

USER MANUAL



ROTOR SPREADER HEX MKII

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For a thorough introduction to your AKVA group product, carefully read through this user manual before assembling, installing or using the product. Our user manuals are available from our website: www.akvagroup.com/user-manuals.

Together we can contribute to making sure that fish farming is an environmentally friendly, sustainable and growing industry that produces safe and healthy seafood for a global market.

Best regards,
AKVA group

SYMBOLS

**WARNING!**

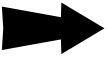
Serious health risk or other serious incidents - Safety sign that implies a danger that may cause physical personnel injuries and/or damages to the equipment.

**REQUIREMENT**

Symbol indicating requirements.

**NOTE!**

Symbol that implies useful hints and recommendations for efficient use of the product.

**GO TO**

Symbol that indicates a link to a page or section with further information. Click on underlined words to go to the reference or open the link.

Note that illustrations in this user manual are meant to illustrate, and the appearance may therefore deviate from the physical product.

SUMMARY

Rotor Spreader Hex consists of a hexagonal base (part 2 in illustration 1: [Rotor Spreader Hex main components](#)) of foam-filled HDPE plastic pipes with rounded corners. A transition in the base allows feed pellets to pass through into the aluminum tube (part 5 in illustration 1), and spread through the upper spreader part, with a rotating bearing. A swivel (1) is mounted in the transition between base and feeding pipe Union, to relieve torsional forces from inclement weather and waves. Between the bearing (part 4) and the base, three struts (part 3) are mounted, in order to maintain a stable construction.

Illustration 1: Rotor Spreader Hex main components



1	Transition with swivel
2	Base with rounded corners
3	Reinforcing metal sleeves
4	Crimped tubes (3x)
5	Bearing
6	Outlet

Rotor Spreader Hex spreads feed pellets on the water surface in floating pens by rotating, and is used with pressure air feeding systems. Rotor Spreader Hex shall not be rebuilt or used for anything other than intended use described in this manual, without written consent from a qualified AKVA employee. Although the Rotor Spreader Hex base floats, it is not designed for stepping or walking on.

Rotor Spreader Hex must never be operated if the components are not properly installed by qualified personnel. Only qualified personnel can perform installation and maintenance of the product. Technical personnel from AKVA group who perform work operations on the system are considered qualified personnel.

Equipment should never be used when it is not in perfect technical condition. To avoid using defective equipment, follow the procedures in this user guide. If any of the equipment is used in a defective condition, the safety functions will be impaired. Use only original spare parts supplied by AKVA group. Unauthorized rebuilding and modifications of the equipment are not recommended.

If the bearing is not mounted as instructed in this document, it may be damaged and loosen, and fall into the pen, causing net damages. Anything lost into the pen shall be removed immediately.

Rotor Spreader Hex is tested and approved for significant wave height $H_s = 2.5$ meters. See other technical specifications in table 2: [Technical specifications](#).

The safest way to transfer a feed pipe from outside of the pen into the Rotor Spreader Hex placed inside the pen, is to lay the feed hose flat over the walkway and thread it through the jump net at the same height according to recommendations from the net supplier. This method is safest for personnel. The feed pipe may in some cases be thread just below the handrail, over the jump net, and attached to the handrail with rope or similar. If this method is preferred for the site, it is crucial to refer to the pen user manual to find maximal allowed load placed onto the handrail.

Rotor spreader Hex is placed inside the pen and moored with 4 ropes attached to the hex base and to the pen handrail. Excess length measurements of mooring ropes shall be calculated to avoid wearing or tearing due to the pen ovalizing.

All equipment must be checked after inclement weather. Check that the suspension is intact and in order, check that the surrounding equipment is intact and in order, it is especially important to check the nets for damage. If any equipment has been damaged, it must be repaired immediately. Therefore contact AKVA group for assistance in such cases.

ABBREVIATIONS AND GLOSSARY

User	Person that is going to be using the equipment
Inclement weather	Weather conditions complicating standing upright in a service boat, and which can cause sea spray on electrical components while working on the equipment
Nm	Newton meter - unit for torque
Qualified personnel	Person who is trained in performing basic operations and maintenance tasks on the equipment. Technical personnel from AKVA group who perform work operations on the system are considered qualified personnel.
Lock-out/tag-out	Lock-out (physical barrier) and Tag-out (visual marking) is a safety procedure used in industry to ensure that dangerous machines are properly shut off and not able to be started up again prior to the completion of maintenance or repair work.
PE	Polyethylene - thermoplastic material

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1 PRODUCT DESCRIPTION

Rotor Spreader Hex spreads pellets with compressed air. By using Air Monitoring combined with Rotor Spreader Hex, with properties such as low friction start and high efficiency, the air speed can be reduced and at the same time achieve excellent feed spreading in the cage. The pipes are made of lightweight aluminum, which means that they require a lower air speed for start-up and rotation. This results in less dust and pellet breakage, power consumption, back pressure, noise, air temperature and wear on the feed hose.

The Rotor Spreader Hex base is made of foam filled HDPE pipes, so that it will not sink if it is exposed to damage.

Rotor Spreader Hex MKII is our latest variant of AKVA feed spreaders. MKII is an improved version of Rotor Spreader Hex, and has a swivel in the transition between base and feed pipe, by the Union, to relieve torsional forces in weather and wind, see illustration 2: [New swivel by the transition](#) to feed hose. Rotor Spreader Hex may be retrofitted with a swivel if desired. Contact AKVA group Service personnel for more information about this.

Illustration 2: New swivel by the transition



Illustration 3: New reinforcing metal sleeve



Rotor spreader Hex MKII is also reinforced with metal sleeves in the base strut attachments, see illustration 3: [New reinforcing metal sleeve](#). These sleeves withstand tensile and torsional forces that can occur with large and large movements in the sea and hex base.

Table 1: Part names

1	Hex base	10	M10 Washer
2	Hex Crimped Tubes (3 pc.)	11	M10x80 Screw Hex Head
3	Union	12	Nut Nylock
4	Bearing Assembly	13	Centre Pipe R600 w/Hoop
5	Feed Tube Clamp	14	Hose Clamp T-Bolt
6	M8x35 mm Screw	15	M8x70 Screw Hex Socket
7	Rotor Spreader pipe w. bearing plate	16	M8x25 Screw Hex Socket
8	Hex clamp	17	Nordlock Washer
9	Tie Bolt	18	Rope White Nylon

Illustration 4: Rotor Spreader Hex parts 1/3

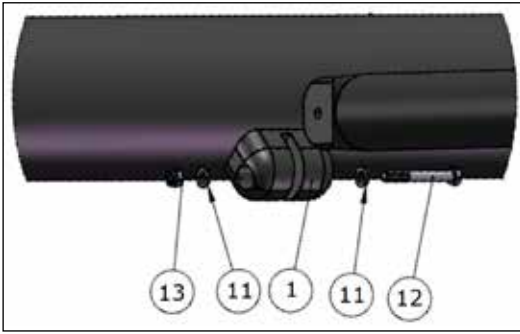


Illustration 5: Rotor Spreader Hex parts 2/3

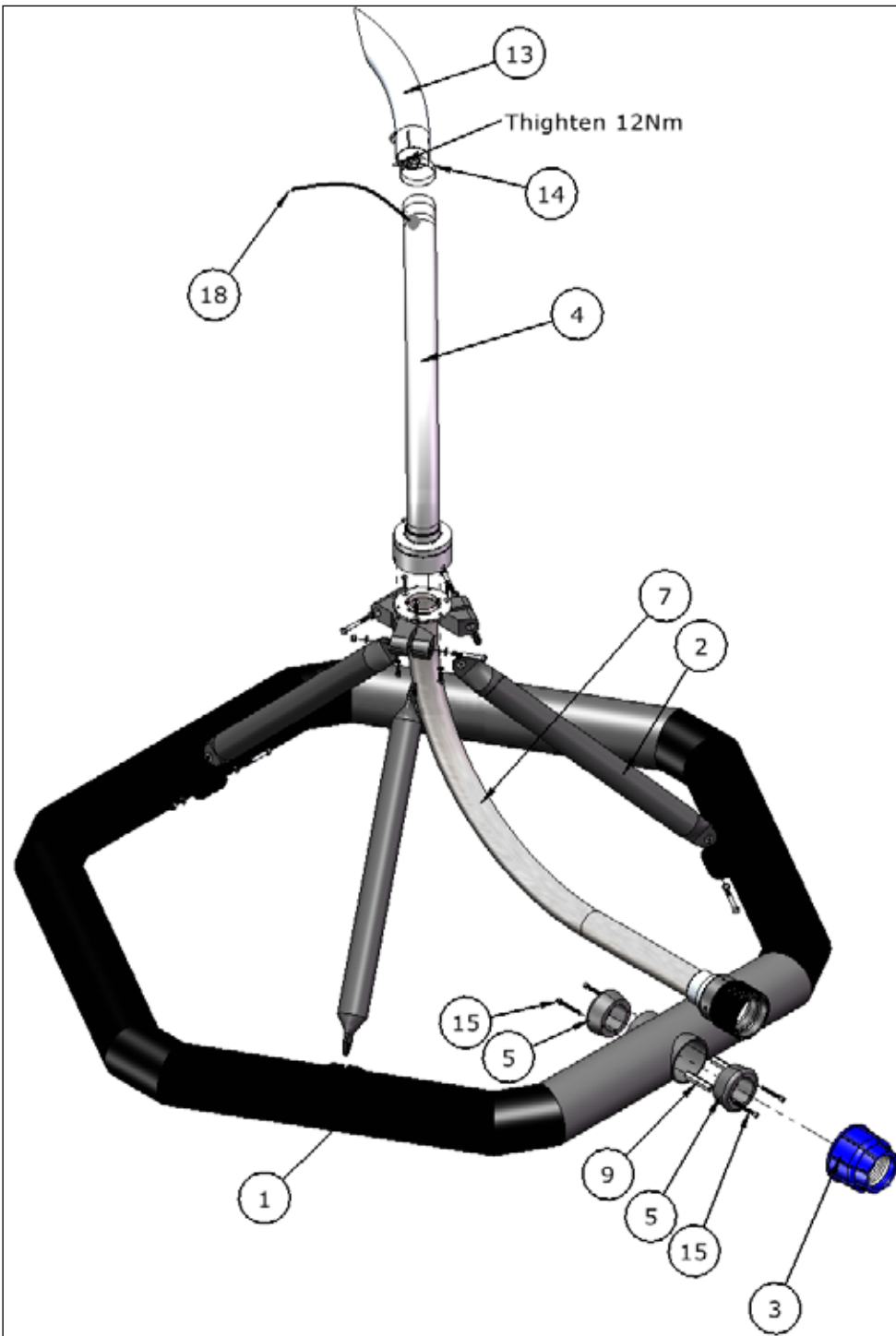
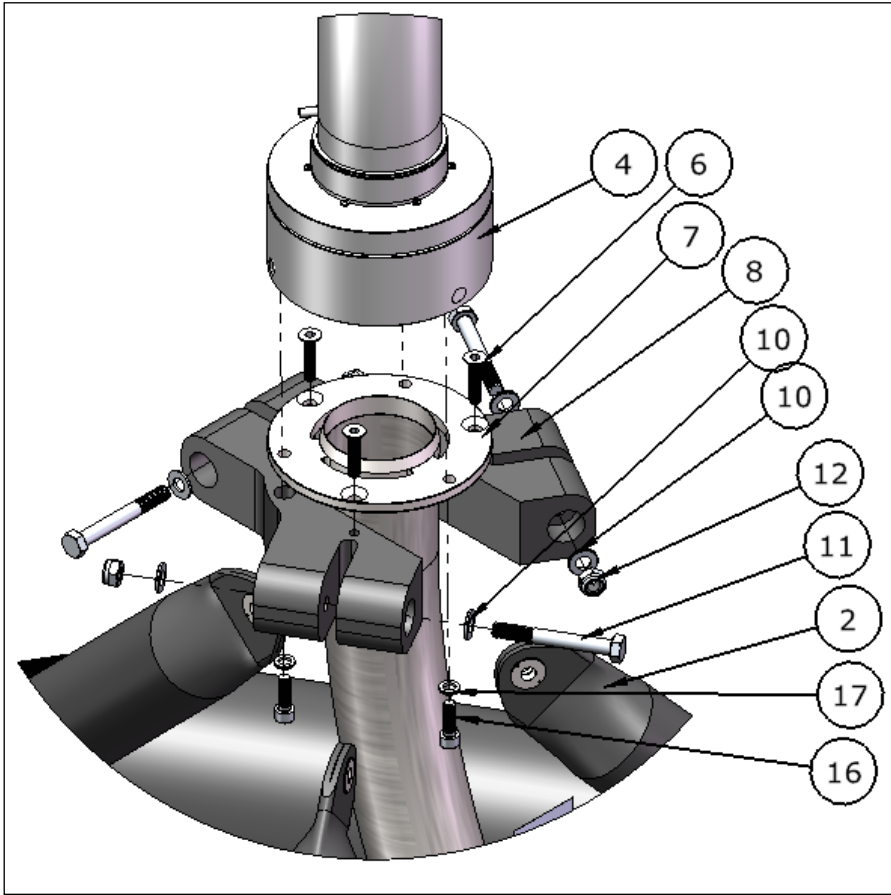


Illustration 6: Rotor Spreader Hex parts 3/3



2.1 TECHNICAL SPECIFICATIONS

Table 2: Technical specifications

Materials	HDPE/Stainless steel/Aluminum/POM/PU-foam
Weight	Approximately 35 kg
PE Pipe dimension	90 mm
Max pellet size	25 mm
Recommended rotation speed	50-100 rpm*
Spreading area	Ø = Approx. 5-18 m*
Height above sea-level	1.5 meter
Depth	0.1 meter
Ball bearing lifespan	600 tonnes of feed
Max load Rotor Spreader mooring ropes	6.245 kN (637 kg)
Aluminum pipe lifespan	1000 tonnes of feed

*Depending on feed system and pellet size

2 INTERFACE WITH OTHER PRODUCTS

The safest way to transfer a feed pipe from the outside of the pen into the Rotor Spreader Hex inside the pen, is to lay the feed hose flat over the walkway and thread it through the jump net at the same height. If this method is to be used, implementation in nets shall be done in accordance with recommendations from the net supplier. It will be safest for personnel to move around the walkway if the feed pipe lays on the walkway and is threaded through the net/jump net.

The feed pipe may in some cases be thread just below the handrail, over the jump net, and attached to the handrail with ropes or similar, so that it is not in contact with any part of the net. If this method is preferred for the site, it is crucial to check the pen suppliers user manual to verify that the feed pipe will not exceed maximal allowed load placed onto the pen handrail.

The Rotor Spreader Hex base is made of HDPE pipes filled with foam, and it floats on water. The base has no protruding parts below the water surface, and will thus not interfere with other equipment that is installed or used under water inside the pen. The base has no sharp edges, so that it does not pose any danger to the net or fish that jump, should contact occur.

Rotor Spreader Hex is moored with 4 ropes stretched from the base out to the handrail. The installer must ensure that the ropes do conflict with other equipment that is installed or used inside the pen, and during operation these mooring ropes must be checked regularly to ensure that they do not pose any risk of loosening or interfering with other equipment and their moorings. The mooring rope lengths have to be in accordance with instructions in this user manual, so that they can withstand any ovalization of the pen.

3 ASSEMBLY

**WARNING!**

Complete the assembly on barge/boat before taking the Rotor Spreader Hex to sea. If bearing bolts are tightened with incorrect torque, Rotor Spreader Hex will not function as expected. If the torque is too tight, the bearing will bend and may break. The assembly process shall be executed by qualified personnel.

**NOTE!**

Once the assembly is complete, it is important torque the tie bolts (part 10 in illustration 4: [Rotor Spreader Hex parts 3/3](#)) according to this chapter.

The equipment must be handled very carefully during transport, and we recommend that two people take part in unpacking the components from transport protection or packaging, when moving to and from the sea and when setting Rotor Spreader Hex up for storage. Always use lifting equipment that is dimensioned to lift the weight that is to be lifted when a package of rotor spreader(s) is to be unloaded from the means of transport.

Check that all parts specified in the delivery note are delivered. If the order is incomplete, or if something has been damaged during transport, please contact AKVA immediately. We recommend that technical personnel from AKVA group check and install the equipment.

3.1 THE HEX CLAMP

Point the open side of the Hex clamp (part 8 in illustration 4: [Rotor Spreader Hex parts 3/3](#)) towards the opening in the Hex base where the feed passes through. When delivered, the Hex clamp should be correctly positioned and attached to one of the crimped tubes (part 2 in illustration 5: [Rotor Spreader Hex parts 2/3](#)). Make sure that this is done correctly for the Rotor Spreader Hex to function as expected. In the unlikely event that it has been fitted incorrectly, release and adjust the assembly.

Illustration 7: Hex clamp open side shall point towards the hex base opening

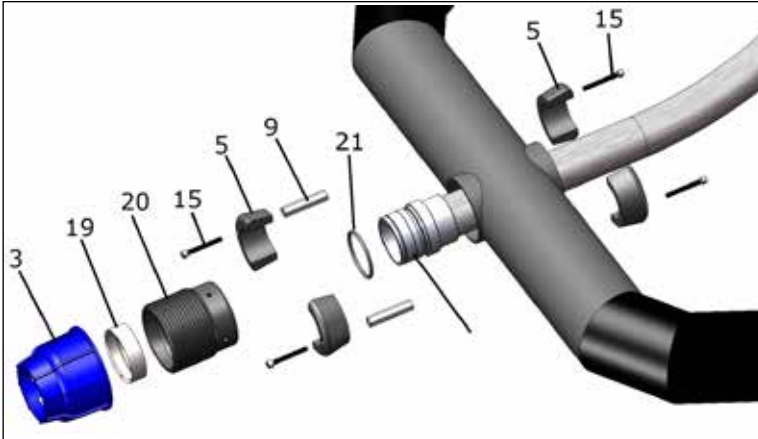


3.2 ASSEMBLE THE ROTOR SPREADER HEX

**NOTE!**

Rotor Spreader Hex MKII also has an O-ring in the coupling (in addition to the O-ring in the Union, which both Rotorspreder Hex and Rotor Spreader Hex MKII has). See part 21 in illustration 8: [Base feeding pipe passage parts](#).

Illustration 8: Base feeding pipe passage parts



The junction between the base and feed pipe is assembled from the production site.

Included parts:

- 3: Union
- 5: Feed Tube Clamp
- 9: Tie bolt
- 15: Bolt
- 19: Swivel
- 20: Union house
- 21: O-ring

Required equipment:

- a. Hex key: 2 x 6 mm
- b. Sockets: 13 mm and 17 mm
- c. Socket Wrench and ratchet
- d. Torque wrench for required Nm values

Illustration 9: Tools for attaching feeding pipe

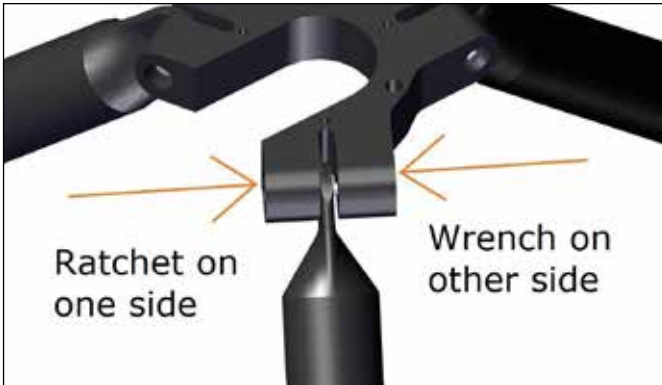


Procedure:

(Number references from illustrations 1-3)

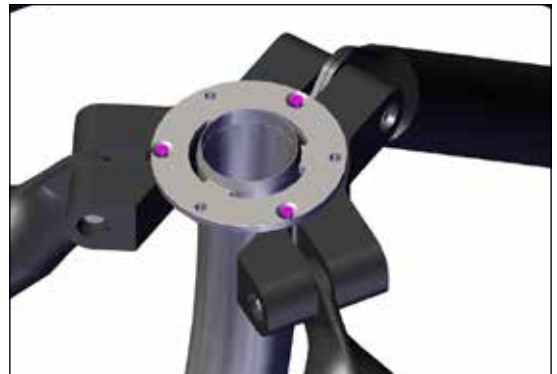
1. Lay the base (1) down on a flat surface.
2. Lift the 3 crimped tubes (2) up towards the centre of the hex base, and make sure that the hex clamp opening (8) points towards the Hex Base opening, see illustration 7: [Hex clamp open side shall point towards the hex base opening.](#)
3. Attach the two loose crimped tubes (2) to the hex clamp (8) with M10x80 bolts (11) with belonging washers (10) and nuts (12).
4. Use two 17 mm pipes to tighten the bolts, one on each side of the bracket, one locked, and one open ratchet.
5. After attaching crimped tubes to the hex clamp, the bolts in the connection between the crimped tubes and the hex base must be tightened. Use the same method as in step 4, with a socket wrench and a ratchet on each side of the bracket. See illustration 10: [Ratchet and wrench on each side.](#)

Illustration 10: Ratchet and wrench on each side



6. Lift the bottom pipe part of the Rotor Spreader (7) inside the base. It may be necessary to loosen the bolts around the feed hose clamps, to be able to move the bottom pipe part into the clamp.
7. Place the bearing plate on top of the hex clamp (8).
8. Attach the bearing plate to the clamp with three M8x25 bolts (16), use a 6mm hex key.

Illustration 11: Attach the Rotor Spreader Hex (7) base plate to the hex clamp (8)



8. Re-tighten bolts in the connection between crimped tubes and the hex base using ratchet and socket wrench as described in illustration 10: [Ratchet and wrench on each side](#).

Illustration 12: Re-tighten bolts between crimped tube and hex base



9. Place bearing (5) on top of bearing plate, as illustrated in illustration 13: [Place and attach bearing to bearing plate](#).
10. Attach bearing with the M8x25 bolts (16) and Nordlock washers (17) under the bearing plate. Use 6 mm torque wrench to tighten each bolt to 6 Nm torque.

Illustration 13: Place and attach bearing to bearing plate



9. After assembling is finished, it is important to tighten the tie bolts (9) in the base feeding pipe passage to make sure the clamps stay in place. Use 6 mm hex key.

Illustration 14: Attach the tie bolts (9)



3.3 ASSEMBLING OUTLET PIPE

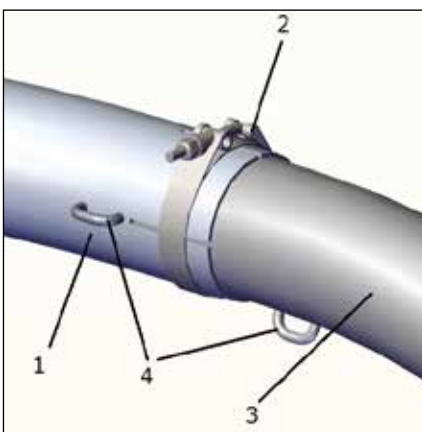


WARNING!

It is very important to attach a rope between the outlet pipe and Rotor Spreader Hex to prevent the outlet pipe and hose clamp from coming loose and falling into the pen, which in the worst-case scenario can lead to holes in the pen and fish escaping.

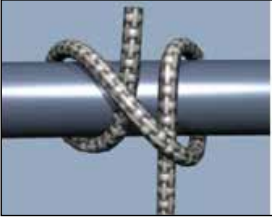
In addition to the parts shown in illustration 15: [Outlet pipe assemble](#), a 0.5 meter long rope is included. The rope is used to attach the outlet pipe and hose clamp to the rest of the rotor spreader pipe. This prevents the attached parts from falling into the water on the rare occasion that disassembly may be required. This safety rope should not be tight, but loose enough for the parts to be easily separated.

Illustration 15: Outlet pipe assemble



1. Outlet pipe
2. Hose clamp with fastening hole
3. Connector pipe
4. Loops for attaching rope

Illustration 16: Recommended knot: double half hitch knot



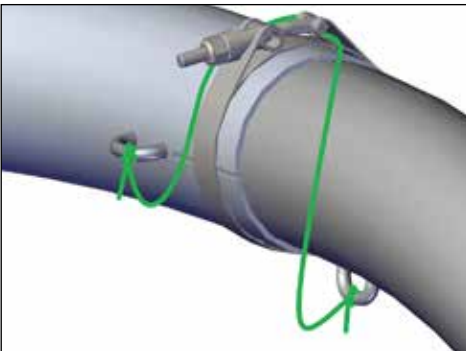
Required equipment:

- 13 mm torque pipe or key

Procedure:

1. Thread the hose clamp over the connector pipe.
2. Thread the outlet pipe over the connector pipe.
3. Place the hose clamp over outlet pipe end that is thread over the connector tube.
4. Tighten the hose clamp with a 13 mm pipe or key and tighten torque to 13 Nm (use torque wrench).
5. Attach the safety rope to the outlet loop with the knot roundturn with double half hitch, or similar or better knot that is simple to release when required, even after being exposed to seawater over time.
6. Thread the loose end of the rope through the hose clamp opening (2).
7. Attach the loose end of rope to the connector pipe loop. Use the recommended knot, and allow enough slack in the rope to enable separating the various parts when required.

Illustration 17: Safety rope for the outlet



3.4 ADJUSTING OUTLET PIPE



WARNING!

When using tools on the pen, secure them, so that they do not fall into the net.

The spread area is adjusted by the outlet pipe:

- pointing it downwards reduces the spread area
- pointing it upwards increases the spread area

4 INSTALL IN PEN



WARNING!

Before lifting, check all certificates for crane, shackles and other ancillary equipment to ensure that everything is approved to lift the intended load.

Ensure that the feeding system is switched off before attaching the feeding pipe to the Rotor Spreader. Set main switch to OFF position and secure it with lock-out/tag-out safety procedure.

The installation process shall be executed by qualified personnel.

4.1 LIFTING ROTOR SPREADER



REQUIREMENT

Wear helmet when occupying areas where lifts are executed.

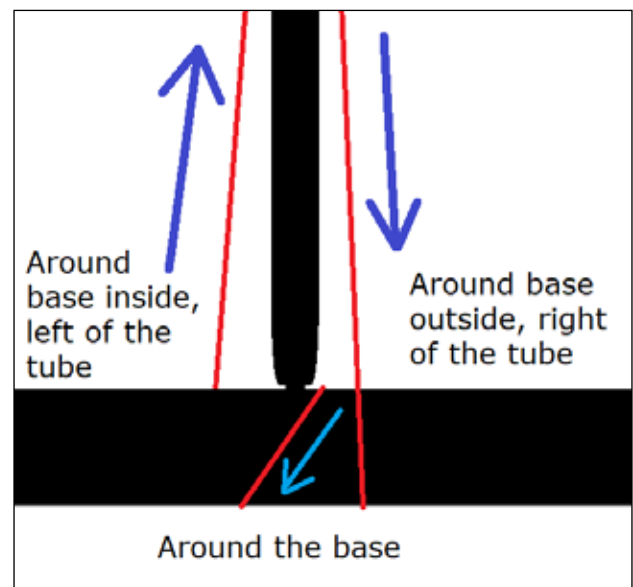
Required equipment:

- boat with crane
- minimum of two people
- 3 lifting straps approved for lifting the weight of a Rotorspreder Hex, as well as for use on floating aquaculture facilities
- 1 safety rope

Procedure:

1. Once fully assembled, the rotor spreader can be taken out to the pen for installation.
2. Attach the lifting straps around each crimp tube and the base for a safe and balanced lift, as shown in illustration 18: [Attach lifting straps](#).
3. Attach the lifting straps to the approved crane.
4. Control that everything is properly attached and safe.
5. Lift the Rotor Spreader as controlled as possible and carefully lower it into the water without disturbing the fish.
6. Attach the safety rope between the Rotor Spreader and the pen before releasing the lifting straps.

Illustration 18: Attach lifting straps



4.2 FEED PIPE FROM OUTSIDE TO INSIDE OF PEN

In order to connect the feed pipe from the feeding system to the Rotor Spreader Hex, which is located inside the pen, the hose must be led from the outside to the inside of the pen by one of two methods:

Method 1: Through the jump net (recommended)

The feed pipe is thread through the netting/jump net. This method has to be executed in accordance with recommendations from the net supplier. Check the net supplier user manual for a safe method for such a passage.

Method 2: Attached to the handrail

The feed pipe is thread between the handrail and the jump net, and secured with a rope or similar fastening device, so that it remains at rest even if the pen moves, and so that it is not in contact with the net. Leave a little slack in the rope, to have some distance between handrail and feed pipe, to avoid gnawing injuries. We recommend using several ropes to secure the position. With this method, the feed pipe will be an obstacle over the walkway, and it will also constitute a load on the handrail. Before using this method, check whether the handrail on the current pen type is constructed to withstand such load.

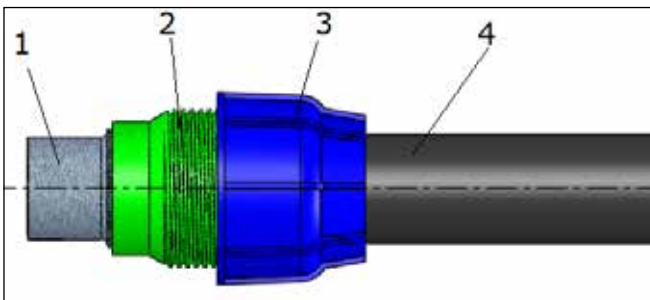
4.3 CONNECT TO FEEDING PIPE ROTOR SPREADER HEX MKI



NOTE!

This procedure relates to Rotor Spreader Hex MKI (without swivel).

Illustration 19: MKI Feeding pipe connector parts, Union



1. Rotor Spreader
2. Union house
3. Union
4. Feeding pipe

Illustration 20: Mounting tool



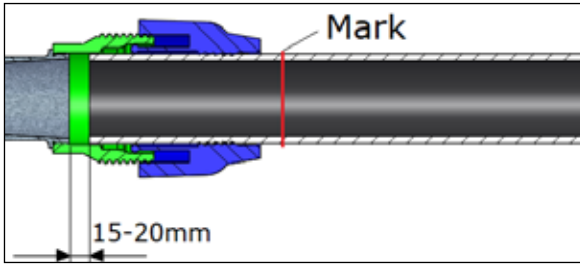
Required equipment:

- Rotary Spreader Mounting tool (illustration 20: [Mounting tool](#))

Procedure:

1. Install Lock-out/Tag-out to the blower service switch in the belonging feedline so that it cannot be started during the process.
2. Ensure that the feed pipe cut surface is straight and graded, and without protruding parts.
3. Place the Rotor Spreader Hex next to the feed pipe outlet, so that the Rotor Spreader is positioned as perpendicular to the surface as possible.
4. Screw Union (3) adapter approximately 15 mm over Union House (2).
5. Lubricate the end of the feeding pipe (4) and inside of the Union (where the O-ring is placed) with silicon grease.
6. Insert feeding pipe end into connected Union parts.
7. Place a mark, see illustration 21: [Place a mark](#) on the feeding pipe at end of the Union (3).

Illustration 21: Place a mark



8. Pull the feeding pipe 15–20 mm out from the connected Union parts.
9. Tighten Union parts by hand (twist in opposite directions).
10. Tighten with Mounting tool to secure it properly.
11. Once fully tightened, the Union connection will look as in illustration 22: [Feeding pipe connector parts, Union](#).

Illustration 22: Feeding pipe connector parts, Union



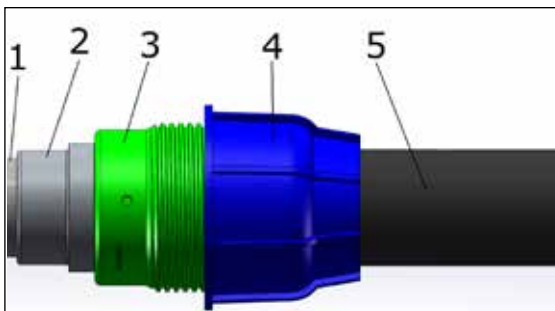
4.4 CONNECT TO FEEDING PIPE ROTOR SPREADER HEX MKII



NOTE!

This procedure relates to Rotor Spreader Hex MKII (with swivel).

Illustration 23: MKII Feeding pipe connector parts, Union



1. Rotor Spreader
2. Swivel
3. Union house
4. Union
5. Feeding pipe

Illustration 24: Hooked spanner



Required equipment:

- Rotary Spreader Mounting tool (illustration 20: [Mounting tool](#))
- Hooked spanner (illustration 24: [Hooked spanner](#))

Procedure:

1. Install Lock-out/Tag-out to the blower service switch in the belonging feedline so that it cannot be started during the process.
2. Ensure that the feed pipe cut surface is straight and graded, and without protruding parts
3. Place the Rotor Spreader Hex next to the feed pipe outlet, so that the Rotor Spreader is positioned as perpendicular to the surface as possible.
4. Screw Union (3) adapter approximately 15 mm over Union House (2).

5. Lubricate the end of the feeding pipe (4) and inside of the Union (where the O-ring is placed) with silicon grease.
6. Insert feeding pipe into connected Union parts.
7. Place a mark, see illustration 25: [Place a mark](#) on the feeding pipe at end of the Union (3).
9. Pull feeding pipe 15–20 mm out from connected Union parts.
10. Tighten Union parts by hand (twist in opposite directions).
11. Tighten by pushing Mounting tool clockwise and Hooked spanner counter clockwise. See illustration 26: [Tighten](#).
12. Once fully tightened, the Union connection will look as in illustration 27: [Feeding pipe connected to Rotor Spreader Hex MKII](#).

Illustration 25: Place a mark

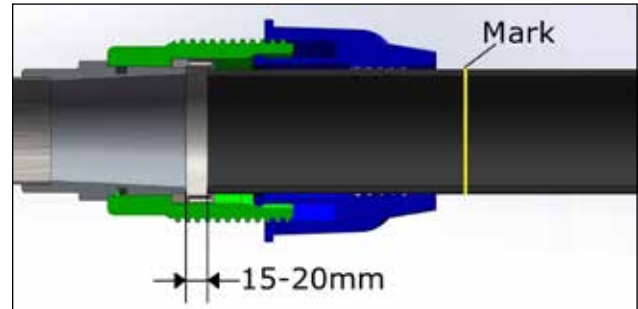


Illustration 26: Tighten

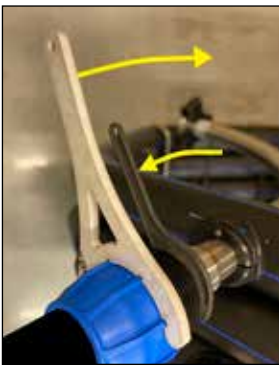
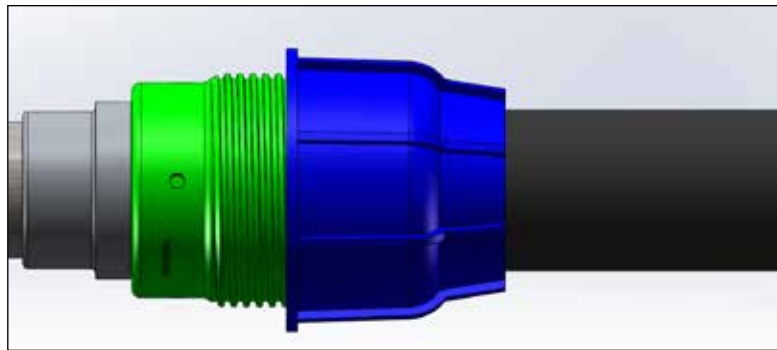


Illustration 27: Feeding pipe connected to Rotor Spreader Hex MKII



4.5 FUNCTION TEST



WARNING!

Place the Rotor Spreader Hex at a safe distance from people, and secure it with ropes so that it does not drift, before testing.

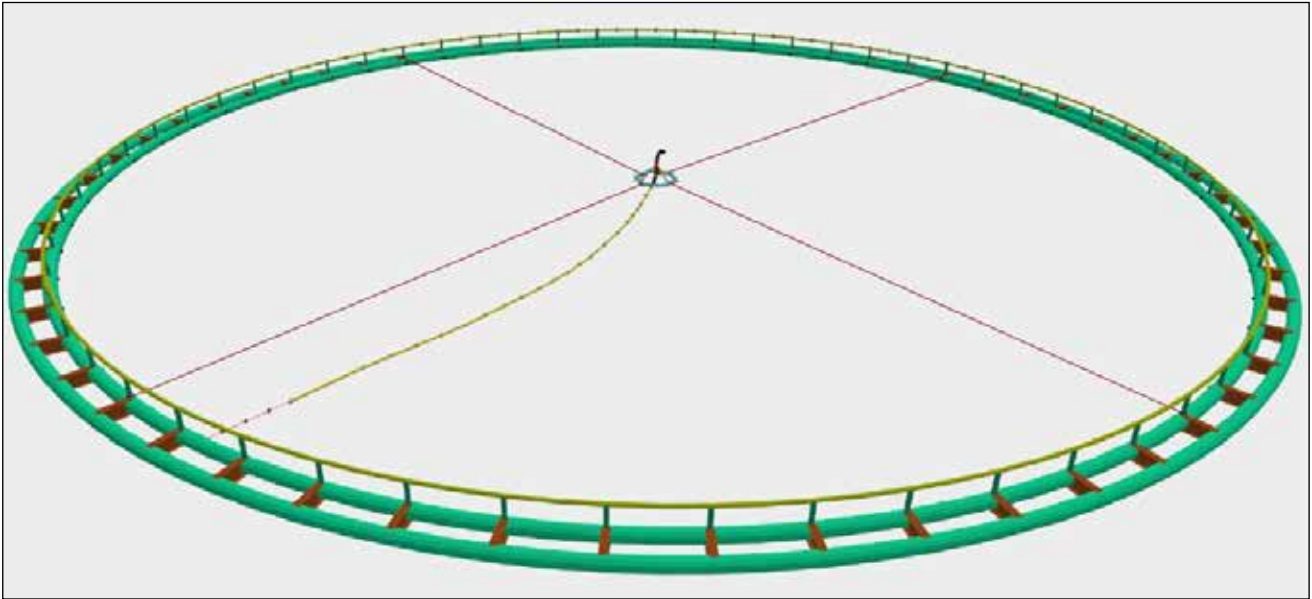
After the Rotor Spreader Hex has been installed and fitted to the feeding system, the functions must be tested. Functional tests must also be performed under control after a storm or moving the equipment.

Procedure:

1. Check that all connections (bolts) are sufficiently tightened and made in accordance with instructions in chapters 3 and 4 of this user manual.
2. Keep a distance from Rotorspreder Hex.
3. Remove Lock-out/Tag-out.
4. Start feeding in AKVAconnect (or in other feeding software).
5. Check that the Rotor Spreader Hex rotates evenly, and that feed pellets exits the feed spreader and are spread in the desired area.
6. Adjust the outlet as instructed in chapter [3.4 Adjusting outlet pipe](#), if necessary.

4.6 POSITIONING IN THE PEN

Illustration 28: Rotor Spreader Hex is moored with 4 ropes in the pen



We recommend positioning Rotor Spreader Hex as centrally in the pen as possible, to ensure that pellets are spread as evenly in the surface as possible. Weather and current conditions at the site must be taken into account, to ensure that no pellets are blown over the edge of the pen or driven out due to currents. Secure the Rotor Spreader Hex with four ropes perpendicular to each other. The ropes will keep the Rotor Spreader Hex in desired position, and also enables easy moving of the Rotor Spreader Hex inside the pen.

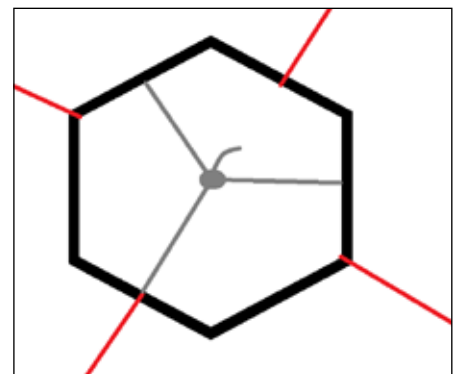
Attach the ropes to the pen handrail poles, unless there is documented proof that the handrail will withstand the loads.

- Recommended rope: 12 mm Danline ropes.
- Calculate additional 10% in length for plastic pens. 120 meter pen has radius 19 meters, and will thus require 1.9 meter excess length per rope. Additional length is not required for steel pens.

Procedure:

1. After attaching the Rotor Spreader Hex to the feeding pipe, attach four ropes to the hexagonal base, as shown in illustration 29: [Ropes attached to hex base](#).
2. Pull the ropes to position the Rotor Spreader Hex to desired position in the pen.
3. Attach ropes to handrail poles with the knot roundturn with double half hitch, or similar or better knot that is simple to release when required, even after being exposed to seawater over time.

Illustration 29: Ropes attached to hex base



5 USING THE ROTOR SPREADER HEX



WARNING!

In the event of announced inclement weather with expected wave heights of more than 2.5 meters, we recommend that the Rotor Spreader Hex is removed from the pen or secured in a safe manner so that it will not pose a danger to surrounding equipment or damage to the pen and net during periods of inclement weather.

Rotor Spreader Hex shall not be handled unless work, such as maintenance, service, releasing blockages or similar, is to be carried out on it.

Rotor Spreader Hex is connected to a feeding system, which is controlled by AKVAconnect feeding software.

Use of Rotor Spreader Hex shall only be performed by qualified personnel, and everyone who is to operate Rotorspreder Hex must be familiar with:

- The contents of this user manual.
- How the Rotor Spreader Hex works with the rest of the feeding system, to which it is connected.
- What safety considerations must be taken into account during use, maintenance and other work tasks on and around Rotorspreder Hex.
- How the Rotor Spreader Hex works and how to use it.
- How to maintain the Rotor Spreader Hex: follow procedures described in this user manual.

6 MAINTENANCE

Regular maintenance of the rotor spreader bearing is important to maintain a smooth rotation during feeding. We recommend inspection of the bearing at least every six months.

Clean and replace bearings in the event of wear or dents in pipes. Replace parts in case of similar wear in clamp tubes, base and other parts. Tighten hose clamp according to frequency specified in the maintenance schedule, see chapter 6.6 Maintenance form.

All bolts and couplings in the rotor spreader must be re-tightened regularly. This is extra important in the bearing, which can twist and lose function if the bolts loosen.

Service life for ball bearings is 600 tonnes of feed, but it must be replaced preventively at 80% of this time to ensure 100% uptime on function, meaning: change at 480 tonnes. Keep an eye on AKVAconnect (feeding software) for when this amount of feed is passed.

The aluminum tube attached to the bearing and the belonging outlet shall both be replaced at the same frequency as the bearing. The aluminum pipe below the bearing shall be replaced preventively after 1000 tonnes of feed.

It is very important that personnel who are to stay in areas where rotating equipment is installed have the necessary protection, minimum helmet and recommended personal protective equipment, and that all precautions described in this manual are followed, for example when troubleshooting the Rotor Spreader Hex, which sometimes must be performed when the power of the feeding line (blower) power is switched on. As a general rule, the power must be turned off and secured with a lock-out/tag-out for the entire feed line before work, such as installation, maintenance and repairs, is to be carried out.

WARNING!



If bearing bolts are torqued incorrectly, the Rotor Spreader Hex will not function as it should. If torque is too tight, the bearing will bend and break.

Secure the work area in the pen to prevent tools and parts from falling into the pen. If anything should fall into the sea against all presumptions, it is important to remove it from the pen immediately. Notify site supervisor if this is not possible within a short time.

Maintenance processes shall only be executed by qualified personnel.



NOTE!

Store bolts in a safe place when they are not attached to bearing.

6.1 CLEAN THE BEARING

Required equipment:

- Hex key, 6 mm
- Torque wrench, 6 mm

Procedure:

1. Install Lock-out/Tag-out to the belonging feeding system blower.
2. Release 3 of the attaching ropes from the pen edge, and use the fourth rope to pull the Rotor

- Spreader Hex to the pen.
3. Release the bearing by removing the M8x25 bolts and Nordlock washers under the bearing plate. Use 6 mm torque wrench and keep the bolts and washers in a safe place during the rest of the procedure.
 4. Check the bearings mobility:
 - a. If it rotates smoothly, clean with warm water and a mild liquid degreasing soap, rinse off, and replace the bearing to the Rotor Spreader Hex.
 - b. If the bearing runs unevenly or slowly, it must be replaced.
 5. Mount the bearing: Attach all three bolts manually and torque them to 6 Nm.
 6. Remove Lock-out/tag-out.

6.2 RE-TIGHTENING BOLTS

Required equipment:

- Hex key and torque wrench: 6 and 5 mm
- Ratchet and wrench with 17 mm pipes

Procedure:

1. Install Lock-out/Tag-out to the belonging feeding system blower.
2. Tighten bearing bolts regularly every 6 months, even if it is not time to inspect the bearing. Attach the bolts one by one, and torque to 6 Nm.
3. Tighten tie bolts (part 10, see illustration 6: [Base feeding pipe passage parts](#)) in the base feeding pipe passage with a 5 mm hex key.

Illustration 30: Bearing bolts

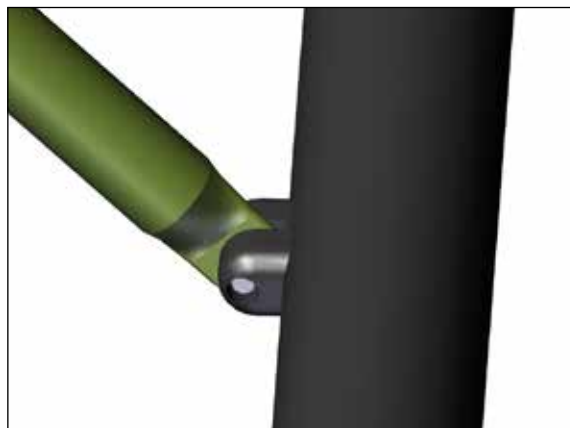


Illustration 31: Base feeding pipe passage bolts



4. Tighten all bolts in all three crimped tubes, at both ends. Use ratchet on one side and wrench on the other, as illustrated in 8: [Ratchet and wrench on each side](#).

Illustration 32: Crimped tube bolts



6.3 RE-TIGHTENING UNION

6.3.1 RE-TIGHTENING UNION ROTOR SPREADER HEX

Tighten the female adapter in the union between Rotor Spreader Hex (without swivel) and feeding pipe properly, and regularly, as instructed in chapter [6.6 Maintenance form](#).

Required equipment:

- Rotary Spreader Mounting tool (illustration 20: [Mounting tool](#))

Procedure:

1. Tighten Union parts by hand (twist in opposite directions).
2. Tighten with Mounting tool to secure it properly.
3. Once fully tightened, the Union connection will look as in illustration 20: [Feeding pipe connector parts, Union](#).

6.3.2 RE-TIGHTENING UNION ROTOR SPREADER HEX MKII

Tighten the female adapter in the union between Rotor Spreader Hex MKII (with swivel) and feeding pipe properly, and regularly, as instructed in chapter [6.6 Maintenance form](#).

Required equipment:

- Rotary Spreader Mounting tool (illustration 20: [Mounting tool](#))
- Hooked spanner (illustration 24: [Hooked spanner](#))

Procedure:

1. Tighten Union parts by hand (twist in opposite directions).
2. Tighten with Mounting tool and Hooked spanner. Turn them in opposite directions to secure properly, see illustration 24: [Tighten](#).
3. Once fully tightened, the Union connection will look as in illustration 25: [Feeding pipe connected to Rotor Spreader Hex MKII](#).

6.4 REMOVE SYSTEM BLOCKAGES



WARNING!

No one shall stay in the area where pellets are exiting feed pipes or Rotor Spreader Hex while the belonging feeding system is turned on.

If two or more people are executing the troubleshooting a blockage, it is crucial to ensure clear communication between the two.

Run the selector to an idle opening to release the internal air pressure inside the line. Install Lock-out/Tag-out before commencing the troubleshooting process.



PROTECTIVE GEAR REQUIREMENTS

Wear helmet and other safety garments when working with loosening blockages.

If pellets are sent out from the dosers to the feeding line, but no pellets exits the Rotor Spreader Hex outlet, when the feeding software is set to feed, this may indicate a blockage inside the system. A blockage inside a feeding system will build up a severe air pressure inside this system. This pressure will not be released just by turning off the blower, so when the blockage dissipates, the air will take the easiest way out: through the Rotor Spreader Hex outlet causing the outlet to start rotating, and thus causing danger for anyone present in the area. This pressure must therefore be equalized as described in this section to avoid injuries to personnel.

The compressed air pressure must be neutralized as described in this section to avoid potential personnel injuries. Control pipes, feeding pipes and rotor spreader for pellet blockages as instructed in this section, if no other causes for air and pellet stop are found in the software or in other equipment. If a blockage cannot be found in neither feeding pipe nor Rotor Spreader Hex, and all equipment has been checked and found to be in order, contact AKVA service personnel.

Required equipment:

- Rubber hammer
- Disassembling tools (see respective installation instructions for the parts being disassembled)

Procedure:

NOTE! If the blockage is located at some point during the procedure execution, jump to step 13.

1. Control that feeding software (AKVAconnect), blower, doser and selector in the blocked feeding line function as should. Contact AKVA service personnel if anything is out of order.
2. Neutralize the pressure inside the system in the feeding software by running the selector to an idle opening. Here, the internal pressure will be released, and the risk for uncontrolled rotating parts will be removed, even if the blockage is released.
3. Install Lock-out/Tag-out to the blocked feed line.
4. Release 3 of the positioning ropes and use the fourth rope to pull the rotor spreader hex to the pen.
5. Use the fourth rope to pull Rotor Spreader Hex to pen where the work is to be carried out.
6. Remove the top part of the Rotor Spreader Hex by releasing the bearing.
7. Control this part for blockage with wire and/or **carefully** knocking on the pipe with the rubber hammer or by treading a wire through the pipes.
8. Disconnect Rotor Spreader Hex from the feed pipe by unscrewing union from union house, and pull the pipe out.
9. Control bottom Rotor Spreader Hex pipe for blockage, as in step 7.

10. Firmly attach end of feeding pipe to pen with opening pointing towards the middle of the pen, so that the hose can not move during the testing procedure.
11. Use the rubber hammer to gently knock along the length of the feeding hose.
12. Ensure that no one is staying near the pipe outlet area, and remove Lock-out/Tag-out.
13. Start the blower in the blocked line. If the blockage has been removed, pellets and air will emit from the hose. Have one person observing what happens when the blower is activated.
14. Install Lock-out/Tag-out.
15. Reassemble all that has been disassembled.
16. Remove Lock-out/Tag-out.

6.5 TAKE ROTOR SPREADER HEX OUT FROM THE PEN



WARNING!

Before lifting, check all certificates for crane, shackles and other ancillary equipment to ensure that everything is approved to lift the intended load. Ensure that the belonging feeding system blower is switched off before releasing the feeding pipe from the Rotor Spreader Hex. Set main switch to OFF position and secure it with lock-out/tag-out safety procedure. Control all equipment after inclement weather, to ensure that it is not damaged.



GO TO

Read section [4.1 Lifting Rotor Spreader](#) before proceeding with lifting process.

Control all equipment after inclement weather. Check that the suspension is in order, that the surrounding equipment, and especially the net, are in order. Also perform a function test as described in chapter [4.5 Function test](#). If any equipment has been damaged, it must be repaired or replaced immediately. Contact AKVA group for assistance in such cases.

Required equipment:

- boat with crane
- minimum of two people
- 3 lifting straps approved for lifting the weight of a Rotorspreder Hex, as well as for use on floating aquaculture facilities
- 1 safety rope

Procedure

1. Install Lock-out/Tag-out.
2. Release 3 of the attaching ropes from the pen edge, and use the fourth rope to pull the Rotor Spreader Hex to the pen.
3. Disconnect Rotor Spreader Hex from the feed pipe by unscrewing union from union house, and pull the pipe out.
4. Firmly attach the end of the feeding pipe to the pen, to prevent it from floating away uncontrolled.
5. Stand on the pen, and lift the Rotor Spreader Hex up from the water to attach the lifting straps, as instructed in section [4.1 Lifting Rotor Spreader](#).
6. Lift the Rotor Spreader Hex out from the pen and on board the boat, according to safety instructions in section 1.6.1.

7 TRANSPORT AND STORAGE

Take special care when handling, moving and storing the aluminum pipes in Rotor Spreader Hex. Avoid dents in the aluminum materials, as this may affect the spreading effect and other expected features.

When moving equipment, ropes and other belonging equipment, it is mandatory to disinfect everything to prevent spread of any possible infection. We recommend rinsing the equipment with fresh water after disinfection, as disinfectants are corrosive chemicals that may damage the materials.

We recommend that the Rotor Spreader Hex is stored indoors in dry and stable conditions, after it has been cleaned and disinfected. Secure the Rotor Spreader Hex so that it does not fall or otherwise be exposed to shocks or impacts, as this may impair the quality and damage the functions of the product.

8 PRODUCER AND PRODUCT IDENTIFICATION

About AKVA group ASA:

AKVA group ASA is present in all markets with offices in Norway, Chile, Denmark, Scotland, Spain, Greece, Iceland, Canada, Australia and Turkey. AKVA group is a unique partner with the capability to offer both pen farming and land based aquaculture operations with complete technical solutions and service.

By developing technology focused on solving the biological challenges, we contribute to the continued development of a sustainable industry. Good operational performance and fish welfare are paramount in achieving good results, and investing in our technology will help deliver both.

AKVA group is a global technology and service partner that deliver technology and services that helps solve biological challenges within the aquaculture industry. Good operational performance and fish welfare ensures sustainability and profitability for the customer. This is the premise for everything we deliver, from single components to services and complete installations. In-depth aquaculture knowledge, extensive experience and a high capacity for innovation characterizes and enables us to deliver the best solutions for both land based and sea based fish farming.

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About the product:

Rotor Spreader Hex is a rotating feed spreader designed for use with air pressure feeding system, to spread feed pellets inside a large area of the water surface inside a floating pen.

9 REVISION HISTORY

DOCUMENT PART NO:
10001712

Rev	Date	Issued	Issued by	Reviewed by	Approved by
H	19.08.21	<p>New Rotor Spreader Hex MKII reinforced with metal sleeves in the base strut attachments and swivel for reinforced construction.</p> <p>Maintenance schedule.</p> <p>Updated according to NS9415: 2021:</p> <ul style="list-style-type: none"> - Changed order and headings for chapters, according to standard. - Added summary. - Specified personnel requirements and restrictions for weather conditions for carrying out work with Rotorspred-er Hex. - Added instruction stating that two people shall participate in unpacking the product. - Added instructions regarding securing tools used when working on the pen. - Added instructions regarding use of approved lifting equipment. - Added instructions regarding transferring feed pipe from outside to inside a pen. - Added instructions regarding function testing after instal-lation, moving and after periods of bad weather. - Added description of use and restrictions in use, including specified maximum allowable wave height for use. 	EBL	IL/JRE	JRE
G	17.03.21	Re-Approved	EBL	OD	JRE
F	09.12.20	Re-approved (ECO-0001893)	EBL	BP/IL	JRE
E	19.07.18	Re-approved (ECO-0001452)	EBL	IL	JRE
D	21.03.18	Re-approved (ECO-0001404)	EBL	JRE	JRE
C	14.07.17	Re-approved (ECO-0001221)	EBL	JRE	JRE
B	16.11.15	Approved (ECO-0000839)	EBL	JRE	JRE