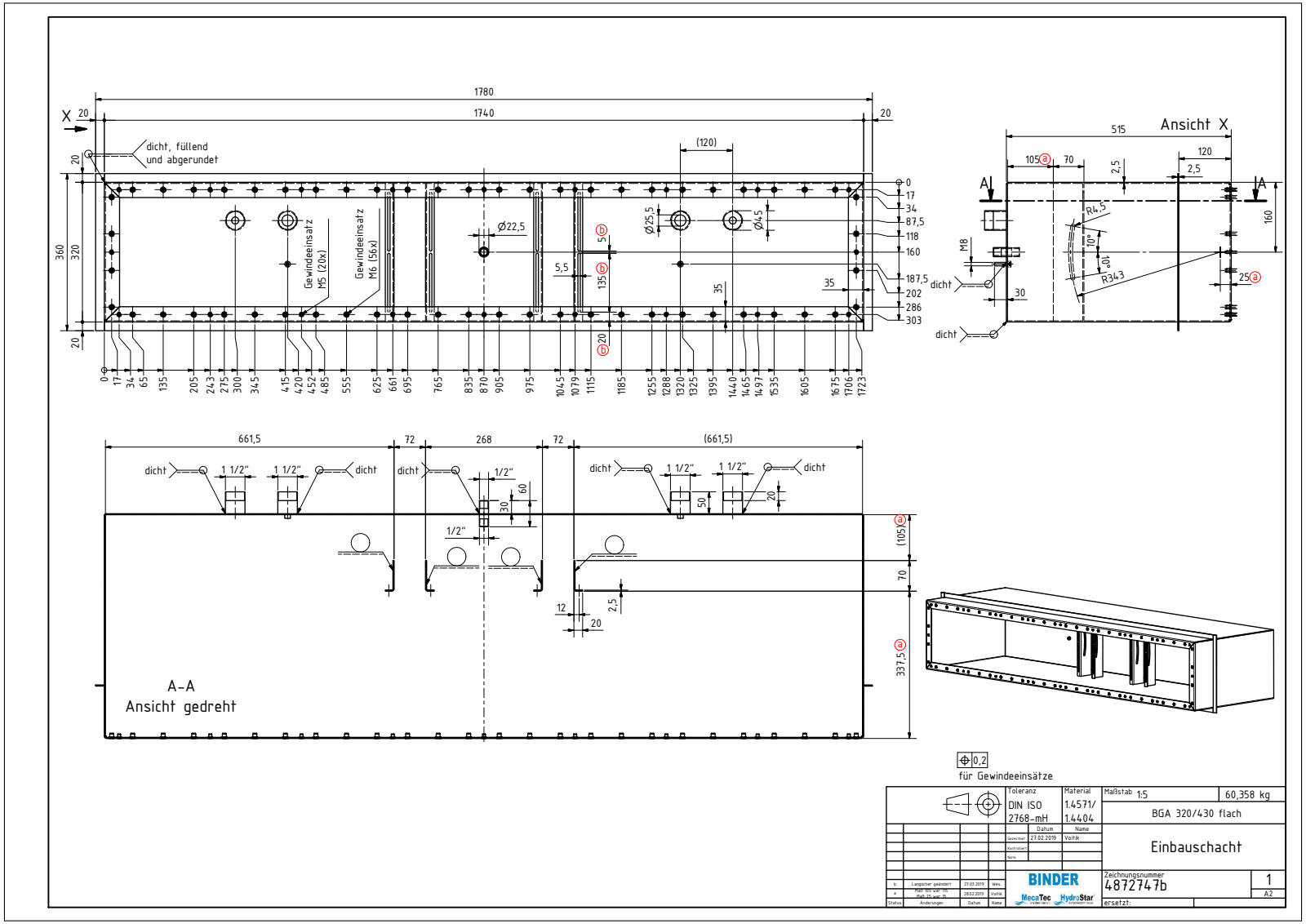


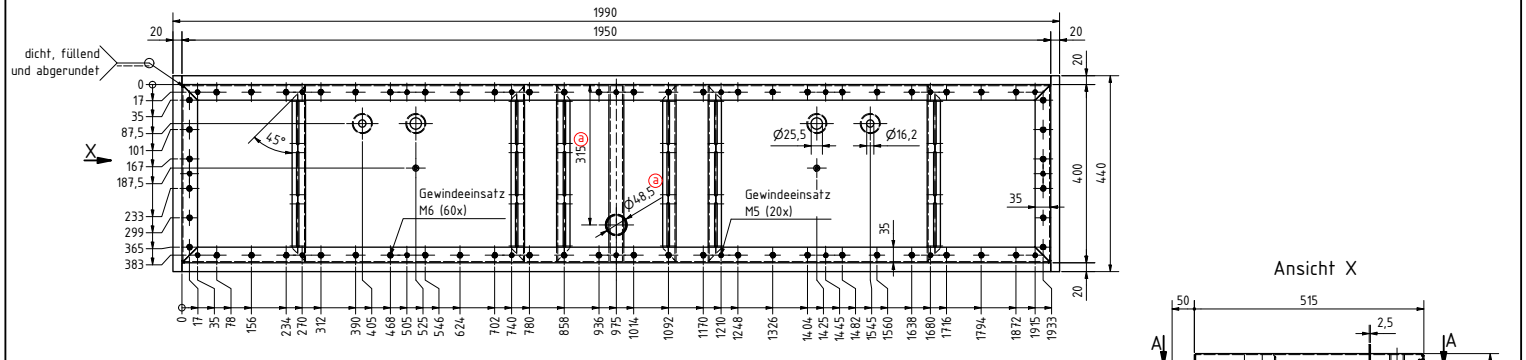


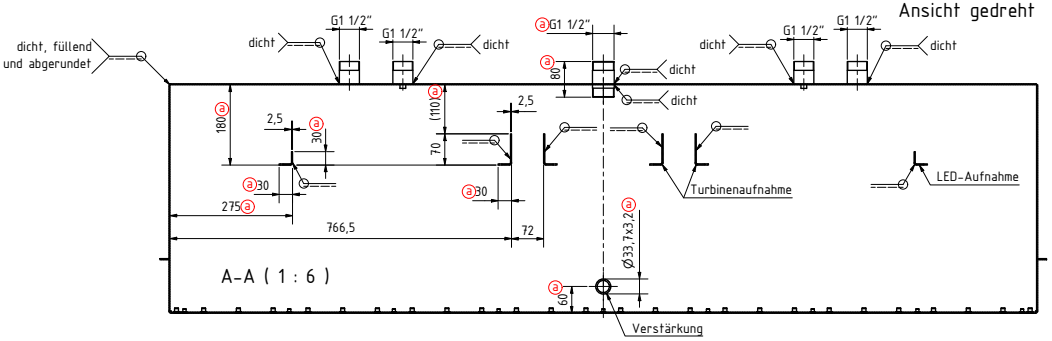
Alle Schweißnähte dicht und ringsumverlaufend,
mit Außnahme des Mauerkragens,
hier ringsum geheftet.

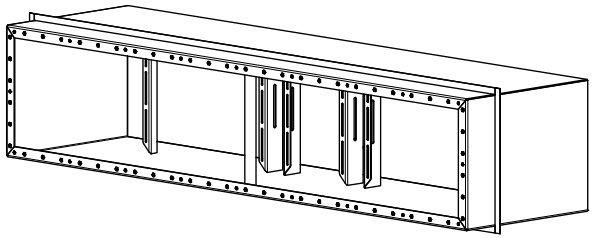
⌖ 0,2 Zur Herstellung CAD-Modell heranziehen.
für Gewindeeinsätze

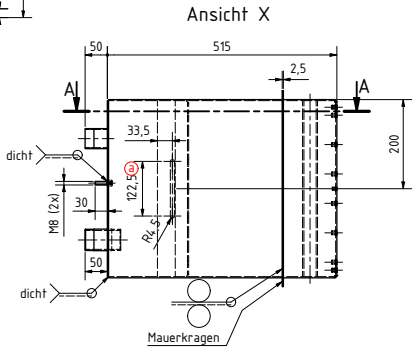
Toleranz: DIN ISO 2768-mH	Material: 1.4571/ 1.4404	Maßstab 1:6	61,676 kg		
		BGA320/430/550			
		Einbauschacht			
BINDER MecaTec HydroStar		Zeichnungsnummer 4872739c	1		
		ersetzt:	A2		


1780
1740
20
X
dicht, füllend
und abgerundet
(120)
Ø22,5
Ø25,5
Ø45
Gewindeeinsatz
M5 (20x)
Gewindeeinsatz
M6 (56x)
5,5
35
360
320
0
17
34
87,5
118
160
187,5
202
286
303
0 17 34 65 135 205 243 275 300 345 415 420 452 485 555 625 661 695 765 835 870 905 975 1045 1079 1115 1185 1255 1288 1320 1325 1395 1440 1465 1497 1535 1605 1675 1706 1723
Ansicht X
515
105
70
120
2,5
2,5
M8
dicht
dicht
30
R4,5
10°
Ø10
R343
160
25
661,5
72
268
72
(661,5)
1 1/2"
1/2"
60
30
50
20
(105)
70
337,5
12
2,5
20
A-A
Ansicht gedreht
0,2
für Gewindeeinsätze
Toleranz
DIN ISO
2768-mH
Material
1.4571/
1.4404
Maßstab 1:5
60,358 kg
BGA 320/430 flach
Einbauschacht
Datum
Name
27.02.2019
Voihk
BINDER
MecaTec
HydroStar
Zeichnungsnummer
4872747b
1
A2
ersetzt:







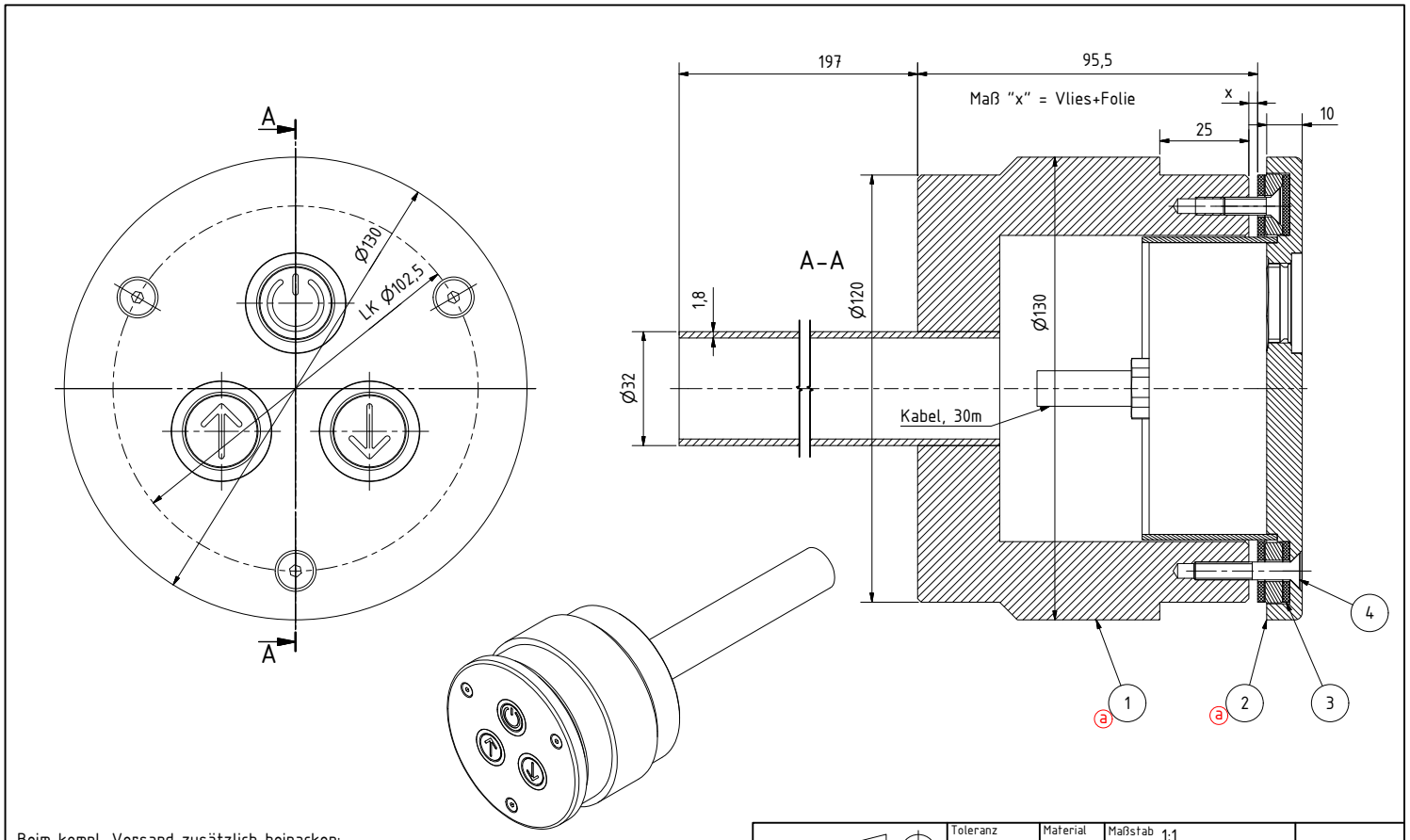


Alle Schweißnähte dicht und ringsumverlaufend,
mit Außnahme des Mauerkragens,
hier ringsum geheftet.

Zur Herstellung CAD-Modell heranziehen.

⌖ 0,2
für Gewindeeinsätze

Toleranz DIN ISO 2768-mH	Material 1.4571	Maßstab 1:6	74,172 kg		
		BGA 550 flach			
	Datum	Name			
Gezeichnet	28.03.2019	Wesolowski	Einbauschacht		
Kontrolliert					
Norm					
BINDER MecaTec HydroStar			Zeichnungsnummer 4872770a	1	
			ersetzt:	A2	
a Konstruktiv geändert 25.07.2019 Voithk					
Status Änderungen Datum Name					



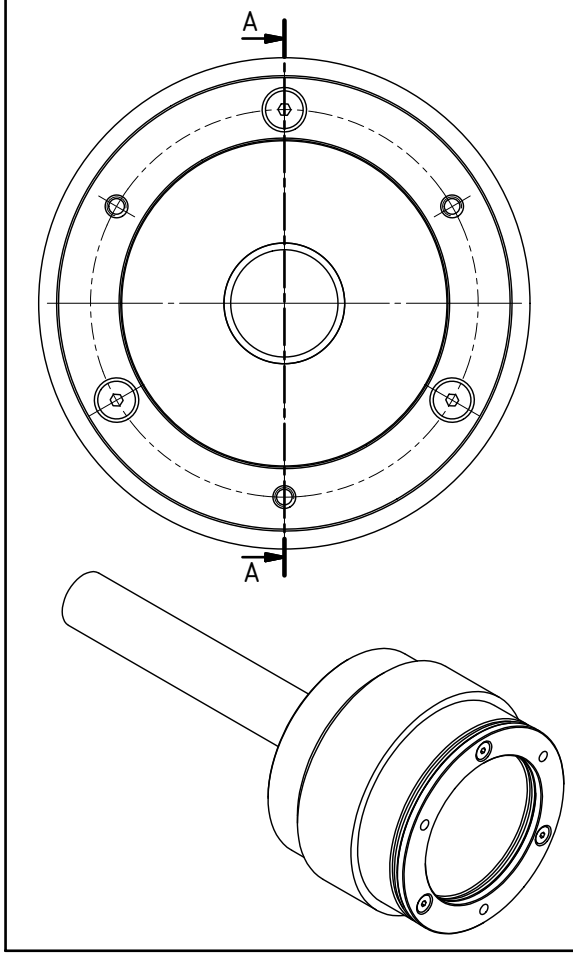
Beim kompl. Versand zusätzlich beipacken:

- 3x Senkkopfschraube DIN 7991-M5x30, A4 (5300436)
- 3x Senkschraube DIN 963-M5x40, PVDF natur (5300214)

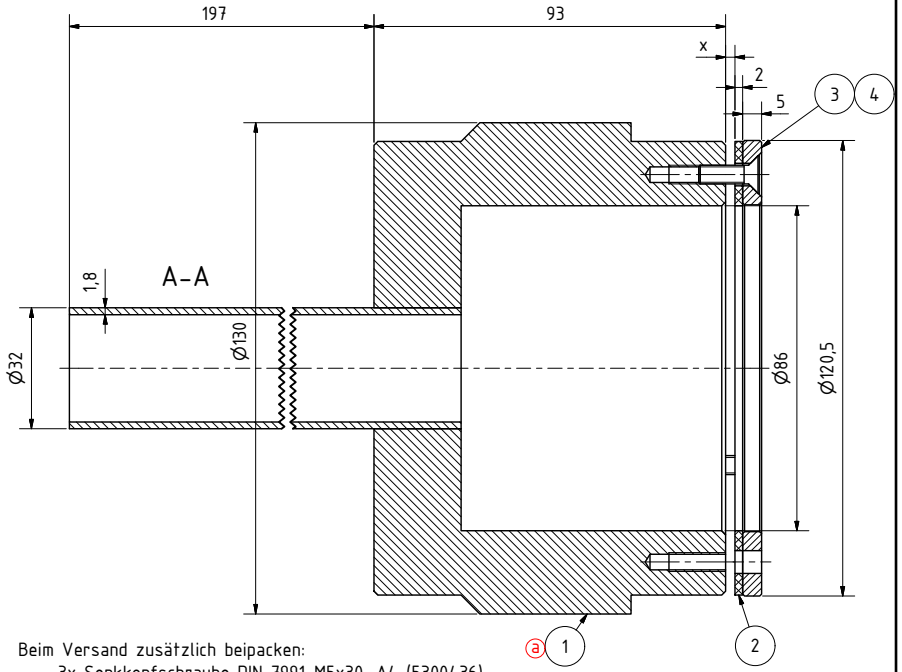
Pos.	Menge	ID-Nr.	Bezeichnung	Kategorie
4	3	5300436	Senkkopfschraube DIN 7991-M5x30, A4	
3	1	5300232a	Dichtung für Steuergerät, 2. Ebene	
2	1	5000621a ⓐ	ZSB Bedienfeld	Baugruppe
1	1	5000595b ⓐ	ZSB Piezo-Gehäuse, rund	Baugruppe

Status	Änderungen	Datum	Name
a	Pos.1 u. Pos.2 geändert	11.01.2019	Voitik

Toleranz: DIN ISO 2768-m-H
Material:
Maßstab 1:1
BGA-Steuergerät - Folienbecken
ZSB HydroStar Piezo Tri
Gezeichnet: 03.07.2018 Voitik
Kontrolliert:
Norm:
BINDER
MecaTec HydroStar
Zeichnungsnummer 5000620a
1
A3
ersetzt:



Maß "x" = Vlies+Folie



Beim Versand zusätzlich beipacken:
- 3x Senkkopfschraube DIN 7991-M5x30, A4 (5300436)

Pos.	Menge	ID-Nr.	Bezeichnung	Kategorie
4	3	5300551	Senkkopfschraube DIN 7991 - M5x16, A4	
3	1	5000592c	Druckflansch f. Steuergerät	
2	1	5300226a	Dichtung für Steuergerät, 1. Ebene	
1	1	5000666a	ZSB Gehäuse, inkl. Kabeldurchführung ⓐ	Baugruppe

Toleranz: DIN ISO 2768-m-H
Material:
Maßstab 1:1

	Datum	Name
Gezeichnet	26.06.2017	Voitik
Kontrolliert		
Norm		

PIEZO Tri - Folienbecken

ZSB Piezo-Gehäuse, rund

BINDER
MecaTec HydroStar

Zeichnungsnummer 5000595b
1
A3
ersetzt:

Status	Änderungen	Datum	Name
a	Pos.1 konstruktiv geändert, ausgelegt als Spritzgussteil	11.01.2019	Voitik

BINDER

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Fax: +49 (0) 5151 / 96 266 - 49