The *Afimilk MPC* is a milk meter, used for measuring milk yield and controlling milking point apparatus at bovine milking parlors. When used together with *AfiFarm 5* dairy herd management system, *Afimilk MPC* is used for collecting milking data and alerting milkers to animal health problems. Milkers can also send animal information to the computer database via *Afimilk MPC* control box. *Afimilk MPC* can be used in the most common parlor types and brands, and control common milking point apparatus such as vacuum valves, pulsators, removal etc.

*Afimilk MPC:* Product P/N 4498999  
This manual: P/N 9440320

Date First Release - March 2013  
2nd Release (Ver2.16) - Nov. 20th 2013  
3rd Release (Ver 3.0) – June 2015

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Afimilk MPC carries all necessary regulations and approvals as the documents at the following pages show. It is officially approved by ICAR committee for cow milk recording and passed all regulatory safety tests.

CAUTION

Responsibility to install, operate, and maintain the system in accordance with all applicable codes, regulations, and safety measures.

Without prior notice and without obligation, the contents of this manual may be revised to incorporate changes and improvements.

Every effort is made to ensure that the information is complete and accurate at the time of publication. Nevertheless, Afimilk cannot be held responsible for errors or omissions.

Trademarks, patents, and copyrights apply.

Contents of this manual may be revised to incorporate changes and improvements.
International Committee for Animal Recording (ICAR)
Via Giuseppe Tomassetti 3
Rome, Italy

AFIMILK MPC
(Previously to Dec. 2012 named Afí-Lite Pro)

manufactured by
Afimilk

is approved by the Board of ICAR for milk measurements and sampling in milking installations

[Signatures: President, December 2012, Secretary General]
EC Declaration of Conformity
(electromagnetic compatibility)

We, Afimilk - Dairy system agricultural cooperative association LTD.
Kibbutz Afikim 15148 Jordan Valley, Israel

Certify that the product described is in conformity with the EMC Directive 2004/108/EC as amended:

AfiMilk MPC Family
Model numbers: 4497900, 4497950, 4497951, 4498999XXX
4498800, 4498994XX

The product has been assessed by application of the following standards or specifications:
Electromagnetic Emissions: EN61000-6-3: 2007
Electromagnetic Immunity: EN61000-6-1: 2007
and is consistent with a technical construction file showing conformity with the requirements of the Directive.

The power supply voltage is 24Vac, thus the Low Voltage Directive 2006/95/EC is not applicable to this equipment.

Test report/file no.: SAEEMC_21447 dated February 2011

Issued by: Hermon Laboratories, P.O. Box 23, Binyamina 30500 ISRAEL

Manufacturer
Name: Mr. Ronen Zexer, General Manager
Date of issue: March 20, 2011
Signature: .................

European Contacts
Company name: TOTAL DAIRY MANAGEMENT S.r.l
Address: Via Piamarta 3/E, 25021 Bagnolo Mella (BS), Italy
Name: RUGGERI MAURIZIO, Position: PRESIDENTE
Date of issue: 20/03/2011
Signature: .................
Hereby grants

GOLDEN MARK

For the year 2010

To: S.A.E.- DAIRY SYSTEMS
AGRICULTURAL COOPERATIVE ASSOCIATION LTD.

For holding these certification marks:

Testifying to compliance of their management systems
to the highest standards of quality

Doron Tamir
Director General
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Introduction

Afimilk MPC milk meter is a milking point controller configurable at most parlor types and brands. Its primary features are measuring cow's milk yield during milking and controlling milking point apparatuses such as vacuum, removal and pulsation. Afimilk MPC consists of control box and milk meter body (Measuring chamber) as shown in the following chapter.

System Requirements

Afimilk MPC is installed at every milking point as either a standalone unit OR under communication mode as part of AfiFarm – milking parlor management system. Afimilk MPC version 3 is designed for optimal performance when operating under AfiFarm5 management software. Its basic system requirements include:

- **Software** – afimilk parlor control module as part of AfiFarm program version 5.00 or higher.
- **Power System** – Afimilk MPC is powered by a 24Vac per specifications at the "Power Supply" chapter below.
- **Animal Type** – The Afimilk MPC was tested and approved for milking cows only.
- **Additional capabilities** - Afimilk MPC version 3 controls the basic functions of the milking point (Pulsation, vacuum and removal). An additional unit – MPC Extender is used for controlling additional functions such as milk separation, backflush etc.
- **Additional Sensors** – Afimilk MPC may be configured in conjunction with AfiLab milking point analyzers. Under AfiFarm5- AfiLab is configured to communicate via Afimilk MPC and not directly to the PC via a separate communication line, as was practiced with previous versions of AfiFarm.
Overview of Components

Afimilk MPC milk meter consists of two main components – a control box (shown below) and a milk meter body (shown on the following page). Both components have their own connection cable, available at various lengths per needs.

An Afimilk MPC connection box is available for securing and protecting wiring connections.

Each Afimilk MPC milk meter body (measuring chamber) is wired to its control box. All control boxes installed in the milking parlor are connected to the AfiControl PC (The AfiFarm software communicating with Afi sensors) via a single communication line.

The afimilk MPC Control Box

The control box serves the following functions:

- Controls milking activities.
- Displays data such as cow number, milk yield alert codes and cow data.
- Used to enter data such as cow numbers at manual ID and send messages from the pit to the AfiControl PC.
Afimilk MPC Milk Meter Body

Afimilk MPC body is a measuring chamber connected as part of the milking system in the parlor. The milk meter body is installed between the milking cluster and the milk line thus all the milk harvested from the cow flows through the body during milking. The Afimilk MPC body is an assembly of three main parts:

- **Upper Cover and Inlet Port**: Milk enters the main chamber through the inlet. The inlet is available in two diameters: 5/8 inch, or 7/8 inch (see Ordering Afimilk MPC, below).

- **Mid-Section**: Milk fills up the measuring chamber in the mid-section while the outlet port's valve is closed. The mid-section body contains the following components:
  - Three electrodes measuring milk electrical conductivity
  - A cylindrical valve, which also serves as overflow tube
  - A silicon gasket

- **Lower Cover and Outlet Port**: Lower cover is the milk discharge mechanism of the milk meter. Its outlet port connects the milk meter to the main milk line via a rubber elbow pipe. The mid-section body contains a solenoid and diaphragm lifting and lowering the valve in the mid-section, allowing milk to accumulate and be dumped into the main milk line per Afimilk MPC's operation sequence.

The electrodes detect milk conductivity and the milk level in the mid-section. When a full mid-section is detected, a signal is sent to energize the solenoid. When the solenoid is energized, vacuum causes the flexible diaphragm to pull the valve down, a path opens between the mid-section and the lower cover and the milk drains via the outlet port into the milk line.

Each portion of milk is measured precisely. The amount of each portion may vary from 200 to 330 cc, depending on the milk flow rate.
Afimilk MPC Inner Structure

The body consists of three main sections: an upper cover, a mid-section, and a lower cover. Each section can be easily dismantled by releasing the retaining clasp.

The mid–section is a measuring chamber with electrodes protruding from its side. The electrodes, probing the milk in the chamber for measuring milk conductivity, are wired to the Afimilk MPC Control Box.

Figure 2: Milk Meter Body—Internal Structure
Afimilk MPC Options

Each Afimilk MPC body is connected to the control unit via a connection box or by any other means ensuring connections protection. Afimilk MPC body incorporates integrated cables, connecting its sensing probes and electronic solenoid to the control unit inside Afimilk MPC control box. Afimilk MPC control box cables and Afimilk MPC body cables are both available at different lengths according to the requirements of installation (Distance between components). Some lengths of the Afimilk MPC control box cable are not stock items, but may be manufactured per order. These are marked with an asterisk.

Afimilk MPC may be ordered with one of two inlet port diameter options according to the milk hose in use (cluster size).

Ordering Afimilk MPC

This chapter explains how to order a milk meter with the desired lengths of cables. The standard configuration of Afimilk MPC offers:

- 5/8 inch inlet port diameter.
- 2m long Afimilk MPC control box cable.
- 3.5m long body cable (probes and valve).

Part number 4498999 is used for ordering the standard configuration of Afimilk MPC described above.

Different cable lengths may be ordered by adding suffix letters to the part number as explained in this diagram.

Afimilk MPC can also be ordered with a non-standard larger inlet port. Add I suffix before the cable length suffixes to order the product with a 7/8 inch inlet port diameter.

Example: 4498999IAC will be:

- I = 7/8 Inlet
- A = 2m Control box cable
- C = 10m body cables
Afimilk MPC Connection Box

A connection box for protecting cable connections is available at [afimilk](https://afimilk.com). This component, a highly recommended accessory for installation, is ordered separately from the milk meter.

*Afimilk MPC connection box P/N 4493840*
Operation Sequence

In all configurations, Afimilk MPC follows the sequence of events charted in this chapter.

Sequence of Events within the Parlor

Session Start
- Power Up
- Transfer Afimilk MPC into Milking Mode
- Close Exit gates
- Open Entry gates
- Cows enters the parlor
- Auto Cow ID
- Manual ID
- Cow data sent to control box
- Alert Code
- Attach Cluster
- Milking
- Flow Rate Dropped?
- Yes
- Milk to bucket
- No
- Removal
- All cows in load Milked?
- Yes
- Open Exit Gate
- Cows released
- Open Entry Gate
- Bring new load
- No
- Yes
Milking Sequence at *Afimilk MPC*

1. **Start key Pressed**
   - Cluster lowered, Vacuum opens, Pulsation starts
2. **Cluster Attached**
3. **Milk Start accumulating in meter body**
4. **Removal counter starts**
5. **Milk detected by electrodes**
   - **Yes**: Body Solenoid energized, Valve raised milk dumped to milk line
   - **No**: Flow below Removal Threshold?
     - **Yes**: Removal Sequence - Vacuum shut down, retraction, Pulsation stop
     - **No**: Milk yield updated at the display
Mounting Components

This chapter describes the following installation procedures:

- Mounting the Afimilk MPC Control Box
- Mounting the Afimilk MPC Milk Meter Body
- Installing milk meter body Vacuum and Clean-air service Lines

Mounting Afimilk MPC Control Box

Afimilk MPC control box is mounted to the milking parlor metalwork at a stable secure location.

- At or above eye level, allowing easy access to its keypad for regular operation.
- At a protected location, with minimum exposure to cows, manure and water.

There are two common mounting options, depending on the metal work design of the milking parlor:

- Cabinet Type – in such parlors, control units are usually mounted at cutouts in the cabinets for flush mounting appearance.
- Other Types – Control units attached to a pole or railings part of the frame with an external bracket.

CAUTION

Connecting the display to an unstable surface may result in breakage of the control panel housing. It is the customer's

The table at the following page outlines mounting and bracket options when using Afimilk MPC brackets.
### Table 1: Bracket Mounting Options

<table>
<thead>
<tr>
<th>Description</th>
<th>Image</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Afimilk MPC mounting bracket and brace (for clamping the mounting bracket to a stanchion) (P/N 5001720) can be used to support control boxes. <em>This assembly is ordered separately.</em></td>
<td><img src="image1" alt="Afimilk MPC mounting bracket and brace" /></td>
</tr>
<tr>
<td>An Afimilk MPC C.B. Bracket (P/N 5001731) secured to a mounting bracket that is welded to a stanchion. <em>Afimilk MPC C.B. bracket is supplied with every milk meter.</em></td>
<td><img src="image2" alt="Afimilk MPC C.B. Bracket" /></td>
</tr>
<tr>
<td>An Afimilk MPC bracket secured to a flat surface</td>
<td><img src="image3" alt="Afimilk MPC bracket secured to a flat surface" /></td>
</tr>
<tr>
<td>The Afimilk MPC bracket may also be secured to a stanchion or rail. Use this technique only if necessary. If using this method, and if a cable is inside the stanchion or rail, make sure that the anchor screws do not damage the cable.</td>
<td><img src="image4" alt="Afimilk MPC bracket secured to a stanchion or rail" /></td>
</tr>
<tr>
<td>Side view of an Afimilk MPC control box mounted on a flat rail.</td>
<td><img src="image5" alt="Side view of an Afimilk MPC control box mounted on a flat rail" /></td>
</tr>
</tbody>
</table>
High Protection Cutout in cabinets

This mounting method is highly recommended since it provides Afimilk MPC Control Box with best protection against water and mechanical damage. The concept of such mounting technique is creating cutouts, shaped per the face of Afimilk MPC control unit, in the front of the cabinet at every milking point.

Securing the control unit to the cabinet is achieved by means of U shape bracket fastened from the inner side of the cabinet.

CAUTION

To achieve precision in cutout dimensions, laser OR C.N.C. technology is highly recommended.

The following figures outline cutout shape and dimensions. If required, afimilk may supply (Per request) an engineering machining file for creating the cutout.
Figure 3: Shape of High Protection Cutout in Cabinet Front Panel

Figure 4: Example of a Cabinet Panel
Figure 5: Afimilk MPC– cabinet mounting technique

Figure 6: An Optional Bracket Mounting
Plugging the main cable at the Control Box

After mounting the control boxes, Afimilk MPC main cable is plugged into its socket in the control box. Follow the procedure described here to avoid oxidation of connector pins and ensure proper contacts between connector and socket pins.

1. Remove the foam plug protecting the D-type socket. The foam plug prevents moisture from corroding connector pins during shipping.

   ![Foam plug]

   Do not leave the connector pins in the socket exposed. Connect main cable to the control box immediately after removing the foam plug.

2. Fill the D-type socket with electrical protective paste supplied with every milk meter.

3. Insert the D-type connector all the way into the control box socket, until the connector pins correspond with their grooves in the control box.

4. Tighten the screws, to secure the control cable to the control box. When secured properly, the connection is resistant to water spray.
   a. Ensure inserting the connector all the way in its receptacle before tightening the screws.
   b. Tightening screws are locked to the enclosure body. Refrain from using excessive force when tightening the screws to avoid damaging the threads. Tighten the screws by hand up-to an initial lock, than tight for about another one eighth of torsion for securing.

5. Slide the Afimilk MPC control box onto the mounting bracket.

6. Run the main cable in a protected route (inside a cabinet or through the railing of the parlor) to the connection box location.
Mounting the Milk Meter Body

Position each *Afimilk MPC* milk meter body per instructions here:

- Below the cow platform
  - Above the milk line, allowing enough space to connect the fat sampler with bottle at test day.
  - Elbow Pipe connecting the meter outlet port to the milk line should be at a downward slope towards the milk line, allowing gravity to control milk evacuation.
- At a level position
- Protected from cow legs for avoiding coincidental damaging contact.
- In a position not interfering with parlor operators work.

**Milk Meter Body Mounting Bracket**

The body bracket is used for firmly fixing the milk meter body to its position. The milk meter bracket should be welded or bolted to a firm wall or structure.

Milk meter body should be level at both axes. When installing the bracket ensure that it is leveled. The bracket allows fine tune leveling of the body by means of adjusting screws, as shown below.
Using a spirit level, make final leveling adjustments as follows:

- To adjust the Y axis, loosen fastener bolts and adjust to a level position, within the clearance of the bolt holes.
- Adjust the X axis as detailed in the table in Figure 7, above.

**Vacuum and Clean-air Lines**

The solenoid in the milk meter body is a crucial component of the meter. Malfunction of this solenoid results in inaccurate milk measurements. Milk meter body solenoids are vacuum-operated; therefore, a continuous supply of stable, clean, and dry vacuum is required.

Solenoids incorporate atmospheric air exhaust. Clean-air lines are used to protect solenoid air suction/exhaust inlets from dirt that may block them or from water that may penetrate and cause damage to the solenoids.

Proper installation, and preventive maintenance, of vacuum and clean-air lines is essential for proper functioning and longevity of the milk meters. After installing the lines, wash the vacuum line as described in the next section. Drawings on the following pages, and the descriptions accompanying them, outline the requirements and the installation procedure for ensuring proper functioning of milk meters.

Install lines as illustrated on the following pages, and in the following descriptions.
Figure 8: Layout of Vacuum and Clean-air Lines, For Milk Meter Solenoids
To vacuum balance tank or stable vacuum source (not pulsator vacuum line)

To pulsator clean air line (optional)

To milk receiving vessel

10 - upper end of milk pipe
300 max - lower end of milk pipe

Oil

1. PIPE MENDER 50 MM PNC PVC - Cat No 5000077
2. PULSATOR PIPE (SINGLE) - Cat No 310001
3. NIPPLE ON VACUUM TRACTOR LINE - Cat No 5200027
4. VALVE, BALL THREAD 1/2" NPT - Cat No 5300009
5. TEE PVC CEMENTED 90 DEG 50MM GRAY - Cat No 16000017
6. SHORT BEND PVC BUSH, DIN. 50X5 GRAY - Cat No 5000010
7. HIDE PVC HIDE CONNECTOR 1/2" - Cat No 5000034
8. DRAIN VALVE WITH BALL 1/2" - Cat No 5000071
9. CAP CEMENTED PVC 50 MM GRAY - Cat No 160000024
10. BRACKET 1 UN 200 33 AGED - Cat No 15231553 + TOLT U 50, MB
Installing Vacuum & Air Lines

1. Use 50 mm diameter PVC pipes for both lines. Three (3) mm wall thickness is recommended.

2. Place vacuum and the clean-air lines as close as possible to the main milk-line. Flexible tubes connect milk meter solenoid ports (Vacuum and exhaust) to their relevant lines, below the milk meters (illustrated in green and red in Figure 8 above). **Length of flexible tubes should not exceed 50 centimeters** (20”).

3. Secure the lines to a wall, or to any common bracket, with its fitted clamps. Prevent pipes from sagging.

4. Install a drain valve at the lower end of each pipe

5. Secure lines with slopes:
   - **Secure the solenoid vacuum line with a downward slope of 1.5 – 2°,** towards the drain valve (detail B in following drawing).
   - **Secure the clean air line with a downward slope of 1.5 – 2°,** towards the ½” ball valve (detail C).

6. Install joints, ends, and vertical sections and as follows:
   - **Solenoid vacuum line:**
     i. At the lower end of the solenoid vacuum line, install a T joint. At the bottom opening of the T joint, install a ½” drain valve as shown in detail B.
     ii. From the upper opening of the T joint, extend the solenoid vacuum line vertically, upwards.
     iii. Connect the solenoid vacuum line to the **main vacuum supply** line high up in the parlor, as close as possible to the balance tank. **DO NOT connect the solenoid vacuum line to the pulsator vacuum line.**
     iv. At the top, at the connection to the main vacuum line, make a PVC pipe bow shape, as shown in detail A.
Clean-air line:

i. At the lower end of the clean-air line, install a 1/2” ball valve, as shown in detail C.

ii. Extend the upper end of the clean-air line upwards -vertically, to a high and ventilated point in the parlor as shown above. This extension should carry a suction filter.

iii. Attach a suction filter to the clean-air line. Use the same type of filter used on air compressors.

7. At each milking point location, drill in two tube joints, one at each line, for connecting milk meter solenoid.

**NOTE**

Tube connectors should be inserted to the air and vacuum lines pointing upwards!

Each *Afimilk MPC* is provided with two quick-connectors. Follow the instructions provided with the meter to insert quick-connectors to the Air/Vacuum lines.

Alternatively, you may use locally sourced male, straight hose, connectors - 8-1/8” NPT, as illustrated. If using NPT connectors, insert them as follows:

i. Carefully drill a proper hole in the line.

ii. Tap a 1/8” NPT female threading.

iii. Using a sealing ribbon, install each hose connector into its threading.
8. Connect the solenoid ports to vacuum and clean air

   - Milk meter solenoid is plugged at a socket in the lower cover of the milk meter. The solenoid has two ports – for vacuum and exhaust.
   - Connect the solenoid to the vacuum line via the larger diameter port and to the clean air line via the smaller diameter port.

![Solenoid Ports]

9. Connect each milk meter solenoid ports to their corresponding Vacuum/Air-line using the supplied flexible ¼"tube. Tube length should be as short and straight as possible, without unnecessary bends.

![Washing the Vacuum Line]

**Washing the Vacuum Line**

After lines are installed, regardless of the type of connectors used, wash the vacuum line as described below:

1. Prepare a pail half-full of warm water.

2. Disconnect the last flexible tube (on the upper end of the line) from the MM solenoid and dip it in the water.

3. Briefly operate the vacuum pump. Water will be pumped into the line. Allow the water to drain through the drain valve.
Vacuum Shut-off Valves

Vacuum shut-off valves and removal pistons are the basic components supporting automatic stoppage of milking.

In principle, large variety of vacuum shut off valves, available for local sourcing, may be used for shutting vacuum off at removal. Alternatively, afimilk offers a range of valves for specific usage in conjunction with Afimilk MPC milk meters. For the list of available vacuum valve options, refer to the accessories chapter.

If one of afimilk valves is used, additional bracket for mounting the valve at its proper place near the milk meter is available. The figure below illustrates the mounting options of afimilk type valves.

![Diagram of mounting options](image-url)
Installing the Power System

*Afimilk MPC* is powered by a designated power supply system. It is crucial, for proper functioning of the meter, that the power supply system feeds the milk meters and their output apparatuses *only*.

The power supply consists of the main transformers and cabling.

- Power output of the transformer should be 23–27Vac
- Each Milk Meter requires a power supply of 75VA per milking point. Calculate transformer size accordingly.
- Power system must employ an isolating type transformer.
  > *Neither the secondary winding of the transformer nor any of the loads, may be connected to the ground.*
  > *The transformer must be supplied with suitable circuit breakers.*
- Power cables diameter must be sufficient to carry the load without causing power drops between the first and the last milk meter.
- *Afimilk* recommends apparatus solenoids of 10watt maximum.

**CAUTION**

The power supply system must be installed by a qualified electrician. The installation must be protected by suitable circuit breakers to meet international safety codes.
Power Supply Transformers

Use isolating transformers. A principle electric drawing of such recommended transformer is illustrated here.

Install the power supply transformers as close as possible to the milk meters. If long cables run between the transformers and the milk meters, consider higher cable gage than originally suggested.

Connect the mains input to the transformer directly. Do not connect additional loads (receiver vessels for example) on the same source cable used to feed the milk meter transformer.

In medium and large size parlors, *afimilk* recommends installing separate power assemblies (transformers and main 24Vac wiring) for each side of the milking parlor for these reasons:

- If one transformer is not functional, the second side of the parlor remains operational.
- Troubleshooting is easier.

The following table specifies the requirements for transformers and cables width in different sizes of parlor.

<table>
<thead>
<tr>
<th>No. of Milk Meters in the parlor</th>
<th>Power Required (V/A)</th>
<th>Recommended Transformer</th>
<th>Power Cable (AWG)</th>
<th>Power Cable (mm²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 - 8</td>
<td>600</td>
<td>600</td>
<td>13 + 13</td>
<td>2.5 + 2.5</td>
</tr>
<tr>
<td>10 - 12</td>
<td>900</td>
<td>2 x 450</td>
<td>10 + 10</td>
<td>4 + 4</td>
</tr>
<tr>
<td>14 - 16</td>
<td>1200</td>
<td>2 x 750</td>
<td>10 + 10</td>
<td>6 + 6</td>
</tr>
<tr>
<td>18 - 20</td>
<td>1500</td>
<td>2 x 750</td>
<td>10 + 10</td>
<td>10 + 10</td>
</tr>
<tr>
<td>22 - 24</td>
<td>1800</td>
<td>2 x 1000</td>
<td>8 + 8</td>
<td>10 + 10</td>
</tr>
<tr>
<td>26 - 28</td>
<td>2000</td>
<td>2 x 1000</td>
<td>8 + 8</td>
<td>16 + 16</td>
</tr>
<tr>
<td>30 - 32</td>
<td>2400</td>
<td>2 x 1200</td>
<td>6 + 6</td>
<td>16 + 16</td>
</tr>
<tr>
<td>34 - 40</td>
<td>3000</td>
<td>2 x 1500</td>
<td>6 + 6</td>
<td>16 + 16</td>
</tr>
</tbody>
</table>
Laying Cables and Connecting Wires

It is the sole responsibility of the installation technician to install and protect wiring connections per the environmental conditions and in accordance with international codes of electrical wiring.

After the power supply is installed, lay cables and connect wires as detailed in this chapter.

Cables

Four groups of cables, described below, are connected to the Afimilk MPC. Cables are wired to the control box's main cable inside the connection box.

<table>
<thead>
<tr>
<th>Cable</th>
<th>From</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication cable</td>
<td>Computer</td>
<td>A single communication line runs between the afimilk PC and the parlor. This line &quot;collects&quot; all Afimilk MPCs (communication from each point connected parallel to all other devices).</td>
</tr>
<tr>
<td>Power cable</td>
<td>Transformer</td>
<td>Power cable braid wired to each side/batch of milk meters (according to the size of cable and power consumption).</td>
</tr>
<tr>
<td>Afimilk MPC body cables</td>
<td>MM body</td>
<td>2-wire valve solenoid cable, 2 wire temp. sensor (2 x 0.75 mm²/21 AWG) and 3-wire electrode cable (3 x 0.75 mm²/21 AWG) run from the body to the connection box per parlor options.</td>
</tr>
<tr>
<td>Apparatuses</td>
<td>Each Apparatus</td>
<td>2 or 3 wire solenoid cables (21 AWG/0.75 mm²) connect each wired apparatus (Shut off valve, pulsator...) to a control box output.</td>
</tr>
</tbody>
</table>

Cable Protection

Run cables inside cabinets if available, or inside cable troughs for protection. Ensure shortest run as possible, refrain from running cables outdoors and make necessary efforts to protect communication and power cables from lightning strikes. General restrictions to consider:

- Cables must be out of reach of cows & protected from mechanical damage!
- Communication cable runs should be at least 50cm away from high power lines.
Communication Cable

Afimilk MPC communication is of RS485 type. Communication cables should support this type of protocol.

Afimilk offers a suitable cable (part number 4097324) designated for connecting the RS485 communication port of several products to the Computer. The cable provides 3-wire connection and shielding for harsh electrical environments.

The cable has one twisted pair and a single additional conductor. It also provides a drain wire that allows easier connection of the shield. The twisted pair of wires transmits and receives the communication signals. The single conductor runs the communication ground reference.

This shielded core is protected with a heavy-duty jacket.

Laying Communication Cables

Afimilk MPC communication is based on a single line “daisy chain” type connection. This means that a single communication cable “collects” all the devices on the line to a single Communication Port in the PC.

The example below demonstrates a 64 point parlor connection.

After laying cables, connect wires as described in the following section.
The diagram below shows the connection between the last/first unit connected in the bus and the computer using \textit{afimilk}' RS485 cable.

**Connecting Communication to the PC**

\textit{Afimilk MPC} communication cable is connected to Port 6 or Port 8 of the \textit{AfiCom1} Card in the Control PC under \textit{afimilk} versions 3-4. With AfiFarm 5, the communication is wired via the AfiCom USB adapter.

For connecting to AfiCom card, connect the extension cable to \textbf{P6} or \textbf{P8} connector according to the wire colors in use. The example below uses a standard RS485 cable supplied by \textit{afimilk}.
To connect *AfiMilk MPC* to *AfiFarm 5* via the *AfiCom USB* adapter use the protection unit to buffer between the communication line and the Adapter:

**MPC RS485** Blue/White wire to Adapter connector Red wire

**MPC RS485** Red/White wire to Adapter connector Green wire

Optional: connect the Communication-cable Drain

Connect the communication-cable to the 1 OR 4 Port AfiCom USB Serial Adapter.
Power Cable

Power cables runs from the milk meters transformers to service a group of milk meters per specifications. An extension of the main power line is connected to each milk meter via Afimilk MPC main cable as outlined below.

Connecting Power Cables and Filter

A Power line filter is supplied with every milk meter. The filter protects Afimilk MPC from surges on the main power line. Power filters are installed at the connection box between the power cable braid and the Afimilk MPC main cable.

Power filter orientation is very important. Connect the side marked IN to the power supply side (Power Braid) and its other side to the Afimilk MPC main cable as shown below.

Power Filter

Afimilk MPC Main Cable

Power Supply Cable Braid
Using Connection Boxes to wire the system

_Afimilk MPC_ connection box is the recommended solution for protecting wired contacts. The box is a sealed enclosure, incasing terminal blocks for connecting the _Afimilk_ main cable to external devices it controls. The _Afimilk MPC_ connection box, shown below incorporates five grommet type cable inlets (Cable inlets are plugged at delivery). These inlets provide proper seal of cable inlets into the connection box and may maintain the non-used inlets sealed. **Only plugs of inlets in use need to be removed prior to threading cables through them.**

Grommets are color coded. Each color indicates a cable size as illustrated in this table.

<table>
<thead>
<tr>
<th>Cable Width</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 5mm²</td>
<td>Red</td>
</tr>
<tr>
<td>6-7mm²</td>
<td>Blue</td>
</tr>
<tr>
<td>9.5mm²+</td>
<td>Black</td>
</tr>
</tbody>
</table>

Inserting Cables into the Connection Box

Proper use of connection box cable inlets ensures keeping the connection box waterproof.

- Use the appropriate cable inlet in accordance with the width of cable as described in the tables below.
- Ensure that no inlets are left open
- Tighten the grommet nuts to seal the enclosure after inserting cables as explained below

<table>
<thead>
<tr>
<th>Cable Wire width</th>
<th>Cable</th>
<th>Grommet Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplied by AfiMilk</td>
<td>Afimilk MPC Main Cable</td>
<td>Black - Larger Inlet</td>
</tr>
<tr>
<td>Part of Afimilk MPC Body</td>
<td>Body Electrodes</td>
<td>Blue</td>
</tr>
<tr>
<td>Part of Afimilk MPC Body</td>
<td>Body Valve</td>
<td>Red</td>
</tr>
<tr>
<td>3 X 0.75mm²/21AWG</td>
<td>Pulsator</td>
<td>Blue</td>
</tr>
<tr>
<td>2 X 0.75mm²/21AWG</td>
<td>Removal Piston</td>
<td>Blue</td>
</tr>
<tr>
<td>2 X 0.75mm²/21AWG</td>
<td>Vacuum Valve</td>
<td>Blue</td>
</tr>
<tr>
<td>RS485 As specified</td>
<td>Communication</td>
<td>Red</td>
</tr>
<tr>
<td>2 X 0.75mm²/21AWG</td>
<td>Power Supply</td>
<td>Blue</td>
</tr>
<tr>
<td>2 X 0.75mm²/21AWG</td>
<td>External Start Button</td>
<td>Blue</td>
</tr>
</tbody>
</table>
To insert a cable into the connection box:

7. Using pliers, pull a plug out of the desired grommets per size of cable as explained above. Being the widest cable in use, *Afimilk MPC* main cable has a single grommet option (see figure below).

8. Loosen the grommet nut

9. Insert the cable through the grommet hole

10. Connect the wires of the cable to the appropriate terminal blocks as described below.

11. Pull excessive slack of cable back through the inlet.

12. When all the wiring of the cables inserted through the grommet is done, tighten the nut by hand until cables may no longer be pulled out.

*Figure 11: Afimilk MPC Connection Box Grommets*

---

**Connecting Wires to the Afimilk MPC Control Box**

After running cables pier to pier, wires are connected to *Afimilk MPC* control box via *Afimilk MPC* main cable. The diagram below and table in the following page illustrate electronic connections of *Afimilk MPC* milk meter system.
Additional functions, described later in this manual (backflush, strip, and milk diversion), can be installed via an additional **MPC Extender** unit as described below.
## Laying Cables and Connecting Wires

### Chapter 6

<table>
<thead>
<tr>
<th>Afimilk MPC Main Cable Wire Color</th>
<th>Connected to</th>
<th>Wire Function</th>
<th>Device Wire Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue</td>
<td>Body Cable</td>
<td>Operating electrode</td>
<td>Blue</td>
</tr>
<tr>
<td>Yellow</td>
<td>Body Cable</td>
<td>Holding electrode</td>
<td>Yellow</td>
</tr>
<tr>
<td>Brown</td>
<td>Body Cable</td>
<td>Common electrode</td>
<td>Brown</td>
</tr>
<tr>
<td>Orange</td>
<td>Body Cable</td>
<td>Thermistor</td>
<td>Orange</td>
</tr>
<tr>
<td>Light Green</td>
<td>Body Cable</td>
<td>Thermistor</td>
<td>Light Green</td>
</tr>
<tr>
<td>White/Pink</td>
<td>Pulsator</td>
<td>Pulsator Front</td>
<td>Blue (per Cable)</td>
</tr>
<tr>
<td>White/Green</td>
<td>Pulsator</td>
<td>Pulsator Rear</td>
<td>Brown (per Cable)</td>
</tr>
<tr>
<td>Red/Blue</td>
<td>Pulsator</td>
<td>Pulsator Common (+VBR)</td>
<td>Yellow/Green</td>
</tr>
<tr>
<td>White/Red/Blue</td>
<td>Removal Signal</td>
<td>DC Removal output (-)</td>
<td>Brown (per Cable)</td>
</tr>
<tr>
<td>Red/Blue (Jumper)</td>
<td>Removal+Vacuum Common</td>
<td>Solenoids DC Common (+VBR)</td>
<td>Blue (per Cable)</td>
</tr>
<tr>
<td>Gray/Pink</td>
<td>Vacuum Valve</td>
<td>DC Vacuum Valve (-)</td>
<td>Brown (per Cable)</td>
</tr>
<tr>
<td>Red</td>
<td>Power Supply</td>
<td>24Vac (0)</td>
<td>Blue (per Cable)</td>
</tr>
<tr>
<td>Green</td>
<td>Power Supply</td>
<td>24Vac (Phase)</td>
<td>Brown (per Cable)</td>
</tr>
<tr>
<td>Pink</td>
<td>Body Solenoid</td>
<td>Body Solenoid (H)</td>
<td>Red</td>
</tr>
<tr>
<td>Purple</td>
<td>Body Solenoid</td>
<td>Body Solenoid (L)</td>
<td>Black</td>
</tr>
<tr>
<td>Gray</td>
<td>External Start Button</td>
<td>External Start Button Contact</td>
<td>Blue (per Cable used)</td>
</tr>
<tr>
<td>Black</td>
<td>External Start Button</td>
<td>External Start Button Contact</td>
<td>Black (Per Cable used)</td>
</tr>
<tr>
<td>White/Brown</td>
<td>Additional Input</td>
<td>Swing Over Arm</td>
<td>Blue (per Cable)</td>
</tr>
<tr>
<td>White/Red</td>
<td>Communication</td>
<td>Communication Signal</td>
<td>Pink (Per cable)</td>
</tr>
<tr>
<td>White/Blue</td>
<td>Communication</td>
<td>Communication Signal</td>
<td>Black (Per Cable)</td>
</tr>
<tr>
<td>Black/Blue</td>
<td>Communication</td>
<td>Comm. Cable Shield</td>
<td>Blue (Per Cable)</td>
</tr>
<tr>
<td>Black/Yellow</td>
<td>Peripheral Communication*</td>
<td>Optional- MPC Extender or AfiLab</td>
<td></td>
</tr>
<tr>
<td>White/Yellow</td>
<td>Peripheral Communication*</td>
<td>Optional- MPC Extender or AfiLab</td>
<td></td>
</tr>
</tbody>
</table>
Chapter 6
Laying Cables and Connecting Wires

Afimilk Cable Braids Offerings

As illustrated, a single, branched, communication cable is connected to all connection boxes on a parlor side. In addition, a single, branched power cable is connected to all connection boxes on each side of the parlor. Afimilk offers Pre Made cable braids for minimizing on-site installation labor. Pre-made cable braids incorporate molded pigtail connections (ultimate connection protection) for various distance options between stalls. These cable braids are supplied in drums for 100 stalls.

100 Milking Points Power Cable Braid
This cable braid includes extension tails for supplying power to each milking point. Tail length is 50 cm. Three variations (distances between stalls) are available:

- PN - 5200000-40 – 40cm (15.75") between stalls (Rotary Parlors)
- PN - 5200000-75 – 75cm (29.53") between stalls (Parallel Parlors)
- PN - 5200000-115 – 115cm (45.28") between stalls (Herringbone Parlors)

100 Milking Points Communication Cable Braid
This cable braid includes extension tails to connect the milk meter communication. The same three variations (distances between stalls) are available:

- PN - 4097323-40 - 40cm (15.75") between stalls
- PN - 4097323-75 - 75cm (29.53") between stalls
- PN - 4097323-115 - 115cm (45.28") between stalls

Communication Cable Extension
An extension cable (P/N 4097324 ordered per length) can be used to extend the branched communication cable, in the parlor, to the computer, in the office.
First Time Operation

This chapter describes procedures that need to be carried out when starting up the meters system the first time.

After the parlor is set up, and wires are connected, start up the system. Starting up involves five steps:

1. **Afimilk MPC** start-up sequence description
2. Loading default parameter values
3. Setting milking point ID numbers
4. Milk Meter Calibrating procedures
5. Setting parameters of milking functions:

   Most parameters may be set via communication from the computer by remote programming. However, in the following situations, parameters must be set at each meter:

   - In all systems the stall number and electrode calibration parameters must be set manually at each meter
   - Stand-alone systems, without computers – all parameters in all meters must be set manually
Afimilk MPC Start-up Sequence

After power to the *Afimilk MPC* milk meter is switched on, the following occurs:

1. The milk meter software version is displayed for a few seconds to be replaced by the stall number set in the display. Stall number appears for several seconds to be replaced by Cleaning Mode display (When activating an *Afimilk MPC* for the first time, Id66 is displayed as stall number).

2. *Afimilk MPC* milk meter starts-up in cleaning mode. Cleaning mode is indicated by illuminated red LED at the cleaning mode key . In this mode, the milk valve opens and closes regardless of the amount of liquid in the milk meter body.

3. Once in Cleaning mode, temperature reading, such as 24c (24°C) appears. This is the wash temperature* detected by the integrated thermistor in the milk meter body.
   a. If the moment of power-up is not during a milking session, or if the meter is not connected to a computer: appears for a few seconds to be replaced by the pulsation indicator:
      
      Press to alternate between cleaning and removal mode. When the red LED is lit and is displayed (with the pulsation indicator alternating), the milk meter is in cleaning mode.

**NOTE**

Temperature reading is available for *Afimilk MPC* incorporating the Pro body (including thermistor). *Afimilk MPC* displays installed with *AfiLite+* bodies, will NOT display wash temperature!
Loading Default Parameter Values

*Afimilk MPC* is supplied with standard parameter values pre-loaded in its operating system. In some countries, local regional parameter values are used. The standard value of the parameter Load is 0. If you are using different set of parameters, use your local load number provided by *afimilk*.

There are two procedures for loading preset parameters values:

- **Full load** – This procedure replaces all of the parameters values stored in the control unit, except stall ID number. Carry out "Full Load" procedure at system startup OR when replacing a faulty display.

- **Partial load**– This procedure replaces operational parameters with new values, preserving existing calibration values as well as stall ID number. Use this procedure if parameter load at operating parlor is needed.

### Parameters Load Procedure

For loading parameters the milk meter need to be in cleaning mode. The status of the "Cancel ACR "Indicator determines a partial or full load procedure:

- Full load is indicated by an illuminated LED indicator
- Partial load is indicated by an extinguished indicator

Select your preferred Load procedure by pressing the "Cancel ACR” key. Then:

1. Press 0 four times and then press to access the load option.

2. Ld00 appears on the display panel. (00 represents the number of the set of parameter presently in the meter.)

3. Type the number of your local load OR use 00 (default load number) to select the desired set of parameter values.

4. Press to Load parameters OR press to abort.

The regional parameter values have been loaded.
Setting Milking Point ID Numbers

Afimilk MPC communicates with AfiControl PC via a single line of communication. The basic principle of communication protocol is milk meters corresponding to communication per their Stall ID number. This means that duplicated ID numbers are not allowed on the same communication line. Therefore, determining an individual identification number for each milk meter is crucial for proper communication as well as for correct assignment of data to cows.

NOTE
The highest Stall ID number allowed is 64. In parlors larger than 64 milking points, multiple communication lines are needed for connecting the milk meters to the system!

How to number Stall ID

The identification number of each meter should correspond with the milking point number. In batch type parlors (Herringbone, Parallel, Swing..) made of two parlor sides the left side should carry the lower stall numbers and the right side carries the higher numbers.

How milking points are numbered

Most batch parlors incorporate two entrances – Cow entrance and people entrance. When standing in the parlor, facing the cows entering towards you, your left hand side is the parlor left side. The stall used for milking the first cow entering the parlor at the left side (furthest from the cow entrance) is milking point number one.

Parlor Layout and Milk Meter ID Numbers
Rotary parlor numbers are sequential, where milking point number one is at attachment position when the parlor is at rest between sessions (System connected to wash).

**Setting ID numbers at the Control Box**

*AfiMilk MPC* ID number is indicated on its control panel by four characters. It begins with the letters *ld*, followed by two numeric digits. For example, *ld03* is the identification number for milk meter number three. At power-up, the milk meter displays its ID number for a few seconds.

Enter the *AfiMilk MPC* identification number as follows:

1. Ensure cleaning working mode (illuminated cleaning key indicator)
2. Press number key four times, then press Cow key.
3. Stall ID number is displayed. In new control boxes the number displayed is *ldbb*.
4. Type Stall ID number corresponding with milking point number as explained above in two-digit format (example: for stall number 7 type 07).
5. Press to save the new number.

The new ID number is now defined.

*Note*:

Milk meter identification number can be displayed any time by pressing and simultaneously.

*Note*:

In some situations embedded software need to be loaded into *AfiMilk MPC* control units. For instructions, Refer to the last section of this manual "Loading software into *AfiMilk MPC*".
AfiMilk MPC Parameters of Milking Functions

_AfiMilk MPC_ controls milking point apparatus such as cluster removal piston, vacuum valve and pulsation thus controlling the entire milking process. Milking parameters are the definitions for controlling the operation of the milking point. Note that once the default set of parameters have been loaded, all milk meter functions are operational and only specific adjustments may be required to adopt local needs. This section describes how parameter works and the way to set them up.

_AfiMilk MPC_ incorporates 4 outputs for controlling selected devices. Additional functions may be controlled via an additional _MPC Extender_ unit. This chapter describes the most common configuration for controlling the following apparatus:

- Automatic Cluster Removal
- Vacuum shut off valve
- Pulsation (two outputs)

Automatic Cluster Removal (ACR)

Milking is stopped automatically by _AfiMilk MPC_ when milk flow has slowed enough (or stopped altogether at kick off). Automatic Cluster Removal process involves retraction of the milking cluster, shutting off vacuum and stopping pulsation.

**ACR Activation**

The ACR piston and vacuum shut-off valve are both operated by solenoids installed at each milking point. These solenoids are operated by _AfiMilk MPC_ control box via its main cable connections as illustrated in the wiring chapter. This chapter describes the functional parameters responsible for the ACR process.
**ACR Parameters**

**Afimilk MPC** removal mechanism is based on a cyclic counter integrated in its embedded program. This counter starts counting when the meter is in milking mode and zeroes every time milk is dumped into the milk line. Thus, if milk flow stops OR if flow rate drops below the desired level, milking stops automatically. Six parameters are related to cluster removal process:

- **F1 - Pre-Milk Time**
  - Cows start letting down their alveoli milk after stimulation. Thus, depending on udder stimulation, milk flow rate may be slower after cluster attachment than during the main phase of milking. Pre-Milk time is the time at the beginning of milking during which ACR is NOT activated. Thus, F1 determines the minimum time the cluster is attached. The value set for F1 is a multiplication of 10 sec. therefore, if a value of 12 is set, pre-milk time of 120 seconds (two minutes) is the minimum time of milking.

- **F2 - Removal Delay**
  - The value of cyclic counter for removal (as explained above) determines the milk flow rate at which milking stops. When the flow rate of milk from the cow decreases, the Milk Meter empties at greater intervals. F2 determines the maximum time allowed between two consecutive milk dumps. If the time elapsed from the last milk discharge is longer than F2, milking stops. As the graphic presentation below illustrates, the milk discharge pulses (blue columns) are more frequent during the main phase of milking. The gaps between pulses opens until time is longer than F2 threshold and that is when removal occurs.
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First Time Operation

As explained above, cluster removal occurs after a threshold delay time. This time may be converted to represent removal flow rate. Below is a simple formula to calculate the required value of $F_2$ per desired flow rate for removal.

$$\text{value of } F_2 = \frac{\text{60 seconds}}{\text{Flow Rate for Removal (kg/min)}} \times 0.20 \text{ kilograms (0.44Lb)} \times 0.8$$

If 0.8Kg/min (1.76Lb/min) is the desired flow rate for removal

$$\text{value of } F_2 = \frac{60 \text{ seconds}}{0.8} \times 0.20 \text{ kilograms (0.44Lb) per minute}$$

$$\text{value of } F_2 = 15$$

*At the end of milking, about 200grams (0.20 Kg = 0.44lb [6.5 oz.]) of milk is released each time the milk valve is opened for dumping milk to the milk line.

$F_3$ - Smooth Removal

Shutting the vacuum off when the pulsation is still active releases the liner vacuum pressure off the teat. $F_3$ is a short delay time between the vacuum shut-off and cluster removal (pulsation stops with removal piston retraction) allowing the liner to smoothly slide off the teat before it is pulled up by the removal piston.

$F_4$ - Quick Cluster Removal

Quick removal is an option for early removal of the cluster for cows with low yield. This feature prevents over-milking of cows at the beginning of lactation, when their production is low.

Quick removal is activated if during the pre-milk time (afimilk delay parameter $F_1$), the cow gave the entire yield expected from it. In such situations, the cluster removal after pre-milk time will be at a faster flow rate (removal process is initiated at half of the regular removal delay [$F_2$]).

The quick removal option is activated via a user-configured parameter $F_4$ that may be set to either enabled or disabled. In addition, AfIFarm allows the user to assign a code to enable quick removal for specific cows (example: all cows within 10 days from calving).
**FS** Second Attachment Premilk Time

- To prevent over-milking of cows under second attachment pre-milk time of re-attachment is shorter than the initial pre-milk time. This parameter allows enough time for the cow to restart milking before the flow rate for removal is calculated yet is shorter than the initial delay.

**FS** parameter is automatically adjusted according to pre-set conditions in the table below:

<table>
<thead>
<tr>
<th>If Time to first Removal (T)</th>
<th>Then – 2nd Attachment Pre-milk Time =</th>
</tr>
</thead>
<tbody>
<tr>
<td>T&lt; (F1*0.5) [half the value of F1]</td>
<td>F1</td>
</tr>
<tr>
<td>F1&gt;T&gt;(F1*0.5) [half the value of F1]</td>
<td>F5+∆F1 (Remaining time for F1)</td>
</tr>
<tr>
<td>T&gt; F1</td>
<td>F5</td>
</tr>
</tbody>
</table>

**F5** Maximum Milking time

- Large farms milking around the clock are very dependent on milking time to achieve optimal parlor throughput. In some situations very slow cows may delay milking of an entire load to a critical operation problem. **F5** parameter enables setting a maximum cluster-on time for slow cows thus preventing delays in milking.
Vacuum valve & Milk Sweep

Milk residues left in the milking claw and hose after cluster removal often drip on the floor and left inside the liners. This may cause cross contamination between a sick cow to the cow milked after her at the same milking machine. This feature if enabled, allows sweeping milk residues. Milk sweep opens the vacuum valve for a short time, sucking atmospheric air through the cluster, now hanged at the stall thus sweeping milk residues into the milk meter body.

**Milk Sweep Parameters**

Milk sweep starts 2 seconds after cluster removal. The time for valve opening for atmospheric air is defined by the parameter $SL$ (in seconds).

![Milk Sweep Timing Diagram]

**Note**

If you wish to cancel the SWEEP function, set $SL=0$. 
Pulsation Control

AfiMilk MPC may be set to control pulsation by means of pulsation rate and ratio. Seven parameters are used to control pulsation; four parameters for pulsation during milking, and three optional stimulation parameters.

Pulsator Installation

Pulsators are wired as illustrated in wiring diagram above:

- The pulsator front is connected to the white/pink wire.
- The pulsator rear is connected to the white/green wire.

Pulsation Parameters (Milking)

The value of each parameter is selected from a list of options:

- **Pulsation Rate** – the number of pulses per minute.
- **Pulsation Ratio** - the ratio between vacuum to atmospheric pressure in the liner at the milking cup, in each pulsation cycle.
- **FCP** – Flow controlled pulsation. This option enables an algorithm to automatically adjust pulsation rate and ratio during milking according to milk letdown.

Pulsation rate and ratio are set according to the milking machine parameters (Vacuum level, size of liners, milk letdown…). Use the advice of local extension service expert to determine the desired pulsation parameters.

Pulsation Rates

Pulsation rates of 0 (no pulsation) 50, 51, 53, 54, 55, 56, 58, 60, 62, 65, 67, 69, 71, 73, 75, 78 pulses per minute are available. (Parameter \( PP \))

Pulsation Ratios

If the pulsation ratio is the default ratio of 60:40, then the timing illustrated in the following figure applies:
Chapter 7 

First Time Operation


**FCP Programs – Flow controlled pulsation**

A pulsation curve, known as Flow Control Pulsation (FCP), may be set to adjust pulsation rate and pulsation ratio automatically according to the milk flow rate. If an FCP curve is enabled, a low milk flow rate has a faster pulsation and lower ratio than high flow rate. As the flow rate increases and decreases during milking, pulsation rate and pulsation ratio change accordingly. Four FCP curves are available. As the table below illustrates, each Curve column lists 8 ranges of flow rates corresponding with pulsation rate and ratio (Example: Curve1 pulsation at flow rate between 2.0-2.5kg/minute will be 58ppm at 63/37 ratio)

<table>
<thead>
<tr>
<th>PPM</th>
<th>Ratio</th>
<th>Curve 1</th>
<th>Curve 2</th>
<th>Curve 3</th>
<th>Curve 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>60/40</td>
<td>0 – 2.0</td>
<td>0 – 2.5</td>
<td>0 – 3.0</td>
<td>0 – 3.5</td>
</tr>
<tr>
<td>58</td>
<td>63/37</td>
<td>2.0 – 2.5</td>
<td>2.5 – 3.0</td>
<td>3.0 – 3.5</td>
<td>3.5 – 4.0</td>
</tr>
<tr>
<td>56</td>
<td>65/35</td>
<td>2.5 – 3.0</td>
<td>3.0 – 3.5</td>
<td>3.5 – 4.0</td>
<td>4.0 – 4.5</td>
</tr>
<tr>
<td>54</td>
<td>68/32</td>
<td>3.0 – 3.5</td>
<td>3.5 – 4.0</td>
<td>4.0 – 4.5</td>
<td>4.5 – 5.0</td>
</tr>
<tr>
<td>53</td>
<td>70/30</td>
<td>3.5 – 4.0</td>
<td>4.0 – 4.5</td>
<td>4.5 – 5.0</td>
<td>5.0 – 5.5</td>
</tr>
<tr>
<td>52</td>
<td>73/27</td>
<td>4.0 – 4.5</td>
<td>4.5 – 5.0</td>
<td>5.0 – 5.5</td>
<td>5.5 – 6.0</td>
</tr>
<tr>
<td>51</td>
<td>74/26</td>
<td>4.5 – 5.0</td>
<td>5.0 – 5.5</td>
<td>5.5 – 6.0</td>
<td>6.0 – 6.5</td>
</tr>
<tr>
<td>50</td>
<td>75/25</td>
<td>5.0 +</td>
<td>5.5 +</td>
<td>6.0 +</td>
<td>6.5 +</td>
</tr>
</tbody>
</table>

**PreMilk Stimulation**

Machine Pre-Milk stimulation is adopted in specific farms. It is designed to stimulate udders for milking at very fast pulsation rate.

There are three parameters that control pre-milking stimulation:

**Stimulation Duration**—time of stimulation prior to switching to milking pulsation. May be set to 0 (disabled), or 1-99 seconds (Enabled).

**Stimulation Pulsation rates** - Values available: 100, 125, 150, 175, 200, 225, 250 or 300 pulses per minute.

Additional Operation Parameters

In addition to milking parameters, you may need to set some basic system parameters.

Cleaning Mode parameters

During wash (CIP process) milk meter bodies are cleaned together with the milking system. To achieve adequate cleaning of the body interior, the entire volume of the body need to be filled with cleaning solution.

When in cleaning mode, the milk meter closes its outlet port to allow cleaning solution to accumulate and opens its outlet port to empty the body in cycles. In most situations, the pre-programed cycle provide proper fill/empty result, however, sometimes when CIP water flow lacking the volume of required, the last milk meter bodies of the line may not be filled completely at the fill time programmed, jeopardizing the quality of cleaning at these points. Cleaning mode parameters allows adjustments in fill/empty cycle ratio, thus increasing filling time available for milk meters.

There are two parameters related to cleaning mode:

- **Filling Time (CL)** - The time milk valve closes the outlet port in each cycle. To increase filling time (if milk meters fail to fill up during CIP) increase the value of this parameter.

- **Emptying Time (CH)** - The time milk valve is open in each cycle. To increase emptying time (if milk meters fail to empty completely during CIP) increase the value of this parameter.

Display parameters

Measurement units are usually set up correctly when regional parameters are loaded. If needed, these parameters may also be set specifically.

- **Weight Units (WU)** – The weight units' options for Afimilk MPC display are pounds or kilograms. North America regional load set these units to Lb. while in all other regions the default is Kg.

- **Temperature Units (TU)** – The Temperature units' options for Afimilk MPC display are Fahrenheit or Celsius. North America regional load set these units to F° while in all other regions the default is C°.
Setting-Up Parameters

There are two ways to set-up parameter values in *Afimilk MPC*. The most convenient way is at the computer, in *afimilk*, for sending the values to *Afimilk MPC* displays via communication. Since most parameters are set uniformly for all the milk meters in the parlor, this method provides additional protection against mistakes.

Parameter values can also be set at each *Afimilk MPC* control box. This method is used mainly in standalone setup where *afimilk* is not available. Refer to the chapter "Setting-up parameters via the control box" for further instructions regarding this option.

**Afimilk MPC and AfiMilk Configuration**

When setting up the systems' configuration for *afimilk*, *Afimilk MPC* needs to be selected as the milk meter type for the parlor setup.

Refer to *AfiForm 5* installation manual for further instructions regarding the setup of milking parlors.

Once set and communication established, *AfiMilk MPC* operation parameters may be accessed and set from the *AfiControl* interface (See screen at the following page).

**Note**

After setting AfiMilk MPC parameter values in the parameters table, press Commit to accept changes
Setting Parameters via the afimilk Computer

To set milk meter parameters via AfiControl computer, enter: 
Parameters ➜ Tools ➜ Parlor. The Parameters window opens, as shown below.

![Parameters window](image-url)
Setting-up parameters via the control box

As explained above, Afimilk MPC parameters may be set at the milking points, via the keyboard of the control box. Access to parameters programming mode is protected by password to prevent coincidental unauthorized changes.

To enter the programming mode:

1. Ensure that Afimilk MPC is in wash mode (wash LED illuminated).
2. Type 2580 and press 8.

Software version number alternating with 8888 on the display represents programming mode. Once in this mode, access to parameters is enabled. Follow the instructions below for changing specific parameters via the control box keyboard.

Changing Parameter values

Afimilk MPC parameters are organized by groups. Each group is accessed by typing its number:

- Group 1 - Cow parameters – Specific milking parameters
- Group 2 - System Parameters – general parameters
- Group 3 - Production Parameters
- Group 4 - Calibration Parameters – Calibration Values

When inside a group of parameters, ← and → are used to scroll up or down to the desired parameter. Alternatively, shortcut numbers may be used to quickly navigate to a specific parameter.

Here is an example for parameter setting procedure sequence for changing the value of parameter F5 in the Cow parameters group

1. Ensure that Afimilk MPC is in wash mode (wash LED illuminated).
2. Type 2580 and press 8 to access programming mode.
3. Press Group access number - 1 to enter group 1 (Cow Parameters).
4. Scroll down to the desired parameter using ←, OR press shortcut number to access the desired parameter directly (See table on below). Example: Press 3 to get to parameter F500.
5. Press \( - \) \( \text{F5} \) flashes indicating that editing is enabled.
6. Type the desired value.
7. Press \( - \) to confirm the change OR \( - \) to cancel the change.

After editing and saving all the parameters requiring change in the group, press \( - \) to return to general programming mode. From this mode you may navigate to another group by entering the group number (1, 2, 3, or 4).

**Parameter Groups definitions**

The following tables specify parameters in each group and their shortcut access numbers.

### Group 1 – Cow parameters

<table>
<thead>
<tr>
<th>Shortcut Number</th>
<th>Symbol</th>
<th>Parameter Range</th>
<th>Units</th>
<th>Parameter Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>F1</td>
<td>1-50</td>
<td>Sec. X 10</td>
<td>Minimal Milking T for First Attachment</td>
</tr>
<tr>
<td>2</td>
<td>F2</td>
<td>6-50</td>
<td>Seconds</td>
<td>Valve opening interval to trigger removal</td>
</tr>
<tr>
<td>3</td>
<td>F5</td>
<td>0-12</td>
<td>Sec. X 10</td>
<td>Second Attachment Premilk Time</td>
</tr>
<tr>
<td>4</td>
<td>PP</td>
<td>List</td>
<td>ppm</td>
<td>Pulsation Rate</td>
</tr>
<tr>
<td>5</td>
<td>Pr</td>
<td>List</td>
<td>%</td>
<td>Pulsation Ratio</td>
</tr>
<tr>
<td>6</td>
<td>StP</td>
<td>List</td>
<td>ppm</td>
<td>Stimulation PPM</td>
</tr>
<tr>
<td>7</td>
<td>Sd</td>
<td>0-99</td>
<td>Seconds</td>
<td>Stimulation Duration</td>
</tr>
<tr>
<td>8</td>
<td>Str</td>
<td>List</td>
<td>%</td>
<td>Stimulation Operation Ratio</td>
</tr>
<tr>
<td>9</td>
<td>AP</td>
<td>0-10</td>
<td>No. of Pulses</td>
<td>Pulsation ratio of 50:50 for number of pulses at the beginning of milking</td>
</tr>
<tr>
<td></td>
<td>St</td>
<td>0-50</td>
<td>Seconds</td>
<td>Strip Threshold</td>
</tr>
<tr>
<td></td>
<td>F4</td>
<td>0/1</td>
<td>Enable/Disable</td>
<td>Quick Removal</td>
</tr>
</tbody>
</table>
## Chapter 7

### Group 2 – System parameters

<table>
<thead>
<tr>
<th>Shortcut Number</th>
<th>Symbol</th>
<th>Parameter Range</th>
<th>Units</th>
<th>Parameter Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SL</td>
<td>0–15</td>
<td>Seconds</td>
<td>Sweep Duration</td>
</tr>
<tr>
<td>2</td>
<td>CH</td>
<td>0–4</td>
<td>Seconds</td>
<td>Cleaning mode: time milk valve is open each cycle</td>
</tr>
<tr>
<td>3</td>
<td>CL</td>
<td>0–99</td>
<td>Seconds</td>
<td>Cleaning mode: time milk valve is closed each cycle</td>
</tr>
<tr>
<td>4</td>
<td>Lb</td>
<td>Lb/Kg</td>
<td>-</td>
<td>Weight Unit</td>
</tr>
<tr>
<td>5</td>
<td>tU</td>
<td>C°/F°</td>
<td>-</td>
<td>Temperature Unit</td>
</tr>
<tr>
<td>6</td>
<td>U1</td>
<td>0–15</td>
<td>Seconds</td>
<td>Backflush Water time</td>
</tr>
<tr>
<td>7</td>
<td>A1</td>
<td>0–15</td>
<td>Seconds</td>
<td>Backflush Air time</td>
</tr>
<tr>
<td>8</td>
<td>SM</td>
<td>0–99</td>
<td>Minutes</td>
<td>Sleep Mode Delay</td>
</tr>
</tbody>
</table>

### Group 3 – Production parameters

<table>
<thead>
<tr>
<th>Shortcut Number</th>
<th>Symbol</th>
<th>Parameter Range</th>
<th>Units</th>
<th>Parameter Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CU</td>
<td>0 - 4</td>
<td>Number</td>
<td>Flow Controlled Pulsation: Program selection</td>
</tr>
<tr>
<td>2</td>
<td>F3</td>
<td>0 - 15</td>
<td>Seconds</td>
<td>Vacuum to Removal Delay</td>
</tr>
<tr>
<td>3</td>
<td>Ct</td>
<td>0 - 30</td>
<td>Sec. X 30</td>
<td>Maximum milking time</td>
</tr>
<tr>
<td>4</td>
<td>Sd</td>
<td>0 - 5</td>
<td>Seconds</td>
<td>Start to Vacuum Delay</td>
</tr>
<tr>
<td>5</td>
<td>IP</td>
<td>4 - 20</td>
<td>Seconds</td>
<td>Removal Alert Fresh cow OR Standalone system</td>
</tr>
<tr>
<td>6</td>
<td>CC</td>
<td>0 - 99</td>
<td>Seconds</td>
<td>Cluster Clearance Delay</td>
</tr>
</tbody>
</table>
### Group 4 – Calibration parameters

<table>
<thead>
<tr>
<th>Shortcut Number</th>
<th>Symbol</th>
<th>Parameter Range</th>
<th>Units</th>
<th>Parameter Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>G</td>
<td>30 -99</td>
<td>-</td>
<td>Air admission Adjustment. Default value - 49</td>
</tr>
<tr>
<td>2</td>
<td>H</td>
<td>25 - 99</td>
<td>-</td>
<td>High Flow Rate Compensation – Default value = 40</td>
</tr>
<tr>
<td>3</td>
<td>P</td>
<td>1.21-1.31</td>
<td>-</td>
<td>Operation Ratio</td>
</tr>
<tr>
<td>4</td>
<td>oH</td>
<td>17 - 33</td>
<td>-</td>
<td>Offset Hold</td>
</tr>
<tr>
<td>5</td>
<td>oA</td>
<td>17 - 34</td>
<td>-</td>
<td>Offset Active</td>
</tr>
</tbody>
</table>

**TIP**

To return original values to the parameter tables use "load default parameters values" procedure described above.
Milk Meter Calibration

Afimilk MPC is calibrated in the factory to ensure milk measurement results within the required accuracy ranges. However, since installation environment may affect milk measurement accuracy, Afimilk MPC requires calibration at installation.

Three calibration procedures are described in this chapter:

1. Calibrating Electrodes
2. Air intake compensation
3. Regulatory meter tests (DHI) and calibration

Calibrating Electrodes

Three electrodes in the milk meter body are the measuring probes of the meter. Although electrodes are calibrated at the factory, cable and connection resistance may affect their accuracy. Electrodes calibration compensates for resistance of the lines and therefore, it is necessary to calibrate the milk meter after installation.

Electrodes calibration procedure is performed with a 100Ω (±0.1%) resistor. At calibration, the resistor is connected between electrodes to test and calibrate them. Afimilk offers calibration tool for the technician incorporating the resistor and probes for hooking to the electrodes (See below).

Milk Meter Electrodes Calibration tool

Calibration tool is built of an encased resistor connected to two socket connectors used for plugging on the calibrated electrodes. This makes an easy to used calibration tool.
Electrodes Calibrating Procedure

At each meter, calibrate the holding and operating electrodes in one single procedure, as described below:

**Holding (middle) electrode:**

Calibrate electrodes as follows:

1. Carefully unlock the bottom clasp of the body and remove the lower cover with the inner valve cylinder connected to it.

2. Connect the 100Ω resistor between the Common (lower) and the holding (middle) electrodes.

3. Ensure that the meter is in wash mode (illuminated cleaning key indicator).

4. Press \[1590\] and \[\] to access electrode calibration mode.

   \[\text{AdjT}\] appears on the display panel.

5. Press \[2\].

   \[\text{H###}\] is displayed (### represents the calibration value). The range of calibration values for Holding electrode is typically between \[\text{H112}\] and \[\text{H118}\].

**WARNING**

Typically, calibration values displayed should be stable or vary by only one digit. Out of range or unstable figures indicates an electrical problem. Refer to the section “Searching for an Electrical Problem,” for solving the problem.

6. Press \[2\] again, to calibrate the Holding electrode and save the value.

   \[\text{AdjT}\] is displayed.
Operating (top) electrode:

Connect the 100Ω resistor between the Operating (top) electrode and the Common (lower) electrode.

1. Press 3.

2. H### is displayed (### represents the calibration value).

3. Press 3 a second time to calibrate the electrode.

   Adj appears.

4. The electrodes have been calibrated.

5. Press to exit editing mode.

Reviewing Calibrated Values of Electrodes

If milk meter fault leads to suspecting calibration problem, the technician may check calibration value at the display:

1. Ensure that Afimilk MPC is in wash mode (wash LED illuminated).

2. Type 2580 and press to access programming mode.

3. Press Group access number - 4 to enter Calibration Group.

4. Scroll down to oA (Operating Electrode).

5. oA## appears on the display panel. (## represents the calibration value.) If the resulting value is less than 17 or more than 34, electrode calibration is required.

6. Press oA to scroll to calibration value oH (Holding Electrode).

   oH## appears on the display panel. (## represents the calibration value.) If the resulting value is less than 17 or more than 33, electrode calibration is required.

5. Press (double press) to return to wash mode.
Air intake compensation

Milking clusters are manufactured with orifices allowing admission of air for improving milk flow inside milking system tubing. Air intake of these orifices varies from 6 to 12 liters per minute. *Afimilk MPC* calibration neutralizes air intake influence. Calibration is required whenever clusters are changed. Calibration procedure adjusts the value of parameters "G" (Air admission Adjustment) and "H" according to the air admission of the claws' orifice.

Checks before Calibration

A thorough visual check of the milking parlor is necessary before calibrating. Complete the following procedure:

1. Check the milking equipment and pipe connections between the milk clusters and the milk lines. At this point, unless all milking tubing is new, AfiMilk recommends replacing rubber liners, as well as rubber gaskets and cracked (usually plastic transparent) parts of used milking clusters.

2. Ensure an open air orifice in each cluster.

3. Check the vacuum lines. Clean and drain.

4. Check the milk meter power supply voltage at the last milking point of each parlor side. A minimum of 23Vac is required while operating at full capacity.

5. Replace all milk-meter rubber parts if not new.

6. Use a spirit level to check the levelness of the length and width of the top rim of the Milk meter body mid-section.

7. Remove the body's solenoid diaphragm and ensure that it is complete and flawless (Replace it if there is any minor difference or flaw). Check for moisture on the underside of the diaphragm. If moist, dry it.

8. Blow pressurized air into the solenoid from its diaphragm end. Check for clean and free airflow to the bottom opening of the solenoid.

9. Check all parts of the Milk Meter body, hoses, and connectors.
Measuring Claw Air Admission

For calibration purposes exact claw air admission is required. Although claw manufacturers specify products' air admission, it is highly recommended to verify on site actual performance of each claw.

Measuring Air Admission using Air Gage

This method incorporates the use of an Air Gauge to measure Air Admission. Afimilk recommends an air gauge manufactured by Dwyer Instruments Inc., the RATEMASTER® FLOWMETER RMA-22-SSV.

Follow the procedure described below if an Air gage is available to ensure accurate results.

1. Remove the milk and pulsation hoses from the cluster as illustrated in Figure 12 below.

2. Insert four plugs into the four milking cups.

3. Clean the air orifice in the cluster.

4. Connect the air gauge as illustrated in Figure 12 below. The lower port of the air gauge is connected to the claw via a short 5/8” hose connector. The top outlet port of the air gauge is inserted into the milk hose leading to the milk meter body.

5. When the gage is securely connected as described, press on the display panel in order to open vacuum to the cluster.

6. Check and seal any vacuum leaks at connections in the air gauge and cluster.

7. Block the air orifice with your finger to verify that the only air intake allowed is via the air orifice. The ball in the gauge should fall to zero if no air leakage occur.
8. Hold the air gauge in a vertical position and allow air admission via claw orifice. Write down the air intake the gage measures. This measurement will be used for calibrating the “G” parameter value as described below.

Repeat measurement procedure at each milking point.

**Adjusting calibration value per air intake**

Adjust the value of G & H parameters in each milk meter according to air admission measured, per the table below.

<table>
<thead>
<tr>
<th>Air Admission in the Cluster (Liters per minute)</th>
<th>G value for calibration</th>
<th>H value for calibration</th>
</tr>
</thead>
<tbody>
<tr>
<td>6–7</td>
<td>40</td>
<td>30</td>
</tr>
<tr>
<td>7–8</td>
<td>46</td>
<td>37</td>
</tr>
<tr>
<td>8–10</td>
<td>49 (default)</td>
<td>40</td>
</tr>
<tr>
<td>11–13</td>
<td>55</td>
<td>46</td>
</tr>
<tr>
<td>14–17</td>
<td>60</td>
<td>50</td>
</tr>
<tr>
<td>18–20</td>
<td>65</td>
<td>55</td>
</tr>
</tbody>
</table>

To adjust G & H parameters follow this procedure:

- Ensure that *Afimilk MPC* is in wash mode (wash LED illuminated).
- Type 2580 and press ‍ to access programming mode.
- Press Group access number - 4 to enter Calibration Group
- G is the first parameter in the group and its value will appear after a short delay.
- Press ‍ - ‍G ‍ flashes indicating that editing is enabled.
- Type the desired value.
- Press ‍ to confirm.
- Scroll down to the second parameter in the group – H and change its value in the same manner as explained above.
- Press ‍ to confirm.
- When done, press ‍ twice to exit editing mode.
Accuracy Adjustment

AfiMilk MPC milk meters are supplied with default adjustment calibration values. If after initial setup (see adjustment per air intake explained above) inaccuracies of milk measurements vs. bulk tank OR in specific milk meters are found, G & H parameters values may need further adjustment.

As illustrated in the chart here, initial calibration is performed by adjusting the value of G parameter. If accuracy is not achieved by correcting the value of G, corrections to the value of H is needed.

The following section explains how to calculate the adjustment value of parameters G & H per deviation in measurement.
Adjusting the “G” Parameter Value

Change the value of "G" parameter per calculated average deviation. If the result is negative (Milk meter reading is lower than the actual weight), the calculated adjustment value needs to be added to the value of G. If the adjustment is positive, the calculated value needs to be subtracted from the value of G.

General adjustment calculation \( \% \text{Dev} \times (-2.5) = \text{Adjustment value} \)

**Example:** if the actual value of G in the milk meter is 55 and the measured deviation -4% (Milk meters show 4% less than actual weight), modify the “G” parameter value by:

\[-4 \times (-2.5) = +10 \quad \text{to} \quad 65\]

Use the same procedure explained above for Air Admission Compensation for accessing and changing the value of G parameter.

---

**NOTE**

Check the accuracy of the new settings within a few days after setting the new “G” value. This may be done by comparing total milk collected by the afimilk system to the bulk tank accumulation.

---

Adjusting the “H” Parameter Value

Change the value of "H" parameter per calculated average deviation. If the result is negative (Milk meter reading is lower than the actual weight), the calculated adjustment value needs to be added to the value of H. If the adjustment is positive, the calculated value needs to be subtracted from the value of H.

General adjustment calculation \( \% \text{Dev} \times (-5) = \text{Adjustment value} \)

**Example:** if the actual value of H in the milk meter is 37 and the measured deviation -4% (Milk meters show 4% less than actual weight), modify the “H” parameter value by:

\[-4 \times (-5) = +20 \quad \text{to} \quad 57\]
To adjust $H$ parameter enter programming mode and set parameter $H$ in group 4:

- Ensure that Afimilk MPC is in wash mode (wash LED illuminated).
- Type 2580 and press to access programming mode.
- Press Group access number - 4 to enter Calibration Group.
- Scroll down to the second parameter in the group.
- Press $H$ flashes indicating that editing is enabled.
- Type the desired value.
- Press to confirm.
- Press twice to exit editing mode.

**Adjusting the values of G & H via communication**

The easiest way to adjust G & H parameters is via the AfiControl interface. As explained below, you may change the value of each milking point individually OR set a uniform value to ALL the milk meters.

To change the values of $G$ & $H$ via AfiFarm PC enter Parameters $\rightarrow$ Tools $\rightarrow$ Parlor and select the stall to adjust as shown below.

On the right hand side section of the screen, adjust the value $G$ & $H$ for the selected stalls.
Regulatory meter tests and Calibration

Local authorities may require periodic accuracy checks of the milk meters, mainly for herd book approval. Such test is performed by collecting the milk each cow gives into a bucket, measuring it and comparing to the reading of the milk meter. Then, statistical deviation calculations are done to indicate the accuracy level of the device.

It is very important to carry out a proper scaling procedure to ensure accurate scaling in accordance with regulations.

To carry out the scaling procedure, an electronic weigh scale and a few milk buckets are required. This chapter describes the correct procedure of scaling and statistical calculations. If deviations in measurements are found, correct those by adjusting G&H values as described above.

Collecting the Milk into a Milk Bucket

Per international regulations the following rules are adopted for scaling:

- Multiple attachments measurements are **not** included in the statistics.

- Only milking claw air admission is allowed. Tests may not be valid if liners cracks or piping holes allow additional air intake by the system. Furthermore, tests where liner slippage or large udder causing squawks occurs are also rejected.

- The Milk Meter reading should be taken after the last dump of milk (milk dump after removal).

- For each reading, list milk meter reading vs. actual milk weighed.

- At least **three** valid readings are required for calculating milk meter accuracy.

To ensure proper measurements, see that the following restrictions are kept:

- The collecting bucket must be placed below the meter outlet port.

- The hose connecting the Milk Meter to the bucket is situated correctly in a downward slope towards the bucket.

- The hose connecting the Milk Meter to the bucket has no pulling or pushing pressure on the outlet of the Milk Meter.
**Statistical Accuracy Calculation**

After scaling milk weights for all the milk meters in the parlor, statistical accuracy calculation is performed for each milk meter.

Statistical calculation is done for each reading and corresponding weigh scale measurement for calculating the difference as a percentage value between the reading of the milk meter and the actual milk weighed.

The following formula is used for calculating difference between the milk meter reading and the milk weighed.

\[
\text{DIF (\%)} = \frac{\text{Milk meter reading (grams or ounces)} - \text{Weigh scale measurement (grams or ounces)}}{\text{weigh scale measurement (grams or ounces)}} \times 100 \%
\]

Average all of the DIF% deviations for each Milk Meter.

The average deviation for every milk meter should be less than 3% to be considered as an accurate measuring device.

Use the G & H adjustment procedure described above for adjusting inaccuracies in measurements of specific milk meters.
“Milker Assistant” Functions

This chapter explains features classified as “milker assistant” functions. These functions assist in making parlor operation efficient. The first two features described below are maintenance issues very important for the longevity and proper functioning of the product. Functions explained in this chapter are:

- **Liners replacement alert** – Afimilk MPC may be set to count liners operation hours. If the feature is enabled, the unit alerts when liner operation hours expires (in embedded software version 2.16 and above).

- **External start button** – Installing external mechanical (air pressure) or electrical (Contact) start button is highly recommended for easier and quicker operation. The use of this button also contributes to the longevity of Afimilk MPC.

- **Sleep Mode** – Sleep mode keeps the electronic circuit warm and ready to start in a cold environment. It also prevents water from condensing inside the control box. This feature is important for parlors with long breaks between milking sessions (several hours). With sleep mode enabled, power to Afimilk MPC is kept ON all the time.

- **Security level & Start button lock** – High level security codes for preventing milk contamination by colostrum/Antibiotic etc.

- **Security level of unidentified cows** – This feature disable regular operation of start button, to draw the attention of the milker to a non-identified cow.

- **Central activations of operation modes** – This feature enables toggling all milk meters in the parlor between working modes (cleaning/removal) from any milking point in the parlor.

- **Lowering clusters and raising them in batches** – In parallel parlors clusters hanging behind the cows interfere with cow preparation for milking (udder cleaning and stimulation). This feature lowers clusters before the beginning of a new load, allowing the milker to lift them in batches to attachment position after cows' udder was treated.

- **Start-key lock on blood detection** – In combination with Afilab, Afimilk MPC may be set to stop milking if blood is detected by Afilab.

- **Blood Indication** – For displaying Blood message on the control box when detected by Afilab

- **Delay of vacuum at start** – A parameter to delay opening of vacuum where the clusters are lowered slowly at start of milking.

- **Stimulation and single-press start for “herd majority”** – An option to decide whether stimulation is activated with a single press on the start button (when
most cows are assigned with stimulation) OR "double start" (only selected cows requiring stimulated by the machine).

**External Start Button**

An external start button may be installed to allow easier operation of milking.

External start functionality is activating milking (start) and de-activating milking (stop if in milking process). External start may be deactivated for cows with specific codes defined as security codes (refer to security levels operation chapter for more information).

**Hardware and Electronic Configuration**

Connect the contact of the external start button as shown in the connection diagram below. External start buttons may be applied – no need for any specific settings.
Liners Replacement Alert

Liners should be replaced periodically per working hours. This feature measures actual Liners working hours (under pulsation) and alerts for replacement time per pre-set desired working hours.

The feature operates according to a user-set parameter Working Hours Limit, and provides an alert when the accumulated working hours reach the parameter’s value.

Activating Liners Counter

Liner replacement alert is deactivated by default. To activate the liners counter, a value of maximum operation hours for the liners should be entered.

**NOTE**

This feature can only be accessed from the MPC keypad. Future AfiFarm versions will enable pre-setting and follow-up reports via the PC.

To activate the liners counter feature via *afimilk MPC* Keyboard

1. Verify that the *afimilk MPC* is in Wash mode (see 0)

2. In the *afimilk MPC* keyboard, type 2580 and press 📈 to access programming mode.

3. Type 2 for group number 2.

4. Browse through the parameters by pressing 🔁, until you see the parameter Linr on the MPC display.

5. Click 📉 to access the parameter editing mode for Linr.

6. Enter the required value of Linr, indicating the recommended number of working hours per liner. (Linr parameter range: [10-9999] hours).

   *Note: To disable the feature, set Linr=0.*

7. Press 📈 to save.

8. Double click on 🕒 to exit programming mode.
Viewing the Remaining Working Hours per Liner

*afimilk MPC* allows the user to check the remaining working hours of the liners via its control panel.

To display the remaining working hours

On the *afimilk MPC* keypad, press **and ** simultaneously

The display present the number of hours left until liner replacement is required.

![NOTE]

When arriving at replacement date the time counter reaches 0. Then, an alert Linr appears on *afimilk MPC* display at power up. Linr alert disappears when a key is pressed or when a cow is identified at the milking point.

If exceeding replacement date, time for replacement has expired. In such situation the display shows a **sign near the hours indicating the hours elapsed from expected liner replacement.

**Resetting Liner Replacement Timer**

When liners are replaced, the liner timer should be zeroed to re-start counting for the new liners.

To reset the Linr parameter back to its original value

In the relevant *afimilk MPC* keyboard, type **and press .
Sleep Mode

In cold environments, sleep mode is used to protect Afimilk MPC meters. Sleep mode keeps Afimilk MPC control panels warm by maintaining the circuit under power, without activating the valve and pulsation outputs.

**NOTE**

To operate Sleep Mode ensure that power to the milk meters stays ON between milking sessions even when vacuum and milk pumps are off!

**Setup**

To enable Sleep mode SM parameter is set to the delay time for entering this mode. Delay time may be set to 15 to 99 minutes (The default value of SM is 0 = Sleep Mode disabled).

SM parameter is in parameters group 2 (system parameters). Refer to either one of the changing parameters chapters above (From AfiFarm OR directly at the control box) for exact setting instructions of SM.

**Operation**

If Sleep mode is enabled, Afimilk MPC shuts its output down automatically after a delay time without electronic input OR keyboard being pressed.

Afimilk MPC returns to its normal operation and display if:

- Any keyboard button is pressed
- Any communication message from the afimilk computer
- A “Session Start” command sent from the PC
Assigning Milking Operations to specific cows

_AfiMilk_ allows assigning nonstandard milking operations to specific cows in the herd. This is done for tuning milking for cows per unique needs.

The milking parameters available for such individual cow assignment are those in _AfiMilk MPC_ COW parameter group.

The concept of operation of this feature is based on codes assigned to specific cow population (either manually OR automatically by a filter). Once such code is built, _afigarm_ allows assigning either one of the milking options to that code.

Security levels are assigned to codes the same way (Start key behavior, code appearance etc.). The following sections describe the setup procedure inside _afigarm_ for assigning security level and milking parameter to a code.

*Settings Interface*

To set and assign security level or milking operations to codes enter the "Operations" screen in _AfiControl_ via the following path:

>`Settings>Parameters`

In the parameters screen highlight the "Parlor" site and Select the "Operations" tab.

The screen that opens allow you to set alert level and operation to each of the codes defined in AfiFarm 5.
Central Activation of Washing/Milking Mode

**Description**

*Afimilk* system enables central activations of specific commands via communication from the PC. The activation of these options is by sending a command from *Afimilk MPC* terminal to the PC which is returning the command back to a group of milk meters in the parlor. This option is used to help the operator to switch the parlor to cleaning mode, by entering all milk meters into cleaning mode from a single point in the parlor. Similarly, all the machines may be switched to removal mode (ready for milking) after removing the clusters from the Jetters.

There are three options under this operation:

- **Full Wash Mode** - Transferring all the meters on the parlor side into wash mode (vacuum open, pulsation activated). This mode is used if clusters may be detached from the ACR pistons and placed on the Jetters. Then, from one display, a wash command is sent to get all the meters into wash mode.

- **Ready to wash** - Lowering the clusters without opening the vacuum. This is used to place clusters on the Jetters followed by a full wash mode command.

- **Removal Mode** – Lift the clusters of the side.

**Activation**

Central activation of Modes is set in *AfiControl* program as default.

**Operation**

**Lowering clusters without opening Vacuum**

To lower all clusters on that side of the parlor without opening vacuum, Send Message 147 from one of *Afimilk MPC* control boxes at that side.

**Full Wash Mode**

To transfer all clusters on that side of the parlor to Wash Mode (Vacuum open, Pulsation operated), send Message 247 from one of *Afimilk MPC* control boxes at that side.

**Removal Mode**

Before milking, clusters are pulled out of their Jetter sockets and placed on the floor. Once all the clusters are off the Jetters, a single message 741 sent from one of the *Afimilk MPC* control boxes at that side will raise all clusters to removal position, and wash mode will be deactivated.
Lowering clusters and raising them in batches

**Description**

In parallel parlors clusters hanging behind the cows interfere with cow prep. for milking (udder cleaning and stimulation). This feature (if enabled) lowers clusters at the beginning of the load clearing the access to cows' udders, allowing the milker to lift them in batches to attachment position after cows udder was treated.

**Activation**

To lower clusters after removal a delay time need to be set in CC parameter of Afimilk MPC (Cluster Clearance)

To raise clusters in batches by pressing removal on one of the meters in the batch, set the "Number of Clusters In Batch"
Blood Detection with *AfiLab* installed

**Description**

In parlors where *AfiLab* is installed, clusters are automatically removed when blood is detected in the milk. Simultaneously, an announcement appears on the *Afimilk MPC* control box.

Both features need to be configured in *Afifarm* program.

---

**WARNING**

After re-attachment of the cluster, the system will no longer alert OR detach even if blood continue to contaminate the milk. This allows milking to a separation bucket!

---

**Activation**

Three parameters define automatic cluster removal at blood detection. The three parameters are accessed via AfiControl’s parameter programming utility.

![Parameter Settings](image)

To enable the option:

- Check the mark at "Blood Removal Enable"
- Set the value of "Blood Removal Threshold"
- Set protection level (The way to continue milking after connecting a bucket) at "LO-Blood"
Delay of Vacuum at Start

The Start Delay (SD) parameter enables a short delay time between Start key press and vacuum opening. This feature is used where time to lower clusters is longer than regular. 

SD parameter belongs to parameters Group 3 (Production parameters). It may be set in AfiMilk MPC parameters table in afifarm OR directly via the control box.

Stimulation Assignment Options

Four automatic pre-milking stimulation operation options are available in AfiMilk MPC. Each farm chooses one of the following:

- No stimulation at all—Stimulation disabled in parameters
- Stimulation for all of the milked cows—Stimulation enabled in parameters.
- Stimulation for a few specific milked cows—Stimulation activated for cows with a code assigned with stimulation operator.
- Stimulation for most of the cows - (few selected cows do not receive stimulation)
  - Stimulation disabled for cows with a code assigned with stimulation operator.

If all or most of the cows in milk get automatic pre-milking stimulation, the stimulation function should be set to begin automatically after the start button is pressed. Otherwise, to initiate stimulation the user must double-click the start button.

**NOTE**

If a cow is assigned for stimulation, pressing a second time will disable stimulation.

If a cow is assigned a high-level health code, there is a “do not milk” command assigned to her. Pressing a second time will reverse the “do not milk” command and start milking with stimulation.

If a cow is assigned with high-level health code as well as stimulation the milker needs to press three times to milk her without stimulation.

Setting Stimulation Start options

As explained above default of stimulation is to start with single press of the Start button. To for assigning double start to stimulation activation for selected/all the cows, a stimulation code is selected and Start button behavior is defined for double start protection (See Security level & Start Button Lock above).

Milking start for all the cows assigned with the stimulation code will start with double start.
Additional Output Configurations

This chapter explains additional functions available with *Afimilk MPC*. These functions require additional outputs and therefore additional hardware is used. A new Sub-device containing extra outputs and input channels - the *MPC Extension* provides the additional hardware required for supporting the following functions:

**Overview of Features**

- **Individual Backflush**: Backflush is used for cleaning milk residues from the milking cups between cows. This prevents cross contamination from a sick to healthy cows. There are two types of backflush systems:
  - Group backflush is used in side type parlors (Herringbone, Parallel). This system is centrally controlled (Backflush controller) to flush all the cups (liners) between milking loads.
  - Individual backflush is used in stall type parlors (rotary, Tandem) for flushing the cups (liners) after the milking of each cow individually. Individual backflush is controlled by the *Afimilk MPC* milk meter.

  When individual backflush is set, the cluster is flushed with water and injected air after cluster removal (only legal removal will initiate backflush).

- **Strip**: This function is popular in specific regions. Strip is actually a mechanism that pulls the claw downwards at the last phase of milking to trigger higher milk letdown. *Afimilk MPC* may be configured to control such mechanism to “Strip” cows when milk flow at the end of milking decreases.

- **Milk Diversion**: In specific situations, mainly where high quality milk has much higher value (Specific cheese production) a secondary milk line system and tank are installed to contain lower quality milk. This allows the producer to collect high quality milk for cheese manufacturers and the rest of the milk for fluid milk consumption. *Afimilk MPC* may be configured to control milking point valves, thus diverting milk in accordance to quality (Based on codes assignment).

- **Milk Classification**: Channeling milk with higher coagulation properties into a bulk tank, separated from the raw and yogurt milk allow higher cheese yield and much more efficient cheese production (See AfiMilk MCS services)

- **Rotary parlor Retention Bar and automatic Teat spray**: for minimizing the number of milkers in rotary parlors, AfiFarm5 end of rotation sequence may be configured to automatically decide which cow requires additional time for milking and lock her in the milking point using retention bar installed at each stall.
Individual Backflush

The combination of individual backflush and vacuum control enables the function of flushing milking cups individually in Rotary/Tandem parlors, alongside “Smooth cluster removal” (Vacuum closed before retraction of the cluster) and Sweep.

The sequence of events at the end of milking with backflush configured is illustrated below:

![Backflush Timing Chart](image.png)

Water and air valves are opened simultaneously, flushing the cluster with water and air. The duration of the water injection is determined by parameter $u l$.

Air injection continues for 3 more seconds after the water injection is completed. Then, if air time is extended ($A_l$ value) Air continues until its time expires.
**Backflush parameters**

The following parameters control backflush events. Determine the desired value for each parameter.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Function</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>u1</td>
<td>Water flush time in seconds. The default value of this parameter is 0. When configuring a backflush, u1 must be assigned a value (1-10 seconds).</td>
<td>0 – 15</td>
</tr>
<tr>
<td>A1</td>
<td>The air injection may be extended beyond the pre-assigned 3 seconds. A1 is assigned with the time added to the default. If the required Air time is 5 seconds, set A1 to 2 (3sec default + 2 additional seconds).</td>
<td>0 – 15</td>
</tr>
</tbody>
</table>

**Strip**

This setup enables Afimilk MPC system to control a strip mechanism.

The sequence of events at the end of milking with the strip function configured is illustrated below:
**Software Configuration**

\( \text{St} \) parameter value is set to the milk flow rate to start stripping, the same way cluster removal (\( \text{F2} \)) delay is calculated. Strip threshold is parameter 11 in parameters group 1 (Cow Parameters).

**CAUTION**

The value of \( \text{St} \) must be smaller than the value of \( \text{F2} \). !

**Milk Diversion**

This option enables the Afimilk MPC system to control milk separation per needs. Milk separation may be used to divert undesirable milk from the main bulk tank (High SCC, Antibiotic...) OR, to separate per destination (high quality milk used for cheese manufacturing while the rest for drinking).

**Hardware and Electronic Configuration**

Milk separation requires constructing additional milk collecting system (Milk Line, pumps, secondary tank...). The way for afimilk to control milk separation is via afimilk MPC acting as an operator of a bi-directional valve installed at each milking point.

**Assigning Milk Diversion command to cows**

Milk diversion is controlled by afimilk by assigning diversion command codes to specific cows. It offers two options for diverting milk into a secondary line:

- Diverting the entire volume of milk of selected cows.
- Diverting certain amount of foremilk for specific cows (Cistern milk contains higher somatic cell count).

Once the system is configured to support milk diversion, specific afimilk codes may be assigned for toggling cows requiring milk diversion. Each diversion code may be assigned with the quantity of Foremilk (number of milk dumps at pre-milk phase) to divert, thus allowing the system to select diversion quantities per cows' physiologic situation.

The setup of milk dump is in the \( \text{dU} \) parameter. When setting the number of milk dumps, each \( \text{dU} \) unit represents 200cc of milk to be dumped. For example, \( 1 = 200cc, 2 = 400cc, 3 = 600cc \), and so forth. The range of diversion units is from 0 to 10.

When \( \text{dU} = 0 \) the function is disabled

When \( \text{dU} = 10 \) – ALL THE MILK OF THE COW IS SENT TO THE DIVERSION LINE
To set and assign separation commands to codes enter the "Operations" screen via the AfiControl interface.

**AfiMilk MPC Extender**

The extension unit of afimilk MPC is an additional device, ordered separately from the milk meter. The following unit is an encased electronic device, incorporating 4 additional outputs and two additional inputs with their connection ports.

*4094005 AfiMilk Extender*

A fimilk Extender is connected to the MPC via communication.
MPC Extender Connections Diagram

Inputs port J5

Outputs Port J3

Solenoids

Black/Blue
White/Yellow
White/Black

Communication To Afimilk MPC

Power Cable
Cable 2x1 0.5mm²
Setting-up MPC Extender

*MPC extender* is enabled and set via *AfiControl* configuration screens.

- When inside the configurator, check the *MPC Extender* box to enable the option.

- Open each of the "Out" port drop-down lists to select the desired option. Note that each *out* supports one of two pre-defined features per the table below:

<table>
<thead>
<tr>
<th>Port Number</th>
<th>Option 1</th>
<th>Option 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Out 1</td>
<td>Milk Classification (MCS)</td>
<td>Milk Separation</td>
</tr>
<tr>
<td>Out 2</td>
<td>Retention Bar (Rotary Parlor)</td>
<td>--</td>
</tr>
<tr>
<td>Out 3</td>
<td>Backflush (Air Output)</td>
<td>Auto Teat Spray (Rotary Parlor)</td>
</tr>
<tr>
<td>Out 4</td>
<td>Backflush (Water Output)</td>
<td>Strip</td>
</tr>
</tbody>
</table>

*Example: Out 3 functional options*
Cleaning and Maintenance

This chapter describes general cleaning guidelines and maintenance procedures.

Afimilk MPC milk meters are washed together with the milking system (CIP cleaning), therefore, general CIP guidelines are used. This chapter highlights cleaning instructions and specific requirements for the cleaning of milk meters. Afimilk recommends using dispensing pumps for accurate detergent dispensation to avoid over use of detergents.

General Instructions

The following conditions must be fulfilled in every cleaning cycle.

- Vacuum pump should operate throughout the cleaning cycle to avoid leakage of milk and cleaning solution through gaskets.
- During every stage of cleaning, check that there is sufficient water to “flood” the interior chamber of the milk meter bodies. If due to insufficient water supply the last meter bodies in the parlor fail to fill up, adjust valve closing time as explained above.
- The volume of each Milk Meter body is 500cc. The amount of water required per milking point varies between 6 – 8 liters, according to:
  - Parlor configuration,
  - Length and diameter of milk lines,
  - Volume of the receiving vessels.

CAUTION

Follow all of the detergents’ manufacturers’ recommendations, including: concentrations, temperatures, and cleaning-cycle times. Excessive use of chemicals may damage the Milk Meters. Leaving the detergent inside the Milk Meter may damage its components.
Cleaning Cycle

There are various cleaning systems and types of detergent/acid in use for CIP procedures. Nevertheless, the following rules must be maintained for all systems in use.

Detergent Wash

Detergent wash cycle should include the following stages:

1. Initial cleaning in an open circuit, to rinse out residual milk: Use lukewarm water that is emptied in the drain, until the water becomes clear. This rinsing water should be at roughly body temperature:
   - If the water is too cold, milk fats solidify onto surfaces, and are more difficult to remove.
   - If the water is too hot, milk fats may be “baked” onto the surfaces.
2. Circulate the water in a closed circuit (CIP) with detergent. Use a basic detergent additive (pH=13) and hot water per detergent manufacturer instructions:
   - Entry water: 70°C [158°F], or hotter,
   - Returning water: 55°C [131°F], or hotter.
   a. Start circulating with hot water, and empty the water in the drain for a short time until the system is warmed up.
   b. Bring the milk line to a circulating position, add the soap, and circulate for 10 – 12 minutes.
   c. Drain the cleaning fluid.

Use cold water. Empty the water in the drain until the water becomes clear.

CAUTION

Butyl Glycol or Butyl Cellusolve in excess of 10% detergent may damage plastic components of the system. Afimilk recommends cleaning fluids with a maximum of 10% Butyl Glycol or Butyl Cellusolve.
Acid Wash

Perform an acid wash three times a week, or more frequently if necessary. Acid wash is not in place of the daily detergent wash routine (There are some cleaning solutions available that remove both milk residues and hard water salts.)

1. Circulating with phosphoric and/or sulfuric acid.
   Use hot water and a chemical additive per acid manufacturer instructions:
   - Entry water: 70°C [158°F], minimum,
   - Returning water: 50°C [122°F], minimum,

   Circulate the solution for 10 – 12 minutes and drain.

2. Rinse the system with cold water.

Cleaning Exterior Surfaces

To clean exterior surfaces of milk meter bodies and control boxes, moisten a soft cloth with water and gently rub the surfaces.

CAUTION

1. Do not use any kind of detergent on either the control panel or on the Milk Meter body.
2. Do not direct jets of water on the AfiMilk MPC control box.
3. Avoid all contact of pesticide materials with the exterior of Milk Meter bodies and control panels. These may damage plastic enclosure and body parts!
Preventive Maintenance of Milk Meters

Proper scheduled maintenance of Afimilk MPC system ensures products' longevity alongside proper operation of the product.

Replacing rubber parts

Rubber parts in the milking system are considered as consumable parts. These need to be replaced periodically. Replacement of milk meter body's gaskets should be carried out annually at regular use and twice a year in the parlor is operating around the clock (if more than 25 cows are milked at each milking point at every milking session). For maintenance, afimilk offers a maintenance kit for each meter (P/N 4098018). Maintenance kit includes these parts:

- Upper and lower silicone gaskets
- Silicone valve gasket
- Rubber diaphragm

Maintaining clean Air/Vacuum to Solenoids

As explained above, the importance of supplying dry/clean vacuum and air to milk meter body solenoid is crucial for its functionality and longevity. This maintenance routine ensures that vacuum and air lines feeding the solenoids are kept dry and clean.

DRAIN the lines

Drain the vacuum lines and clean air line every week.

- Check that there is no leakage through the vacuum drain valve when under vacuum.
- Check that the drain valve is functioning.
- Drain the vacuum line at rest (between sessions when not under vacuum)  
  > If there is a large amount of water in any of the lines, look for a defective MM diaphragm, or any another possible cause.
- Drain clean air line as well

SUCTION FILTER

Every month, remove the suction filter from the line and clean it with compressed air. Change the filter when damaged or partially full of dust.
**Washing the VACUUM LINE:**

*afimilk* recommends washing vacuum lines at least twice a year.

To wash the vacuum line:

1. Prepare a pail half full of warm water.
2. Disconnect the vacuum flexible tube from the milk meter body solenoid furthest from the drain valve (on the upper end of the line).
3. Briefly operate the vacuum pump. Water will be pumped into the line. Allow the water to drain through the drain valve.
4. Prepare a warm detergent solution in the bucket and repeat step 3.
5. Repeat step 3 with cold water, to rinse the line.

**DO NOT WASH** the clean-air line.
Fault Alerts

Three types of fault alerts may be displayed during or after milking:

- **Outputs Alert** – This alert indicates an overcurrent at one of the outputs (meaning a device may be short-circuiting). Apparatus controlled by AfiMilk MPC and their corresponding fault alerts are listed below.

  The fault indication format is **E01** alternating with **Out#** (# = number of output).

  If an output alert appears, try pressing one of the keys of the control box. If the problem persists OR if the alert appears again, the device needs to be replaced or fixed.

<table>
<thead>
<tr>
<th>Output Message</th>
<th>Device Correlated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Out1</td>
<td>Removal Piston Solenoid</td>
</tr>
<tr>
<td>Out2</td>
<td>AfiLite Valve Solenoid</td>
</tr>
<tr>
<td>Out3</td>
<td>Vacuum Valve Solenoid</td>
</tr>
<tr>
<td>Out4</td>
<td>Pulsator Front</td>
</tr>
<tr>
<td>Out5</td>
<td>Pulsator Rear</td>
</tr>
</tbody>
</table>

- **Communication Fault** – This fault alert indicates a momentary failure in communication. The error display format for this fault is **E 03**.

  If a Communication Fault alert appears, try pressing one of the keys of the control box. If the problem persists, OR if the alert appears again, you must replace the AfiMilk MPC control box.

- **Milk Dump Delay** – AfiMilk MPC dumps the portions of milk into the milk line. The design of AfiMilk MPC body allows fast discharge of the milk when the valve is opened. Delays in milk discharge may cause measurement inaccuracies alongside delays in removal. Error messages **E 02** and **E02F** indicates milk discharge delay.
- **E02** Error message: resistance to milk discharge, where the milk is not discharged quickly enough. This alert appears after cluster removal to indicate a possible milk measuring inaccuracy.

- **E02F** = dramatic discharge problem: The milk meter is not emptied and milk overflows through the measuring chamber. This alert appears immediately, as soon as the error is indicated. This problem usually occurs due to a valve or another severe mechanical malfunction. In such situations, *Afimilk MPC* stops measuring although pulsation continues to function.

- If such happen check the following:
  a. If the elbow pipe connecting the milk meter outlet port to the milk line is at a downwards slope towards the milk line
  b. If air orifice in the milking claw is open
  c. If at cleaning mode the valve is moving up and down properly (if not, the body solenoid may be faulty OR the solenoid diaphragm may be damaged).
Accessories

Accessories are components required for the milking system which are NOT part of Afimilk MPC assembly. Accessories may be sourced locally or purchased from afimilk.

Vacuum shut off Valves

Afimilk offers three optional types of Shut-off valves:

- Air Operated Shut-off Valve
- Vacuum Operated Normally Closed
- Vacuum Operated Normally Open

All valves may be supplied in two inlet diameters – 5/8' or 7/8'.

Valve main features:

- The valve body is made of a transparent polymer that allows you to see the flow of milk.
- The cover and control components are made of reinforced polypropylene for long-term durability.
- The valve permits flow in both directions.
- Each of the valve’s nipples has a sharp one-way barb that stops the hose from coming off.
- The valves are designed and tested in accordance with the following milk equipment standards:
  > Construction and implementation—from milking standards ISO 5707 and ASAE S518.2
  > Testing—milking machine systems—ISO 6690 and ASAE EP 445.1

The tests were performed in the Israeli National Service for Udder Health and Milk Quality – Milking Equipment's Lab
Range of Shut-off Milk Valves

These **Normally Open** valves replace the traditional clamp valve. The main advantage of such diaphragm valve is refraining from clamping the hose during operation thus maintaining hose diameter (Clamp valves cause diameter reduction to hoses).

**Normally Closed Vacuum-Operated Valve**

When there is a vacuum in the milk line, the valve is closed. When the valve’s control input is connected to a vacuum source, it opens.

![Closed Valve](image)

**Normaly Open Air-Operated Valve**

When there is a vacuum in the milk line, the valve is kept open. When the valve’s control input is connected to a source of compressed air, it closes.

![Open Valve](image)

**Normally Open Vacuum-Operated Valve**

When there is a vacuum in the milk line, the valve is kept open. When the valve’s control input is connected to a vacuum source, it closes.
Ordering Info

AfIMilk Vacuum valves are sold in packages of two units of a kind. The following part numbers are used for ordering the different type valves:

5077101 - VALVE 5/8 AIR OPERATED (PACK OF TWO)
5077102 - VALVE 7/8 AIR OPERATED (PACK OF TWO)
5077103 - VALVE N.C. 5/8 VACUUM OPERATED (PACK OF TWO)
5077104 - VALVE N.C. 7/8 VACUUM OPERATED (PACK OF TWO)
5077105 - VALVE N.O. 5/8 VACUUM OPERATED (PACK OF TWO)
5077106 - VALVE N.O. 7/8 VACUUM OPERATED (PACK OF TWO)
5077107 - VALVE 7/8 FEMALE INLET AIR OPERATED (PACK OF TWO)*
5077108 - VALVE N.C. 7/8 FEMALE INLET VACUUM (PACK OF TWO)*
5077109 - VALVE N.O. 7/8 FEMALE INLET VACUUM (PACK OF TWO)*

* Female Inlet = Direct mounting to the milk meter inlet

Valve Accessories

As per request, afimilk offers specially designed mounting brackets for the valves (for attaching to the milk meter brackets). Valve brackets kits (Including bolts and mounting aids) may be ordered under the part number:

5077053 – Valve Bracket kit for Afimilk MPC milk meter
The Fat Sampler

International dairy authorities, as well as most local dairy authorities, may require the sampling of milk during the milking process. The fat sampler complies with these regulations. The fat sampler is made up of a sampling bottle and a sampler head.

Mounting the Fat Sampler

The Fat Sampler is mounted below the Milk Meter body between the outlet port and the elbow joint to the milk line.

**Note**

During normal milking, when not sampling, a sampler replacement tube fills the gap reserved for the fat sampler.
## Parts List

* Indicates special order

<table>
<thead>
<tr>
<th>Item</th>
<th>Cable Length Options (Meters)</th>
<th>Part Number</th>
<th>Prefix</th>
<th>Suffix</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afimilk MPC Milk Meter</td>
<td>1.5  5</td>
<td>4498999</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3  20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Afimilk MPC control box, packaged (With Cable)</strong></td>
<td>1.5</td>
<td>4497950</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td></td>
<td></td>
<td>C</td>
</tr>
<tr>
<td>Cable, + D-type connector</td>
<td>1.5</td>
<td>4093455</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td></td>
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## Parts List

<table>
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<tr>
<th>Item</th>
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<th>Cable Length Options (Meters)</th>
<th>Part Number</th>
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<td><strong>AfiFlo</strong> body upper cover</td>
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<td><strong>AfiFlo</strong> body gaskets, upper &amp; lower</td>
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<td>Samplar bottle</td>
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Loading Software into *afimilk MPC*

When to Upgrade MPC(s)

For proper operation of afimilk system it is important that **all** the milk meters in the milking parlor carry the same embedded software version. New software need to be loaded into an *afimilk MPC* control unit in one of the following instances:

- **A new version is released** – In this situation **ALL** the milk meters need to be updated to the new version.
- **A display unit has been replaced or added** - In this situation the new unit needs to be updated to the same software version as all the other units in the parlor. If there is a mismatch between the new unit’s software version and the software version loaded in AfiFarm (indicating the software loaded to the rest of the parlor), the controller of the new unit will display *Boot* at the beginning of milking session. The procedure for updating software in a single unit is described in a chapter "Replacing a faulty display" in the user manual.

There are two methods for uploading a new embedded software version into an *afimilk MPC* performed by an installation technician (user update of specific units per change of a parlor display is described in a separate document):

- Via a PC command; this method is used for upgrading **ALL** of the *afimilk MPCs* to a new version at a new release
- **OR**
- Via an *afimilk MPC* keyboard command (from the parlor); this method is best used for upgrading a single or a few milk meters.

Both methods require the same preparation phases, as explained in this chapter:

1. Verify the pre-upgrade requisites, see section 0
2. Load the new software version into AfiFarm, see Error! Reference source not found.
3. Load the software version into the *afimilk MPC* via the relevant method:
   - Load version to all *afimilk MPCs* via AfiFarm, see Error! Reference source not found.
   - Load version to specific *afimilk MPCs* via their keyboard, see Error! Reference source not found.
Pre-upgrade Requisites

To upgrade to the new version, verify the following:

- **Operation mode**: All *afimilk MPCs* that are to be upgraded must be either in **Wash** mode or in **Removal** mode. See 0.
- **Session Time**: AfiFarm Real Time must be In Milking Session (i.e. communicating with the milk meters).

The following sections provide instructions for verifying that the system and *afimilk MPCs* are ready for software installation.

Checking Milk Meters Operation Mode

The *afimilk MPC* software upgrade may be performed when the control unit is in Wash mode or in Removal mode (i.e. not during actual milking of a cow).

To verify the milk meters are in Wash / Removal operation mode – via the *AfiControl* interface

- Wash Mode indications:
  - The red indicator in the Wash button is illuminated
  - The display presents temperature measurements (e.g.: 25°C).

- Removal Mode indications:
  - The LEDs on the *afimilk MPCs* sides are illuminated – cluster is at elevated position
AfiMilk MPC Version selection

AfiMilk MPC version to load is placed in the versions directory of AfiControl.

To upgrade software from the parlor

1. At *afimilk MPC* keyboard, Click the key sequence corresponding with the procedure you are using:

2. To upgrade a single device in the parlor -Send message

   ![Key sequence image]

   - To upgrade a side of a herringbone/parallel parlor -Send message

   ![Key sequence image]

   - To upgrade all of the meters in the parlor -Send message

   ![Key sequence image]

3. The display on the meters being upgraded shows the following sequence:

   - The message that was entered appears briefly (158, 258 or 358)
   - *LoAd* appears briefly
   - *Strt* appears briefly
   - A countdown begins, indicating the remaining time for download. For example, if the countdown starts near 38, the display will show A38.0, A37.9 and so forth.

4. When complete, the meters return to their previous state. For example, if the meters were in *Wash* mode, the temperature is displayed (25C).