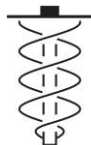


AQUA TURBO®



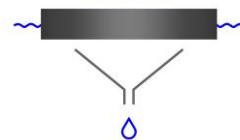
SCREWPELLER®

AQUASYSTEMS INTERNATIONAL NV

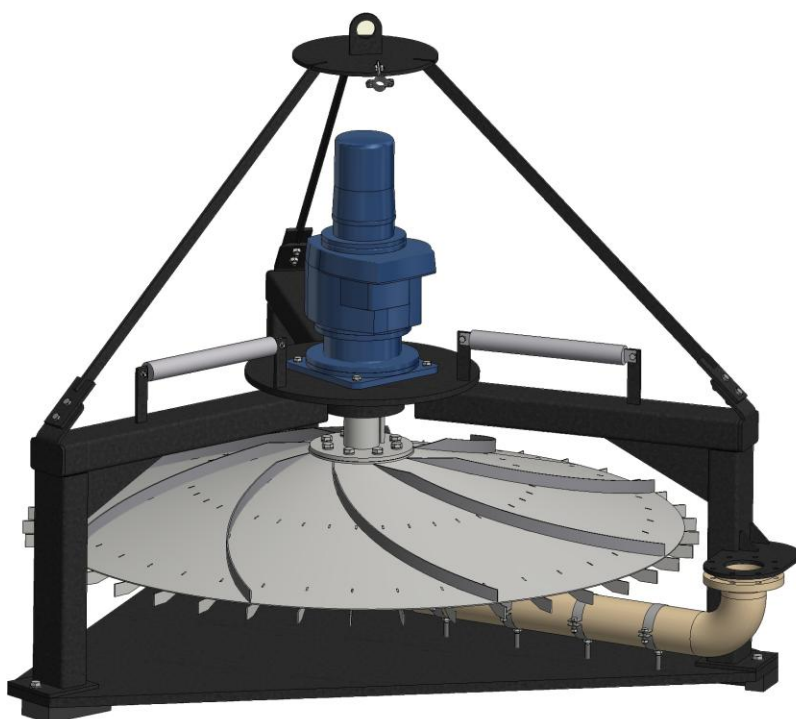
WASTE WATER TREATMENT EQUIPMENT

Brusselsesteenweg 508 • B-1500 Halle - Belgium • Tel.: 32 (0)2 362 02 62 •
Fax: 32 (0)2 360 35 89 • e-mail: asi@aquaturbo.be • <http://www.aquaturbo.be>

AQUA
DECANT™



OPERATION AND MAINTENANCE MANUAL



LOW SPEED SUBMERSIBLE AERATOR AQUA TURBO® AER-GS X-X

Serial number(s):

.....

IMPORTANT: Prior to the installation, operation, and maintenance of this equipment, anybody involved should imperatively read and fully understand this O&M manual, including the enclosed drive O&M manual.



VERY IMPORTANT REMARK

For Maximum efficiency it is required to regulate the AER-GS at maximum power and maximum speed!

The best performance is obtained by programming your Frequency drive for Torque control at 98% of the nominal current/Torque.

The frequency drive has to be set for constant torque application and the maximum frequency will go higher than 50Hz!

For more details we refer to page 23 of this manual.

TABLE OF CONTENTS

DECLARATION OF CONFORMITY	5
1. WARRANTY	6
2. SAFETY REGULATIONS	8
3. Product overview	9
3.1. Description.....	9
3.2. Working principle.....	10
3.3 Different executions,.....	11
3.4 Material description.....	12
4. Receiving and handling	14
4.1 Receiving and acceptance.....	14
4.2 Receiving and acceptance.....	14
5. ASSEMBLY AND INSTALLATION	15
5.1. Assembly of the AER-GS.....	15
5.2. Installation of the AER-GS.....	18
5.3. Electrical cable and wiring instructions.....	19
6. START-UP	22
7. MAINTENANCE	24
7.1. Change gearbox oil.....	24
7.2. Change pre-chamber oil.....	24
7.3. Change anodes	24
8. STORAGE	26
8.1. Temporary storage (= a few weeks)	26
8.2. Long term storage (= more than a month)	26
ENCLOSURE I: PART LIST AQUA TURBO® AER-GS	27
1. Part list of the AER-GS with flexible hose as air supply.	27
2. Partlist of the AER-GS with flexible hose and a short piece of fixed pipe as air supply:	29

3. Partlist of the AER-GS with fixed pipe as air supply:	32
ENCLOSURE II: GENERAL DATA	35
1. Identification plate + data on the delivered material	35
2. Electrical connection.....	36
3. Major dimensions	39
ENCLOSURE III: MOTOR AND GEARBOX O&M MANUAL	40
ENCLOSURE IV: SPECIFIC DATA FOR PROJECT	41



DECLARATION OF CONFORMITY

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

Manufacturer : AQUASYSTEMS INTERNATIONAL NV
Brusselsesteenweg 508
B- 1500 Halle
BELGIUM

herewith declares that :

The product : AQUA TURBO® Low speed submersible Aerator(s) AER-GS X-X
Serial number(s):

conforms to

the Royal Warrant of June 11th 1992 : **The European Machinery Directives 89/392/EEC**, amended by 91/368/EEC, 93/44/EEC, 93/68/EEC, 98/37/CE and 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 pumps, considered as components, comply with:

- * the requirements of the standard **EN 60 034 (ICE 34)**,
and therefore comply with the provision of **Low Voltage Directive 73/23/EEC** of February 19th 1973,
amended by Directive 93/68/EEC, and 2006/95-EC.
- * the EMC Directive 89/336/EEC, amended by Directive 2004/108/EC concerning the intrinsic characteristics of emission and immunity levels.

During the design and construction of the Decanter, following standards are used:

- * EN 292 - 1: Safety of machinery: PART 1: Methodology
- * EN 292 - 2: Safety of machinery: PART 2: Technical principles and specifications
- * EN 60 034: IEC 34 - concerning safety precautions of electrical machinery
- * GWT - Directive 12: concerning low speed Aerators (except 3.1.54 and 3.3.)

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.

Belgium, Halle, 23/10/2026
AQUASYSTEMS INTERNATIONAL NV
Represented by its Chairman & C.E.O.
Innovest Inc.

ing. J. HAEGEMAN

1. WARRANTY

AQUASYSTEMS INTERNATIONAL NV guarantees to the initial purchaser that the products and parts manufactured by it are free of material defects and construction faults. This warranty is given for a period respectively of 27 months from the date of availability of the goods (ex-works) or 24 months from the date of commissioning (installation start-up). The first expiring period is valid. Regarding products and components from other manufacturers and suppliers which are an integral part of the products and parts delivered by AQUASYSTEMS INTERNATIONAL NV, our guarantee is limited to the conditions of guarantee that we can assert ourselves against the manufacturer or supplier of these products and components (unless otherwise specified by AQUASYSTEMS INTERNATIONAL NV in the agreement).

Only AQUASYSTEMS INTERNATIONAL NV has the authority to honour and adjust all warranty claims and make the final decision pertaining to those claims.

Only AQUASYSTEMS INTERNATIONAL NV's original customer is covered by this warranty.

The following conditions will be considered as part of AQUASYSTEMS INTERNATIONAL NV's warranty. Your claim will be considered if:

A) AQUASYSTEMS INTERNATIONAL NV receives a written claim or description of the problem within 30 days after it occurred first.

This report of failure contains at least:

- motor, gearbox and unit serial number,
- date of first day of operation of the unit,
- date of the last maintenance, if the product has been in service longer than 6 months,
- description of the defect and the possible causes,
- estimated hours of operation since the start-up.

B) If the user prefers to have the defect repaired by others than AQUASYSTEMS INTERNATIONAL NV and wants to claim the incurred costs for repairs, the warranty claim has to be accompanied by:

- A written permission of AQUASYSTEMS INTERNATIONAL NV for repair and/or service of the unit by others.
- Specifications, detailed invoices and quote for the repair and/or service.

Repair and/or service have to be executed in accordance with the instructions of AQUASYSTEMS INTERNATIONAL NV.

The warranty is void if:

- A) The unit invoice has not been paid in full at the date of the claim.
- B) Damage is due to faulty handling, misapplication, accident, cause beyond control or normal wear and tear.
- C) The unit has been altered or modified in any way, without the prior written approval of AQUASYSTEMS INTERNATIONAL NV.
- D) Any or all of the unit safety devices were not installed/connected, wrongly installed/connected, or were removed.
- E) The unit was poorly maintained.
- F) The unit was not properly protected electrically or mechanically.
- G) The unit was damaged during disassembly, within the warranty period.
- H) The owner/user/contractor fails to cooperate in determining the cause and/or extent of a failure, doesn't inform about the whole situation in which the unit is operating.
- I) The product has been in service beyond the warranty period.
- J) Damage is due to abuse or other than normal use.
- K) The unit was not installed according to the instructions in this manual.

LIMIT OF LIABILITY:

AQUASYSTEMS INTERNATIONAL NV's total liability under the above warranty is limited to the repair or replacement of the defective part. AQUASYSTEMS INTERNATIONAL NV may, at its own discretion, repair or replace or credit the purchaser for defective goods.

Crane costs, disassembly costs, transport costs, and indirect costs from possible damage to the basin or the process are not covered by this warranty.

2. SAFETY REGULATIONS

The major kind of risks and dangers that might occur, and the safety precautions to be taken imperatively, are:

- * As mentioned in our declaration of conformity, our AQUA TURBO® can only be operated/installed when the installation, into which they need to be incorporated, is declared conform to the Machinery Directive.
- * If AQUASYSTEMS INTERNATIONAL NV did not deliver an explosion proof motor, it is forbidden to use the equipment in areas where explosive gases might be present.
- * Persons who are not directly involved with the handling should be kept out of the handling area.
- * The equipment used for lifting has to be inspected by an official instance and found suitable for the job, to allow safe loading, unloading, positioning and handling of the goods.
- * Cables and U Shaped shackles are delivered to lift aerators and are certified for lifting the units by an authorized body prior to delivery. This is not applicable for mooring cables and shrouds used to keep the aerators in position.
A copy of the certification of the cables and shackles can be obtained by written request to **AQUASYSTEMS INTERNATIONAL**.
- * The transfer of responsibility from **AQUASYSTEMS INTERNATIONAL** to the end-user/end-customer is as at the time of delivery of the equipment. Signing off the delivery documents concludes that the transfer of responsibility for the equipment transfers to the client.
From the transfer moment outlines above, the end-user / client becomes solely responsible for the proper use, maintenance, storage and inspection of cables and shackle rings that are used to lift the aerators.
- * From the date of transfer of responsibility, the periodic inspections by an authorized body of the lifting equipment are the sole responsibility and expense of the end-user / client.
- * **AQUASYSTEMS INTERNATIONAL** shall in no event be held responsible for damage during any lifting operation or to the installation after delivery or due of the equipment.
- * The complete electrical installation has to be designed in accordance to the European standard EN 60204 for machinery, and to any local standard.
- * During the installation of the unit, all necessary personal protection equipment has to be at the disposal of all personnel, involved in the assembly and installation of the equipment.



It is essential to check that the safety/connection switch of the unit that needs to be installed, and of all units located in the basin where the unit needs to be installed, has

been switched off and locked in this position during all work on the electrical installation, during maintenance or repairs, and during installation.

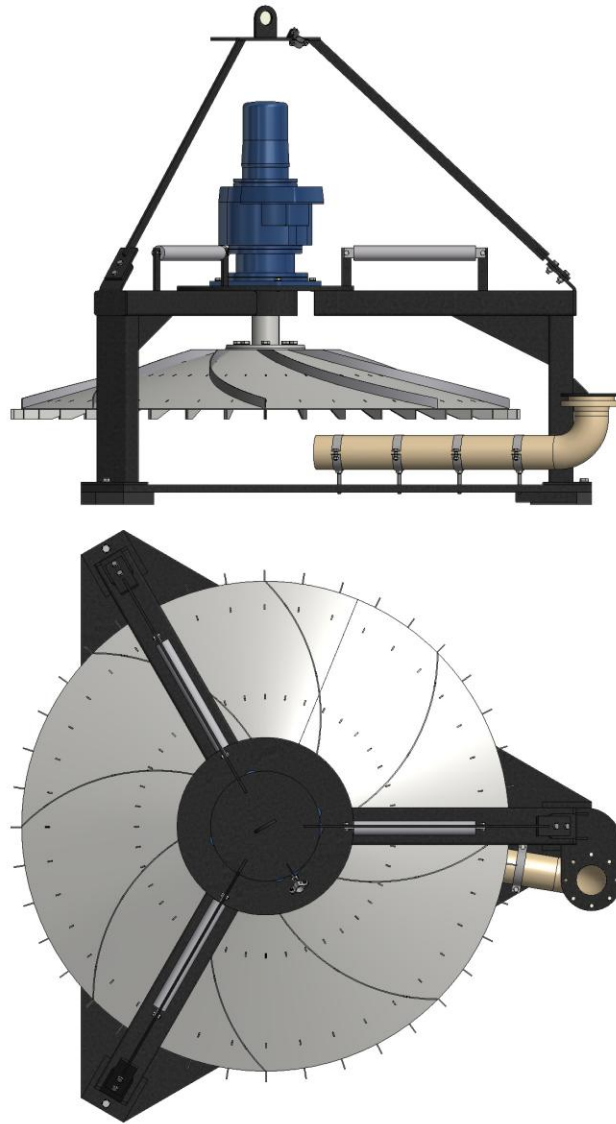
- * Make sure that all safety precautions are taken to make sure that nobody can fall into the water.
- * During any intervention on the electrical installation, maintenance and/or repairs of the unit, a second person has to be present to verify the safe intervention and eventually assist.

AQUASYSTEMS INTERNATIONAL NV is not responsible for any kind of incidents due to an unsafe application, handling, and/or installation of the equipment.

3. Product overview

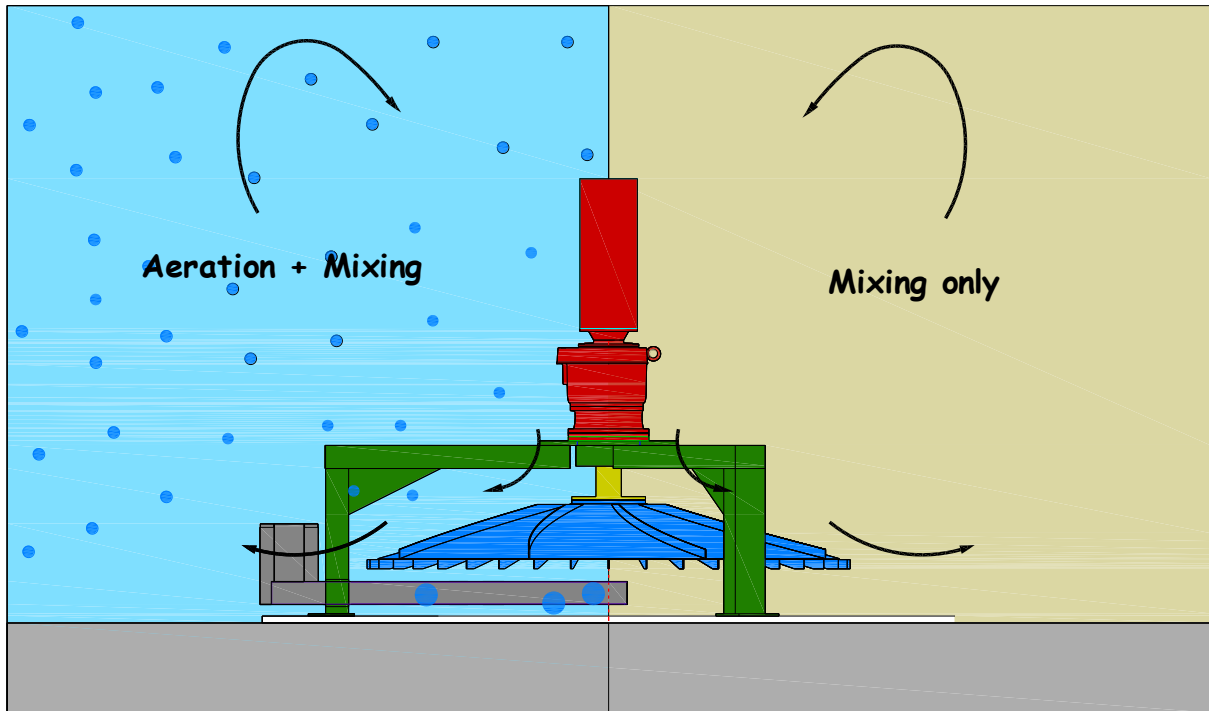
3.1. Description

The submersible AER-GS generally consists of a heavy duty submersible gearbox with a top mounted submersible electrical motor. This gearbox is mounted on a support structure that allows the unit to stand on the floor. On to the outgoing shaft of the Gearbox, a conical shaped impeller equipped with mixing and diffusing flaps is fixed by means of a flange connection. A static air diffuser is fixed to one of the support legs of the structure and to the ballast plate and brings the air to the centre underneath the conical disk. To the flange connection of the static air diffuser, a flexible tube or a stainless steel pipe can be mounted to connect to the blower. The support construction is mounted on to a ballast that is usually a coated steel plate or a concrete block. A central lifting frame is installed to lift the unit. This lifting frame is bolted to the 3 ends of the support construction. At least 3 rubber supports are fixed Below the ballast plate to increase the stability and adherence of the unit to the floor of the tank.



3.2. Working principle

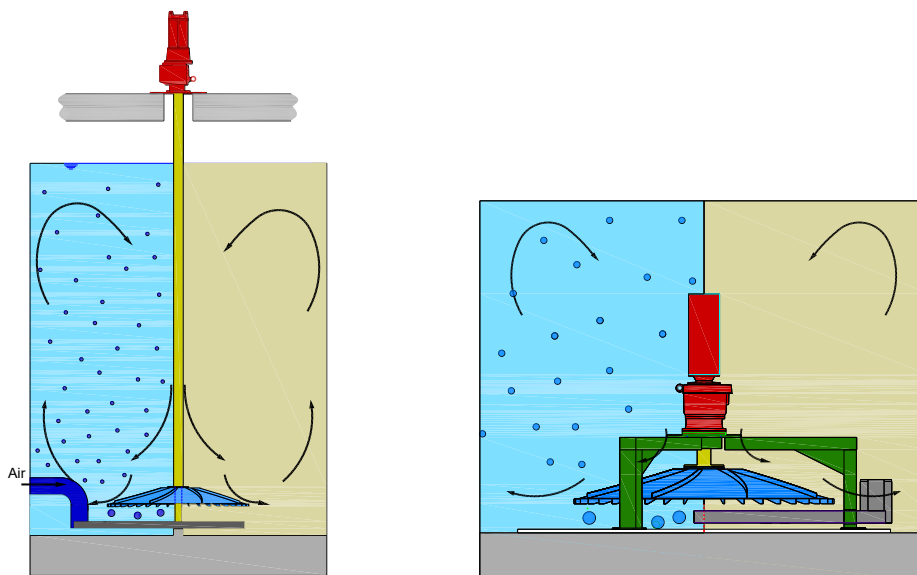
The conical disk, driven by the submersible geared drive, mixes the water and spreads the air in fine bubbles. The mixing flaps on top of the conical disc radially spread the water 360° around the unit. The diffuser flaps on the lower side of the cone chop the air that is blown under the cone into fine bubbles that are then entrained by the flow generated by the mixing flaps.



When no air is supplied through the air diffuser, the unit will operate in "Mixing only" mode.

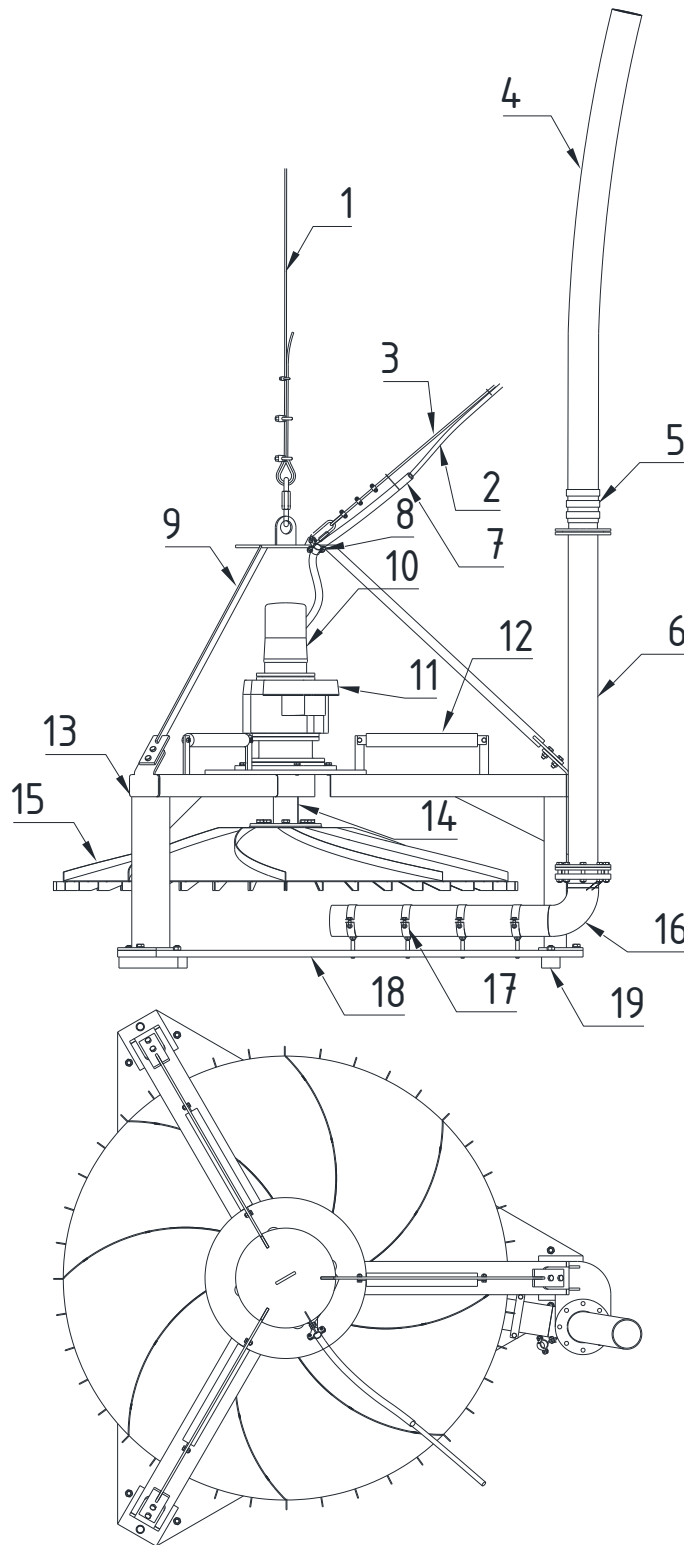
3.3 Different executions,

The AER-GS units are available in 2 different executions. One with submersible Gearbox mounted onto a support, installed on the floor of the basin, and one with a gearbox mounted on the walkway, with a long drive shaft and a bottom bearing fixed to the floor of the tank. This manual only describes the submersible version.



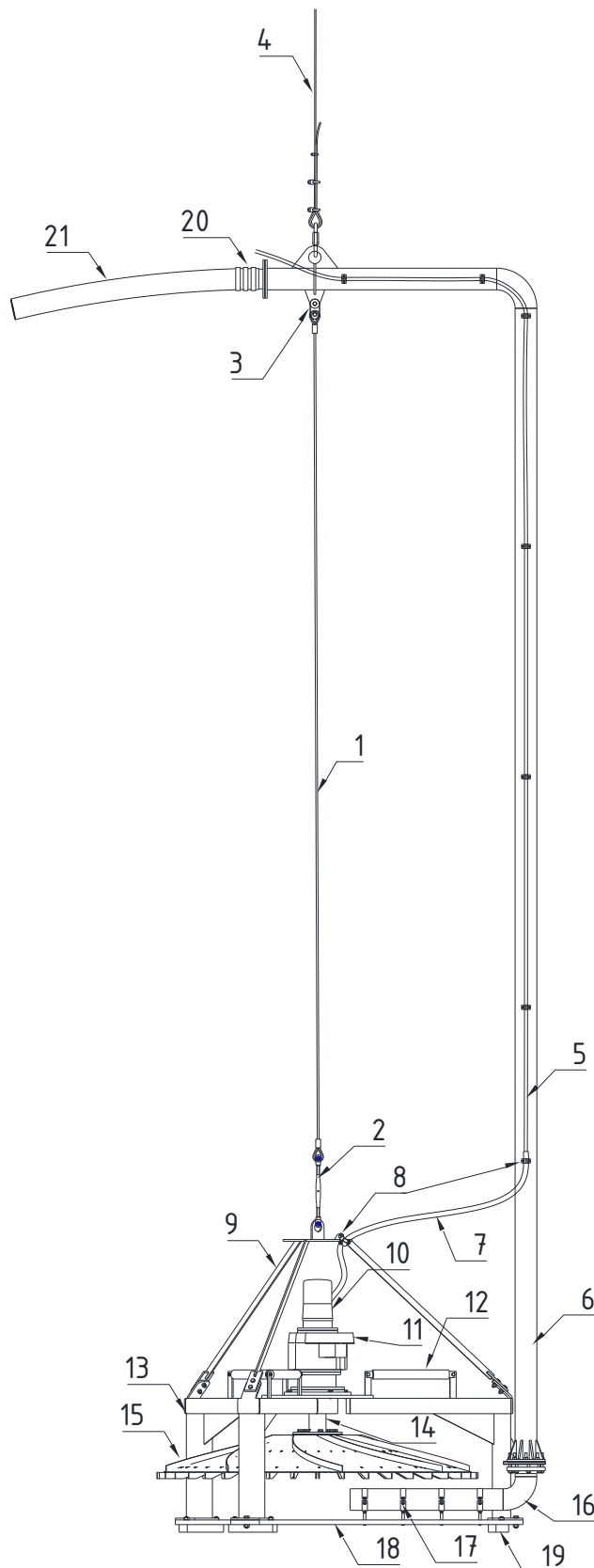
3.4 Material description

Version 1: With flexible hose for air supply



- 1) Central Lifting cable
- 2) Electric cable
- 3) Support cable for the Electric cable
- 4) Flexible hose for air supply
- 5) Fixing clamps for the flexible tube
- 6) Fixed air pipe (Optional)
- 7) Flexible hose to protect the Electric cable
- 8) Strain relief for Electric cable
- 9) Lifting frame
- 10) Submersible motor
- 11) Submersible gearbox
- 12) Anode
- 13) Support construction
- 14) Impeller Hub
- 15) Conical impeller
- 16) Air diffuser
- 17) Fixing brackets for air diffuser
- 18) Ballast
- 19) Rubber supports

Version 2: with fixed air pipe.



- 1) Lifting cable between the Air pipe and lifting frame
- 2) Cable tensioner
- 3) Connection plates air pipe-cable
- 4) Lifting cable
- 5) Electric cable
- 6) Fixed air pipe with lifting hooks
- 7) Flexible hose to protect the Electric cable
- 8) Strain relief for Electric cable
- 9) Lifting frame
- 10) Submersible motor
- 11) Submersible gearbox
- 12) Anode
- 13) Support construction
- 14) Impeller Hub
- 15) Conical impeller
- 16) Air diffuser
- 17) Fixing brackets for air diffuser
- 18) Ballast
- 19) Rubber supports
- 20) Fixing clamps for the flexible tube
- 21) Flexible hose for air supply

AER-GS: This entity consists of a submersible motor mounted on top of a submersible gearbox; this gearbox is mounted on a support construction. On the outgoing shaft of the gearbox, there is a hub with flange connection to which the conical impeller is bolted. The air supply is fixed to one of the supports and the ballast plate and brings the air to the centre of the impeller. Below the support construction, a ballast is affixed to keep the machine in position during operation. Rubber supports are fixed below the ballast plate to increase the stability and adherence of the unit to the floor of the tank.

4. Receiving and handling

4.1 Receiving and acceptance

- Check the goods for visible damage before unloading. If you have any remarks, please note them on the forwarding documents at the time of delivery and contact AQUASYSTEMS INTERNATIONAL NV immediately.

All visible damage has to be reported to Aquasystems International N.V. within a period of maximum 7 days after delivery.

- The AER-GS is generally delivered completely assembled. If the size is too big to fit the unit on the truck or in the container, the conical impeller will be supplied separately and needs to be mounted on the hub on the outgoing shaft of the gearbox.

- The flexible air pipe is usually pre-assembled with a connection flange on each side. This pipe is supplied separately and needs to be bolted to the Air diffuser.

4.2 Receiving and acceptance

Be careful when handling this type of heavy precision equipment to avoid damage to it or other equipment, or injury to any person involved.

Persons that are not directly involved in loading/unloading, handling, or installation, should be kept out of the handling area.

The lifting equipment used should have been inspected by an official organism, and approved for the job, prior to unloading the truck and installing the units, in order to allow safe handling.



IMPORTANT REMARK:

Only use the central lifting hook on the support construction. Before lifting, please verify that the lifting frame is correctly attached to the support construction. The weight below the support construction is very heavy. Only use the correct lifting hooks or the supplied lifting cables.

If the lifting frame was removed for transport reasons, it first needs to be attached correctly to the support structure before lifting the entire unit.

5. ASSEMBLY AND INSTALLATION



IMPORTANT NOTE: apply anti-seize grease (f.ex. Mi-setral-7N) on all bolts prior to assembly.

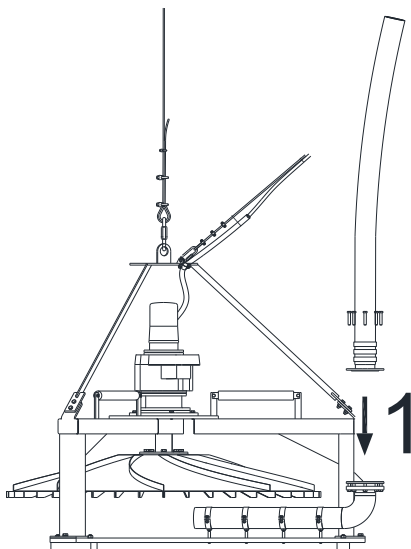
5.1. Assembly of the AER-GS

As a safety precaution, the installation of the AER-GS must always be performed by at least two persons.

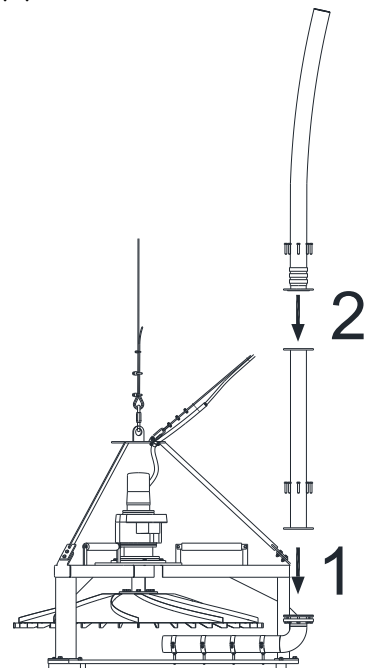
The use of a crane is required for this installation!

5.1.1 If the unit is delivered assembled, you just need to bolt the air pipe to the flange connection of the air diffuser.

- 1) Flexible hose directly connected to the connection flange of the AER-GS.
- 2) The Air supply of the AER-GS is first connected to a piece of stainless steel pipe. The flexible tube is attached to the other side of this fixed stainless steel pipe.

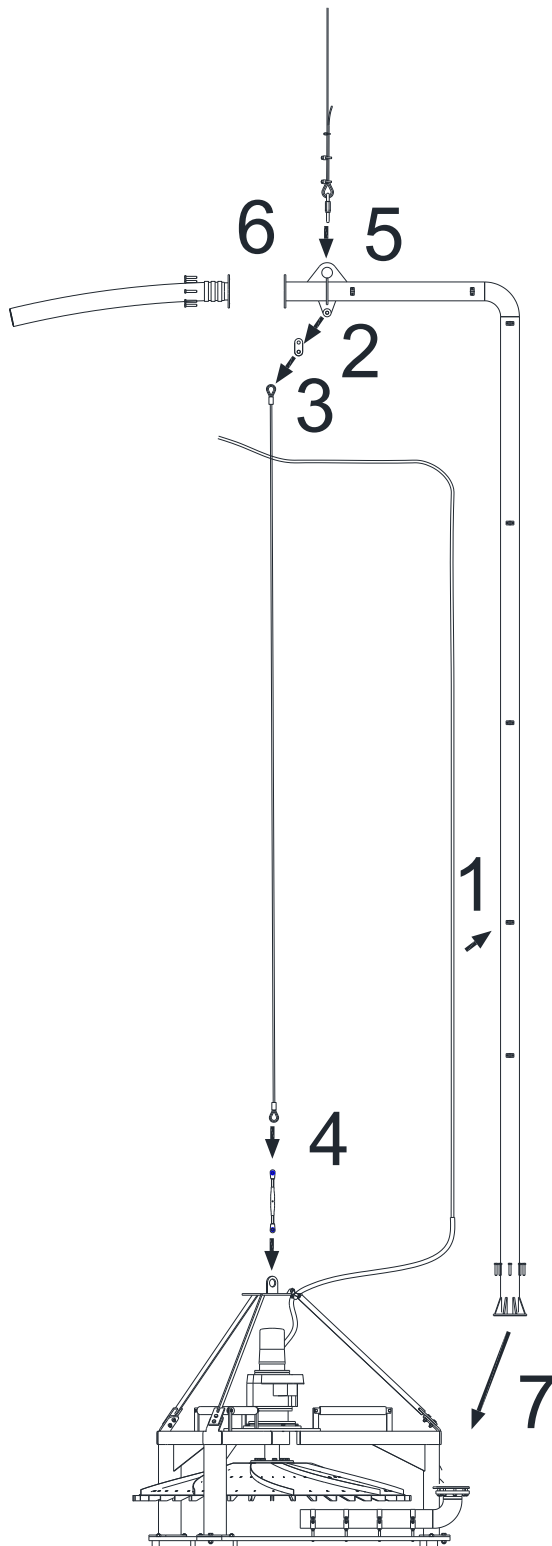


Connect the flange of the flexible hose to the flange of the air diffuser on the AER-GS (1). A seal has to be placed between the 2 flanges before bolting them together.



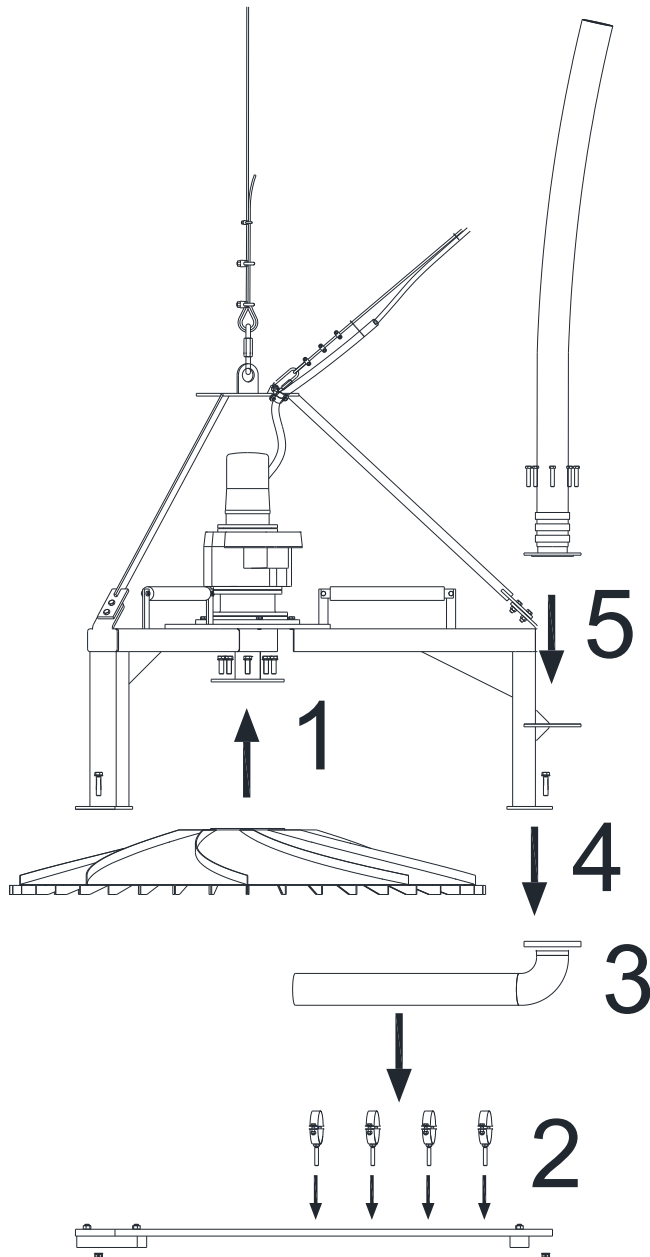
First (1) fix the piece of stainless steel air pipe to the connection flange of the air diffuser. Next fix the flange of the flexible hose (2) to the other side of the stainless steel pipe.. A seal has to be placed between each flange connection before bolting them together.

- 3) A fixed tube reaches above the waterlevel. A flexible tube is used to make the connection between the fixed air pipe and the air supply flange at the basin side.



- 1) Put the long air pipe on the ground next to the AER-GS unit with the second Strain relief (1) as close as possible to the connection flange of the air diffuser on the AER-GS. In this position, fix the electric cable to the strain reliefs on the air pipe starting with the second strain relief. (not yet on the first strain relief)
- 2) Fix the short lifting cable (3) to the air pipe by means of the supplied connection plates (2).
- 3) Attach the cable tensioner at the other end of the short lifting cable (4).
- 4) The long lifting cable can now be fixed to the lifting hook on top of the air pipe.
- 5) Connect the flange of the flexible tube to the flange on the top of the long air pipe. A seal has to be used to seal this connection.
- 6) Use the long lifting cable to lift the air pipe with its accessories. WHILE LIFTING TAKE CARE NOT TO DAMAGE THE ELECTRIC CABLE!!!!
- 7) Once in the correct position where the lifting hook on top of the air pipe is above the central lifting hook on top of the AER-GS, the lower flange of the air pipe can be bolted onto the flange of the Air diffuser. Between each flange connection a seal has to be used.
- 8) When all bolts of the flange connection are tightened correctly, the cable tensioner can be fixed to the central lifting hook and slightly tightened to obtain a slight tension in the lifting cable.
- 9) The electrical cable who is in a plastic protective tube can now be attached to the lower strain relief on the Air pipe
- 10) The unit is now ready to be positioned into the basin.

5.1.2 If the unit is supplied with only the gearbox on the support structure and the impeller, air diffuser and ballast disassembled. You need to assemble the unit as follows:



- 0) Fix the lifting cable to central lifting hook installed on the support construction.
- 1) Lift the unit and place it on top of the conical impeller; fix the impeller with the connection flange on the outgoing shaft of the gearbox.
- 2) Fix the brackets to hold the air diffuser to the ballast plate.
- 3) Place the air diffuser in the brackets.
- 4) Place the unit on top of the ballast plate and bolt the 3 supports to the plate. Check the position of the air diffuser and correct if necessary.
- 5) Fix the flange of the air pipe to the connection flange as described in point 5.1.1

5.2. Installation of the AER-GS

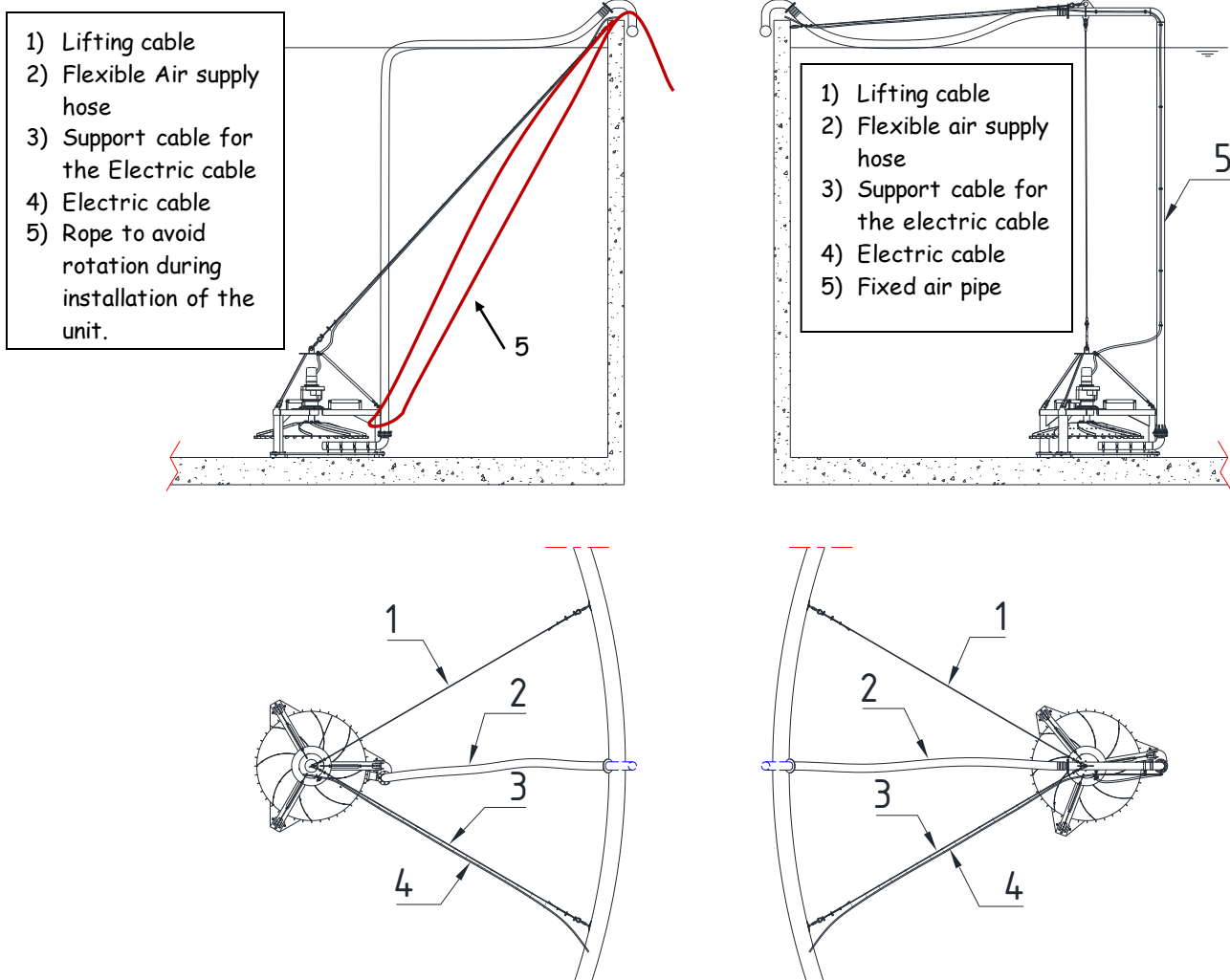


IMPORTANT REMARK:

Never fix the electrical cable to the lifting cable. When lifting the unit, the lifting cable may twist around the electrical cable and damaging it.

After assembly of the unit it can be lifted with the lifting cable and placed into the basin. While lifting, take care that no cables get crossed and the flexible tube doesn't get damaged due to its own weight. For longer flexible air tubes, we advise to roll up the tube on the unit and only unroll it at the tank wall close to the connection point. Take care that cables and flexible hoses can never touch each other. The heavy turbulence will cause damage to all touching parts. During positioning in the tank, care has to be taken that the connection of the flexible hose for the air supply points to the same direction as the connection point at the basin side. If this is not the case, the flexible tube will float on the surface in the highest turbulence zone caused by the rising air bubbles and may get damaged on short term. To avoid this, a rope can be used as shown on the drawing below. This rope is to be removed after placing the unit the unit in the right position on the bottom of the tank.

Installatie met Flexibele darm 2) Installatie met vaste luchtbuis



When the unit is in position on the tank floor, you should fix the lifting cable to a wall anchor on the basin side. The cable must be tight enough to avoid that it can be aspirated by the rotor of the machine during operation, but also to prevent damage to the structure or to the anchor points for wear (friction) due to turbulence. For the same protective reason we advised to fix the electrical cable with its support cable to the wall. Cables and flexible hoses may never touch each other or another object in the tank. Damage will occur in short time due to the turbulences.

**IMPORTANT REMARK:**

If the unit is installed in an existing tank where sludge may have settled on the basin floor, it is mandatory to remove the sludge prior to the installation of the unit. This is to avoid that the ballast would slide on the sludge which may cause the unit to move at the start up.

**WARNING:**

The Gearbox must be filled with oil before start-up! Always check that the level of the oil is in the middle of the looking glass (For more details, see Gearbox O&M manual). Always keep the Gearbox in vertical position when filled with oil.

5.3. Electrical cable and wiring instructions

To avoid warranty discussions about water infiltration in the motor due to incorrect mounting of the power cable at motor side, all AER-GS Submersible Aerators are systematically provided with pre-wired power cables at motor side.

Consequently, it is of capital importance that AQUASYSTEMS INTERNATIONAL NV be informed about the exact required cable length at the time the purchase order is placed; if not, AQUASYSTEMS INTERNATIONAL NV will foresee a standard cable length of 10 m.



If for any reason the customer needs to change the power cable, AQUASYSTEMS INTERNATIONAL NV should be contacted first for approval. Else, all warranty claims originating from this change will not be accepted by AQUASYSTEMS INTERNATIONAL NV.

To optimize the efficiency of the AER-GS units, we advise to always use a frequency drive. This drive will increase the speed of rotation with the air flow of the unit when it runs in aeration mode. This will reduce the size of the air bubbles to a minimum. If the air flow stops, the unit will run as a pure mixer and the RPM and consumed power can be reduced. In Aeration mode we advise to operate the frequency drive in "torque control" mode where the drive will automatically adjust the RPM to obtain 95% of the nominal current of the AER-GS.

The control panel/junction box in which the AER-GS electrical cable will be connected at the basin side once the unit is installed, has to be designed to conform to the IEC or NEMA standard or any legally ruling local code.

Make sure you follow all the steps mentioned below prior to the installation of the unit in the basin:

- Take note of all motor data and allowed connections mentioned on the motor nameplate.
- Please check line voltage on site and the corresponding connection (star or delta) of the motor (see enclosure II). Remember that the Amperage draw during direct on line start procedure is approximately six times the nominal one, while in case of star/delta starting procedure you need approximately two times the nominal one. Make sure that the fuses are able to tolerate the starting Amperage.
- Make sure the yellow/green ground conductors of the unit are connected to the ground of the electrical installation, before the other conductors are connected. The ground conductor must also be the last to be removed when the motor is disconnected. The extreme ends of the cables must never be immersed or be in contact with liquid.
- The line loss must be limited so that the line voltage at the motor terminals is within $\pm 5\%$ of the nominal voltage. Too low voltage can reduce the motor life. During start-up of the motor, the voltage dip at the terminals should be momentary (a few seconds) not be more than 10% of the nominal voltage.
- You are advised to check the tension of the electrical connection in the junction box at basin wall at least once a year.
- Make sure that the electrical cable cannot be sucked into the impeller caused by a superfluous length of the cable.

Connect the power cable to the electric panel or to a junction box near the basin edge according to the selected start procedure, and verify the correct set point of the thermal protection.

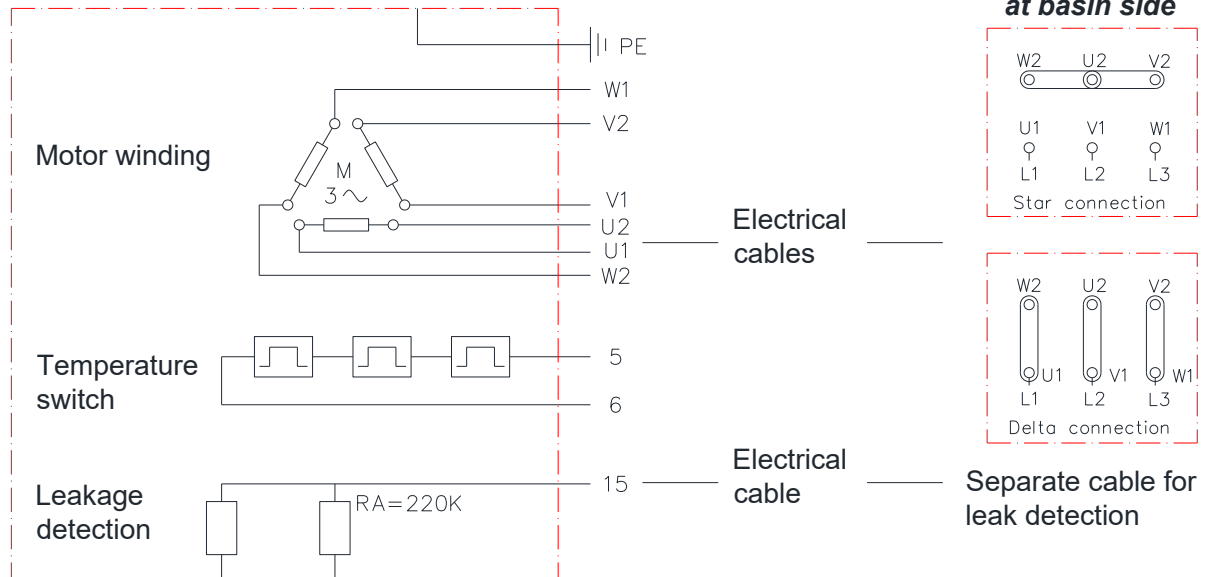
The following figure shows the coding of the electrical cables of the motor. All motors up to 3 kW for EMOD motors and 5,5kW for HEW motors are generally designed for direct starting (only cables U-V & W, not U1-U2-V1-V2-W1-W2). However, upon motor supplier's discretion, it is possible that even a small power motor comes with 6 power leads, to allow star/delta start procedure (depending on power supply).

Other motors are generally equipped with either 1 multi-wire electrical cable, or with 3 separate cables (2 cables for the power supply, 1 cable for thermal protection and leak detection inside the motor) that bring all the leads of the winding out of the motor.

The submersible gearboxes can be supplied with 2 different motor brands; EMOD or HEW. According to the type of motor the electrical connection is slightly different:

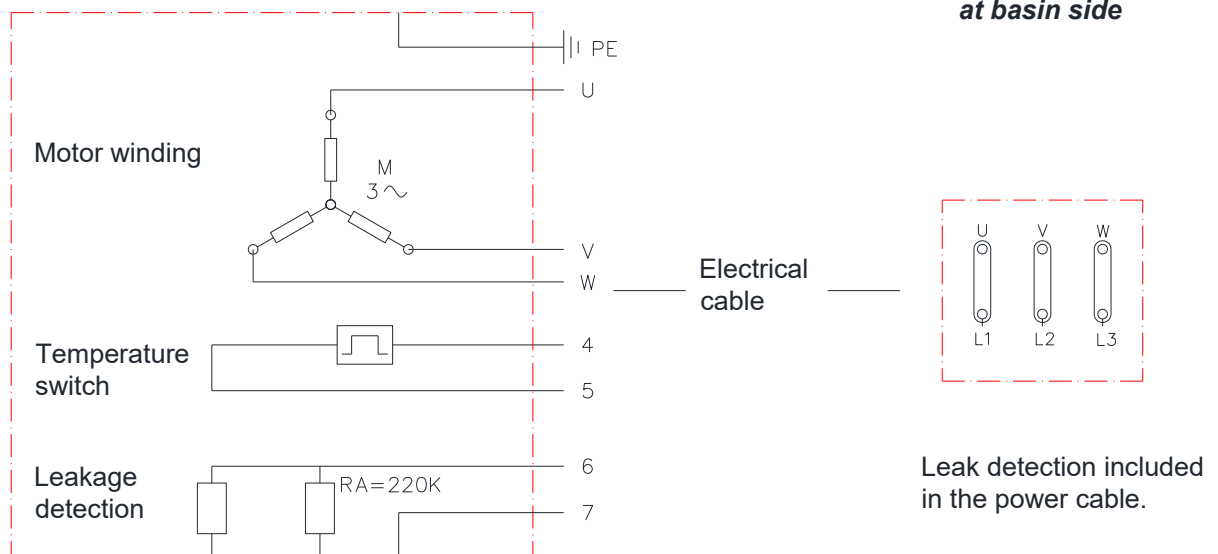
① For EMOD motors:

Submersible EMOD motor on Premium Stefan gearbox



① For HEW motors:

Submersible HEW motor on Premium Stefan gearbox



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 NOTE:

It is mandatory to connect the PTO (contacts 5 and 6 or 4 and 5), and the leak detection (contacts 15 and ground or 6 and 7), in such a way that the equipment will automatically and directly be stopped when over temperature or moisture ingress is detected (see enclosure II 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 AQUASYSTEMS INTERNATIONAL NV before connecting the relay, to verify the right connection.

6. START-UP



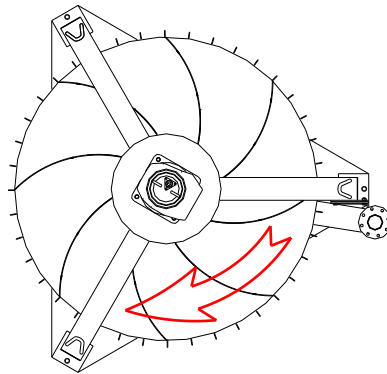
Before starting up the unit, make sure that no large foreign objects (wood, plastic, etc...) are located in the basins. These objects can be sucked by the unit and could damage it. AQUASYSTEMS INTERNATIONAL NV will not accept liability for such damage. These objects should normally not find their way into the basin, as they should be stopped by a filter or a screen, placed upstream of the supply towards the aeration basins.

After the above step has been carried out correctly, you can start the unit. The first start-up is to be done without air supply where the operation of the unit is checked as mixer.



Some units are designed to be operated with a frequency drive to reduce the speed of rotation during mixing (no air supplied). These units will be overloaded when mixing at full speed. Always Check with Aquasystems that you know the correct running speed for mixing and for aeration. And check on site when setting the thermal protection.

Make sure the Impeller is rotating in the direction mentioned on the Impeller. The best way to do this is by checking the sense of rotation when the unit is still out of the basin. If the unit is already installed in the basin and if the unit is not visible in the water any more, wait for a few minutes to see in which direction the water in the basin is rotating. The standard unit is running clockwise. If very little mixing is noticed and the direction of rotation of the basin is counter clockwise (for a clockwise impeller) you should stop the unit and reverse 2 phases of the electrical connection to reverse the sense of rotation of the impeller. If it is difficult to see the direction of rotation without air, we advise to supply a small amount of air to the unit. In a short time the small air bubbles will, depending on the basin geometry, show a clearly rotating pattern that shows the direction of rotation of the impeller.



Then start the Aerator again after setting the correct direction of rotation and check the normal pattern of the flow.

Check the exact consumed power and the following data: voltage, current, power factor $\cos \varphi$. There are instruments that can measure these data simultaneously and print it out. Such a device is advised to attain an exact measurement of the power. Note that the unit will consume more power directly after the start-up. When the unit is running a few minutes, the water will start to rotate slightly with the mixer and the power consumption will drop.

If the AER-GS unit is running on variable speed drive and it is under or overloaded you may adjust the speed of rotation to correct the power consumption. Please contact AQUASYSTEMS INTERNATIONAL NV before applying any adjustments.

Significant under loading, any overloading, or remarks concerning the flow, noise, instabilities..... should be mentioned and discussed immediately with AQUASYSTEMS INTERNATIONAL NV. In this case the unit should be stopped immediately.

If everything is normal, let the unit run for at least 30 minutes to warm up and then analyse the power consumption again.

In some cases it is possible that, at start-up of the Aerator, the motor is overloaded due to high sludge concentration and/or debris. Normally, the problem will be resolved after approximately one hour since the sludge will be mixed with the liquid fraction.

When the unit is running correctly as mixer, you can start the blower for the air supply.



The mixer has to be started before or at the latest at the same time as the blower starts. Avoid the situation where the blower already runs before the mixer starts; Due to the air under the impeller, the high starting torque may cause the unit to move or rotate during start-up. This may cause damage to the unit and should be avoided at all times.

When the air supply is started, the mixer power will drop due to the fact that the diffuser flaps on the lower side of the cone will pump air instead of water.

If the unit is running on variable speed drive, you may now increase the speed of the mixer to get a better air dispersion. While increasing the speed of the mixer the power will rise.

For best results with frequency drive operation, the drive parameters should be set for a constant torque application!

The most optimal way to operate the AER-GS unit with frequency drive is to program the drive for torque control or current control. This way, the frequency drive will automatically correct the speed of the unit to the maximum without overloading the motor.

The purpose of this torque control setting is to run the AER-GS impeller at maximum speed at all times when air is supplied. The AER-GS needs this maximum speed of rotation for optimal air diffusion and oxygen transfer.

The torque or current should be set to 98% of the nominal value at all times when air is supplied to the unit.

7. MAINTENANCE

7.1. Change gearbox oil

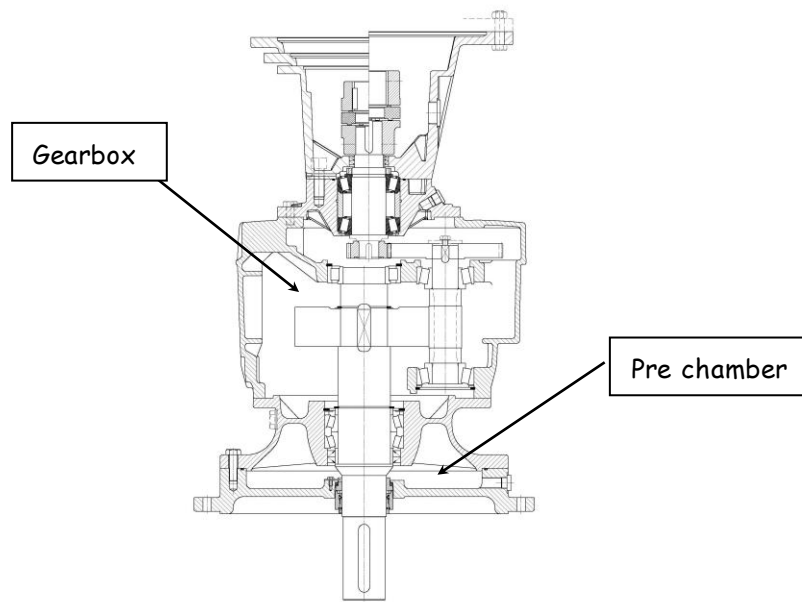
The gearbox oil needs to be replaced 16000 running hours. We refer tot the manual of the gearbox manufacturer for the oil replacement procedure and the position of the fill openings.

7.2. Change pre-chamber oil

The pre chamber is an oil chamber before the gearbox on the outgoing shaft. This chamber is sealed from the gearbox with a lip seal and from the water with a mechanical seal.

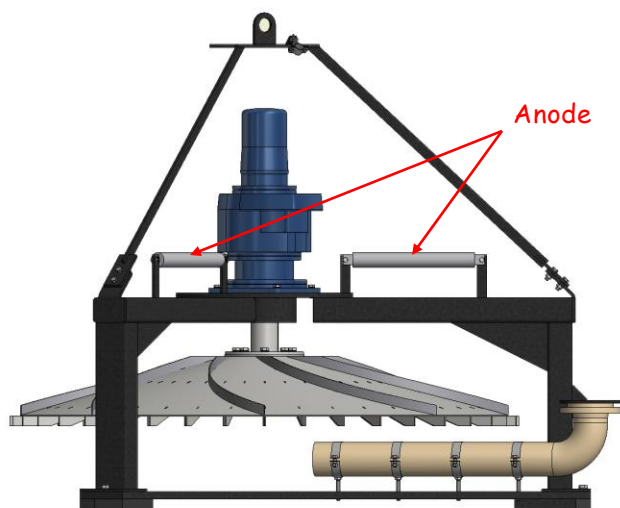
The leak detection in this chamber will protect the gearbox against water intrusion from the outside. Therefore it is important that the leak detection is correctly connected.

The first step if water is detected in this pre-chamber is to stop the unit immediately to avoid any risk of further damage. After lifting the unit out of the tank, the oil needs to be replaced and the mechanical seal needs to be checked.



7.3. Change anodes

Each submersible AER-GS unit is equipped with one or more sacrificial anodes to protect the motor from corrosion. They are generally located on the motor support construction. The anode material is slowly consumed over time. When it is fully consumed, the anode will no longer offer protection against corrosion. It is therefore important to check the anodes each time maintenance is performed on the unit.



Several types of anodes may be present on AQUASYSTEMS INTERNATIONAL NV equipment. They are listed in the table below, along with recommendations for replacement. For AER-GS units, the type of anode is usually a 10 kg Zinc circle anode.

Material	Type	Unconsumed dimensions	Replacement when...
Zinc	2.2 kg circle	Ø70 x 110	Diameter < 50 mm
	10 kg circle	Ø60 x 500	Diameter < 45 mm
	4.4 kg disc	Ø150 x 36	Diameter < 120 mm
	6 kg block	200 x 65 x 65	Width < 50 mm
Magnesium	2.2 kg circle	Ø120 x 110	Diameter < 85 mm
	10 kg circle	Ø110 x 500	Diameter < 80 mm
	2.2 kg prismatic	174x80x87/76	Width < 60 mm

New anodes can be ordered from AQUASYSTEMS INTERNATIONAL NV.



Should you notice that an anode is already largely consumed after a first maintenance period, we advise reducing the time in between maintenances.

8. STORAGE

8.1. Temporary storage (= a few weeks)



Upon delivery, after a short term of dry storage (<1 month) and before installation, the impeller should be rotated a few times by hand. This will avoid the risk that the mechanical seals of the gearbox gets jammed and/or damaged during start-up. If you feel significant resistance/blockage of the impeller, contact AQUASYSTEMS INT. N.V.



Beware of not damaging the power cable when handling the Aerator.

Do not bend the cables sharply (the minimum radius of the bend must be more than 5 times the diameter of the cable itself). The free end of the electrical cables must never be in contact with water!

If the unit is stored outside the water, the AER-GS unit must be handled with care, to avoid damage to the coated steel parts.

Prior to starting the unit, after a short period of storage, it is necessary to verify the insulation of the windings by Meggering the motor. For any value less than 5 MΩ, never start the unit, and call AQUASYSTEMS INTERNATIONAL NV.

8.2. Long term storage (= more than a month)

The same precautions have to be made as for temporary storage, but additionally, in this case, precautions must be taken to avoid damage to motor bearings.



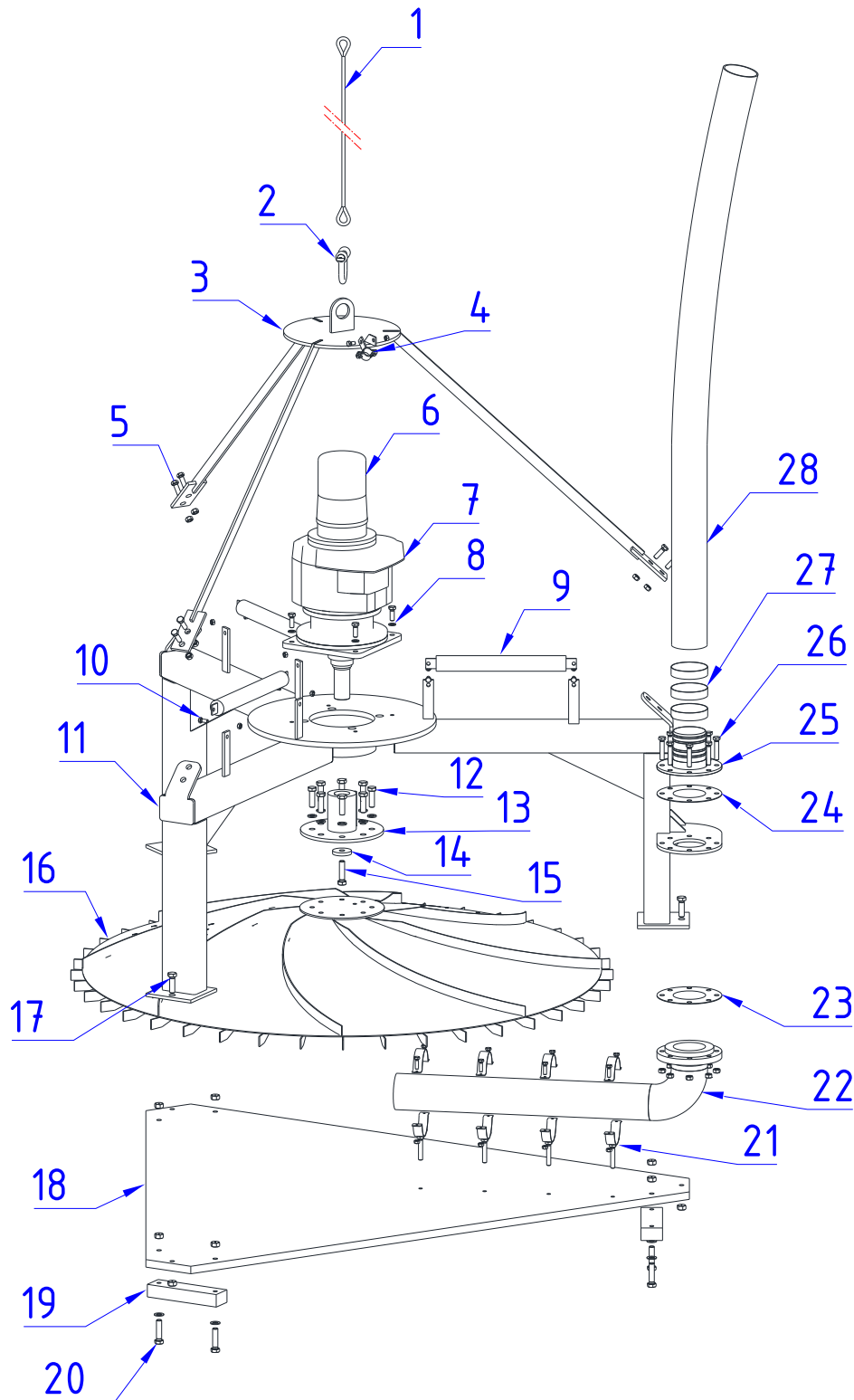
You are requested to rotate the motor shaft of the AER-GS manually on a monthly basis and prior to start-up to prevent jamming or damaging of the bearings and/or mechanical seals. If you feel significant resistance/blockage of the impeller, contact AQUASYSTEMS INT. N.V.

For a safe storage after previous operation, the product must be thoroughly cleaned. Do never use hydrocarbon-based cleaning products for this purpose.

Prior to starting the unit, after a long period of storage, it is necessary to verify the insulation of the windings by Meggering the motor. For any value less than 5 MΩ, never start the unit, and call AQUASYSTEMS INTERNATIONAL NV.

ENCLOSURE I: PART LIST AQUA TURBO® AER-GS

1. Part list of the AER-GS with flexible hose as air supply.



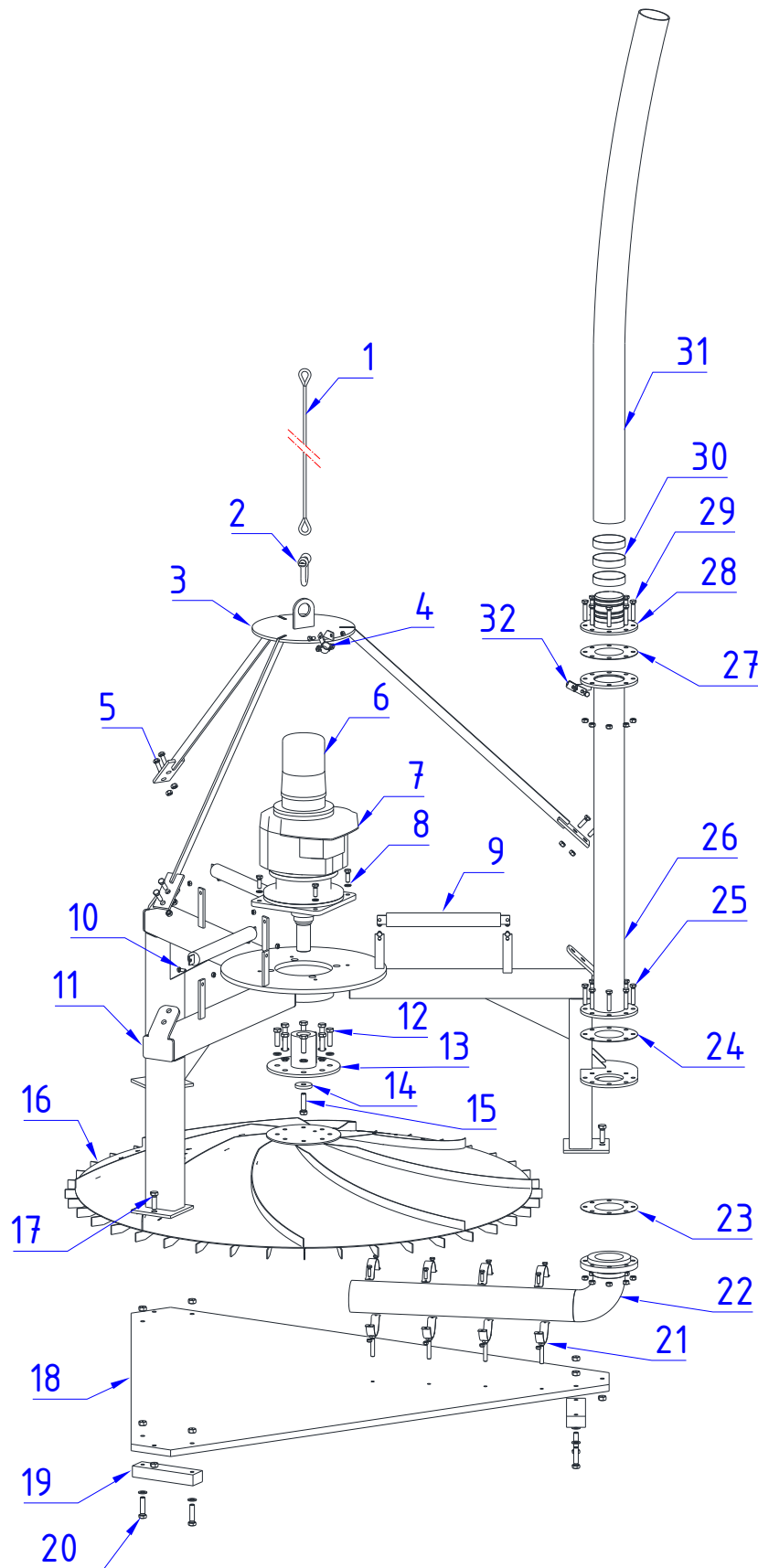
1.1 Partlist of the AER-GS with flexible hose as Air supply:

ITEM	HOEEVELH.	BESCHRIJVING	MATERIAAL
1	1	Lifting cable	AISI 316L
2	1	Shackle to connect the lifting cable	AISI 316L
3	1	Lifting frame	ST52 (Coated)
4	1	Strain relief for Electric cable	AISI 304L
5	6	Fixing bolts and nuts for the lifting frame	A2
6	1	Submersible motor	Cast iron - epoxy coated
7	1	Submersible gearbox	Cast iron - epoxy coated
8	8	Bolts for gearbox-flange connection	A2
9	3	Anode	Zn
10	6	Fixing bolts for Anodes	A2
11	1	Motor Support construction	ST52 (Coated)
12	8	Bolts for impeller connection	A2
13	1	Hub for connection of the impeller to the motor	AISI 304L
14	1	Washer for hub fixation	AISI 304L
15	1	Hub fixing bolt	A2
16	1	AER-GS Impeller	AISI 304L
17	3	Bolts and nuts for the connection of the support construction to the ballast plate.	A2
18	1	Ballast plate	ST37 (Coated)
19	3	Supports for increased friction	Rubber
20	6	Bolts and nuts for the connection of the rubber supports to the ballast plate.	A2
21	4	Fixing brackets for air diffuser	A2
22	1	Air diffuser	PP
23	1	Seal between the air diffuser and the connection flange on one of the standoffs.	Perbunan
24	1	Seal between the flexible hose and the connection flange on one of the standoffs.	Perbunan
25	1	Hose connection with loose flange for fixation of the flexible hose to the air diffuser.	AISI 304L
26	8	Bolts and nuts for the fixation of the flexible hose to the air diffuser	A2
27	3	Fixing clamps for the flexible tube	AISI 304L
28	1	Flexible hose for air supply	EPDM

On Request:

- AISI 316L / A4 Stainless steel

2. Partlist of the AER-GS with flexible hose and a short piece of fixed pipe as air supply:



2.1 Partlist of the AER-GS with flexible hose and a short piece of fixed pipe as air supply:

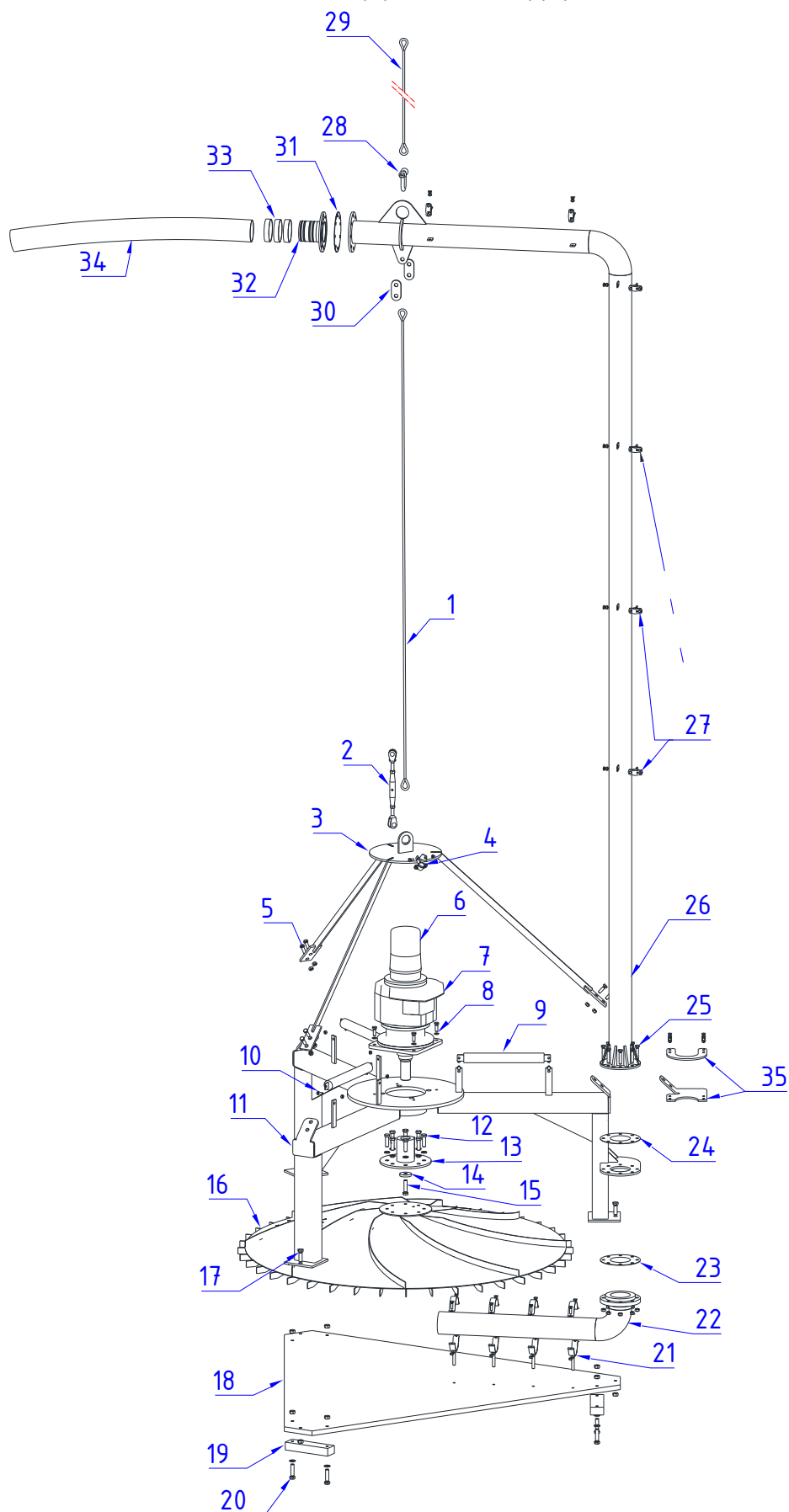
ITEM	HOEVEELH.	BESCHRIJVING	MATERIAAL
1	1	Lifting cable	AISI 316L
2	1	Shackle to connect the lifting cable	AISI 316L
3	1	Lifting frame	ST52 (Gecoat)
4	1	Strain relief for Electric cable	AISI 304L
5	6	Fixing bolts and nuts for the lifting frame	A2
6	1	Submersible motor	Cast iron - epoxy coated
7	1	Submersible gearbox	Cast iron - epoxy coated
8	8	Bolts for gearbox-flange connection	A2
9	3	Anode	Zn
10	6	Fixing bolts for Anodes	A2
11	1	Motor Support construction	ST52 (Coated)
12	8	Bolts for impeller connection	A2
13	1	Hub for connection of the impellet to the motor	AISI 304L
14	1	Washer for hub fixation	AISI 304L
15	1	Hub fixing bolt	A2
16	1	AER-GS Impeller	AISI 304L
17	3	Bolts and nuts for the connection of the support construction to the ballast plate.	A2
18	1	Ballast plate	ST37 (Coated)
19	3	Supports for increased friction	Rubber
20	6	Bolts and nuts for the connection of the rubber supports to the ballast plate.	A2
21	4	Fixing brackets for air diffuser	A2
22	1	Air diffuser	PP
23	1	Seal between the air diffuser and the connection flange on one of the standoffs.	Perbunan
24	1	Seal between the short piece of fixed pipe and the connection flange on one of the standoffs.	Perbunan
25	8	Bouten en moeren voor de bevestiging van het kort stuk vaste buis aan de luchtverdelers	A2
26	1	Short piece of fixed air pipe	AISI 304L
27	1	Seal between the short piece of fixed pipe and the flange connection of the flexible hose.	Perbunan
28	1	Hose connection with loose flange for the fixation of the flexible hose to the short piece of fixed pipe.	AISI 304L
29	8	Bolts and nuts for the fixation of the flexible hose to the short piece of fixed Air pipe.	A2

30	3	Fixing clamps for the flexible tube	AISI 304L
31	1	Flexible hose for air supply	EPDM
32	1	Strain relief for fixation of the electric cable to the short piece of pipe. (OPTIONAL)	AISI 304L

On Request:

- AISI 316L / A4 Stainless steel

3. Partlist of the AER-GS with fixed pipe as air supply:



3.1 Partlist of the AER-GS with fixed pipe as air supply:

ITEM	HOEVEELH.	BESCHRIJVING	MATERIAAL
1	1	Short Lifting cable	AISI 316L
2	1	Turnbuckle	AISI 316L
3	1	Lifting frame	ST52 (Gecoat)
4	1	Strain relief for Electric cable	AISI 304L
5	6	Fixing bolts and nuts for the lifting frame	A2
6	1	Submersible motor	Cast iron - epoxy coated
7	1	Submersible gearbox	Cast iron - epoxy coated
8	8	Bolts for gearbox-flange connection	A2
9	3	Anode	Zn
10	6	Fixing bolts for Anodes	A2
11	1	Motor Support construction	ST52 (Coated)
12	8	Bolts for impeller connection	A2
13	1	Hub for connection of the impellet to the motor	AISI 304L
14	1	Washer for hub fixation	AISI 304L
15	1	Hub fixing bolt	A2
16	1	AER-GS Impeller	AISI 304L
17	3	Bolts and nuts for the connection of the support construction to the ballast plate.	A2
18	1	Ballast plate	ST37 (Coated)
19	3	Supports for increased friction	Rubber
20	6	Bolts and nuts for the connection of the rubber supports to the ballast plate.	A2
21	4	Fixing brackets for air diffuser	A2
22	1	Air diffuser	PP
23	1	Seal between the air diffuser and the connection flange on one of the standoffs.	Perbunan
24	1	Seal between the short piece of fixed pipe and the connection flange on one of the standoffs.	Perbunan
25	8	Bouten en moeren voor de bevestiging van het kort stuk vaste buis aan de luchtverdeler	A2
26	1	Fixed air pipe	AISI 304L
27	More than 1	Strain relief for fixation of the electric cable to the fixed air pipe.	AISI 304L
28	1	Shackle to connect the lifting cable	AISI 316L
29	1	Long lifting cable	AISI 316L
30	2	Fixing plates for the connection of the short lifting cable to the fixed air pipe.	AISI 304L

31	1	Seal between the fixed pipe and the flange connection of the flexible hose.	Perbunan
32	1	Hose connection with loose flange for the fixation of the flexible hose to the fixed pipe.	AISI 304L
33	3	Fixing clamps for the flexible tube	AISI 304L
34	1	Flexible hose for air supply	EPDM
35	1	Additional support for the connection of the fixed Air pipe to the top of a support leg. This bracket is only applied when the fixed pipe is installed on a support structure that has not been re-enforced to hold the weight and forces of the air pipe.	AISI 304L

On request:

- AISI 316L / A4 stainless steel

ENCLOSURE II: GENERAL DATA

1. Identification plate + data on the delivered material

AQUASYSTEMS INTERNATIONAL NV
 Brusselsesteenweg 508
 B-1500 Halle
 BELGIUM

Tel.: +32 (0)2 362 02 62
 Fax: +32 (0)2 360 35 89

UNIT DATA:

Year of production : 201X
 Type : AER-GS X-X
 Serial number(s) :
 Total weight of the device : X kg

Delivered accessories (per aerator):

- Air-Intake Pipe DN X : X m
- Power cable X mm² : X m
- Leak detection (without detection relay, if not ordered)
- Thermal protector switch (PTO)
- (Detection relay)
- (X)

GEARBOX DATA:

Type :
 Serial number(s) :
 Speed in/out : X/X rpm

MOTOR DATA:

Type:	
Serial number(s):	
Motor power/Shaft speed:	 kW / rpm
Nominal voltage:	 V
Nominal Amps:	 A
Cos phi:	
Power connection:	3 x V - Hz
For DOL start: I _{max} /I _{nom} :	

2. Electrical connection

As the type of connection will depend on the power supply voltage, the allowed voltages to the motor and the start-up procedure, please measure first the line voltage, and verify data on motor nameplate.

ALLOWED CONNECTIONS / STARTING PROCEDURES FOR SUBMERSIBLE MOTORS

Measured power supply at end customer	Allowed voltage supply to motor (mentioned on motor nameplate)	Authorised start procedure	Required power leads
240V - 3P	240 - 400V	Y/Δ	6
		Δ DOL	3
400V - 3P	240 - 400V	Y DOL	3
	400 - 690V	Y/Δ	6
		Δ DOL	3
		Y DOL	3
690V - 3P	400 - 690V	Y DOL	3

- If authorised, STAR/DELTA start procedure

→ During start-up : STAR connection (the start-up period in star must always be limited to max. 3 seconds; exact time to be determined on site by an electrician, so that at transition from Y to Δ the current surge is minimal)

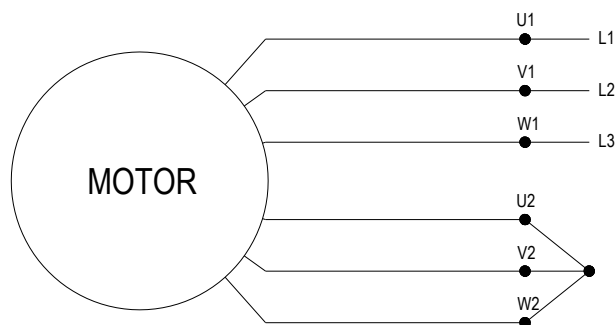


Fig. A

→ After start-up: DELTA connection

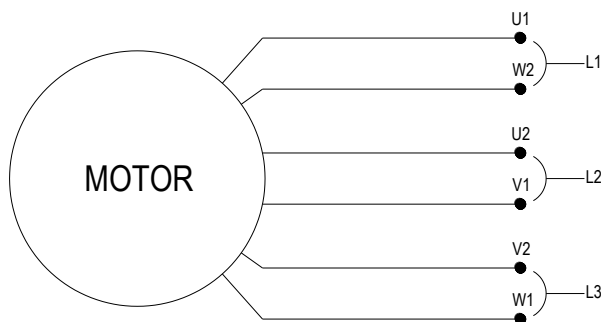


Fig. B

- If authorised, DOL Star start procedure

→ See fig. A

- If authorised, DOL Delta start procedure

→ See fig. B

Temperature detector: Thermal protector switch - PTO

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

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

All motors are standard equipped with such thermal Bi-metal protection switch.

Leak detection:

In the oil chamber of the submersible mixer motor, a leak detection is mounted. If the mechanical seal of the motor leaks, water penetrates into the oil chamber and reduce the electrical resistance of the oil.

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

The use of the provided leak detection is **MANDATORY!**

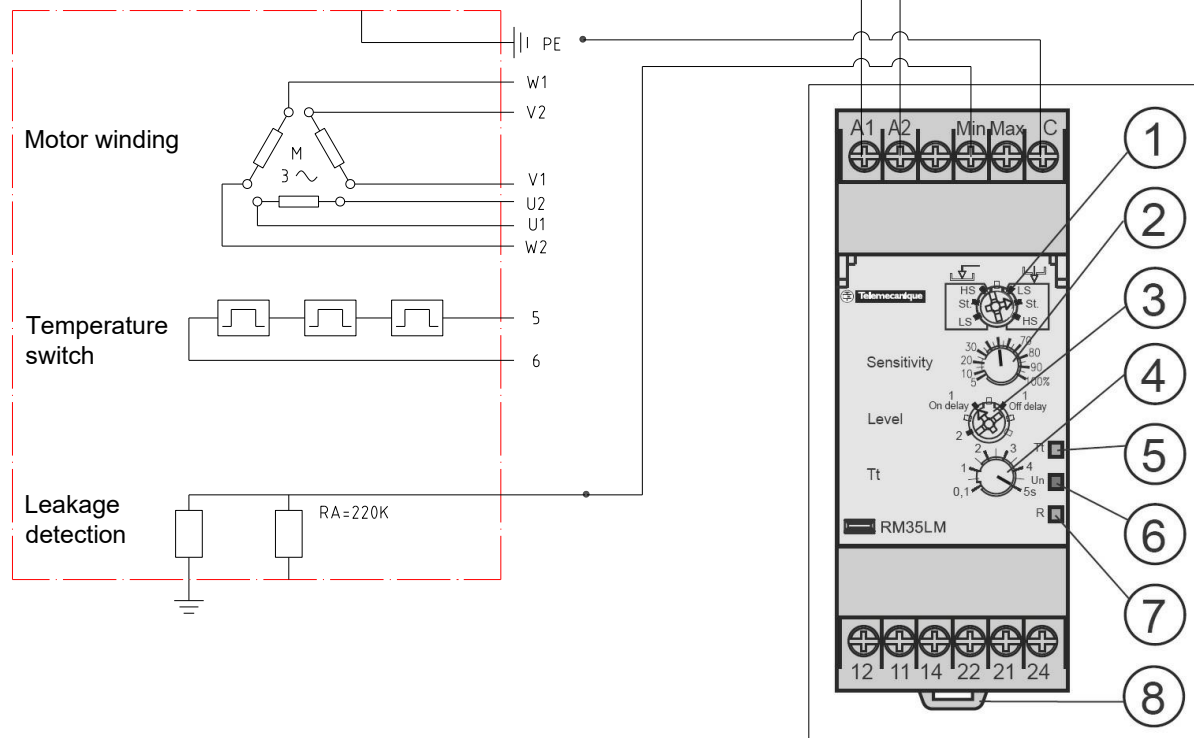
Detection relay:

Standard detection relays, delivered by AQUASYSTEMS INTERNATIONAL NV are ZelioRM35LM33MW relays.

① Connection of the Zelio RM35LM33MW moisture detection relay

- Connect the power supply (230V - 50Hz) to A1 and A2
- Connect the cable of the leakage detection probe (cable nr. 15 for an EMOD motor) to contact "Min" on the relay. Connect the ground cable of the motor to contact "C" of the relay.
- When a certain quantity of water has entered the oil chamber (dependant on the setting of the sensitivity on the relay), the relay will detect it and the contacts 11-12 & 21-22 will open. The contacts 11-14 & 21-24 will close.

Submersible motor



The time delay and the sensitivity can be adjusted on the relay: our advice is as follows:

- The sensitivity (1) is set at $L \downarrow \downarrow St$ (5 k Ω ... 100 k Ω).
- The percentage of the sensitivity (2) at 50% (50% of 100 k Ω).
- Level (3) should be on "1 On Delay" (delay at switching on)
- The time delay on the detection (4) is set at 5 seconds.

Remark: Every change of settings must be followed by interruption of power supply to A1 and A2



NOTE:

- The moisture detection relay must imperatively stop the motor when water ingress has been detected.
- The temperature detector (PTO) also has to be connected in such a way that the motor is stopped when the temperature reaches the limiting temperature.

VERY IMPORTANT:

Always check the correct operation of the relay after installation.

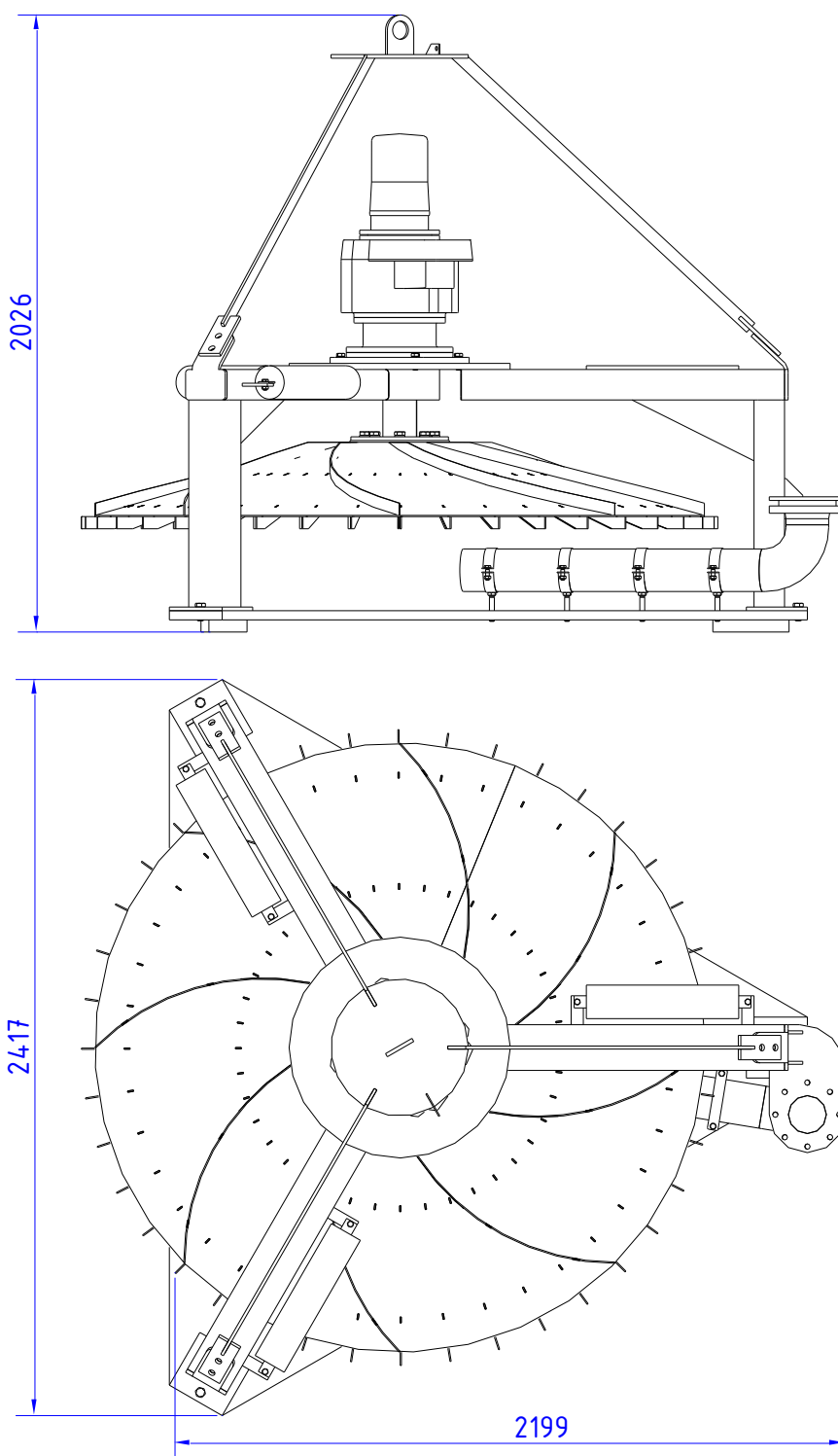
TEST: make a connection between C and Min to check if the detection works.

If it doesn't work, please contact AQUASYSTEMS.

- There is a resistance of 220K Ω in parallel with the leakage detection cable.

This resistance allows to measure that the cable is not broken.

3. Major dimensions



AER-GS 0550-24 (DN125)

Total weight: $\pm 1230\text{kg}$

ENCLOSURE III: MOTOR AND GEARBOX O&M MANUAL

ENCLOSURE IV: SPECIFIC DATA FOR PROJECT