MagStream™

Wireless Milk Meter

Installation Manual

Instructional Content and Purpose

These instructions aim to aid those responsible (outlined under "Responsibilities") for installing, operating, maintaining, troubleshooting, and servicing this product.

Responsibilities

Procedures in these instructions are to be performed according to applicable codes (state, local, and other) by the person(s) qualified (licensed, if applicable) to do so—that is:

- Welding must be done by a qualified welder;

- AC power wiring for voltages over 40V (50V in Europe) must be done by a qualified (licensed) electrician in compliance with the latest edition of the ANSI/NFPA Standard 70, National Electrical Code, (USA) or either LVD 2006/95/EC or EMC 2004/108/EC (Europe) and in compliance with the local wiring codes as applicable;

- Other installation, major maintenance, and service work must be done by an authorized BouMatic dealer;

- Product/system checkout and troubleshooting steps are to be performed by an authorized BouMatic dealer;

- Deviation from these instructions could affect product performance or create a hazardous situation. Under no circumstances will BouMatic be responsible for any problems caused in whole or in part by any deviation from the procedures specified in these instructions without prior written approval from BouMatic;

- Operation steps may be performed by the owner/operator after the dealer or technician has successfully finished the product/system checkout. The owner/operator is responsible for properly operating, maintaining, and monitoring the product/system to ensure that it works properly.

Close compliance with the procedures herein is essential for the owner to get maximum benefit from the product/system.

Disclaimers

No warranties are contained in these instructions. The division of responsibilities, stated above, is a general reminder of those provisions in the applicable dealer contract and does not change any agreement between BouMatic and the dealer. Information in these instructions is not all-inclusive and cannot cover all unique situations.

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1. SAFETY

1.1 REVIEWING PERSONAL SAFETY MESSAGES

Follow the safety messages below and throughout this manual to prevent possible bodily injury. The owner is responsible for replacing safety labels should they become illegible.

Provide positive, lockable disconnects to prevent unintended application of electrical or pneumatic power to the equipment. See **Figure 1**. Refer to national regulations for proper lock-out procedures for equipment service or repair.

Warning

Always turn off the main power supply when working on the electrical installation.

Always use appropriate personal protective equipment (PPE) when installing and maintaining the MagStream.

Caution

Installation and service should only be done by locally qualified personnel.

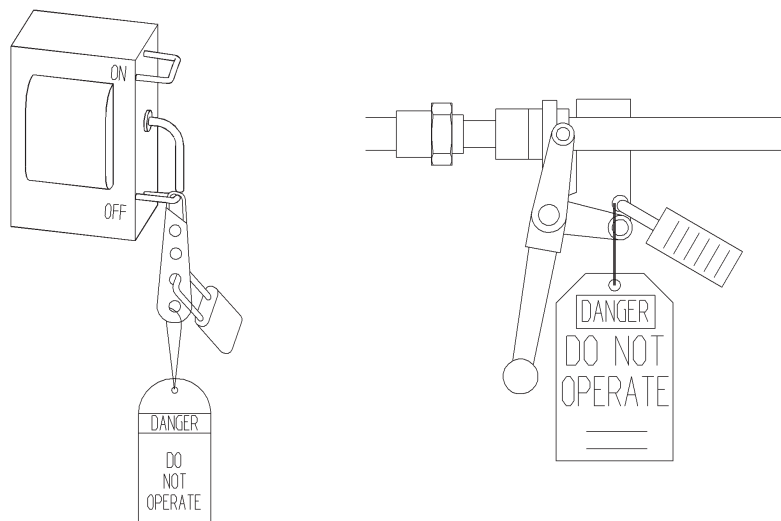Install the system according to the local rules and regulations.

We recommend to install and maintain the MagStream with at least 2 persons.

The installation area must be free from any obstacles, including animals.

Make sure all components are installed out of reach of animals.

Make sure all cables are properly concealed and do not pose a tripping hazard.

1.   **Lock-out Techniques for Power, Hydraulic, and Air**

2. MAGSTREAM OVERVIEW

2.1 MAGSTREAM INTRODUCTION

The MagStream milk meter measures and registers the milk yield and flow rate of individual cows during each milking. The mechanical geometry and electronic recording principle of the MagStream are designed for a continuous and optimally free milk and air flow. No flow obstruction or interruption occurs that could cause a vacuum drop, vacuum fluctuation or rough treatment of the milk. As a result, cows are milked more gently and completely and udder health improves. Milk quality is higher with fewer free fatty acids.

The MagStream is completely wireless. See **Figure 2**. The float inside the MagStream and the Velos Process Unit (VPU) form the intelligent brains and the heart of the system. They combine advanced technologies that make power supply, the measuring principle and data communication completely wireless. The float is equipped with state-of-the-art technologies for the most accurate and reliable measurements. It has smart functionalities on board such as a data-memory and a control system that monitors whether the device is correctly installed, functions properly, cleans properly and has a data connection.

Data communication between the MagStream and the dairy management system takes place via Ultra High Frequency (UHF) communication. All data that is measured and recorded by the MagStream is sent real-time and wirelessly, collected by an antenna and processed by the VPU. Information and insights are immediately available via the web-interface (on desktop, tablet or smartphone) and/or via the display of the milking parlor control unit. Automated actions, such as automatic cluster take-off, are executed immediately as needed.
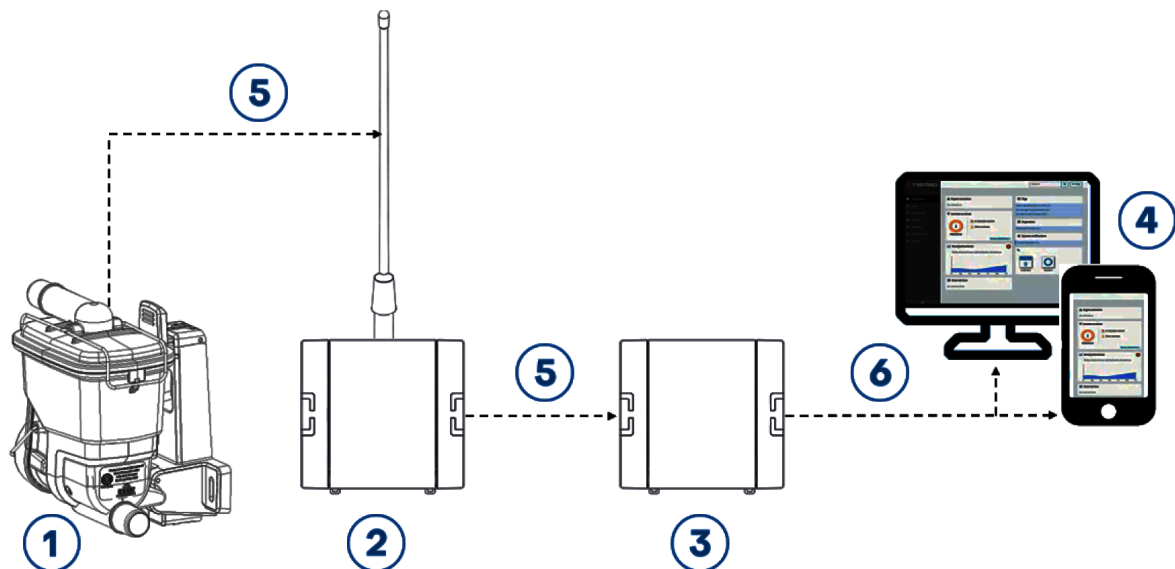
1. MagStream with Float
2. V-box with VP4102 UHF reader and antenna (922 MHz)
3. V-box with VP8002 VPU
4. PC or smartphone with performance insights in Velos
5. UHF connection (CAN or Ethernet)
6. Ethernet connection

2. MagStream System Overview

The MagStream milk meter is delivered together with the SmartLite milking point control unit. One SmartLite unit is installed for every four milking points to control the milking and cleaning process. For more information see literature *9e1027 SmartLIte Installation and Operation Instructions*.
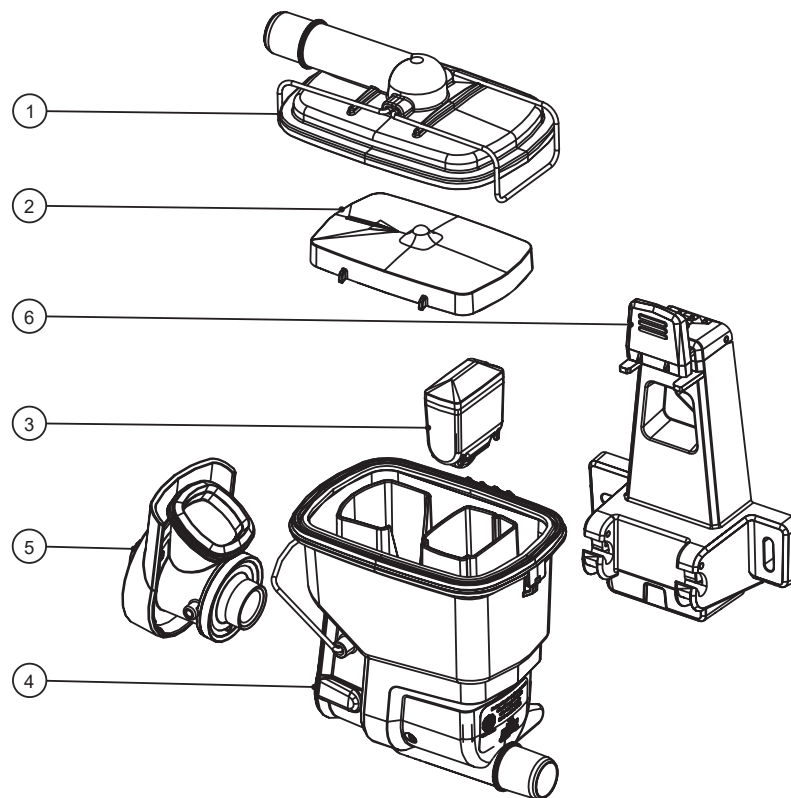
1. Cover
2. Spreader plate
3. Float
4. Main volume
5. Valve module
6. Mounting bracket

3. **MagStream Components**

2.2 COMPONENTS

The main components of the MagStream are shown in **Figure 3**.

1. The cover with the inlet ensures a continuous milk and air flow.

2. The spreader plate spreads the milk and air into the main volume for a free milk and air flow.

3. The float measures the milk yield and milking process.

4. The main volume collects the milk and ensures a free air flow during milking.

5. The valve module makes sure the milk or cleaning fluid flows through the MagStream. The MagStream cleaning valve has two positions, shown in **Figure 4**.

6. The mounting bracket ensures the MagStream can be mounted firmly to the wall.

When the MagStream cleaning valve is in the milking position, the milk cannot flow away from the right side of the valve. The milk level in the main volume rises, and the float starts floating on the milk flow, and measures the amount of milk in the MagStream.

When the MagStream cleaning valve is in the cleaning position, only a bit of the liquid can flow through the flow column. This will completely fill the rest of the MagStream with cleaning liquid, which ensures proper cleaning of the MagStream.

Milking mode   **Cleaning mode**

4.   **Cleaning Valve Modes**
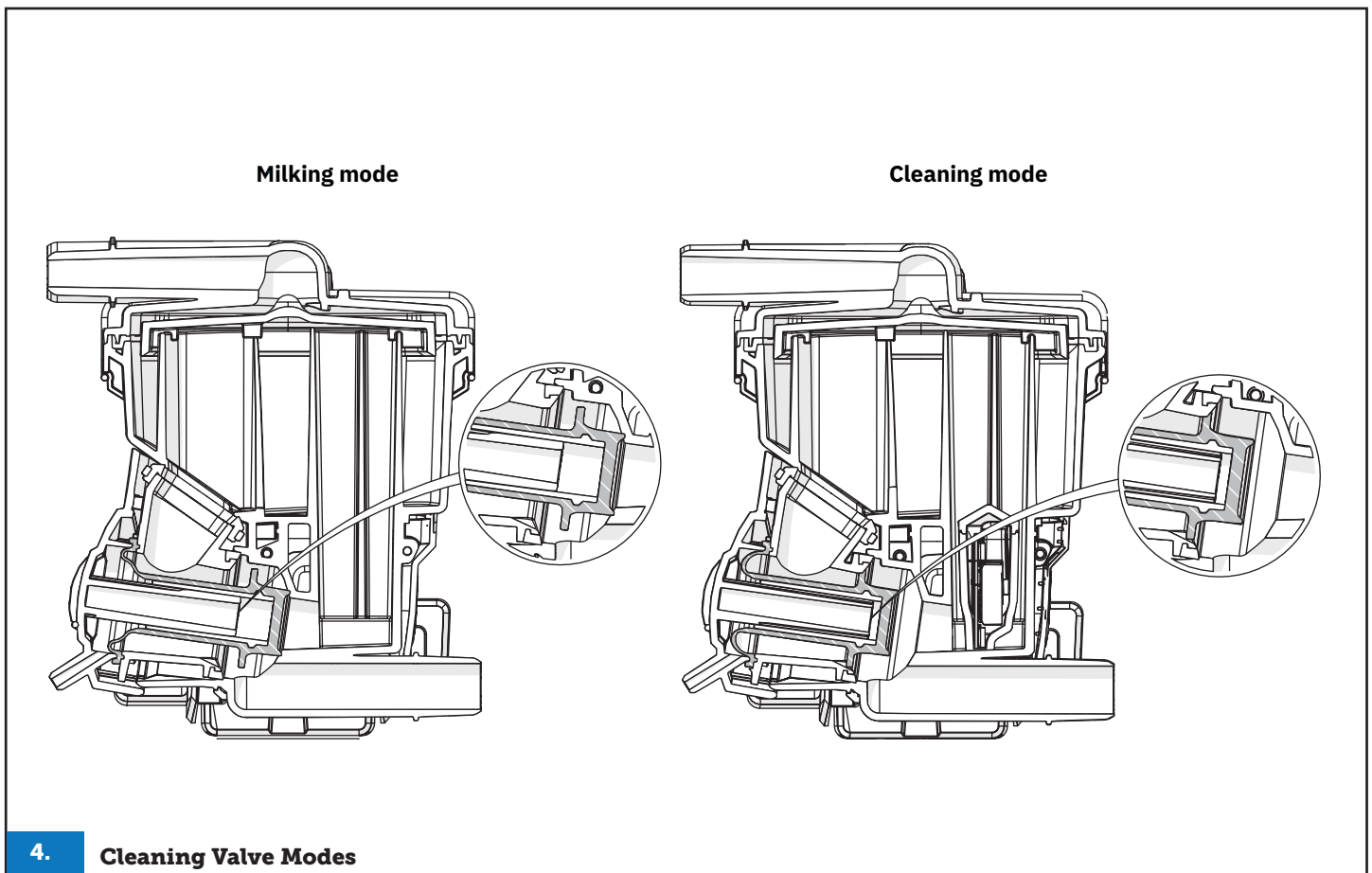
3. INSTALLATION

Do not operate the product without first reading this chapter and the safety section at the beginning of this manual.

Warning

Failure to follow safety precautions in this chapter could result in serious injury or death.

3.1 REQUIREMENTS FOR INSTALLATION

3.1.1 ELECTRICAL REQUIREMENTS

Make sure the mains power supply for the system is easily accessible and not too far away from the barn in which the units are placed. The power sockets shall be installed near the equipment and must be easily accessible.

Caution

Nedap power supplies must be connected to a power socket with protective earth (PE). Always use a 3-pole connector with a PE contact.

If there is no PE available, create a PE next to the power socket to be used for each power supply. The properties of a correct PE depend on local circumstances and legislation. Always comply with local rules and regulations when installing earth electrodes.

3.1.1.1 NETWORK

Use a fiberglass network between the VPUs (VP8002) if any of these conditions apply:

- the power supplies have different power sources with a separate PE;
- the distance between two VPUs or the distance between one VPU and a router/switch exceeds 100 m (330 ft.);
- there is often lightning in the area.

3.1.1.2 CABLING

Install Velos CAN cable(s) and Ethernet cable(s) inside a plastic (PVC) conduit.

- Do NOT install cables directly to metal ceiling, trusses and feed lines.
- Install fiberglass cables inside a plastic (PVC) conduit with an inner diameter of at least Ø 25 mm (1 in.).

3.1.1.3 SURGE PROTECTION AND UPS

Caution

Always use surge protectors with Ethernet surge protection.

Install an Uninterruptible Power Supply (UPS) that is connected to the VP2001 when the power source is not reliable and constant. The UPS is intended to correctly power down the VP8002 and will also run the other Vpacks in the system for a brief period.

The VP8002 has internal backup power that will shut down the VP8002 correctly when the power is interrupted. The internal backup power will not run the other V-packs in the system.

3.1.1.4 LIGHTNING PROTECTION

It is important to follow closely the guidelines that are described in this section, in order to minimize risk of damage on Velos systems in case of lightning.

Protective Earth (PE) is meant for safety related issues such as electric shocks to humans or animals. PE will not protect devices (sufficiently) when they are struck by lightning. Normally PE is situated next to the main power source only.

Grounding is a connection to the ground, but not Protective Earth, for example a metal roof that is connected to different earth electrodes in order to lead high peak currents (such as lightning) to the earth.

3.1.2 NETWORK REQUIREMENTS

3.1.2.1 BASIC NETWORK REQUIREMENTS

- Router to connect the VPU (VP8002) to the Internet.
- Use of DHCP (Dynamic Host Configuration Protocol) advised.
- LAN Ethernet cable UTP minimum cat 5.
- Minimum upload speed: 1 MB/s

3.1.2.2 WI-FI REQUIREMENTS

To experience all the benefits of the system, a full covering Wi-Fi installation is crucial in the area where the system is applied. A functional Wi-Fi connection offers easy access to the mobile interface, allowing operation by smartphone or tablet. Because of the wide variation in barn designs, we recommend to make use of local Wi-Fi specialists to plan, install and service such a Wi-Fi installation.

In order to install single wireless networks, we advise you to consider the following conditions. These conditions are set up for a so-called single wireless network.

General recommendations regarding setting up a Wi-Fi installation:

- Always follow local circumstances and legislation regarding wireless network configurations.
- Never use powerful Wi-Fi transmitters; powerful transmitters will generate more noise.
- Do not use dual band or the 5 GHz band; only use the 2.4 GHz band.
- Never use (multiple) ordinary consumer electronics Wi-Fi routers.
- Only use professional access points to create a wireless network.
- Only use a single wireless network configuration, also called "roaming network".
- Use splash and dust proof plastic housings (IP65) to install professional access points.

Wi-Fi bridge requirements for point-to-point connection

- 5GHz to minimize interference (recommended 5.18GHz ~ 5.825GHz).
- High-Power Output to ensure long distance coverage.
- Connection rate of 300 Mbps or higher.
- Internal High-Gain Directional Antenna (10 dBi to 13 dBi or higher).
- Supports WPA2 Wi-Fi Security.

3.1.3 ELECTROMAGNETIC REQUIREMENTS

Animal identification uses radio waves in compliance with ISO 11784/11785 standard and local regulations.

Animal identification may not function optimally due to devices that emit radio waves, such as (but not limited to) variable frequency drives, electronic ballasts of lighting systems, power supplies, electronic converters of solar panels/windmills and (long) wave radio stations, which may cause interference with animal identification. In order to achieve optimal performance of animal identification, the electrical installation on the farm needs to meet the conditions that are shown below.

- Maximum allowed environmental noise level: 10 dBµA/m quasi peak, according to CISPR 16-1-1.
- Maximum allowed conducted noise: according to EN55032: 2015.

3.2 ADDITIONAL DOCUMENTATION

The following additional documentation is required for the proper installation of the MagStream system. This documentation can be obtained from your dealer or from the Boumatic website.

- *9e1027 SmartLIte Installation and Operation Instructions*
- *VP4102 Installation Manual or VP4102 set for dairy farming Installation Manual*
- *VP2001 Installation Manual*
- *Antenna Installation Manual*
- *Antenna mounting bracket Quick Start Manual (delivered with the product)*
- *MagStream E-learning module*

3.3 INSTALLATION OVERVIEW

Assemble and install the system according to the steps below. Each step will be fully explained in the next sections.

- Unpack the MagStream components (*Section 3.4*).
- Place the MagStream components (*Section 3.5*).
- Mount the components (*Section 3.6*).
- Mount the central vacuum line for cleaning the MagStream milk meters (*Section 3.7*).
- Configure the VP8002 VPU and VP4102 reader (*Section 4.1*).
- Configure the Velos software (*Section 4.2*).
- Calibrate the MagStream (*Section 4.4*).

3.4 UNPACK THE MAGSTREAM COMPONENTS

1. Check if all parts and components are present:

    - MagStream milk meters
    - MagStream floats
    - VP8002 VPU or VP8002 VPU set
    - VP4102 reader or VP4102 reader set
    - VP2001 power supply (for VP8002 VPU)
    - Indoor antenna 922 MHz
    - Antenna mounting bracket (optional)

2. Check the content of the delivery for visible damage.

3. Report any missing or damaged part or component immediately to your supplier.

3.5 PLACE THE MAGSTREAM COMPONENTS

Place the MagStream components on the locations indicated in the installation plan provided by the dealer.

3.6 MOUNT THE COMPONENTS

3.6.1 MOUNT AND WIRE THE VP8002 VPU AND VP2001 POWER SUPPLY

The VP8002 VPU is powered by a VP2001 power supply.

1. Consult the installation plan provided by the dealer for the mouting locations of the VP8002 VPU and the VP2001 power supply. The VP2001 power supply must be placed near the VP8002.

2. Mount and wire the VP8002 VPU following the instructions in the *VP8002 Installation Manual*.

3. Mount and wire the VP2001 power supply following the instructions in the *VP2001 Installation Manual*.

Caution

- The VP2001 power supply is for indoor use only.
- The VP2001 power supply must be wall mounted and the wires must enter and exit at the bottom only.
- Do NOT place the V-box with VP2001 power supply inside another box!
- Make sure to always close the V-boxes with the V-box covers.

3.6.2 MOUNT AND WIRE THE VP4102 READER AND ANTENNA

The 922 MHz antenna of the VP4102 reader is preferably mounted with an antenna mounting bracket.

1. Consult the installation plan provided by the dealer for the mounting location of the VP4102 reader with antenna.

   - It is advised to place antenna at a maximum distance of 25m (82 ft.) from the antenna.
   - There must be a free line of sight between the antenna and the MagStream milk meters.

2. Mount and wire the VP4102 reader (set) following the instructions in the VP4102 (set for dairy farming) Installation Manual.

Caution

- Connect the VP4012 reader with the VP8002 VPU using a LAN connection and not a CAN cable.
- Connect the VP4102 reader to the LAN2 connector of the VP8002 VPU.
- When no VP4102 reader set is used, the VP4102 reader must be powered by a VP2001 power supply. Do not connect to the power supplies used for the InTouch control units.
- Make sure to always close the V-box with the V-box cover.

3. Mount the antenna mounting bracket following the instructions delivered with the mounting bracket.

4. Mount and wire the antenna (922 MHz) following the instructions in the *Antenna Installation Manual.*

3.6.3 MOUNT THE MAGSTREAM

1. Mount the bracket on a flat surface such as a wall or a plate. Use appropriate mounting material. Make sure there is at least 10cm (3.9 in.) free space above the bracket.

   a. Use the drilling template (**Figure 5**) that is delivered with the MagStream to mark three drilling holes on the wall or panel.
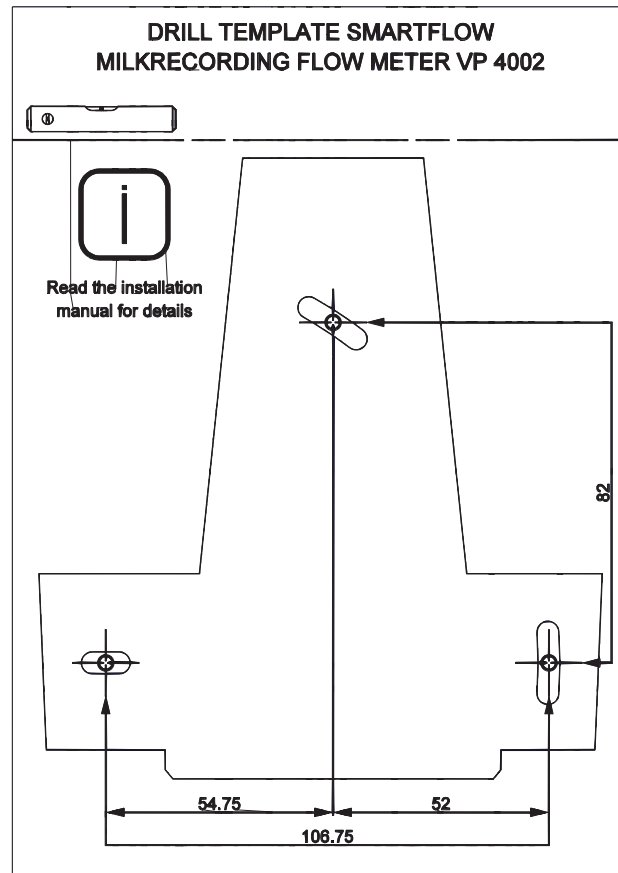
5.   **Drill Template**

   b. Drill the holes.

   c. Mount the bracket (**Figure 6**) using three M6 hex bold screws or hex head lag wood screws at least 20 mm (0.78 in.) length and washers.

   d. Tighten the two lower screws hand-tight. These screws are used to level the MagStream.

   e. Use the two lower screws of the bracket to level the bracket in the sidewards direction (left or right). See **Figure 7**.

   f. Tighten the two lower screws to lock the bracket.

DRILL TEM... ...RTFLOW
MILKRECORDI... ...TER VP 4002

Read the installation
manual for details

82

54.75   52
106.75
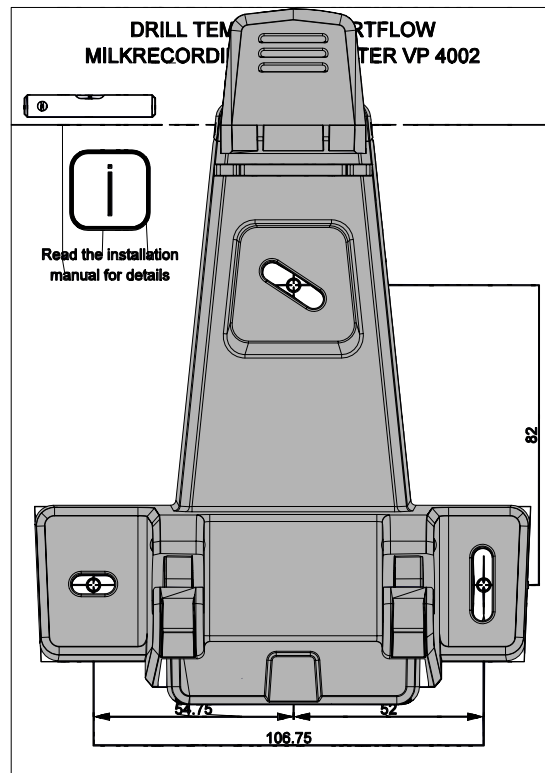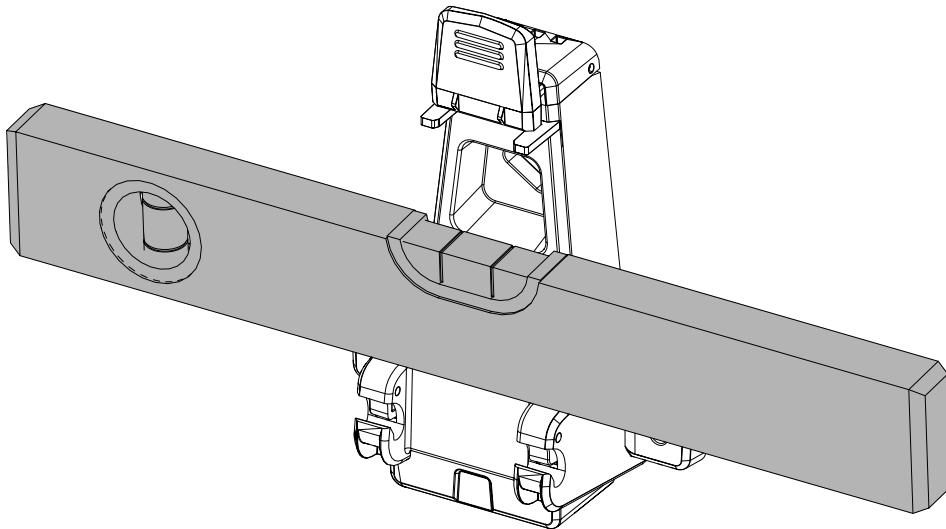
6.   Mount the Bracket

7.   Level the Bracket
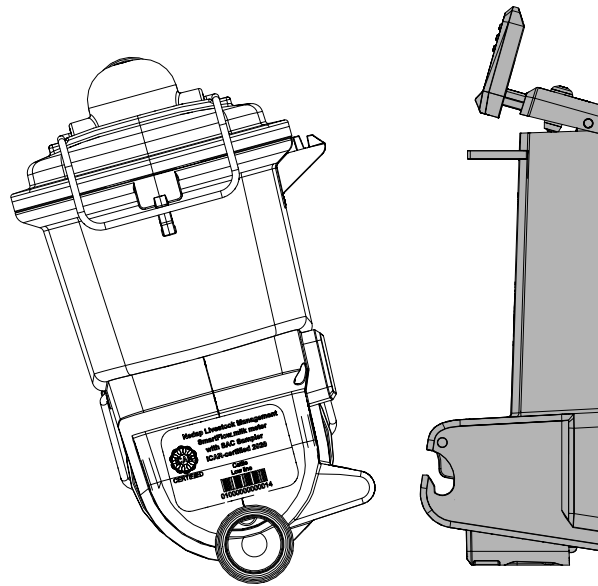
8. MagStream & Bracket, Side View
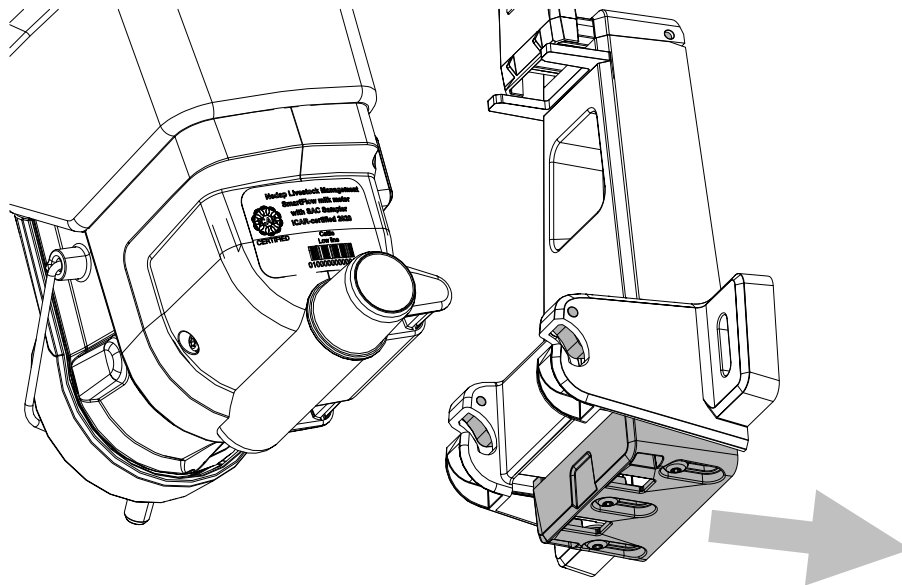
9. Press Push Button to Open Hinges

2. Place the MagStream (**Figure 8**) in the bracket as follows:

   a. Press the push button at the bottom of the bracket backwards to open the hinges (**Figure 9**).

   b. Slide the lower part of the MagStream in the hinges and release the push button (**Figure 10**). The hinges are now closed and the lower part of the MagStream is fixed in the bracket.

   c. Press the lever at the top of the bracket and slide the ridge of the MagStream under the lever (**Figure 11**).

   d. Release the lever to snap the upper part the MagStream. The MagStream is now mounted firmly in the bracket.

3. Level the bracket in forward-backward direction:

   a. Loosen the cover brackets of the MagStream (**Figure 12**).

   b. Remove the cover and spreader plate (**Figure 13**).

   c. Use the screw on top of MagStream to level the bracket in the forward-backward direction.
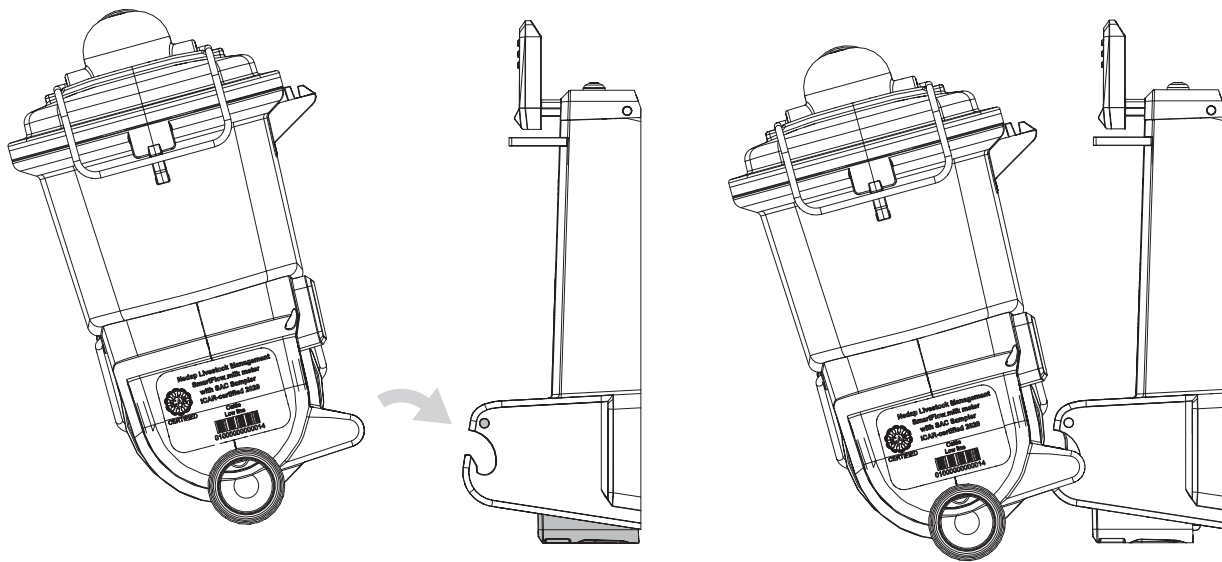
10. **Place Lower Part of MagStream into Hinge & Release Button**
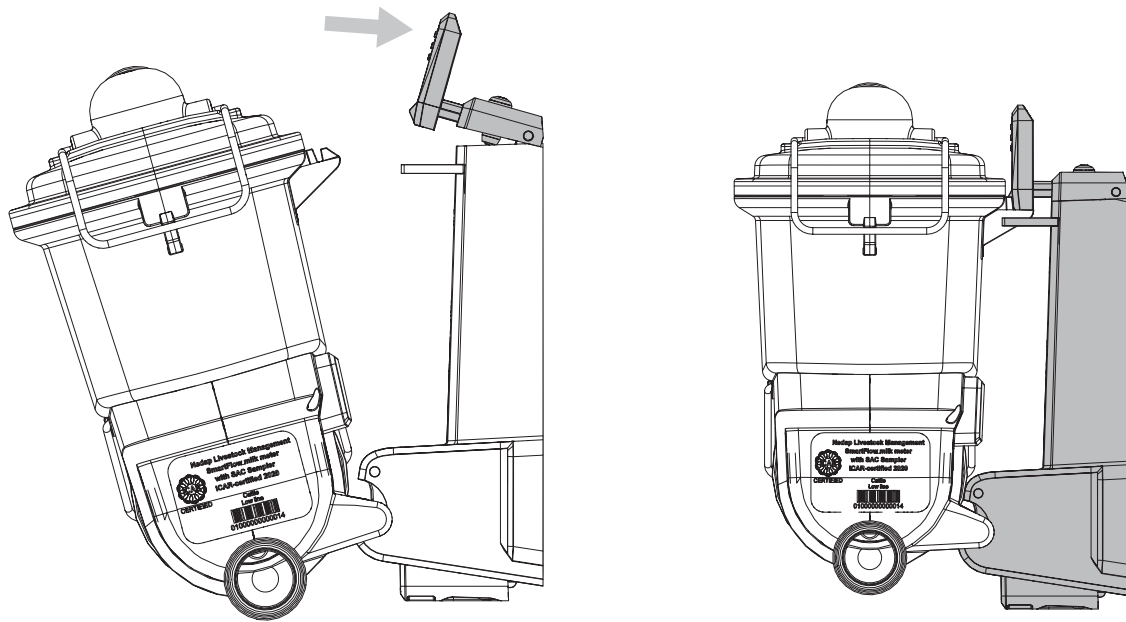
11. Press Top Lever & Insert Top of MagStream
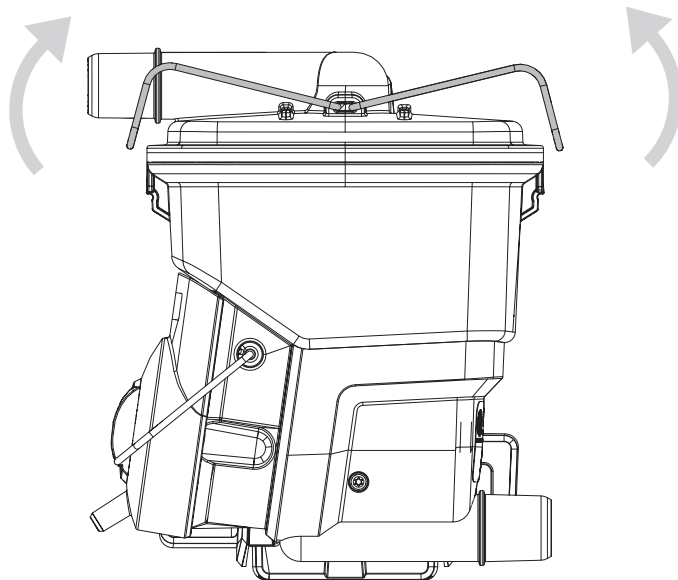
12. Loosen MagStream Cover Brackets
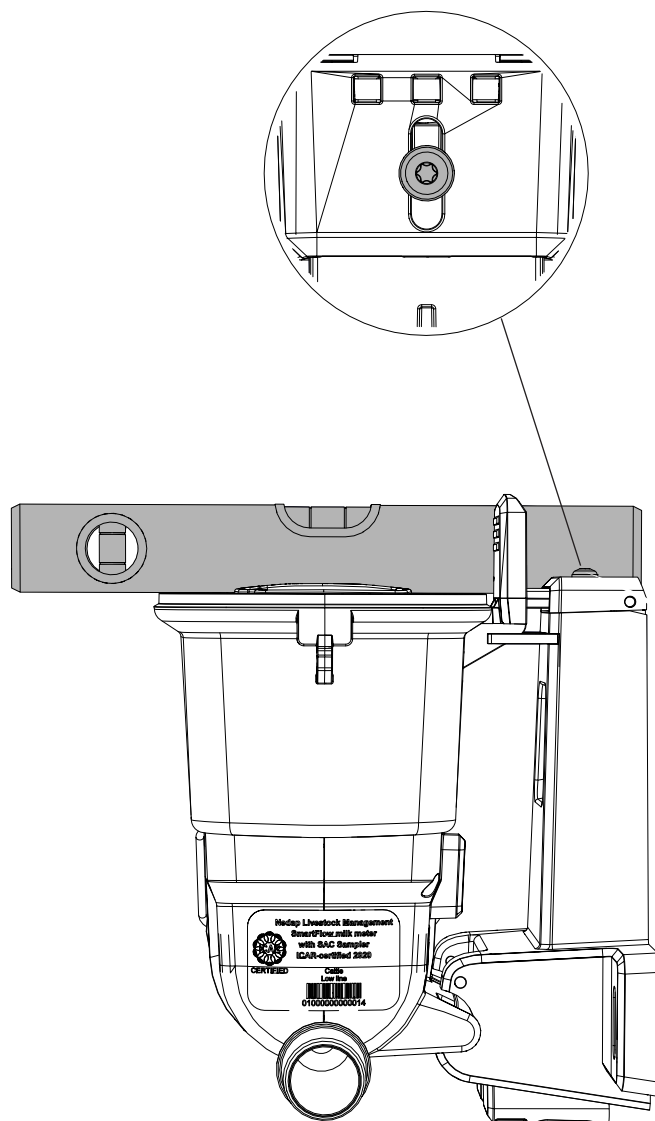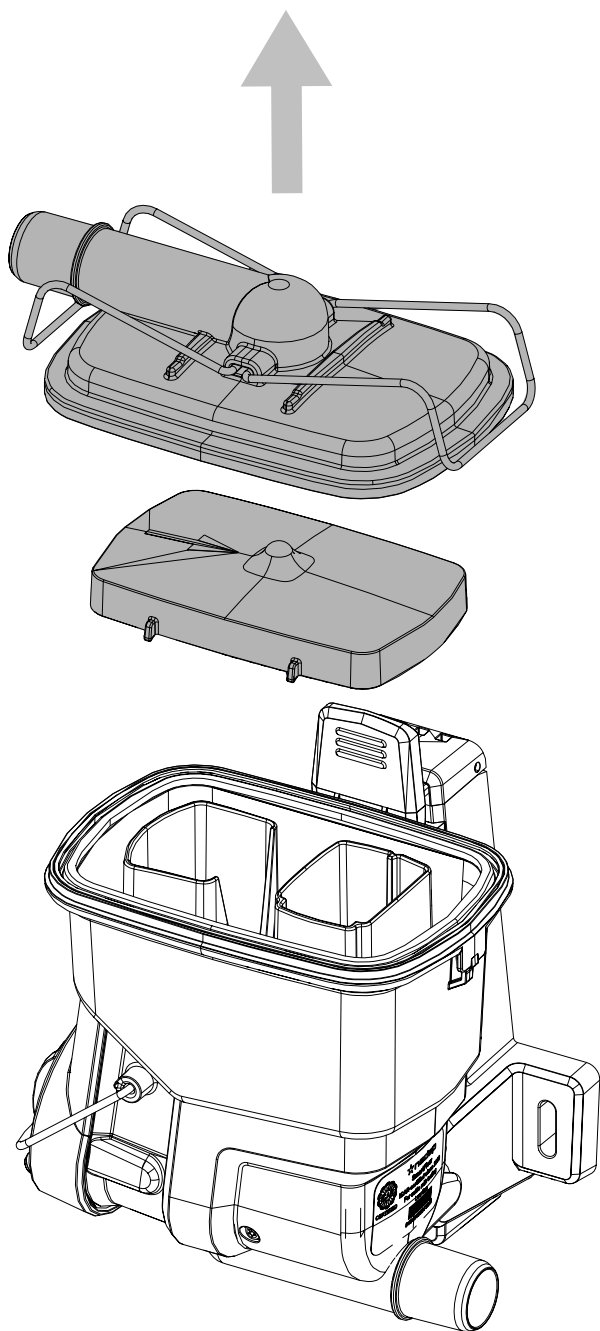
13. **Level in the Forward-Backward Direction using Screw**

3.6.4 PREPARE THE FLOAT

When the MagStream has been mounted, the next step is to prepare the float and attach the milk and vacuum tubes to the MagStream:

1. Unpack the float (**Figure 14**).
2. Record the number that is on the float, and the number of the milking point where the float will be used.
3. Put the float in the MagStream as is shown in **Figure 15**. This is the only correct way to place the float.
4. Place the spreader plate as is shown **Figure 16**. There is only one correct way to place the spreader plate.
5. Place the cover of the MagStream (**Figure 17**):

The cover of the MagStream can be mounted in two ways: With the milk inlet tube on the left side or on the right side. The mounting procedure only shows illustrations of the left side configuration, but is applicable for the right side configuration as well.

6. Fasten the cover brackets (**Figure 18**).
7. Attach the milk tube for the inlet to the cover of the MagStream. The milk tube on the cover must be pointing to the left, as shown in the picture (**Figure 19**).
8. Attach the milk tube for the outlet to the MagStream (**Figure 20**).
9. Attach the vacuum tube to the valve module (**Figure 21**).

The MagStream is now ready for use.
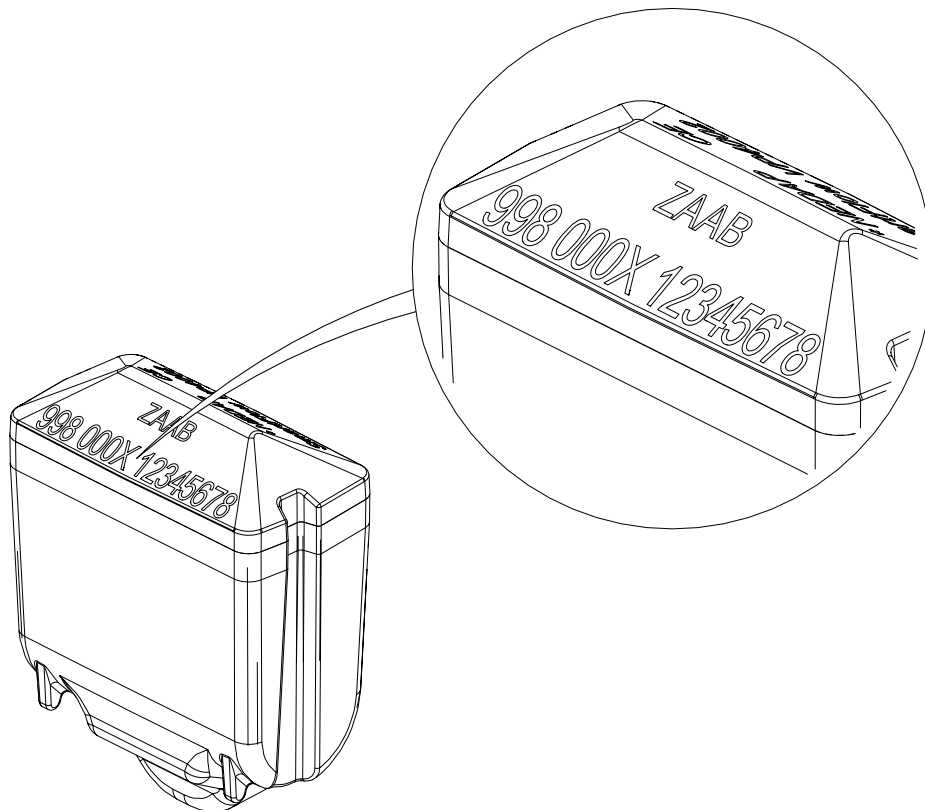
14. Float & Detail View of Number
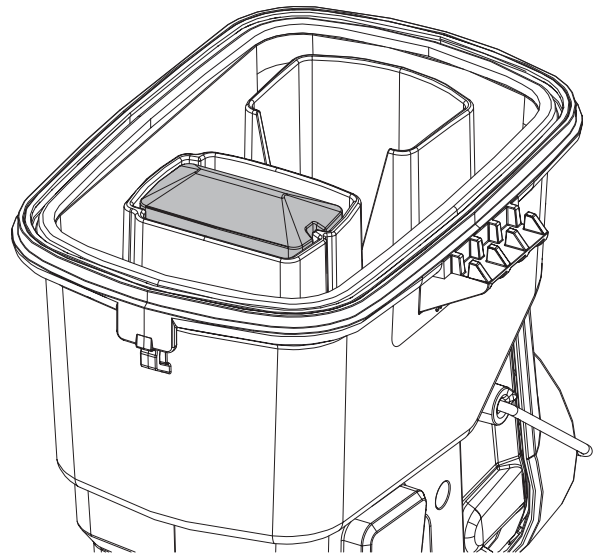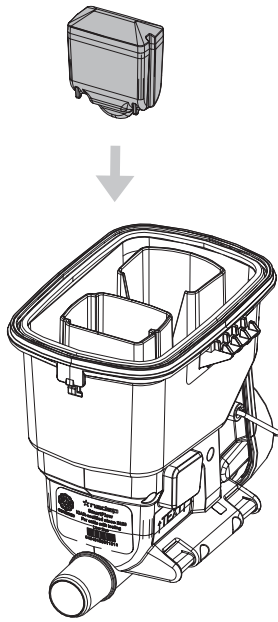
15. Correct Placement of Float
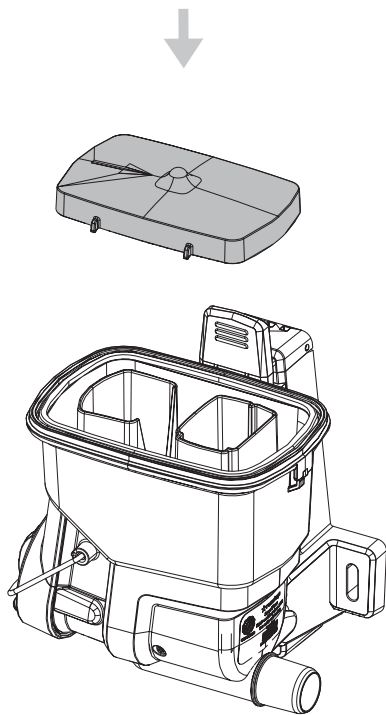
16. Spreader Plate
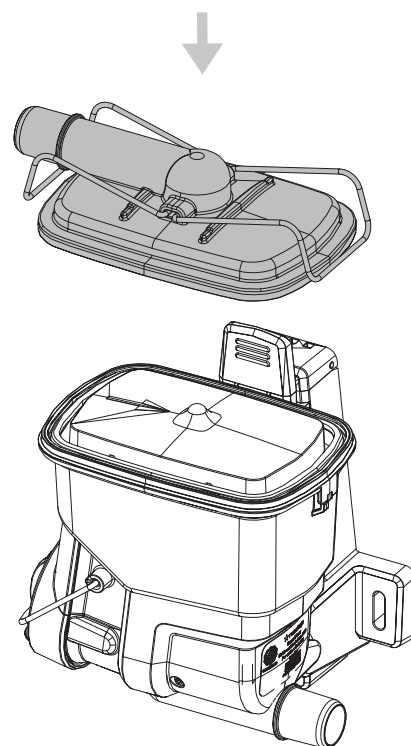
17. Cover
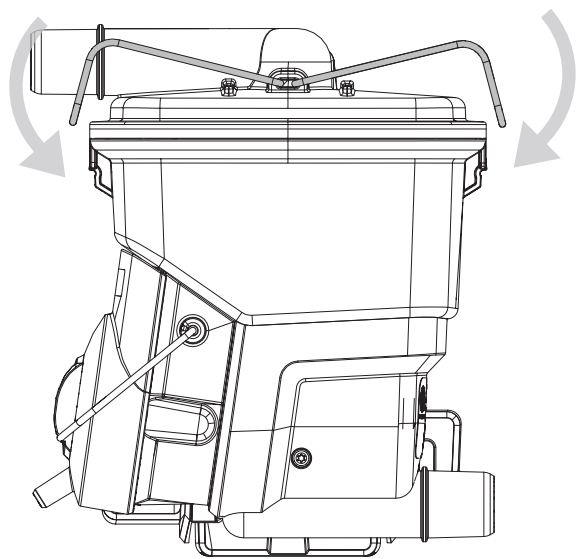
18.	Fasten Cover Brackets
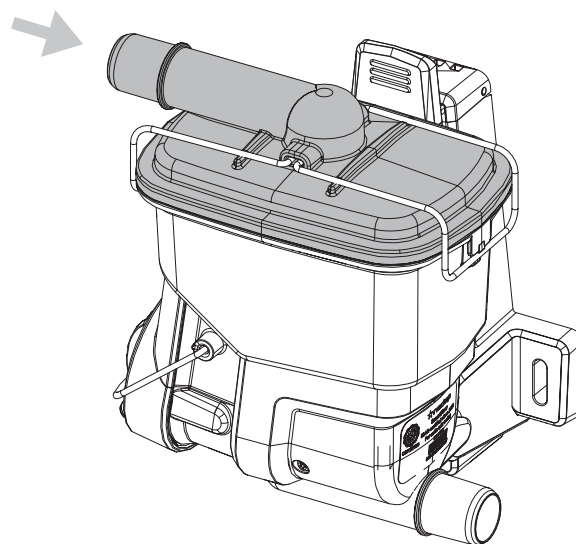
19.	Attach Milk Tube for Inlet
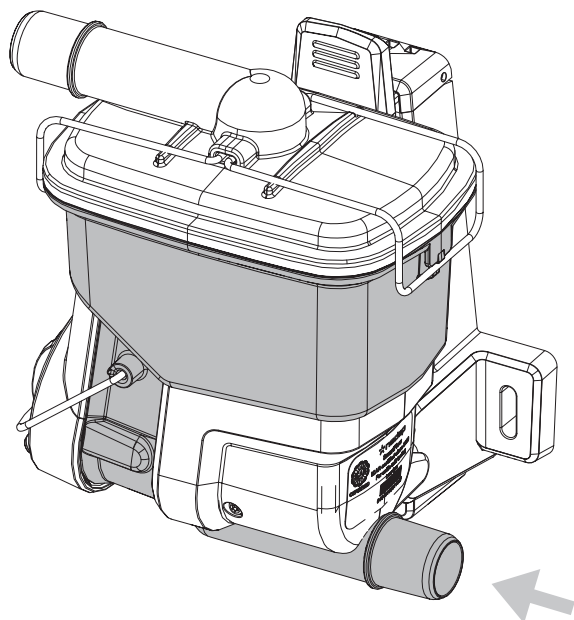
20.	Attach Milk Tube for Outlet
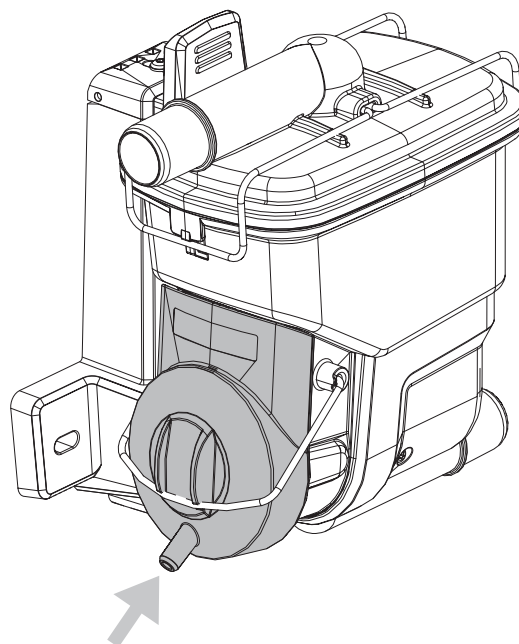
21.	Attach Vacuum Tube

3.7 MOUNT THE CENTRAL VACUUM LINE FOR CLEANING

The cleaning installation of the milking parlor must be connected with the MagStream milk meters. A central vacuum line is used to operate the valves of the MagStream milk meters for cleaning purposes.

3.7.1 CENTRAL VACUUM LINE FOR CLEANING

The central vacuum line for cleaning is a vacuum line to which all MagStream valve modules (refer to **Figure 3**) are connected. Vacuum is applied to change the position of the MagStream cleaning valve from the miking position to the cleaning position. When the vacuum is released the valve returns to the milking position.

The central vacuum line for cleaning must meet the following requirements:

- Air pressure hose (PE): 8, 10 or 12mm (0.3, 0.4 or 0.5 in.) diameter.
- Maximum length: 100m (328 ft).
- The cleaning vacuum must be as high or higher than the vacuum in the milking installation with a maximum of 55 kPa (8.0 psi).

3.7.2 CENTRAL CLEANING VALVE

The central valve in the vacuum line for cleaning operates the cleaning cycles of all MagStream milk meters connected to the vacuum line:

- The central cleaning valve must allow vacuum in the central vacuum line during cleaning.
- The central cleaning valve must never allow vacuum in the central vacuum line during milking. This prevents the MagStream from measuring the milk yield.

1. MagStream milk meter
2. Central vacuum line for cleaning
3. Central cleaning valve

22. **Vacuum Line for Cleaning the MagStream Milk Meters**
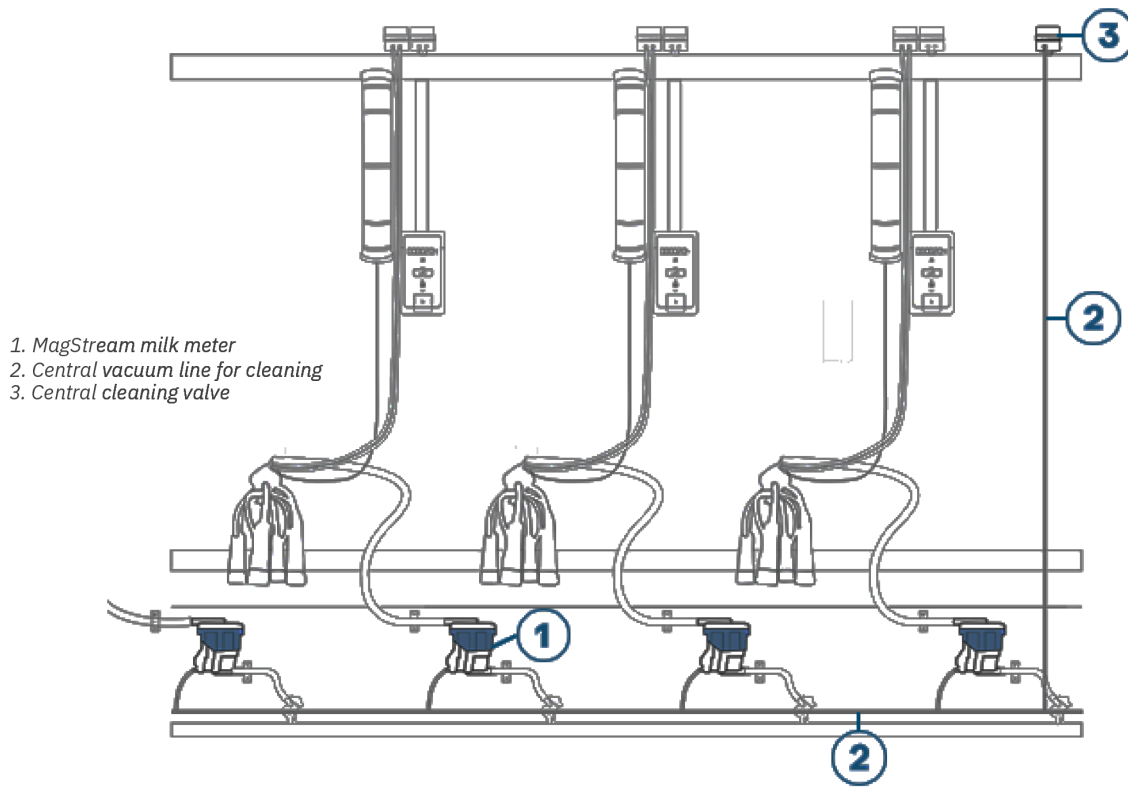
4. CONFIGURATION & CALIBRATION

Configure the MagStream system in the following order to ensure a correct start-up:

1. Configure the VP8002 VPU and VP4102 reader (*Section 4.1*)

2. Configure the Velos software (*Section 4.2*)

3. Zero Point test of the MagStream floats (*Section 4.3*)

4. Calibration of the MagStream milk meters (*Section 4.4*)

The MagStream calibration and validation events occur in the following order:

1. Installation of the new milking parlor, including the MagStream milk meters.

2. Zero Point test of the MagStreams to determine the setpoint of the float (*Section 4.3*)

3. Calibration of the MagStreams by carrying out the auto calibration or milk test (*Section 4.4*)

4. Annual validation check of the MagStreams by checking either the Zero Point test or the correction factors (*Section 6*)

Caution

When a component of the MagStream is repaired or replaced, for instance the float, the MagStream needs to be calibrated and validated again by executing steps 2, 3 and 4.

4.1 CONFIGURE THE VP8002 VPU AND VP4102 READER

Configure the VP8002 VPU(s) and VP4102 reader(s) before the MagStream milk meters are configured.

1. Configure the VP8002 VPU as described in the *VP8002 Installation Manual*.
   (When multiple VPUs are used in the system, configure one VPU as the main VPU and the other VPUs as secondary VPUs (see *VP8002 Installation Manual*).

2. Configure the VP4102 reader as described in the *VP4102 Installation Manual*.
   (When multiple VP4102 readers are used in the system, make sure that each VP4102 reader has a unique logic address (see *VP4102 Installation Manual*).

4.2 CONFIGURE THE VELOS SOFTWARE

The milking parlor and MagStream milk meters units must be configured correctly in Velos to enable a smoothly running milking process.

Before the MagStream milk meters are configured, make sure that the VP8002 VPU and VP4102 UHF reader(s) are configured (see *Section 4.1*).

4.2.1 MILKING PARLOR CONFIGURATION

The layout of the milking parlor must be configured in Velos.

1. In Velos, go to Settings > Milking > Parlours.
2. Click on Add a new parlour. The General parlour settings window opens.
3. Complete the General parlour settings:
   a. Enter a name for the milking parlor
   b. Select the type of parlor in the drop-down list.
   c. Fill in the numbers of the milk position range(s).
   d. Rotary parlor: Indicate if the rotary is turning clockwise or counter clockwise.
   e. Select the correct VPU in the dropdown list.
4. Click on Submit to create the milking parlor.

4.2.2 INSTALL THE BEHAVIOR COMPONENT

Since some components of the MagStream system are also used in other systems (for example the VP4102 UHF reader that is also used in CowControl and Cow Locating systems), all components must function as part of the MagStream system. Therefore the Behavior Component 'MagStream receiver' must be installed. The Behavior Component determines the correct function of the components. Install one Behavior Component per milking parlor.

1. In Velos, go to Settings > System > Behavior components.
2. Click on Add behavior component.
3. In the field Type:
   a. Select MagStream receiver.
   b. Fill in a name for the Behavior Component (BC).
   c. Click on Next.
4. Select the correct V-pack for the BC.
5. Click on Submit to install the BC.

4.2.3 COUPLE THE FLOATS TO THE MILKING POINTS

After the first time installation and when floats are replaced, the floats must be activated and coupled in Velos to the milking points.

> ⚠️ **Caution**
>
> The floats are deactivated for transport and therefore need to be activated before they can be coupled to a milking point.

1. In Velos, go to Settings > Milking > MagStream settings.
2. Select the milking parlor.
3. In the tab Float address, click on Start Activating Floats at the bottom of the screen. It will take a few minutes to activate the floats.
4. In the column Address, select the correct float numbers that correspond with the milking points recorded when the floats where placed inside the MagStream milk meters (see *Section 3.6.4*).
5. Click on Submit.

4.3 ZERO POINT TEST

The Zero Point test is a static measurement that measures the raw sensor height of a MagStream Float in a known setting. The Zero Point test is carried out at installation of the MagStream or after changing the Float. Furthermore, the Zero Point test can be done at the annual validation check.

Caution

Before the Zero Point test can be performed the milk meters must be cleaned.

4.3.1 CLEAN THE MILK METERS

Run a complete cleaning cycle to clean the MagStream milk meters.

4.3.2 START THE ZERO POINT TEST IN VELOS

1. In Velos, go to Settings > Milking > MagStream settings.
2. Select the milking parlor.
3. Go to the tab Zero Point Test.
4. At first installation the Zero Point Test must be run for all MagStream milkmeters. After the initial Zero Point test all or only a selection of MagStream milk meters can be tested:
   a. All MagStream milk meters: Click on the Start all button.
   b. One or multiple MagStream milk meters: Click on the Start button of the milking point(s).
5. The message Ready for new run is displayed for all milking points that are tested.
6. Continue with Execute the Zero Point test in the milking parlor (*Section 4.3.3*)

4.3.3 EXECUTE THE ZERO POINT TEST IN THE MILKING PARLOR

1. Decouple the milk inlet tube from the milk claw.

2. Install an air compressor on the vacuum inlet (between 200 and 500 mbar (2.9 and 7.3 psi). Recommended: 300 mbar (4.35 psi).

Warning

Do not exceed this pressure to avoid damage to your installation!

3. Pour drinking water in the milk inlet tube (see **Figure 23**). The minimum flow is 5 L/min (1.3 gal/min) for at least 5 seconds).

    a. To ensure that the water behind the milk meter can drain freely, the passage to the milk line must be open during the ZPT test.

    b. The float must rise at least halfway in the MagStream housing.

    c. When a small layer of water remains in the MagStream housing, the test run went well. If this is not the case, the valve is not in the correct position. Check the compressor connection and the pressure in the central cleaning line (Between 200 and 500 mbar (2.9 and 7.3 psi). Recommended: 300 mbar (4.35 psi). The temperature of the drinking water must be ca. 10°C (50°F)

4. In Velos the message Run in progress.. is displayed.

    a. The progress of the 5 runs of the Zero Point test is shown between brackets (x/5).

    b. If the test needs to be stopped while running, click on the Stop button.

5. When a test run is completed, the message Ready for new run is displayed to indicate that the milk meter can be filled again.
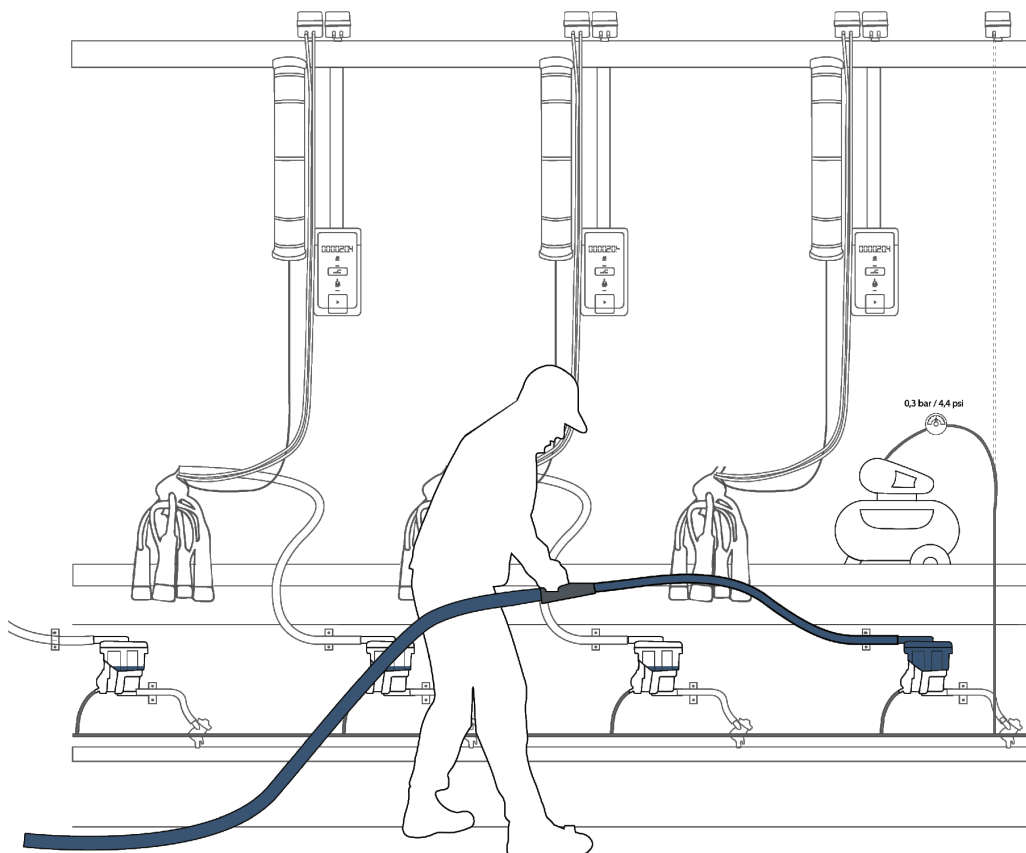
23. **Pouring Water into the Milk Inlet Tube**

6. Repeat step 3 and 4 four times.

⚠️ **Caution**

The total Zero Point test session consists of five consecutive runs, with at least 2-minute intervals.

7. For each tested milk meter, check if Velos has accepted the results of all 5 test runs:

   a. If all test runs are accepted, go to step 8.

   b. If less than 5 test runs are accepted: Run the missing number of test runs for that milk meter.

   c. If all test runs are not accepted: Click on the Restart Zero Point Test button and return to step 3.

8. Check the Zero Point test results (see *Section 4.3.4*).

9. Uninstall the air compressor.

10. Reconnect the milk inlet tube to the milk claw.

11. Remove any remaining water from the milk meter before a new milking session is started.

4.3.4 ZERO POINT TEST RESULTS

1. When the Zero Point test is finished in the milking parlor, Velos shows the status of the test results:

   a. The Zero Point test was completed successfully: The message Test completed. Calculated value = appears, including the calculated value.

   b. The Zero Point test was completed unsuccessfully: The message No Zero Point Test value could be calculated. is displayed. This is caused by the fact that the test results show too much variation. Click on the Restart Zero Point Test button and repeat the Zero Point test: See Section 4.3.3>

2. When the Zero Point test was completed successfully, always click the Write result button to save the test result.

   a. The message "The Zero Point Test value is being saved" is shown while the test results are being saved.

   b. Writing the test results can take up to two hours after pressing the Write result button.

3. Click on the Submit button to leave the test page.

4. The Reports > MagStreams page is opened automatically to show an overview of the Zero Point Test (ZPT) results.

5. The report can be printed by using the print icon.

6. 6. Send the "Zero point test" report to your ICAR Member Organization when calibration is completed (see *Section 4.4*).

TABLE 1: ZERO POINT TEST REPORT

Column Header	Description
Milking Point	
Address	
Current ZPT result	
New ZPT Result	
Last Performed	
Last Updated	
Value	
Last Updated	
Status	
Remark	

4.4 CALIBRATE THE MAGSTREAM

After installation of all MagStream milk meters, the milk meters must be calibrated to compensate for installation differences. MagStream milk meters can be calibrated by using auto calibration (see *Section 4.4.1*) or running the milk test (see *Section 4.4.2*). Auto calibration is the recommended method, provided that the conditions for auto calibration are met.

4.4.1 AUTO CALIBRATION

The Auto Calibration procedure analyses milk yield data over an extended period to calculate a correction factor for each milk meter and a bulk tank correction factor. After the installation of the MagStream milk meters and the execution of the Zero Point Test, Velos must collect stable milk yield data for at least 21 days. The data collection period starts when the Zero Point Test has been completed succesfully (see *Section 4.3*).

After at least 21 days of milking data collection, the Auto Calibration data becomes available in Velos. A warning is shown when not enough milking data is collected yet, including an expected delivery data for the Auto Calibration data.

All of the following conditions must be met to enable the use of this test. When not all conditions are met, this test cannot be used.

- The weights measured by the bulk tank must be weighed by a calibrated measuring instrument.
- Only milk from the milking parlor with MagStreams ends up in the bulk tank.
- The non-delivered milk yield can be properly estimated: The amount of milk that has flown through the MagStreams and has not been delivered via the bulk tank (for example when there is a milk tap on the farm or when some milk is used for own consumption or for feeding calves).
- There must be accurate animal identification in the milking parlor.
- The animals are sufficiently mixed over the different milking points.
- The equipment in the milking parlor (animal identification and all MagStreams) must have functioned without any problems or changes for at least 21 days , so that the data are representative and reliable.

Follow this procedure for Auto Calibration.

1. In Velos, go to Settings > Milking > Smartflow settings.

2. Select the milking parlor.

3. Go to the tab Auto Calibration.

⚠️ **Notice**

At initial start-up the bulk tank correction factor field is empty.

4. Click on the Update Bulk Tank Information button. The Delivery Period window opens.

⚠️ **Notice**

The delivery period is the milking period that is used for the calculation of the bulk tank correction factor. The milk yield registered in Velos during this period is used in the calculation. The delivery period preferably has a length of at least 6 days or includes at least 2 milk deliveries. The exact date and time can be found on the delivery note of the milk factory.

a. Enter the start date of the delivery period.

b. Enter the end date of the delivery period.

c. Enter the bulk tank yield that is reported by the milk factory.

d. Enter the non-delivered yield.

e. Click Submit.

5. The proposed correction factors for each milking point are calculated and the deviation between the current and newly proposed factors is shown.

6. Click on the Submit button to save the correction factors:

    a. A warning is displayed: Submitting these changes will update the correction factors for all milking points that have a new proposed correction factor.. Confirm your decision by clicking on Submit.

    b. The milk meters are now ready for use.

4.4.2 MILK TEST & CALIBRATION

- The milk that must be collected must flow through the MagStream before it is collected by a milking bucket.
- Weigh the collected milk with a calibrated ICAR approved weighing scale. See the ICAR documentation for more information.
- Collect the milk from at least 8 cows per milking place. If strange or extreme milkings are found in the collected milkings, collect the milkings from more cows.

Follow this procedure for the milk test. Use the Excel spreadsheet provided by the dealer for this test (Calibration sheet - milk test SmartFlow_V2020_2.xlsx).

1. Use one milking bucket per milking place and mark the bucket.

Notice

When there are not enough milking buckets for all milking places, be sure to use the same bucket for one milking place.

2. Wet all milking buckets, and empty them.

3. Weigh each empty milking bucket and fill in the weight of the buckets in the cell of row A Empty bucket (kg) of the calibration sheet.

4. Place the milking buckets on the milking places. Make sure the milk first flows through the MagStream before it is collected in the bucket.

5. Milk the first cow.

6. When the milking session of the first cow is finished, check the milk yield on the milking point controller of the first cow and fill in this weight in the cell of row B1 MPC (kg) of the calibration sheet.

7. Weigh the milking bucket with the collected milk, and fill in this weight in a cell of row C1 Bucket (kg) of the calibration sheet.

8. Empty the milking bucket completely.

9. Place the milking bucket back on the same milking place to collect the milk of the next cow.

10. Repeat steps 3 - 8 for all cows.

Notice

The calibration sheet calculates the correction factor automatically when at least 8 valid milkings are entered. Outliers are excluded for calculation. The number of valid milkings is shown in row Nr of valid milkings. The row Assignment shows if the correction factor can be used or if additional milkings are needed.

11. In the calibration sheet, in the row Correction factor, a new correction value is calculated. Fill in this value in Velos via Settings > Milking > SmartFlow settings > Overview.

5. COMMISSIONING

Caution

Before commissioning and handing over the system to the user, the installer must perform several checks and tests to verify that the system functions flawlessly. Encountered issues and problems must be solved first.

5.1 BEFORE STARTUP

Check that:

- All bolts are properly tightened. Tighten if necessary.
- All electrical connections are in order. Fix if necessary.
- No cabling is loose. Fasten cables with cable ties.

Notice

Prevent cables from touching moving parts.

- No obstacles might hinder or hurt the animals, such as protruding bolt ends. Remove if necessary.
- All components are connected to the network
- The Wi-Fi network is functioning properly.
- The Velos software is up and running and updated to the latest version.
- All VP8002s in one installation have unique numbers.
- All VP4102 readers in one farm section have unique numbers.
- When using multiple VP8002s: the VP4102 readers in one installation communicate with the correct VP8002.

5.2 INFORM THE END USER

Make sure the end user knows how to find all information in order to be able to work with the system:

1. Instruct the end user about the use and maintenance of the MagStream.

2. Instruct the end user about the use of the Velos system:

   a. Help option in Velos, by clicking on the Help icon in the right upper corner of the screen.

   b. Webhelp for more background information and all instructions for the daily use of the system. Find the Webhelp by clicking on the link More in the Velos Help.

6. ROUTINE CHECKS

All MagStream milk meters must be validated regularly, preferably annually, to ensure the accuracy of milk yield data.

The validation can be done by checking the auto calibration (recommended method) or alternatively, by checking the Zero Point test:

- Statistical routine check (*Section 6.1*)
- Alternative routine check (*Section 6.2*)

6.1 STATISTICAL ROUTINE CHECK

The MagStream milk meters can be validated by checking the auto calibration results of the milking points.

All of the following conditions must be met to enable the use of this test. When not all conditions are met, this test cannot be used.

- There must be accurate animal identification in the milking parlor.
- The animals are sufficiently mixed over the different milking points.
- The equipment in the milking parlor (animal identification and all MagStreams) must have functioned without any problems or changes for at least 21 days , so that the data are representative and reliable.

The procedure that must be followed depends on the data in the MagStream settings report:

1. In Velos go to Reports > Milking > SmartFlows..

2. Select the range of milking points that must be validated and click Ok.

Notice

A report is displayed with the current MagStream statuses. The column "Validation - Status" shows if theMagStreams are still measuring sufficiently.

3. Check the status of all milking points in the report:

   a. Status Ok for all milking points: Go to step 7.

   b. Status Not ok for one or more milking points: Go to step 4.

4. Check the MagStream milk meters with the status Not ok in the milking parlor:

   a. Malfunction not found: Go to step 5.

   b. Malfunction found: Go to step 6.

5. When the malfunction of the MagStream milk meters is unknown:

   a. Recalibrate the MagStream milkmeters (see *Section 4.4*).

   b. In Velos go to Settings > Milking > SmartFlow settings and select the milking parlor.

   c. Go to the tab Overview.

   d. Enter a remark about the recalibration.

   e. Click Submit.

   f. Go to Reports > Milking > SmartFlows.

g. Select the range of milking points that must be validated and click Ok.

h. Go to step 7.

6. When the malfunction of the MagStream milk meters is known:

a. Fix the malfunction of the milk meters.

b. When the malfunction included replacement of the MagStream Float:

1. Run the Zero Point Test (see *Section 4.3*).

2. Calibrate the MagStream (see *Section 4.4*).

3. Proceed with step 6d.

c. When the malfunction did not include replacement of the MagStream Float, use **Table 2** to check if recalibration is necessary:

TABLE 2: RECALIBRATION CHECK

Malfunction	Recalibration
Housing defect	Yes
Housing dirty	No
Cleaning valve defect	No
Housing is tilted	No

1. If recalibration is required: Follow the procedure in Calibrate the MagStream (*Section 4.4*) and proceed with step 6d.

2. If recalibration is not required: Go to step 6d.

d. In Velos go to Settings > Milking > SmartFlow settings and select the milking parlor.

e. Go to the tab Overview.

f. Enter a remark about the malfunction of the MagStream.

g. Click Submit.

h. Go to Reports > Milking > SmartFlows.

i. Select the range of milking points and click Ok.

j. Go to step 7.

7. Send the MagStream report to the certifying organization.

6.2 ALTERNATIVE ROUTINE CHECK

When the auto calibration method cannot be used, the Zero Point test can be used as an alternative method for the validation check of the MagStream milk meters.

6.2.1 CLEAN THE MILK METERS

Run a complete cleaning cycle to clean the MagStream milk meters.

6.2.2 START THE ZERO POINT TEST IN VELOS

1. In Velos, go to Settings > Milking > SmartFlow settings.
2. Select the milking parlor.
3. Go to the tab Zero Point Test.
4. Click on the Start all button.

> ⚠ **Caution**
>
> All MagStream milk meters must be tested annually!

The message Ready for new run is displayed for all milking points that are tested.

Continue with Execute the Zero Point test in the milking parlor (See *Section 6.2.3*)

6.2.3 EXECUTE THE ZERO POINT TEST IN THE MILKING PARLOR

1. Decouple the milk inlet tube from the milk claw.
2. Install an air compressor on the vacuum inlet (Between 200 and 500 mbar (2.9 and 7.3 psi). Recommended: 300 mbar (4.35 psi).

> ⚠ **Warning**
>
> Do not exceed this pressure to avoid damage to your installation!

3. Pour drinking water in the milk inlet tube (see **Figure 23**). The minimum flow is 5 L/min (1.3 gal/min) for at least 5 seconds.

   a. To ensure that the water behind the milk meter can drain freely, the passage to the milk line must be open during the ZPT test.

   b. The float must rise at least halfway in the MagStream housing.

   c. When a small layer of water remains in the MagStream housing, the test run went well. If this is not the case, the valve is not in the correct position. Check the compressor connection and the pressure in the central cleaning line (Between 200 and 500 mbar (2.9 and 7.3 psi). Recommended: 300 mbar (4.35 psi)).

> ⚠ **Notice**
>
> The temperature of the drinking water must be 10°C (50°F)

4. In Velos the message Run in progress.. is displayed.

   a. The progress of the 5 runs of the Zero Point test is shown between brackets (x/5).

   b. If the test needs to be stopped while running, click on the Stop button.

5. When a test run is completed, the message Ready for new run is displayed to indicate that the milk meter can be filled again.

6. Repeat step 3 and 4 four times.

⚠️ **Caution**

The total Zero Point test session consists of five consecutive runs, with at least 2-minute intervals.

7. For each tested milk meter, check if Velos has accepted the results of all 5 test runs:

   a. If all test runs are accepted, go to step 8.

   b. If less than 5 test runs are accepted: Run the missing number of test runs for that milk meter.

   c. If all test runs are not accepted: Click on the Restart Zero Point Test button and return to step 3.

8. Check the Zero Point test results (see Zero Point test results: (*Section 6.2.4*).

9. Uninstall the air compressor.

10. Reconnect the milk inlet tube to the milk claw.

11. Remove any remaining water from the milk meter before a new milking session is started.
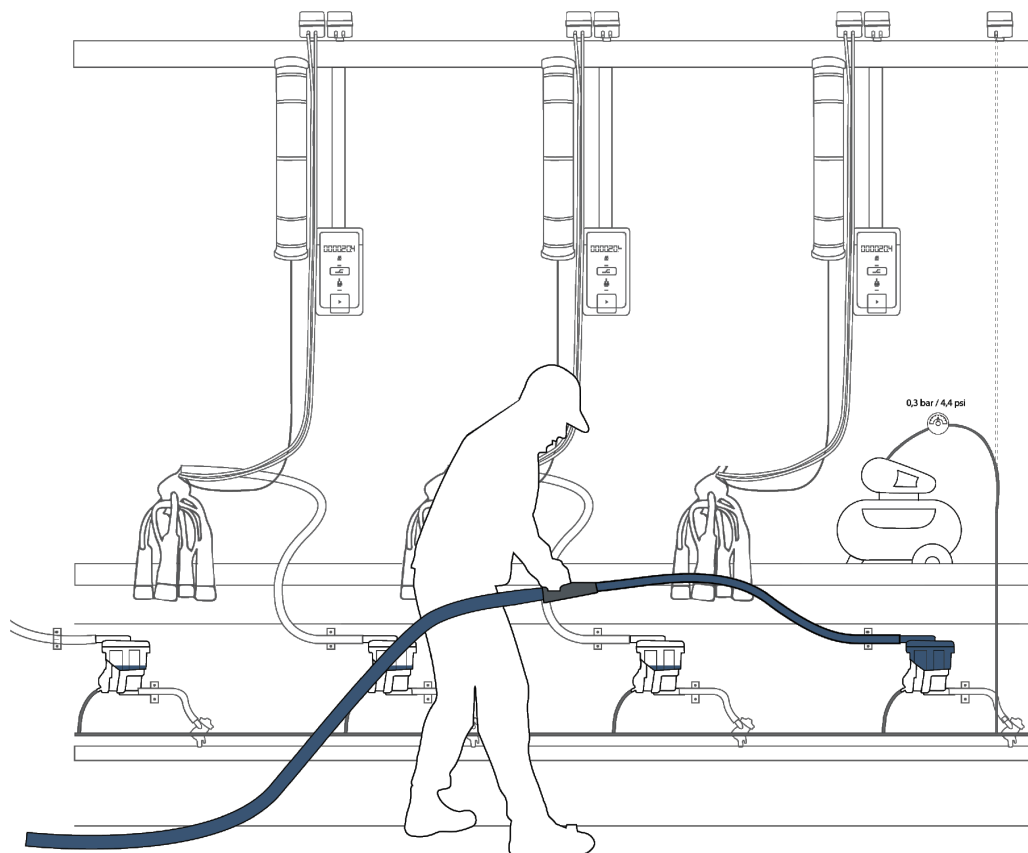
23. **Pouring Water into the Milk Inlet Tube**

6.2.4 ZERO POINT TEST RESULTS:

1. When the Zero Point test is completed, the result passed or failed is shown immediately.

2. PASS: new Zero Point Test value is in range. : No further action is needed, the result is stored and can be checked in the report.

3. FAILED: Zero Point Test result is not in range.: Check the MagStream in the milking parlor for technical issues.

    a. The MagStream is technically fine: Select one of the following options to proceed:

      • Cancel the new Zero Point test results.
      • Restart the Zero Point test.
      • Save the new Zero Point test result by selecting the option to overwrite the existing value and recalibrate (see *Calibrate the MagStream, Section 4.4*).

    b. The MagStream is technically not fine: Follow the following procedure:

      1. Fix the MagStream.

      2. Perform a new Zero Point test.

      3. Recalibrate (see *Calibrate the MagStream, Section 4.4*).

4. Click on the Submit button to leave the test page.

5. The Reports > MagStreams page is opened automatically to show an overview of the Zero Point Test (ZPT) results.

6. The report can be printed by using the print icon.

7. Send the "Zero point test" report to your ICAR Member Organization.

7. CLEANING

Make sure the MagStream is clean before using it for the first milking session. The main objective of optimizing the washing and disinfecting process of the MagStream is to ensure that no organic and/or inorganic residues can affect the quality of the milk flowing through the MagStream. The secondary objective is to strive for the longest possible service life of the MagStream and its components.

The environment of the equipment can have a major effect on its service life. The plastics used in the MagStream have good resistance to hot water with acidic and alkaline milking machine cleaning agents and disinfectants. However, products containing chloride, iodine, chloride acid, ketones, chlorinated hydrocarbons, aromatic hydrocarbons, phenols and higher alcohols can affect chemical resistance. Some of these chemicals can be present in varying concentrations in products such as fly sprays, some teat dip solutions and are sometimes used as propellants in aerosol cans. Avoid contact of these products with the plastic components of the MagStream.

Also take into account that long exposure of plastics to sunlight (UVA and UVB) can cause slight changes of color and/or transparency.

7.1 CLEAN THE MAGSTREAM

The MagStream must be in the cleaning mode to enable cleaning of the inside of the MagStream. Vacuum is applied to change the position of the MagStream cleaning valve from the milking mode to the cleaning mode (see *Section 2.2*). When the vacuum is released the valve returns to the milking position.

1. Check that the cleaning agents and the cleaning procedure meet the requirements described in *Section 7.2*.
2. Make sure that the MagStream cleaning valve is in the cleaning position when the cleaning cycle starts. The valve is put in the cleaning position by applying a vacuum on the vacuum line for cleaning (see *Section 3.7*).
3. Ensure a minimal flow rate of 5 kg/min (176 oz./min).
4. Start the cleaning manually or automatically.

Caution

Make sure that the cleaning vacuum ends when the milking starts.

7.2 CLEANING REQUIREMENTS

The quality of the washing process is determined by:

- Cleaning agents used, type and concentration: Cleaning agents (*Section 7.2.1*)
- Temperature: Water temperature and flow rate (*Section 7.2.2*)
- Mechanical aspects: Mechanical aspects (*Section 7.2.3*)
- Duration of the phases in the cleaning cycle: Cleaning cycle (*Section 7.2.4*)
- Amount of water used: Water usage (*Section 7.2.5*)

Read the following requirements and instructions concerning the cleaning process before cleaning the MagStream.

7.2.1 CLEANING AGENTS

Most common cleaning agents combine disinfecting and washing properties but single purpose cleaning agents are also available. Descaling of the equipment is required on a regular basis. Frequency depends on the quality of the water used for cleaning.

- Type and quality: Use good quality cleaning agents intended for cleaning milking equipment and approved by relevant (national or international) authorities.
- Concentration: Follow the instructions of the manufacturer. Both underdosing and overdosing must be avoided.
- Storage: Cleaning agents must be stored safely and under the conditions prescribed by the manufacturer. (Temperature can be a critical factor!)
- Shelf life: Most cleaning agents have a limited shelf life. Once expired, the effectiveness, especially the disinfecting qualities, can reduce significantly.
- Composition: The materials used in the MagStream are resistant to all known cleaning agents for milking installations. In some cases (especially for cleaning agents containing acids) long contact times must be avoided. This means that all MagStream milk meters need to be drained thoroughly after washing. Proper draining requires adequate closing and opening of the MagStream cleaning valve. The vacuum level in the milking installation determines the functioning of the valve. To put the MagStream in the cleaning mode, make sure the vacuum level on the valve is higher than the vacuum level in the MagStream itself.

Caution

Avoid contact between the MagStream and products with chloride, iodine, chloride acid, ketones, chlorinated hydrocarbons, aromatic hydrocarbons, phenols and higher alcohols to prevent chemical resistance of the MagStream.

7.2.2 WATER TEMPERATURE AND FLOW RATE

In circulation cleaning systems, the water temperature during the main wash phase is a critical factor. The minimum temperature at the end of the main wash phase must be ± 45°C (113°F) in order to keep the milk residues (fat) dissolved.

Good timing of the cleaning phases, the amount of (hot) water used, covering the wash trough, adding additional heating and insulating of parts of the milking installation can help meet this minimum temperature requirement.

Although the MagStream and all its components can resist temperatures up to and above 100°C (212°F), it is not recommended to apply hot boiling water washing. The maximum allowed temperature is 75°C (167°F).

For the cleaning program a minimal flow rate of 5 kg/min (176 oz./min) is necessary.

7.2.3 MECHANICAL ASPECTS

Both the design and materials of the milk meter and the mechanical components of the cleaning process are instrumental in the quality and effectiveness of the cleaning process of the milking equipment and the MagStream milk meter in particular.

The milk meter is designed to be used in circulating cleaning systems. A specially integrated cleaning program controls the MagStream cleaning valve, which actively supports the quality and effectiveness of the cleaning process.

The settings of the cleaning program must be synchronized with the manual or automatic cleaning procedures. See *Section 7.2.6*.

The mechanical components of the cleaning process are:

- Turbulence
- Column formation in large diameter milk lines
- Speed and persistence of columns

Turbulence has the greatest positive effect on the cleaning of the milk meter. The availability of sufficient cleaning liquid in all phases of the cleaning process is also important.

Turbulence can be promoted by air injection and/or increased vacuum (5 to 10 kPa (0.7 to 1.5 psi) above milk vacuum). A sufficient vacuum level is essential for the proper functioning of the MagStream cleaning valve and the drainage after each phase of the cleaning process (phase separation).

7.2.4 CLEANING CYCLE

In general the cleaning cycle exists of the following phases:

1. Pre-rinse: Cold or lukewarm pre-rinsing without circulation with clean water to remove the milk residues. The length of this phase mainly depends on the time needed to thoroughly rinse and drain all internal surfaces of the milking installation.

2. Main wash: Hot main wash with circulation of water with cleaning agent. The length of this phase mainly depends on the instructions of the manufacturer of the cleaning agent at the minimum water temperature of 45°C (113°F). The main wash takes on average 5 to 10 min.

3. Rinse: Cold rinse without circulation to remove the last remnants of the cleaning agent used in the main wash. The length of this phase mainly depends on the time needed to thoroughly rinse and drain all internal surfaces of the milking installation.

7.2.5 WATER USAGE

The amount of water needed for the cleaning of a milking installation strongly depends on the construction and configuration of the milking installation. The extra water usage for the cleaning of the MagStream milkmeters is: 0.6 L (0.16 gal) per milk meter and per cleaning cycle (see *Section 7.2.4*).

The pre-rinse and rinse phases of the cleaning cycle do not use circulation and therefore need sufficient water to thoroughly clean all internal surfaces.

7.2.6 CLEANING PROGRAM SETTINGS

The cleaning program settings depend on the cleaning equipment used, but the settings must give the following results:

The central valve in the vacuum line must control the MagStream cleaning valve.

The MagStream milk meter must be completely filled with water for more than 50% of the time during each of the three phases of the cleaning cycle (see *Section 7.2.4*).

Caution

When this condition is not met, the cleaning program must be adjusted.

7.3 CLEANING VALIDATION

It is very important that the milking installation and the MagStream milk meters are cleaned thoroughly after each milking session. The cleaning of the MagStream milk meters is validated by Velos, based on the MagStream Float position and temperature.

An attention is created when the cleaning procedure is not started or does not run correctly:

1. No_cleaning attention:
    - Based on the absence of a temperature rise after a milking session.
    - Attention is at parlor level.
    - If a new cleaning cycle is started, the attention will be removed.
    - If no new cleaning cycle is detected after the next milking session, a new No_cleaning attention will be created.
2. Abnormal_cleaning attention:
- Based on the detection of a temperature rise after a milking session: The temperature rises when the cleaning cycle starts.
- Based on the height of the MagStream Float during cleaning:
    - Correct operation: The MagStream Float lies on the bottom of the milk meter during the cleaning cycle.
    - Incorrect operation: The MagStream Float is floating in the milk meter during the cleaning cycle.
      This caused by the fact that the cleaning valve is not in the correct position or the vacuum line of the MagStream is not functioning correctly.
- Attention is at MagStream level (per milking point).
- If the next cleaning cycle is normal, the attention will be removed.
- If the next cleaning cycle is abnormal again, a new attention is created.
- If no new cleaning cycle is detected after the next milking session, no new Abnormal_cleaning attention will be created. The current Abnormal_cleaning attention remains and a new No_cleaning attention is created.

The cleaning validation is based on the following requirements:

- The duration of the milking session should be at least 30 min.
- The cleaning cycle starts within 60 min. after the miking session has ended.
- The validation check is performed every 5 sec., based on the last received message of the MagStream Float.

8. MAINTENANCE

Caution

Always turn off the mains power supply when working on the electrical installation.

Always turn off the air pressure supply when working on the pneumatic installation (if applicable).

Never power wash the electrical components of the installation.

Do not use corrosive and/or toxic cleaning agents.

Notice

Any damage and/or accelerated wear due to non-compliance or complete lack of maintenance is not covered by the manufacturer's warranty.

Any damage caused by power washing or any other form of high pressure washing is not covered by the manufacturer's warranty.

8.1 MAINTENANCE SCHEME

TABLE 3: MAINTENANCE SCHEDULE

| When	Part	Action	Who
After each milk session	MagStream	Clean the MagStream following instructions in *Section 7.1*	User
After each milk session	Milk cluster	Clean the milk cluster and check that the air bleed hole(s) are open	User
Every two years or after 12,000 milkings	Part: • Main valve module • Seal	Replace with parts delivered in: • MagStream Valve Module replacement set • MagStream Seals replacement set	Installer
Float is broken	Float	Replace the MagStream Float following instructions in *Section 8.2*	Installer

8.2 REPLACE THE MAGSTREAM FLOAT

When the MagStream Float needs to be replaced, proceed as follows. See **Figures 24**, **25** & **26**.

1. Loosen the cover brackets of the MagStream milk meter.
2. Remove the cover and spreader plate.
3. Unlock the MagStream.
4. Rotate the MagStream to remove the float. Prevent the float from falling on the ground.
5. Place the MagStream back in the mounting bracket and lock the lower and upper part of the MagStream.
6. Use the screw on top of MagStream to level the bracket in the forward-backward direction (see *Section 3.6.3*)
7. Place the new float following the procedure described in *Section 3.6.4*.
8. Place the spreader plate and cover.
9. Fasten the cover brackets.
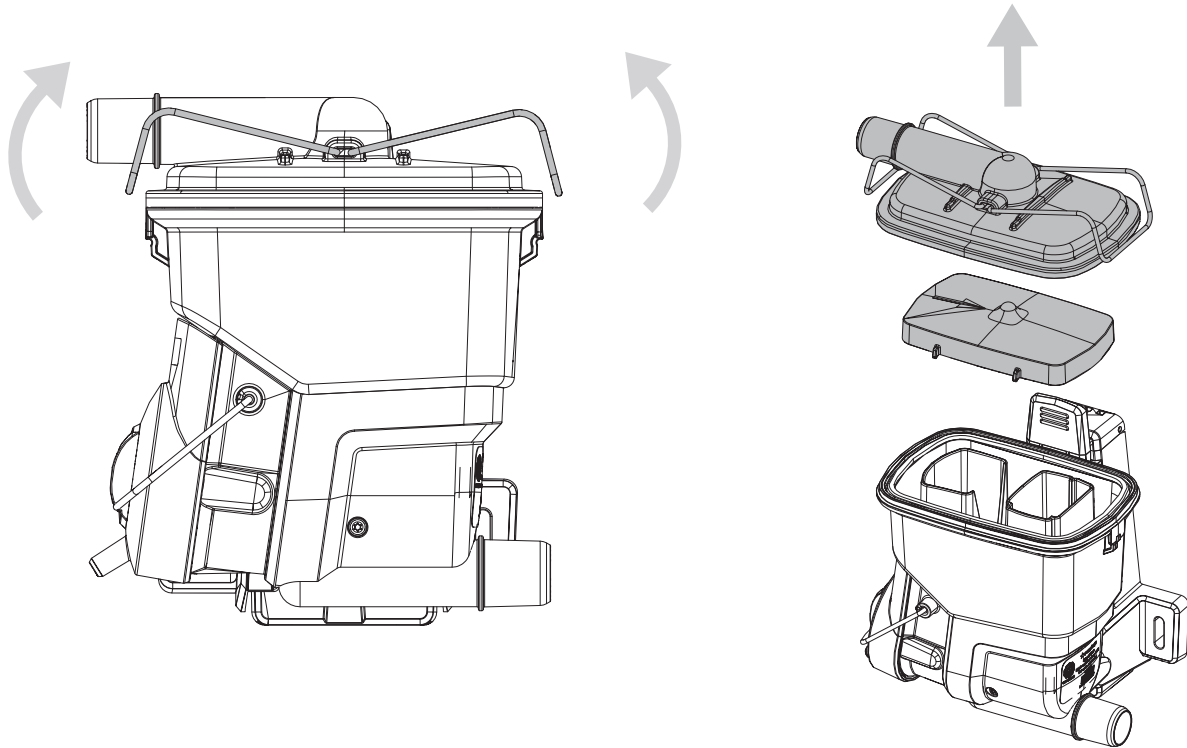
24. **Loosen Cover Brackets & Remove Cover & Spreader Plate**
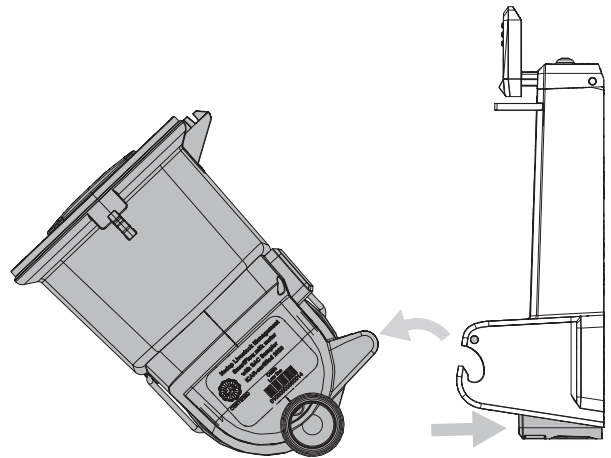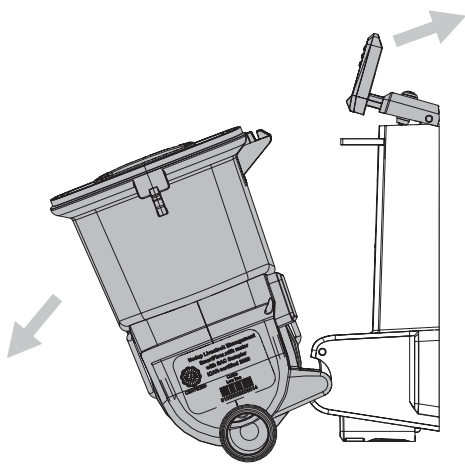
25. Unlock the MagStream
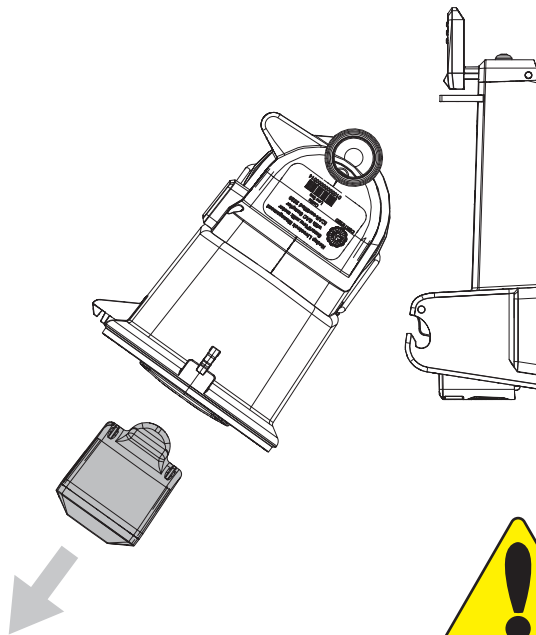
Caution

Prevent the float from falling on the ground

26. Rotate the MagStream to Remove the Float

9. TROUBLESHOOTING

9.1 MALFUNCTIONS

TABLE 4: MALFUNCTIONS, CAUSES & SOLUTIONS

Malfunction	Cause	Solution
No milk yield measurement.	• MagStream milk meter is clogged. • Float broken/ float does not send data. • Seal of the MagStream cleaning valve is torn.	• Clean the inside of the MagStream. • Replace the float. • Replace the seal of the MagStream cleaning valve with the seal delivered in the replacement kit.
Milk yield measurement deviates.	• MagStream milk meter is skewed. • MagStream milk meter is clogged. • Seal of the MagStream cleaning valve is torn.	• Level the MagStream. • Clean the inside of the MagStream. • Replace the seal of the MagStream cleaning valve with the seal delivered in the replacement kit.
Milk yield measurement shows milk yields that are far too high.	The air bleed hole(s) of the milk cluster are clogged.	Clean the milk cluster.
MagStream milk meter is clogged.	Insufficient cleaning.	• Check supply of cleaning agent. • Check vacuum hose. • Check seal of the MagStream cleaning valve. • Check MagStream seal.
No_cleaning attention	The cleaning cycle has not started (see Cleaning validation, Section 7.3).	Check the cleaning installation of the milking parlor.
Abnormal_cleaning attention	The MagStream is not cleaned correctly (see Cleaning validation, Section 7.3).	• Check if the float is on the bottom of the MagStream during the cleaning cycle. If the float is floating during cleaning, the cleaning valve is not in the correct position. • Check the vacuum line of the MagStream.

10. STORAGE & DISPOSAL INSTRUCTIONS

If the product is to be stored for some time, make sure that it is under a protective cover to prevent dirt and moisture from entering.

Do not expose the product to direct sunlight and/or adverse weather conditions such as storm, rain, hail or snow.

See the technical specifications for the storage temperature range and relative humidity (*Section 12*).

The owner or last user of the product is responsible for the proper disposal of (parts of) the product according to local rules and regulations.

The WEEE symbol in Europe indicates that the relevant electrical product or battery should not be disposed of as general household waste in Europe. To ensure the correct waste treatment of the product and battery, please dispose of them in accordance to any applicable local laws of requirement for disposal of electrical equipment or batteries. In so doing, you will help to conserve natural resources and improve standards of environmental protection in treatment and disposal of electrical waste (Waste Electrical and Electronic Equipment Directive WEEE 2012/19/EU).

11. GLOSSARY

TABLE 5: GLOSSARY TERMS

Term	Description
Behavior component	The behavior of a standard hardware component and/or the total management system, set by Velos software.
MagStream	The milk meter.
Float	The float in the milk meter that wirelessly monitors whether the device is correctly installed, functions properly, cleans properly and has a data connection.
SmartLite	Milking point control unit
V-box	Housing for V-packs.
V-pack	VPU or VP
VP4102	Reader Input/Output controller
VP8002	Velos Processing Unit (VPU)
VPU	Velos Processing Unit (VP8002)
VPU-online	An online address for the herd manager that makes the Nedap system worldwide accessible by the Internet.
Velos software	Nedap software to control the system

12. TECHNICAL SPECIFICATIONS

TABLE 6: TECHNICAL SPECIFICATIONS

Component	Feature	Value
MagStream without Float	Dimensions (L x W x H)	175 x 155 x 192mm (6.89 x 6.10 x 7.56 in.)
	Weight	1.0kg (2.2 lbs)
	Construction material	• Parts in contact with milk: PPSU + LSR (Liquid Silicone Rubber) (both FDA and EU approved) • Other plastic parts: PPGF 30 • Mounting materials: stainless steel
Float	Dimensions (L x W x H)	47 x 25 x 61mm (1.9 x 0.9 x 2.4 in.)
	Weight	0.035kg (0.077 lbs)
	Construction material	Parts in contact with milk: PPE + PP (FDA and EU approved)
	Enclosure protection class	IP67
	Power source	Non-replaceable lithium coin cell battery meeting UN3091
	UHF Data communication (Operating frequency)	• EU: 866.0 - 867.5MHz • USA, Canada, China, Oceania: 921.8 - 924.2MHz • Japan: 918.6 - 921.8MHz
	Max. transmit power	< 1mW E.r.p
	Update rate	Every 5 sec. (when placed in the MagStream and activated)
	Energy saving	Sleeping mode when not placed in the MagStream
	Detection distance	30m (98 ft)
Vacuum supply	Minimum (work) pressure	30kPa (4.4 psi, 0.3 bar)
	Maximum (work) pressure	60kPa (8.7 psi, 0.6 bar)
Milk tube	Inside diameter Ø	16 to 19mm (0.62 - 0.75 in.)
Vacuum tube for cleaning valve	Inside diameter Ø	6 to 8mm (0.23 - 0.31 in.)
Cleaning		Suitable for Cleaning In Place (CIP)
Warranty		2.5 yrs.
Environmental	Enclosure protection class (Float)	IP67
	Operating temperature range	-10 to 80°C (14 to 176°F)
	Storage temperature range	-20 to 70°C (-4 to 158°F)
	Relative humidity (non-condensing)	< 93%
Compliance	Certification	ICAR, 3-A Sanitary Standards
	Certificates and declarations	All relevant certificates and declarations are available at the business portal: https://nedap.com/livestockmanagement-portal.

13. COMPLIANCE

13.1 FCC AND ISED COMPLIANCE STATEMENT

This device complies with part 15 of the FCC Rules and with RSS-210 of Innovation, Science and Economic Development Canada. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

13.2 FCC AND ISED RADIATION EXPOSURE STATEMENT

This equipment complies with FCC and Canadian radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

13.3 FCC AND ISED INFORMATION TO THE USER

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequent energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that of the receiver.
- Consult the dealer or an experienced radio/TV technician for help.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. To ensure compliance with FCC regulations, use only the shielded interface cables provided with the product, or additional specified components or accessories used with the installation of the product.

This Class B digital apparatus complies with the Canadian standard ICES-003.

13.4 CE - UKCA DECLARATION

Nedap N.V. hereby declares that the subject equipment is in compliance with:

- For CE: Directives 2014/53/EU (Radio Equipment Directive) and 2011/65/EU (Restriction of the use of certain hazardous substances).
- For CE: Complies with the essential requirements and provisions of Directive 1935/2004 on materials and articles intended to come into contact with food as amended. The equipment also complies with Directive 10/2011 relating to plastic materials and articles intended to come into contact with foodstuffs as amended
- For UKCA: SI2017/1206 (UK Radio Equipment Regulations 2017) and SI2012/3032 (Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 (RoHS)).

The full text of the declarations of conformity is available at http://www.nedap.com/livestockmanagementportal where, if applicable, REACH information may also be found.

See **Table 7** for certifications.

TABLE 7: COMPLIANCE

Region	Certification
Europe	CE
United Kingdom	UK CA
USA	FCC ID: CGDVP4002
Canada	IC: 1444A-VP4002
Australia	
New Zealand	R-NZ
Japan	209-J00450