

Innovations for clean water



## ATB – HBA(-C)

# Installation/Operating Instructions

# !!! IMPORTANT !!!

## PRIOR TO USING THE UNIT

- Anybody involved MUST imperatively read and fully understand the unit's O&M manual.
- It is most important that the O&M manuals remain with the operator for future reference.

## GENERAL

- No foreign objects such as hard materials, plastic bags, etc... are allowed in the basins. These objects can cause extensive damage and/or for example create unbalances to the impeller.

## PLEASE NOTE:

- The following information refers to the standard execution of the aerators. In the case of special versions, which can be identified as such by the product designation, deviations may occur. If necessary, this manual can be supplemented with additional information.
- As our products are subject to continuous development, the technical specifications in the tables are to be regarded as non-binding. ATB Water reserves the right to introduce technical changes to its products without prior notice.
- Failure to comply with the information contained in these documents, misuse or unauthorized alteration of the product will void the warranty.

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## 1. Safety regulations



We will mention, in this chapter, the major kind of risks and dangers that might occur and the safety precautions to be taken.

- As mentioned in our declaration of conformity, our submerged aerator can only be used when the installation, into which it needs to be incorporated, is declared conform to the Machinery Directive.
- Devices with motors without explosion protection must never be operated in basins with explosive media.
- Unauthorized personnel must leave the working area of the unit!
- The installation, maintenance, repair or dismantling of the device must be carried out by qualified personnel who have the appropriate qualifications and are equipped with suitable tools. Operation may also be carried out by non-specialised personnel provided that they are fully familiar with the contents of this manual and all other documents supplied with the product.
- All electrical parts must be installed and connected in accordance with the European Standard EN 60204 for the electrical equipment of machines.
- During the installation of the device in the tank, individual steps must be taken to protect the personnel. This applies in particular to the use of suitable protective clothing. In principle, all applicable accident prevention regulations must be observed. Specifically make sure that the oxygen concentration is sufficient and that no toxic gases are present in the working area.
- Before welding or using an electric tool, make sure that there is no risk of explosion.



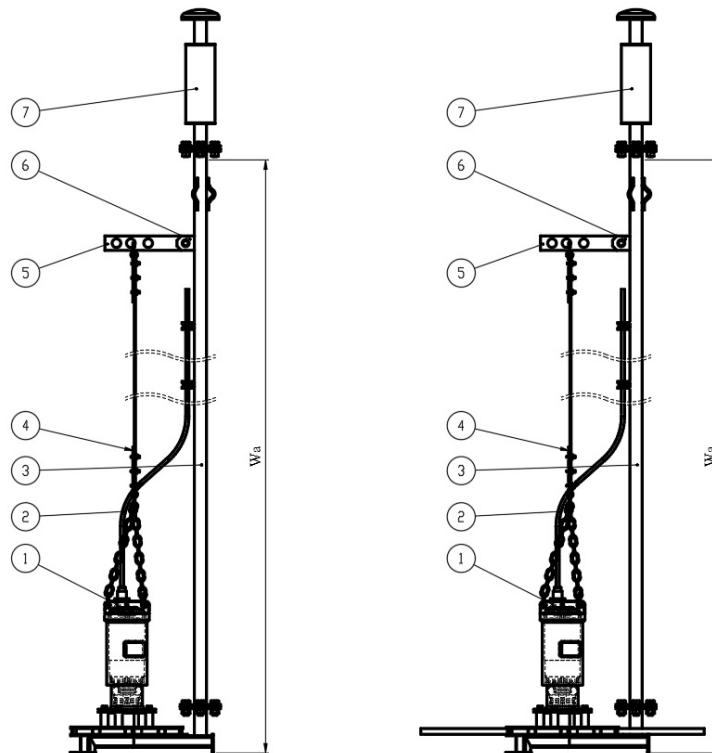
When working on the electrical system or during maintenance and repair works, it must be ensured that the circuit breaker is switched off and locked.

- Suitable safety measures must be taken at all times to ensure that no person can fall into the water.
- A second person must be involved in all works on the electrical system or maintenance and repair works.
- For safety reasons, but also to avoid exclusion of warranty, the aerator must not be operated in the event of faults or changes in performance.

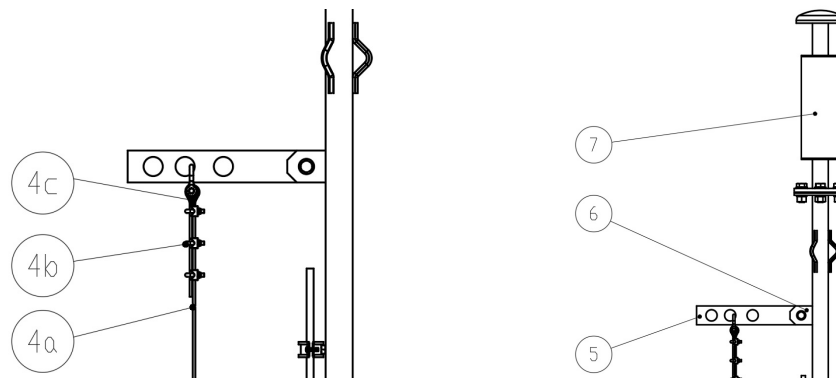
**ATB WATER GmbH is not responsible for any kind of incidents.**

## 2. Product overview

### 2.1. Description



*Drawing 1: Type HBA (left) and HBA-C (right)*



*Drawing 2: Cable and clamps (left) and lifting bracket (right)*

Legend for drawings 1 and 2:

- 1 = Fixation zone of the motor chain
- 2 = Electric cable or cables
- 3 = Intake pipe
- 4 = Lifting kit
  - 4.a = Rope
  - 4.b = Clips
  - 4.c = Thimble
- 5 = Lifting bracket
- 6 = Plate for fixing the lifting bracket
- 7 = Silencer

## 2.2. Working principle

The submersible aerators type HBA and HBA-C consist of a submersible motor, which drives an impeller. The rotation of the impeller creates a vacuum inside the unit, which draws air into a suction chamber. The air and the liquid are mixed in the chamber and pushed into the ejection channels and ejected with a radial discharge, whereby the medium in the tank is aerated and mixed.

The electric motor is a submerged three-phase asynchronous cage motor with IP68 degree of protection, insulation class F or H, suitable for continuous operation (S1).

Starting from type HBA-040 and for all larger devices the motor will be equipped with the following protection devices:

- Thermal protection devices
- Electrode to detect water in the oil chamber.

Smaller motors up to 3 kW can be optional (on demand) equipped with thermal protection devices while oil leakage sensors are not available.

The aerators can be installed without the aid of any anchoring and supporting structure. The machine's own weight and low centre of gravity generally ensures high stability. Under special operating conditions, however, the aerator could eventually start to move. In such cases, the intake pipe is anchored to the pool edges with 3 ropes to fix the aerator (see Drawing 5).

A lifting cable, which can be attached to the engine and intake pipe, allows easy removal and repositioning of the aerators without the use of operating bridges or platforms or emptying the tank.

## 2.3. Exclusion of fields of application

The aerators of the HBA and HBA-C series are generally **not** suitable for the following applications or operating conditions:

- Dry operation or operation in which the motor with the liquid to be aerated is not completely submerged;
- Aeration/mixing of liquids with a temperature exceeding 40°C;
- Water depth exceeding the highest values in table 1;
- pH value of the liquid to be aerated/mixed outside the range 6 to 8.5 (if other pH values are required, special versions can be manufactured according to customer requirements);
- Aeration/mixing of flammable liquids;
- Operation in potentially explosive atmospheres.

### 3. Receiving and handling

#### 3.1. Receiving and acceptance

Check the goods for completeness and visible damage before unloading.

Any damage caused during transport must be reported immediately. The scope of delivery must be compared with the information on the delivery note. Before confirming receipt of the delivery by signature, the relevant remarks must be noted.

In the event of damage or the discovery of missing or incorrect accessories, ATB must be notified immediately in writing.

#### 3.2. Handling (loading/unloading)

Be careful when handling this type of heavy, precision equipment to avoid damage to it or other equipment, or injure any person involved. Persons that are not directly involved in loading/unloading should be kept out of the handling area.

The lifting equipment used should have been inspected and approved by an official authority prior to unloading the truck in order to allow safe handling.

The eyebolts or the handle for lifting the aerator are located on the upper part of the motor. The centre of gravity of the aerator without intake pipe is close to the vertical axis due to the radial geometry of the aerator. Due to the design of the unit, the centre of gravity is in the lower part of the unit. When the intake pipe is mounted, the centre of gravity of the aerator is placed in the direction of the intake pipe but remains between the eyebolts.

When handling the aerator, a distinction must be made between 3 cases:

1. dispatch and acceptance of the unit
2. handling with intake pipe and non-mounted extended channels (if fitted), i.e. moving the aerator on the premises of the treatment plant;
3. handling with intake pipe and already mounted extended channels (if any), i.e. moving the aerator for installation in the tank.

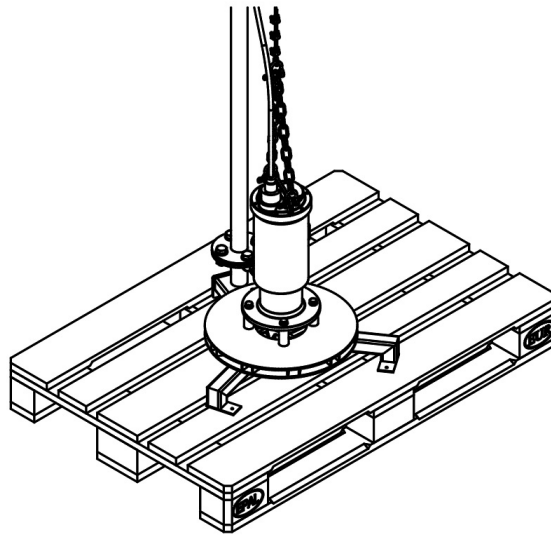
##### **Case 1:**

During shipment and acceptance, the aerator must be placed on a pallet with an appropriate load capacity. It must be protected with a packaging foil or packed in a wooden box.

The aerator is supplied with two iron brackets attached to the pallet (see Drawing 3).

To separate the aerator from the pallet, remove the screw connecting each bracket to the aerator foot.

Finally, remove the mounting brackets from the pallet by removing the mounting screws. Keep the mounting brackets in case the aerator will have to be transported again in the future.

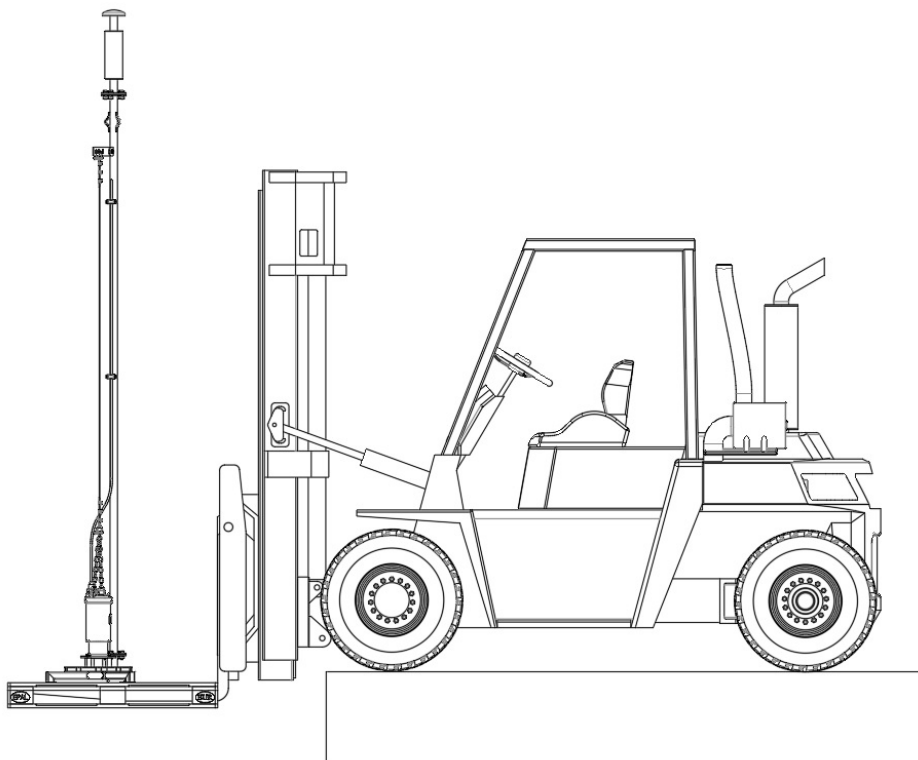


*Drawing 3: Removal of the device fastenings on the pallet*

**Case 2:**

If you lift and move the aerator inside the wastewater treatment plant, use the special handle to move it with sufficient force for the weight of the unit without accessories and lifting gear. When handling with forklift trucks, position the forks parallel to the suction chamber and take care not to crush or break the chamber itself (see Drawing 4). Always place the aerator on a firm surface with applicable load-bearing capacity.

Check the weights and dimensions of the aerator.



*Drawing 4: Handling on the wastewater treatment plant*



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### **Case 3:**

For handling during installation of the aerator in the tank, all accessories required for operation must already be installed (see below). The entire unit must then be lifted by means of a crane with the appropriate lifting capacity.

While lifting the aerator with the intake pipe fitted, the unit may sway slightly. However, it is impossible for the unit to tip over. The use of the sling bar (see Drawing 2) minimises the inclination of the assembly aerator + intake pipe unit when particularly long intake pipes are present.



Take care not to damage the electrical cable when moving the device. It is explicitly forbidden to pull the device by the electric cable!

Do not bend the cable (bending radius > 5 times cable diameter). The open cable end must never get into contact with water and must be protected from weather influences.

## 4. Assembly

### 4.1. Preliminary work / instructions / installation of the aerator



For safety reasons, the device must always be installed by at least 2 persons.

- Make sure that the aerator has not been damaged during transport.
- Check the horizontal orientation of the aerator's footprint. The aerator should be installed as vertically as possible. Using the aerator in a non-vertical position could cause considerable damage to the rotating parts.
- Do not immerse the end of the cable. In addition, the aerator must never be lowered by means of the electric cable, but only by means of the steel cable provided for this purpose. Such unauthorized actions could cause water to enter the cable, break the inner conductors or damage the motor.
- Only qualified personnel may extend the power cable if necessary.
- The water depth has a considerable influence on the operating conditions of the motor. The bigger the water depth, the higher will be the load on the motor.
- The maximum water depth indicated in table 1 must not be exceeded under any circumstances. However, after consultation with ATB, deviations are possible, and ATB will adapt the aerator accordingly.

<b>Aerator</b> Type	<b>Power</b> [kW]	<b>Maximum Water Depth</b> [m]
HBA-008	0,8	2,50
HBA-015 (-C)	1,5	2,50
HBA-030 (-C)	3,15	3,50
HBA-040 (-C)	4,0	3,50
HBA-055 (-C)	5,5	5,00
HBA-075 (-C)	7,5	5,00
HBA-090 (-C)	9,0	6,00
HBA-110 (-C)	11,0	6,00
HBA-150 (-C)	15,0	6,50
HBA-185 (-C)	18,5	6,50
HBA-220 (-C)	22,0	6,50
HBA-300 (-C)	30,0	7,00
HBA-370 (-C)	37,0	7,00
HBA-450 (-C)	45,0	8,00
HBA-550 (-C)	55,0	8,00
HBA-750 (-C)	75,0	8,00

*Table 1: Maximum permitted water depth*

- In addition, make sure that the aerator motor is constantly submerged. Otherwise the motor could overheat and be damaged.

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- The aerators should preferably be installed in square or round containers. For oblong rectangular tanks, it is recommended to use several aerators with lower capacity. Alternatively, additional mixers can be used to avoid partial formation of dead zones. Before starting to install the unit in the tank, we strongly recommend that you submit an installation plan to ATB for approval in order to avoid incorrect positioning.
- After a long period of inactivity of the aerator, the oil quantity should be checked.
- When an aerator is put back into operation after a break in operation, it should also be checked that there are no foreign bodies and/or water in the oil. The emptied oil must be disposed of in accordance with the applicable regulations.



Before electrically connecting the aerator, check by hand that the impeller is free to move and rotates easily. Under no circumstances should this check be carried out when the aerator is connected to a power supply.

- After this check and the installation of the aerator on an appropriate surface, the electrical and thermal protection devices must be connected by qualified electricians.



**If the thermal protection device and the oil chamber control are not or poorly connected, any warranty claims will be refused.**

- Check by inspection the correct direction of rotation of the motor (clockwise in top view). You should be at least one meter away from moving parts, wear suitable protective clothing and do not touch the aerator.

## 4.2. Assembly and installation

### 4.2.1. Mounting the extension channels (HBA-C only)

The models of the HBA-C series are equipped with extension channels. For transport reasons these are not assembled for delivery. Before installing an aerator, these channels must be mounted on the ribs emerging from the plate.

### 4.2.2. Mounting the intake pipe and the silencer (optional)

Assemble the intake pipe and, if necessary, the silencer using the flange connection provided (for types up to and including 3 kW engines: screw connection "1 1/4").

### 4.2.3. Assembly of the lifting device supplied by ATB (optional)

Please note: The numbers used refer to drawing 1 and 2.

- Fit the sling bar (6) to the intake pipe (3) using the collar (7). For the types with engine up to 3 kW inclusive (i.e. with intake pipe 1 "1/4"), the collar is replaced by two welded ribs.



If correctly installed, the bracket must be foldable upwards (see arrow in Drawing 2).

- The recommended distance T1 is 200 to 250 mm.
- Provide each end of the rope (5.1) with the supplied clamps (5.2) and thimbles (5.3).

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- Then attach one end to the aerator handle and the other end to the sling bar.



The clamps should be mounted with the saddle on that part of the rope that is under tension and the bracket on the other part of the rope. The distance between 2 clamps should be 1.5 to 3 times the width of the clamp (see Drawing 2). Refer to Table 2 for rope diameter, minimum number of clamps for each end, and recommended length LR.

- The rope must be mounted in such a way that it is almost tensioned.



A suitable lifting device must be connected to the ring (8) to lift the aerator + suction pipe unit. The bracket then folds upwards and tensions the pull cable.



If the lifting device supplied by ATB is not used, the customer/installer must provide an appropriate device with rope or chain. This device must be attached on one side to the handle of the aerator and on the other side to a point outside the tank intended for later removal of the aerator. The choice and dimensioning of such alternative lifting devices are the exclusive responsibility of the customer/installer.

Aerator Type	Power [kW]	Rope diameter [mm]	Minimum number of clamps for each end	Recommended mounting length [mm]
HBA-008	0.8	4	3	220
HBA-015 (-C)	0.15			
HBA-030 (-C)	3,15			
HBA-040 (-C)	4,0			
HBA-055 (-C)	5,5			
HBA-075 (-C)	7,5			
HBA-090 (-C)	9,0			
HBA-110 (-C)	11,0	6	3	300
HBA-150 (-C)	15,0			
HBA-185 (-C)	18,5			
HBA-220 (-C)	22,0			
HBA-300 (-C)	30,0			
HBA-370 (-C)	37,0			
HBA-450 (-C)	45,0	8	3	350
HBA-550 (-C)	55,0			
HBA-750 (-C)	75,0			

*Table 2: Rope and clamps*

#### 4.2.4. Installation of the power cable

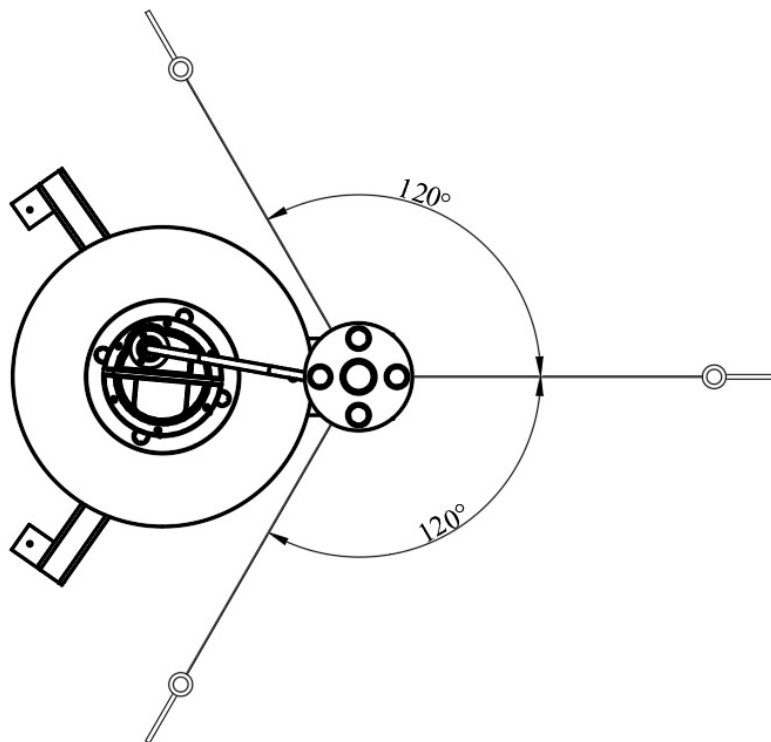
The power cable must be attached to the intake pipe using the clamps provided.



The cable must not be under tension or bent. Only clamps without cut edges may be used, or protective devices must be used between the cable and the clamps. The clamps must not be tightened too much to prevent damage to the cable. The cable must always be protected from sharp surfaces and/or sharp edges.

#### 4.2.5. Installation of the aerator in the tank

- Simply lower the aerator to the intended position and place it on the bottom of the tank.
- Gently pull out the power cable so that it runs along the shortest route. If necessary, use floating buoys to hold the cable.
- If there is a risk of the aerator shifting during operation, it is recommended to anchor the aerator with ropes (see Drawing 5).



*Drawing 5: Recommended mooring*

## 4.3. Instructions for electrical connection

### 4.3.1. General instructions



The aerator motor housing must not be opened. However, if this is necessary, such work may only be carried out by qualified personnel.

The electrical connection may only be carried out by qualified electricians in compliance with all applicable accident prevention regulations.

The switch cabinet should be protected by RCD (protection against possible insulation damage of the motor).

The motors are usually operated at 400 V. For other supply voltages, please contact ATB.

Complete the grounding connections using the yellow and green conductor of the power cable. In case of a double power cable for the star-delta starting, connect to the grounding both yellow and green conductors.

Check the correct running of the power cable and the signal cable connections.



**ATTENTION:**

When carrying out tests to check the motor operational conditions, the motor can work out of the water for no more than ten minutes.

Depending on the device supplied, the motor is connected either directly (DOL) or via star-delta. If the supply cable has 7 wires, the connection can only be made directly. However, if the cable has 10 wires or 2 cables, the connection can be made either directly or via star-delta.

To continue the cable from the on-site terminal box on the basin wall, a cable with at least the same number of wires and at least the same conductor cross-section must be used. Please contact ATB directly for order-specific technical data of the cable.



Before connecting the aerator, always check that the connection type, voltage and frequency correspond to the information on the nameplate of the device!

Since the aerator motor is a submersible motor, it is necessary to ground the motor. The yellow-green wire must be used for this purpose. When connecting the motor, all green-yellow grounding cables must be connected first. When disconnecting the motor, these grounding cables must be the last to be disconnected.

The free cable ends must never be immersed in a liquid. They must neither become damp nor be exposed to the weather without adequate protection.

Please note that the starting current for direct starting exceeds 6 times the nominal current, while for star-delta starting it exceeds 2 times the nominal current. Therefore, check that the fuses are rated for the above starting current.



**Engines with more than 4 kW are equipped with a leakage sensor. This sensor MUST be connected by the customer to an evaluation relay, otherwise the warranty claim expires. The corresponding relay can be obtained from a specialist electrical dealer or on request from ATB.**

#### 4.3.2. Control panel

The control panel must be equipped with a normal motor protection switch for direct starting. For star-delta connection, the control cabinet must be equipped with a star-delta starter with motor-protective circuit-breaker relay.

When working on the control panel, make sure the main disconnect has been switched off and locked in this position. Also make sure that all other machines installed in the same basin have been switched off.



**IMPORTANT:**

It is mandatory to connect the PTO and the leak detection (if available) in such a way that the equipment will automatically and directly be stopped when over temperature or moisture ingress is detected (see below for the connection of the moisture detection relay to motor).

If, for any reason, the delivered relay (if ordered) would not coincide with the relay referred to in enclosure, please contact ATB before connecting the relay, to verify the right connection.

Thermal protector switch (PTO) – Standard available only from 4 kW (on request for smaller motors):

When reaching the limiting temperature, the switch opens the control circuit. The NC-switch closes the circuit again when the temperature decreases under the limit temperature.

Contact rating: 1,6A for 250V AC.



All motors from 4 kW are standard equipped with such thermal protector switch, which needs to be connected imperatively. The temperature detector (PTO) has to be connected in such a way that the motor is stopped when the temperature reaches the limiting temperature.

Leak detection– Standard available only from 4 kW:

In the oil chamber of the submersible motor, a leak detection probe is mounted. If the mechanical seal of the motor would leak, water will penetrate the oil chamber and reduce the electrical resistance of the oil.

Once the electrical resistance reaches a certain level, a detection relay which can be ordered at ATB, will automatically stop the motor or indicate an alarm signal on the control panel.



The use of the provided leak detection is **MANDATORY!** The moisture detection relay must imperatively stop the motor when water ingress has been detected.

Direct start:

The motor-protective circuit-breaker must be set to the value on the type plate.

Star-delta:

The thermal protection must be set to 0.58 times the nominal current printed on the type plate.

If the motor-protective circuit-breaker trips during operation of the aerator, the fuses must be checked before attempting a new start. However, this new attempt must only be made after the cause of the fault has been established and rectified. If necessary, contact ATB.

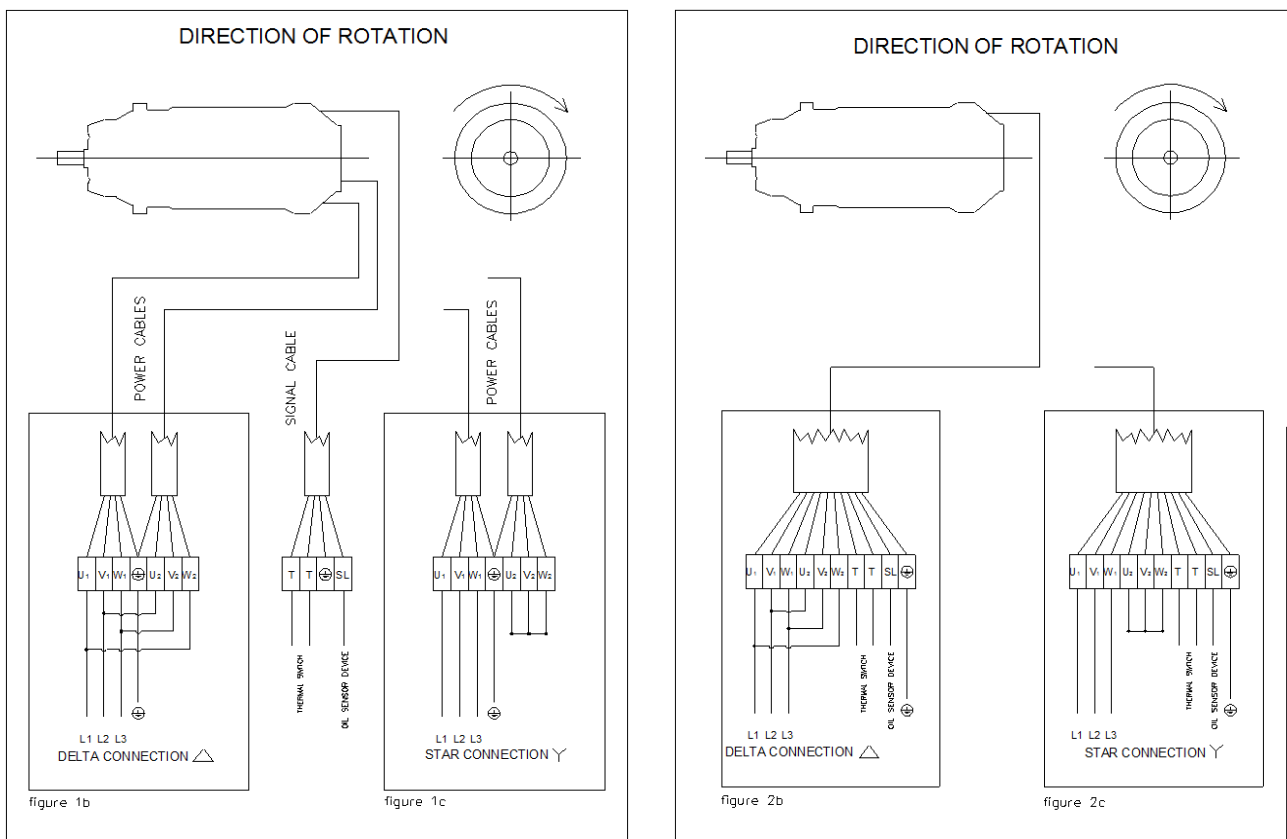


**If the thermal protection device and the oil chamber control are not connected or are connected incorrectly, the warranty claim expires.**

### 4.3.3. Direction of rotation

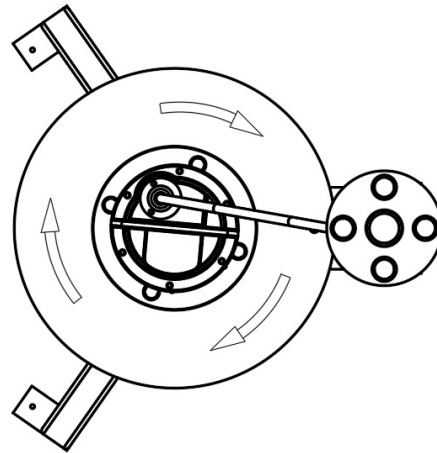
When the phase power conductors L1, L2 and L3 are connected respectively to the terminals **U**, **V** and **W**, the motor shaft will turn clockwise (from the shaft exit side).

If the connection between any two terminals is inverted (ex: L1, L2, L3 are connected respectively to **V**, **U**, **W**), the motor shaft will turn counterclockwise (see Fig. 1 – 2). In case of a double power cable for the star-delta starting, or for unique ten conductors cable, **U1**, **V1**, **W1** shall indicate the winding start, while **U2**, **V2** and **W2** shall indicate the winding end (see Fig. 1 – 2).



The direction of rotation of the motor must be checked after each new connection or after each power interruption (see Drawing 6).





*Drawing 6: Direction of rotation of the motor*

The impeller should rotate clockwise in top view. Check the direction of rotation before re-installing the aerator in the tank by connecting it to the power supply. If the direction of rotation is incorrect, the aerator will not draw in air and the motor will have an increased current consumption. In this case, two wires of the supply cable must be interchanged on the control cabinet.

#### **4.3.4. Delta connection**

Connect (Fig. 1b – 2b):

L1 line to the U1 and W2 clamps,

L2 line to the V1 and U2 clamps,

L3 line to the W1 and V2

Through this connection the motor shaft will turn clockwise (seen from the shaft exit side).

#### **4.3.5. Star connection**

Close the U2, V2 and W2 terminals in one single clamp

Supply the U1, V1 and W1 clamps respectively through L1, L2 and L3 (see Fig. 1c – 2c).

The motor shaft will thus turn clockwise (seen from the shaft exit side).

#### 4.4. Start-up



Before start-up, make sure that there are no objects in the basin that can be aspirated by the device and damage it. ATB accepts no liability for such damage. The entry of objects into the basin must be prevented by suitable means such as sieves or screens.

Before the motor is started up make sure that the grounding conductor is well connected and perfectly running. The section and type of cable, and the connections must comply with the existing regulations.

The star-delta starting must be selected and correctly calibrated to avoid faulty operation. Make sure the power cables and the signal cable are tightly anchored in order to prevent it from freely fluctuating in the liquid in which the motor is submersed, to avoid possible damage.

After carrying out all the steps described above, the aerator can be switched on under observation.

If the aerator does not start (impeller does not rotate), avoid repeated attempts to start in order not to damage the unit. Instead, the cause of the fault must be found and eliminated.

With star-delta starting, the duration of the star phase must be short and must never be longer than a few seconds.

## 5. Operation and maintenance

### 5.1. Operation



No special maintenance is required after installation. However, it should always be checked regularly that no solid and/or fibrous foreign matter is blocking the aerator.

The motor must always work submerged in water, which maximum temperature must not be over 40°C.

The motor can work out of the water at full power for maximum 10 minutes. While it runs, make sure that the parameters are kept within tolerable limits.

In particular:

- a) Avoid overload
- b) Avoid dangerous rising of the temperature of the liquid in which the motor is submerged
- c) Avoid voltage drops
- d) Regularly check that the power and signal cables are not in any way damaged.

The motor must be employed exclusively for the applications it is intended for, and must be regularly operated and checked, within the limits provided for by regulations.

In addition, preventive tests must be carried out periodically, depending on the operating conditions of the aerator. In the meantime:

- the electrical insulation of the motor and the supply cable,
- the oil quality
- and the hydraulic status

have to be checked (see 5.2).

Since the rope is immersed and cannot therefore be checked periodically, it is forbidden to stand under or next to the suspended load while the aerator is being removed from the tank.

The condition of the slinging and lifting equipment should also be checked during the periodic inspection of the aerator. It is also advisable to check the condition of the circuit (if fitted) every 6 to 12 months.

If irregularities are found during operation of the aerator, their causes must be found and eliminated.



**Inform ATB immediately about unusual events!**

### 5.2. Maintenance

In order to extend the service life of the aerator, all inspections described in this manual must be carried out at regular intervals. In addition, we explicitly refer to the engine manual in enclosure.



For maintenance and repair work, either the supply cable must be disconnected or the safety switch must be switched off and secured in this position!



Maintenance work and any repairs to the aerator must be carried out exclusively by trained specialised personnel, whereby the personnel must be equipped with suitable tools. In addition, these personnel should have read and understood the contents of this manual and other documents supplied.



**Exceptional maintenance work and repairs which require the opening of the motor housing must only be carried out by ATB or by maintenance partners authorised by ATB! The tightening torques in Table 3 must be observed.**

Screw diameter	Without lubrication (coefficient of friction $\mu_{tot}$ 0.40)		With lubrication (coefficient of friction $\mu_{tot}$ 0.20)	
	$F_{vmax}$ [kN]	$M_A$ [Nm]	$F_{vmax}$ [kN]	$M_A$ [Nm]
M 3	-	-	0,65	1,1
M 4	1,6	3,3	2,4	2,6
M 5	2,62	6,6	3,93	5,1
M 6	3,7	11,3	5,54	8,8
M 8	6,8	27,6	10,2	21,4
M 10	10,8	56	16,2	44
M 12	15,8	96	23,7	74
M 14	21,7	152	32,6	119
M 16	44,9	237	44,9	183
M 18	37,5	334	56,2	260
M 20	48,4	479	72,4	370
M 22	-	-	88	488
M 24	-	-	101	608

$F_{vmax}$  [kN]: preload force       $M_A$  [Nm]: tightening torque

Tightening torque reference values for A2-70 class screws in accordance with ISO 3506.

*Table 3: Fastener tightening torques for opening and closing of motor housing*

### 5.2.1. Leakage test

This checking should take place at least once a year. If the aerator is operated under difficult conditions, the frequency of testing should be increased.

- Check that there has been no unusual liquid penetration into the seals.
- Also check that no liquid has penetrated into the stator housing or oil chamber.
- If the aerator is new or the seal has been replaced, it is advisable to repeat the test after one week of operation.



If liquid has penetrated through the seal, the oil chamber may be under pressure. To prevent oil from splashing out, it is recommended that the oil chamber plug is held in place with a rag as long as it is opened.

### 5.2.2. Oil check



If liquid has penetrated through the seal, the oil chamber may be under pressure. To prevent oil from splashing out, it is recommended that the oil chamber plug is held in place with a rag as long as it is opened.

To check the oil level in the seal housing chamber or change the oil proceed as follows:

- a) Place the motor horizontally in a safe location, on a sturdy support, with the filling/discharge cap in an upwards position;
- b) Remove the cap and the gasket and slowly rotate the motor so that the filling/discharge hole is turned downwards;
- c) Let the oil flow out and collect it in a clean container in order to check its quality;
- d) If the oil is clear, fill the chamber with new oil. Change the gasket before closing the cap. If the oil looks emulsified (with evident water traces or other impurities) or the amount is sensibly lower than the correct amount, it is necessary to substitute the upper and lower mechanical seals.

If the oil is slightly grey-yellow and viscous or if there is water in the oil, this indicates damage to the seal bearing or seal, which must therefore be replaced. In this case, the aerator must be taken to a repair workshop for a complete overhaul.

To prevent any penetration, the breather and oil chamber filler plugs must be tightened well. The washers must be replaced.

**Such work should only be carried out by ATB or by maintenance partners authorised by ATB!**



**ATTENTION:**

When pouring new oil do not exceed the set level, which is 25 mm below the cap gasket support surface.

Aerator [Type]	Power [kW]	Oil quantity [l]
HBA-008	0,8	0,275
HBA-015	1,5	0,275
HBA-030 (-C)	3,15	0,4
HBA-040 (-C)	4,0	1,05
HBA-055 (-C)	5,5	1,05
HBA-075 (-C)	7,5	1,05
HBA-090 (-C)	9,0	1,05
HBA-110 (-C)	11,0	1,05
HBA-150 (-C)	15,0	2,3
HBA-185 (-C)	18,5	2,3
HBA-220 (-C)	22,0	2,3
HBA-300 (-C)	30,0	2,7
HBA-370 (-C)	37,0	2,7
HBA-450 (-C)	45,0	2,7
HBA-550 (-C)	55,0	2,7
HBA-750 (-C)	75,0	2,7

*Table 4: Oil quantity (in liter)*

## Installation/Operating Instructions ATB – HBA(-C)

To change oil, use only:

- VALVOLINE ETC HL 32 (ISO VG 32), or
- Mineral base oil with ISO 32 viscosity, that is, equal to 3 degrees Engler at 50°C, or
- Car motor oil with 10W

Do not disperse the oil in the environment after use.

### 5.2.3. General overhaul

Regular inspections and preventive maintenance measures ensure the continuous and safe operation of the aerator. However, since ball bearings are present in the aerator, a general overhaul must be carried out every three years.

Remove the aerator from the basin using the steel cable provided for this purpose. Neither bolts nor screws have to be loosened.

Clean the aerator with a water jet.

The aerator must then be taken to a specialised workshop for a general overhaul.

Remove the aerator, clean all sealing surfaces and check that they are in good condition. Replace any damaged parts, clean and lubricate the ball bearings. If water is mixed with oil or if there is water in the stator housing, the lower sealing bearing must be replaced.

**Such work should only be carried out by ATB or by maintenance partners authorised by ATB!**

### 5.2.4. Checking the insulation of the motor

Check the stator winding insulation with a direct voltage insulation tester (Megaohmmeter, or Megger).



**Please note:**

This check-up procedure must always be completed before installing after long storage or long inactivity periods.

The procedure is as follows:

Disconnect the motor power cables from the fuse board and, through the free terminals, measure the insulation both of the cable and the motor. It shall have to be greater than the values reported in the following table (*Table 5*)

The test must be performed both between phases and between phase and mass.

In case the resistance is lower than 10 MΩ, disconnect the motor cable completely and perform separate measurements in order to determine whether the cable must be replaced or the motor has to be repaired.

If the motor has to be repaired, the causes are to be attributed to humidity and/or dirt.

To fix any damage the motor must be disassembled and cleaned. The stator must be dried in an oven between 80° and 120° for at least eight hours.



**ATTENTION:**

Windings should be discharged immediately after measurement to avoid risk for electric shock.

## Installation/Operating Instructions ATB – HBA(-C)

After the windings are cleaned and dried, insulation test must be repeated, as above described. A correct measurement of the insulation resistance is possible only after it is cooled down, reaching room temperature (between 20°C and 30°C).

Carefully follow operational instructions for the insulation tester (Megger) specifically used. As a general rule the minimal and critical insulation resistance measurement (taken approximately at a temperature of 20°C) is indicated as follows (*Table 5*).

Test voltage	DC 500 V (min. DC 100 V )
Minimal insulation resistance with new, cleaned or repaired windings	$\geq 10 \text{ M}\Omega$
Critical insulation resistance after long operating periods or storage in unfavourable conditions	$\geq 1 \text{ M}\Omega$

*Table 5: Insulation values*

### 5.2.5. Lubrication

The bearings on the aerator are self-lubricating RZ or 2Z permanent bearings. It is therefore not necessary to lubricate them regularly. However, it is advisable to check their wear condition periodically.

**Such work should only be carried out by ATB or by maintenance partners authorised by ATB!**

Loosen the oil cap, pour the oil into a clean container and check. Depending on the engine type, fill the oil chamber with insulating oil (see Table 4 for recommended quantity). Replace the cover. It is recommended to replace the O-ring seal before fitting the cover.

### 5.2.6. Checking the impeller

If a decrease in air intake is found, proceed as follows:

- Make sure that the impeller is not clogged. If necessary, remove any foreign matter in compliance with all applicable accident prevention regulations.
- Replace impeller and/or axle bearing. **If such parts are damaged, contact ATB.**

### 5.2.7. Checking the air intake

Make sure:

- that the intake pipe is not clogged or damaged.
- that the protective grid (if present) is not clogged.
- that the control valve (if fitted) is in good condition.
- that there is no dust on and in the silencer. If the silencer is clogged with dust, wash it.

Such problems can lead to an overload of the engine.

## 6. Storage

Store the device in a dry, smoke-free and clean room.

The device should then be stable on a suitable surface.



Take care not to damage the electric cable when handling the device.

Do not bend the cable (max. bending radius > 5 times cable diameter). The open cable end must never contact with water!

The impeller should be turned by hand once a month to prevent it from getting stuck.

If the device was already in operation before storage, it must be carefully cleaned before storage. Never use hydrocarbon-based cleaning agents for this purpose.

After it's been stored for more than twelve months, check the conditions of the bearings grease and the oil level in the mechanical seals.



## 7. Trouble shooting

Error description	Possible cause	Suggested solution
1. Aerator does not run.	1.1 Switch is set to OFF.	1.1 Set switch to ON
	1.2 Power supply is interrupted.	1.2 Check power supply at switch cabinet and cable
	1.3 The control elements (level switches, thermal protection...) do not enable the motor to operate.	1.3 Wait until normal operating conditions are reached again / check the function of the control elements.
2. The motor protection relay or other protective device is tripped during operation of the aerator.	2.1 Not all phases are sufficiently supplied with voltage.	2.2 Check the electrical system / check the condition of the power supply
	2.2 Different voltages between the phases	2.2 Check phase balance / If necessary have aerator checked by a specialist workshop.
	2.3 Wrong rotation direction	2.3 Swap 2 of the 3 phases
	2.4 Incorrect setting of the motor-protective circuit-breaker	2.4 Correct the setting value of the motor-protective circuit-breaker (see nameplate)
	2.5 Supply voltage does not correspond to the operating voltage of the aerator.	2.5 Replace aerator or change supply voltage
	2.6 Impeller does not rotate freely due to friction.	2.6 Have the impeller (see section 5.2.5) / aerator inspected by a specialist workshop.
	2.7 Aerator works in a too viscous liquid	2.7 Check the selection of the aerator for this medium.
	2.8 Temperature in control cabinet is too high	2.8 Check that the relay is a temperature difference relay. Protect the switch cabinet from sunlight and heat.
	2.9 Temperature in the motor is too high.	2.9 Remove any incrustations on the motor cooling surfaces / Check that the aerator is constantly submerged.

## Installation/Operating Instructions ATB – HBA(-C)

	2.10 Motor windings are damaged by penetration of water.	2.10 Check aerator (see 5.2) / have aerator checked by a specialist workshop
3. Aerator does not switch off	3.1 The control elements (level switch, thermal protection...) do not switch off the motor.	3.1 Wait until normal operating conditions are reached again / check the function of the control elements.
4. Aerator does not supply enough air	4.1 Wrong rotation direction	4.1 Swap 2 of the 3 phases
	4.2 Wear of the aerator	4.2 Check aerator (see 5.2)
	4.3 Aerator is clogged	4.3 Remove clogging
5. Aerator is loud or vibrates	5.1 Incorrect installation of the device	5.1 Ensure that the aerator is constantly submerged.
	5.2 Wear of the aerator	5.2 Check aerator (see 5.2)
	5.3 The liquid contains too many solid matters.	5.3 Check aerator selection

## **ENCLOSURE I: General data**

MANUFACTURER:

ATB WATER GmbH

Südstr. 2

D-32457 Porta Westfalica

Tel: +49 (0) 5731 30230-0

Fax: +49 (0)5731 30230-30

All unit data (Year of production, Type and Serial Number) is indicated on the identification plate of the device. This information must be given to ATB in warranty case or for ordering spare parts.

## ENCLOSURE II: Declaration of conformity



# DECLARATION OF CONFORMITY

(in accordance with enclosure II B of the Machinery directive)

**Manufacturer :** ATB WATER GmbH  
Südstr. 2  
32457 Porta Westfalica  
GERMANY

Herewith declares that:

**The product :** ATB – HBA(-C)  
Radial submerged aerator (with extension channels)

Conforms to

### The European Machinery Directives 2006/42/EC.

We hereby declare to be in conformity with the basic safety- and health claims concerning development and production of machinery.

By design, the motors, considered as components, comply with:

- the requirements of the standard EN 60 034 and therefore comply with the provision of Low Voltage Directive 2014/35/EU
- the EMC Directive 2014/30/EU concerning the intrinsic characteristics of emission and immunity levels.

During the design and construction of the mixer, following norms are used:

- EN ISO 12100 : 2011 : Safety of machinery: PART 1: Methodology and PART 2: Technical principles and specifications
- EN 60 034 – concerning safety precautions of electrical machinery

Remark: The machines mentioned above shall not be started until the installation, into which they have been incorporated, has been declared to be in conformity with the Machinery Directive.

This declaration of conformity is invalid if any constructive changes that affect the operating instructions or the technical specifications and/or the intended use have been made to the product.

Porta Westfalica, Germany, 01.03.2018

ATB WATER GmbH  
Represented by its Manager  
Markus Baumann

A handwritten signature in black ink, appearing to read 'M. Baumann', is written over a horizontal line.

**ENCLOSURE III: Maintenance sheet**

Date	Work performed	Comments

**ENCLOSURE IV: O&M manual of the motor**

Innovations for clean water



## **ATB – BTSQ & BTSP motor**

# Installation/Operating Instructions

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## 1. Introduction

ATB BTSQ & BTSP series motors are designed to work completely submerged in water. They must be installed by qualified personnel fully aware of normative and technical standards required for correct functioning.

## 2. Transportation and storage

Lifting and transporting the motor must be carried out through the special rings locked into position.



**ATTENTION:**

Do not lift the motor by the power cables, never utilise the cables to pull the motor, make sure that the cables are not smashed or damaged when it is moved.

Store the motor in a dry, vibration free environment, at a temperature between -20°C and +40°C, placed vertically.

Manually rotate the motor shaft every four months and run through the "insulation test" (see section 9).

After it's been stored for over twelve months, check the conditions of the bearings grease and the oil level in the mechanical seals.

## 3. Check up before installation

Before installing the motor, run through the following operations:

- a) Rotate the shaft manually to make sure that it can move freely
- b) Check if the motor has suffered any damages due to accidental hits or corrosion.



**ATTENTION:**

Accurately check whether the power cables and the signal cable are intact. The cable sheath must be free from rubbing or cuts that may cause water infiltration.

Make sure that the motor tag data correspond with the work the motor is intended to perform.

Any detected damage must be signalled to us within three days.

## 4. Mechanical installation

Check that all coupled and clamped connections are correct and properly tight.

The keying on the motor shaft of the pump impeller or the drag box must be carried out with maximum care to avoid damaging the bearings.

## 5. Electrical installation

Complete the grounding connections using the yellow and green conductor of the power cable. In case of a double power cable for the star-delta starting, connect to the grounding both yellow and green conductors.

Check the correct running of the power cable and the signal cable connections.



### **ATTENTION:**

When carrying out tests to check the motor operational conditions, the motor can work out of the water for no more than maximum ten minutes.

When working on the control panel, make sure the main disconnect has been switched off and locked in this position. Also make sure that all other machines installed in the same basin have been switched off.



### **IMPORTANT:**

It is mandatory to connect the PTO and the leak detection (if available) in such a way that the equipment will automatically and directly be stopped when over temperature or moisture ingress is detected (see below for the connection of the moisture detection relay to motor). If, for any reason, the delivered relay (if ordered) would not coincide with the relay referred to in enclosure, please contact ATB before connecting the relay, to verify the right connection.

### **Thermal protector switch (PTO) – Standard available only from 4 kW (on request for smaller motors):**

When reaching the limiting temperature, the switch opens the control circuit. The NC-switch closes the circuit again when the temperature decreases under the limit temperature.

Contact rating: 1,6A for 250V AC.



All motors from 4 kW are standard equipped with such thermal protector switch, which needs to be connected imperatively. The temperature detector (PTO) has to be connected in such a way that the motor is stopped when the temperature reaches the limiting temperature.

### **Leak detection– Standard available only from 4 kW:**



**Engines with more than 4 kW are equipped with a leakage sensor. This sensor MUST be connected by the customer to an evaluation relay, otherwise the warranty claim expires. The corresponding relay can be obtained from a specialist electrical dealer or on request from ATB.**

In the oil chamber of the submersible motor, a leak detection probe is mounted. If the mechanical seal of the motor would leak, water will penetrate the oil chamber and reduce the electrical resistance of the oil.

Once the electrical resistance reaches a certain level, a detection relay which can be ordered at ATB, will automatically stop the motor or indicate an alarm signal on the control panel.



The use of the provided leak detection is **MANDATORY!** The moisture detection relay must imperatively stop the motor when water ingress has been detected.

### 5.1. Direction of rotation

When the phase power conductors L1, L2 and L3 are connected respectively to the terminals **U**, **V** and **W**, the motor shaft will turn clockwise (from the shaft exit side).

If the connection between any two terminals is inverted (ex: L1, L2, L3 are connected respectively to **V**, **U**, **W**), the motor shaft will turn counterclockwise (see Fig. 1 – 2). In case of a double power cable for the star-delta starting, or for unique ten conductors cable, **U1**, **V1**, **W1** shall indicate the winding start, while **U2**, **V2** and **W2** shall indicate the winding end (see Fig. 1 – 2).

### 5.2. Delta connection

Connect (Fig. 1b – 2b):

L1 line to the U1 and W2 clamps,

L2 line to the V1 and U2 clamps,

L3 line to the W1 and V2

Through this connection the motor shaft will turn clockwise (seen from the shaft exit side).

### 5.3. Star connection

Close the U2, V2 and W2 terminals in one single clamp

Supply the U1, V1 and W1 clamps respectively through L1, L2 and L3 (see Fig. 1c – 2c).

The motor shaft will thus turn clockwise (seen from the shaft exit side).

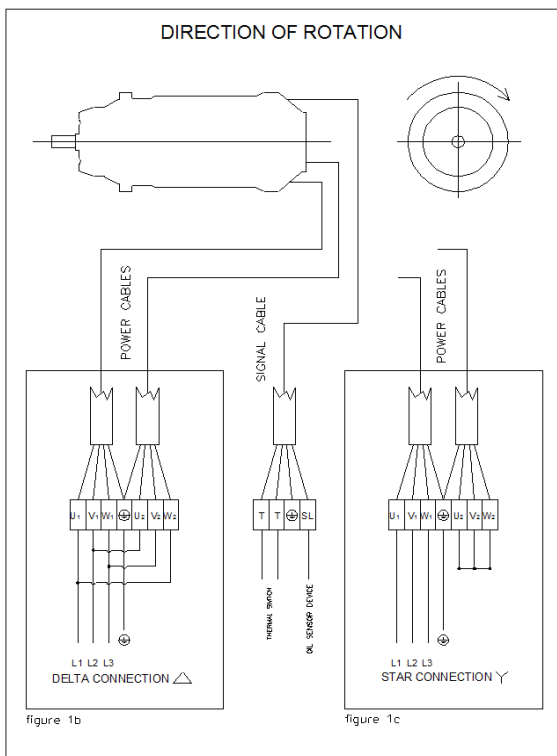


Figure 1

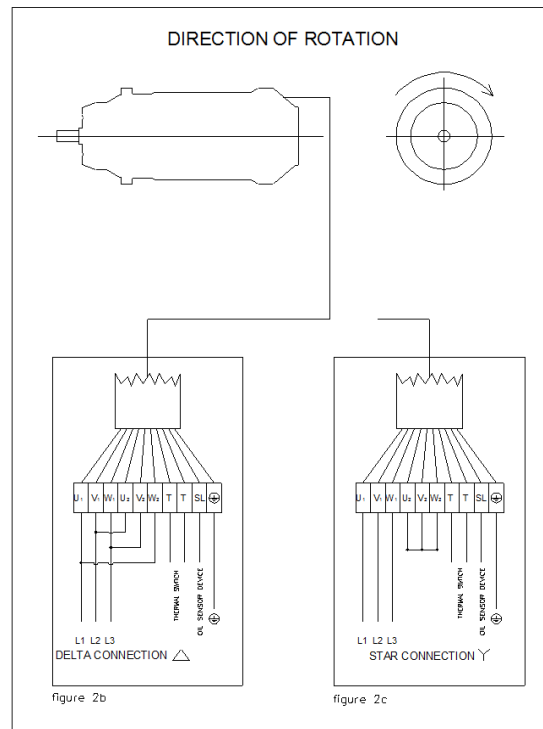


Figure 2

## 6. Working conditions

The motor must always work submerged in water, which maximum temperature must not be over 40°C.

The motor can work out of the water at full power for maximum 10 minutes.

While it runs, make sure that the parameters are kept within tolerable limits.

In particular:

- a) Avoid overload
- b) Avoid dangerous rising of the temperature of the liquid in which the motor is submerged
- c) Avoid voltage drops
- d) Regularly check that the power and signal cables are not in any way damaged.

The motor must be employed exclusively for the applications it is intended for, and must be regularly operated and checked, within the limits provided for by regulations.

## 7. Start up procedures

Before the motor is started up make sure that the grounding conductor is well connected and perfectly running. The section and type of cable, and the connections must be compliant with the existing regulations.

The star-delta starting must be selected and correctly calibrated to avoid faulty operation.

Make sure the power cables and the signal cable are tightly anchored in order to prevent it from freely fluctuating in the liquid in which the motor is submersed, to avoid possible damage.

## 8. Maintenance



### **ATTENTION:**

For security reasons, prior to maintenance operations, make sure the motor is disconnected from the power source, to prevent accidental start up.

Motor maintenance must be carried out by qualified personnel fully aware of security normative.

The following check ups must be carried out every 2500 working hours (or at least once a year).

### 8.1. Oil check

To check the oil level in the seal housing chamber or change the oil proceed as follows:

- a) Place the motor horizontally in a safe location, on a sturdy support, with the filling/discharge cap in an upwards position;
- b) Remove the cap and the gasket and slowly rotate the motor so that the filling/discharge hole is turned downwards;
- c) Let the oil flow out and collect it in a clean container in order to check its quality;
- d) If the oil is clear, fill the chamber with new oil. Change the gasket before closing the cap.

If the oil looks emulsified (with evident water traces or other impurities) or the amount is sensibly lower than the correct amount, it is necessary to substitute the upper and lower mechanical seals.



**ATTENTION:**

In pouring new oil do not exceed the set level, which is 25 mm below the cap gasket support surface.

Oil quantity

<b>BTSQ 125</b>	about 0,275 litres	<b>BTSQ 152</b>	about 0,400 litres
<b>BTSQ 173/4</b>	about 1,050 litres	<b>BTSQ 200</b>	about 1,050 litres
<b>BTSP 240</b>	about 2,300 litres	<b>BTSQ 240</b>	about 1,550 litres
<b>BTSP 270</b>	about 2,700 litres	<b>BTSP 300</b>	about 2,900 litres
<b>BTSP 340</b>	about 2,700 litres		

To change oil, use only:

- VALVOLINE ETC HL 32 (ISO VG 32), or
- Mineral base oil with ISO 32 viscosity, that is, equal to 3 degrees Engler at 50°C, or
- Car motor oil with 10W

Do not disperse the oil in the environment after use.

## 8.2. Winding insulation check

To proceed with the winding insulation check run through the "insulation test" explained in point 9.

## 8.3. Cables check

Check the power and signal cables condition: in case of evident signs of damage in the outside sheath, proceed with cable replacement.

When requesting spare parts to us, be sure to specify registration number and motor type.

## 9. Insulation test

Check the stator winding insulation with a direct voltage insulation tester (Megaohmmeter, or Megger).



**Please note:**

This check-up procedure must always be completed before installing after long storage or long inactivity periods.

The procedure is as follows:

Disconnect the motor power cables from the fuse board and, through the free terminals, measure the insulation both of the cable and the motor. It shall have to be greater than the values reported in the following table (*Table A*)

The test must be performed both between phases and between phase and mass.

In case the resistance is lower than 10 MΩ, disconnect the motor cable completely and perform separate measurements in order to determine whether the cable must be replaced or the motor has to be repaired.

If the motor needs to be repaired, the causes are to be attributed to humidity and/or dirt.

To fix any damage the motor must be disassembled and cleaned. The stator must be dried in an oven between 80° and 120° for at least eight hours.



**ATTENTION:**

Windings should be discharged immediately after measurement to avoid risk for electric shock.

After the windings are cleaned and dried, insulation test has to be repeated, as above described. A correct measurement of the insulation resistance is possible only after it is cooled down, reaching room temperature (between 20°C and 30°C).

Carefully follow operational instructions for the insulation tester (Megger) specifically used. As a general rule the minimal and critical insulation resistance measurement (taken approximately at a temperature of 20°C) is indicated as follows (*Table A*).

Test voltage	DC 500 V (min. DC 100 V )
Minimal insulation resistance with new, cleaned or repaired windings	$\geq 10 \text{ M}\Omega$
Critical insulation resistance after long operating periods or storage in unfavourable conditions	$\geq 1 \text{ M}\Omega$

*Table A*

**WARRANTY LIMITS: WE DO NOT ACCEPT MOTORS TAMPERED. FOR OTHER TERMS, SEE OUR GENERAL GUARANTEE CONDITIONS.**