



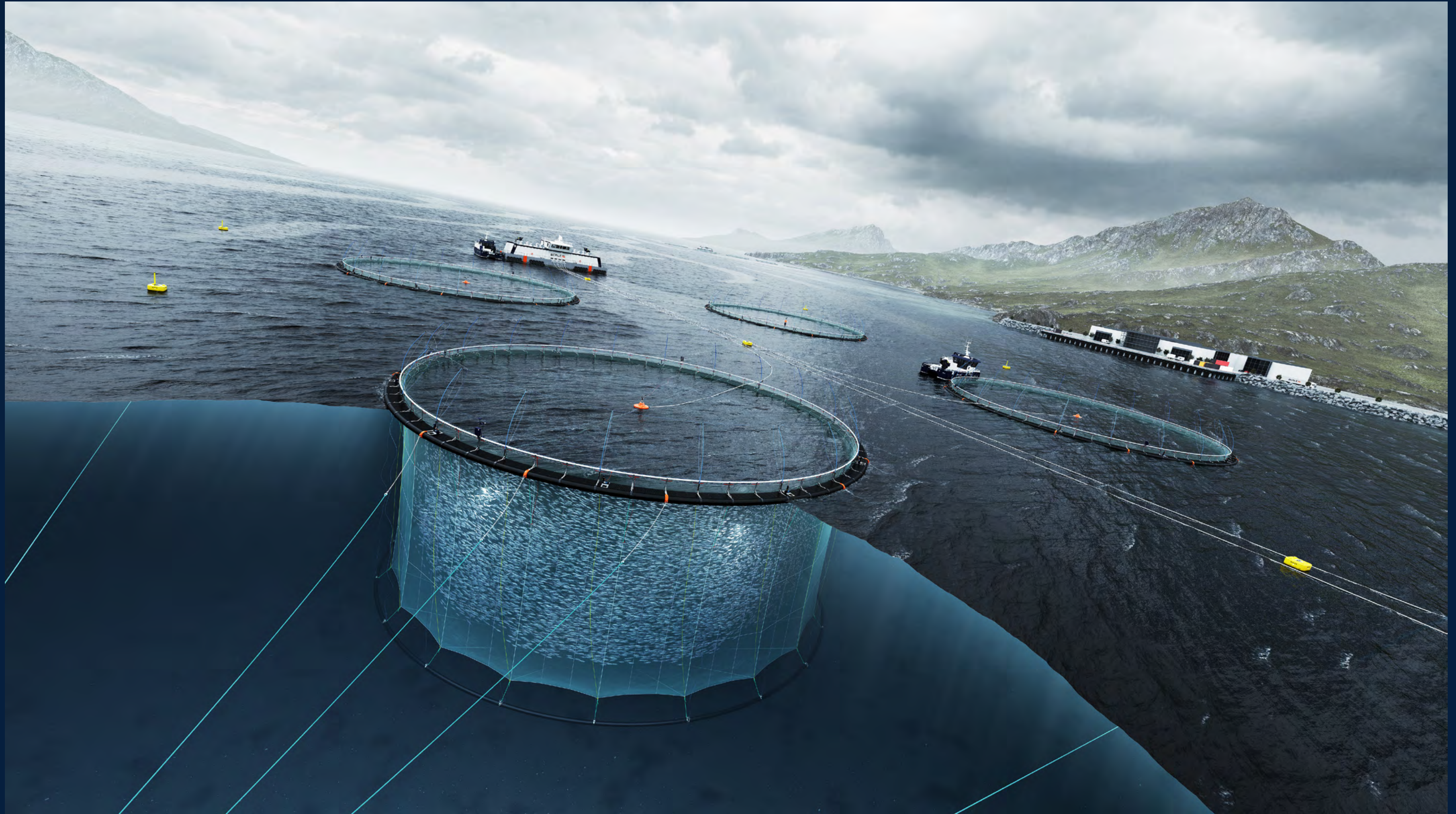
SCALE **AQ**

Mortality
handling



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ScaleAQ is a leading global technology provider that supplies and manufactures complete sites for the aquaculture industry in more than 40 countries. The company has approximately 900 employees and offices in Norway, Scotland, Poland, Iceland, Chile, Canada, Tasmania and Vietnam. Through focus on sustainability and biology, ScaleAQ has taken a clear role in ensuring the development of technology on the terms of biology and the environment. We do this by producing and delivering technology, infrastructure and services in a solid, sustainable and innovative way.

Ensilage

ScaleAQ has been supplying systems for handling dead fish since 1992. The systems can be supplied as standard models or customized according to the customer's needs. We supply comprehensive receiving facility systems with certified collection containers, grinders and storage tanks, acid dosing systems and systems for collecting dead fish.

How the raw material is treated is critical when it comes to the future value of the ensilage. At ScaleAQ, we are committed to working on the development, production, supply and installation of comprehensive dead fish management systems of all sizes. From onshore aquaculture operations to major offshore installations, slaughter facilities, processing plants and fishing vessels. Dead fish equipment supplied by ScaleAQ is easy to use and lasts year after year.



Solid

The silage products from ScaleAQ are based on durable and solid solutions. Through several years of optimization, we are now left with good and proven solutions in all aspects.



Maintenance

Through conscious choice of materials and well-thought-out design, we minimize maintenance on the equipment.



Lifespan

Many of the same factors that make our silage equipment low maintenance also give our equipment a long life.



Silage

Silage can refer to many different things, but in this context, we will focus solely on the term "fish silage," which means that the silage is made from fish and fish raw materials.

Therefore, fish silage is fish or parts of fish mixed with a preservative, making the mixture stable for long-term storage. Typically, an acid is used as the preservative, which lowers the pH (acidity level) of the mixture to a point where bacterial growth in the fish mass stops.

When conditions are right, i.e., temperature above 5°C and a pH between 3.5 and 4.5, the fish biomass will begin to break down. This occurs more rapidly at higher temperatures up to 40°C. This process is called hydrolysis. Enzymes break down muscle tissue, resulting in a liquid mass.

At the same time, another term for the same process, autolysis, is used. This term highlights

how the process unfolds, namely automatically ("auto"lysis). Hereafter, we will consistently use the term autolysis to refer to the breakdown of fish waste by enzymes present in the mass, under the right pH and temperature conditions.

Why do we store silage?

Dead fish are a highly perishable raw material that cannot withstand storage without preservation. Depending on how the dead fish are ensiled, they can either be sold as a resource or disposed of as special waste.

If one fails to ensile dead fish optimally, the entire batch of silage may need to be destroyed as special waste. This can be costly compared to delivering high-quality silage.

Poor-quality silage is considered a by-product, while high-quality silage is seen as a resource. This distinction can save significant costs for the fish farmer.

What is silage used for?

Finished silage is categorized into various grades, ranging from rotted silage that must be destroyed to high-quality products like skincare products. Here are some of the uses for silage in different categories:



Skincare products



Livestock and fur animal feed



Fertilizer



Biofuel



Dead fish



Silage

How do we make silage?

To make silage, we need fish or fish waste, acid for preservation, and equipment to mix and grind everything into a homogeneous mass. We must ensure that all parts of the produced silage have an acid content that maintains the pH at a stable level.

We achieve this by adding the right amount of acid to the fish and grinding/mixing it into a homogeneous mass. It's important to remember that large amounts of bones will cause a rise in pH as the acid penetrates the bone mass. Bones, or the calcium compounds they consist of, will neutralize the acid until all the buffering capacity of the bones is used up. The duration of the pH rise will depend on how finely the mass is ground, how much bone the mass contains, and its temperature.

If the pH rises to a certain level, over 4.5 for formic acid, the silage will begin to rot. This indicates that we have used too little acid. On the other hand, adding too much acid will affect the economics negatively.

When pumping the mass to storage tanks, we must monitor the pH in the storage tank to prevent the silage from rotting. The pH must be kept at the correct level for the acid being used.

Checking the pH value is simple. This can be done with suitable litmus paper or a handheld instrument.

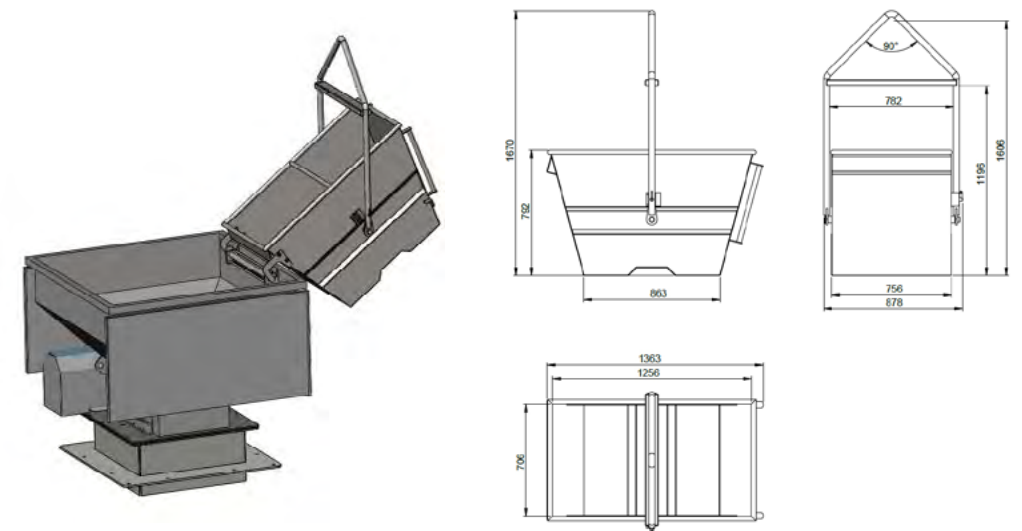
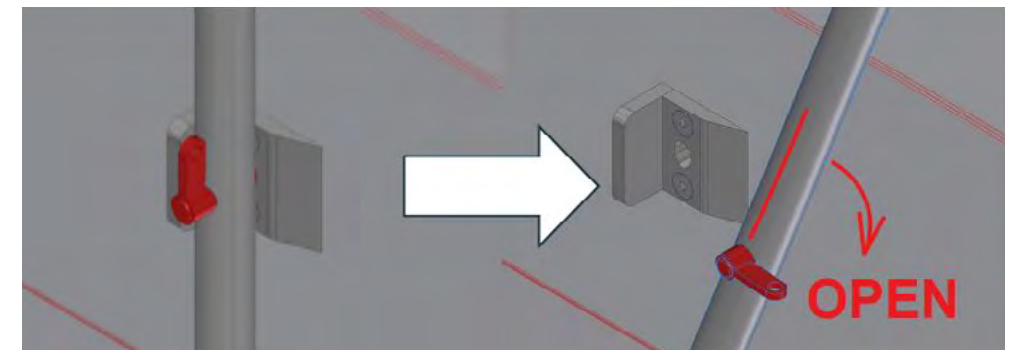
Quality check

The quality check for silage is conducted at the production facilities. The three best tips for achieving the highest possible quality of silage are as follows:

- ▶ Collect dead fish at least once a day to ensure the fish is as fresh as possible.
- ▶ Never grind fish that has started to rot into high-quality silage.
- ▶ Always maintain a low pH level to prevent the silage from rotting.

Dead fish tipping container

- Can be lifted/tipped using either a truck or lifting straps
- Includes lock to avoid tipping during lifting
- Streamlines moving dead fish



The ScaleAQ tipping container for dead fish is available as a 580l container with or without a lid. The container is made of seawater-resistant aluminum. The stainless steel hoop is installed to allow for lifting and tipping. The lifting and tipping of the container takes place through the use of a forklift truck or lifting straps. The container features a lock to prevent the container from tipping during lifting. All tipping containers supplied by ScaleAQ come with lifting certificates. Tipping containers can also be designed according to the customer's wishes.

Specifications	
Capacity	580l
Lid	With or without a lid
Container material	Seawater-resistant aluminum
Hoop material	Stainless steel
Certificate	Issued by EIVA SAFEX
Options	Can be based on customer wishes – connection options to grinder or similar

Tipping basin

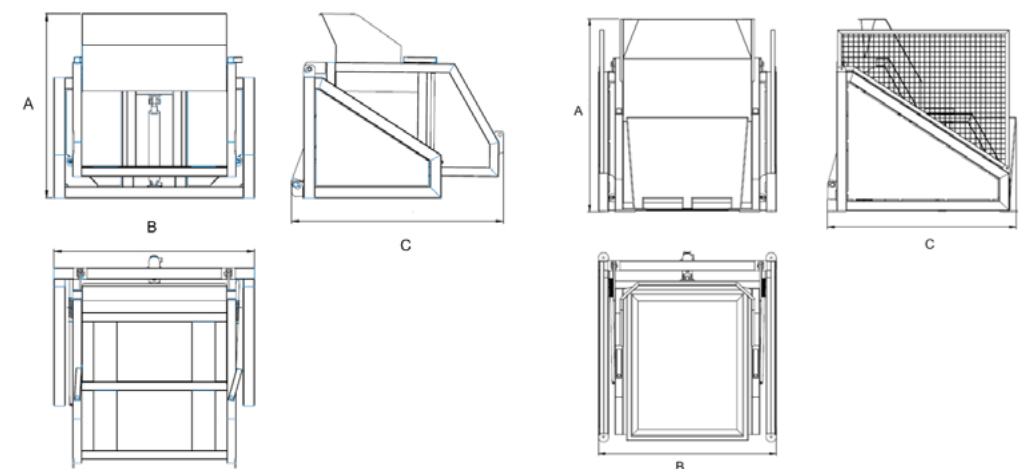
- Automatic locking system
- Suitable for use with cranes, truck or pallet trucks
- Manufactured from stainless steel



Tipping basin with 1000l fish basin. Features a unique locking system that automatically locks the basin in the tipper when it begins to lift the basin.

ScaleAQ's tipping basin is available in two different versions. One for basins lifted on the tipper using a truck or crane, and one for basins lifted on the tipper using a pallet truck. Both tipping basins can be supplied with hydraulic aggregates, hydraulic cylinders for connection to existing hydraulic systems or the ability to tip through the use of external cranes or other lifting equipment.

The tipping basin can be easily set up as part of a system featuring ScaleAQ's coarse grinder or grinding tanks.



Dimensions

Model for truck and crane		Model for pallet jack	
A	1600 mm	A	1600 mm
B	1750 mm	B	1750 mm
C	1900 mm	C	1900 mm
Height for tipping	1420 mm	Height for tipping	1090 mm

Specifications

Engine	4kW – 230V/400V
Hydraulic cylinder	HM-80/50-600 – metallized and painted
Hydraulic aggregate (option)	140 bar, 10 oil tank, painted/plastic
Capacity	1000l basin
Framework material	Stainless steel
Electrical control cabinet	Buttons up/down

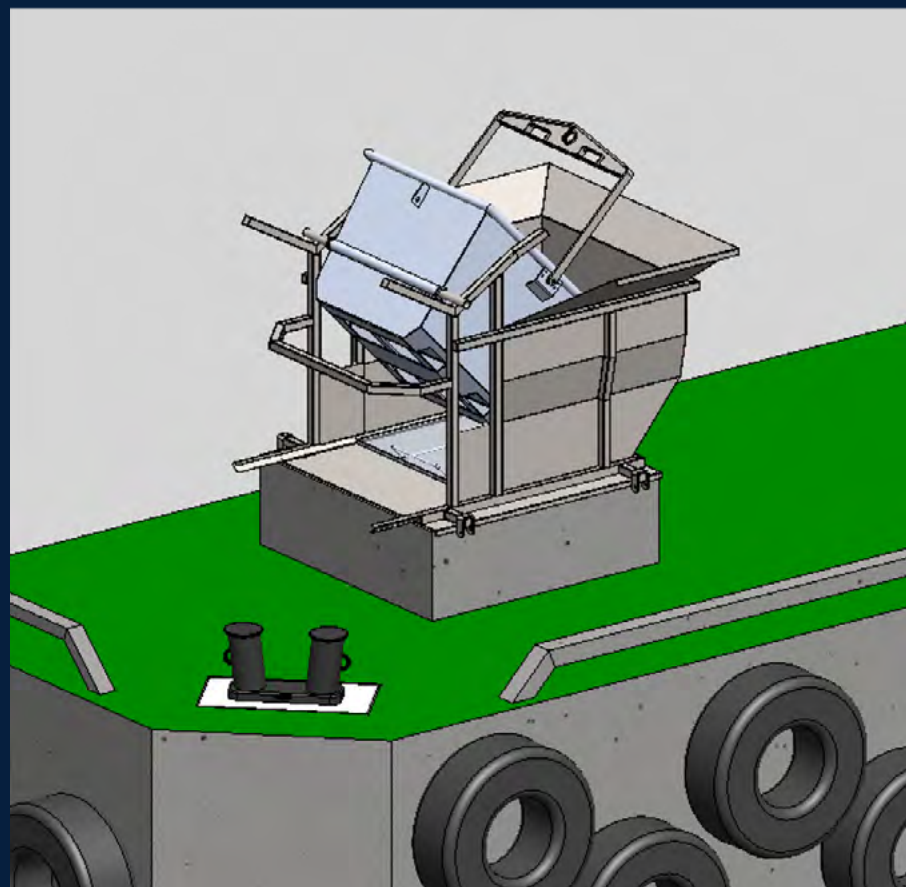
Other tipping units

- Safe tipping of basins, containers or other units
- Better HSE
- Reduced mess leads to better biosecurity

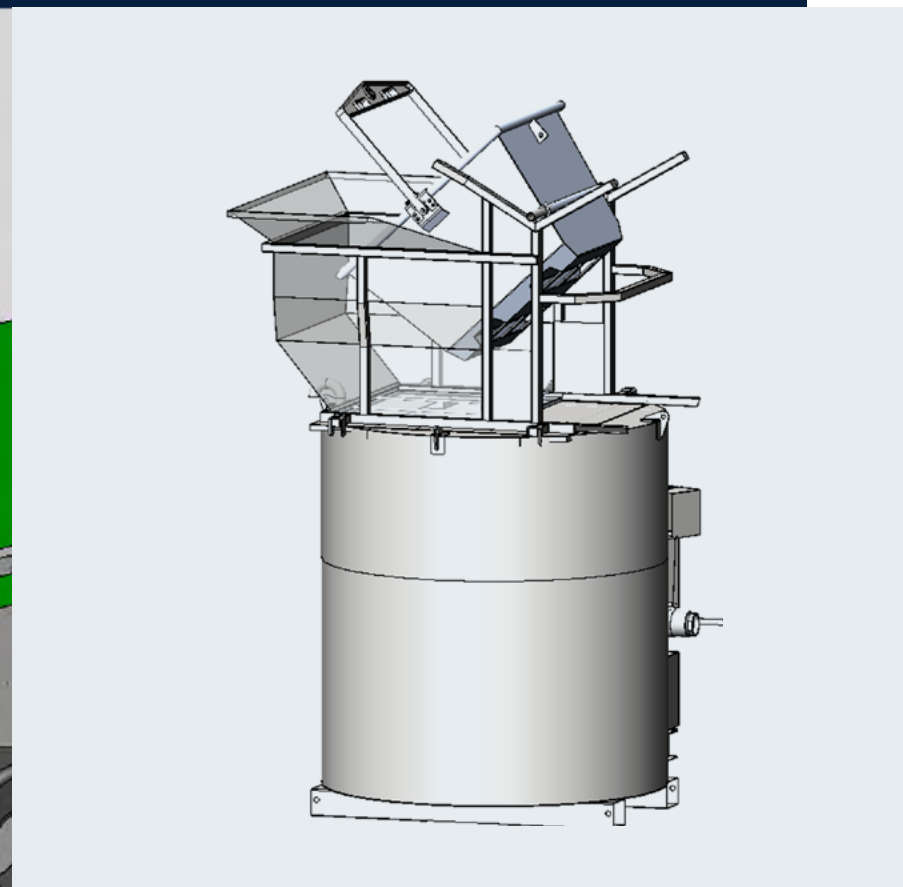
ScaleAQ offers a variety of systems, all of which can be adapted with tipping arrangements. Combinations of different equipment, tanks, or similar units are usually feasible. The images below showcase some of the variations we have delivered to various customers.



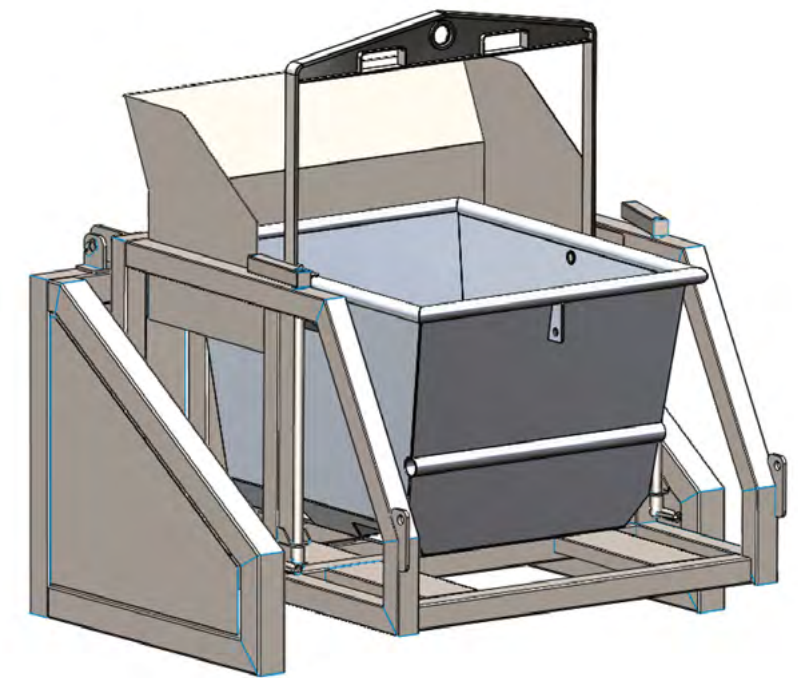
Tipping arrangement for tipping container against pre-grinders



Adaptions for existing concrete feed barge



Tipping arrangement for tipping container against grinder tank



Adapted car tipper for fish basin and tipping container

Pre-grinder DFC-20

- Capacity of 10–15 tons per hour
- Handles all sizes of fish
- Manufactured from stainless steel

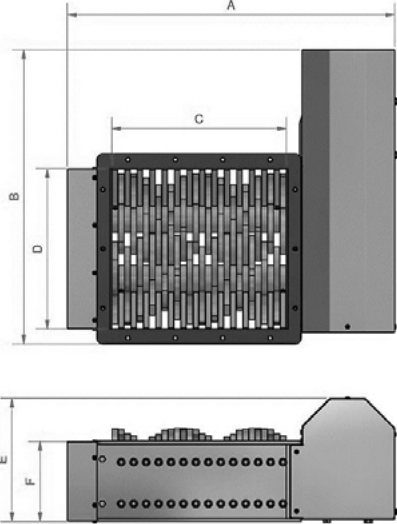


Hook-shaped blades provide maximum capacity

The DFC-20 pre-grinder is the most efficient pre-grinder on the market today. Thanks to a capacity of 10–15 tons of dead fish per hour, it is in a class of its own. It handles all sizes of fish and can increase the capacity of your existing ensiling system. The grinder has a total of 28 blades on two axles. The unique design and blade diameter of 300 mm per blade ensures the best possible grip – even on big fish. The blades are 20 mm wide and manufactured from stainless steel to ensure durability, even in the toughest conditions.

The ScaleAQ pre-grinder is designed for grinding dead fish and other types of fish waste. The blades are designed to handle larger fish without any compromise in terms of quality. By positioning the pre-grinder on top of existing grinding tanks, you can achieve a significant boost to the capacity of your full ensiling system. Acid dosing takes place as usual in the process tank outside the pre-grinder.

Acid is added directly to the tank – either from a canister or from an acid dosing system. Remember to check and adjust the pH levels in the grinding tank before transferring to the storage tank.

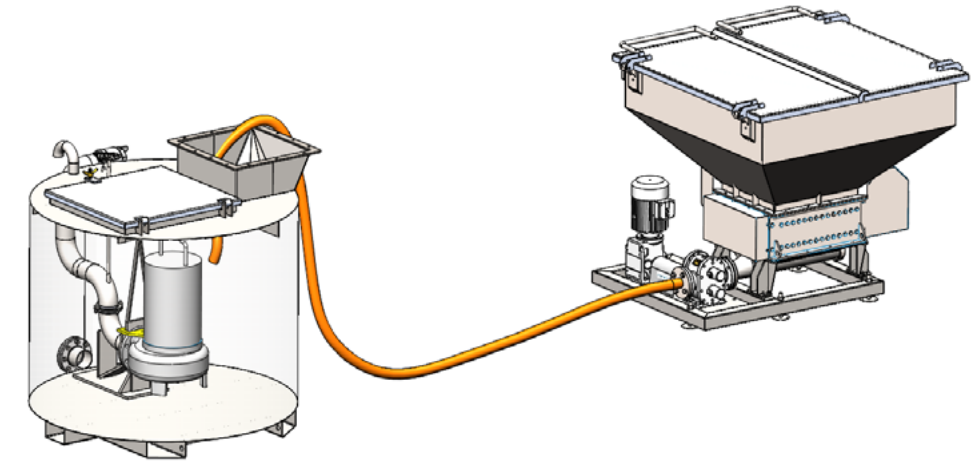
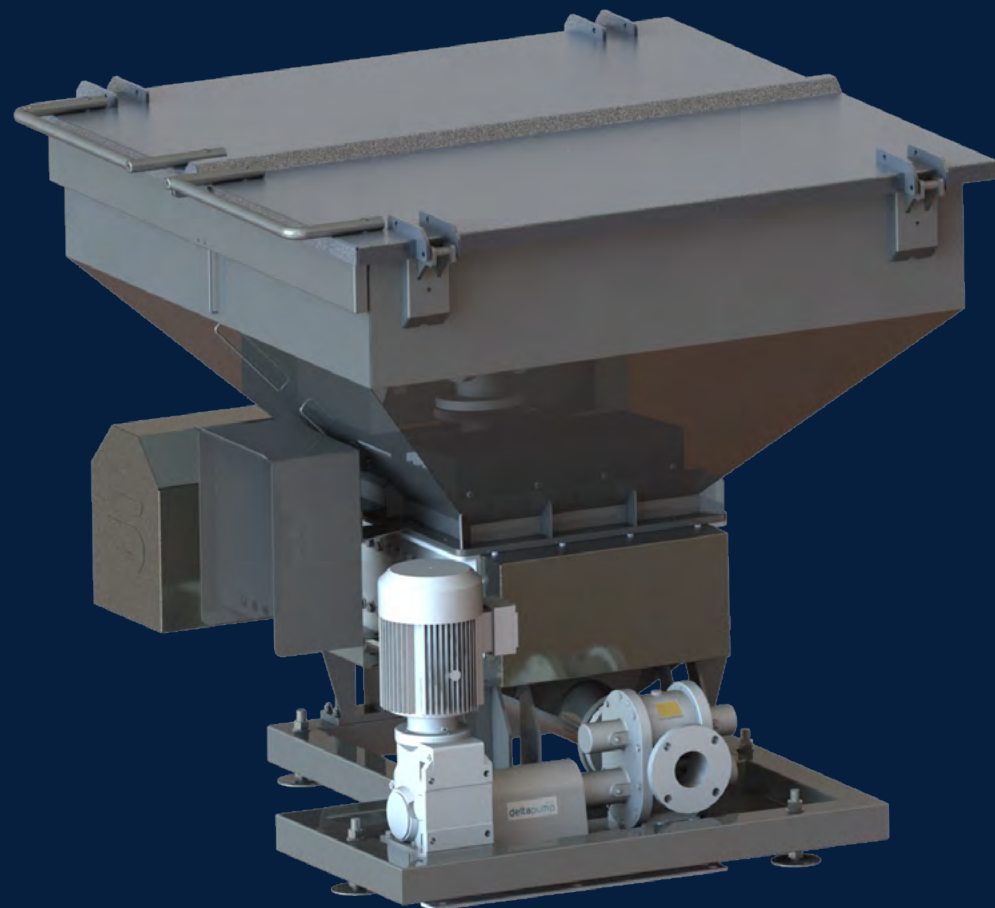


Dimensions	
A	1106 mm
B	992 mm
C	590 mm
D	540 mm
E	415 mm
F	270 mm

Specifications	
Engine	7,5w/400V
Hopper	1000L with two-piece hatch
Interior flange dimensions underside	597 × 540 mm
Exterior flange dimensions underside	697 × 640 mm
Capacity	Estimert 10–15t / time
Blades	Stainless steel
Framework	Stainless steel

Mobile pre-grinder DFC-20

- Mobile pre-grinder system for barge, boat and land
- Fish size does not affect the capacity of up to 8–10 tonnes per hour
- Construction in stainless steel



With a capacity of up to 8–10 tonnes of dead fish per hour, the mobile pre-grinder is quite unique. It handles all fish sizes and can increase the capacity of your existing silage system. Fish are loaded into the funnel on the pre-grinder. The pre-ground mass then falls into the funnel of the framework and is pumped through the Delta pump. A flexible hose can easily be connected to the flange of the Delta pump. Cam-lock connections can be provided as an option. The system can easily be lifted by strops or truck. Total power requirement is 13 kW.

The system consists of ScaleAQ's DFC-20 pre-grinder, Delta pump and stainless-steel frame with funnel and adjustable legs.

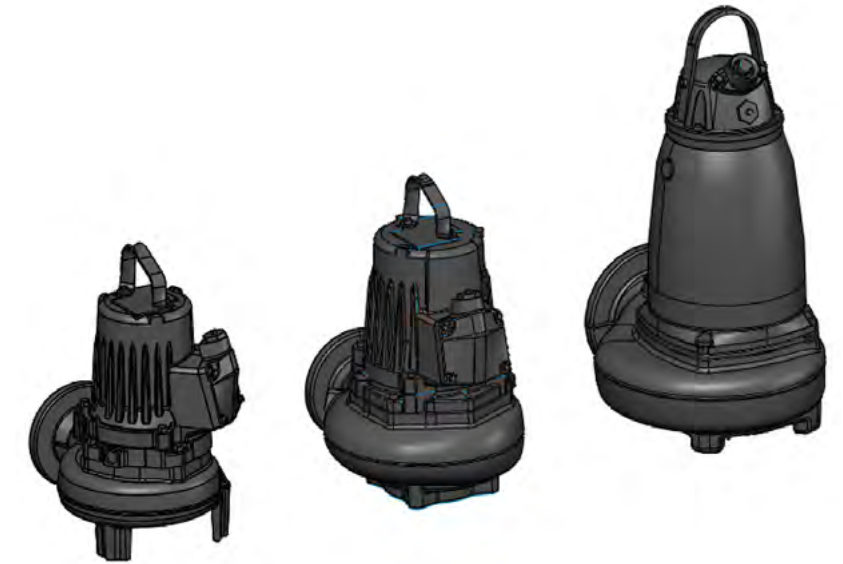
Specifications

Engine	7,5kw/400V (Pre-grinder) 5,5kW (Delta pump)
Funnel	1000L with hatch
Material	Stainless steel
Capacity	Estimated to max 8–10 tons/hour (Lifting height and pumping length will affect the capacity)
Fish size	Smolt to 15 kg fish
Total weight	720 kg
Connection flange	DN80 Ø160

Dead fish grinder

- Hygienic and efficient ensiling system
- High levels of reliability and service life
- Standard tanks, as well as modular customizations

The ScaleAQ dead fish grinder is designed to grind dead fish and other types of fish waste. The grinding tanks can be supplied with submerged grinding pumps or dry-facing grinding pumps. The fish are either ground using the coarse grinder up into the grinding tank or directly in the grinding tank. Acid dosing occurs directly in the grinding tank prior to the fully ground ensilage being pumped into the storage tank.



Submerged grinding pump

The submerged grinding pump is the most commonly used pump in ScaleAQ's grinding tanks.

The cutting system on the pump consists of specially hardened impeller and cutting/ bottom plates. The cutting plate has 8 cutting pockets that act as blades. When recirculating in the 'day tank', the waste/fish will compact. The cutting rate reaches a rate of 8000 cuts per minute. The pump operates at a relatively low speed while offering powerful torque. The impeller is designed with a screw end that draws the waste into the pump. A standard 13.5 kW submerged grinding pump has a capacity of 52 l/second. In the event of any blockage/wedging during the grinding process, it is possible to reverse the pump by using the reverse switch in the control cabinet. This will efficiently dissolve blockages.

For our various grinding tanks, we supply a wide range of submersible grinding pumps, ranging from 2 kW as the smallest to 13.5 kW as the largest. By using submersible pumps, all the supplied energy is utilized in the silage production. The added heat increases production capacity and enables production during winter or in colder climates.

Dry-mounted grinding pumps

We also supply dry-mounted grinding pumps and circulation pumps. These pump models have become increasingly popular in recent years. The ability to service the pump without significant mess makes this understandable.

ScaleAQ supplies dry-mounted grinding pumps from the supplier Mapex. We have extensive and positive experience with this supplier.

The pumps we can provide range in sizes from 7.5 kW up to 18 kW, with or without a cutter.

Specifications	
Pump	Fish size
F-3085LT 2kW	0-100 g
F-3102LT 3,1kW	0-200 g
F-3127LT 5,9kW	0-2000 g
F-3152LT 13,5kW	0-10 000 g



Acid safety container

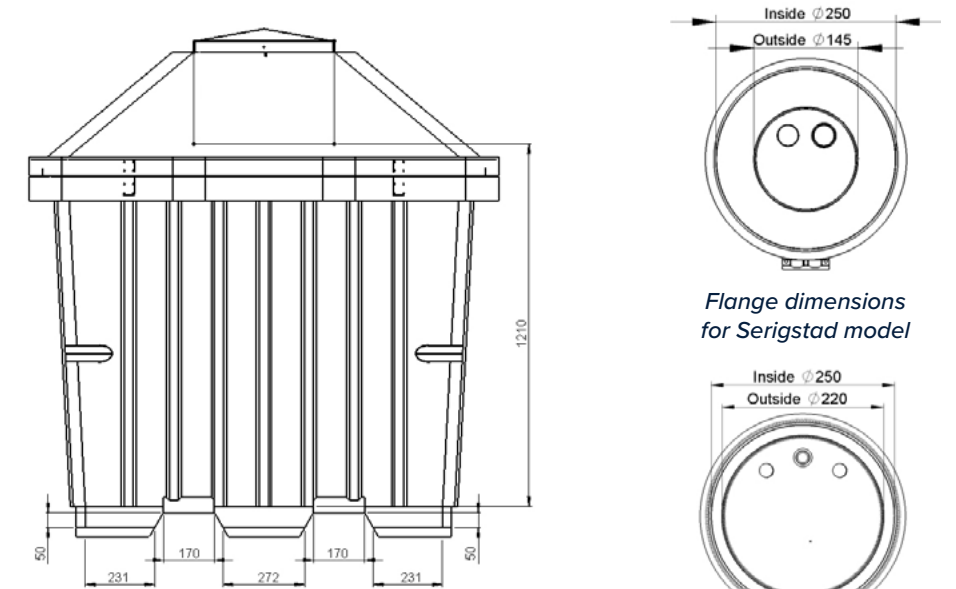
- Corrosion-resistant material
- Light weight – only 80kg



Secondary safety for IBC containers. The safety container is also equipped with a strap attachment for securing to the deck, and cut-outs for use with forklift trucks. The safety container is manufactured from rotary cast polyethylene, which is a corrosion-resistant and chemically resistant material. The safety container is made using reinforcing ribs that ensure it is very stable.

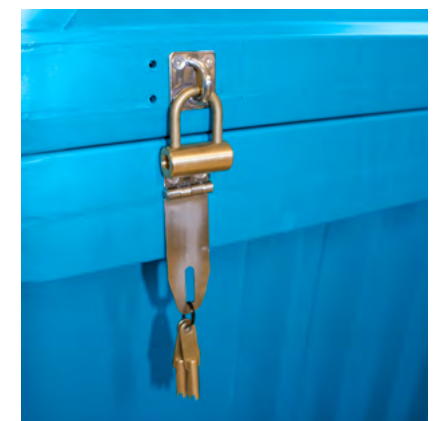
IBC container

There are numerous types of IBC containers available on the market. Ensure that the safety container is compatible with your IBC containers and vice versa. Specifically, make sure that the height of the IBC containers going into the safety container does not exceed 1100mm. Also, check that the flange size on the “suction tube” fits the opening of the container. It may also be beneficial for the pallet on the IBC container to fit into the grooves at the bottom of the tank.



Flange dimensions for Serigstad model

Flange dimensions for Iwaki model



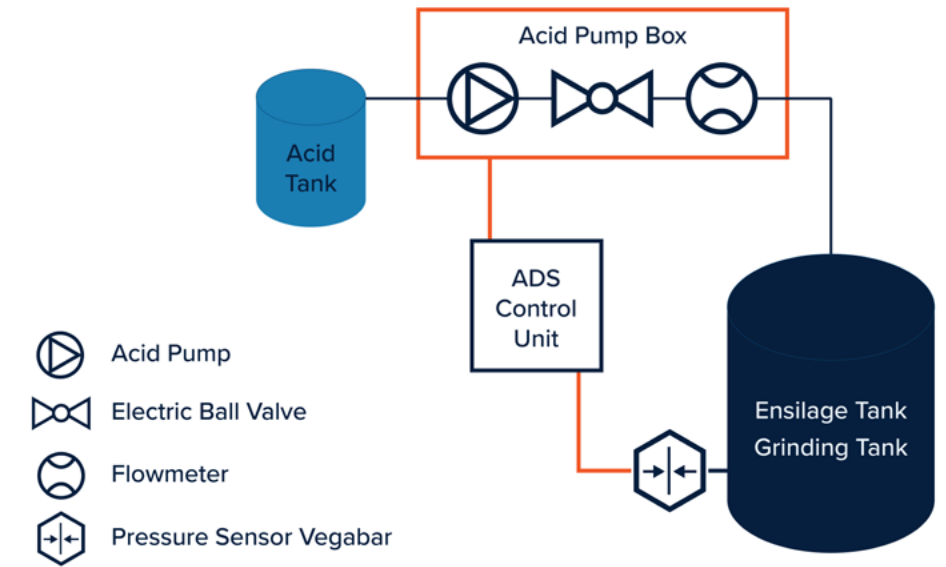
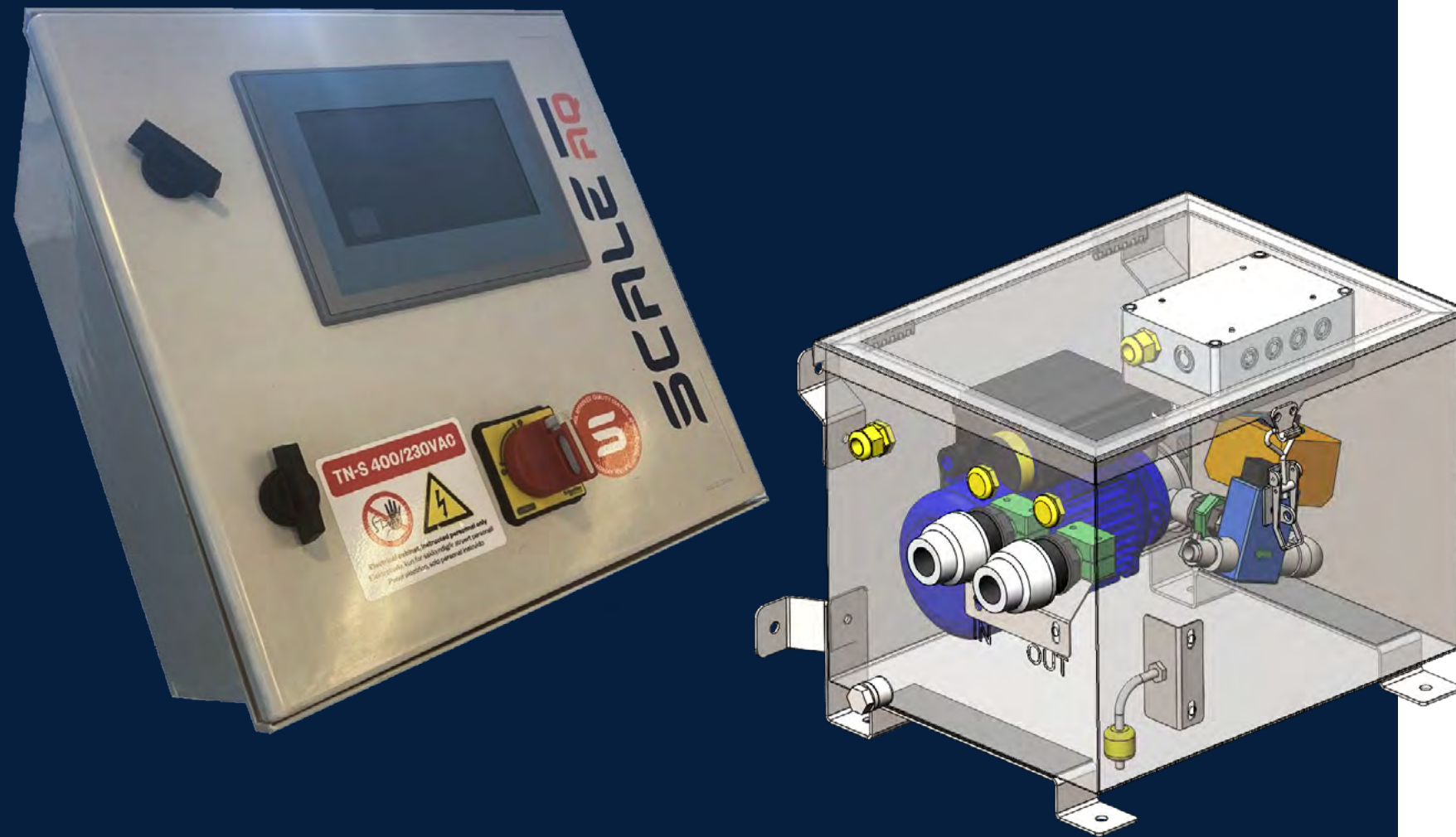
Option to lock the container with a padlock

Specifications

External dimensions	1,53 × 1,53 × 1,68 m
Material	Rotationally molded polyethylene
Lid	Hinged and lockable

Acid dosing system

- Efficient, safe, and accurate acid dosing
- Semi-automatic acid dosing based on the amount of fish loaded into the grinding tank
- Manual operation also available



Efficient and precise acid dosing

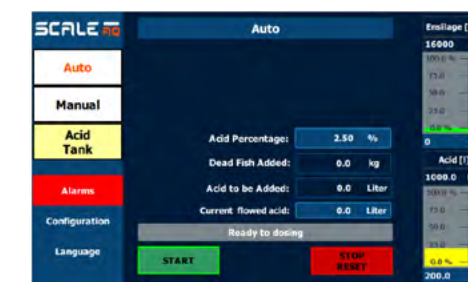
ScaleAQ's semi-automatic acid dosing system has been developed in collaboration with fish farmers to address today's challenges. To ensure the highest possible quality of ensilage while minimizing acid consumption, ScaleAQ's system relies on measurements of the amount of fish loaded into the grinding tank. The system's PLC then calculates the required amount of acid based on preset values. The operator must confirm before the acid is added. Manual dosing is also possible, either by setting the desired amount of acid to be added or by inputting the amount of fish loaded, which will then be converted into the necessary acid requirement.

Customization

The system features a setup for adaptation to various ensilage tanks, considering both size and shape. This ensures that the acid dosing system can also be retrofitted to existing ensilage tanks.

Operating modes

The acid dosing system is equipped with three different operating modes:



Semi-automatic mode



Manual mode for acid dosing per liter



Manual mode for acid dosing per kg of fish loaded

CleanPump

- Dead fish vacuum that doesn't damage nets and facilities. No permanent installation in the pen and no sharp edges that could gnaw holes in the net, reducing the risk of escape with ScaleAQ CleanPump.
- A plug-and-play solution that is efficient and easy to use. Connects to a compressor and the existing hydraulic system on the boat.



Easy to set up – easy to customize

CleanPump can be installed on most boats and is a plug-and-play solution that utilizes energy from the existing hydraulic systems on workboats. The system requires very little capacity, needing only four liters per minute, and is easily controlled with a remote that is connected to the crane's hydraulics. Although CleanPump comes standard with hydraulic operation, we also offer solutions for electric operation for those who need it.

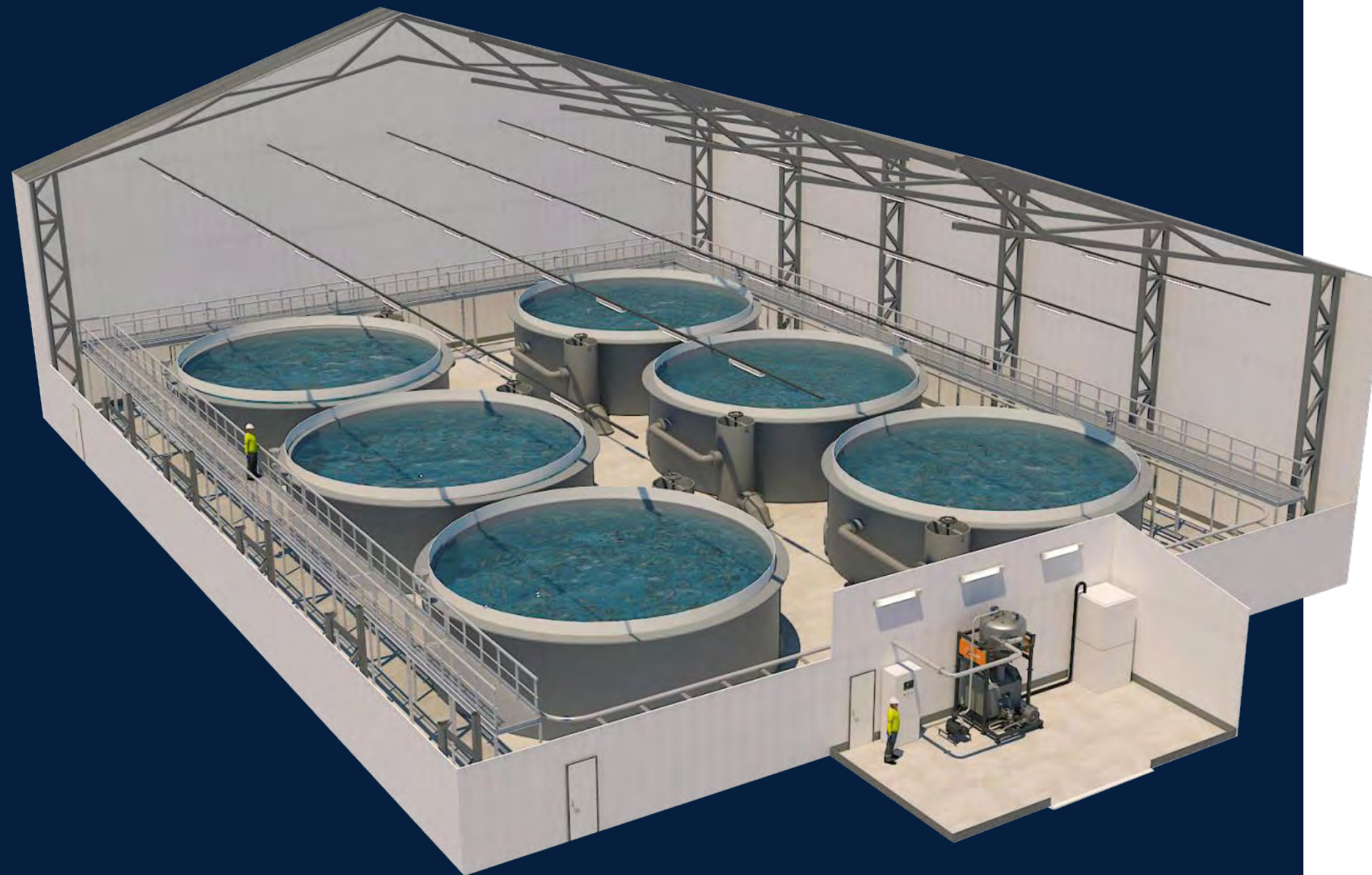
The pump connects to an external compressor, with a minimum air requirement of 3.5 m³/min into CleanPump. It comes standard with a 50-meter suction hose, but we can also provide longer hoses if needed. CleanPump is equipped with an efficient filter box that ensures good drainage, making it both reliable and effective in use.

Specifications

Hydraulics	Amount: Min 5 l/min, Pressure: 200 bar
Air demands	Amount: Min 3,5 m3/min, Pressure: min 7 bar
Weight	980 kg, 1035 kg
CE marking	Yes
Hose	50 m (standard)
Size	Length: 2105 cm, width: 2180 cm, height: 1380 cm

Landbased solutions

- Ensures HSE at the facility
- Enhanced biosecurity through a closed piping system
- Efficient system



In collaboration with our partner, Bush Vakuumteknikk, we offer complete dead fish handling systems for land-based facilities. This includes transportation systems from tank or departmental level back to a dedicated ensilage area with grinding solutions, acid dosing, and storage tank solutions for the finished ensilage.



Hopper at tank or departmental Level



Dedicated ensilage area with a cyclone for collecting dead fish from the vacuum system, a grinding tank for fine grinding of the fish, acid dosing systems for ensilage preservation, and storage tank solutions for storing finished ensilage. All systems are customized to each facility, considering factors such as facility size, customer requirements, logistics, and more.

Customized solutions

Over the years, ScaleAQ has supplied a range of customized solutions based on the above products. These are customized solutions developed on the basis of several decades of experience and knowledge. This incorporates everything from customizations of existing products to brand new, innovative systems. The illustrations and images below give you a flavor of what we are able to deliver. We go to great lengths to make the customer happy.

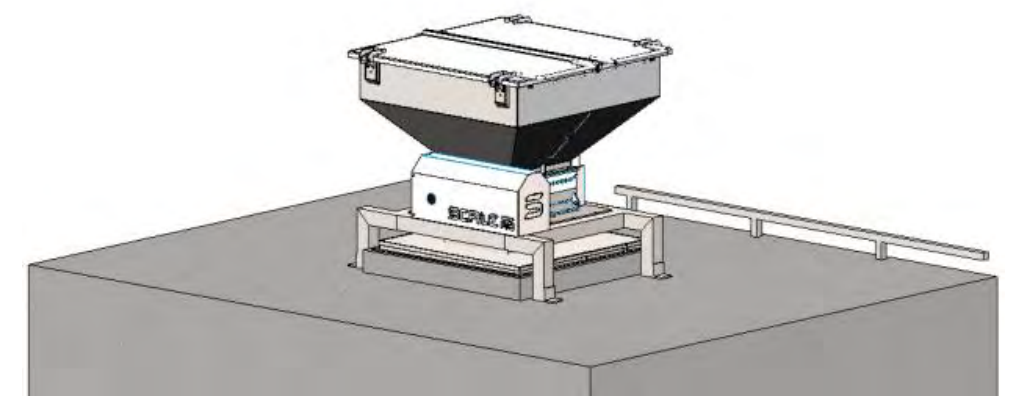
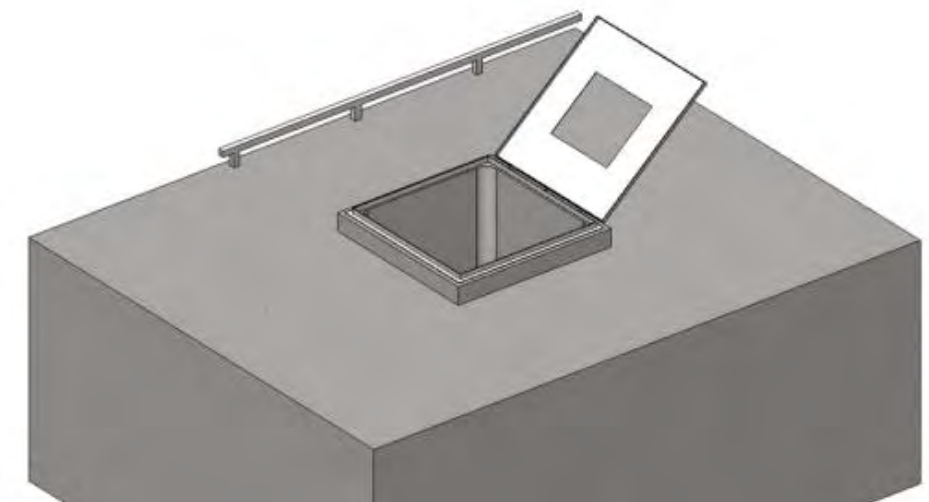
Upgrades for existing ensilage systems

At ScaleAQ, we offer a wide range of options for upgrading existing ensilage systems. This includes replacing existing systems, upgrading current systems for better capacity, expanding existing systems for increased storage capacity, and more. Regardless of the existing installation, we customize systems based on the products shown in this brochure. We make adjustments to all existing installations, regardless of the supplier. Below, you can see customizations designed for various clients.



Replacement for existing system

- New acid safety container
- New grinding tank adapted to the platform on the barge and existing storage tank system



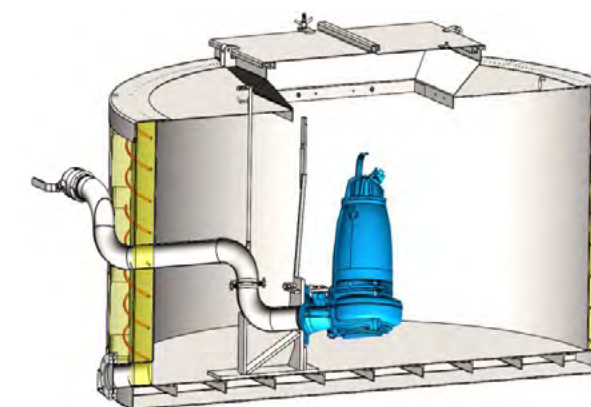
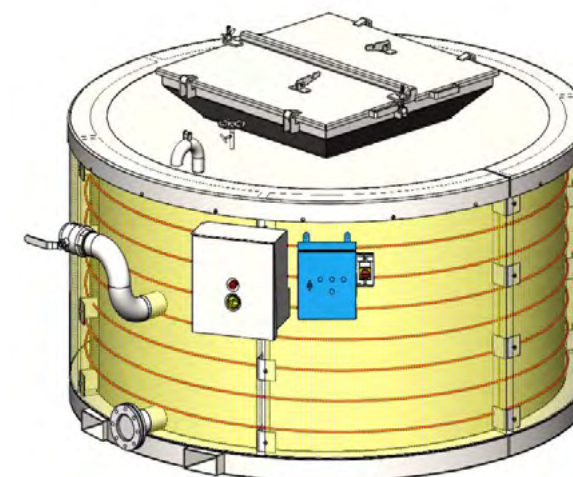
Upgrading existing grinding tank on concrete barge

Pre-grinder from ScaleAQ adapted to the existing system



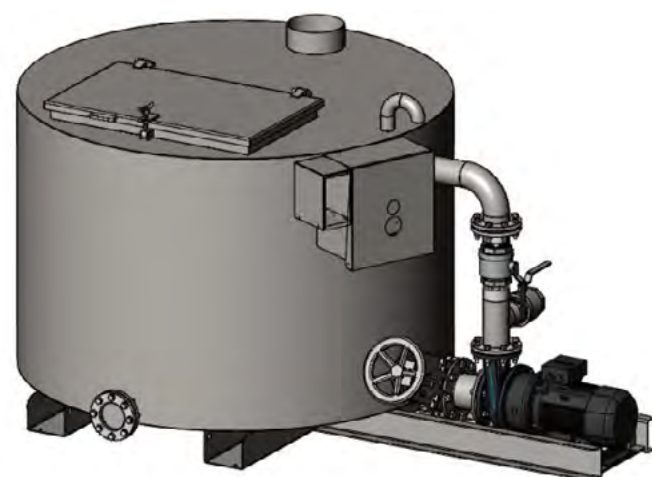
Mobile grinding facility with large capacity

The facility consists of two 10 m³ grinding tanks, each equipped with two 13.5 kW submersible grinding pumps. Additionally, our in-house developed DFC20 pre-grinder is mounted on top of one of the grinding tanks, complete with a platform for personnel. The DFC pre-grinder boasts a grinding capacity of up to 20 tons per hour.



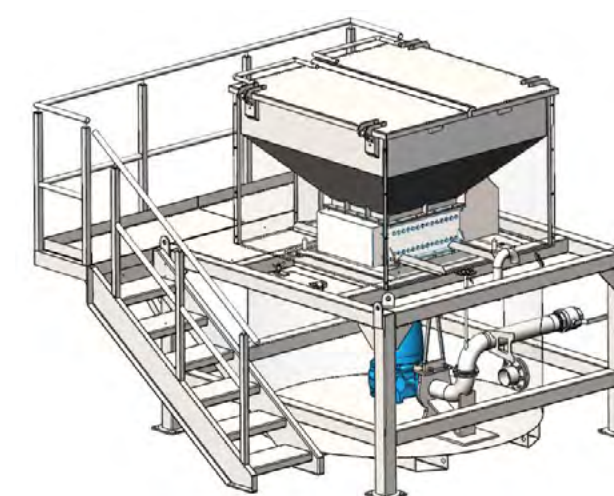
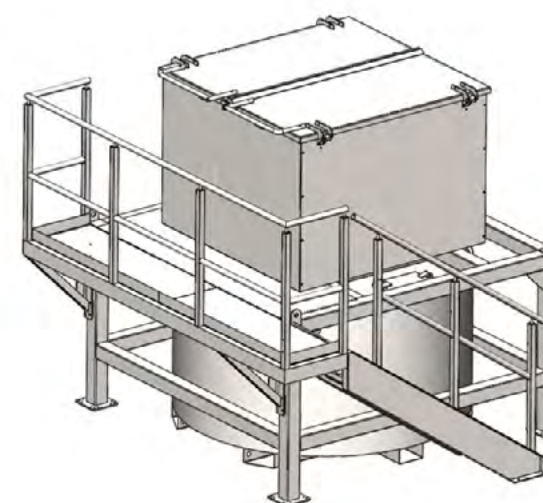
5 m³ insulated grinding tank

5m³ insulated grinding tank with heat strands for use in the Arctic region. Submerged 13.5kW grinding pump with starter cabinet. 500l hopper with hatches and the possibility of retrofitting the DFC-20 pre-grinder.



3.5 m³ grinding tank with dry-facing grinding pump

3.5 m³ grinding tank manufactured from stainless steel with a standard lid, drainage outlet, dry-facing 7.5 kW grinding pump, starter cabinet and piping with valves and Cam-lock to supply finalized ensilage.



3m³ grinding tank with pre-grinder and plateau

3m³ grinding tanks with DFC-20 pre-grinder and submerged 13.5 kW grinding pump. Easily transportable with lifting brackets for use on floats, boats and onshore. Large capacity for delivery to external storage tanks.

Level monitoring

In some cases, it is beneficial to monitor tank levels in both sea-based and land-based facilities. This can be for direct on-site readings or for production planning and alarm systems. At ScaleAQ, we customize level monitoring specifically for your facility. As standard, we use the Vegabar 28 pressure transducer and Vegadis 845 as the display and controller.

Pressure transducer for level monitoring - VEGABAR 28

Application area

The VEGABAR 28 is a universally applicable pressure sensor with switching function and ceramic measuring cell. It is used for measuring gases, vapours and liquids. Even with high requirements for robustness and hygiene, the device records the measured values with high accuracy. The optional universal connection for hygiene adapters reduces the installation effort and stockkeeping.

Your benefit

- High plant availability through maximum overload and vacuum resistance of the ceramic measuring cell
- Coloured 360° status indication
- Convenient wireless setup and diagnostics with smartphone via Bluetooth
- Easy integration into control systems due to a variety of connection technologies

Function

The heart of the pressure transmitter is the pressure measuring cell transforming the pressure into an electrical signal. This pressure-dependent signal is converted by the integrated electronics into a standardized output signal. Sensor element with VEGABAR 28 is the ceramic CERTEC® measuring cell with excellent long-term stability and high overload resistance.



Technical data

Measuring ranges	-1 ... +60 bar/-100 ... +6000 kPa (-14.5 ... +870 psig)	SIP process temperature	+150°C (+302°F) with brief vapour stratification
Smallest measuring range	+0.1 bar/+10 kPa (x1.45 psig)	Ambient, storage and transport temperature	-40 ... +70°C (-40° ... +140°F)
Deviation	< 0.3%	Bluetooth standard	Bluetooth 5.0 (downward compatible to Bluetooth 4.0 LE)
Output signal	4 ... 20 mA	Effective range Bluetooth typ.	25 m (82 ft)
Process fitting	Thread from G¼, ¼ NPT, hygienic fittings from DN 25	Operating voltage	12 ... 35 V DC
Process temperature	-40 ... +130°C (-40 ... +266°F)	Protection rating	Up to IP66/68 (0.5 bar) or IP66/67/69 acc. to EN 60529/IEC 529, up to Type 6P NEMA/UL 50E

Display for level monitoring - VEGAMET 841

Display for level monitoring. Enables reading on the display, signal to the main system, or alarm system.

Application area

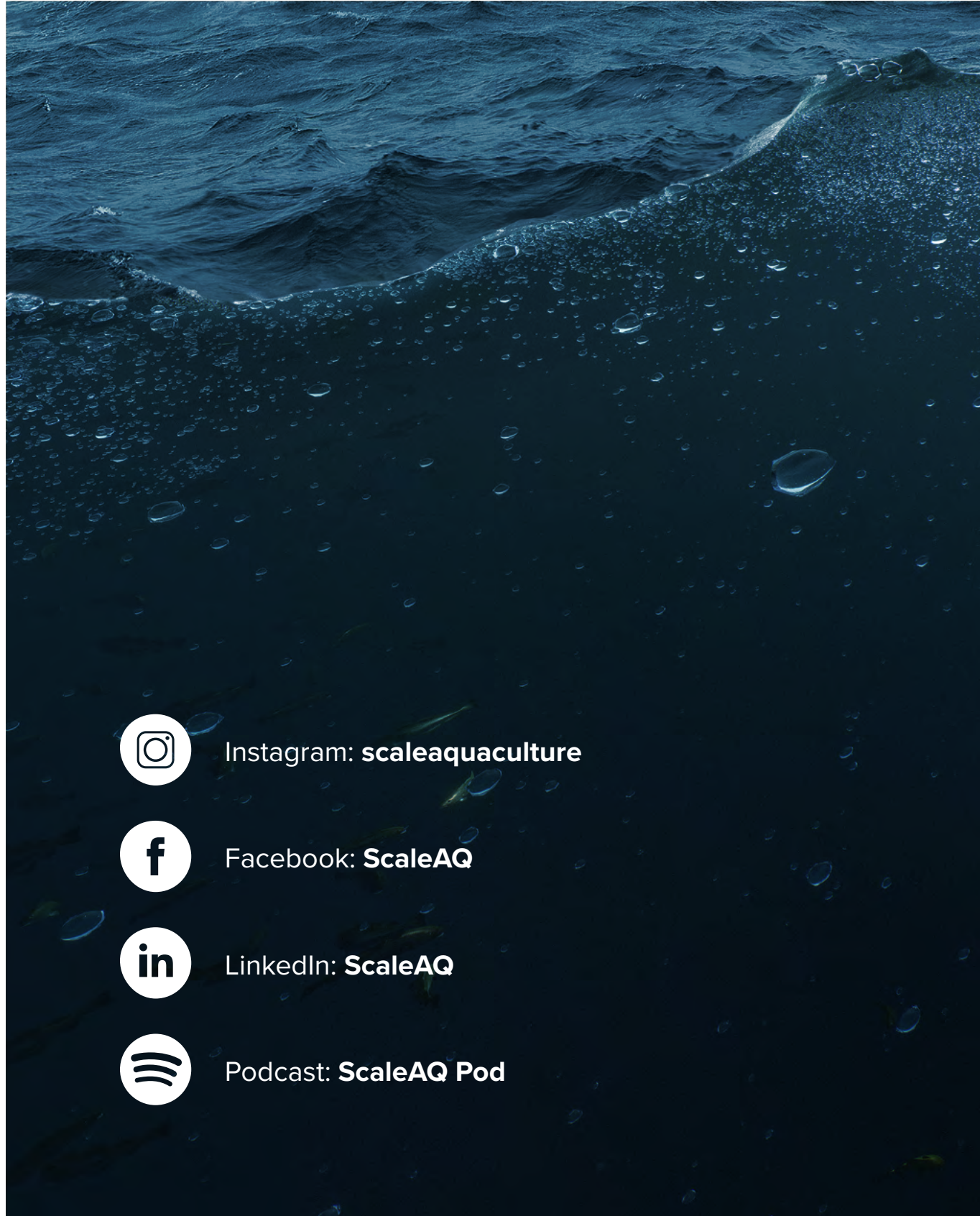
The VEGAMET 841 controller feeds the connected 4 ... 20 mA sensor, processes the measured values and displays them. A large display for data visualisation is integrated in the housing designed for rough field conditions. It enables simple implementation of pump controls, flow measurements on open channels and weirs and totalizers. With the VEGAMET 841, limit values can be reliably monitored and relays can be switched, e.g. for an overflow protection according to WHG. Due to its various possibilities it is suitable for many industrial branches.



Your benefit

- Easy-to-read display from a distance, even in sunlight and darkness
- Complex programming of control tasks is no longer necessary
- Simple and reliable commissioning and diagnosis of the measuring points via smartphone

Technical data			
Operating voltage – Nominal voltage AC – Nominal voltage DC Power consumption	100 ... 230 V (-15%, +10%) 50/60 Hz 24 ... 65 V (-15%, +10%) max. 11 VA; 3 W	Bluetooth interface Bluetooth standard	Bluetooth 5.0 (downward compatible to Bluetooth 4.0 LE)
Sensor input Number of sensors Type of input (selectable) – Active input – Passive input Measured value transmission – 4 ... 20 mA Terminal voltage	1 × 4 ... 20 mA Sensor supply through VEGAMET 841 Sensor has an own voltage supply analogue for 4 ... 20 mA sensors 27 ... 22 V at 4 ... 20 mA	Indicators Measured value indication – Graphic-capable LC display, with lighting – Adjustment elements	89 × 56 mm, digital and quasi-analogue display 4 × keys for menu adjustment
Relay output Quantity Switching voltage Switching current Breaking capacity	3 × operating relay, one can be configured as a fail safe relay max. 250 V AC/60 V DC max. 1 A AC (cos phi > 0.9), 1 A DC min. 50mW, max. 250 VA, max. 40 W DC (with U < 40 V DC)	Ambient conditions Ambient temperature – Instrument in general – Display (readability)	-40 ... +60°C (-40 ... +140°F) -20 ... +60°C (-4 ... +140°F)
Current output Quantity Range Max. load	1 × output 0/4 ... 20 mA, 20 ... 0/4 mA 500 Ω	Electrical protective measures Protection rating	IPtt/67 acc. to IEC 60529, Type 4X acc. to UL 50



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