AGRONA TEC

BEYOND OXYGEN

Nanobubble

User Manual

Models covered: 20 m³/h, 26 m³/h, 40 m³/h, 60 m³/h

Table of Contents

1 About this document

This manual contains all instructions and safety information for using and maintaining the Nanobubble Generator (hereafter referred to as the system).

	Read and understand this manual before installing or using the system. Carefully store this manual for future reference.

1.1 LANGUAGE

This manual is originally written in English (GB). All other language versions are translated from the original English manual.

1.2 USED SYMBOLS

This manual contains safety instructions. Ignoring these instructions may lead to personal injury or damage to the system. Each safety instruction is indicated with a signal word. The signal word corresponds with the level of risk of the described hazardous situation.

DANGER	This symbol indicates a hazard, which, if not avoided, **will** cause death or serious injury.
WARNING	This symbol indicates a hazardous situation which, if not avoided, **could** result in death or serious injury.
CAUTION	This symbol indicates a hazardous situation which, if not avoided, **may** result in minor or moderate personal injury or machine
NOTE	Indicates important information or instructions not related to personal injury.

Other signal words in this manual do not refer to safety.

!	This symbol indicates extra information that might be helpful for some users.

2 About the machine

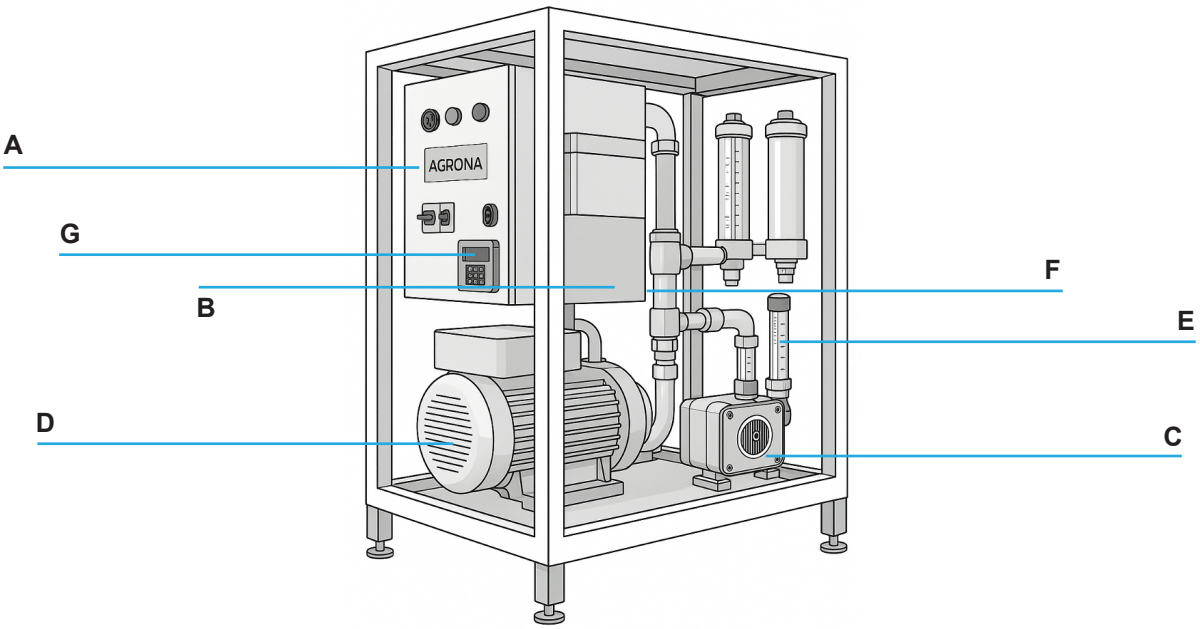
The Agrona Nanobubble Generator is a floor standing, plug and play system designed to increase dissolved oxygen (DO) levels in water.

The machine produces nanobubbles with an approximate diameter of 75 nanometers. At this size, the bubbles have a high surface area to volume ratio, enabling efficient oxygen transfer and long-term stability in water. The system operates using ambient air as its oxygen source. The water oxygenation process is chemical-free and does not require any additives.

The Agrona Nanobubble Generator can be used in various water based applications, including irrigation, horticulture, aquaculture, water treatment, and recreational water bodies such as lakes and ponds.

The system includes an integrated IP-rated control cabinet and can be equipped with an optional dissolved oxygen (DO) sensor for real-time monitoring. Component specifications may vary depending on the model type and selected configuration options.

2.1 MAIN PARTS



A. Control Panel
B. Main switch
C. Concentrator
D. Pump
E. Air filter
F. Flow meters
G. Oxygen Sensor

Your machine may differ from the illustration. Agrona machines are project-specific and may include customized features or optional components.

2.2 TECHNICAL SPECIFICATION

The Agrona Nanobubble Generator is available in multiple model variants. Differences between models relate mainly to pump power, flow capacity, oxygen flow settings, inlet/outlet dimensions, and total system weight.

Flow Rate m3/hour2	12 m3/hour	20 m3/hour	26 m3/hour	40 m3/hour	60 m3 hour
Temperature Tolerance °C	5-60	5-60	5-60	5-60	5-60
Indicated Gas Flow Range Maximum per minute	10 litre	10 litre	15 litre	20 litre	30 litre
Indicated Gas Flow Range Recommended per minute	5 litre	5 litre	10 litre	15 litre	20 litre
Standard Oxygen Transfer Efficiency	> 97%	> 97%	> 97%	> 97%	> 97%
Capacity m3 per day	288 m3	480 m3	624 m3	960 m3	1440 m3
PUMP					
Pump Model	Priming Pump	Priming Pump	Priming Pump	Priming Pump	Priming Pump
Pump Motor (kw)	0.7 kw	1.0 kw	1.3 kw	2.2 kw	5.5 kw
Voltage	230 volt	230 volt	230 volt	400 volt	400 volt
Hz	50/60	50/60	50/60	50/60	50/60
Total kw	1.3 kw	1.5 kw	1.9 kw	3.3 kw	6.5 kw
CONTROLLER					
Voltage	230 volt	230 volt	230 volt	400 volt	400 volt
Timer	Incl.	Incl.	Incl.	Incl.	Incl.
Power Light	On/Off	On/Off	On/Off	On/Off	On/Off
Dissolved Oxygen (DO) Sensor	Optical, 0 – 40 ppm, 10 Second Response Time				
CONNECTIONS					
Inlet	50 mm	50 mm	50 mm	90 mm	110 mm
Outlet	50 mm	50 mm	50 mm	75 mm	90 mm
FOOTPRINT DIMENSIONS					
Length	72 cm	72 cm	72 cm	98 cm	98 cm
Width	72 cm	72 cm	72 cm	72 cm	72 cm
Height	110 cm	110 cm	110 cm	110 cm	110 cm
Weight	75 kg	85 kg	98 kg	115 kg	125 kg
TRANSPORT DIMENSIONS					
Length	80 cm	80 cm	80 cm	105 cm	105 cm
Width	80 cm	80 cm	80 cm	105 cm	105 cm
Height	120 cm	120 cm	120 cm	120 cm	120 cm
Weight	83 kg	93 kg	106 kg	123 kg	133 kg
TRANSPORT DETAILS					
Loading meters	0.23	0.23	0.23	0.42	0.42
Total Pallets	1	1	1	1	1

Note: OPTION Integrated Dissolved Oxygen Optical Sensor Probe

2.3 CONFORMITY

The machine is intended for use with water only. It is supplied in accordance with applicable EU directives (Machinery Directive and others). Consult Appendix I for the complete Declaration of Conformity.

3 SAFETY

3.1 INTENDED USE

The Nanobubble Generator is intended to increase dissolved oxygen levels in water-based industrial, agricultural, and environmental processes. Typical applications include irrigation systems, horticultural water circuits, aquaculture basins, lakes and ponds, water purification and waste water treatment processes. The system is designed for installation in water supply lines for silos, tanks, basins, or comparable fixed installations where enhanced oxygenation is required to support water quality and biological stability. The Nanobubble Generator is not intended for medical applications, potable water production, or for treating any fluids outside the specifications defined by the manufacturer. The system must be installed and operated in controlled environments accessible only to uthorized personnel.

3.2 QUALIFICATION OF PERSONNEL

Personnel working with the system can be divided into 3 categories.

The installer is responsible for mounting, connecting, and configuring the system during initial setup. The **installer** must:

• Be authorized to perform installation activities in accordance with applicable local regulations and standards.
• Have read and understands this manual.

The operator operates the system and performs the weekly, monthly or yearly maintenance. The **operator** must:

• Have permission from the owner to operate the machine.
• Have read and understands this manual.

The qualified technician performs the commissioning, troubleshooting, and yearly maintenance. The **qualified technician** must:

• Have authorization to work on the machine, in accordance with all applicable local regulations and standards.
• Have read and understands this manual.

The Nanobubble Generator is not intended for use by persons (including children) with reduced physical, sensory, or mental capabilities, or lack of experience or knowledge, unless they have been given supervision or instruction by a person responsible for their safety.

3.3 SAFETY SYMBOLS ON THE MACHINE

The following symbols are applied to the system.

Symbol	Meaning	Location
	Electrical hazard. Risk of electric shock or electrocution.	Electrical cabinet

3.4 PERSONAL PROTECTIVE MEASURES (PPM)

The following personal protective measures are needed when working with the machine:

	Indicates that protective gloves must be worn.		Indicates that safety or non-slip footwear must be worn.
	Indicates that a face mask must be worn.		Indicates that splash goggles must be worn.

Technicians performing electrical work must wear electrical rated PPE (Personal Protective Equipment) in accordance with local regulations.

3.5 SAFETY INSTRUCTIONS

WARNING

Improper installation, adjustment, modification, servicing, or use may result in electric shock, fire, or other hazardous conditions. Read and follow all safety instructions on the equipment and in this manual.

- Keep all panels, covers, and protective guards closed during operation.
- Do not modify the machine or bypass any safety devices.

DANGER **Electrical Hazard**

Risk of death or serious injury. The machine contains live electrical components inside an enclosed cabinet.

- Only qualified technicians may access internal electrical parts.
- Power must be isolated before opening the cabinet.

WARNING **Electric Shock Hazard**

Risk of serious injury or death due to electric shock.

- Disconnect the machine from the power supply before opening the electrical cabinet or performing service work.
- Multiple disconnect switches may be present.
- Do not touch the machine with wet hands or tools.
- Ensure all electrical work complies with local regulations and standards.

WARNING **Mechanical and moving-part hazard**

The system contains internal moving components such as the pump and motor.

- Keep all covers closed during operation.
- Do not reach into the machine while it is running.

WARNING **Suction and entrapment hazard**

Risk of serious injury or drowning. Water inlets and suction points may create suction forces that can trap persons, animals, or objects.

- Stay off and away from suction points.
- Prevent access to suction points by installing barriers, grates, or equivalent protections.
- The facility owner or site management is responsible for ensuring that the installation area is secured, regularly inspected, and compliant with applicable local safety requirements.

WARNING **Fall Hazard**

Risk of serious injury or death. Working on or near silos, elevated tanks, or open edges may result in falls.

- Use approved access equipment and fall arrest protection when working at height.
- The facility owner or site management must ensure that access platforms and fall protection systems are installed and compliant with local regulations before elevated work begins.

WARNING **Heavy Lifting**

The unit weighs 75 - 135 kg depending on model.

- Handle the unit carefully, use approved lifting equipment.
- Do not lift the unit alone.

CAUTION **Sharp edge hazard**

Risk of minor injury. Sheet-metal components and fittings may have sharp edges.

• Wear protective gloves and handle components carefully during installation and maintenance.

CAUTION **Pressure hazard**

Risk of minor injury or equipment damage. The system operates under water pressure.

• Do not open or loosen pressurized components.
• Depressurize the system before maintenance.

CAUTION **Hot surface hazard**

Risk of minor burns. Certain internal components may become hot during operation.

• Allow components to cool before touching them.

CAUTION **Slip, trip, and fall hazard**

Risk of minor injury. Water or condensation may be present around the installation area.

• Keep the working area dry and free of obstacles.
• In case of water leakage: stop operation, close valves, and inspect seals and connections.

If any unsafe condition occurs

Stop the machine immediately and contact a qualified technician.

Agrona is not responsible for injuries or damage caused by incorrect installation, modification, or unauthorized service.

4 Installation

WARNING

Improper installation may result in electric shock, equipment damage, or unsafe operating conditions.

Installation must be carried out only by qualified installers or authorized technicians and must comply with all local regulations, standards, and site specific safety requirements.For detailed model specific information on piping, connection points, electrical ratings, and component layout refer to the technical drawing (available upon request).

NOTE

Agrona is not responsible for injuries or damage resulting from incorrect installation, unauthorized modifications, or work performed by unqualified personnel.

4.1 DELIVERY AND INSPECTION

Upon receipt, inspect all packaging and components for visible damage before unpacking.

Verify that all accessories and parts are included:

- Nanobubble Generator unit
- PVC pipes and fittings
- Ball valves, T-pieces, elbows, and funnel
- Foot valve and check valves
- Pressure gauge and venturi connections

Report any missing or damaged components to Agrona Tec. immediately.
Retain packaging materials for future transport or service.

4.2 SITE REQUIREMENTS

- Install The Nanobubble Generator as close as possible to the water source.
- The floor must be flat, stable, and dry.
- Keep at least 1 m of space on each side for airflow and service access.
- Ensure the installation area is accessible only to authorized personnel.

The machine may be installed indoors or outdoors.

- Operating temperature: +5 °C to +40 °C
- Relative humidity: < 70%, non-condensing
- The enclosure is corrosion-resistant and suitable for normal outdoor environments.

When installed in recreational or public areas:

- The unit must be protected with barriers or a locked enclosure.
- The area must be clearly marked with warning signs.
- The installation area must be secured and monitored according to local safety regulations.

4.3 INSTALLATION STEPS

4.3.1 Nanobubble Generator 20 m³/h – Type A 50hZ

Before starting installation verify that all components match the 20 m³/h Type A installation kit:

STEP 1

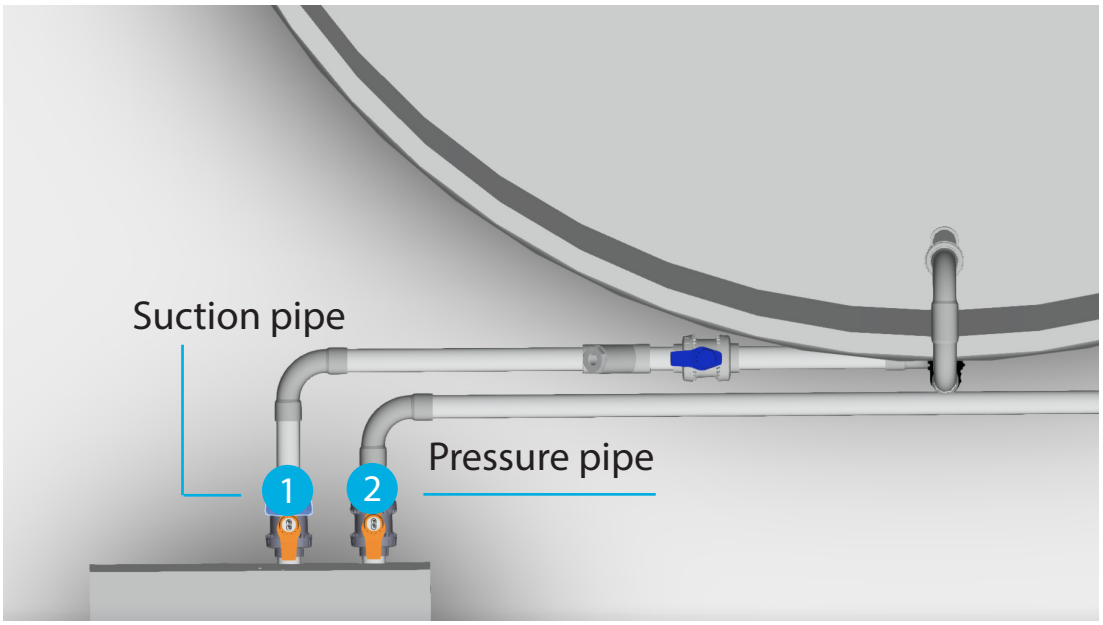
Position the Unit

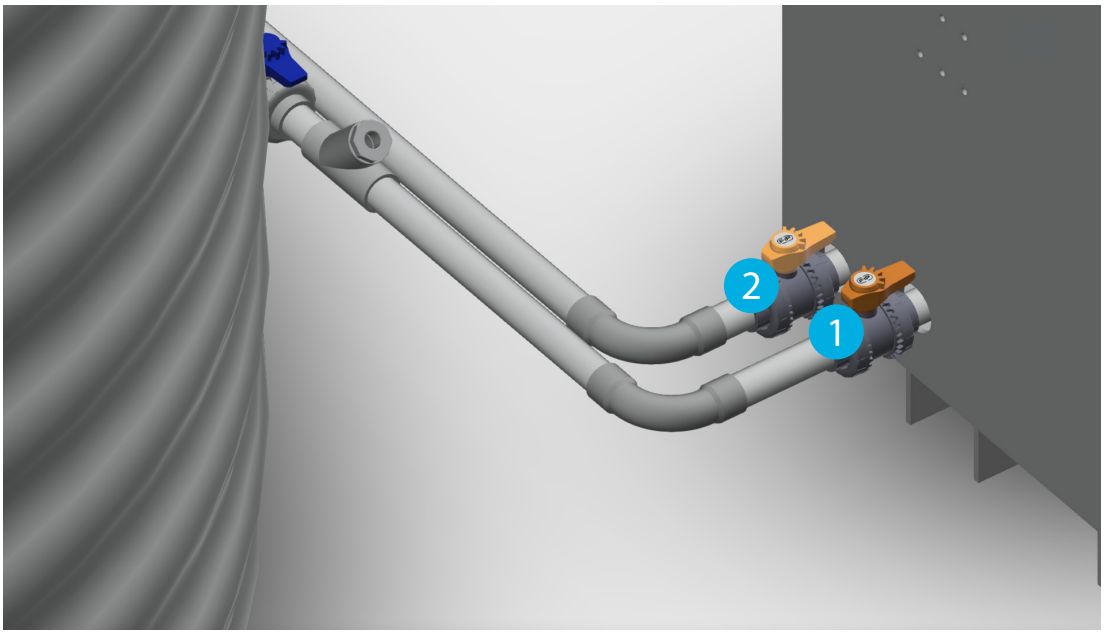
• Place the Nanobubble system as close as possible to the water storage tank on a flat, stable, dry surface.

STEP 2

Install Ball Valves on Pump Inlet and Outlet

• Ball valve 1 on the suction pipe (pump inlet).
• Ball valve 2 on the pressure pipe (pump outlet).



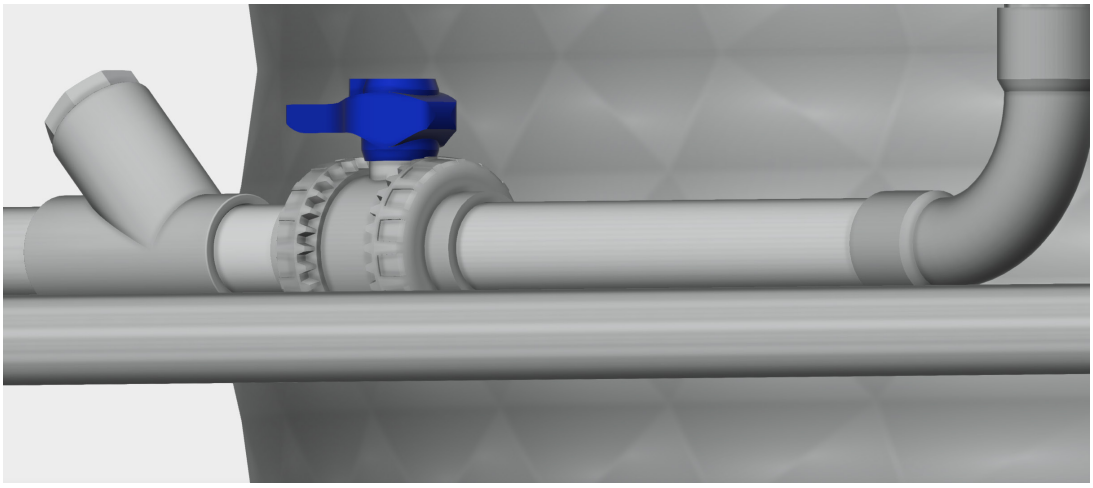


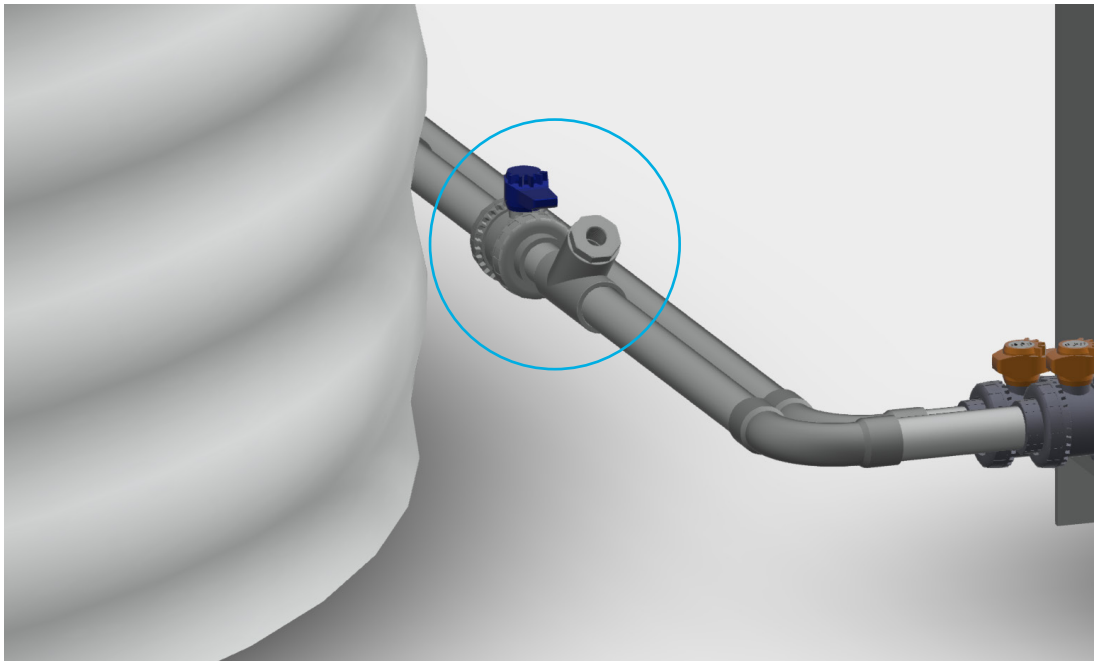
STEP 3 (OPTIONAL)

Install DO Sensor Connection

If machine is equipped with a dissolved oxygen (DO) sensor:

• Install the 45° T-piece on the pressure line.
• Install the ball valve directly after the 45° T-piece.





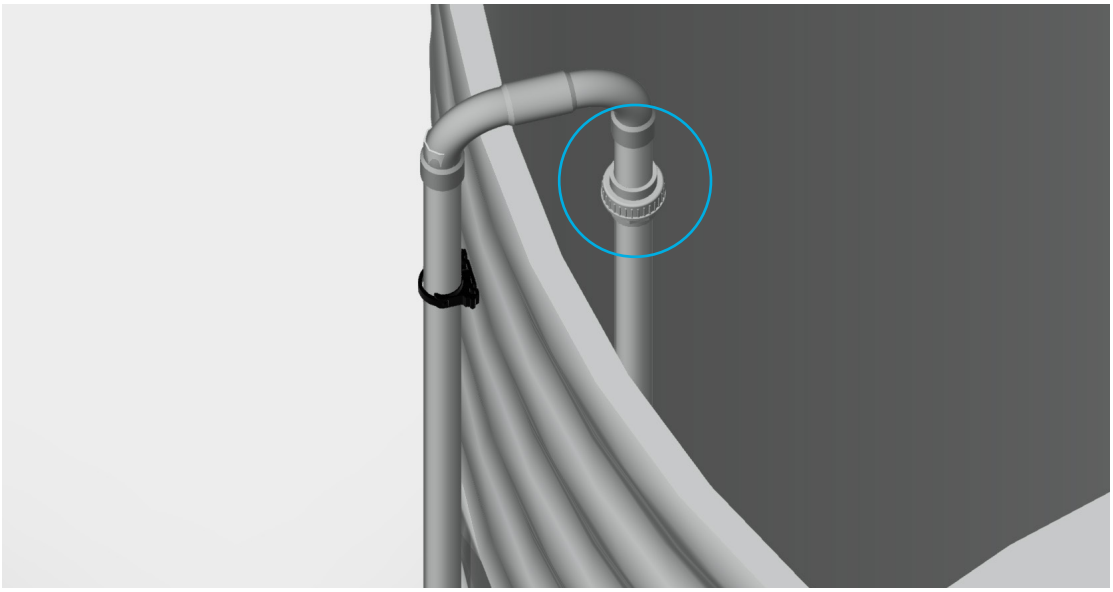
NOTE

Protect the sensor probe from impact, water exposure, and scratches during installation.

STEP 4

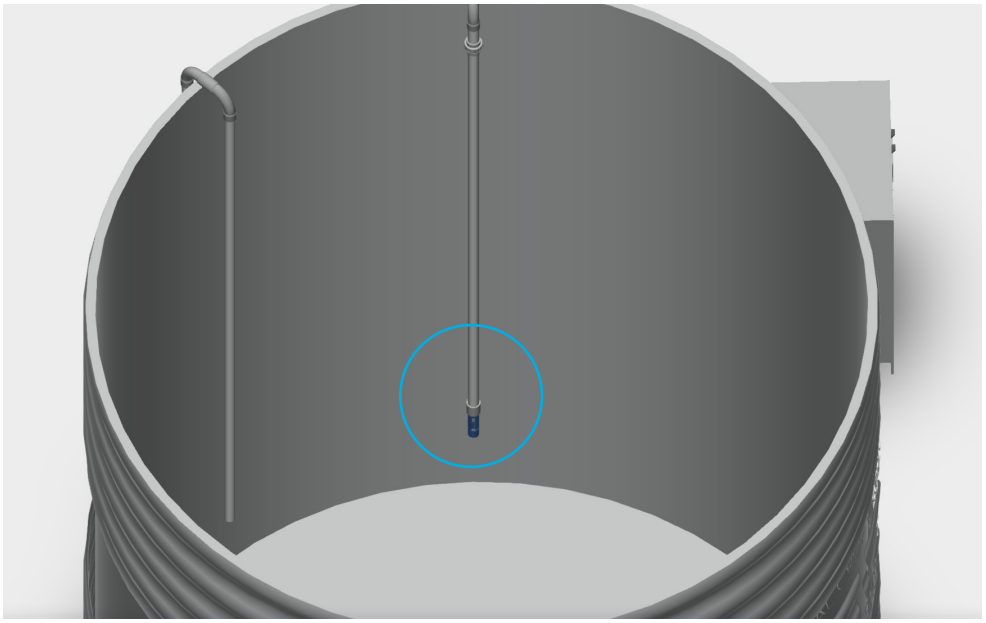
Install the Suction Inlet Line

• Place two 90° PVC elbows with a clamp coupling on the top edge of the silo.
• Install the foot valve approximately 40 cm above the bottom of the silo.



NOTE

Always ensure that the suction pipe is below the minimum level of the silo.
This prevents air intake and protects the pump from dry running.

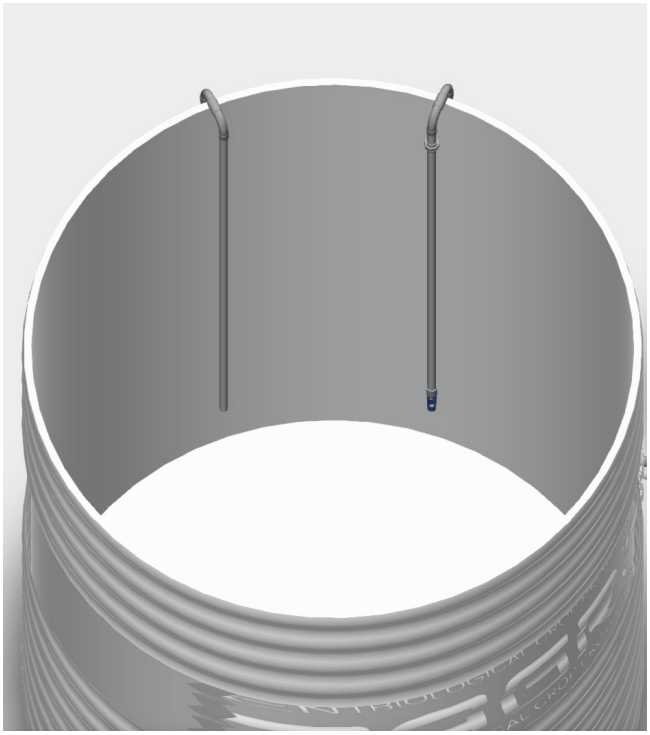


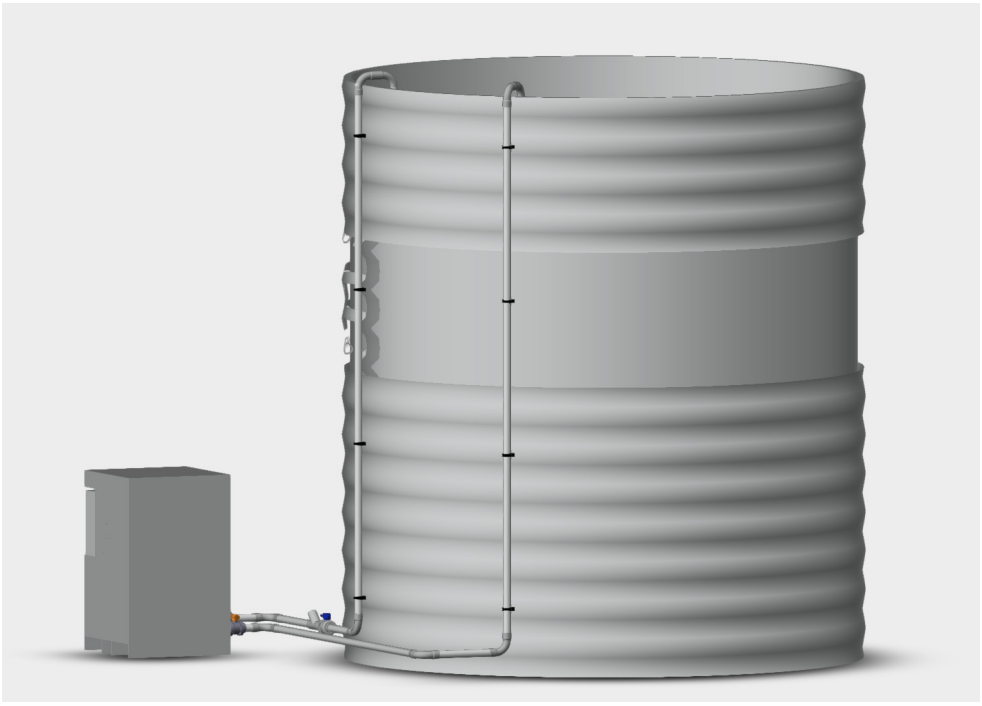
STEP 5

Install the Pressure Outlet Line

Install the pressure pipe the same way as the suction pipe, but:

- **Do not use clamp couplings inside the water column.**
- Keep the pressure pipe **4-5 m away** from the suction pipe to optimize circulation.





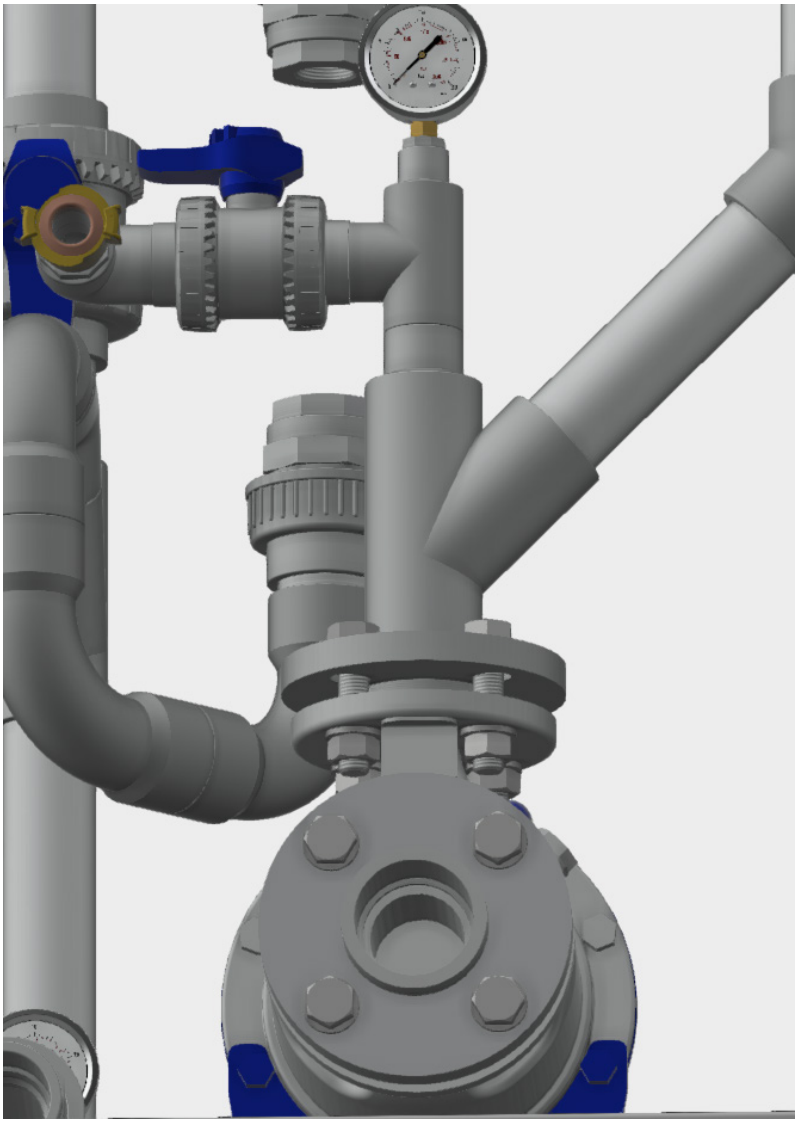
STEP 6

Prime the Pump

- Fill the pump and piping with water until all air is completely vented.
- Confirm that the pump and suction line are fully filled with water.
- Only start the pump once it is completely primed.

CAUTION **Dry Running Hazard**

Do not start the pump without water. Running the pump dry can cause severe damage to seals and internal components.



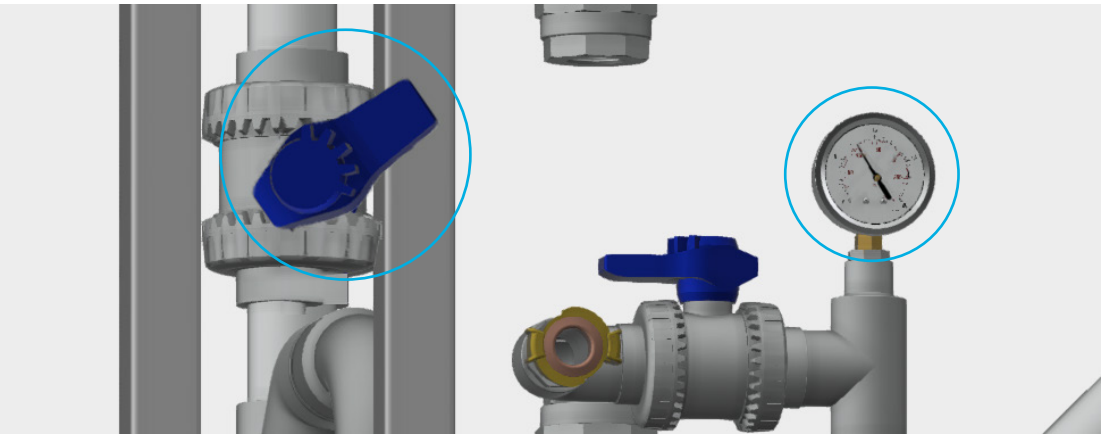
STEP 7

Venturi Adjustment

• Disconnect the blue pipe from the check valve on the venturi.
• Close the ball valve until suction occurs on the venturi.
• Adjust the pressure gauge to **1.5 bar**.
• Reconnect the pipe to the check valve of the venturi.

NOTE

The ball valve must remain half-open at all times to achieve a counter pressure of 1.5 bar. **The ball valve must not be completely closed.**



STEP 8

Set Concentrator and Oxygen Flow

• Turn the oxygen concentrator on to automatic or manual mode.
• Set the flowmeter to 5 L/min.

4.3.2 Nanobubble Generator 20 m³/h – Type B 60hZ

Before starting installation verify that all components match the 20 m³/h Type B installation kit:

STEP 1

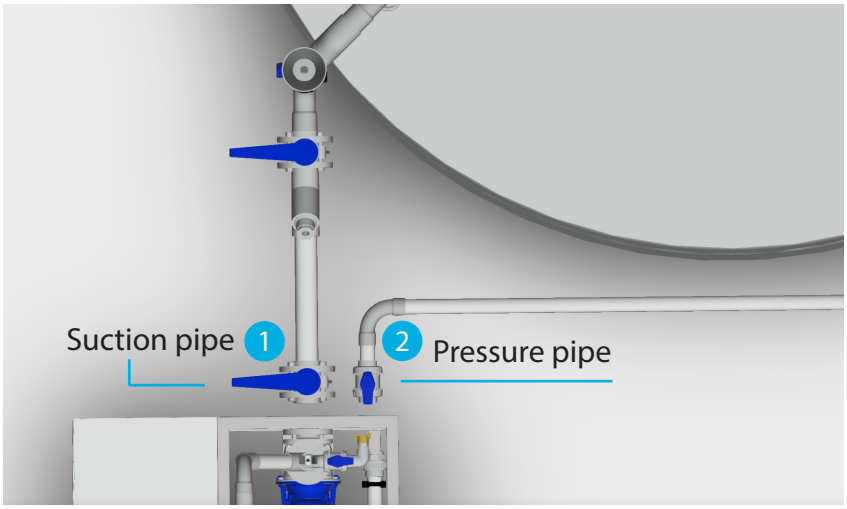
Position the Unit

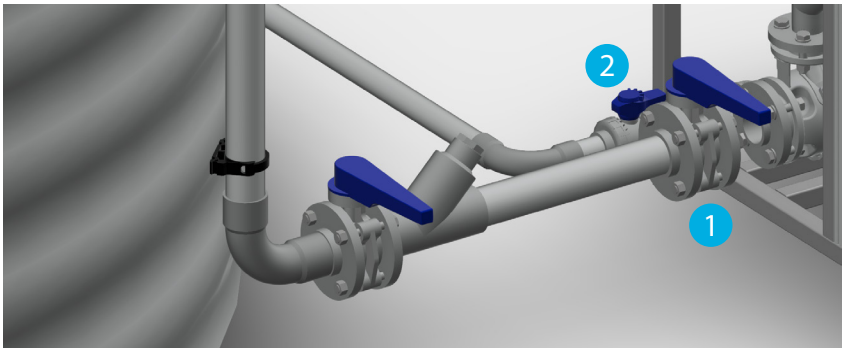
• Place the Nanobubble system as close as possible to the water storage tank on a flat, stable, dry surface.

STEP 2

Install Valves on Pump Inlet and Outlet

• Butterfly valve 1 on the suction pipe (pump inlet).
• Ball valve 2 on the pressure pipe (pump outlet).



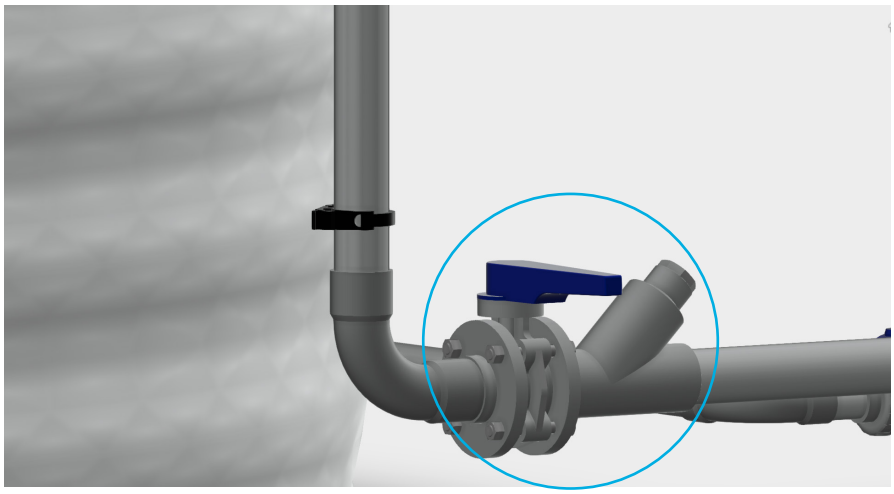


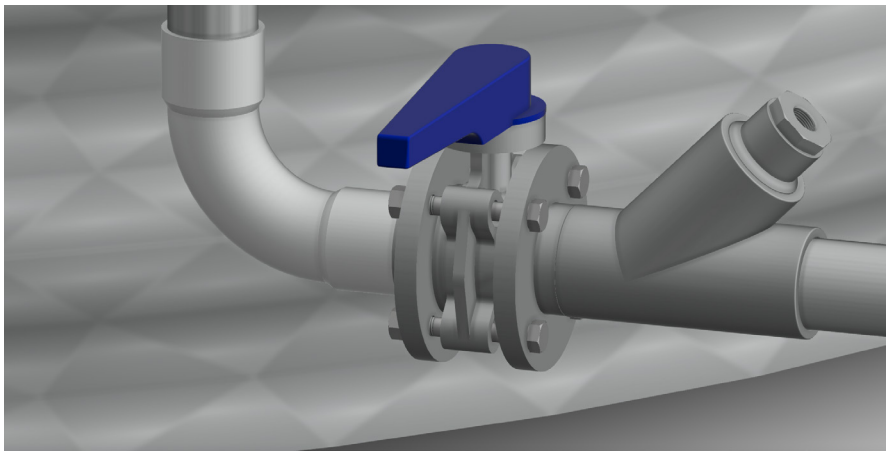
STEP 3 (OPTIONAL)

Install DO Sensor Connection

If machine is equipped with a dissolved oxygen (DO) sensor:

- Install the 45° T-piece on the pressure line.
- Install the butterfly valve directly after the 45° T-piece.





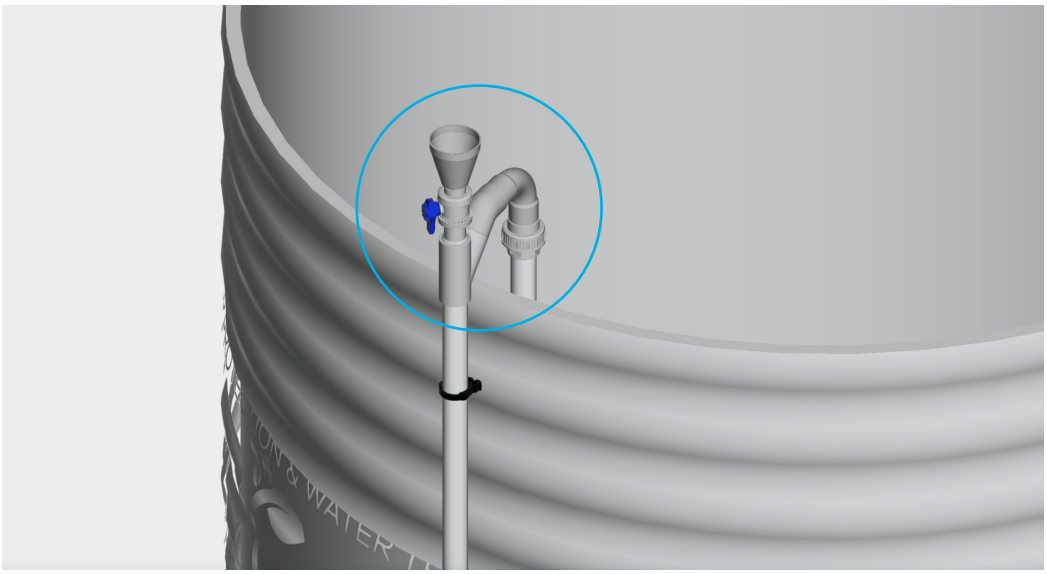
NOTE

Protect the sensor probe from impact, water exposure, and scratches during installation.

STEP 4

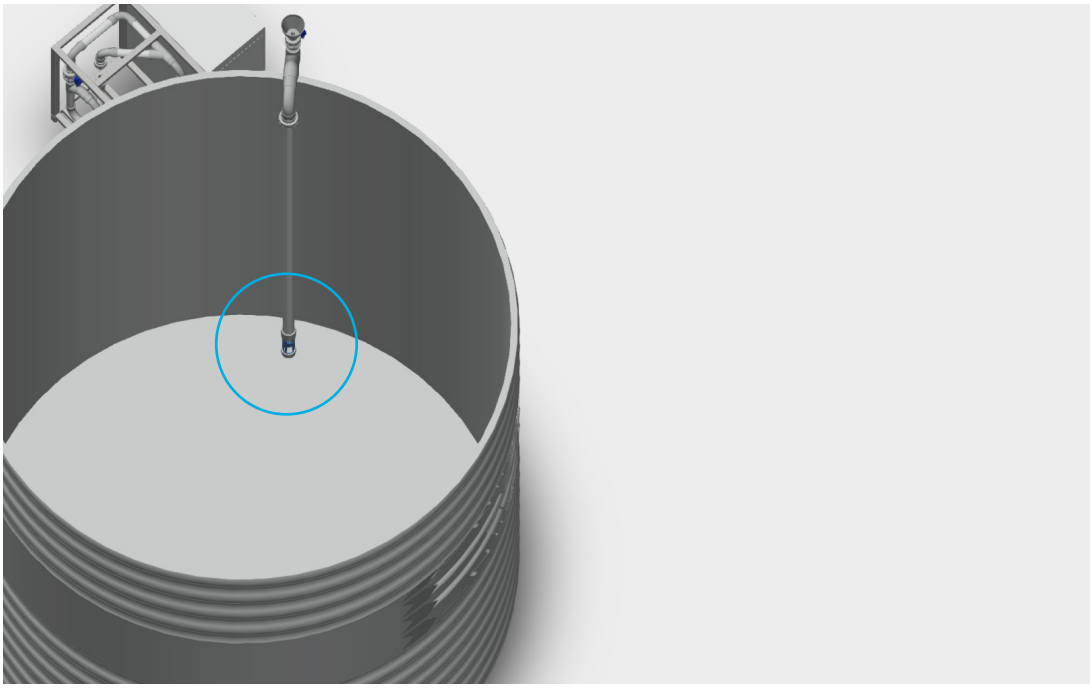
Install the Suction Inlet Line

• Place the 90° T-piece with valve (32mm), funnel, elbow, and clamp coupling 90° over the edge of the silo.
• Install the foot valve approximately 40 cm above the bottom of the silo.



NOTE

Always ensure that the suction pipe is below the minimum level of the silo. This prevents air intake and protects the pump from dry running.

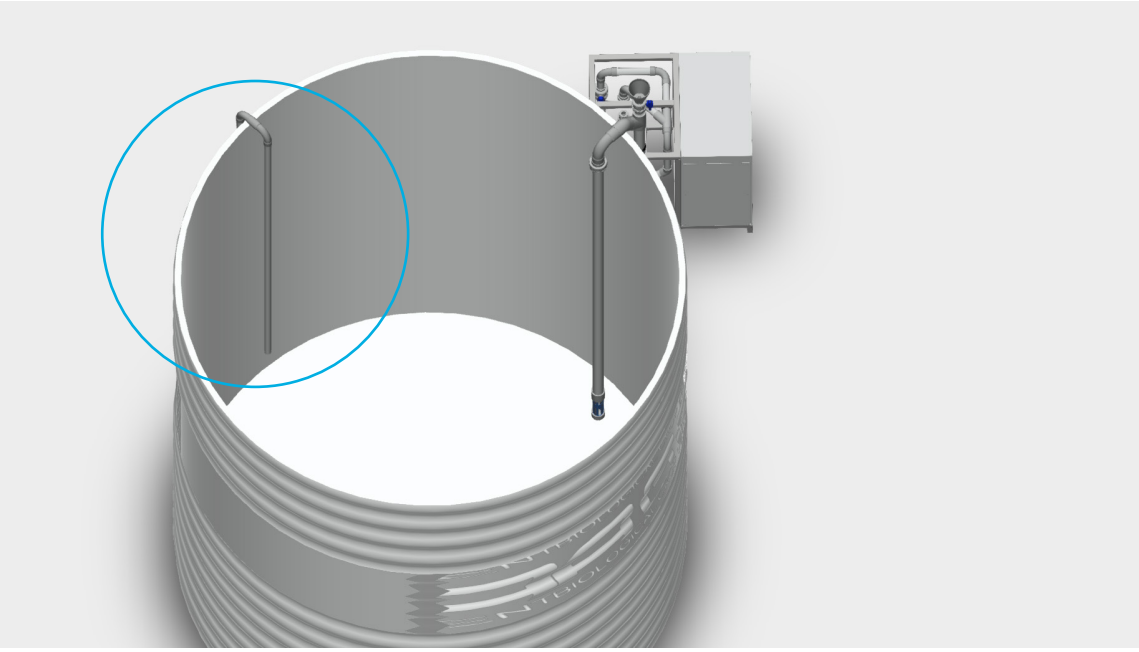


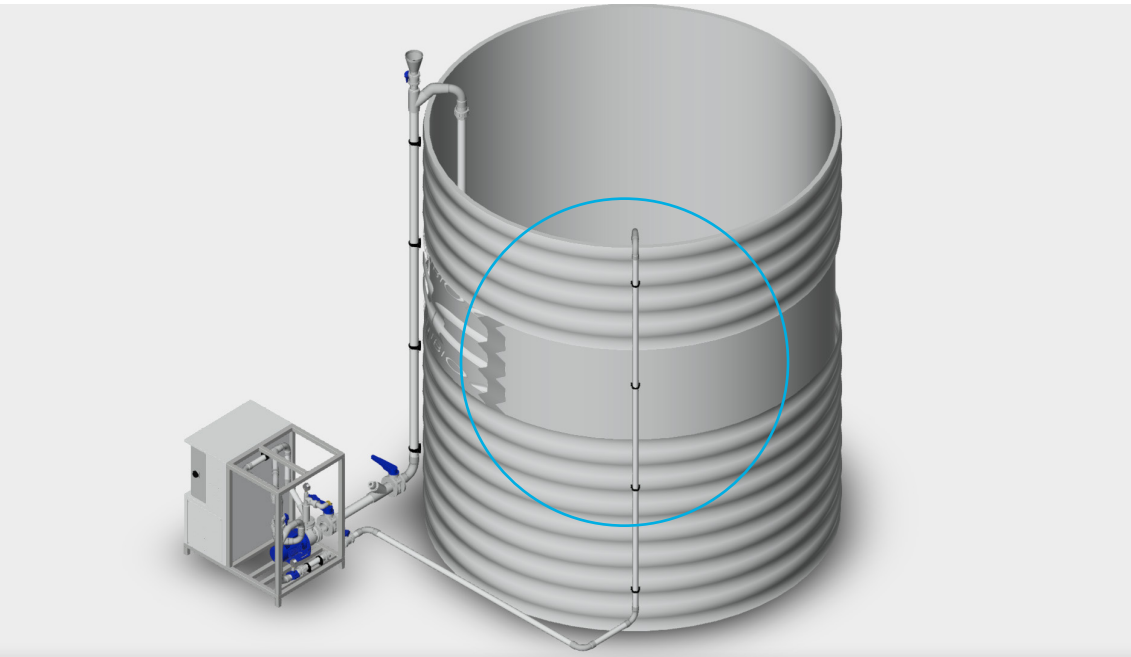
STEP 5

Install the Pressure Outlet Line

Install the pressure pipe the same way as the suction pipe, but:

- **Do not use clamp couplings inside the water column.**
- Keep the pressure pipe **4-5 m away** from the suction pipe to optimize circulation.





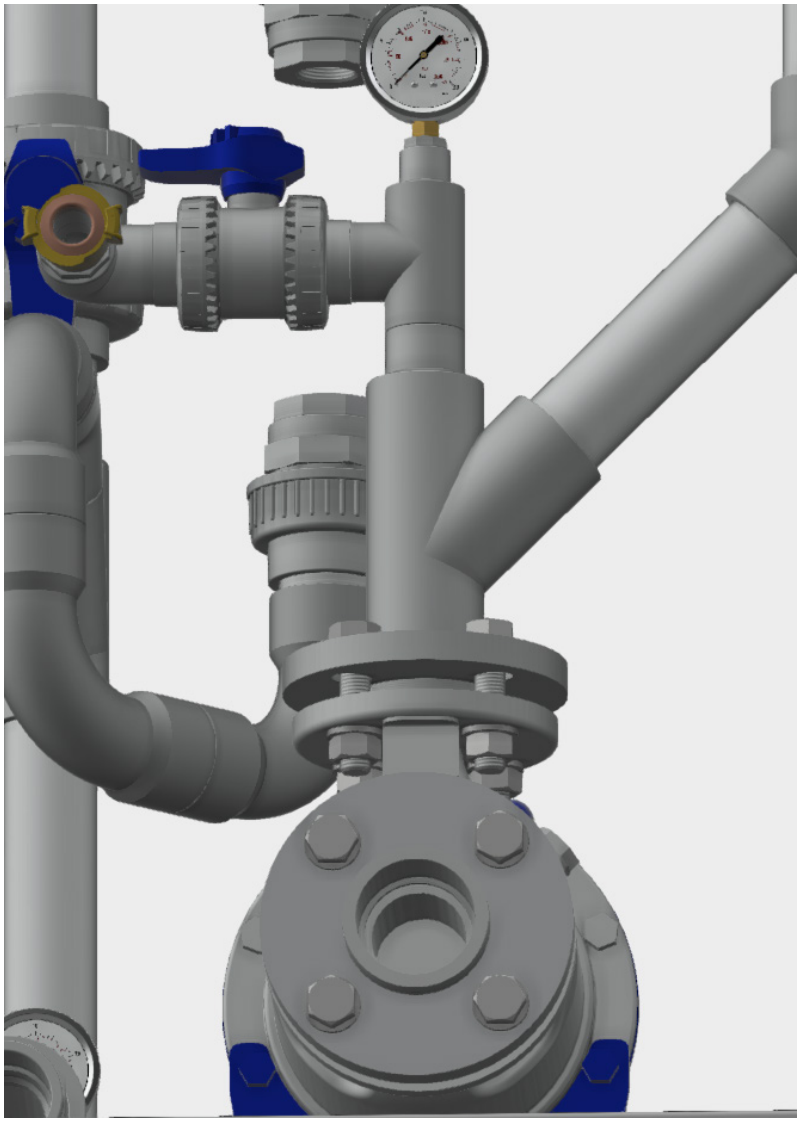
STEP 6

Prime the Pump

• Fill the pump and piping with water until all air is completely vented.
• Confirm that the pump and suction line are fully filled with water.
• Only start the pump once it is completely primed.

⚠ CAUTION **Dry Running Hazard**

Do not start the pump without water. Running the pump dry can cause severe damage to seals and internal components.



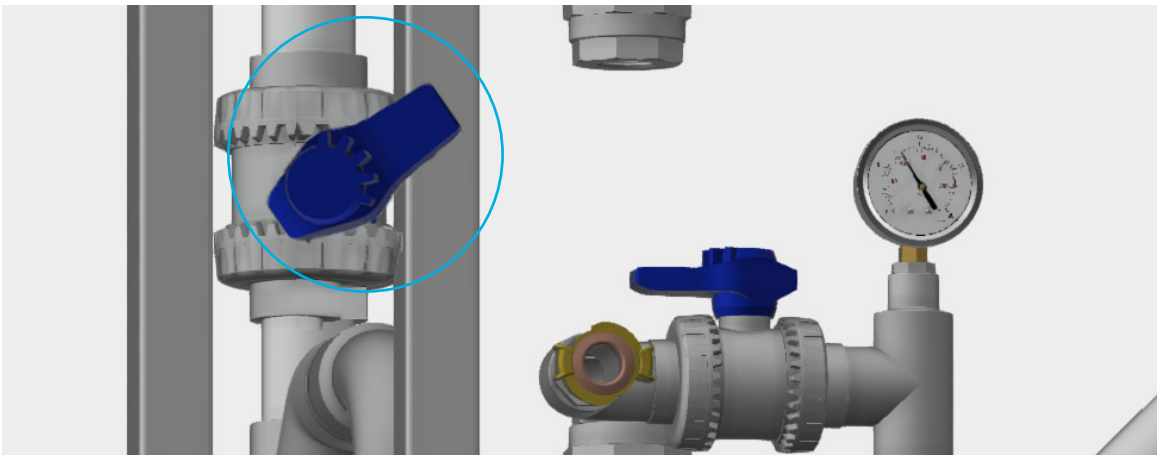
STEP 7

Venturi Adjustment

• Disconnect the blue pipe from the check valve on the venturi.
• Close the ball valve until suction occurs on the venturi.
• Adjust the pressure gauge to **1.5 bar**.
• Reconnect the pipe to the check valve of the venturi.

NOTE

The ball valve must remain half-open at all times to achieve a counter pressure of 1.5 bar.
The ball valve must not be completely closed.



STEP 8

Set Concentrator and Oxygen Flow

• Turn the oxygen concentrator on to automatic or manual mode.
• Set the flowmeter to **10 L/min**.

4.3.3 Nanobubble Generator 25 m³/h – Type A 50 hZ

Before starting installation verify that all components match the 25 m³/h Type A installation kit:

STEP 1

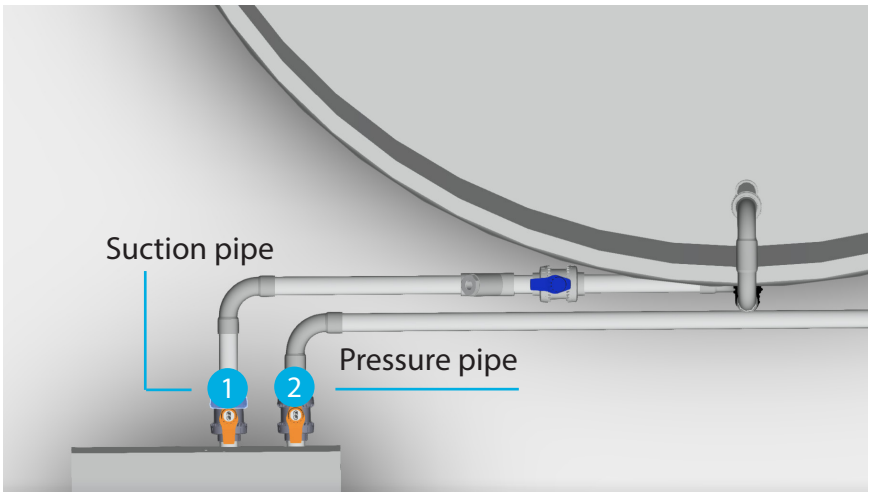
Position the Unit

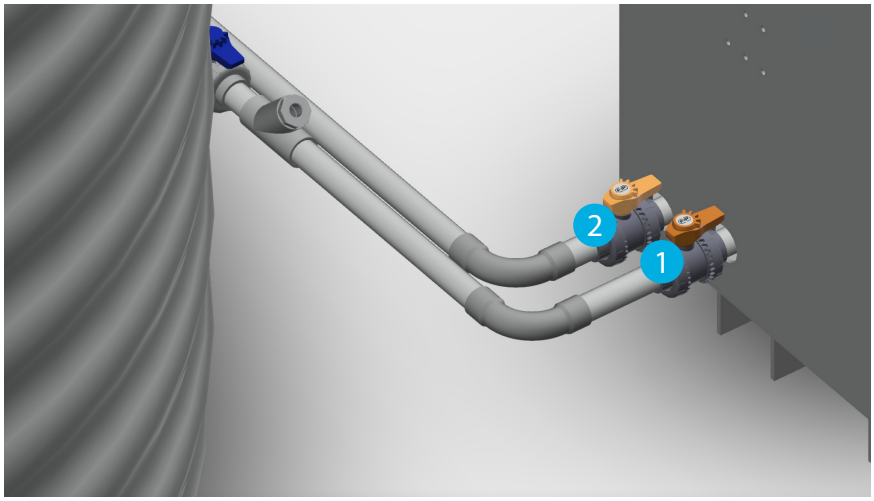
• Place the Nanobubble system as close as possible to the water storage tank on a flat, stable, dry surface.

STEP 2

Install Valves on Pump Inlet and Outlet

- Ball valve 1 on the suction pipe (pump inlet).
- Ball valve 2 on the pressure pipe (pump outlet).



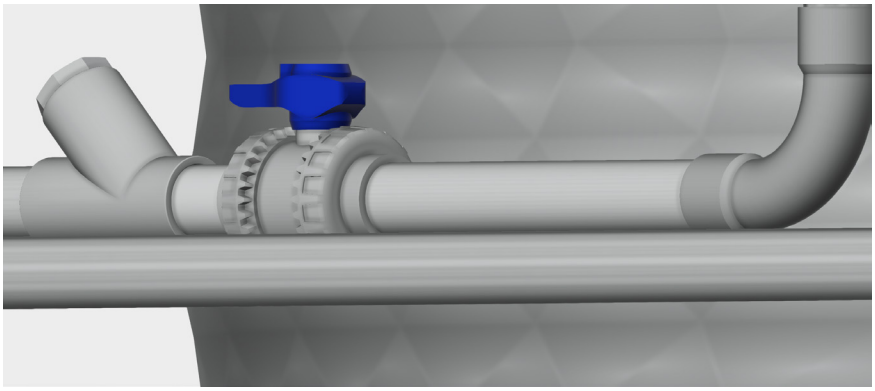


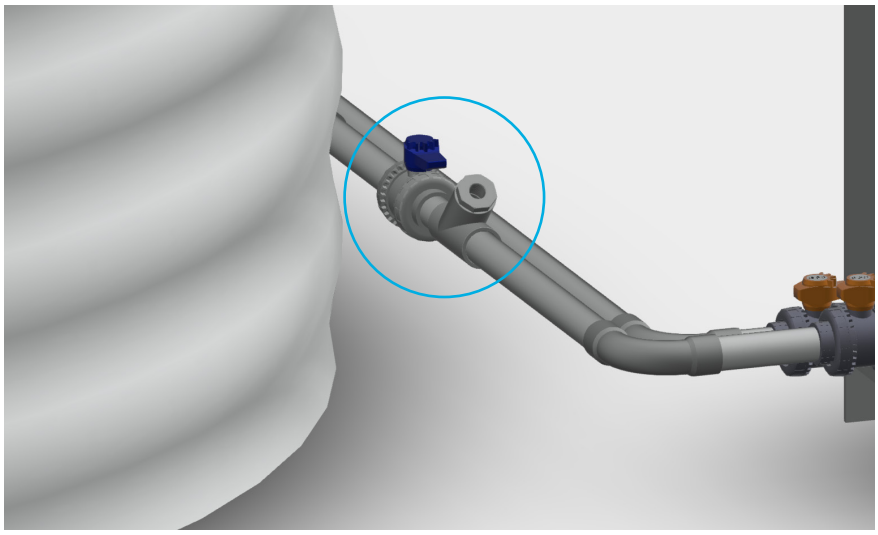
STEP 3 (OPTIONAL)

Install DO Sensor Connection

If machine is equipped with a dissolved oxygen (DO) sensor:

- Install the 45° T-piece on the pressure line.
- Install the ball valve directly after the 45° T-piece.





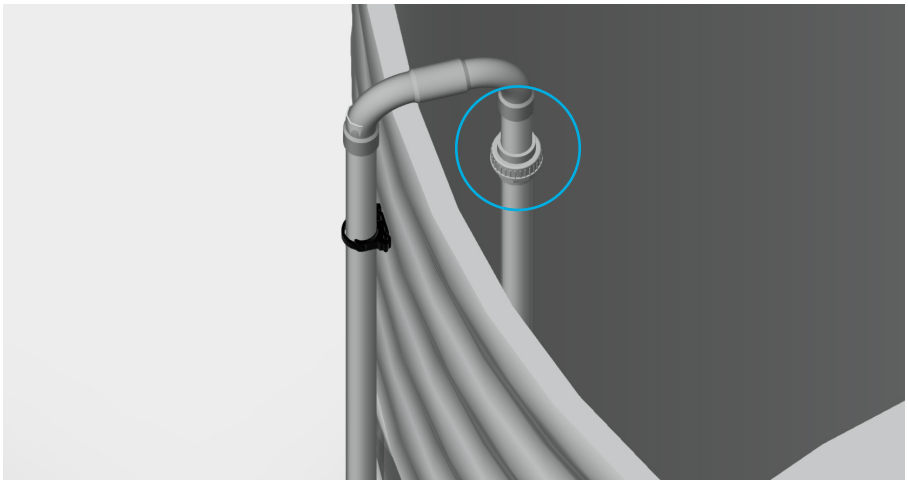
NOTE

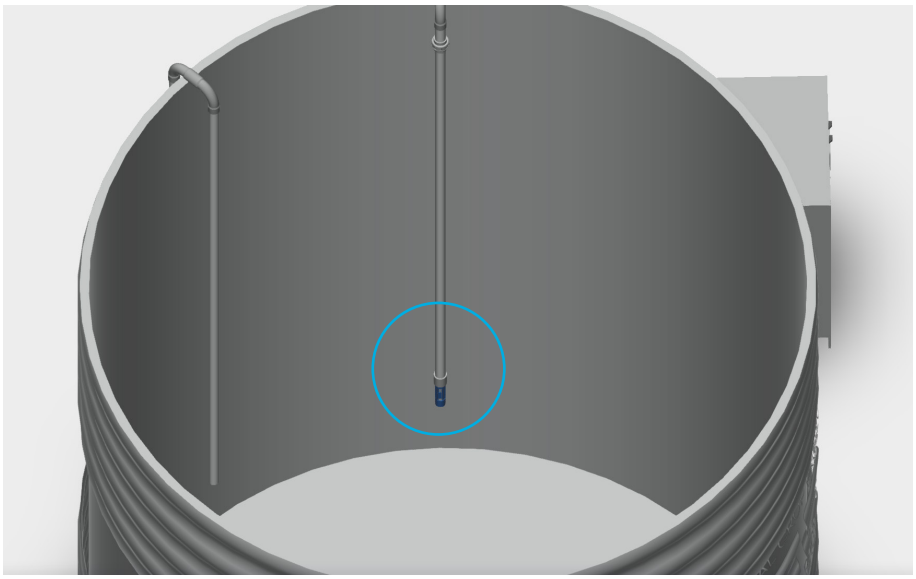
Protect the sensor probe from impact, water exposure, and scratches during installation.

STEP 4

Install the Suction Inlet Line

• Place two 90° PVC elbows with a clamp coupling on the top edge of the silo.
• Install the foot valve approximately 40 cm above the bottom of the silo.





NOTE

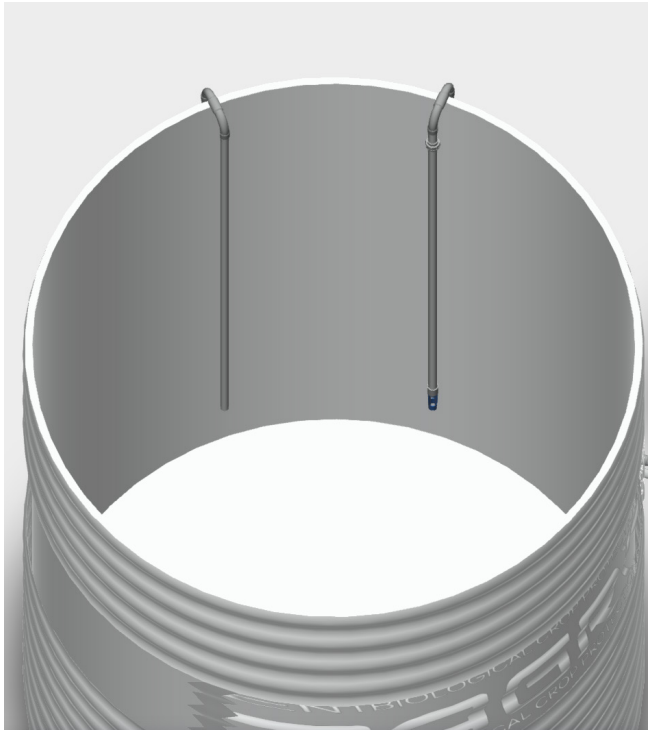
Always ensure that the suction pipe is below the minimum level of the silo.
This prevents air intake and protects the pump from dry running.

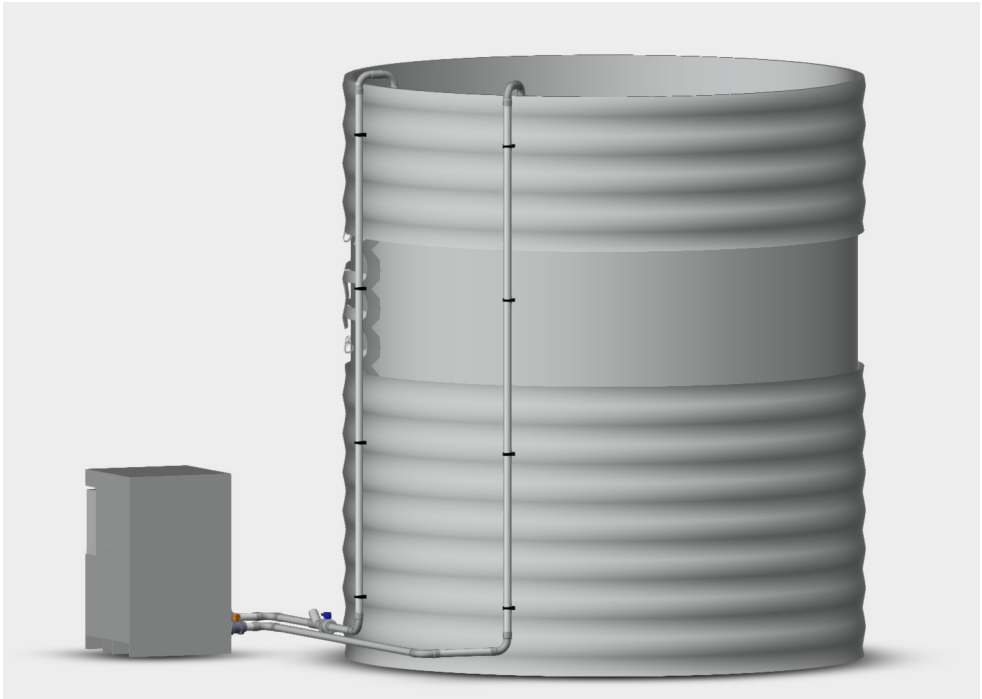
STEP 5

Install the Pressure Outlet Line

Install the pressure pipe the same way as the suction pipe, but:

- **Do not use clamp couplings inside the water column.**
- Keep the pressure pipe **4-5 m away** from the suction pipe to optimize circulation.





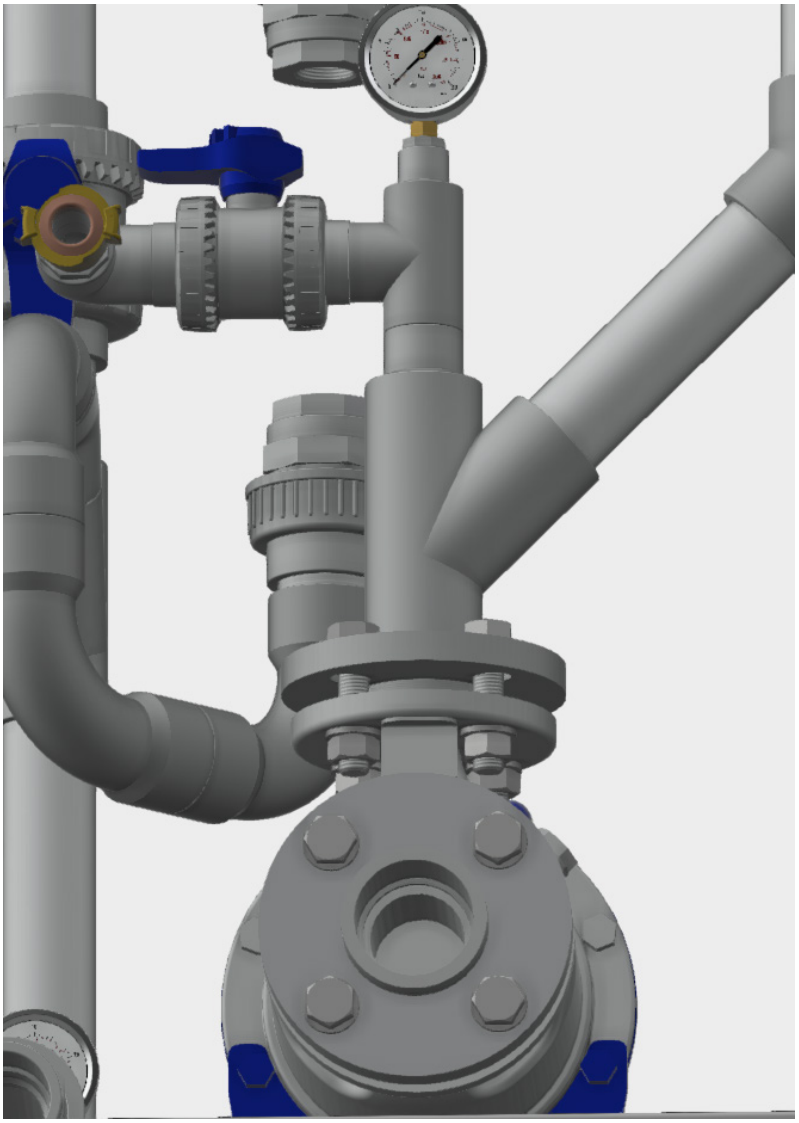
STEP 6

Prime the Pump

- Fill the pump and piping with water until all air is completely vented.
- Confirm that the pump and suction line are fully filled with water.
- Only start the pump once it is completely primed.

⚠ CAUTION **Dry Running Hazard**

Do not start the pump without water. Running the pump dry can cause severe damage to seals and internal components.



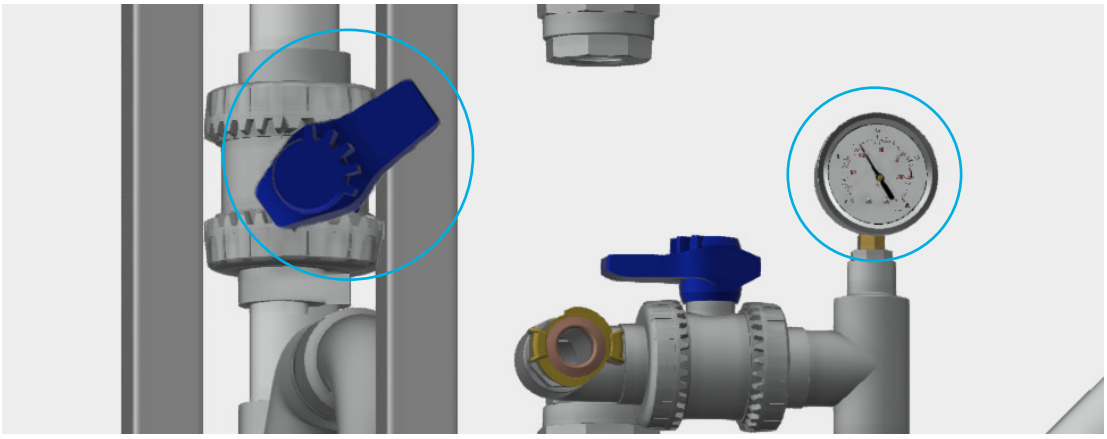
STEP 7

Venturi Adjustment

• Disconnect the blue pipe from the check valve on the venturi.
• Close the ball valve until suction occurs on the venturi.
• Adjust the pressure gauge to **1.5 bar**.
• Reconnect the pipe to the check valve of the venturi.

NOTE

The ball valve must remain half-open at all times to achieve a counter pressure of 1.5 bar. **The ball valve must not be completely closed.**



STEP 8

Set Concentrator and Oxygen Flow

• Turn the oxygen concentrator on to automatic or manual mode.
• Set the flowmeter to 10 L/min.

4.3.4 Nanobubble Generator 25 m³/h – Type B 60 hZ

Before starting installation verify that all components match the 25 m³/h Type B installation kit:

STEP 1

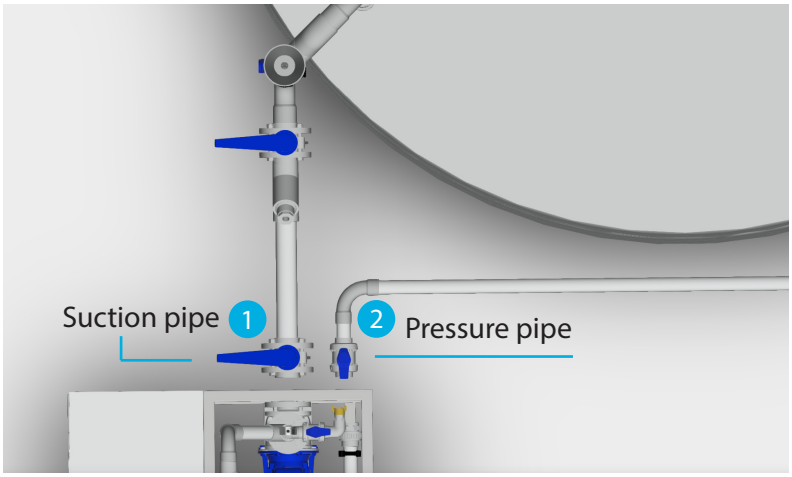
Position the Unit

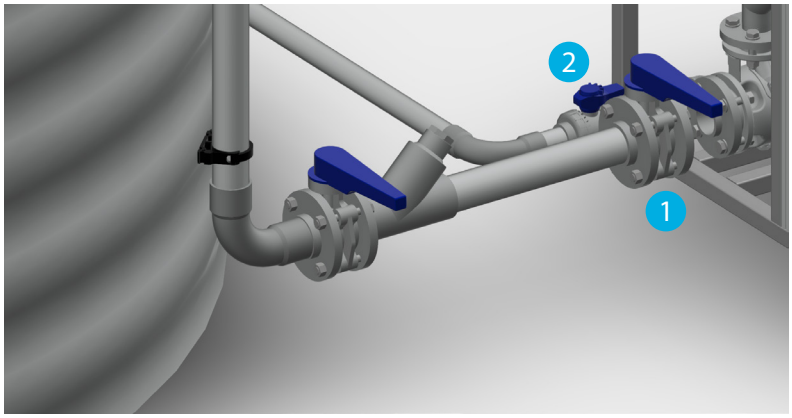
• Place the Nanobubble system as close as possible to the water storage tank on a flat, stable, dry surface.

STEP 2

Install Valves on Pump Inlet and Outlet

• Butterfly valve 1 on the suction pipe (pump inlet).
• Ball valve 2 on the pressure pipe (pump outlet).



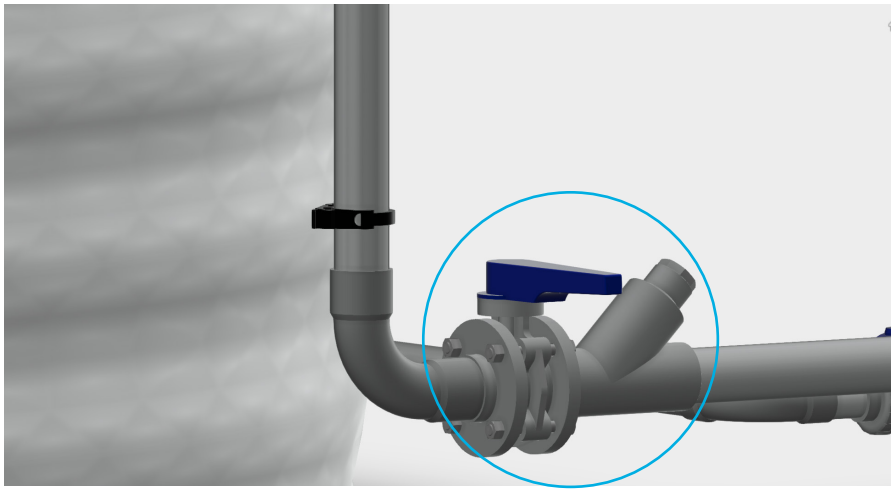


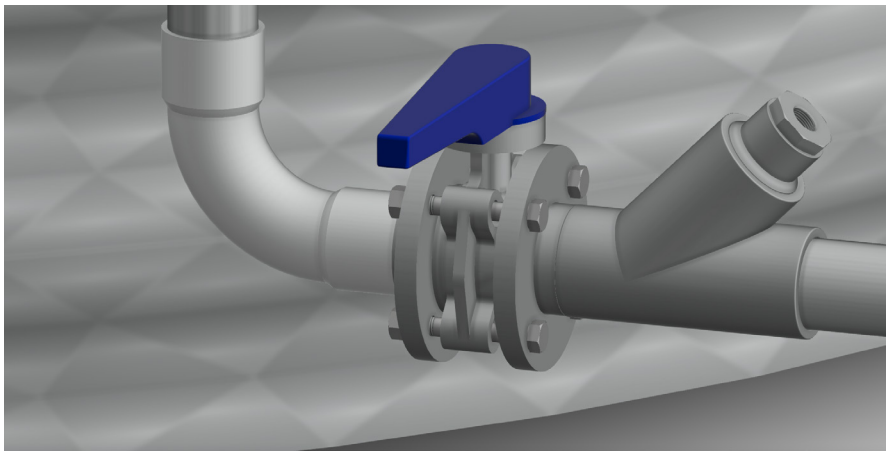
STEP 3 (OPTIONAL)

Install DO Sensor Connection

If machine is equipped with a dissolved oxygen (DO) sensor:

- Install the 45° T-piece on the pressure line.
- Install the butterfly valve directly after the 45° T-piece.





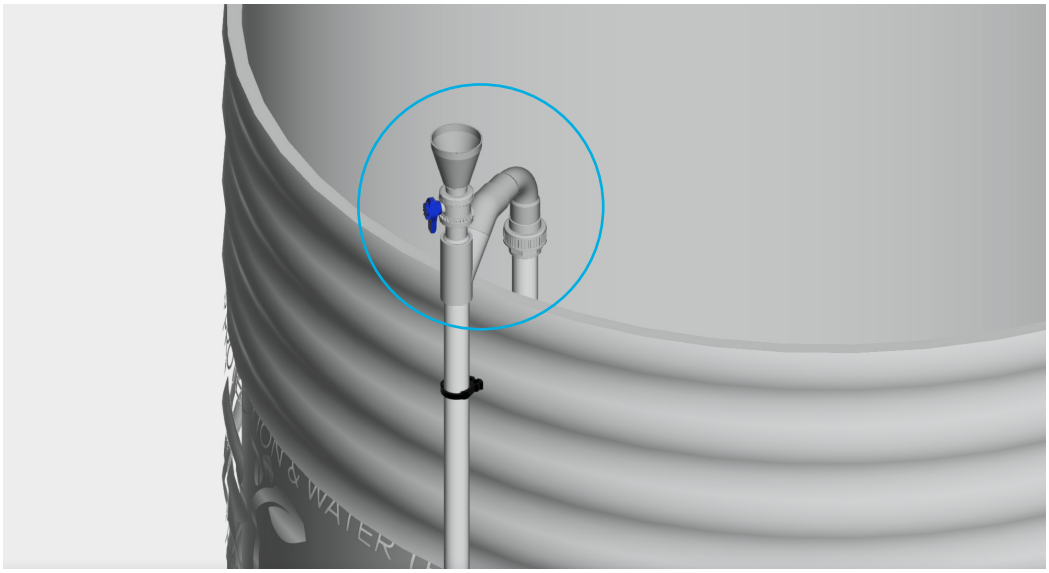
NOTE

Protect the sensor probe from impact, water exposure, and scratches during installation.

STEP 4

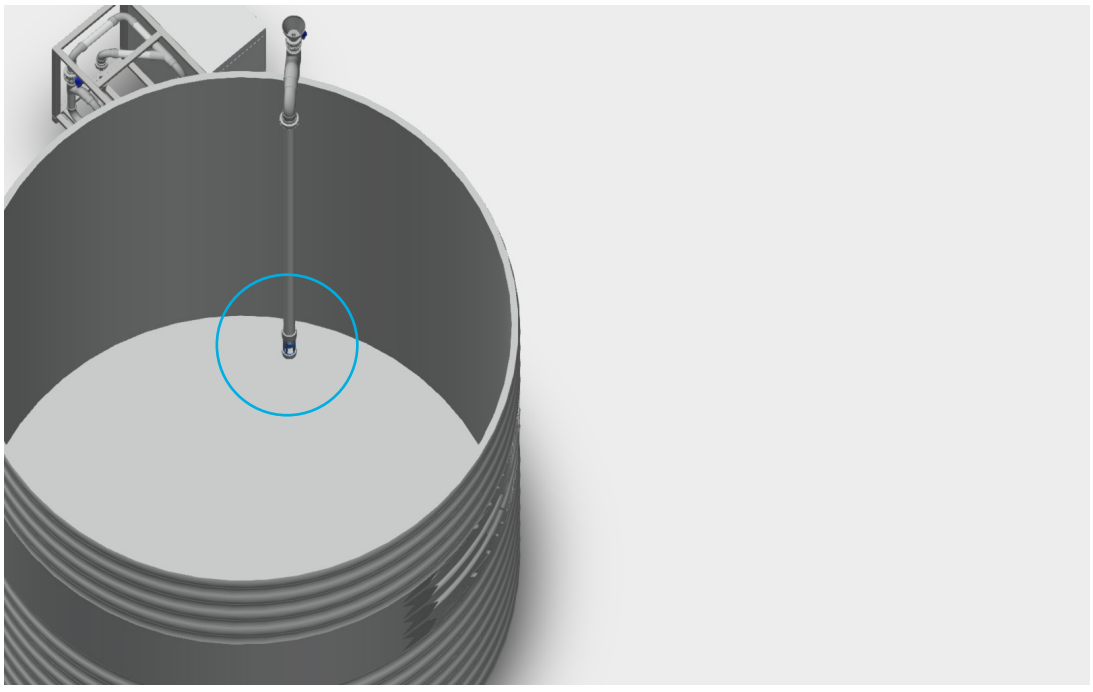
Install the Suction Inlet Line

• Place the 90° T-piece with valve (32mm), funnel, elbow, and clamp coupling 90° over the edge of the silo.
• Install the foot valve approximately 40 cm above the bottom of the silo.



NOTE

Always ensure that the suction pipe is below the minimum level of the silo. This prevents air intake and protects the pump from dry running.

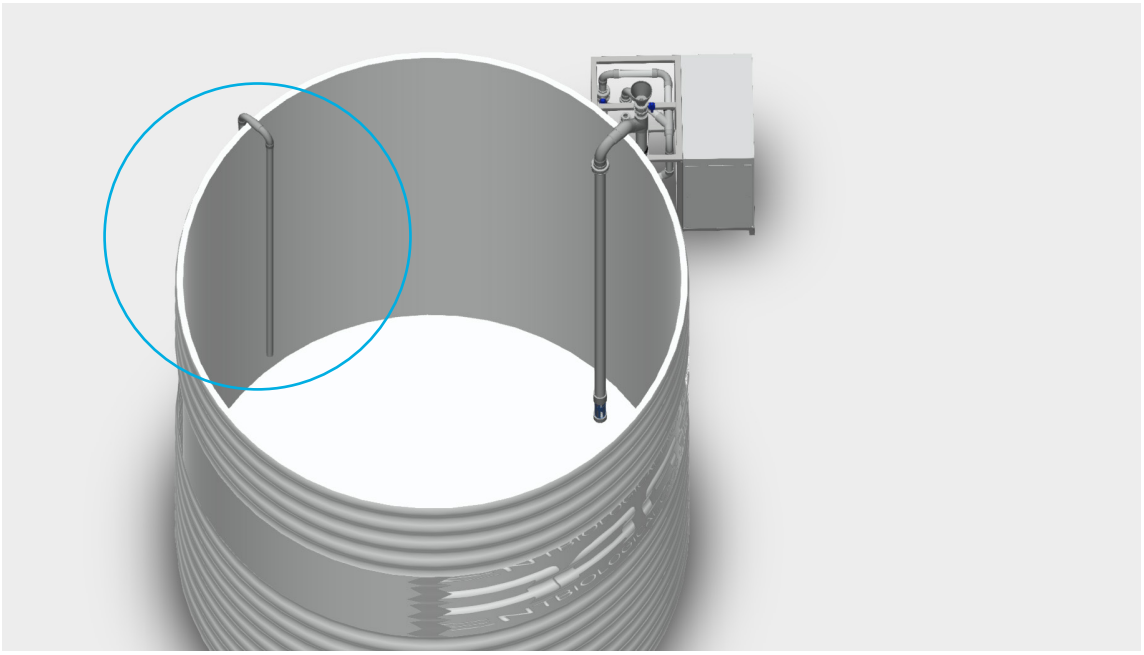


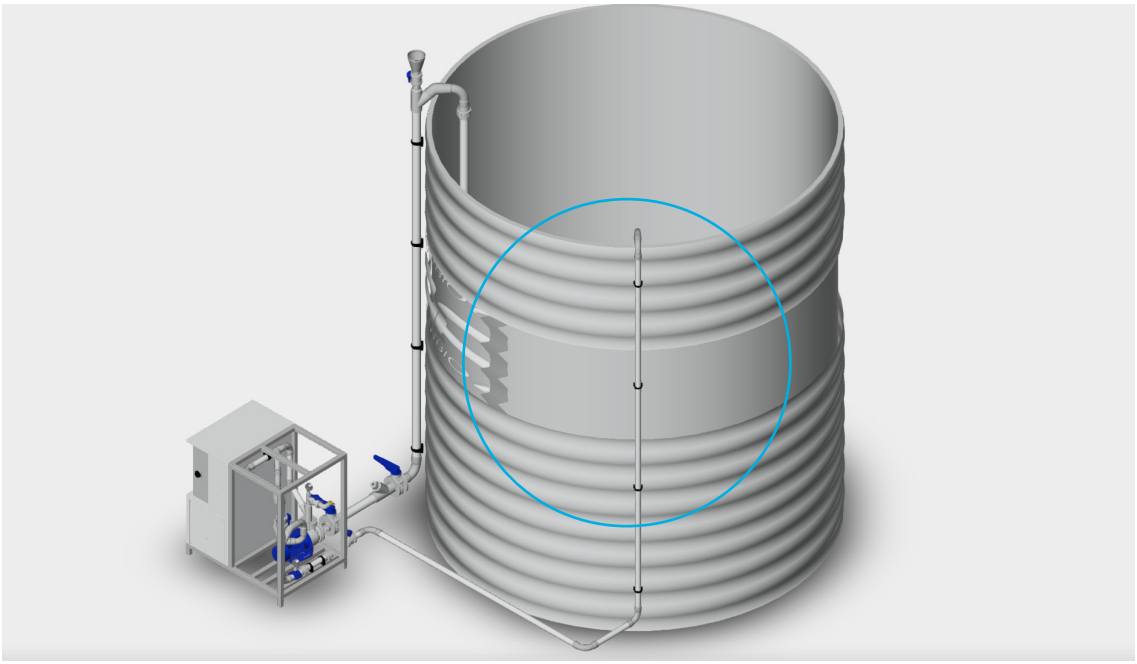
STEP 5

Install the Pressure Outlet Line

Install the pressure pipe the same way as the suction pipe, but:

- **Do not use clamp couplings inside the water column.**
- Keep the pressure pipe **4-5 m away** from the suction pipe to optimize circulation.





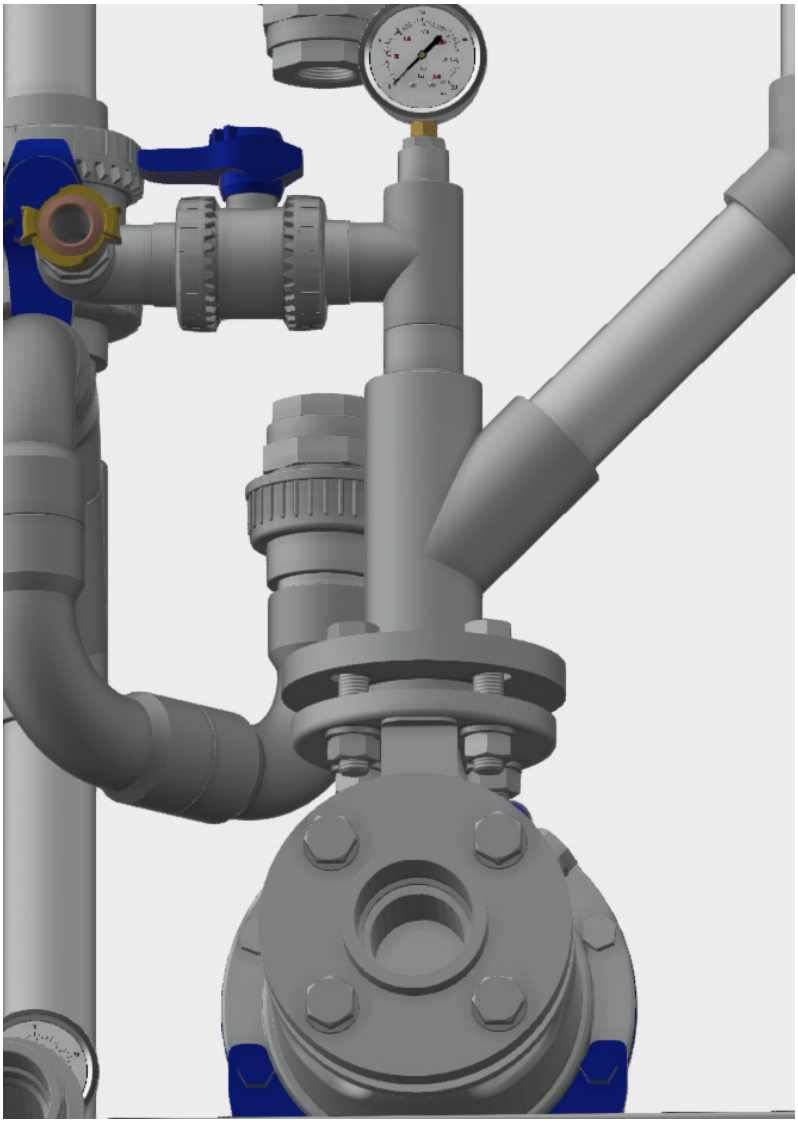
STEP 6

Prime the Pump

- Fill the pump and piping with water until all air is completely vented.
- Confirm that the pump and suction line are fully filled with water.
- Only start the pump once it is completely primed.

CAUTION **Dry Running Hazard**

Do not start the pump without water. Running the pump dry can cause severe damage to seals and internal components.



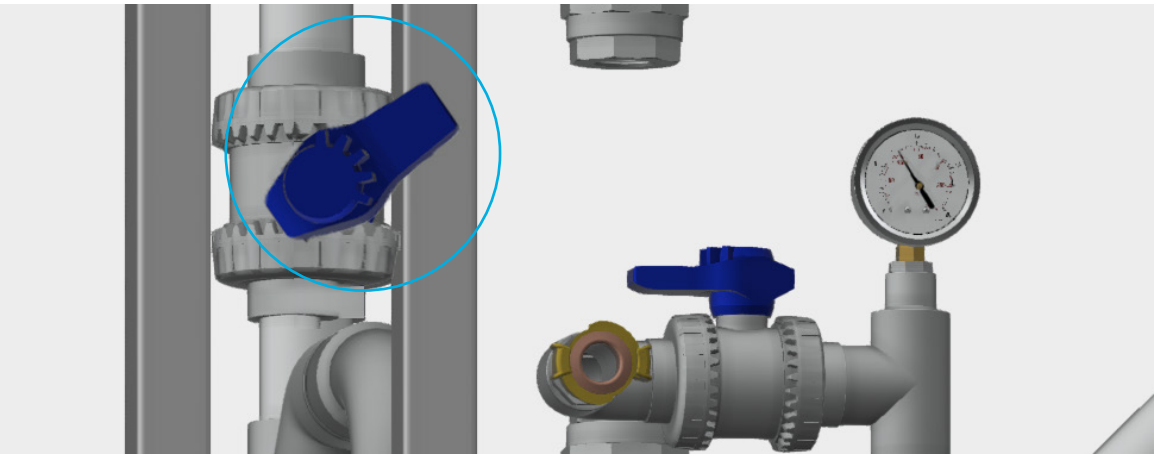
STEP 7

Venturi Adjustment

• Disconnect the blue pipe from the check valve on the venturi.
• Close the ball valve until suction occurs on the venturi.
• Adjust the pressure gauge to **1.5 bar**.
• Reconnect the pipe to the check valve of the venturi.

NOTE

The ball valve must remain half-open at all times to achieve a counter pressure of 1.5 bar.
The ball valve must not be completely closed.



STEP 8

Set Concentrator and Oxygen Flow

• Turn the oxygen concentrator on to automatic or manual mode.
• Set the flowmeter to **10 L/min**.

4.3.5 Nanobubble Generator 40 m³/h

Before starting installation verify that all components match the 40 m³/h Type B installation kit:

STEP 1

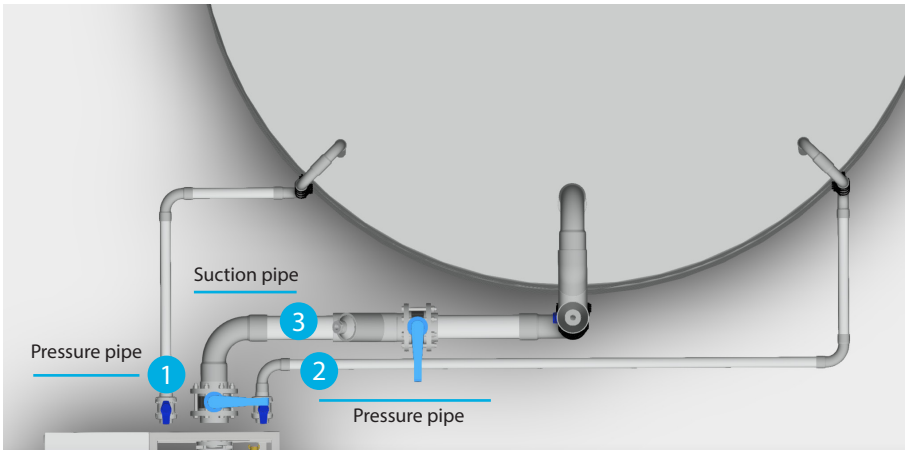
Position the Unit

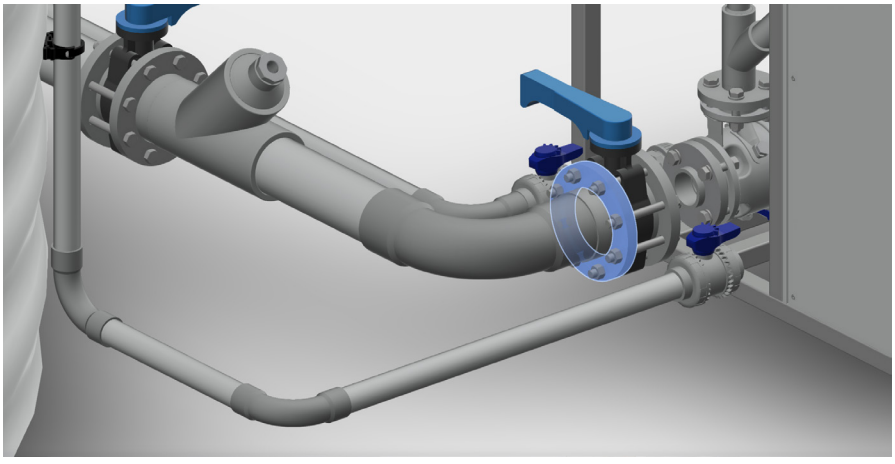
• Place the Nanobubble system as close as possible to the water storage tank on a flat, stable, dry surface.

STEP 2

Install Valves on Pump Inlet and Outlet

• Install ball valves no. 1 and 2 on the discharge pipe of the nanobubble.
• Install the butterfly valve on the inlet of the pump.



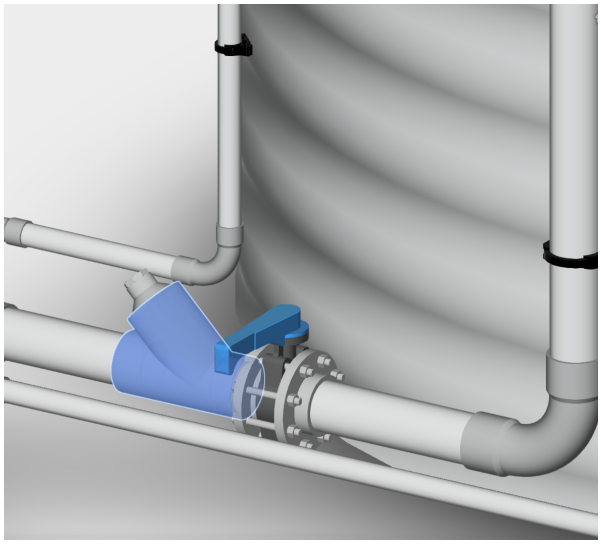


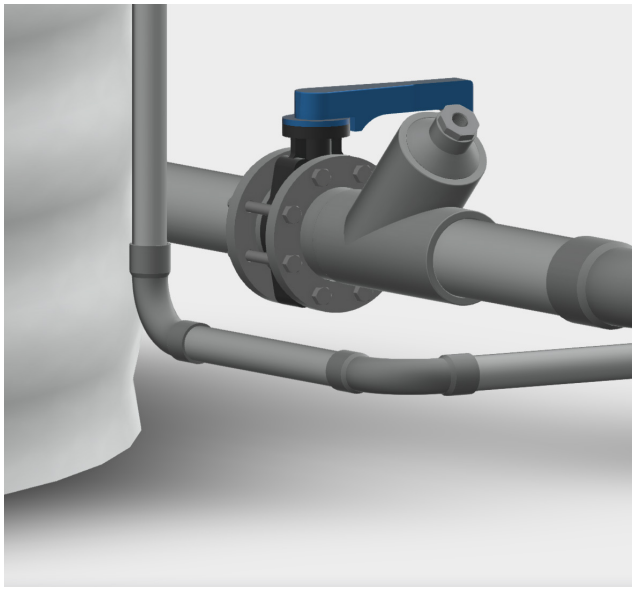
STEP 3 (OPTIONAL)

Install DO Sensor Connection

If machine is equipped with a dissolved oxygen (DO) sensor:

- Install the 45° T-piece on the pressure line.
- Install the butterfly valve directly after the 45° T-piece.





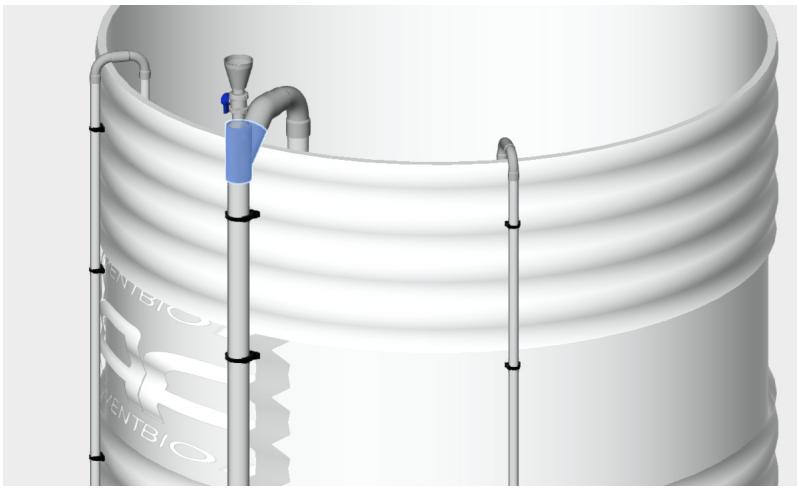
NOTE

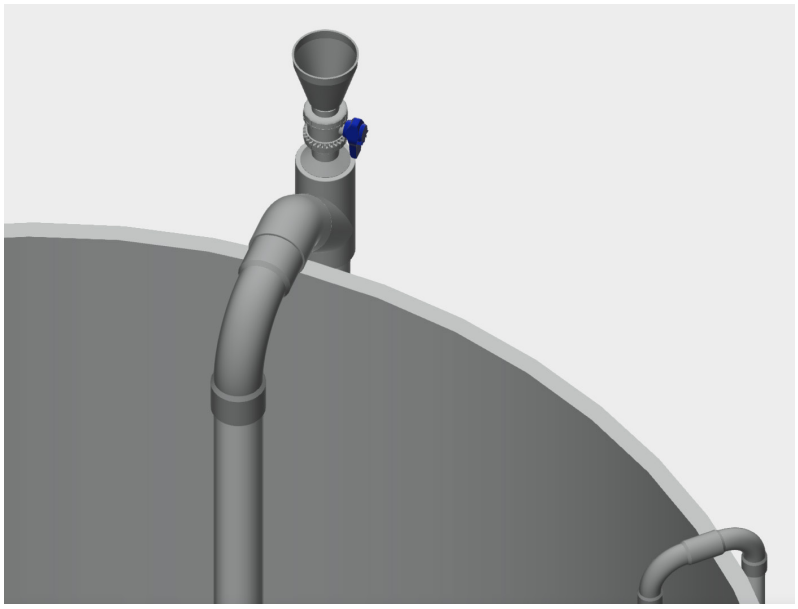
Protect the sensor probe from impact, water exposure, and scratches during installation.

STEP 4

Install Top Assembly for the Suction Inlet

• Place the 90° T-piece with valve (32mm), funnel, elbow, and clamp coupling 90° over the edge of the silo.

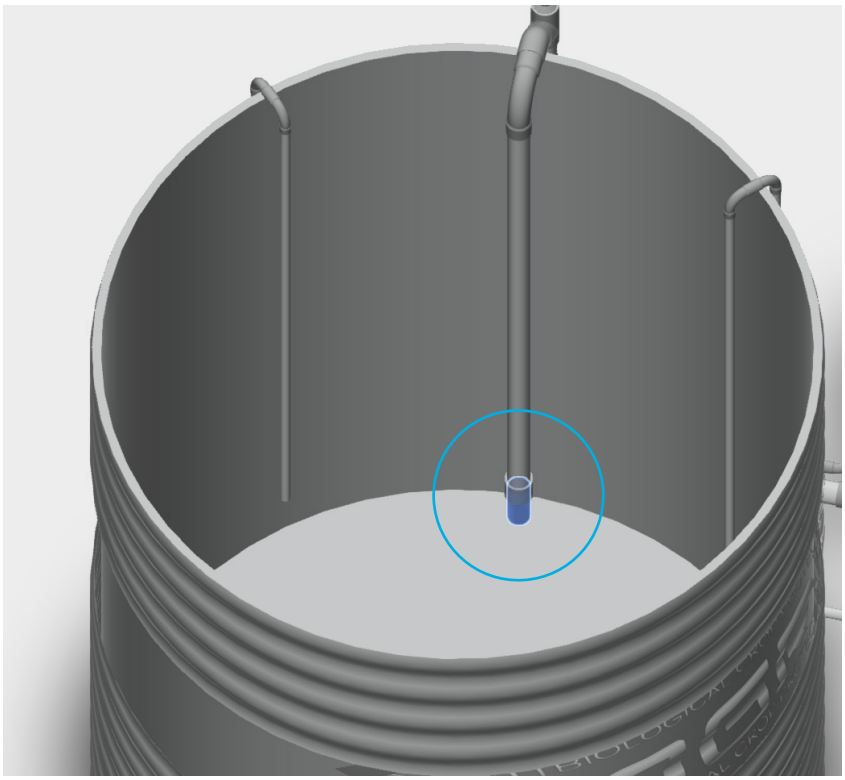




STEP 5

Install the Foot Valve for the Suction Inlet

• Install the foot valve approximately 40 cm above the bottom of the silo.



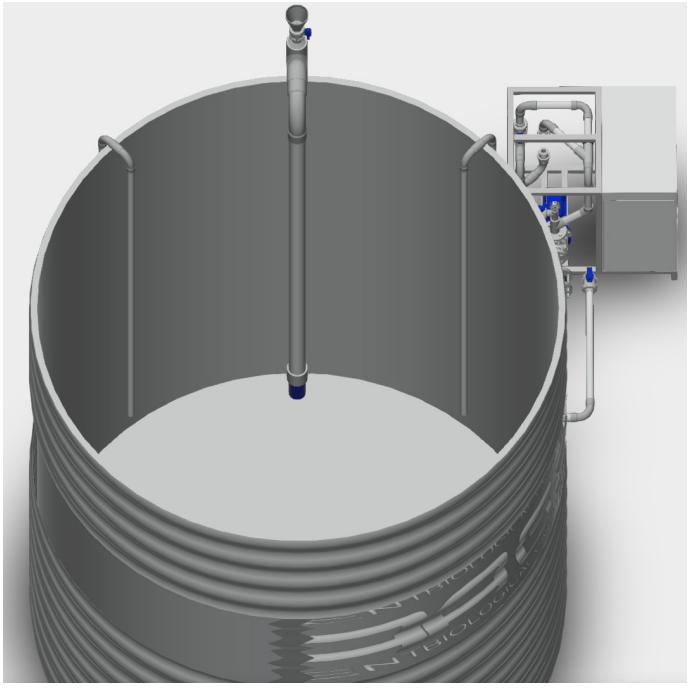
NOTE

Always ensure that the suction pipe is below the minimum level of the silo. This prevents air intake and protects the pump from dry running.

STEP 6

Install the Pressure Outlet Line

• Place the pressure pipe approximately 40 cm from the bottom **without a clamp coupling**.
• **Do not use clamp couplings inside the water column.**
• Keep the pressure pipe **4-5 m away** from the suction pipe to optimize circulation.



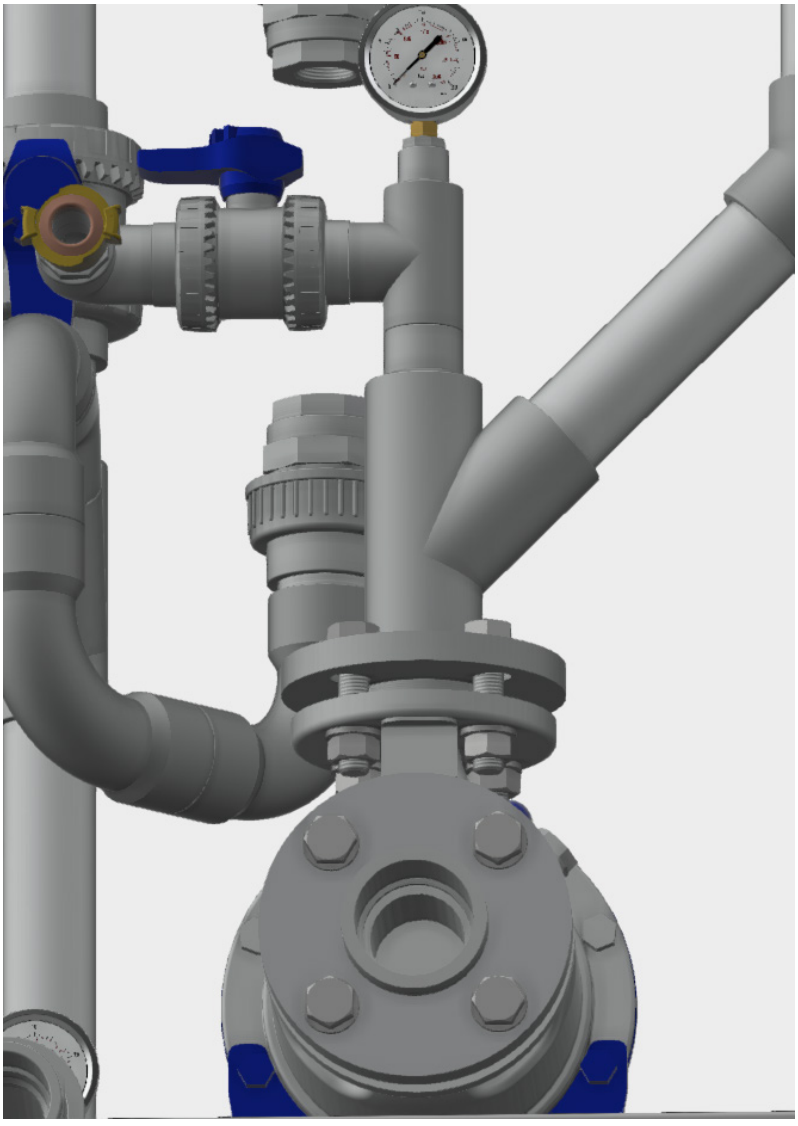
STEP 7

Prime the Pump

- Fill the pump and piping with water until all air is completely vented.
- Confirm that the pump and suction line are fully filled with water.
- Only start the pump once it is completely primed.

CAUTION **Dry Running Hazard**

Do not start the pump without water. Running the pump dry can cause severe damage to seals and internal components.



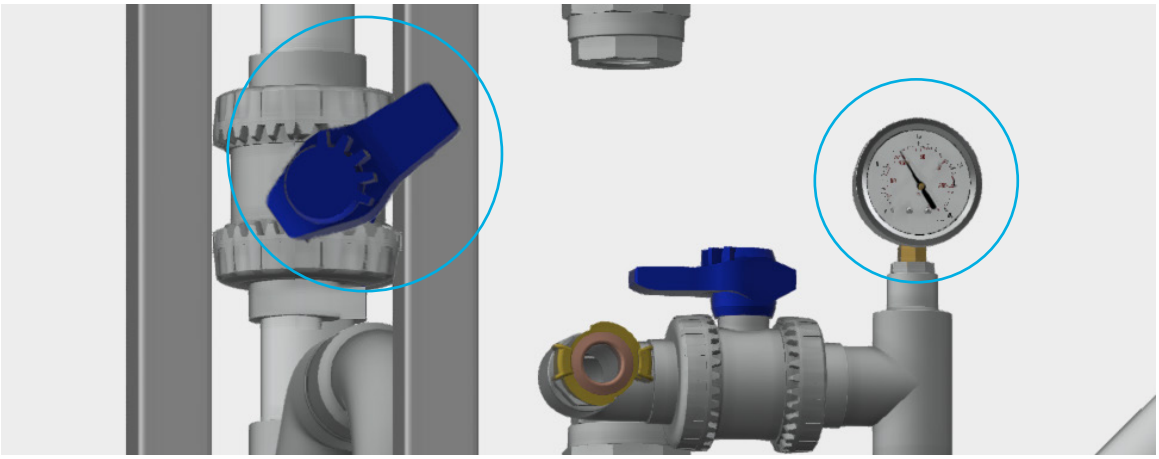
STEP 8

Venturi Adjustment

• Disconnect the blue pipe from the check valve on the venturi.
• Close the ball valve until suction occurs on the venturi.
• Adjust the pressure gauge to **2.0 bar**.
• Reconnect the pipe to the check valve of the venturi.

NOTE

The ball valve must remain half-open at all times to achieve a counter pressure of 2.0 bar.
The ball valve must not be completely closed.



STEP 9

Set Concentrator and Oxygen Flow

• Turn the oxygen concentrator on to automatic or manual mode.
• Set the flowmeter to **5 and 10 L/min**.

4.3.6 Nanobubble Generator 60 m³/h

Before starting installation verify that all components match the 60 m³/h installation kit:

STEP 1

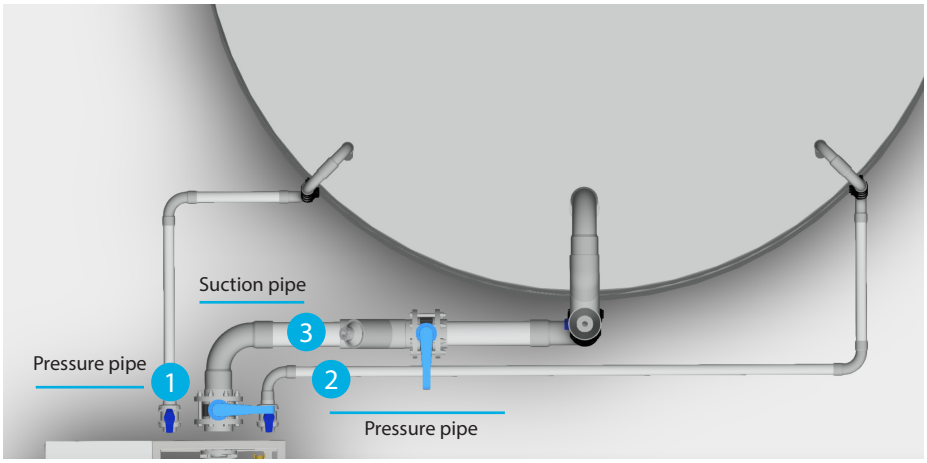
Position the Unit

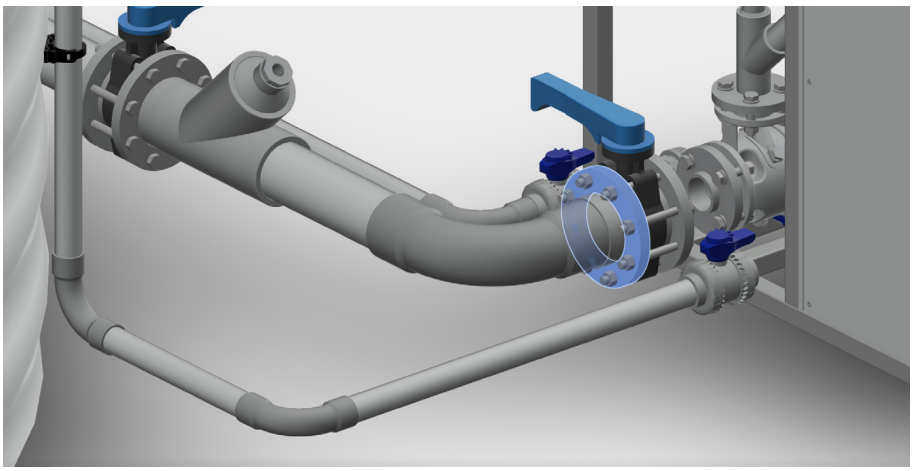
• Place the Nanobubble system as close as possible to the water storage tank on a flat, stable, dry surface.

STEP 2

Install Valves on Pump Inlet and Outlet

• Install ball valves no. 1 and 2 on the discharge pipe of the nanobubble.
• Install the butterfly valve on the inlet of the pump.



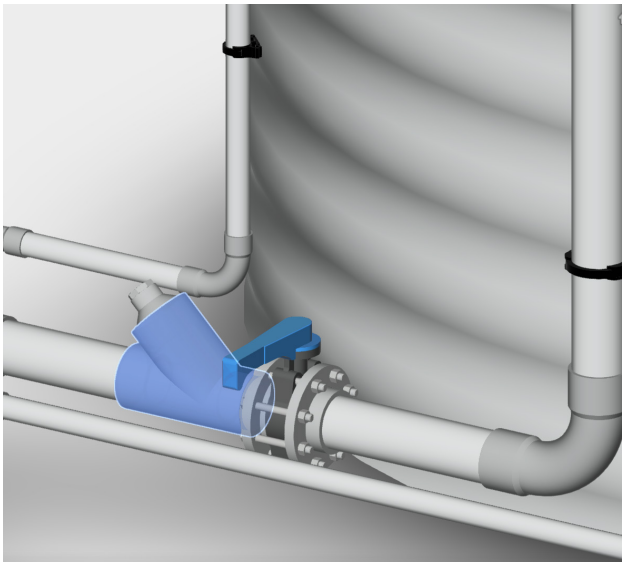


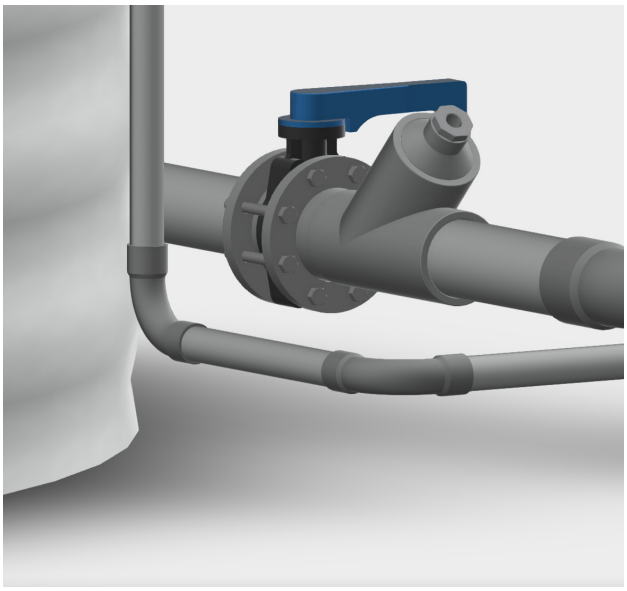
STEP 3 (OPTIONAL)

Install DO Sensor Connection

If machine is equipped with a dissolved oxygen (DO) sensor:

• Install the 45° T-piece on the pressure line.
• Install the butterfly valve directly after the 45° T-piece.





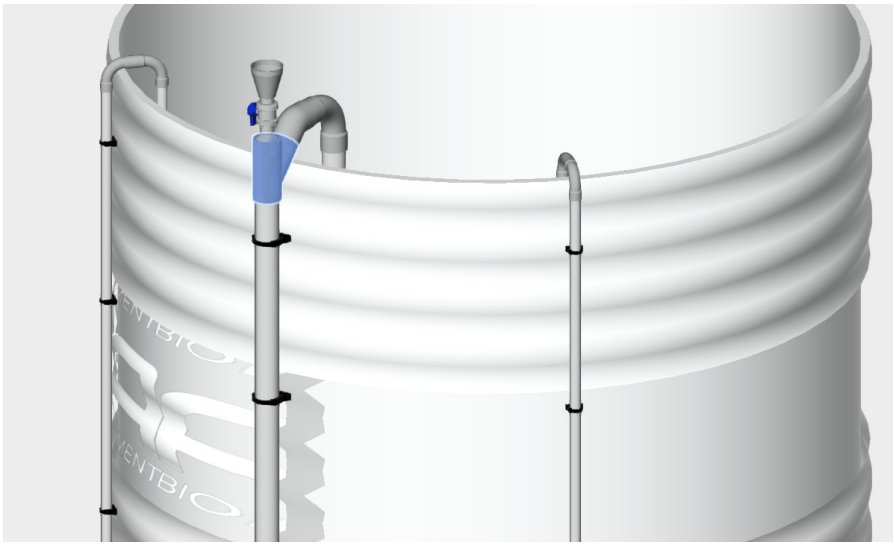
NOTE

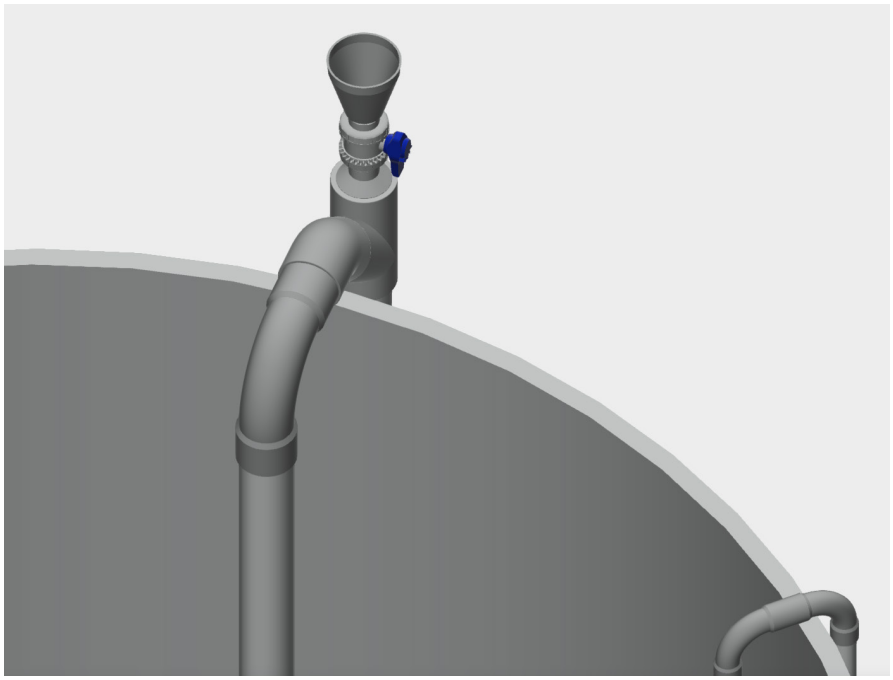
Protect the sensor probe from impact, water exposure, and scratches during installation.

STEP 4

Install Top Assembly for the Suction Inlet

• Place the 90° T-piece with valve (32mm), funnel, elbow, and **clamp coupling** 90° over the edge of the silo.

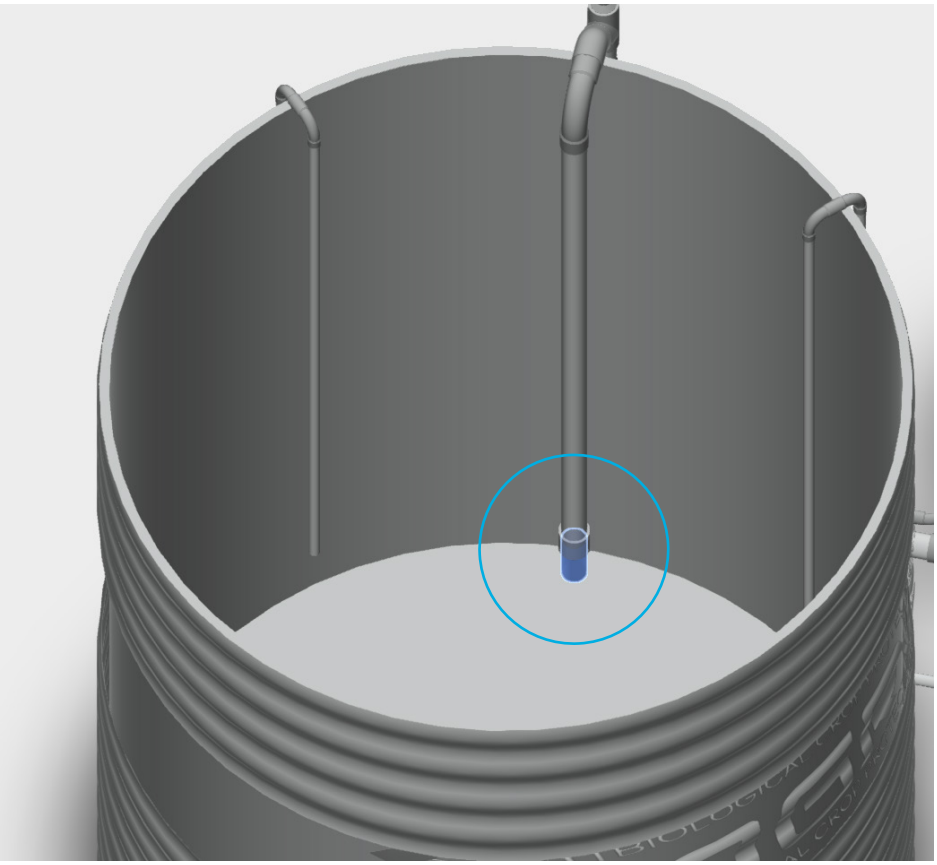




STEP 5

Install the Foot Valve for the Suction Inlet

• Install the foot valve approximately 40 cm above the bottom of the silo.



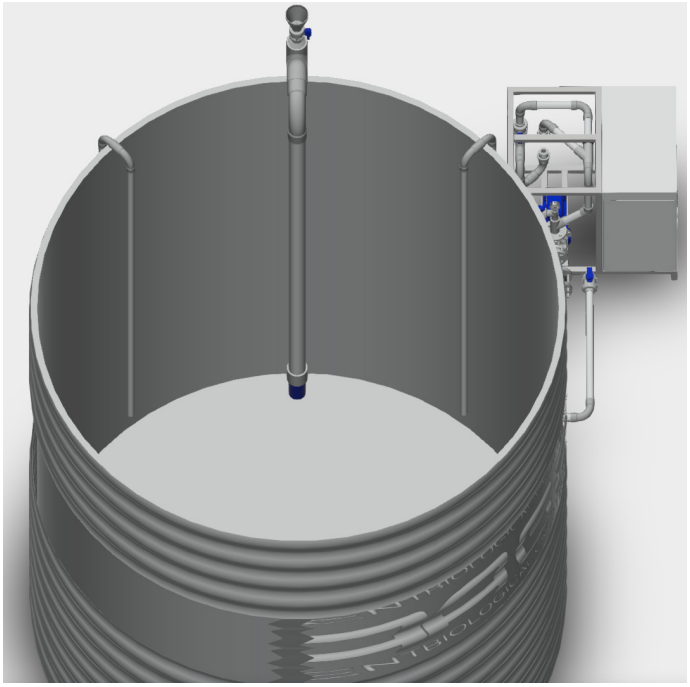
NOTE

Always ensure that the suction pipe is below the minimum level of the silo. This prevents air intake and protects the pump from dry running.

STEP 6

Install the Pressure Outlet Line

• Place the pressure pipe approximately 40 cm from the bottom **without a clamp coupling**.
• **Do not use clamp couplings inside the water column.**
• Keep the pressure pipe **4-5 m away** from the suction pipe to optimize circulation.



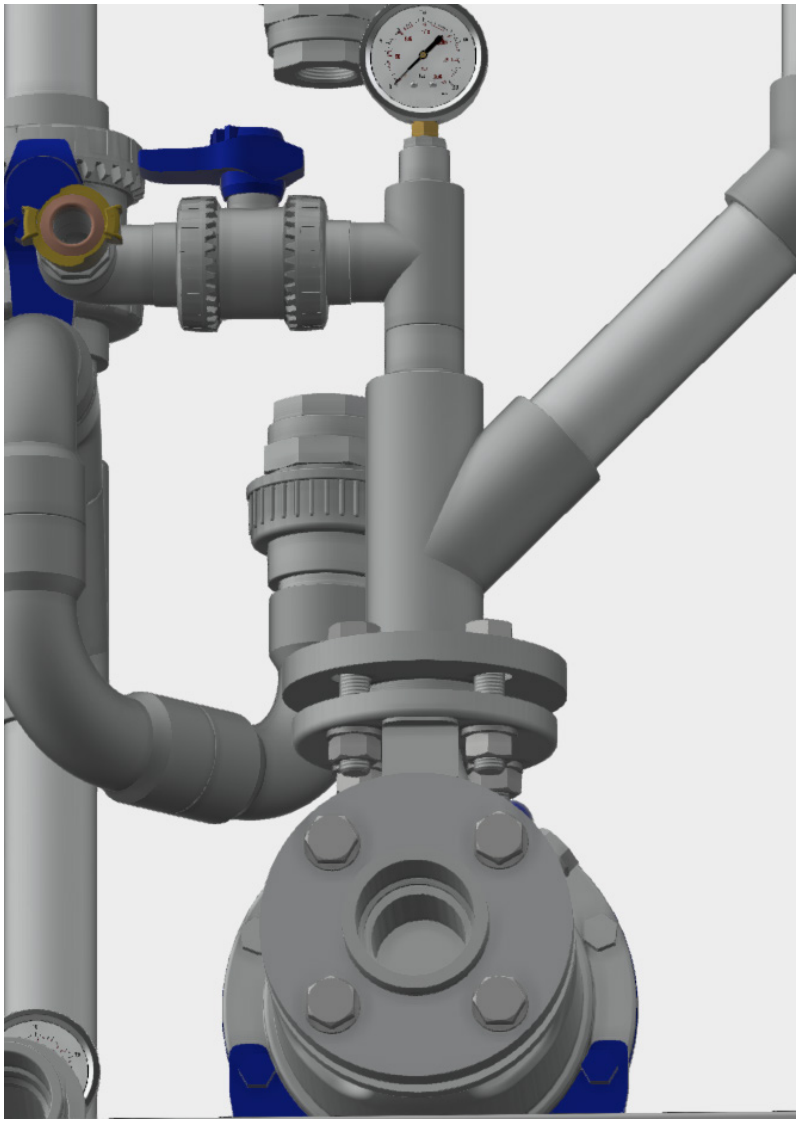
STEP 7

Prime the Pump

- Fill the pump and piping with water until all air is completely vented.
- Confirm that the pump and suction line are fully filled with water.
- Only start the pump once it is completely primed.

⚠ CAUTION **Dry Running Hazard**

Do not start the pump without water. Running the pump dry can cause severe damage to seals and internal components.



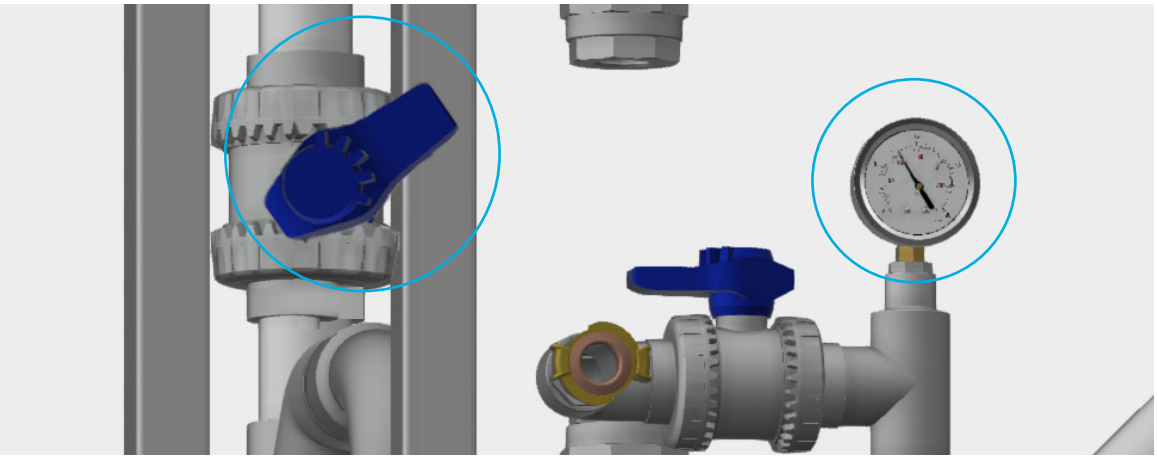
STEP 8

Venturi Adjustment

• Disconnect the blue pipe from the check valve on the venturi.
• Close the ball valve until suction occurs on the venturi.
• Adjust the pressure gauge to **2.5 bar**.
• Reconnect the pipe to the check valve of the venturi.

NOTE

The ball valve must remain half-open at all times to achieve a counter pressure of 2.5 bar.
The ball valve must not be completely closed.



STEP 9

Set Concentrator and Oxygen Flow

• Turn the oxygen concentrator on to automatic or manual mode.
• Set the flowmeter to **10 L/min**.

4.4 ISTALLATION CHECKIST

Complete this checklist before commissioning the Agrona Nanobubble Generator.
All points must be reviewed and confirmed by the installer.

Checkpoint	Status ☑ / ☐
Unit positioned and level	☐
All accessories and fittings installed	☐
Electrical connection performed by a qualified professional	☐
Suction line installed correctly and foot valve positioned below minimum water level	☐
Water lines connected and leak-free	☐
Venturi and oxygen sensor connected	☐
Pump primed with water	☐
System pressure set correctly (model-specific: 1.5 bar or 2.5 bar)	☐
Venturi ball valve left half-open (not fully closed)	☐
Flowmeter set to correct oxygen flow (model specific: 5-10 L)	☐
Manual available near the unit	☐
Warning signs and barriers installed	☐
Area secured and accessible only to authorized personnel	☐

5 Commissioning (Start Up)

Commissioning Start Up Procedure must be performed only by a qualified technician after installation has been completed and verified.

Before operating the machine for the first time, ensure that all safety measures, electrical protections, and water connections have been installed correctly and comply with all applicable local regulations and standards.

WARNING **Electrical and Mechanical Hazard**

Ensure all covers are closed, the area is secure, and the system is correctly installed before energizing the equipment.

5.1 STEP BY STEP STARTUP PROCEDURE

Once all pre-startup checks are completed, perform the following steps:

STEP 1

Tighten All Connections

• Due to transportation, a coupling can come loose. Make sure that all couplings are tightened securely.

STEP 2

Ensure Pump and Pipes Are Filled

• Verify that the pump and connected piping are fully primed with water.

NOTE

The pump must not run without water.

STEP 3

Turn On the Main Switch

• Switch the main switch to the ON position to energize the system.

STEP 4

Start the Water Pump Manually

• Switch on the water pump manually after all pipes are filled with water and fully primed.

⚠ WARNING

If abnormal noise, vibration, leaks, or alarms occur during startup, stop the machine immediately and correct the issue before proceeding.

5.2 VENTURI OPERATION & FLOW ADJUSTMENT

STEP 5

Adjust Valve to Reach Required Pressure

• Close the valve 30% - 50% to reach 1.5-2.5 bar on the manometer above the pump.

For 12-20 m³/h models: 1.5 bar
For 26-60 m³/h models: 2.5 bar

• Make sure there is suction on the venturi.

NOTE

The ball valve must not be completely closed.



5.3 OXYGEN FLOW METER SETTINGS

STEP 6

6 Turn ON Oxygen Generator

• Turn on the oxygen generator after a complete water flow in the system.

STEP 7

Set the Oxygen Flow Meter by Model

• Set the oxygen flowmeter(s) according to the model:

20 m³/h:
Turn the oxygen flow meter from **0 to 5** liters per minute.

26 m³/h:
Turn the oxygen flow meter from **0 to 10** liters per minute.

40 m³/h:
Turn the **first oxygen flow meter** from **0 to10** liters per minute and the **second flow meter** from **0 to 5** liters.

60 m³/h:
Turn the **2 oxygen flow meters** from **0 to10** liters per minute.

5.4 DISSOLVED OXYGEN (DO) PROBE

5.4.1 Dissolved Oxygen (DO) Sensor Calibration

The Agrona Nanobubble Generator continuously monitors and regulates the dissolved oxygen (DO) concentration in process water. Accurate calibration of this system is essential for precise DO measurement and stable operation of the generator.

Purpose of Calibration

To ensure reliable and consistent measurement of dissolved oxygen levels within the Agrona Nanobubble Generator system. Proper calibration maintains control accuracy, optimizes oxygen transfer efficiency, and supports the desired oxygenation performance of the process.

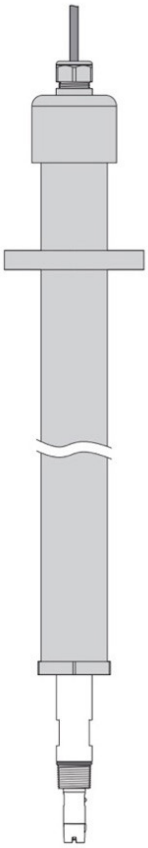
When Calibration Is Required

- Before installation
- Whenever the probe is replaced
- When higher accuracy is required
- After periodic maintenance
- After calibration TimeOut has expired

Step-by-Step Calibration Procedure

1. Prepare the System

- Stop the Nanobubble Generator.
- Ensure there is no water pressure on the sensor.



2. Check Sensor Installation

- Verify that the DO sensor is correctly connected to the controller.
- Confirm that the pump is OFF before performing any mechanical adjustments or probe maintenance.

3. Inspect and Clean the Sensor

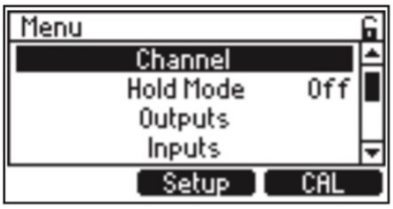
- Remove the sensor from the water.
- Rinse the probe and Smart Cap with clean water to remove debris or buildup, and ensure no air bubbles remain on the optical surface.
- Check that the Smart Cap is properly installed, hydrated, and within its service life. Replace it if expired or damaged.

4. Calibrate the 100% Point (Air Calibration)

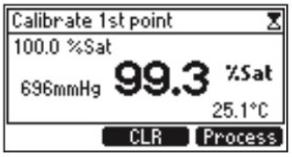
- Hold the sensor in clean, humid air, away from direct water contact, until the reading stabilizes.
- The membrane surface should remain moist but not submerged.
- Allow the reading to stabilize.

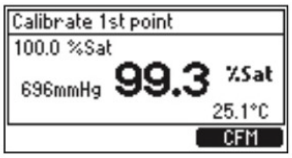
On the controller navigate to MENU:

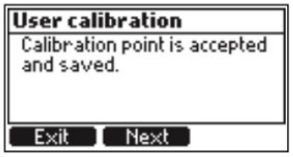
- Press ≡ from the Measure mode.
- Select channel → press CAL, to enter calibration.
- Wait until the reading stabilizes near 100% saturation or 10 mg/L.
- Confirm measurements either % saturation or mg/L.



- On the controller: CAL → 100% (or AIR SAT) → Confirm
- Save the calibration point for 100% air saturation.







Note: *A second calibration point (0% saturation) using a zero-oxygen solution is optional but not necessary.*

5.4.2 Smart Cap Replacement

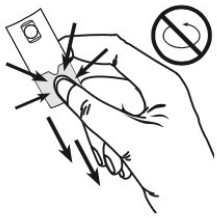
When the cap approaches annual expiration, a warning screen notifies the user of required replacement.

Press [? DIAG] key to read days remaining before expiration. When one year is reached the message will change to “Cap Expired”.

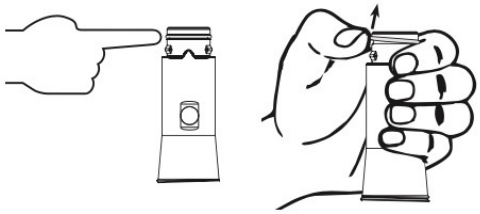
To maintain measurement accuracy, Smart Cap replacement is mandatory.

Ensure all cap-replacement steps are correctly followed.

1. Clean off probe body and dry off with cloth.
2. Remove the expired Smart Cap from the probe by squeezing the cap at the cutout arrow and pulling it off the probe body (do not twist).



3. Remove the used O-ring by rolling it off the body.



4. Clean the O-ring groove and lens with a soft tissue followed by the lens cleaning wipe.

5. Remove the new O-ring from the container and slide on the probe tip (do not roll or twist the O-ring).

6. Use a syringe filled with silicone grease and sparingly lubricate the O-ring with a thin film of grease. Avoid getting grease or fingerprints onto the optical window.

7. Remove the new optical cap from its container and align the cutout arrow on the Smart Cap with the matching guide on the probe body.

8. Slide and press the Smart Cap onto the probe body until the cap snaps in place. Once the cap is installed, it should not be removed unless a new cap is required.

9. Turn ON the controller or plug in the probe's terminal connector

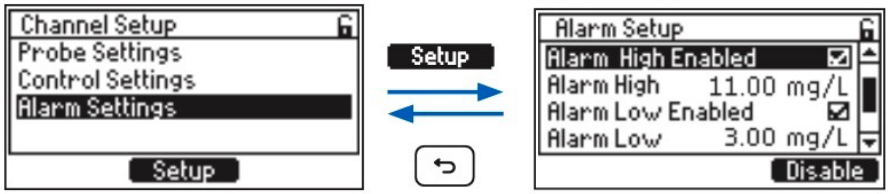
10. Calibrate the probe and controller before reinstalling into the process.

5.4.3 Alarm Settings

The Alarm Settings menu allows users to define upper and lower settings for dissolved oxygen (DO). When a measured value exceeds or drops below these limits, the controller activates the Alarm Relay and stops generator operation until conditions return to settings.

Accessing the Alarm Menu

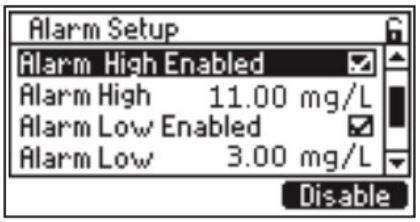
- Press the ⮌ **Back key** from the Measure mode.
- Select Channel.
- Choose Alarm Settings.
- Press the ▲ ▼ keys to move between options.
- Confirm YES to place the controller in HOLD mode (this pauses control while you make changes).



Setting Alarm Parameters

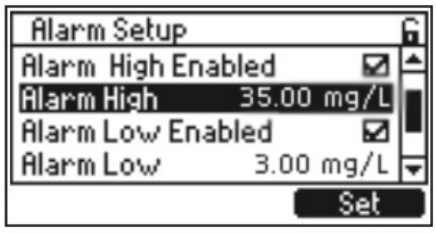
1. Enable Alarm High

- Navigate to **Alarm High Enabled**.
- Press the corresponding key to toggle between Enable and Disable.
- When enabled, a check mark confirms the parameter is active.
- Press the ⮌ **Back key** to save and return to the previous menu.



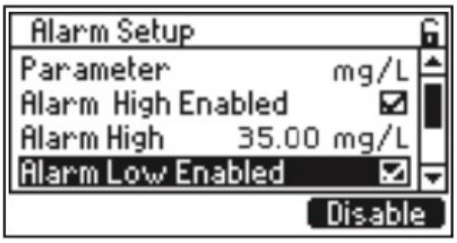
2. Set Alarm High Value

- Select **Alarm High**
- Press **Set**. Press the ▲ ▼ keys, to modify.
- Enter the recommended upper limit: **35.0** mg/L (ppm) or **350 %** corresponding saturation value.
- Press **CFM** to confirm.
- Press the ⮌ **Back key** to save and return to the menu.



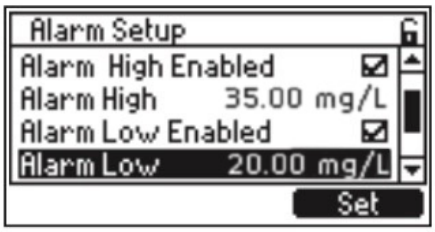
3. Enable Alarm Low

- Navigate to **Alarm Low Enabled**.
- Press the corresponding key to toggle between Enable and Disable.
- When enabled, a check mark confirms the parameter is active.
- Press the ⮌ **Back key** to save and return to the menu.



4. Set Alarm Low Value

- Select **Alarm Low**
- Press **Set**. Press the ▲ ▼ keys, to modify.
- Enter the recommended lower limit: **20.0** mg/L (ppm) or **200 %** corresponding saturation value.
- Press **CFM** to confirm.
- Press the ⮌ **Back key** to save and return to the menu.



5. Save and Exit

- After setting both alarm limits, press the Back key to return to the Channel Menu.
- When prompted, press YES to save changes.

The controller validates all parameters and returns to Measurement Mode.

5.4.4 Analog Output (4-20 mA) Signal Setup

The Universal Process Controller (UPC) can send a 4-20 mA signal to external devices such as PLCs, monitoring systems, data loggers, or automation controllers. This allows the measured DO value to be transmitted as a proportional electrical signal.

The instructions below explain how to configure the analog output when using an optical dissolved oxygen probe.

Recommended 4–20 mA Scaling for Dissolved Oxygen

For most applications using the optical dissolved oxygen probe, we recommend the following scaling values for the 4–20 mA output:

- **4 mA = 0 ppm DO**
- **20 mA = 50 ppm DO**

This range provides good resolution within the Nanobubble system and ensures accurate monitoring by external devices.

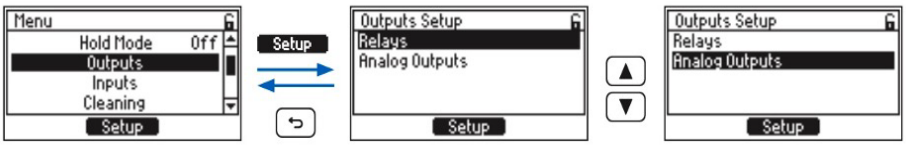
Example Interpretation

If DO = 25 ppm:
• 25 ppm is halfway between 0 and 50 ppm → Output ≈ 12 mA

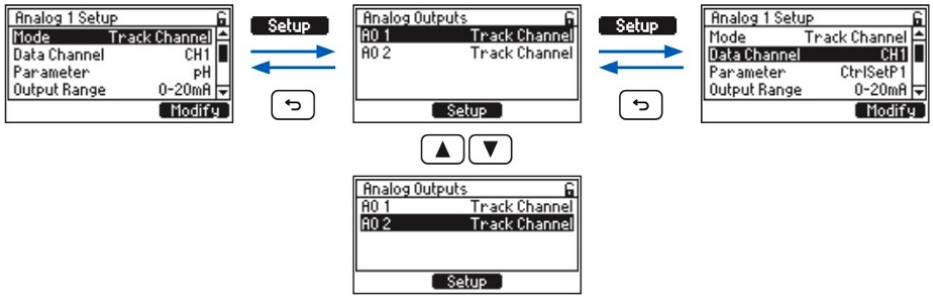
If DO = 45 ppm:
• 45 ppm corresponds to ~18 mA

Menu Navigation

- From Main menu, press the ▲ ▼ keys to select Outputs.
- With Outputs selected, Setup virtual key is visible.
- Press Setup to open a submenu structure.
- Press the ▲ ▼ keys to select Analog Output Setup.

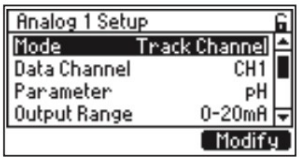


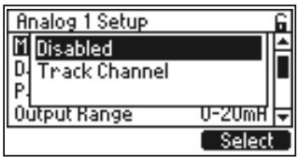
- From Analog Outputs, press Setup.
- Press the ▲ ▼ keys to navigate between parameters.
- Choose the analog channel you want to configure (AO 1 or AO 2).



Mode

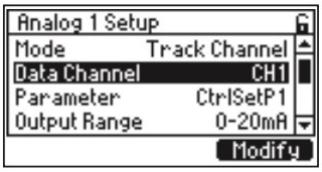
Option: Disabled, Track Channel
With Mode selected, press **Modify** to toggle options.
Disabled indicates that analog output has not been allocated to any function.
With Track Channel selected the analog output follows a specific parameter.





Data Channel

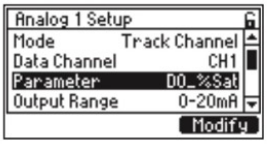
Option: CH1 for one channel
Data channel is always CH1.

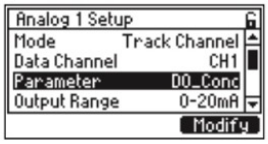


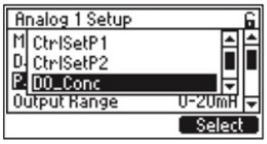
Parameter

With Parameter selected, press **Modify** and select the DO parameter from the available options. Press **Select** to save.

DO

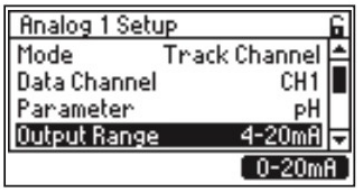






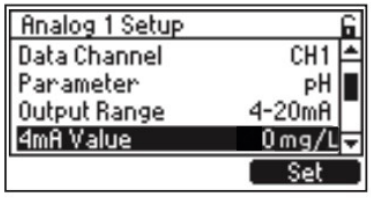
Output Range 4-20 mA

With Output Range selected, press the corresponding virtual key to toggle 0 -20 mA /4 -20 mA output range and choose **4-20**



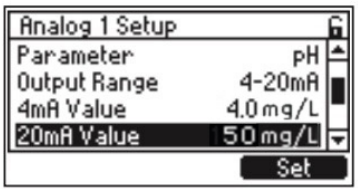
4mA Value - Low Range Value

- With **4mA** Value selected, press **Set**.
  The value will flash indicating it can be modified.
- Press the ▲ ▼ keys to increase or decrease the value → enter low range value **0 ppm**. This means 4 mA = 0 ppm DO
- Press **CFM** to save.



20 mA Value – High Range Value

- With 20 mA Value selected, press Set. The flashing value indicates that it can be modified.
- Press the ▲ ▼ keys to increase or decrease the value → enter high range value 50 ppm. This means 20 mA = 50 ppm DO
- Press CFM to save.



Save Settings

- Press **Back** ⮌ to exit the menu.
- When prompted, select **YES** to save changes.

Verify the Output (Optional but Recommended)

1. Connect a multimeter or loop tester in series with the analog output.

2. Check that the current matches the DO reading on the display.

3. Example:
- DO = 25 ppm → Current ~12 mA
- DO = 45 ppm → Current ~18 mA

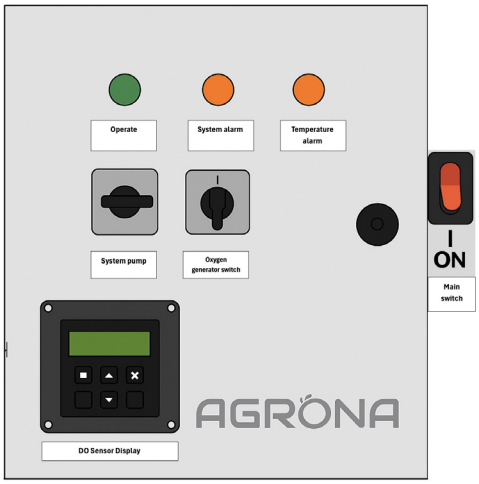
If values differ, check probe calibration, wiring, or scaling.

6 Use

6.1 CONTROL PANEL OVERVIEW

Depending on the model configuration, the control panel may include:

- Main Power Switch
- System Pump Switch
- Oxygen Generator Switch (Manual / Automatic)
- Indicator Lights:
  - Operate: System is running normally
  - System Alarm: General system malfunction
  - Temperature Alarm: Pump temperature too high - automatic shutdown activated. Reset required after cooling.
- Optional dissolved oxygen DO Sensor Display



6.2 NORMAL OPERATING PROCEDURE

NOTE

Before starting the system, ensure that installation and commissioning have been completed according to Chapter 5.

1. Verify Water Supply

- Ensure water supply is available.
- Confirm all suction and pressure pipes are fully filled with water.
- Never start the system with a dry pump.

2. Switch on Main Power

- Turn the main power switch to ON.
- The green Operate indicator should illuminate.

3. Start the System Pump

- Activate the pump switch.
- Allow the pump to establish a stable and continuous water flow.

4. Activate the Oxygen Generator

- Set the oxygen generator cooling fan switch to:
  - Automatic mode (recommended), or
  - Manual mode, if required.
- Ensure airflow is present before oxygen generation starts.

5. Check System Indicators

- Verify that:
  - No alarm indicators are active.
  - No abnormal noise or vibration is present.
  - No water or air leaks are visible.

6. Verify Operating Parameters

- Observe:
  - Pressure and suction values
  - Flow meters
  - Optional DO sensor display
- Confirm that oxygen flow settings remain within commissioning limits.

NOTE

Flowmeter settings are established during commissioning and are not intended for operator adjustment.

NOTE

If oxygen flow becomes unstable, notify a qualified technician.

6.3 OPERATING PARAMETERS AND OBSERVATION

During operation, the operator should check:

- Stable water pressure
- Continuous suction at the venturi
- Correct system indicator lights (no alarms)
- No leaks or abnormal vibration
- If installed, DO sensor values within expected range

If abnormal conditions occur, stop the machine and contact a qualified technician.

6.4 TEMPERATURE ALARM, PUMP OVERHEAT PROTECTION

- The system is equipped with automatic pump temperature protection.
- If the pump temperature becomes too high:
  - The temperature alarm indicator activates.
  - The system performs an automatic safety shutdown.
- After shutdown:
  - Allow the pump to cool down.
  - Identify and remove the cause (e.g. blocked ventilation, dry running, overload).
  - Manual reset is required before restarting.

	**Never bypass temperature protection systems.**

6.5 SHUTDOWN PROCEDURE

Normal shutdown

1. Reduce Oxygen Flow to Zero (if applicable, performed by technician).

2. Switch OFF the Oxygen Generator
- Turn OFF the **oxygen generator switch** first.
- Allow the cooling fan to continue running briefly if in automatic mode.

3. Switch OFF the System Pump
- Turn OFF the **pump switch** after oxygen generation has fully stopped.
- Ensure water flow has completely stopped.

4. Switch OFF Main Power
- Turn the **main power switch** to OFF.
- All indicator lights should switch off.

5. Secure the System
- Ensure the system cannot be restarted unintentionally.
- Close water supply valves if the system will remain off for an extended period.

Emergency shutdown

- Switch OFF the **main power switch immediately.**
- Stop the water supply if required, close water valves if necessary to prevent damage.
- Secure the area.
- Contact qualified service personnel.

6.6 EXTENDED STANDSTILL PROCEDURE

For extended downtime (e.g., crop rotation):

- Switch OFF main power.
- Close the ball valve on the suction line.
- Disconnect the ball valve on the discharge line.
- Allow all water to drain from the system.
- Keep the unit dry and protected against frost, dust, direct rain or any other impact.

7 Maintenance

Only qualified technicians may perform maintenance or component replacement. Operators may only carry out basic visual checks and weekly or monthly tasks as assigned by site management.

NOTE

Use only Agrona-approved parts.

!	All maintenance must comply with local safety and technical regulations.

⚠ WARNING

All maintenance must be performed with the machine fully powered off, isolated from the electrical supply, and depressurized.

7.1 SAFETY BEFORE MAINTENANCE

Before performing any maintenance work:

- Switch off the machine and isolate electrical power. Verify that no residual energy is present.
- Close water supply valves and depressurize the system.
- Allow hot surfaces to cool.
- Wear appropriate personal protective equipment (PPE), including gloves, safety glasses, and protective footwear.
- Follow all site-specific safety procedures.

⚠ CAUTION

Sheet-metal components and internal fittings may have sharp edges. Handle all parts carefully.

7.2 MAINTENANCE SCHEDULE OVERVIEW

The Nanobubble Generator requires both periodic inspections and component replacements.

The main maintenance items include:

- Air filters (machine and concentrator)
- Cylinders
- Moisture absorber
- Condenser cleaning
- Pump filter and seal
- Pressure relief valve inspection
- Valve and PCB condition check

All recommended service intervals are listed in **7.7 Service Intervals Table.**

7.3. FILTERS, CYLINDERS, MOISTURE ABSORBER

Air Filter (Machine Intake)

- The air filter may become clogged by dust or moisture.
- Check regularly and clean or replace if contamination is present.
- Recommended replacement: once per year.

Concentrator Air Filter

- Replace the oxygen concentrator air filter once per year.
- This prevents reduced oxygen production.

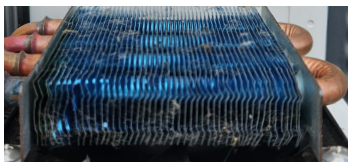
Cylinders

- Cylinders must be replaced when oxygen output drops or purity cannot be maintained.
- Approximate lifetime: 9000 operating hours.
- Lifetime varies depending on air quality (avoid dust and high humidity).

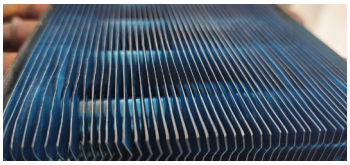
Moisture Absorber

- Inspect the moisture absorber regularly.
- If water is present, drain the absorber immediately.
- Recommended replacement: once per year.

7.4 CONDENSOR CLEANING

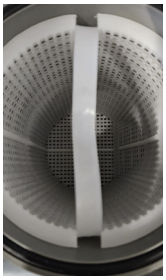


The condenser must remain free of dust to prevent overheating and reduced performance.



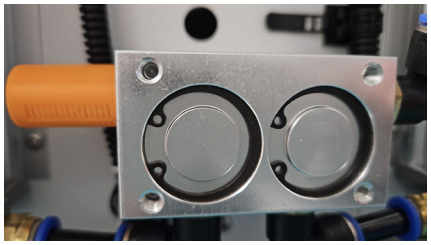
- Clean the condenser regularly using compressed air.
- Ensure the machine is powered off before cleaning.
- Never use liquids or high-pressure cleaners.

7.5 PUMP SEAL REPLACEMENT



- Inspect the pump regularly for water leakage.
- Leakage indicates that the pump seal must be replaced.
- Only qualified technicians may disassemble or reassemble pump components.

7.6 VALVE AND PCB FAILURE INDICATORS



- Valves may be damaged by moisture in the air supply.
- If a valve is damaged, the PCB (control board) may also need replacement.
- Symptoms of valve/PCB failure may include:
  - Irregular oxygen flow
  - Fault alarms
  - No venturi suction
  - System not responding to control inputs

7.7 SERVICE INTERVALS TABLE

The following components and spare parts require periodic inspection, cleaning, or replacement.

Component/Spare Part	**Recommended Interval**	Notes
Air filter (machine)	Replace once per year	Inspect regularly.
Air filter (oxygen concentrator)	Once per year	–
Oxygen cylinders	Replace when oxygen output drops	Approx. 9000 running hours
Concentrator filter set (5 L / 10 L)	Once per year	–
Air filter cartridges (paper / prefilter)	Once per year	Replace earlier if clogged
Moisture absorber	Check regularly	Drain when full. Replace once per year.
Condenser	Clean regularly	Use compressed air. Keep dust-free.
Pressure relief valve	As required	Replace if counterpressure becomes too high.
Smart cap DO sensor	As required	Replace according to DO sensor interval.
Oxygen concentrator (5 L / 10 L)	Every 2 years	-
Water trap	Drain regularly	Replace if damaged.
Pump seal	As required	Replace when water leakage occurs.
Pump bearings	As required	Replace if worn or noisy; often replaced during seal service.
Pump capacitor	As required	Replace if pump fails to start.
Oxygen concentrator capacitors (5 L / 10 L)	As required	Replace if concentrator fails to start.
Flowmeters (5 L / 10 L)	As required	Replace if damaged or malfunctioning.
Check valve	As required	Replace if backflow or leakage occurs.
Manometer	As required	Replace if pressure readings become inaccurate.
Automatic valve controller	As required	Replace if valve regulation fails.
Circuit board (PCB, 5 L / 10 L)	As required	Replace if damaged or malfunctioning.
Pump filter tray	Inspect regularly	Clean when contaminated.
Cover & O-ring	As required	Replace if pre-filter lid leaks.
Connecting set 50 mm	As required	Replace if leakage occurs.
Thermostat & ring	As required	Replace if pump overheats or thermal protection fails.

8 Troubleshooting

Troubleshooting may only be performed by trained operators or qualified technicians as described in Chapter 3.

⚠ WARNING

Always isolate electrical power and depressurize the system before opening any covers or components.

8.1 FAULTS & CAUSES

Fault	Possible Cause
Pump does not start	Faulty pump capacitor, no electrical supply, overload protection tripped, pump not primed
Pump runs but no water flow	Air trapped in line, suction valve closed, blockage in suction line, debris in pump filter tray
No suction at venturi	Incorrect ball valve position, insufficient water flow, venturi clogged, air leak in piping
Low or no oxygen flow	Oxygen concentrator off, clogged filter, blocked flowmeter, defective concentrator capacitor, incorrect commissioning setting
Low oxygen output / DO level	Oxygen cylinder near end of life, clogged filters, moisture absorber full, insufficient venturi suction
Irregular or incorrect DO readings	Contaminated DO sensor, expired smart cap, calibration required, sensor wiring issue
Flowmeters not moving	Blockage in flow line, incorrect valve position, failed flowmeter
Oxygen concentrator not starting	Faulty capacitors, electrical fault, clogged air filter
Oxygen generator alarms	Low intake airflow, clogged filters, electrical failure, PCB or capacitor malfunction
High counterpressure	Blocked pressure line, faulty pressure relief valve
Unstable or fluctuating pressure	Incorrect ball valve position, partial venturi blockage, failing pressure relief valve
Water leakage / leakage from pump	Pump seal failure, loose fittings, damaged O-rings
High pump noise or vibration	Worn bearings, blocked impeller, air in system, misaligned piping
High temperature / overheating	Dirty condenser, blocked ventilation, faulty thermostat
Moisture inside control cabinet	Failed water trap, leak in air system, damaged fittings
PCB / valve malfunction	Moisture damage, defective valve, wiring fault

8.2 ERROR SYMPTOMS

Pump Issues

- Pump humming but not running: Capacitor fault or seized bearings
- Pump stops during operation: Overheating, blocked condenser, thermal protection activated
- Pump runs dry: Suction pipe above water level, pump not primed

Oxygen System Issues

- Low DO: Cylinder exhausted, concentrator filter clogged, moisture absorber full
- No oxygen flow: Flowmeter blocked, concentrator not running, valve closed

Venturi Issues

- No suction: Ball valve over-open or over-closed, pressure too low
- Fluctuating suction: Incorrect backpressure, air entering suction pipe

Electrical Issues

- No power: Main switch off, fuse blown, loose wiring
- Frequent tripping: Ground fault, pump overload, moisture in electrical section

Sensor Issues

- Incorrect DO readings: Dirty probe, expired smart cap, calibration required
- Sensor alarm: Cable fault, sensor unplugged, DO level outside limits

8.3 CORRECTIVE ACTIONS

Operators may perform these checks:

- Confirm the main switch is ON and water supply is available.
- Check that all valves are open and water flow is stable.
- Verify the oxygen generator is switched on (after water flow is established).
- Ensure the venturi suction is present by checking pressure and flow indicators.
- Inspect for visible leaks, loose couplings, or blocked filters.
- Clean dust from condenser (if safe and accessible).
- Reset alarms or power cycle the machine if instructed by site procedures.

Qualified technicians must perform the following:

- Electrical diagnostics (capacitors, PCB, wiring, voltage).
- Replacement of filters, seals, bearings, valves, flowmeters, or capacitors.
- Repair or replacement of circulating pump components.
- Troubleshooting oxygen concentrator faults.
- DO sensor calibration or component replacement.
- Correction of moisture-related damage to valves or electronics.
- Repair of pressure relief, thermostat, or internal temperature faults.

If the cause cannot be identified using these steps, isolate the machine and contact Agrona Service.

Symptom	Corrective Action
Pump does not start	Check power, reset main switch, replace capacitor, verify pump priming
Low oxygen output	Replace cylinders, replace concentrator air filter, drain moisture absorber
No suction at venturi	Adjust valve to half-open, ensure pressure is correct (1.5 or 2.5 bar depending on model)
DO reading incorrect	Clean sensor, replace smart cap, recalibrate sensor
Water leakage at pump	Replace pump seal, check O-rings and fittings
Pressure too high	Inspect pressure line for blockages, replace relief valve
Pump noisy	Check bearings, verify secure mounting, purge system with water
Concentrator not operating	Replace capacitors, clean air filter, check power supply
Flowmeter stuck	Inspect for debris, clean or replace flowmeter
PCB not responding	Inspect for moisture, replace valve if sticking, replace PCB if necessary

8.4 WHEN TO CONTACT AGRONA SERVICE

Stop the machine immediately and contact Agrona or an authorized service partner if:

- The pump does not run despite correct electrical supply
- Water leakage continues after replacing seals
- Oxygen generator alarms persist after filter replacement
- Pressure relief valve activates continuously
- DO sensor readings remain incorrect after cleaning or cap replacement
- Moisture is detected inside the control cabinet
- Electrical burning smell, smoke, or sparks are present
- Any unsafe or abnormal condition persists

Provide the following information when contacting support:

- Model and serial number
- Description of the fault
- Alarm codes or indicator light status (if applicable)
- Recent maintenance actions performed
- Photos of the installation and relevant components

9 Disposal

The Nanobubble Generator and its components must be disposed of in accordance with applicable local, regional, and national regulations. The machine contains electronic components, metals, plastics, and materials that must not be discarded with general waste.

Electrical and electronic components

Electronic parts such as circuit boards, sensors, capacitors, wiring, and the oxygen concentrator must be disposed of as WEEE (Waste Electrical and Electronic Equipment) at approved collection or recycling facilities.

Mechanical and hydraulic components

Pumps, valves, filters, seals, and piping materials may be disposed of at metal or technical waste recycling centers, depending on local regulations.

Packaging materials

Packaging materials (wood, cardboard, protective plastics) can be recycled at standard facilities unless contaminated.

End of life

At the end of service life, the unit should be disassembled by qualified personnel or returned to Agrona or an authorized service partner for environmentally responsible disposal.

NOTE

Never dispose of the machine in water systems, open land, or domestic waste streams.

10 Limited Warranty

Agrona Tec provides a limited warranty that the Nanobubble Generator is free from defects in materials or manufacturing under normal, authorized use, subject to the terms and exclusions below.

This Limited Warranty applies exclusively to the original purchaser and begins on the date of delivery.
No other warranties, express or implied, are provided.

Warranty Period

- 12 months on electrical, electronic and mechanical components

Consumables and wear parts are not covered beyond their stated period.

Warranty Coverage

Agrona will, at its sole discretion:

- Repair or replace defective parts
- Provide equivalent replacement components

Warranty coverage applies only when:

- Installation follows Agrona instructions
- Maintenance is performed as specified in this manual
- Only genuine Agrona parts are used
- No unauthorized modifications have been made

What This Warranty Does NOT Cover

- Incorrect installation, wiring, or commissioning
- Misuse, negligence, or operation outside specified limits
- Water damage caused by leaks, incorrect drainage, or improper piping
- Electrical damage caused by incorrect voltage, surges, or grounding issues
- Corrosion caused by chemicals or unsuitable environments
- Failures resulting from lack of maintenance
- Labor costs, travel expenses, or on-site service fees
- Normal-wear consumables and parts, including:
  - Filters
  - Moisture absorbers
  - Pump seals and bearings
  - O-rings and gaskets
  - DO sensor caps
  - Flowmeters, capacitors, valves (normal wear)

Agrona is **not responsible** for loss of production, downtime, or consequential damages.

Conditions That Void the Warranty

The warranty becomes void immediately if:

- The unit is modified or repaired by unauthorized persons
- Non-Agrona parts are used
- The machine is operated without water (dry operation)
- Safety devices or protective covers are removed or bypassed
- Incorrect electrical voltage or wiring is used
- The serial number or identification labels are altered or removed

11 Appendix I – Declaration of Conformity

AGRONA TEC
BEYOND OXYGEN

EC DECLARATION OF CONFORMITY CONCERNING MACHINERY

Declaration in accordance with Directive 2006/42/EC, as last amended (hereinafter referred to as the Machinery Directive). This language version of the declaration has been verified by the manufacturer (original declaration).

We (manufacturer):

Company name:	Agrona Tec.
Address:	Leeuwenhoekstraat 56, 2652XL Berkel en rodenrijs
Country:	Netherlands

For the product described below:

Generic name:	Nanobubble Water Treatment System
Trade name:	Nanobubble Generator
Type:	For all types from 20 to 60 m3/h
Serial number:	
Function:	Water oxygenation system for water treatment, agriculture, horticulture, aquaculture, cleaning and industrial processes.

All the relevant provisions of the Machinery Directive are complied with:

The product is in accordance with the provisions of the following European directives:

- Low Voltage Directive 2014/35/EU
- EMC Directive 2014/30/EU
- RoHS Directive 2011/65/EU

Whereas the following harmonized standards have been used:

- EN ISO 12100:2010 | Safety of machinery - Basic concepts for design - Risk assessment and risk reduction
- NEN 5509:2016 + EN-ISO 20607:2019 - User Manuals
- EN 60204-1:2018 | Safety of machinery - Electrical equipment of machinery - Part 1: General requirements

The following natural or legal person established in the Community is authorised to compile the technical file:

Company name:	Agrona Tec
Name and position:	N.Laaguili, Directeur
Adres:	Leeuwenhoekstraat 56, 2652XL Berkel en rodenrijs
Land:	The Netherlands

Issued on, 05 January 2026.

Director, Agrona Tec.

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AGRONA TEC

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