

USER MANUAL



FLEXIBLE FEEDING SYSTEM

Thank you for choosing AKVA group

AKVA group develops, manufactures and supplies technology and services aimed at solving biological and technical challenges in the global aquaculture industry. All our products, from single components to service assignments and complete farms, are designed to achieve the best possible fish welfare, operational performance and profitability for our customers.

We aim to write easy to understand user manuals, while providing as accurate and updated information as possible. In order to do this, we rely on input, feedback and collaboration with people who use our products. We appreciate all the input we have received, as this helps us provide better and safer equipment and solutions. Please contact us through our websites with questions or suggestions for improvements.

This manual is written with the purpose of complying with the standards NS9415 and NEK EN 82079-1.

Unless such responsibility has been agreed upon in a separate written contract with AKVA group, we are not responsible for loss, damage or incorrect use of equipment or software that arises as a result of errors in text or illustrations, or by following instructions in this user manuals.

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

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ABBREVIATIONS AND GLOSSARY

AKVAconnect	An AKVA process control platform that may be used to connect and control feeding, sensors, camera surveillance, barge control and more.
User	Person who is going to be using the equipment
EE waste	Discarded electrical and electronic products
Qualified personnel	Person who is trained in performing basic operations and maintenance tasks on the equipment. Technical personnel from AKVA group who execute work and 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.
Product	Product is sometimes called transport medium, and is what is being conveyed through the pipe transport system. In the AKVA Flexible Feeding System, fish feed, as pellets, is being conveyed.

1 SAFETY

Safety for the users of our equipment is main focus when AKVA group ASA develop new products and product manuals.

We strongly recommend that everyone who are going to be using the AKVA product, all who perform any type of repairs, service, maintenance or other work on AKVA products, and all who work in areas where such products are installed, are aware of the contents of this manual.

This recommendation is based on both personnel safety as well as a desire to keep AKVA products in order, and to avoid risk for damages as a result of not following safety instructions.

1.1 SAFETY SYMBOLS



WARNING!

Serious health risk or other serious incidents - Safety sign that implies a danger that may cause death, serious (irreversible) personnel injuries or risk of reduced fish welfare or fish escaping.



PROTECTIVE GEAR REQUIREMENTS

Warning symbol indicating required use of personal protective equipment.



CAREFUL!

Material damages - Safety sign that implies a situation that may cause damages to the product or items in the product surroundings.



NOTE!

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



RECYCLING

Warning symbol regarding recycling, waste management and disposal.



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.

1.2 ABOUT THIS USER MANUAL

The purpose of this user manual is to enable qualified personnel to use and maintain the Flexible Feeding system in a safe, secure and financially sustainable manner. The user manual is to be considered part of the Flexible Feeding system equipment, and shall be read before use and used as an aid when working on the equipment.

Note that illustrations are intended to illustrate, and may therefore differ from the actual product appearance.

1.3 GENERAL

In order to avoid injuries and damaged equipment, this safety section shall be read and understood by all participating personnel before commencing installation or any other type of work on the Flexible Feeding system. The complete system shall be designed and installed in accordance with the safety requirements set forth in the standards and regulations of the country in which the system is installed to protect all personnel. Owner and manager of the site where a Flexible Feeding system is installed, are responsible for that all local and national regulations are complied with when installing, using, maintaining and repairing parts of or the entire system.

1.4 TRANSPORT AND RECEIVING

The Flexible Feeding system and components shall be installed by AKVA service personnel, who checks the delivery and report missing and damaged parts.

Leave components attached to skids (pallets) for ease of transportation. Leave components in original shipping containers until ready to install. Store components in a cool, dry place. Protect components from the effects of weather. Components have awkward shapes and can be heavy. Use safe lifting practice to loading/unloading units that weigh more than 9kg.

1.5 PERSONNEL

Personnel working by, on or with the Flexible Feeding System are required to hold necessary qualifications for each operation, and follow the instructions in this manual as well as other written instructions provided by AKVA Group.

Only technically qualified personnel are allowed to install, use and maintain the Flexible Feeding System. Site owner and manager are responsible for ensuring that technicians qualifications always comply with current, applicable standards and regulations, in addition to the instructions in this manual when executing tasks that may endanger health and lives of **USERS** = anyone working by, on or with the Flexible Feeding system.

Qualified personnel: Person who is trained in performing basic operations and maintenance tasks on the equipment. Technical personnel from AKVA group who execute work and operations on the system are considered qualified personnel.

Mechanics: Personnel that are going to work on mechanical units are required to hold relevant technical qualifications.

Electricians: Personnel working on electric installations, shall be qualified electricians, and be employed in a company approved for electrical installations.

Welders: Personnel performing welding work, shall hold relevant technical qualifications for such work.

1.6 PERSONAL PROTECTIVE EQUIPMENT (PPE)

While operating the Flexible Feeding system, wear appropriate protective gear (PPE). This includes, but is not limited to the following: hard hat, gloves, protective shoes with slip resistant soles, eye protection, hearing protection.

Make sure that all safety equipment are in order. If a protective device is not in order or ineffective, the person wearing it is exposed danger. Before operating the conveyor, always verify that all protective devices are effective.

1.7 SAFE OPERATIONS

The system shall only be operated by qualified personnel who have received training from AKVA personnel, and who are qualified for the relevant operations.

Always disconnect power before starting work on the system. Secure the drive motor by installing Lock-out (physical barrier) and Tag-out (visual marking) to avoid unexpected start of the machine. Lock-out/Tag-out works by locking the system in the off position and marking it off, in order to eliminate the risk of it being switched on again when work is still being carried out on the system. If the machine starts up unexpectedly, personnel who are working on or by the machine are exposed to serious injury. It is important that the drive motor is secured in no-voltage condition, even when work is being executed on other components. This is because the Drive Unit provides power for moving parts that pass through the whole system.

No one should stay in the area around the Flexible Feeding system when it is in use. Unqualified personnel shall never stay in the area where the system is installed. During troubleshooting, occupying the area may be required. In such cases, personal protective gear shall always be used.

Safety procedures related to work with, on or by the feed line and its components shall be followed to avoid personnel injuries and damaged equipment.

If safety signs and decals stickers are not visible or clearly legible, this poses a danger to people. Replace any safety signs and decals that are not clearly legible or visible. Do not remove safety equipment or cover safety signs.

1.8 SAFE WORK ENVIRONMENT

Dust and Debris and slipping and stumbling hazards can result in serious accidents or death. Always keep walkways, grips, steps, railings, landings, platforms and ladders free of dust and debris. Wear approved safety shoes to avoid slipping. The system may be routed low to ground. Never climb or walk on the machine and do not use it for storage. Use only approved walkways, grips, steps, railings, landings, platforms and ladders to access system. Wear approved PPE to prevent dust Inhalations. Different materials may cause noise levels to vary above normal ambient levels. Always wear approved hearing PPE while operating system.

1.9 EMERGENCY STOP

Emergency stop is a condition which overrides all other system controls, removes drive power from the motors, stops all moving parts and removes power from other dangerous functions controlled by the system.

All emergency stop buttons have to be available for users at all times. Never block access to emergency stop buttons. Users shall familiarize themselves with where all system emergency stop buttons are located, and what equipment is connected to the individual button.

Activate emergency stop whenever there is a risk of injury to personnel or damage to

equipment. A built in emergency stop button is located at the front of the main control cabinet door.

Before restarting anything after an emergency stop, the reason of the stop shall be located and repaired. Emergency stop must always be deactivated at the same place where it was activated before the system can be ready to restart.

1.10 RISKS

To prevent injuries and damages during installation, the regulations applicable in the country concerned, and the instructions from AKVA group (hereunder this manual), shall be complied with. Special attention shall be paid to the following points:

- The product specifications and instructions in this installation manuals shall always be followed.
- System supplier shall ensure that all circuits delivered with the safety functions are interlocked in accordance with the applicable standards for that function.
- Although troubleshooting may, on occasion, have to be carried out while the power supply is turned on, the main rule is that the system shall be turned off and secured in OFF position during installation, maintenance and repairs, thus disconnecting all electric leads and disconnecting or connection of units.

Danger of high voltage is associated with the following parts of the system:

- The mains supply/mains switch of the main control cabinet.
- The frequency inverters of the main control cabinet.
- The coupling housings for the motors.
- The external voltage connected to the main control cabinet mains switch remains live even when the mains switch is turned off.

There is great risk for static electricity occurring and thus risk of electric shock if the wire is pulled through the Flexible Feeding system by motor. Therefore: use cord/rope and manual hand power to pull the wire through the system.

2 INFORMATION

2.1 SYSTEM DESCRIPTION

A Flexible Feeding system may have 8-12 buffer silos with load cells connected directly to one or a few feed lines, and may be adapted to existing barges or built into new ones. A high-capacity transport system moves feed pellets from main feed silos to buffer silos fully automatically. From there, the feed is passed through an AKVA feeding system to the desired pen. It is also possible to install selector valves after the buffer silos to feed several pens from one feed line. With the Flexible Feeding system, it is simple and fast to change feed source, calibrate and move feed from one silo to another, in case the feed runs out, has technical problems or wants to level off the barge. The entire system is controlled with AKVAconnect from the control room. The feed is transported gently and efficiently at high speed from main silos to buffer silos.

Illustration 1: Components overview

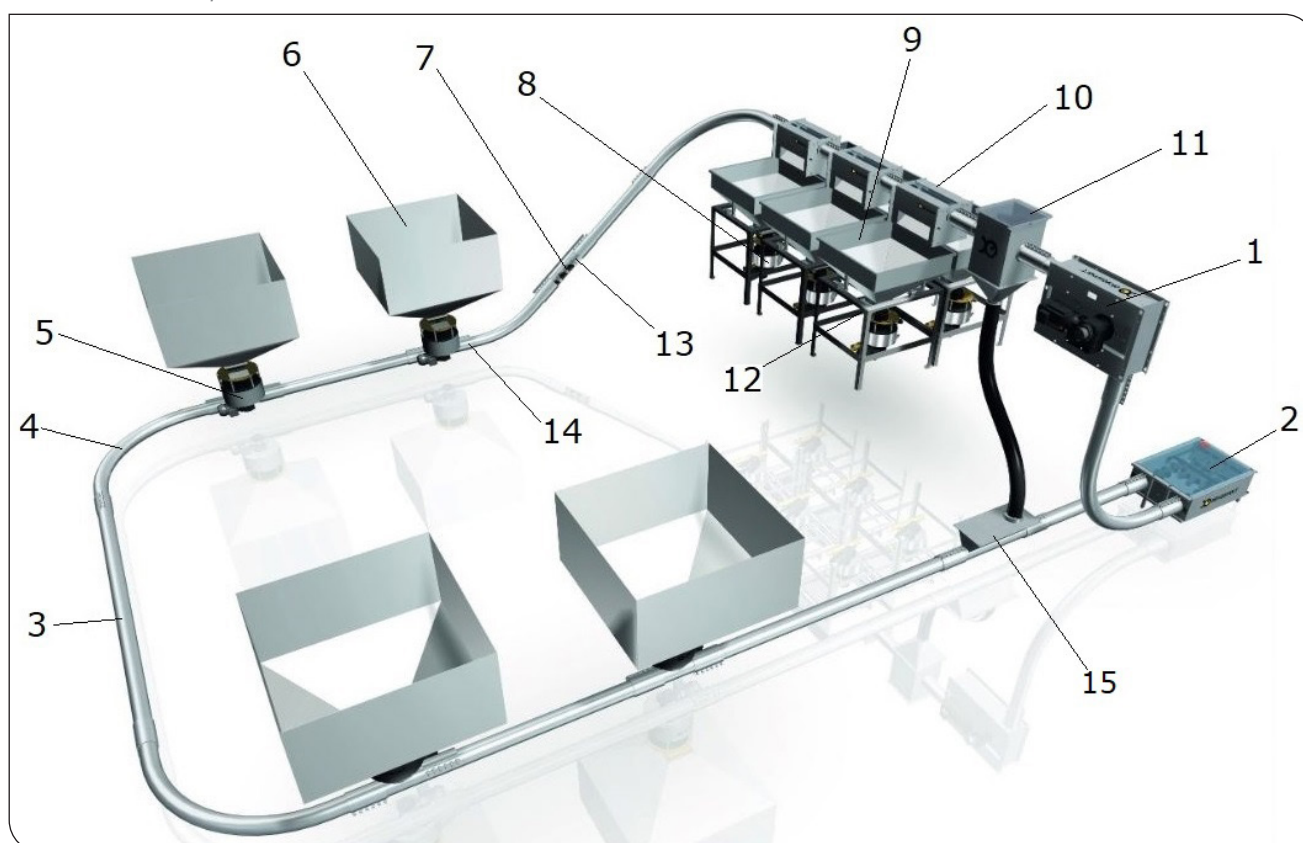


Table 1: Components overview

1: Drive Unit	6: Main silo	11: Brush box
2: Tension Unit	7: Inspection section	12: Load cells
3: Pipes	8: Buffer silo doser	13: Wire with discs
4: Bends	9: Buffer silo	14: Compression clamps
5: Main silo doser	10: Outlet valve	15: Inlet valve

2.2 AMBIENT CONDITIONS

Table 2: Ambient conditions

	Min.	Max.
Temperature when in operation	0° C	40° C
Temperature when at standstill	0° C	40° C
Humidity	25 %	50 %

2.3 COMPONENTS AND DEFINITIONS

Bends

Bends are angled pipes used to change the direction of wire and product in the pipe transport system. Where the system changes direction, little, if any, damage to the product occurs because the bend transitions are small and gradual.

Brush box

As the wire and discs are being pulled through the Brush Box, feed residues are brushed off from discs and wire, and will fall out through an outlet below the Brush Box. This material shall be allowed to re-enter the system through the bottom of the Brush Box either back into the pipe system, or into one of the buffer silos.

Buffer silo

A buffer silo serves one feedline. The buffer silos are filled up as required, the feed is dispensed into the pipe transport system and the Outlet valves opens up to drain to the buffer silos that are installed below the outlet valves.

Drive Unit

The Drive Unit is the mechanism that pulls the wire through the system. The wire is pulled through the Drive Unit by a Sprocket driven by an electric gear motor. As there is no tensioning device on this unit, it shall be used in conjunction with a Tension Unit.

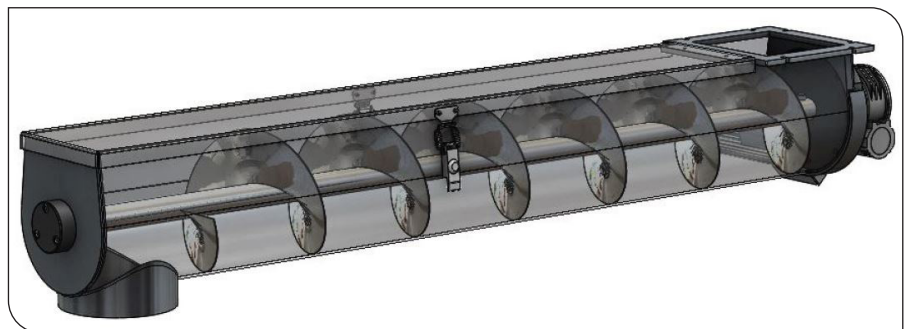
Inlet Valve

The Inlet valves are Dosers or Augers. They function as transmitters of feed pellets from a feed source (here: main silo) to the pipe transport system.

Illustration 2: Doser



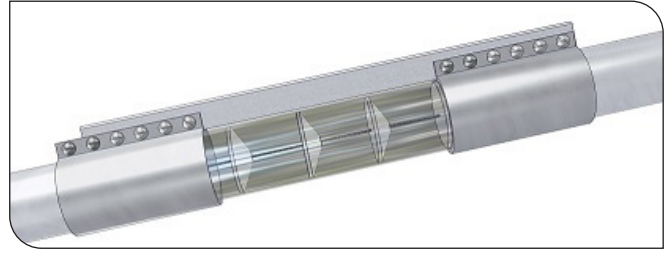
Illustration 3: Auger



Inspection Section

The main objective of the inspection section is to enable the user to view the product as it is being conveyed. This can inform the operator of quantity of product and quality of product being conveyed.

Illustration 5: Inspection section



Main silo

The Main silo is connected to the Flexible Feeding System via the Doser/Inlet valve, and this is where the feed is contained before it is released into the system.

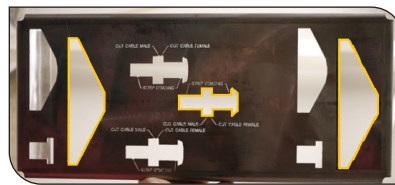
Compression clamps

These clamps are used to attach pipe to pipe, pipe to passage, and passage to passage.

Gauge

The gauge is used as a template to have perfect distance between the discs every time the wire is connected and repaired.

Illustration 4: Gauge



Outlet valve

The Outlet valves are installed in a vertical line above the buffer silos, one valve per two buffer silos. Outlet valves release feed from the Flexible Feeding System to one of the two buffer silos, that are placed below to the left or to the right.

Pipeline

The pipe transport system is a closed piping system set up by pipes supplied by AKVA group. The transport pipeline is connected to all other components. The system can be custom designed and installed at any angle from horizontal to vertical. Wires and disks are dragged through the pipeline and transports pellets to the Outlet valves.

Pipe support

Pipe supports support pipes and bends either from the ground or from the ceiling.

Tension Unit

Tension Unit is a mandatory part of the Flexible Feeding pipe system, and completes the system by turning the wire 180 degrees inside the pipes. The Tension Unit contains four sensors:

1. **Home sensor** with belonging detectable metal bracket.
2. **Safety sensor** that is triggered when the cover is opened.
3. **Limit Switch** is set up to acute shut down the system if the Sprocket Idler frame is outside its set range of motion. The frame may move outside this area as a result of a plugged system due to overloading, or if the wire breaks for any reason. The limit switch indicates whether the tension on the wire and the frame in the Tension Unit moves within the specified working range. If the cable breaks or the system is blocked, the sensor shall stop the system.
4. **Tacho (sensor pulse counter)** is designed to measure the wire speed, and provides data to the software, which at all times has control over where the main wire connection is located.

The Sprocket is located inside the Tension Unit. The wire and discs move around the Sprocket, the wires in the slot in the teeth's outer end, and the discs are pushed against the teeth, thus turning it around. If the wire becomes too tight, it may in the worst case cause smoke, and if it gets too slack, it will cause the movements of the discs to move inside the pipe system. The Tension Unit sensors are set up to avoid such problems.

Toothpick

The toothpick is designed to remove product build-up that may be brought with the wire and discs in to the teeth of the Tension Unit Sprocket.

Illustration 6: Toothpick



Wire and discs

The Wire and Discs combined makes the heart of the AKVA Flexible Feeding System. They form a continuous loop that gently moves the product through the system. Make sure to install Wire and Discs in correct direction in the system for it to function as expected. The flat side is the front side, that is pushing the product forwards, and the back side is the one that is being pushed around by the Sprocket teeth in the Drive Unit.

Load Cell

Load cells transmit weighing data from buffer silos to the feeding software (AKVAconnect), that uses this information to provide automatic filling for the buffer silos when required.

2.4 IDENTIFICATION PLATE-SYSTEM

Illustration 7: Identification plate



The identification plate shall at least contain:

- Manufacturer Logo
- Machine Series
- Machine Serial Number
- Manufacture Date
- Sales Order number
- Location of Manufacture
- Customer ID
- Description
- Customer PO

2.5 COMPONENT LIFE CYCLE

Life cycle for Flexible Feeding system components greatly depends on material being conveyed, wire speed and system layout configuration. Life cycle for all components, such as Sprocket, pipes, bends, cable, discs and inspection section, will vary depending on the conditions of the individual component. We recommend using an hour meter to establish the optimum preventive maintenance schedule for each system.

3 START OPERATION

**WARNING!**

Note that irregular noises may indicate faults in the system.

**NOTE!**

Never fill the system more than 80 % of maximum capacity. Overloading may cause the pellets to brak inside the system, or the drive unit to become overloaded and stop.

**GO TO**

Instructions and information for using AKVAconnect can be found in the built-in manual: Main Menu - Help - User Manual.

Prosedyre:

1. In the feeding software (AKVAconnect): Set the system to feeding mode, and set feeding speed and rate based on product and product requirements (based om pellet size and weight, biomass and expected appetite). AKVA service personnel will set up and assist for further setup changes when required (such as when biomass increases).
2. Add pellets slowly at first, and increase amount up to desired capacity.
3. Control regularly visually that the pellets are moving as expected through the system. In case of pellets accumulating somewhere inside the system, this may cause a stop. Check visually for accumulations here:
 - in Tension unit
 - around wire and discs
 - in the Drive unit
 - in the brush box
 - in the pipes, especially in bends.
4. Control that the buffer silos are not overfilled, and that the overfill outlet is open and in order.
5. Check visually that pellets exit the outlet valves through the outlet valve top glass cover and/or the inspection section.

3.1 NORMAL SHUT-DOWN

To empty the system before work is to be executed on the system, or to finishing the daily feeding, or if the system has to be stopped for reasons other than emergency stop, this procedure must be followed.

Procedure:

1. In AKVAconnect: Disable filling operation, and wait for the Flexible Feeding system to clear all pellets from the pipe system.
2. Run the system "Home".
3. Stop machine.

4 MAINTENANCE

**WARNING!**

Do not perform work other than maintenance instructed in this user manual, or make changes to components of the system without written consent from AKVA service personnel.

The Cablevey User's Guide provides troubleshooting and system repair instructions.

**WARNING!**

Install Lock-out/Tag-out on the corresponding safety switch before starting maintenance work. All safety switches are marked with the equipment to which they belong, and named in the current language.

**WARNING!**

Before commencing any maintenance or other work on the system, follow the instructions in section [3.1 Normal shut-down](#). Install Lock-out/Tag-out on the system to shut down all power supply.

Keep maintenance and inspection units clean, clear and accessible for maintenance personnel. Only properly trained and qualified technician shall perform maintenance or repairs on the Flexible Feeding system.

Do not assume that stopped equipment is safe equipment. Stored energy may exist within the components. Follow all safety procedures to execute work safely on the equipment.

Make sure to install Lock-out/Tag-out to the system (Drive unit) before executing any work on the system or its components. After finishing the maintenance tasks, before returning system to operation, ensure that the safety cover and access panels are in place before removing Lock-out/Tag-out and turning power back on.

4.1 MAINTENANCE FREQUENCIES

Maintenance frequencies for Flexible Feeding system components depends largely on pellet quality (and the amount of dust and deposits), wire speed and system setup configuration. Keep maintenance and control areas clean and accessible for maintenance personnel. Clean components externally when required.

Fill in maintenance form when executing these tasks. See [Appendix A - Maintenance form](#).

Every week:

- Listen for irregular noises.
- Clean/vacuum dosers inside and out, check for air leakages, check connections in pipes and hoses.
- Remove the cover and vacuum inside feed auger. Clean both sides of cover.
- Check that Tension Unit Sprocket idler carriage is centred related to the frame. Adjust tension according to instructions in section [7.3 Adjust tension](#) if necessary. If the Limit switch moves outside the predetermined area, the wire must be shortened. The user shall contact

trained, qualified service personnel for this task.

Every 3 months (or more often when required*):

- Check toothpick and red marks in Sprocket teeth.
- Check that wire with discs moves evenly through the system. Check this through all inspection glasses, Inspection Section, Tension Unit, Outlet Valves and Drive Unit.
- Check cleanliness of motor fins, clean if required (clean at least once a year).
- Vacuum inside Outlet Valve and Tension Unit.
- Check all engine cables and connections in inlet valves (doser and feed auger),
- Vacuum inside Brush Box and control the brushes. Change brushes if they are worn down.
- Check for holes in bends and pipes.

**When transporting pellets with more breakage than normal, and the amount of dust and feed residue in the system and its components is increased.*

4.2 BRUSH BOX

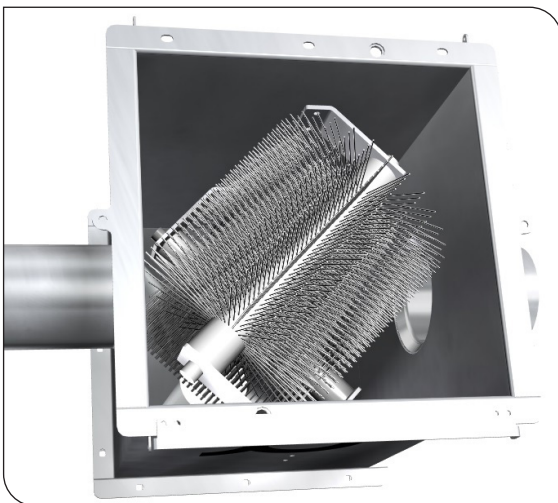
Necessary equipment:

- personal padlock and marking
- vacuum cleaner
- cleaning equipment

Procedure:

1. Follow instructions in section [3.1 Normal shut-down](#).
2. Install Lock-out/Tag-out on the system service switch.
3. Remove the cover and inspect the brush box.
4. Vacuum and/or clean inside if required.
5. If it is no longer possible to get the brush clean, contact AKVA service personnel for assistance to replace it.
6. Replace the cover and remove Lock-out/Tag-out.

Illustration 8: Open brush box seen from above



4.3 OUTLET VALVE

Necessary equipment:

- personal padlock and marking
- outlet valve cover key
- vacuum cleaner
- cleaning equipment

Procedure:

1. Follow instructions in section [3.1 Normal shut-down](#).
2. Install Lock-out/Tag-out on the system service switch.
3. Control visually through the transparent top cover whether cleaning is required.
4. If cleaning is required, unlock and remove side cover(s).
5. Vacuum and/or clean the inside.
6. Replace the cover and lock them with all locks.
7. Remove Lock-out/Tag-out.

Illustration 9: Outlet valve without and with covers

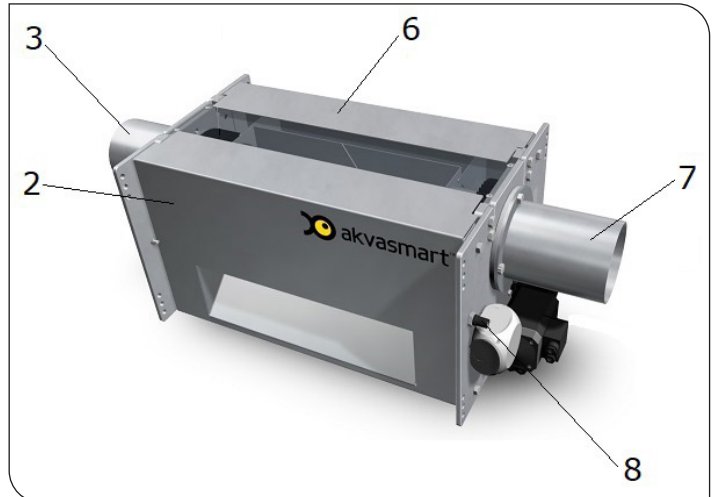
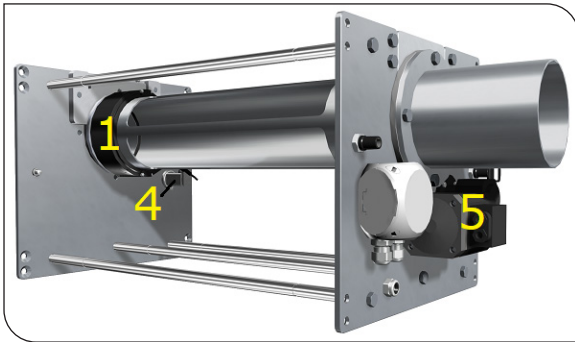
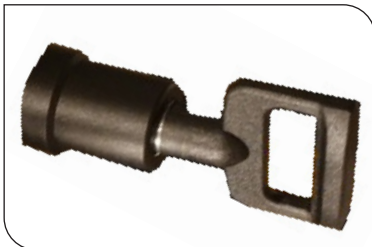


Table 3: Outlet valve parts

1: Gear	3: Inlet	5: Motor	7: Outlet
2: Side cover (1 of 2)	4: Positioning sensor	6: Inspection cover, top	8: Key hole (1 of 4)

Illustration 10: Key in Keyhole(8)



4.4 TENSION UNIT

Necessary equipment:

- personal padlock and marking
- vacuum cleaner
- cleaning equipment

Procedure:

1. Follow instructions in section [3.1 Normal shut-down](#).
2. Install Lock-out/Tag-out on the system service switch.
3. Remove the cover.
4. Vacuum and/or clean if required.
5. Inspect Tension Unit and its components visually:
 - a. Springs (1), one on each side. Shall have equal tension = equal length. Measure length.
 - b. Control the frames of the in- and outgoing ports (10) for tearing.
 - c. Check Sprocket (8) wearing. Red mark shall not be visible in the side trace of the teeth.
 - d. Check idler carriage (3). Shall be able to move freely.
5. If the results of any control in step 4 are negative, contact AKVA service personnel for assistance.
6. If all is in order, close the cover and remove Lock-out/Tag-out.

Illustration 11: Tensionunit, parts and sensors

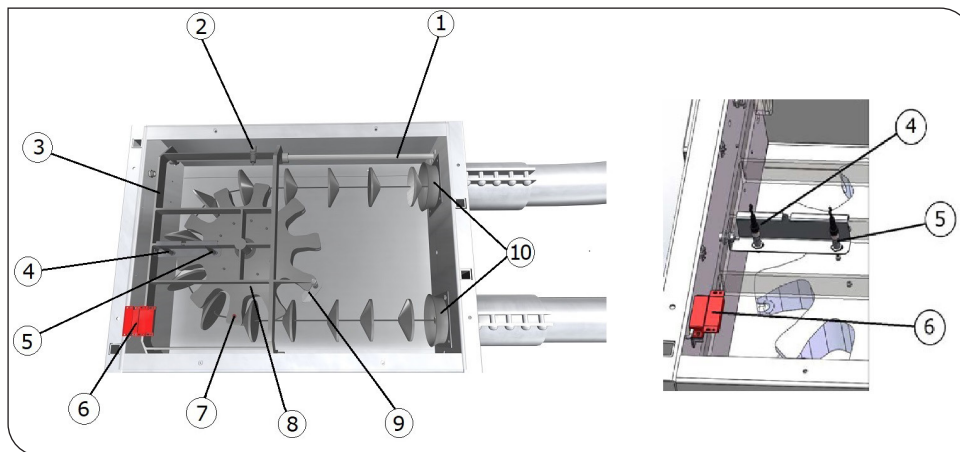


Table 4: Tension unit parts

1: Spring
2: Limit switch
3: Idler carriage
4: Home sensor
5: Motion sensor
6: Safety switch
7: Tearing mark
8: Sprocket
9: Tooth pick
10: Ports, in and out

Illustration 12: Tension Unit directions

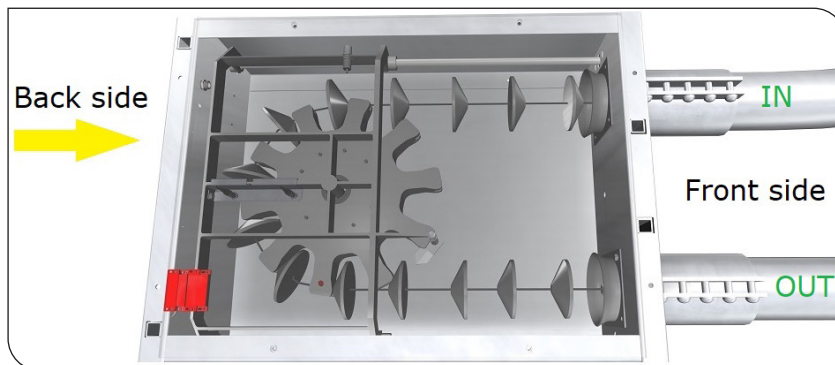
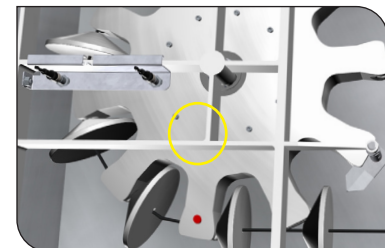


Illustration 13: Tearing mark (7)



4.5 WIRE, DISCS AND WIRE CONNECTION



CAREFUL!

If there are several connections on the wire (for example after repair and splicing), check the torque on all set screws on all connections.



NOTE!

Two people work together when checking the wire, so that it can be started and stopped safely. It is very important to have clear communication between the two.

Necessary equipment:

- gauge
- torque key for set screws
- two people: one in the control room and one by the Flexible Feeding system

Procedure:

1. Visually inspect the following through the inspection section or through the Tension Unit cover. If wire chipping, disc wear or other damage is detected, contact AKVA service personnel immediately for assistance. If required, stop the system from AKVAconnect to take a closer look at the various components.
 - a. Check that discs do not have signs of wearing. Check several disks in several places on the wire.
 - b. Check if a coating has formed around the wire around connector(s). In case of coating, check the brush box and, if required, clean or replace the brush.
 - c. Check for signs of wearing and chipping on the wire.
 - d. Check the metal ring (illustration 15: [Metal ring](#)) located on the disc in front of the main wire connector. The ring shall be attached with all 4 screws. Replace metal ring and/or screws in the event of wear or corrosion.
 - e. Check that all discs start up smoothly and goes evenly around the Sprocket.
2. Follow instructions in section [3.1 Normal shut-down](#).
3. Install Lock-out/Tag-out, open the cover and check torque on all set screws in the wire connection(s), shall be 15 Nm. See illustration 14: [Control wire connection set screws torque](#).
4. Check that the distance between the disks and between disks and wire connections(s) are equal. Use the gauge, see illustration 13: [Wire and disc in the gauge](#).
5. If everything is in order, close the cover and remove Lock-out/Tag-out.

Illustration 14: Wire and disc in the gauge

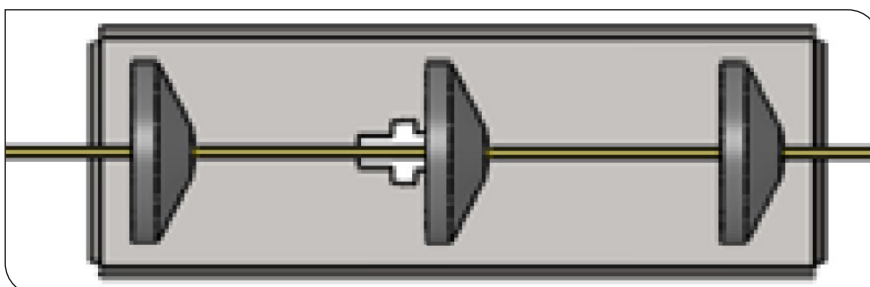


Illustration 15: Control wire connection set screws torque

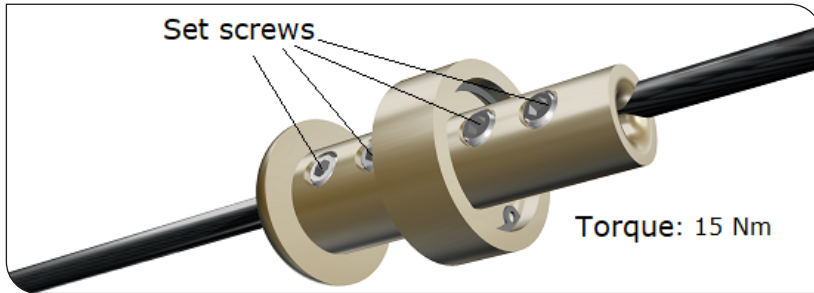
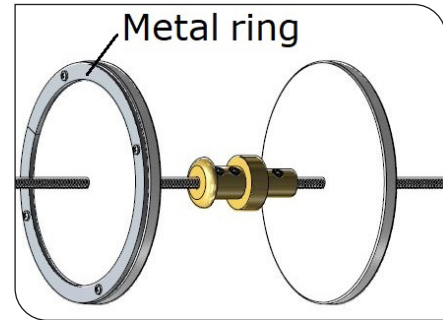


Illustration 16: Metal ring



4.6 CLEAN INSIDE THE SYSTEM



CAREFUL!

Sponges shall be cleaned with warm water with a mild degreasing detergent after use. Do not use a sponge that is not clean after cleaning or is damaged during use.



NOTE!

Cleaning sponges shall only be run through the Flexible Feeding system when the system is empty.

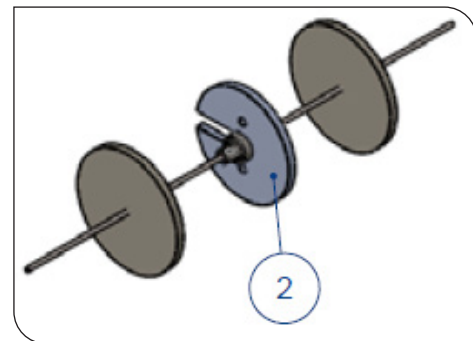
We recommend running the sponge through the system when required, and at least once a week. Sponge kit, item No.: **10004258**.

1. Cleaning sponge
2. Trail Disc
3. Retainer Disc

Procedure:

1. Follow instructions in section [3.1 Normal shut-down](#).
2. Install Lock-out/Tag-out to the system service switch.
3. Tread Trail Disc (2) over female wire connector, so that flat side faces male wire connector.
4. Moisten sponge with clean water before installation.
5. Attach the sponge to the pins in the Retainer Disc (3) so that the slot in the sponge and the slot in the retainer are aligned.
6. Install the sponge with the retainer on the wire in front of the connector, so that the slot points in the opposite direction in the Quick Trail Disc.
7. Align the Retainer disc (3) pins into holes on the Trail Disc (2).
8. Press all items together until the spring loaded catch pins snap into place, as shown in illustration 17: [Press all parts together](#) until the springed

Illustration 17: Trail disc to female connector



spikes are snapped into place (click sound). See illustration 18: [Sponge is attached, and ready for use.](#)

9. Remove the Lock-out/Tag-out from the system.
10. Manually run the sponge through the system at low speed. See the AKVAconnect User Manual for version 2.16 or newer, for instructions on how to operate the system manually.
11. Recommended speed for running the cleaning sponge is 30 %.
12. After the sponge has run a round through the system, turn it off and secure with Lock-out/Tag-out again.
13. Now, the Retainer Disc (3) can be released by pressing the release mechanism and pulling it out of the sponge and the Trail disk (2).
14. Remove Lock-out/Tag-out before the running the system again.

Illustration 18: Press all parts together

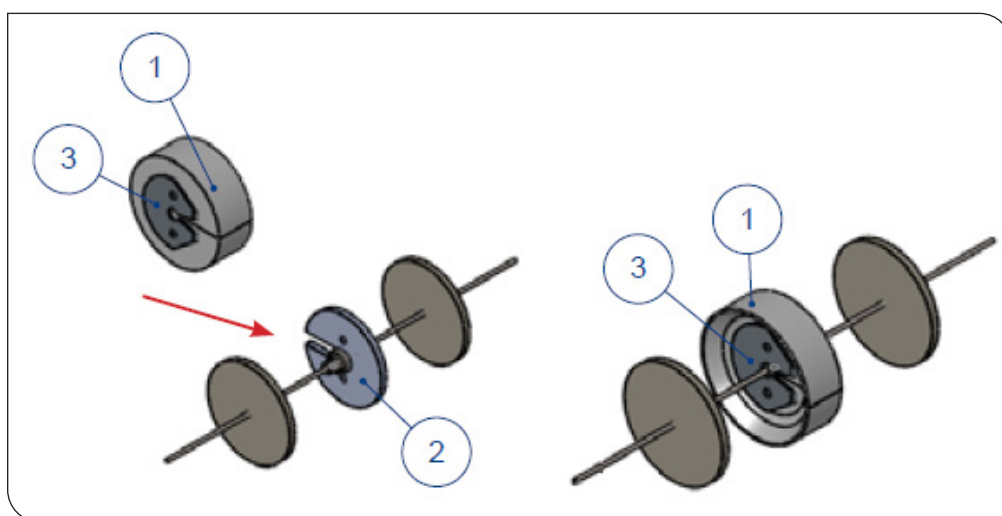
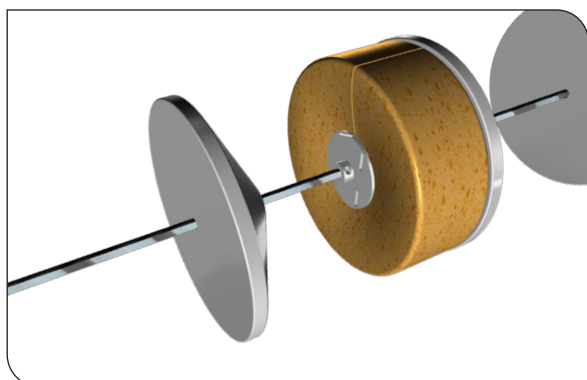


Illustration 19: Sponge is attached, and ready for use



4.7 INLET VALVE MAINTENANCE

4.7.1 DOSERS



WARNING!

The part of the doser that is being lowered from the rest, weighs up to 95 kg. To protect both equipment and personnel, it is therefore important to have a focus on HSE. Use aids, such as a lifting jack, to lower and raise the doser part.



CAREFUL!

If gaskets are removed from the doser rotor, they shall be placed back in the rotor in the exact same order.

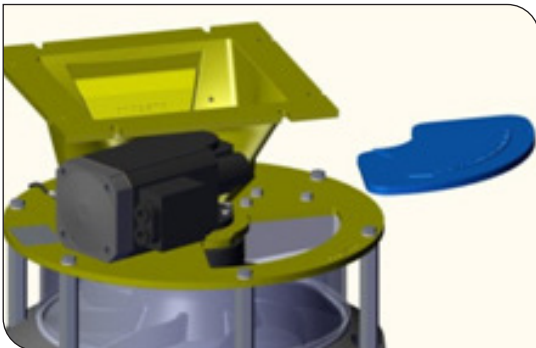
Necessary equipment:

- Lifting jack
- Wrench
- Vacuum cleaner
- Hex keys
- Cleaning equipment
- Silicon grease

Procedure:

1. Follow instructions in section [3.1 Normal shut-down](#).
2. Install Lock-out/Tag-out to the doser service switch.
3. Remove the inspection hatch.

Illustration 20: Remove the inspection hatch



4. Vacuum the area around the feeder unit through the hatch.
5. Unlock and remove the doser cover.

Illustration 21: Remove bolts in lower gear

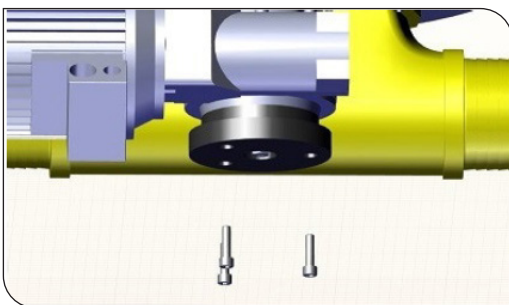
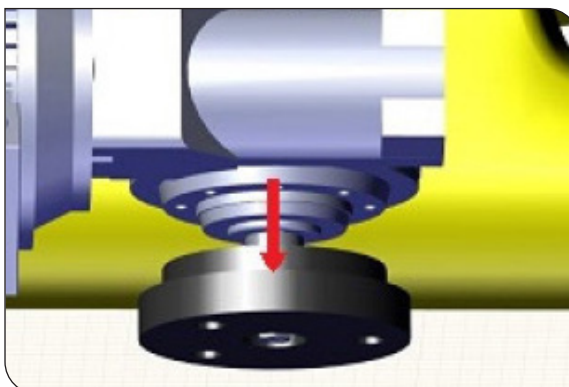


Illustration 22: Pull lower gear down



5. Release the three hex bolts in the lower gear (underside of doser).
6. Pull the lower gear down approx. 3 cm.
7. Release the bolts on the upper gear.

Illustration 23: Remove bolts of upper gear

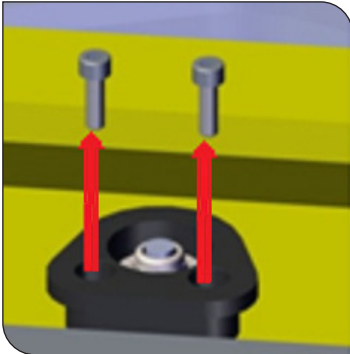
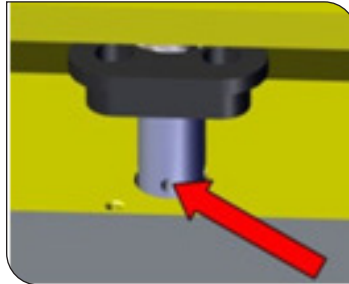


Illustration 24: Secure upper gear



9. Pull the gear upwards.
10. Fasten the gear with a 4 mm hex key or similar, in one of the through holes, to prevent the gear unit from falling down during the work.
11. Loosen the 6 nuts below the base plate 2-3 turns.
12. In the front of the doser:
 - a. Unscrew the two nuts below the base plate completely.
 - b. Release the belonging two bolts on top of the top plate.
 - c. Lift up the spacing bolts from the top of the intermediate plate.
 - d. Remove the two tension bolts.
 - e. Remove the rotor.

Illustration 25: Remove the two bolts in front

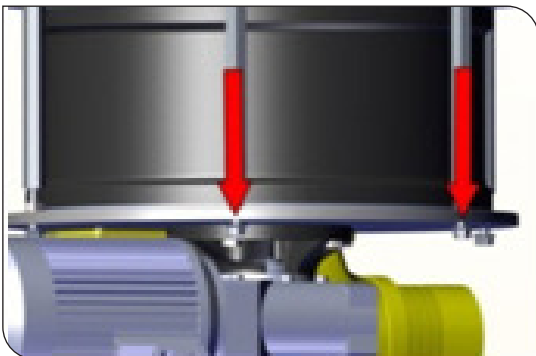
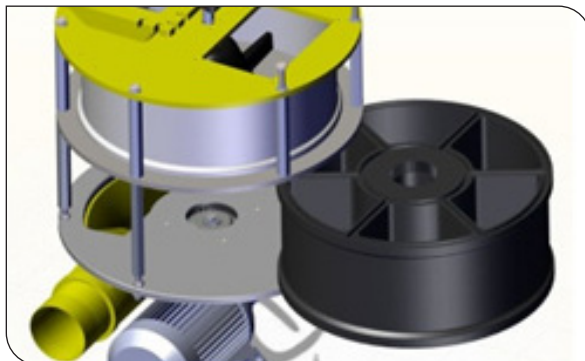


Illustration 26: Remove rotor

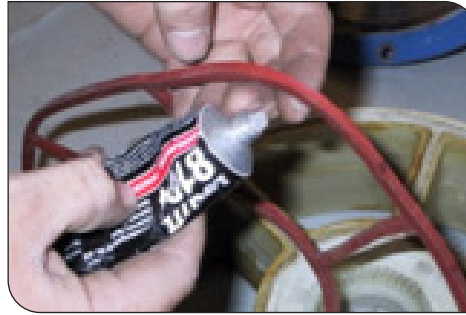


13. Clean the bottom and middle plates.
14. Clean the outlet.
15. Look over the inside of the rotor and check if it needs proper cleaning, or if it is enough to vacuum inside.
16. If thorough cleaning is required: Remove all gaskets - remember their order!
17. Wash the gaskets in warm Zalo water (or equivalent grease-soluble dish soap).
18. If any of the gaskets are damaged, they must be replaced.
19. Dry the gaskets properly.
20. Lubricate all rubber gaskets with silicone grease after drying.

Illustration 27: Remember the gasket order

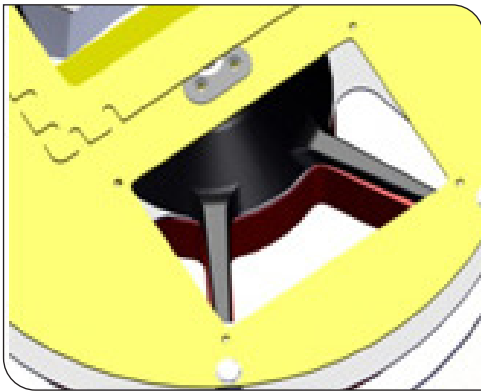


Illustration 28: Grease the rubber gaskets



21. Replace the gaskets in their correct order.
22. Replace the rotor to the doser. Make sure to place in correct position according to the feeder unit, as shown in illustration 29: [Correct and wrong positioning of rotor, seen from above](#). If this is done wrongly, pellets will be crushed when dosed.

Illustration 29: Correct and wrong positioning of rotor, seen from above



23. Replace the tension bolts. Follow the instructions in step 10 d, c, b, a (reverse order).
24. Replace the upper gear and secure with the bolts.
25. Lift and replace the lower gear and secure with the bolts.
26. Clean doser exterior.
27. Replace the cover and lock it.
28. Remove Lock-out/Tag-out.

4.7.2 FEED AUGER

Necessary equipment:

- Vacuum cleaner
- Cleaning equipment

Procedure:

1. Follow instructions in section [3.1 Normal shut-down](#).
2. Install Lock-out/Tag-out to the feed auger service switch.
3. Unlock the hinges on the transparent cover.
4. Remove the cover.
5. Vacuum the end of the auger profile and as far down the funnel as possible, with the vacuum cleaner.
6. Clean the cover with a mild degreaser soap, and dry off.
7. Replace the cover and lock the hinges.

5 STORAGE AND DECOMMISSIONING

5.1 STORAGE

Before periods of stillstand and when storing Flexible Feeding system components, the system shall be cleaned inside and outside, and required maintenance shall be performed. AKVA service personnel shall be involved and look over the components to prevent that damaged equipment is stored. In the event of a standstill between fish lifecycles, a service review is required. Where the Flexible Feeding system is installed on a barge, the barge user manual will contain instructions on how the equipment should be stored while it is out of operation. All equipment must be stored indoors, cleaned and dry.

5.2 DISASSEMBLING

Disassembling is performed by AKVA service personnel.

5.3 DISPOSE AND RECYCLE



RECYCLING

Used and removed parts shall be delivered to a recycling station after use.

Dispose of the machine and its components in accordance with your locally applicable codes and regulations.

- Sort and dispose of metals parts by the type of metal.
- Dispose of electric motors properly.
- Dispose of electronic parts properly.
- Dispose of plastic pieces properly.

APPENDIX A - MAINTENANCE FORM

- These tasks are performed by qualified personnel.
- Sign for each task after it is completed and completed.
- Use one form per Flexible Feeding system per 24 weeks.
- Gray box = do not perform task, white box = perform task.
- Fill in deviation form for any deviations that are discovered.

Date	Weekly				Every 3 month						
	Listen for noises	Clean doser inside and out, check for air leaks, check all connections	Remove cover and clean feed auger inside and outside	Check that discs move evenly in Sprocket	Control toothpick and red mark on Sprocket teeth	Check that wire with discs move evenly through the system	Control engine fan, clean if required	Check cables and connections in el-motor in doser/feed auger	Vacuum inside Outlet valve and Tension Unit	Vacuum inside Brush box and, check brush. Change brush if required	Look for holes in pipes and pipe bends

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APPENDIX C - DECLARATION OF INCORPORATION



Specializing in Conveying Since 1971
"The Gentle Way To Convey"

Cablevey (Intraco, Inc.)
P.O. Box 148
Oskaloosa, IA 52577 U.S.A.
www.cablevey.com

Tel: 641-673-8451
Tel: 800-247-3344
Fax: 641-673-7419
Email: info@cablevey.com

Declaration of Incorporation

Intraco, Inc. Operating as Cablevey Conveyors
2397 Highway 23
Oskaloosa, Iowa 52577

Telephone No. 1 641 673 8451

Product: 4 and 6 Inch Tubular Drag Cable Conveyor
Model No. 4100, 4200, 4300, 6100, 6200, 6300

The undersigned hereby declares, on behalf of the Cablevey Conveyors of Oskaloosa, Iowa, that the above-referenced product, to which this declaration relates, is in conformity with the provisions of:

- EN 618:2002+A1:2010 on continuous handling of equipment and systems
- EN 60204-1:2006/AC:2010 on electrical equipment of machines –part 1, general requirements
- EN 60204-1:2006+A1:2009+AC:2010 on electrical equipment of machines –part 1, general requirements
- EMC 2004/108/EC on electromagnetic compatibility

The Technical Construction File required by this Directive is maintained at the corporate headquarters of Cablevey Conveyors; 2397 Highway 23; Oskaloosa, Iowa 52577.

The authorized representative located within the Community is:

Gary Hall; 2397 Highway 23; Oskaloosa, Iowa 52577; Phone: 641-673-8451;
Fax: 641-673-7419

The Cablevey conveyor system shall not be put into service until the final machinery in which it has been incorporated with has been declared in conformance with Directive 2006/42/EC of the European Parliament and the Council of 17 May 2006.

Date of Issue: 17th of May, 2013

Place of Issue: Cablevey Conveyors; 2397 Highway 23; Oskaloosa, Iowa 52577

A handwritten signature in black ink, appearing to read "Gary Hall", is written over a horizontal line.

Gary Hall, Chief Executive Officer

DOCUMENT NO: DC10001768
DOCUMENT PART NO: 10006979

Rev	Date	Issued	Issued by	Reviewed by	Approved by
A	26.10.20	Approved (ECO-0001326)	EBL	SG/IL	JRE
B	03.02.20	Re-approved (ECO-0001966)	EBL	SG/IL	JRE

About AKVA group

AKVA group 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 ASA | www.akvagroup.com
Svanavågveien 30, N-4374 EIGERSUND
NORWAY