Instruction Manual

Nedap SmartFlow

Installation manual
Version 00.001 / September 2020 / EN

Original instructions
Copyright
Copyright © Nedap N.V. All rights reserved. The information in this document is subject to change without notice, it is not to be reproduced in any way, in whole or in part, without the written consent of Nedap N.V. All trademarks referenced belong to their respective owners.

Disclaimer
Nedap N.V. has made every effort to ensure the accuracy of the information contained in this document. However, Nedap N.V. makes no representations or warranties whatsoever whether express or implied as to the accuracy, correctness, completeness or fit-for-purpose or suitability for the purpose of this product. You use the products at your own risk. Nedap N.V. excludes any liability to the maximum extent permitted by applicable law for the damages caused by errors or failures made during the installation or improper use of this product or by not applying the instructions stated in this document. Nedap N.V. reserves the right to make improvements or amendments to this document and/or the products described therein at any time without any notification. The latest version of this document can be found on the Nedap Livestock Management business portal (www.nedap.com/livestockmanagement-portal). Please download the latest version of this document (by yourself or reseller) and keep a copy for your own records. This document can be published in various languages but only the English language version will prevail. Nedap N.V. assumes no responsibility for any errors caused for the translations into another language.

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.
# Content

1. **Safety** .......................................................... 3

2. **SmartFlow overview** ..................................................... 5
   2.1 SmartFlow introduction .......................................................... 5

3. **Installation** ............................................................. 9
   3.1 Requirements for installation .......................................................... 9
       3.1.1 Electrical requirements .......................................................... 9
       3.1.2 Network requirements .......................................................... 10
       3.1.3 Electromagnetic requirements ................................................. 10
   3.2 Installation overview ............................................................. 11
   3.3 Mount the components .......................................................... 11
       3.3.1 Mount the SmartFlow .......................................................... 11
       3.3.2 Prepare the Float ................................................................. 18

4. **Configuration** ........................................................... 23
   4.1 Configure the Velos software ...................................................... 23
   4.2 Calibrate and validate the SmartFlow ........................................... 23
       4.2.1 Zero-point test ................................................................. 24
       4.2.2 Milk test ................................................................. 25
       4.2.3 Statistic test ................................................................. 25

5. **Commissioning** .......................................................... 28
   5.1 Cleaning ........................................................................... 28
       5.1.1 Cleaning requirements ......................................................... 28
       5.1.2 Clean the SmartFlow .......................................................... 29
   5.2 Inform the end user ............................................................. 29

6. **Maintenance** ............................................................ 30
   6.1 Maintenance scheme .......................................................... 30

7. **Troubleshooting** .......................................................... 31

8. **Handling instructions** ...................................................... 32

9. **Glossary** ........................................................................ 33

10. **Technical specifications** .................................................... 34

11. **Compliance** .............................................................. 35
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.
- **Tips**: 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 SmartFlow 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
3. V-box with VP8002 VPU
4. PC or smartphone with performance insights in Velos
5. UHF connection (CAN or Ethernet)
6. Ethernet connection
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 valve has 2 positions:
a. Milking mode.

When the 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 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.
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.

⚠️ Caution
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.).

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

### 3.2 Installation overview

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

1. Mount the SmartFlow (page 11).
2. Configure the Velos software (page 23).
3. Calibrate and validate the SmartFlow (page 23).

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](image_url)

The installation of the VP8002 VPU and VP4102 UHF reader with antenna is described in the installation manuals of these products. This documentation can be obtained from your dealer or on our Business portal: [http://www.nedap.com/livestockmanagement-portal](http://www.nedap.com/livestockmanagement-portal).

### 3.3 Mount the components

#### 3.3.1 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 (M5, at least 20 mm length) with washers.

   (a) 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. The correct tightening moment for the bolt is xx Nm (xx lbf-ft.)

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.

3.3.2 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.
4 Configuration

4.1 Configure the Velos software

Before the SmartFlows are configured, make sure that the VP8002 VPU and VP4102 UHF reader(s) are configured correctly.

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 Heat detection 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. Fill in the number of milk points and the number of the first milk point.
5. Select the correct V-pack for the BC. Maximum 4 V-packs can be coupled to one BC.
6. Click on Submit to install the BC.

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

1. In Velos, go to Settings > Milking > Smartflow numbers.
2. In the column Address, select the correct Float numbers that correspond with the milk points you wrote down during installing the Floats.
3. Click on Submit.

4.2 Calibrate and validate the SmartFlow
After installation of all SmartFlows, they must be calibrated to compensate the installation differences, and validated to check the functioning of the SmartFlows.

The 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 24)).
3. Calibration of the SmartFlows by carrying out the milk test (see Milk test (page 25)).
4. Annual validation check of the SmartFlows by carrying out either the zero-point test (Zero-point test (page 24)) or the statistic test (Statistic test (page 25)).

*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.*

### 4.2.1 Zero-point test

A 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. Decide to start the zero-point test for (a) separate SmartFlow device(s) or for all at once.
2. Click the **Start Zero-point test** button in Velos.

**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)*

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

*The total zero-point test session consists of five consecutive runs, with 3-minute intervals.*

6. De-install the air compressor.
7. Reconnect the milk inlet tube to the milk claw.

**Zero-point test results:**
1. Stop the zero-point test by clicking on the **Stop zero-point test** button in Velos.
   Velos will show the zero-point test results.
2. **At installation:** Always click the **Write** button to store the zero-point test results in the Velos database.
3. **Annual validation check:** When the zero-point test is completed, the result is shown immediately.
   a. **Pass:** New result of zero-point test is within range: No further action is needed, the result is stored and can be checked in the report.
   b. **Fail:** New result of zero-point test is NOT within range: Check the SmartFlow in the milking parlor for technical issues.
      1. **The SmartFlow is technically fine:** Store the new zero-point test result and calculate a new calibration value using the milk test (see Milk test (page 25)).
      2. **The SmartFlow is technically not fine:** Fix the SmartFlow. Next perform a zero-point test and recalibrate using the milk test (see Milk test (page 25)).

When the zero-point test is completed, the results are stored in the "Zero point test" report. Send the report to your ICAR Member Organization.
4.2.2 Milk test

The milk test is the ICAR certified calibration method.

**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**

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 **B 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 25).

**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 numbers**.

4.2.3 Statistic test

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

**Conditions**

- Only milk from milk sessions that completely end up in the bulk tank counts (when the bulk tank is emptied during a milk session, that milk session cannot be included in the test).
- The weights measured by the bulk tank must be weighed by a calibrated measuring instrument.
- Only milk from the parlor with SmartFlows ends up in the bulk tank.
• The amount of milk that has flown through the SmartFlows and has not been delivered via the bulk tank can be properly estimated (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 14 days, so that the data are representative and reliable.

Procedure

Use the Excel spreadsheet Validation sheet - statistic test SmartFlow_version2020_2.xlsx for this test.

The test consists of 3 parts:
1. Inter meter comparison. The actual deviation per SmartFlow is calculated, based on the expected milk yield from the cows.
2. Bulk tank comparison. The average deviation of all SmartFlows in a milking parlor is determined, based on the weight of the delivered milk in the bulk tank.
3. Calculation of the individual SmartFlow deviation. The deviation per SmartFlow is calculated, corrected by the average deviation of the whole barn of the bulk tank comparison.

Inter meter comparison
1. In the Excel spreadsheet, go to the tab Step 1 (Milk parlour settings) and fill in the general farm data.
2. In Nedap Velos, go to Reports > Milking > ICAR milk meter deviations.
3. Select all milking points and the latest milking session. Click Ok.
4. In the Excel spreadsheet, go to the tab Step 2 (ICAR milk meter dev).
5. Fill in the deviations of the column History (10 days) Deviation of the Velos report.
6. Follow the next step Bulk tank comparison (page 26).

Bulk tank comparison
1. Open the report of your milk delivery company.
2. In the Excel spreadsheet, go to the tab Step 3 (Bulk tank comparison).
3. Fill in:
   a. The weight of the delivered milk (in kg)
   b. The start and end dates of all milking sessions that correspond with the start and end dates of emptying the bulk tank
   c. The weight of the milk that is measured by the SmartFlows, but that has not been delivered via the bulk tank
4. In Nedap Velos, go to Reports > Milking > Milk meter statistics.
5. Select all milking sessions that correspond with the time frame of step 3 and click Ok.
6. In the Excel spreadsheet, fill in the total milk yield of the Velos report. The barn deviation is automatically calculated.
7. Follow the next step Individual SmartFlow deviation.

Calculation of the individual SmartFlow deviation

Make sure the Nedap equipment in the milking parlor (animal identification and all SmartFlows) must have functioned without any problems or changes for at least 14 days, after the calibration, so that the data are representative and reliable.

1. In the Excel spreadsheet, go to the tab Conclusions.
2. In the column **Approved**, check that the SmartFlow has been approved. The SmartFlow is approved when the deviation is in the range 97% - 103%.
   a. **SmartFlow ok** indicates that the SmartFlow is approved: No further action is needed. The SmartFlow is ready to use.
   b. **SmartFlow not ok** indicates that the SmartFlow is not approved: Check the SmartFlow in the milking parlor for technical issues.
      1. **The SmartFlow is technically fine**: Perform a zero-point test and calculate a new correction value using the milk test (see Milk test (page 25)).
      2. **The SmartFlow is technically not fine**: Fix the SmartFlow. Next perform a zero-point test and calculate a new correction value using the milk test (see Milk test (page 25))
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 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.

5.1.1 Cleaning requirements

The quality of the washing process is determined by:

- Detergents used, type and concentration
- Temperature
- Mechanical aspects
- Length (time) of the stages in a washing cycle

Read the next requirements and instructions concerning the washing process before cleaning the SmartFlow.

Detergents

Many of the actually available detergents combine disinfecting and washing but also separate functionality is relatively often applied. Descaling of the equipment is required on a regular basis and highly depends on the quality of the water used for washing.

The following aspects require attention:

- Type and quality: Starting point is the use of good quality detergents meant for washing of milking equipment and allowed to be used for this purpose by the relevant (national or international) authorities.
- Concentration: Follow the instructions of the manufacturer. Both under and overdosing must be avoided.
- Stocking: Detergents must be stored safely and under the conditions prescribed by the manufacturer (temperature can be a critical factor!).
- Service life: Most detergents have a limited service life. Once expired the effectiveness, especially related to disinfecting, can reduce significantly.
- The materials used in the SmartFlow are resistant to all known washing detergents. Restriction is in some cases (especially with acids) that long contact times must be avoided. This means that all SmartFlows need to be drained thoroughly after washing. Proper draining requires adequate closing and opening of the SmartFlow 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.

Caution

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

In circulation washing systems, the water temperature during the wash stage is a critical factor. The minimum temperature at the end of the wash stage is ± 45 ºC (113 ºF) in order to keep the milk residues (fat) dissolved. Quantity of (hot) water, covering the wash trough, reheating and insulation of parts of the milking installation can contribute to fulfilling this minimum temperature requirement.

Although the SmartFlow and all its components resist temperatures up to and above 100 ºC (212 ºF), it is not recommended to apply acidified boiling water washing. The maximum allowed temperature is 75 ºC (167 ºF).

**Water flow rate**

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

**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 acid and alkali milking machine detergents and disinfectants. However, products containing chloride, iodine, chloride acid, ketones, chlorinated hydrocarbons, aromatic hydrocarbons, phenolics 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.

### 5.1.2 Clean the SmartFlow

1. During cleaning make sure the valve is in cleaning position by applying a vacuum on the valve. The cleaning vacuum must be as high or higher than the vacuum in the milking installation.
2. Ensure a minimal flow rate of 5 kg/min (176 oz./min).
3. Start the cleaning manually or automatically.

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

### 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 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.

6.1 Maintenance scheme

Regularly clean the SmartFlow following the instructions described in Cleaning (page 28).
7 Troubleshooting
8 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).
## Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behavior component</td>
<td>The behavior of a standard hardware component and / or the total management system, set by Velos software.</td>
</tr>
<tr>
<td>SmartFlow</td>
<td>The milk meter.</td>
</tr>
<tr>
<td>Float</td>
<td>The float in the milk meter that wirelessly monitors whether the device is correctly installed, functions properly, cleans properly and has a data connection.</td>
</tr>
<tr>
<td>MPCU</td>
<td>Milking Point Control Unit</td>
</tr>
<tr>
<td>V-box</td>
<td>Housing for V-packs.</td>
</tr>
<tr>
<td>V-pack</td>
<td>VPU or VP</td>
</tr>
<tr>
<td>VP4102</td>
<td>Reader Input/Output controller</td>
</tr>
<tr>
<td>VP8002</td>
<td>Velos Processing Unit (VP8002)</td>
</tr>
<tr>
<td>VPU</td>
<td>Velos Processing Unit (VP8002)</td>
</tr>
<tr>
<td>VPU-online</td>
<td>An online address for the herd manager that makes the CowControl™ system worldwide accessible by the Internet.</td>
</tr>
<tr>
<td>Velos software</td>
<td>Nedap software to control the system</td>
</tr>
</tbody>
</table>
10 Technical specifications

SmartFlow (without Float)

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

Float

<table>
<thead>
<tr>
<th>Item</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (L x W x H)</td>
<td>47 x 25 x 61 mm (1.9 x 0.9 x 2.4 in.)</td>
</tr>
<tr>
<td>Weight</td>
<td>0.035 kg (0.077 lbs)</td>
</tr>
<tr>
<td>Construction material</td>
<td>Parts in contact with milk: PPE (FDA approved)</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>0 to 40 °C (32 to 104 °F)</td>
</tr>
<tr>
<td>Operational relative humidity</td>
<td>&lt; 93% @ 45 °C (113 °F)</td>
</tr>
</tbody>
</table>
11 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 license d’Innovation, Sciences et Développement économique Canada. L’opération est soumis aux deux conditions suivantes: (1) cet appareil ne doit causer aucune interférence, et (2) cet appareil doit accepter n’importe quelle interférence, y inclus interférence qui peut causer une operation non pas voulu 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 a 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 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 to which 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 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.