

Instruction Manual

Nedap SmartFlow



Installation manual

Version 01.001 / 2021 / EN

Original instructions



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Warranty and spare parts

Please consult the Nedap products dealer from whom you purchased this product, in regards to the applicable warranty conditions. This product cannot be used for any other purpose as described in this document. If the product is not installed according to this document; the warranty provided is not applicable. At the sole discretion of Nedap N.V., Nedap N.V. may decide to change the conditions of the warranty policy. You agree that Nedap N.V. is able to compensate you the pro-rata value of the warranty involved rather than replacing or repairing the product depending on the technical or economical value of the product. Prior to applying the warranty, please verify if you comply with the warranty conditions of the warranty policy, whether you can successfully apply for the replacement or repair of a defective part. Parts can only be replaced with original Nedap parts, otherwise the warranty policy will not be applicable on the product. If the warranty is applicable, please contact the dealer or send the defective parts to the dealer.

Additional information

For any information or questions regarding the product, please contact your own dealer.

Nedap SmartFlow



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1 Safety

Read this manual before using this product. Failure to follow the instructions and safety precautions in this manual may result in serious injury or death. Keep this manual in a safe location for future reference.

Symbols used in the manual

 Danger	Indicates a hazardous situation that, if not avoided, will result in death or serious injury.
 Warning	Indicates a hazardous situation that, if not avoided, could result in death or serious injury.
 Caution	Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.
	Indicates important information but not hazard related.
	Suggestions and advice to perform certain tasks more easily.

General safety instructions

-  **Warning**
Always turn off the mains power supply when working on the electrical installation.
-  **Warning**
Always wear proper protection when installing and maintaining the Nedap SmartFlow.
-  **Caution**
Installation and service should only be done by locally qualified personnel.
-  **Caution**
Install the system according to the local rules and regulations.
-  **Caution**
We advice to install and maintain the Nedap SmartFlow with at least 2 persons.

Working environment

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





Caution

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



Caution

Make sure all cables are properly concealed, and form no danger for stumbling.

Animal welfare and safety

The automated actions of the Nedap Livestock Management systems do never discharge the installer and the user of the system from his/her responsibility to assure **and** to take care of the well-being of the animals.



2 SmartFlow overview

2.1 SmartFlow introduction

The Nedap SmartFlow 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 Nedap SmartFlow 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. It also leads to higher milk quality with less free fatty acids.

The SmartFlow is completely wireless. The Float inside the device 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 SmartFlow and Nedap's dairy management system takes place via Ultra High Frequency (UHF) communication. All data that is measured and recorded by the Nedap SmartFlow 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.

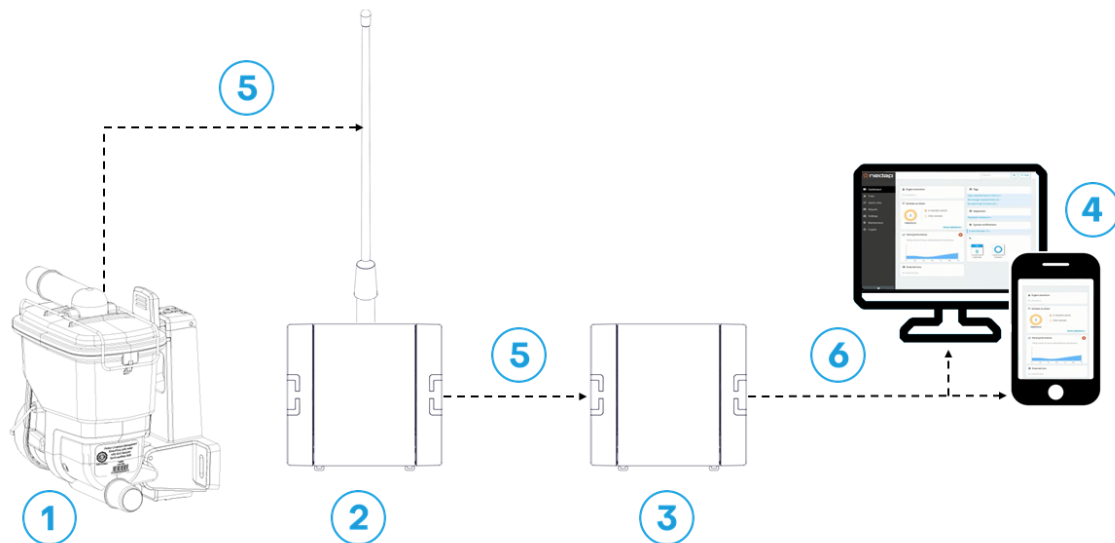



Figure 1: SmartFlow system overview

1. SmartFlow 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

 The Nedap SmartFlow milk meter is delivered together with the Nedap Milking Point Control Unit (MPCU). The MPCU is installed on each milking point to control the milking and cleaning process. For more information see the MPCU Installation Manual.

2.2 Components

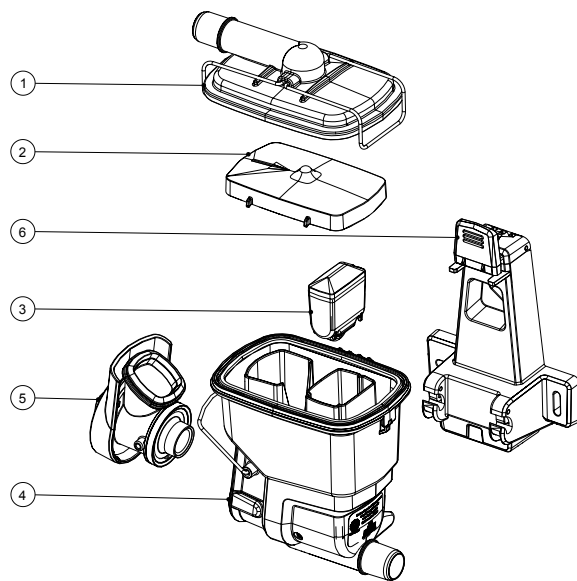


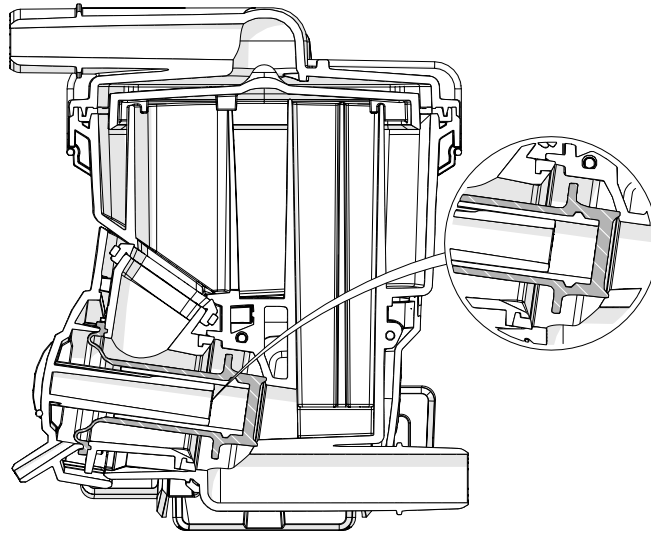
Figure 2: SmartFlow components

- | | |
|-------------------|---------------------|
| 1. Cover | 4. Main volume |
| 2. Spreader plate | 5. Valve module |
| 3. Float | 6. Mounting bracket |

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 SmartFlow. The SmartFlow cleaning valve has 2 positions:

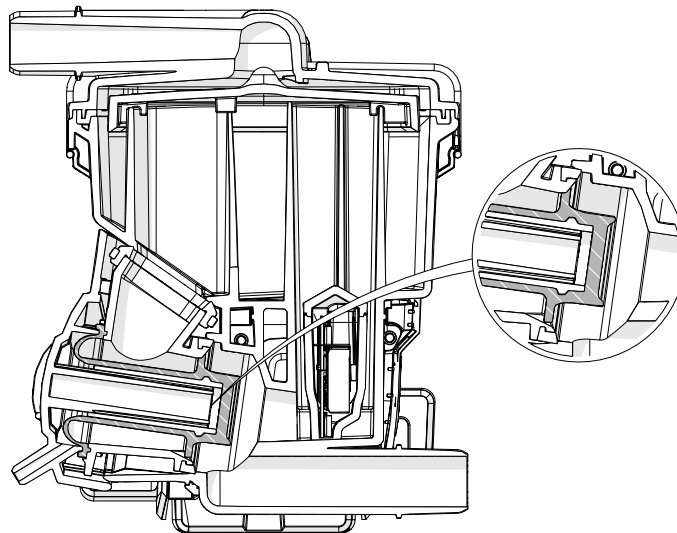


a. **Milking mode.**



When the SmartFlow 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 SmartFlow.

b. **Cleaning mode.**



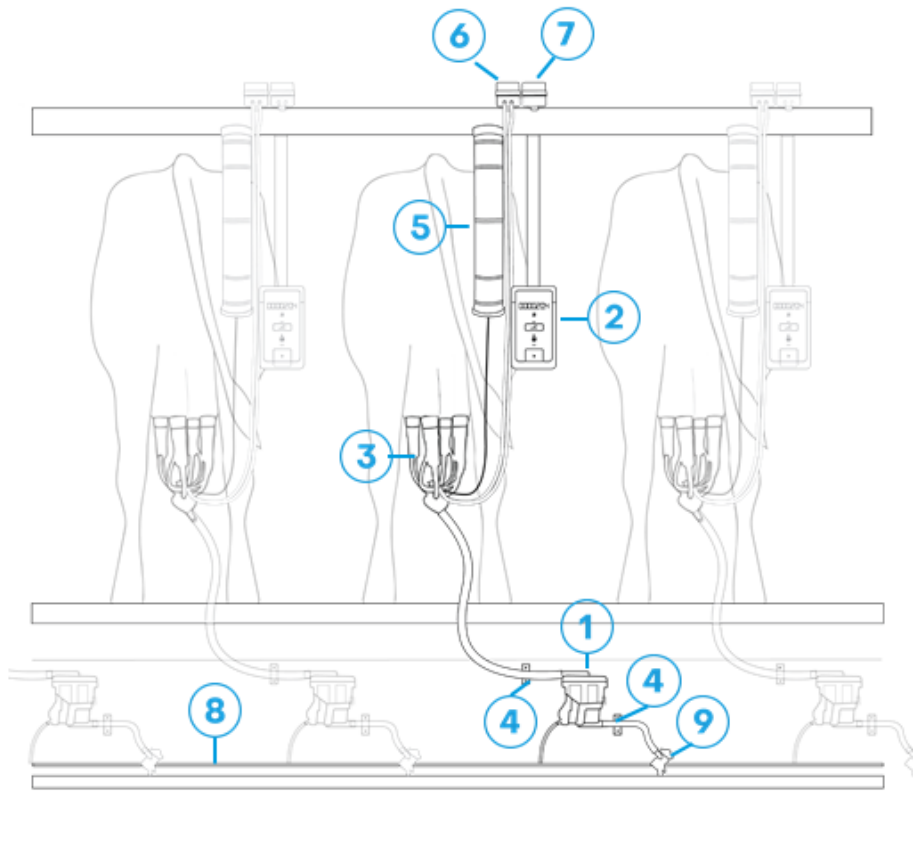
When the SmartFlow cleaning valve is in the cleaning position, only a bit of the liquid can flow through the flow column. This will completely fill the rest of the SmartFlow with cleaning liquid, which ensures proper cleaning of the SmartFlow.



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

2.3 SmartFlow and MPCU in the milking parlor

The Nedap SmartFlow milkmeters and Nedap Milking Point Control Units (MPCU) are mounted in milking parlors to measure the milk flow and control the milking process. The location of the SmartFlows and MPCUs in the milking parlor are indicated in the following illustration. The other parts indicated in the illustration are not delivered by Nedap.



1. Nedap SmartFlow
2. Nedap MPCU
3. Milk cluster
4. Milk hose bracket
5. Take off cylinder

6. Pulsator
7. Take off/Vacuum valve
8. Vacuum line for cleaning
9. Vacuum valve



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

Mains power

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.

Network

Use a fiberglass network between the VPUs (VP8002) if

- 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.

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 \varnothing 25 mm (1 in.).

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 V-packs in the Nedap 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 Nedap system.



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. Nedap does, however, not accept any responsibility for damage caused by high voltage (such as lightning), as described in the Warranty Policy.

Protective Earth (PE)

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

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

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

Wi-Fi requirements

To experience all the benefits of the Nedap 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.



Nedap can never be kept responsible for incorrect functioning of networks or any damage arising from the recommendations mentioned in this document.

3.1.3 Electromagnetic requirements

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



Notwithstanding all due precaution by Nedap, Nedap 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 Nedap Animal Identification.

No claims, representations or warranties, whether expressed or implied, are made by Nedap as to the performance, reliability, durability and safety of Nedap Animal Identification used in conjunction with abovementioned or other devices.

In order to achieve optimal performance of Nedap Animal Identification, the electrical installation on the farm needs to meet the conditions that are shown below.

- Maximum allowed environmental noise level: 10 dB μ A/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 SmartFlow system. This documentation can be obtained from your dealer or on our Business portal: <http://www.nedap.com/livestockmanagement-portal>.


Document
VP8002 Installation Manual or VP8002 set Installation Manual
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)
SmartFlow 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.

1. Unpack the SmartFlow components (page 13).
2. Place the SmartFlow components (page 13).
3. Mount the components (page 13).
4. Mount the cleaning installation (page 25).
5. Configure the VP8002 VPU and VP4102 reader (page 27).
6. Configure the Velos software (page 28).
7. Calibrate the SmartFlow (page 30).



 The SmartFlow can be mounted in two configurations: The milk outlet is positioned either on the right side or the left side of the Smartflow. The mounting procedure only shows illustrations of the right side configuration, but is applicable for the left side configuration as well.

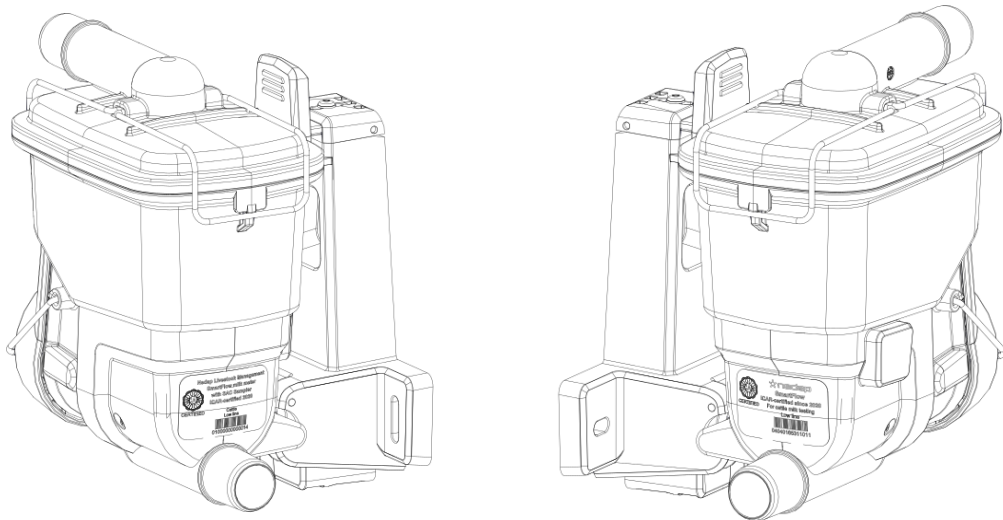


Figure 3: Right and left side configuration of the milk outlet on the SmartFlow

3.4 Unpack the SmartFlow components

1. Check if all parts and components are present:

Item
SmartFlow milk meters
SmartFlow 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 SmartFlow components

Place the SmartFlow components on the locations indicated in the Installation Plan.

3.6 Mount the components

3.6.1 Mount the VP8002 VPU and VP2001 power supply

The VP8002 VPU is powered by a VP2001 power supply:

1. Consult the installation plan where the VP8002 VPU and the VP2001 power supply must be mounted. 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 (see Additional documentation (page 12)).
3. Mount and wire the VP2001 power supply following the instructions in the VP2001 Installation Manual (see Additional documentation (page 12)).



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!



Caution

Make sure to always close the V-boxes with the V-box covers.

3.6.2 Mount the VP4102 reader and antenna

The antenna (922 MHz) of the VP4102 reader is preferably mounted with an antenna mounting bracket:

1. Consult the installation plan where the VP4102 reader with antenna must be mounted.
2. Mount and wire the VP4102 reader following the instructions in the VP4102 Installation Manual (see Additional documentation (page 12)).
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 (see Additional documentation (page 12)).



Caution

Make sure to always close the V-box with the V-box cover.

3.6.3 Mount the SmartFlow

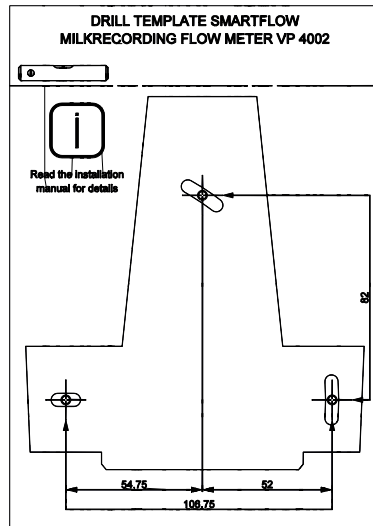
1. Mount the bracket on a flat surface, for example a wall or a plate. Use appropriate mounting material.



Make sure there is at least 10 cm free space above the bracket.

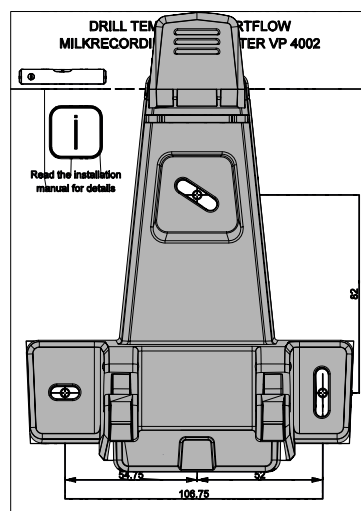


- a. Use the drilling template that is delivered with the SmartFlow to mark 3 drilling holes on the wall or panel.

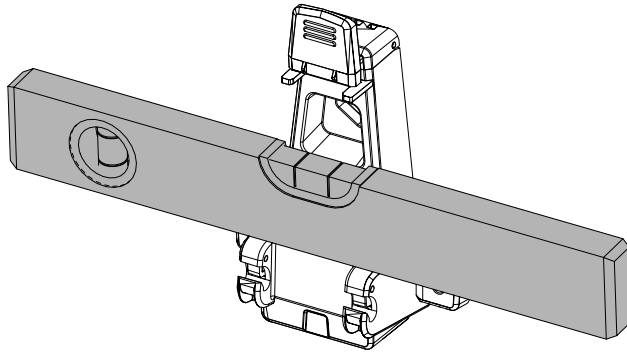


- b. Drill the holes.
- c. Mount the bracket using 3 hex bold screws or hex head lag wood screws (M6, at least 20 mm length) with washers.

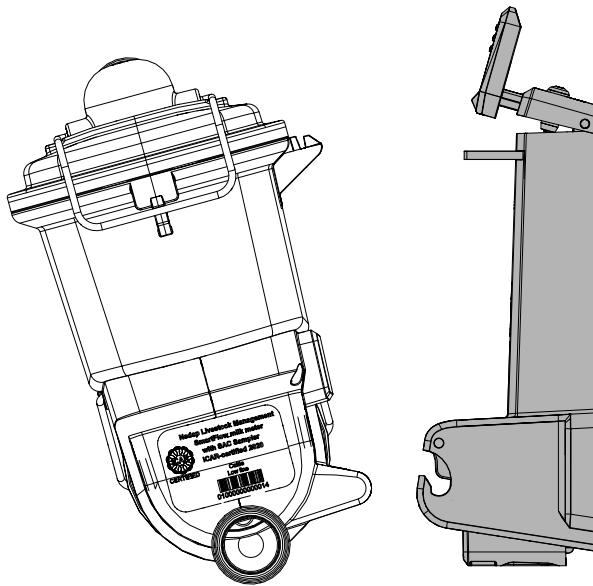
 *Tighten the 2 lower screws hand-tight. These screws are used to level the SmartFlow.*



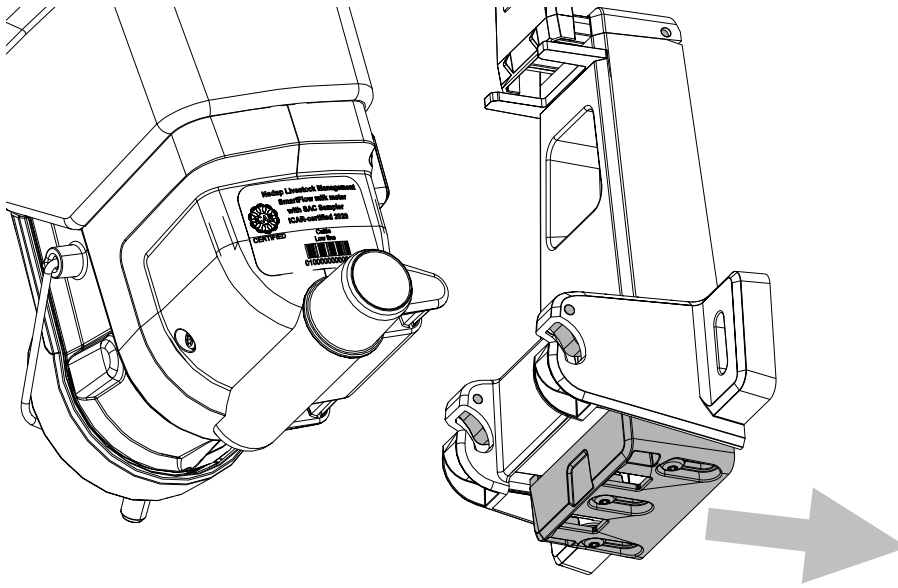
- d. Use the two lower screws of the bracket to level the bracket in the sideways direction (left or right).



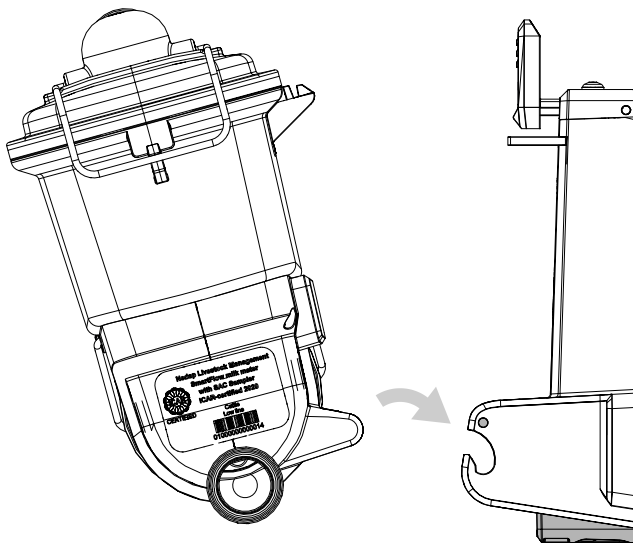
- e. Tighten the 2 lower screws to lock the bracket.
2. Place the SmartFlow in the bracket as follows:



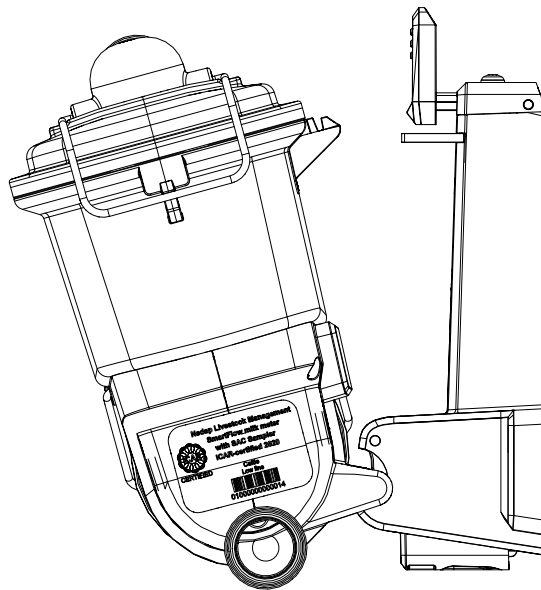
- a. Press the push button at the bottom of the bracket backwards to open the hinges.



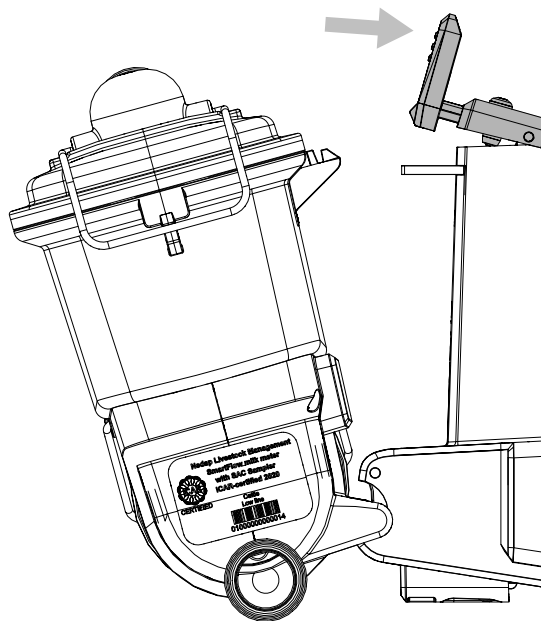
- b. Slide the lower part of the SmartFlow in the hinges and release the push button.



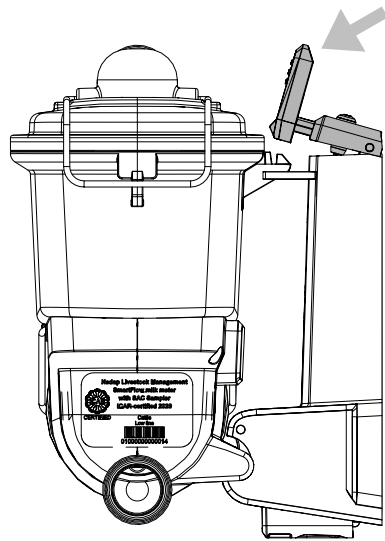
- c. The hinges are closed and the lower part of the SmartFlow is now fixed in the bracket.



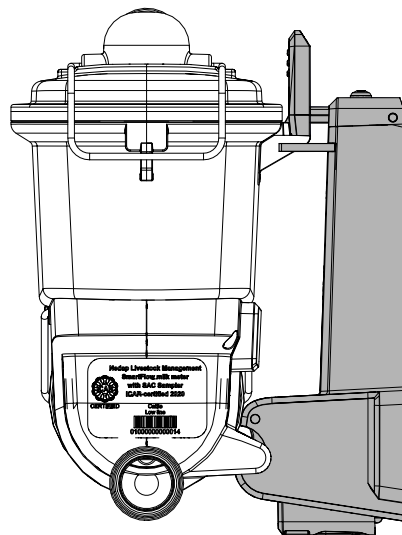
- d. Press the lever at the top of the bracket and slide the ridge of the SmartFlow under the lever.



- e. Release the lever to snap the upper part the SmartFlow.

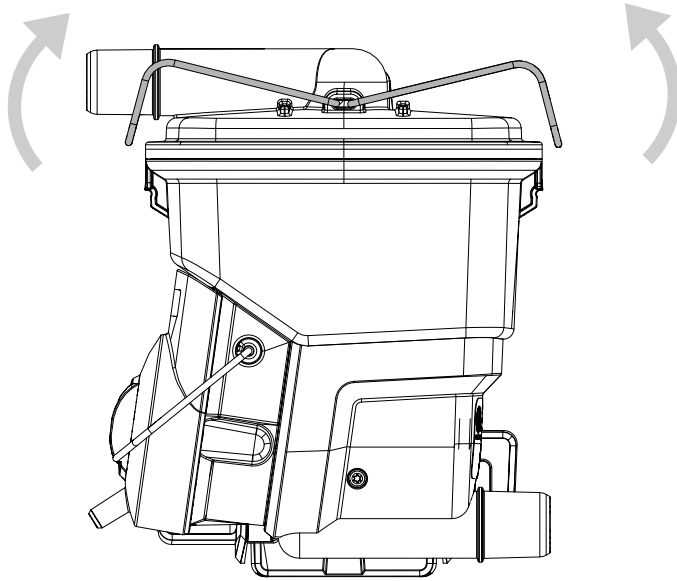


The SmartFlow is now mounted firmly in the bracket.

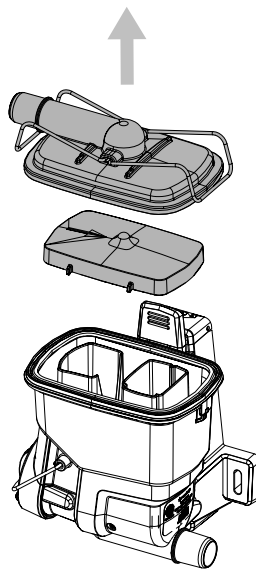


- 3. Level the bracket in forward-backward direction:

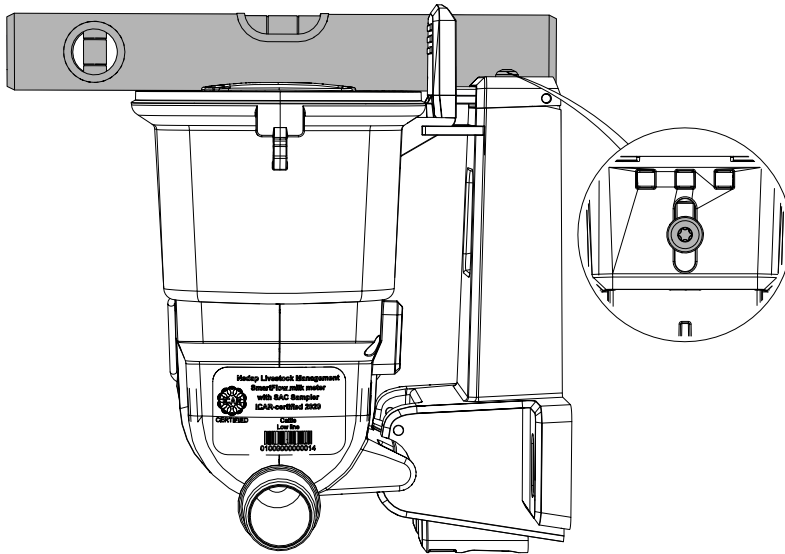
a. Loosen the cover brackets of the SmartFlow.



b. Remove the cover and spreader plate.



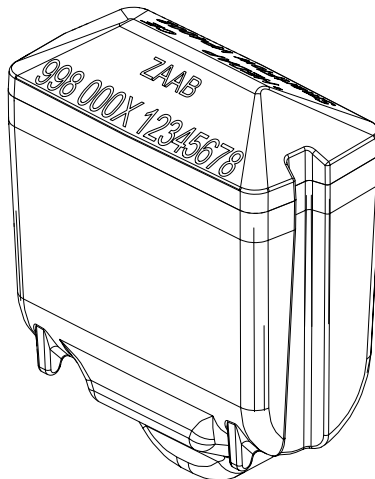
4. Use the screw on top of SmartFlow to level the bracket in the forward-backward direction.



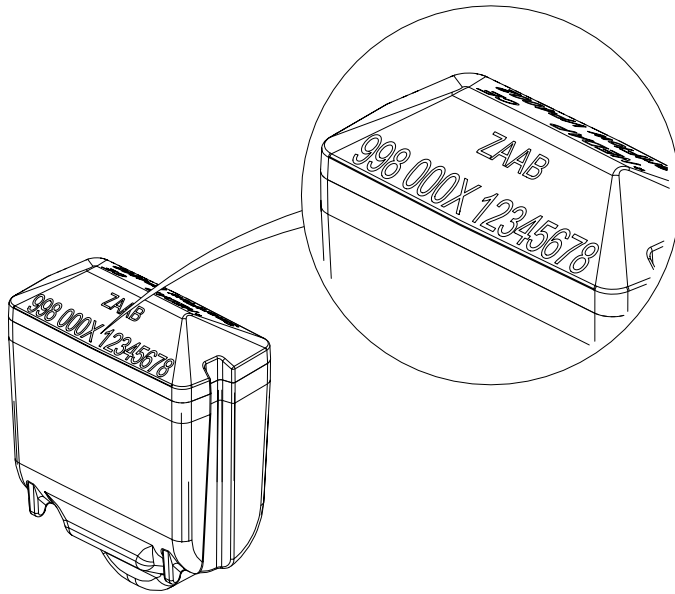
3.6.4 Prepare the Float

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

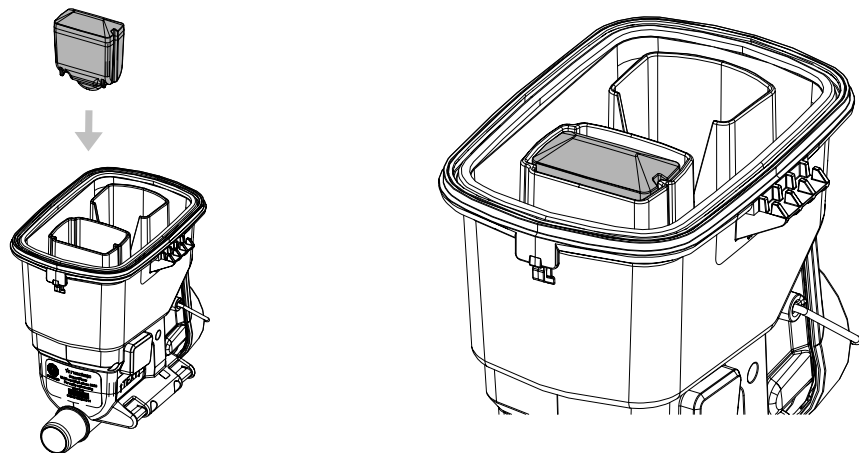
1. Unpack the Float.



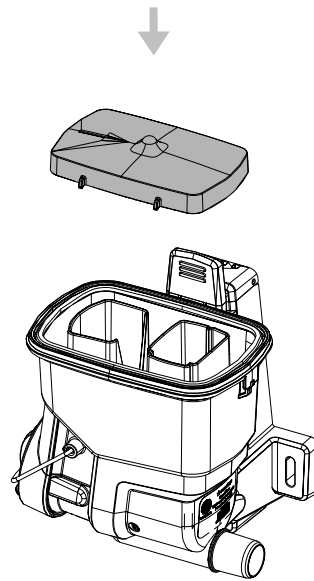
2. Write down the number that is on the Float, and the number of the milking point where the float will be used.



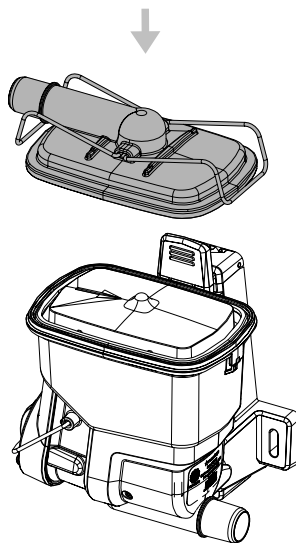
3. Put the Float in the SmartFlow as is shown in the pictures. This is the only correct way to place the Float.



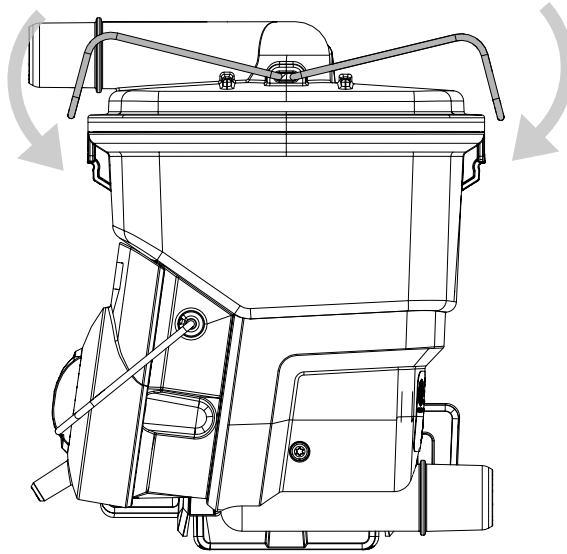
4. Place the spreader plate as is shown in the pictures. There is only one correct way to place the spreader plate.



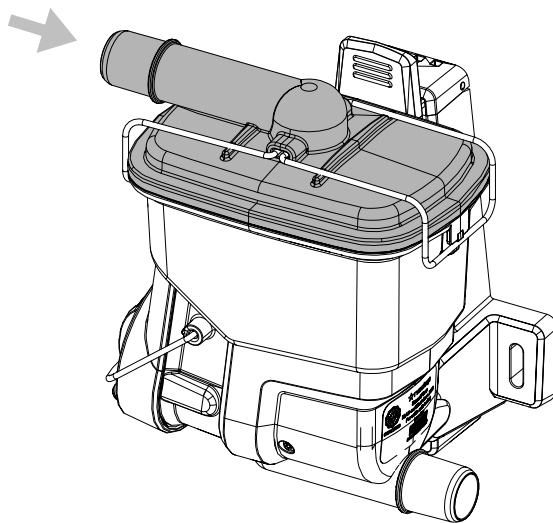
5. Place the cover of the SmartFlow:



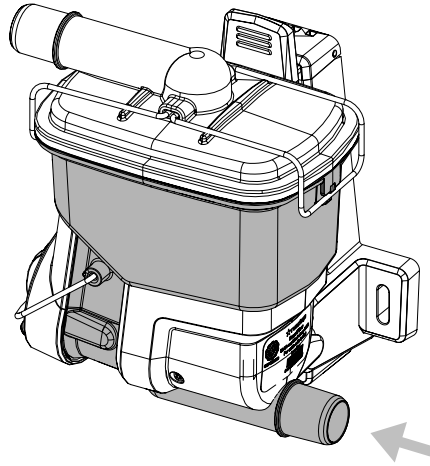
6. Fasten the cover brackets.



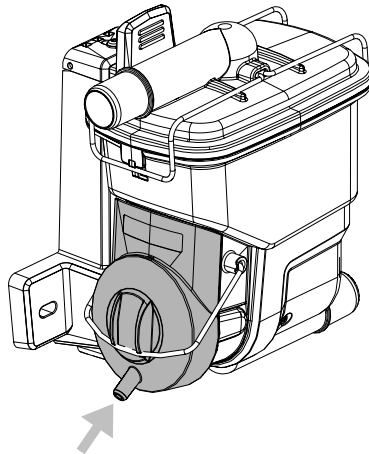
7. Attach the milk tube for the inlet to the cover of the SmartFlow. The milk tube on the cover must be pointing to the left, as shown in the picture



8. Attach the milk tube for the outlet to the SmartFlow.



9. Attach the vacuum tube to the valve module.



The SmartFlow is now ready for use.

3.7 Mount the cleaning installation

The cleaning installation of the milking parlor, which is not sold by Nedap, must be connected with the SmartFlow milk meters. A vacuum line is used to operate the valves of the SmartFlow milk meters for cleaning purposes.

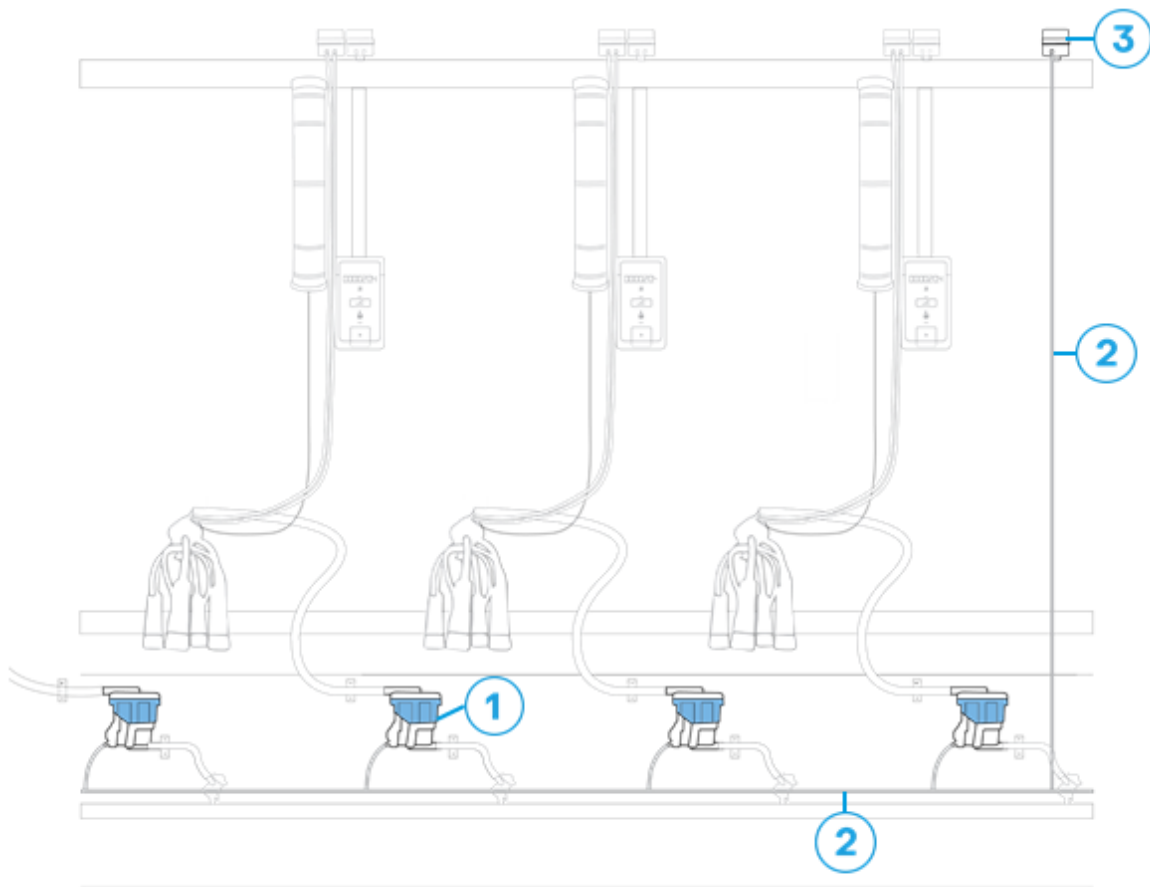


Figure 4: Vacuum line for cleaning the SmartFlow milk meters

- | | |
|-------------------------------------|---------------------------|
| 1. SmartFlow milk meter | 3. Central cleaning valve |
| 2. Central vacuum line for cleaning | |

Central vacuum line for cleaning

The central vacuum line for cleaning is a vacuum line to which all SmartFlow valve modules (see Components (page 7)) are connected. Vacuum is applied to change the position of the SmartFlow cleaning valve from the milking position to the cleaning position. When the vacuum is released the valve returns to the milking position.

The central vacuum line for cleaning is not delivered by Nedap, but must meet the following requirements:

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

Central cleaning valve

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

1. The central cleaning valve must allow vacuum in the central vacuum line during cleaning.
2. The central cleaning valve must **never** allow vacuum in the central vacuum line during milking. This prevents the SmartFlow to measure the milk yield.

4 Configuration



Caution

When the milking process in the milking parlor is controlled by Nedap Milking Point Control Units (MPCUs), the MPCUs must be configured before the SmartFlow milkmeters are configured (see the MPCU Installation Manual).

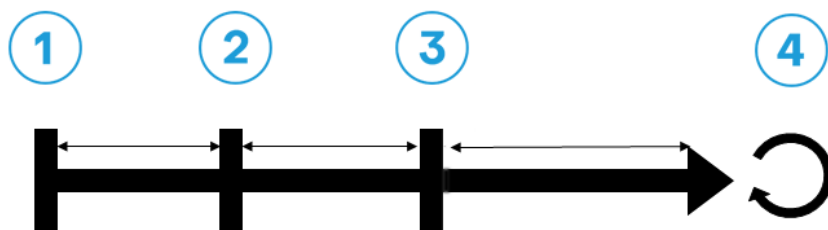
Configuration procedure

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

1. Configure the VP8002 VPU and VP4102 reader (page 27).
2. Configure the Velos software (page 28)
3. Zero Point test of the SmartFlow Floats (see Zero Point test (page 28)).
4. Calibration of the SmartFlow milk meters (Calibrate the SmartFlow (page 30)).

Calibration and validation procedures for the SmartFlow milk meters

An overview of the SmartFlow calibration and validation moments is shown below:



1. Installation of the new milking parlor, including the SmartFlow milk meters.
2. Zero Point test of the SmartFlows to determine the setpoint of the Float (see Zero Point test (page 28)).
3. Calibration of the SmartFlows by carrying out the auto calibration or milk test (see Calibrate the SmartFlow (page 30)).
4. Annual validation check of the SmartFlows by checking either the Zero Point test or the correction factors (see Routine checks (page 34)).



Caution

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

4.1 Configure the VP8002 VPU and VP4102 reader

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



1. Configure the VP8002 VPU as described in the VP8002 Installation Manual (see Additional documentation (page 12)).
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 (see Additional documentation (page 12)).
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

 Before the SmartFlow milk meters are configured, make sure that the VP8002 VPU and VP4102 UHF reader(s) are configured (see Configure the VP8002 VPU and VP4102 reader (page 27)).

Install the Behavior Component

Since some components of the SmartFlow 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 SmartFlow system. Therefore the Behavior Component 'Smartflow 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 **Smartflow 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.

Couple the Floats to the milking points

After the first time installation and when Floats are replaced, the Floats must be coupled In Velos to the milking points.

1. In Velos, go to **Settings > Milking > Smartflow settings**.
2. Select the correct parlor configuration.
3. Go to the tab **SmartFloat address**:
 - a. In the column **Address**, select the correct Float numbers that correspond with the milking points you wrote down during installing the Floats.
 - b. Click on **Submit**.

4.3 Zero Point test

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

Start the zero-point test:

1. In Velos, go to **Settings > Milking > Smartflow 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 SmartFlow milkmeters. After the initial Zero Point test all or only a selection of SmartFlow milk meters can be tested:
 - a. **All SmartFlow milk meters:** Click on the **Start all Zero Point Tests** button.
 - b. **One or multiple SmartFlow milk meters:** Click on the **Start Zero Point Test** button of the milking point(s).


The message **Zero Point Test in progress ..** is displayed for all milking points that are under test.

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

5. If the test needs to be stopped while running, click on the **Cancel** button.

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 (**max. 300 mbar**).

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

3. Pour drinking water in the milk inlet tube (minimum flow of 5 L/min and for at least 5 seconds)

 *The temperature of the drinking water must be ca. 10 °C (50 °F)*

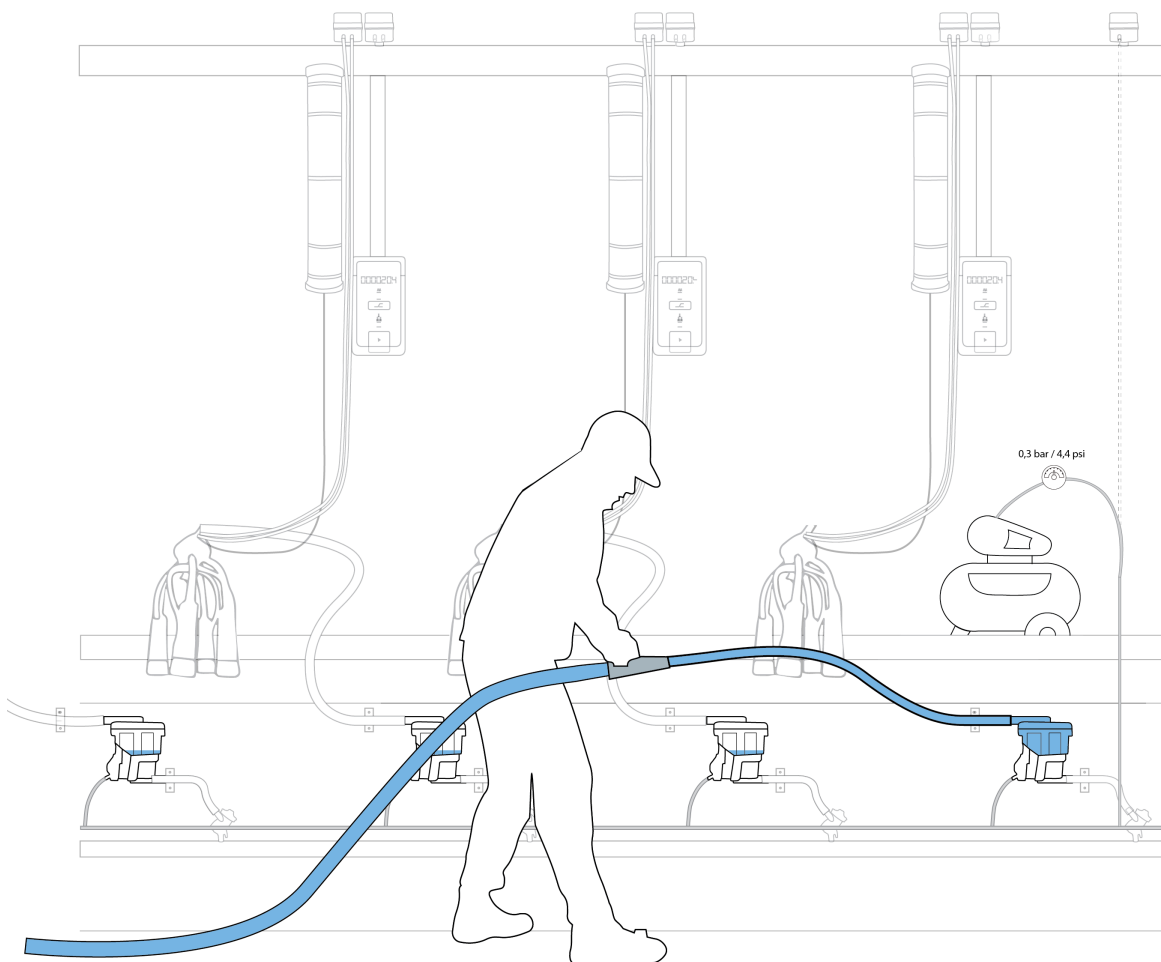


Figure 5: Pouring water in the milk inlet tube

4. Wait for at least 3 minutes.
5. Repeat step 3 and 4 four times



Caution

The total Zero Point test session consists of five consecutive runs, with at least 3-minute intervals.


6. Check if Velos has accepted the results of all 5 test runs:
 - a. If less than 5 test runs are accepted: Run the missing number of test runs.
 - b. If all test runs are not accepted: Repeat the complete Zero Point test.
7. Save the Zero Point test results (see Zero Point test results: (page 30)).
8. De-install the air compressor.
9. Reconnect the milk inlet tube to the milk claw.

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 **Zero Point Test completed** appears and the calculated value is displayed.
 - 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.
 1. Repeat the Zero Point test: See Execute the Zero Point test in the milking parlor: (page 29).
2. When the Zero Point test was completed successfully, always click the **Write result** button to save the test result.
The message **The Zero Point Test value is being saved** is shown while the test results are being saved.



Writing the test results can take a long time.

3. Click on the **Submit** button to leave the test page.
4. Go to **Reports > Milking > Smartflows** to see an overview of the test results:
 - a. Select the milking points that were tested.
 - b. When the Zero Point test results were saved correctly, the test date is shown in the **Last updated** column.
5. The report can be printed by using the print  icon.
6. Send the "Zero point test" report to your ICAR Member Organization when the calibration procedure is completed too (see Calibrate the SmartFlow (page 30)).

4.4 Calibrate the SmartFlow

After installation of all SmartFlow milk meters, the milk meters must be calibrated to compensate for installation differences.

The SmartFlow milk meters can be calibrated by using auto calibration (see Auto calibration (page 30)) or running the milk test (see Milk test (page 31)). Auto calibration is the recommended method, provided that the conditions for auto calibration are met.



When the calibration procedure is completed, both the calibration report and the Zero Point test report must be send to your ICAR Member Organization.

4.4.1 Auto calibration

The Auto calibration procedure analyses milk yield and bulk tank 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 SmartFlow milk meters and the execution of the Zero Point Test, Velos must collect stable milk yield data for at least 21 days before the Auto calibration can be run. The data collection period starts when the Zero Point Test has been completed successfully (see Zero Point test (page 28)).



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.

Conditions

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 SmartFlows ends up in the bulk tank.
- The non-delivered milk yield can be properly estimated: The amount of milk that has flown through the SmartFlows 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 Nedap equipment in the milking parlor (animal identification and all SmartFlows) must have functioned without any problems or changes **for at least 21 days**, so that the data are representative and reliable.


Procedure

1. In Velos, go to **Settings > Milking > Smartflow settings**.
2. Select the milking parlor.
3. Go to the tab **Auto calibration**.

 *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:

 *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 (see Conditions (page 31)).
 - 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. Confirm your decision by clicking on **Submit**.

4.4.2 Milk test

Conditions

- The milk that must be collected must flow through the SmartFlow 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.

Procedure

 *Use the Excel spreadsheet **Calibration sheet - milk test SmartFlow_V2020_2.xlsx** for this test.*



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



When you don't have enough milking buckets for all milking places, make sure you 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 SmartFlow 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.
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. Go to the next step Calibration (page 32).

Calibration

In the calibration sheet, in the row **Correction factor**, a new correction value is calculated. Fill in this value in Nedap 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

1. 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.




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 SmartFlow.
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 SmartFlow milk meters must be validated annually to ensure the accuracy of the milk yield data.

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

- Check status auto calibration (page 34)
- Check the Zero Point test (page 35)

6.1 Check status auto calibration

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

Conditions

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 Nedap equipment in the milking parlor (animal identification and all SmartFlows) 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 SmartFlow settings report:

1. In Velos go to **Reports > Milking > Smartflows**.
2. Select the range of milking points that must be validated and click **Ok**.
A report is displayed with the current SmartFlow statuses. The column "Validation - Status" shows if the SmartFlows are still measuring sufficiently.
3. Check the status of all milking points in the report:
 - Status **Ok** for all milking points: Go to step 7.
 - Status **Not Ok** for one or more milking points: Go to step 4.
4. Check the SmartFlow milk meters with the status **Not OK** in the milking parlor:
 - Malfunction not found: Go to step 5.
 - Malfunction found: Go to step 6.
5. When the malfunction of the SmartFlow milk meters is unknown:
 - a. Recalibrate the SmartFlow milkmeters (see Calibrate the SmartFlow (page 30)).
 - 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 SmartFlow milk meters is known:
 - a. Fix the malfunction of the milk meters.
 - b. When the malfunction included replacement of the SmartFlow Float:
 1. Run the Zero Point Test (see Zero Point test (page 28)).
 2. Calibrate the SmartFlow (see Calibrate the SmartFlow (page 30)).
 3. Proceed with step 6d.



- c. When the malfunction did not include replacement of the SmartFlow Float, check if recalibration is necessary:

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 SmartFlow (page 30) and proceed with step 6d.
 2. If recalibration is not required: Go to step 6d.
- d. In Velos go to **Settings > Milking > Smartflows** and select the milking parlor.
- e. Go to the tab **Overview**.
- f. Enter a remark about the malfunction of the SmartFlow.
- 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 SmartFlow report to the certifying organization.

6.2 Check the Zero Point test

The Zero Point test can be used for the annual validation check of the SmartFlow milk meters.

Start the zero-point test:

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 Zero Point Tests** button.



Caution
All SmartFlow milk meters must be tested annually!

The message **Zero Point Test in progress ..** is displayed for all milking points that are under test. The progress of the 5 runs of the Zero Point test is shown between brackets (x/5).

5. If the test needs to be stopped while running, click on the **Cancel** button.

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 (**max. 300 mbar**).



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

3. Pour drinking water in the milk inlet tube (minimum flow of 5 L/min and for at least 5 seconds)



The temperature of the drinking water must be ca. 10 °C (50 °F)



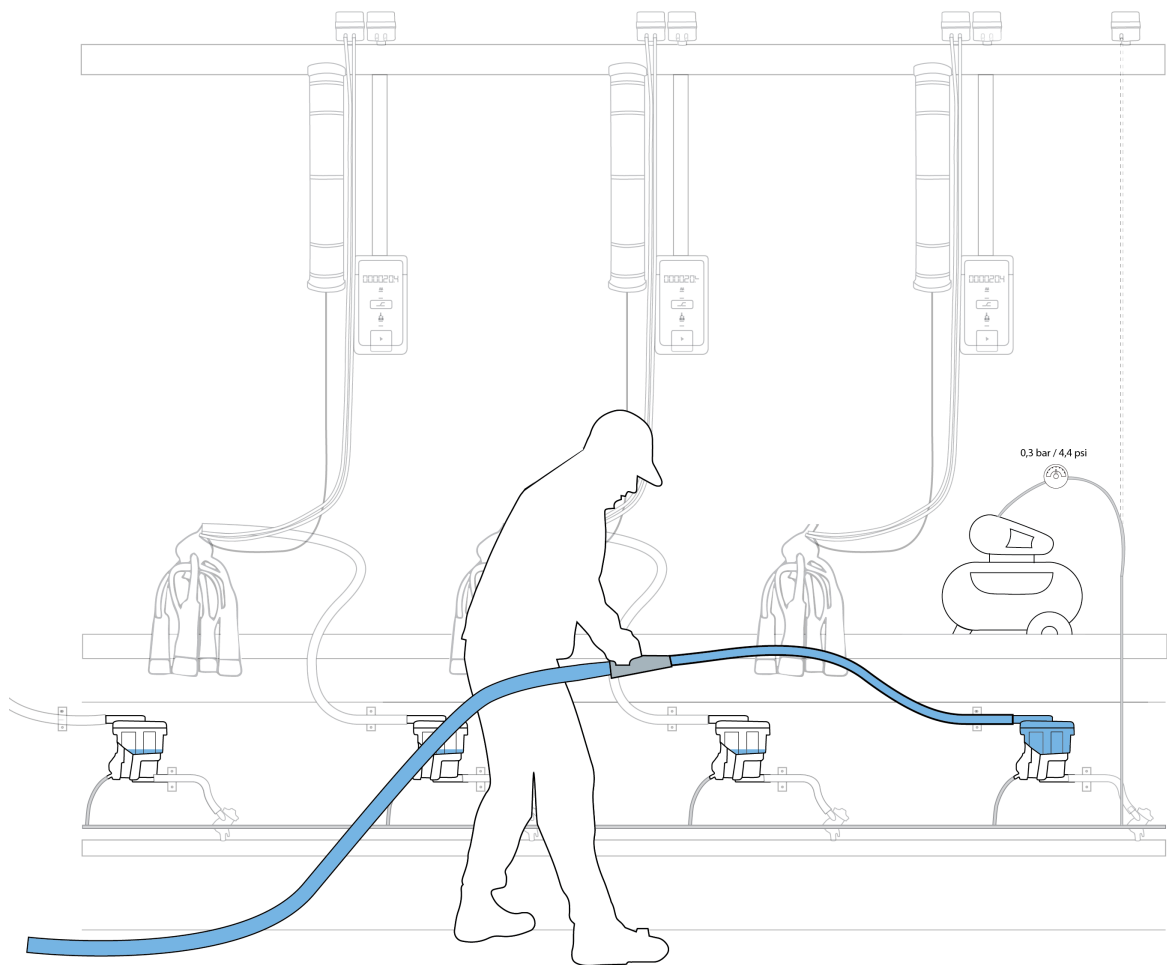


Figure 6: Pouring water in the milk inlet tube

4. Wait for at least 3 minutes.
5. Repeat step 3 and 4 four times



Caution


The total Zero Point test session consists of five consecutive runs, with at least 3-minute intervals.

6. Check if Velos has accepted the results of all 5 test runs:
 - a. If less than 5 test runs are accepted: Run the missing number of test runs.
 - b. If all test runs are not accepted: Repeat the complete Zero Point test.
7. De-install the air compressor.
8. Reconnect the milk inlet tube to the milk claw.

Zero Point test results:

1. When the Zero Point test is completed, the result passed or failed is shown immediately.
2. **PASSED: Zero Point test result 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 SmartFlow in the milking parlor for technical issues.
 - a. **The SmartFlow is technically fine:** Select one of the following options to proceed:
 - Cancel the new Zero Point test results.
 - Restart the Zero Point test.



- Store the new Zero Point test result by selecting the option to overwrite the existing value and recalibrate (see Calibrate the SmartFlow (page 30)).
- b. **The SmartFlow is technically not fine:** Follow the following procedure:
 1. Fix the SmartFlow.
 2. Perform a new Zero Point test.
 3. Recalibrate (see Calibrate the SmartFlow (page 30)).
 4. Click on the **Submit** button to leave the test page.
 5. Go to **Reports > Milking > Smartflows** to see the Zero Point test report.
 - a. When the Zero Point test results were saved correctly, the test date is shown in the **Last updated** column.
 - b. The report can be printed by using the print  icon.
 6. Send the "Zero point test" report to your ICAR Member Organization.



7 Cleaning

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

External surfaces of the SmartFlow

The environment of the equipment can have a major effect on its service life. The plastics used in the SmartFlow 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 SmartFlow.

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

7.1 Clean the SmartFlow

The SmartFlow must be in the cleaning mode to enable cleaning of the inside of the SmartFlow. Vacuum is applied to change the position of the SmartFlow cleaning valve from the milking mode to the cleaning mode (see Components (page 7)). 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 Cleaning requirements (page 38).
2. Make sure that the SmartFlow 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 Mount the cleaning installation (page 25)).
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 (page 39)
- Temperature: Water temperature and flow rate (page 39)
- Mechanical aspects: Mechanical aspects (page 39)
- Duration of the phases in the cleaning cycle: Cleaning cycle (page 40)
- Amount of water used: Water usage (page 40)

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



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 and highly 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 SmartFlow 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 SmartFlow milk meters need to be drained thoroughly after washing. Proper draining requires adequate closing and opening of the SmartFlow cleaning valve. The vacuum level in the milking installation determines the functioning of the valve. To put the SmartFlow in the cleaning mode, make sure the vacuum level on the valve is higher than the vacuum level in the SmartFlow itself.



Caution

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

7.2.2 Water temperature and flow rate

Water temperature

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 $\pm 45\text{ °C}$ (113 °F) in order to keep the milk residues (fat) dissolved.

A good timing of the cleaning phases, the amount of (hot) water, covering the wash trough, additional heating and insulation of parts of the milking installation can contribute to fulfilling this minimum temperature requirement.

Although the SmartFlow 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).

Water flow rate

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

7.2.3 Mechanical aspects

The quality and effectiveness of the cleaning process of the milking equipment and the SmartFlow milk meter in particular, is affected by the following mechanical aspects:

The design and materials of the milk meter

The milk meter is designed to be used in circulating cleaning systems. A specially integrated cleaning program controls the SmartFlow 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 Cleaning program settings (page 40).

The mechanical components of the cleaning process

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. Also the availability of sufficient cleaning liquid in all phases of the cleaning process is important.

Turbulence can be promoted by air injection and/or increased vacuum (5 to 10 KPa above milk vacuum). A sufficient vacuum level is essential for the proper functioning of the SmartFlow 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 en de minimal water temperature ($\pm 45^{\circ}\text{C}$ (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 different phases of the cleaning cycle depend on the number of milking points and the construction and configuration of the milking installation.

For modern milking installations with wide milk pipes, an average amount of 5 l (1.3 gal.) per milking point can be used as a guideline.

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.

The water usage can be reduced by an optimized timing of the opening and closing of the valves in the cleaning installation and the milk meter.

7.2.6 Cleaning program settings

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

1. The central valve in the vacuum line must control the SmartFlow cleaning valve.
2. The SmartFlow 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 Cleaning cycle (page 40)).



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.



- 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

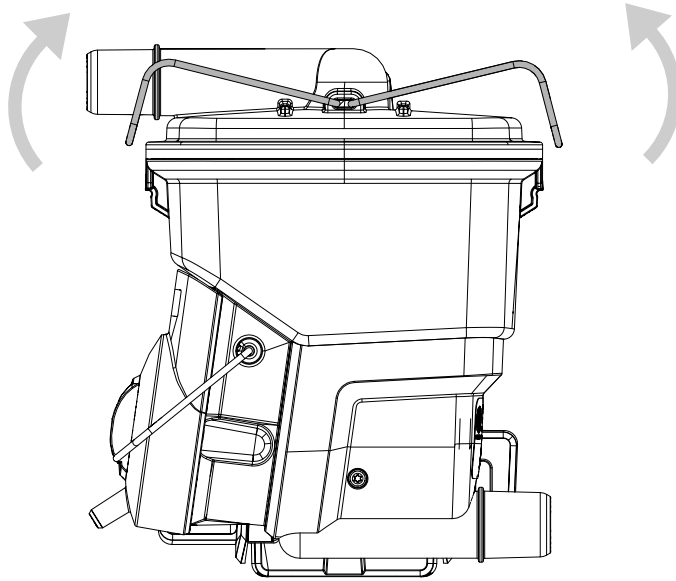
When	Part	Action	Who
After each milk session	SmartFlow	Clean the SmartFlow following the instructions described in Cleaning (page 38)	User
Every 2 years or after 12000 milkings	<ul style="list-style-type: none">• Main valve module• Seal	Replace with parts delivered in the Nedap SmartFlow Valve Module replacement set: <ul style="list-style-type: none">• Replace the valve module• Replace the seal	Installer
Float is broken	Float	Replace the SmartFlow Float: Replace the SmartFlow Float (page 41)	

8.2 Replace the SmartFlow Float

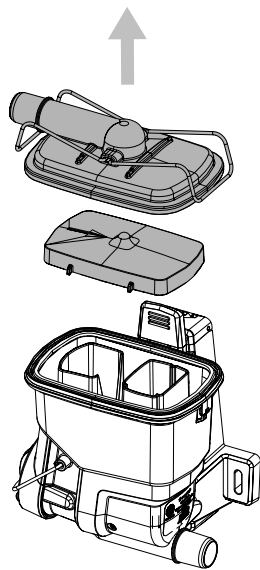
When the SmartFlow Float needs to be replaced, proceed as follows:



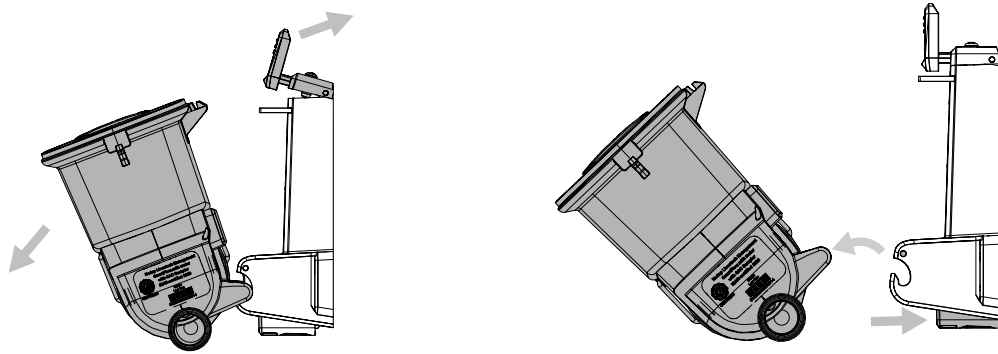
1. Loosen the cover brackets of the SmartFlow milk meter.



2. Remove the cover and spreader plate.

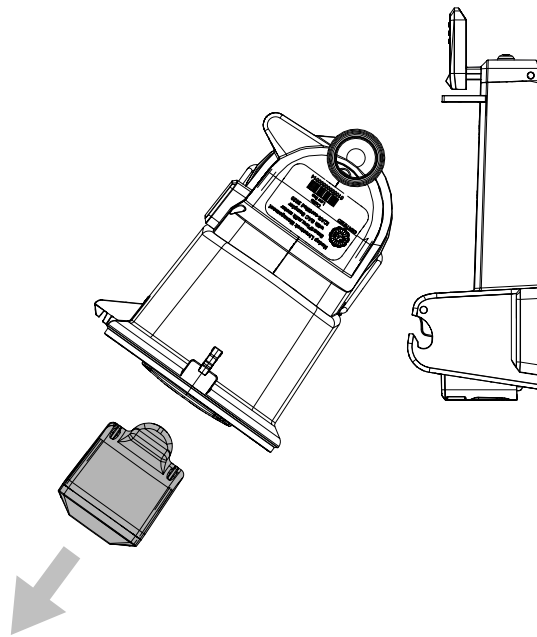


3. Unlock the SmartFlow.



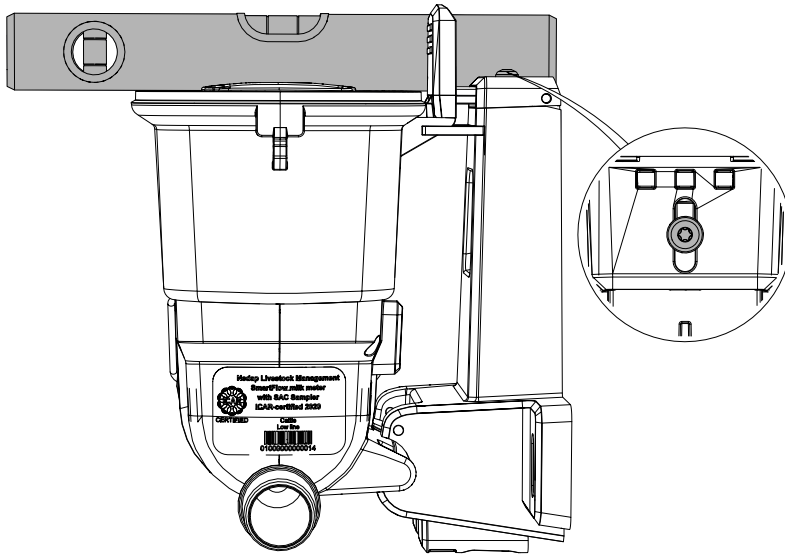
4. Rotate the SmartFlow to remove the Float.

 **Caution**
Prevent the Float from falling on the ground.



5. Place the SmartFlow back in the mounting bracket and lock the lower and upper part of the SmartFlow.

6. Use the screw on top of SmartFlow to level the bracket in the forward-backward direction.



7. Place the new Float following the procedure described in Prepare the Float (page 21).
8. Place the spreader plate and cover.
9. Fasten the cover brackets.

9 Troubleshooting

9.1 Malfunctions

Malfunction	Cause	Solution
No milk yield measurement.	<ul style="list-style-type: none">• SmartFlow milk meter is clogged.• Float broken/ Float does not send data.• Seal of the SmartFlow cleaning valve is torn.	<ul style="list-style-type: none">• Clean the inside of the SmartFlow.• Replace the Float.• Replace the seal of the SmartFlow cleaning valve with the seal delivered in the Nedap replacement kit.
Milk yield measurement deviates.	<ul style="list-style-type: none">• SmartFlow milk meter is skewed.• SmartFlow milk meter is clogged.• Seal of the SmartFlow cleaning valve is torn.	<ul style="list-style-type: none">• Level the SmartFlow.• Clean the inside of the SmartFlow.• Replace the seal of the SmartFlow cleaning valve with the seal delivered in the Nedap replacement kit.
SmartFlow milk meter is clogged.	Uninsufficient cleaning.	<ul style="list-style-type: none">• Check supply of cleaning agent.• Check vacuum hose.• Check seal of the SmartFlow cleaning valve.• Check SmartFlow seal.




10 Handling instructions

Storage

- 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.
- Storage temperature range: -20 to 70 °C (-4 to 158 °F).
- Relative humidity < 93%

Disposal

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 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

Term	Description
Behavior component	The behavior of a standard hardware component and / or the total management system, set by Velos software.
SmartFlow	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.
MPCU	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

SmartFlow (without Float)

Item	Value
Dimensions (L x W x H)	175 x 155 x 192 mm (6.89 x 6.10 x 7.56 in.)
Weight	1.0 kg (2.2 lbs)
Construction material	Parts in contact with milk: PPSU (FDA approved) Other plastic parts: PPGF 30 Mounting materials: stainless steel
Operating temperature range	0 to 40 °C (32 to 104 °F)
Operational relative humidity	< 93% @ 45 °C (113 °F)

Float

Item	Value
Dimensions (L x W x H)	47 x 25 x 61 mm (1.9 x 0.9 x 2.4 in.)
Weight	0.035 kg (0.077 lbs)
Construction material	Parts in contact with milk: PPE (FDA approved)
Operating temperature range	0 to 40 °C (32 to 104 °F)
Operational relative humidity	< 93% @ 45 °C (113 °F)



13 Compliance

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.

Cet appareil se conforme aux normes CNR-210 exemptés de licence d'Innovation, Sciences et Développement économique Canada. L'opération est soumise aux deux conditions suivantes: (1) cet appareil ne doit causer aucune interférence, et (2) cet appareil doit accepter n'importe quelle interférence, y compris l'interférence qui peut causer une opération non souhaitée de cet appareil.

Les changements ou modifications n'ayant pas été expressément approuvés par la partie responsable de la conformité peuvent faire perdre à l'utilisateur l'autorisation de faire fonctionner le matériel.

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.

Cet équipement est conforme à CNR-102 limites énoncées pour un environnement non contrôlé.

FCC and ISED Information to the user

Note: 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 frequency 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 to which the receiver is connected.
- 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 that can be used with the installation of the product.

This Class B digital apparatus complies with the Canadian standard ICES-003. Cet appareil numérique de Classe B est conforme à la norme Canadienne ICES-003.



CE

Hereby NEDAP N.V. declares that the subject equipment is in compliance with the directives 2014/53/EU (Radio Equipment Directive) and 2011/65/EU (Restriction of the use of certain hazardous substances). The full text of the EU declaration of conformity is available at our Business Portal: <http://www.nedap.com/livestockmanagement-portal>.



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