Silicon Form

Manual
MULTILACTOR
Basic

Silicon Form

Silicon ⊙ Form

Congratulations, upon selecting Multilactor® you have decided in favour of a substantially automated and remarkably innovative milking system.

Multilactor® is a novel user and animal friendly milking system. It is based on a milking unit without any collecting piece, which simulates the behaviour of a sucking calf by means of the specifically developed novel and patented pre-stimulation device having a certain movement during the main milking time. By additionally using the Bio-Milker milking cup including the Bio-Milker valve a substantially natural gentle milking process is guaranteed, thereby obtaining a final milk extraction efficiency that has previously not been feasible. Due to the ergonomic construction any work for the operator is significantly improved by protecting as much as possible the operator's joints and spine (expertise Dr. Falk Liebers, Federal Institute for protection of labour and medical care, Berlin, as well as Dr Martina Jakob, Leibniz-Institute for agricultural technique, Potsdam-Bornim).

Multilactor® provides the following features:
- ‖ simple intuitive operation
- ‖ milking unit without any collecting piece that operates on each quarter of the udder independently
- ‖ sequential pulsation in order to ensure a milk transport as gentle and rapid as possible
- ‖ optimised stimulation for achieving a high oxytocin concentration in the blood of the dairy animal and as a consequence thereof a complete extraction of milk even from the alveols into the udder cistern
- ‖ a gentle main milking process with continuous movement of an actuator for relaxing the udder muscles in combination with an effective low vacuum concept
- ‖ due to the usage of the Bio-Milker system a defined air inlet leads to a substantially semi-natural milking process (similar to the suction of a calf at the teat
- ‖ a remarkably precise measurement of the milk amount (reading) is guaranteed by using Pulsameter 2®
- ‖ control of the milking status (amount of milk, milking time, characteristic) is illustrated by the chronological presentation of the milk flow curve on the display during the milking process
- ‖ enhancing activity of the actuator at the end of the main milk flow (milk-out-phase or final milking phase) in order to guarantee an optimum degree of final milk extraction
- ‖ automatic detaching the milking cups at the physiologically correct point in time
- ‖ intermediate cleansing and disinfection of the milking cups after each individual milking process (outwardly and inwardly) in order to eliminate the transfer of udder-pathogenic gems between individual cows
- ‖ fully automatic positioning of the milking cups in the cleaning box for the circular cleaning and disinfection during the main cleaning process

We are certain to meet your expectations with respect to successive milking and wish you "luck in your stable".

Multilactor®, Bio-Milker and Pulsameter are registered trademarks.

Contents

1. Safety instructions

Please observe the following instructions for your personal safety and for maintaining warranty claims!

- ❖ The electricity installation is to be provided by an expert only. Similarly, any repairs extending beyond the maintenance instructions provided in this manual as well as any measures for eliminating disturbances are to be performed by dedicated experts only. To this end, please contact your responsible service partner.
- ❖ Operation of the milking equipment is allowed only if all electrical modules are tightly closed.
- ❖ During maintenance, repair and cleaning activities any electrical voltage whatsoever has to be disconnected from the device.
- ❖ Do not position your hands between any moving parts of the Multilactor during operation! Risk of injury.
- ❖ Cleaning by using a high-pressure cleaning device is to be performed very carefully in order to avoid penetration of water into the controller!
- ❖ Only those cleaning and disinfection agents as well as acids must be used, which are tested by Siliconform and which have been approved as appropriate agents for the Multilactor® cleaning. Usage of any non-approved chemicals results in loss of liability of Siliconform for any damage of parts that have been come into contact with these chemicals.

- ❖ Any cleaning and disinfection agents are to be handled with care. Contact with skin causes pronounced irritation and chemical burn. Therefore protect your hands and eyes with protective gloves and safety glasses, respectively, when handling chemicals. Please always observe safety data sheets, product information and identification of the manufacturer prior to usage!
- ❖ Any contact with chemicals by children must be avoided! A lockable storage with collecting well and corresponding identification has to be provided!
- ❖ The dosing station for peracetic acid and the acid for cleaning the valves must not be accessible by children and must be located in a separate lockable room.

❖ Siliconform ltd. is not liable for any damage caused by inappropriate usage or unau-
thorised handling.

Hint:

During start up (milking-in) there should not be too many further persons-except for the
milker-in the milking parlour. A change of the milking environment and the milking
procedure, respectively, is already a significant challenge for the animals and this situation
should not be exaggerated by unknown persons and precipitance in the milking parlour. A
quiet and positive atmosphere during the milking process considerably contributes to a
success of the milking system.
Software version V2.10a (16.12.2014)

2. Device configuration

Multilactor consists of the main components:

    1 housing
    2 tilt trestle
    3 pivot arm
    4 purge unit / Sani-box (combined cleaning and disinfection)
    5 milk amount gauge Pulsameter®
    6 collecting piece-free milking gadget (not shown in figure 1)
    7 actuator

The components of the controller and the pulsator are disposed post on the lateral part of the housing (see figure 1). The tilt trestle is the support of the pivot arm and includes the shut-off valves for the milking cup vacuum. The pivot arm receives the milking cups and transfers the stimulating motion to the udder via the milk hoses. The control unit is disposed on the front of the housing.
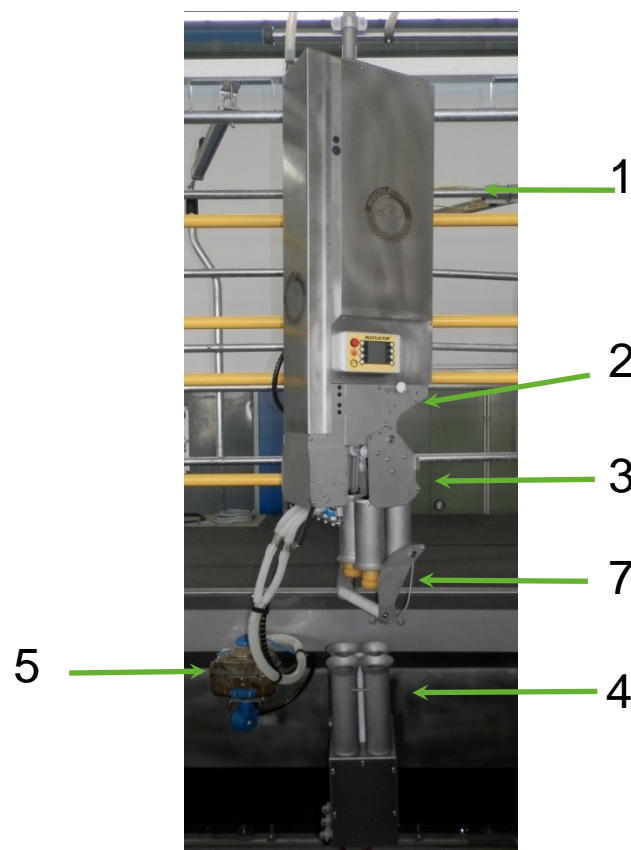

Figure 1

3. Operation and mode of operation

Hint for milking:

During automatic milking including stimulation the milking cups are automatically removed at the end of the milking process. Automatic cleaning and intermediate disinfection follow each milking process. This mode of operation is a default setting and may be deactivated in the menu "basic position". (The intermediate disinfection may be re-activated during the milking operation for specific milking processes.)

Figure 2: main menu "basic position"
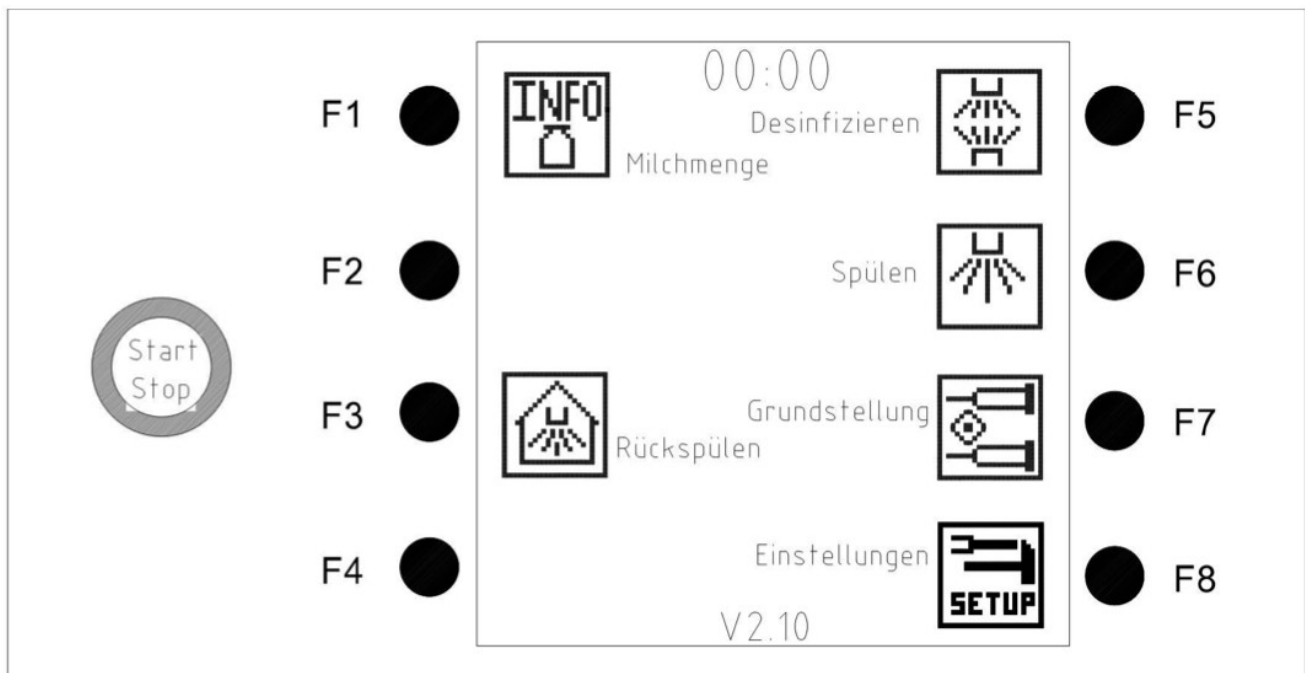
Multilactor may take three positions:

3.1. Purge or cleaning position

Multilactor® is aligned parallel to the milking cavern, the pivot axis is blocked. The pivot arm including the magazine faces downwards.
Te hoses are extended for purging and the milking cups are within the purge unit.

3.2. Basic position

Multilactor® faces the direction of the stand of the animal, the pivot axis is blocked. The pivot arm in the magazine faces downwards.
The hoses are retrieved, the milking cups are positioned in the magazine.

3.3. Milking position

Multilactor® faces the direction of the stand of the animal, the pivot axis is released.
The pivot arm is pivoted to the front towards the animal.
The hoses are released, the milking cups may be put on.

3.4. Getting ready for milking

After cleaning the equipment the Multilactors are in standby mode (dark display).
-Switch purge unit to "milking".
-Press start button at a respective milking place.
- ➜Multilactor moves into basic position, menu MILKING is displayed.
-The animals may enter the milking parlour.
-The animal to be milked is prepared for milking:
  -control milk jet
  -clean teats

3.5. Milking procedure

- Upon pressing the START button or activating the knee switch Multilactor moves into the milking position and the milking procedure starts.
- ➜The milking parameters are displayed: milking time, current milk amount and milk flow curve, milking mode (for example manual milking).

- The hoses are released and the milking cups may be removed from the magazine and may be attached to the udder in any sequence.
  -Hint: Multilactor comprises a device for automatically switching off the vacuum, when air is sucked into the milking cup (drop of a milking cup or three-teat cow). As soon as the milking cup is re-attached the vacuum is turned on again. By activating the knee switch a forced vacuum is turned on in order to facilitate the attachment of the milking cup.
- It is important that the hoses hang freely downwards in a wide arc, however, without touching the ground and pulling at the milking cups. In this manner, any interfering pressure forces and tensions are avoided and optimum simulation at and adaptation to the udder are achieved.

Figure 3: Attaching milking cups

HINT:

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In case of 3-teat cows there is a possibility for locking one hose of a teat cup to avoid contact of the hose with the ground. To this end, the white lock screw positioned at the right-hand side below the touch panel is to be pulled and turned until it is locked in the second position. Do not forget to reset the hose brake after having milked this cow (refer to Figure 3)!

Figure 4: Menu MILKING
Icon F7 stimulation manual milking is visible only upon activating F8 manual milking

After expiration of the attachment time (typically 10 seconds) the actuator starts with intensive stimulation. Upon activating any button during the milking process the menu "MILKING" is re-opened.
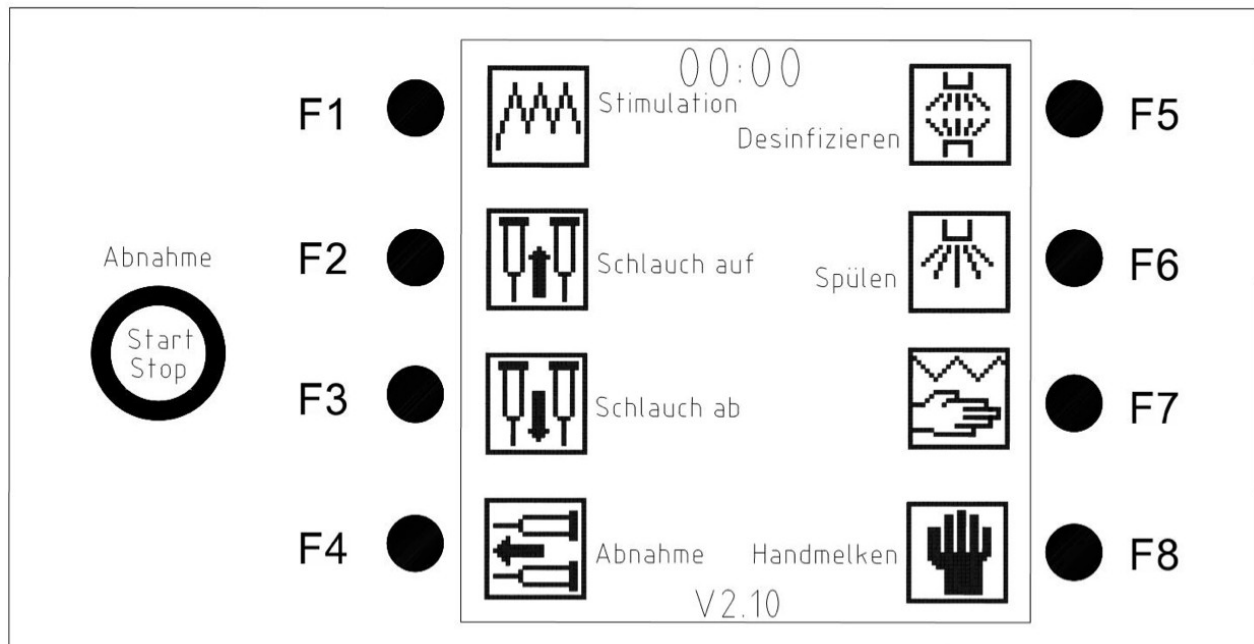
- By activating the button F2 (hose up) / F3 (hose down) the length of the hose may be readjusted!

Repeated milking

In case that an animal (is not correctly emptied and) is to be milked again, the pre-stimulation phase may be skipped after attaching the milking cups by pressing the button F1 (stimulation) and holding the button for about 5 seconds, thereby immediately entering the main milking process.

The milking procedure is divided into the following 4 steps:

- Full pre-stimulation
- By means of the actuator the milking cups are forced to swing through the milk hoses in order to relax of the udder muscles and to ensure a high concentration of the hormone oxytocin that is necessary for emptying the alveolae. This is similar to the natural behaviour of the cow at the beginning of the calf's sucking. At the same time the pulsation is automatically adjusted such that only a low amount of milk can leave the system in order to avoid penetration of damaging vacuum into the udder cistern during the stimulation process.
- **Hint:**
- The stimulation may be deactivated at any time (e.g., to prevent the milking cups from dropping off for animals having very small teats and/or for udders with edema.

- Main milking
- After a successful pre-stimulation the pulsation is adjusted to 60% suction phase and 40% relief phase with a pulsator frequency of 60 cycles per minute.
- At the same time the pulsation is running in sequential mode, i.e., neither change-mode pulsation nor common-mode pulsation. This ensures a remarkably gentle milk removal resulting in low FFA-contents in the delivery milk. (FFA = free fatty acids)
- During this process concurrently a stimulation frequency is transferred to the teat during the opening phase of the teat rubber, similar to the calf acting with its tongue on the teat in a natural way.
- Additionally, the actuator frequency is reduced to a type of oscillation that is convenient and gentle for the animal in order to achieve a milking of the cow that is as convenient as possible.
- The vacuum value for milking should be adjusted to 32 to 36 kPa at most.
- The behaviour of the animals and the degree of emptying the udders during the milking process as well as attachment of the milking cups should be taken as parameters for adjusting the value of the vacuum. The entirety of these measures results in a particular relaxation of the dairy animal during the main milking process.

- Final milking
- At the end of the main milking process when reaching a milk flow of 800 g/min the actuator movement is enhanced such that the muscles of the udder are again intensively relaxed by the actuator motion so that the remaining procedural milk may be extracted from the connecting channels positioned between the alveolae and the milk cistern and into the teat cavity.
- Upon reaching a milk flow of 200 g/min and after an adjustable delay time, preferably 10 seconds, the automatic detachment is activated.

- The reliable and gentle withdrawal of the milk hoses and the milking cups into the milking cup magazine is to be accomplished without touching the floor of the milking box. Concurrently the milk hoses are automatically cleaned by water nozzles and brushes.

- Intermediate disinfection
- Multilactor® moves into the purge position, the LED is blinking:
- **Do not touch the equipment during the movement!**
- The milking cups move downwards into the purge unit and are firstly pre--cleaned inwardly and outwardly by using water.
- Thereafter the milking cups are again withdrawn into the magazine and the residual water is shaken off.
- Multilactor® again pivots into the purge position and moves the milking cups downwards into the purge unit. During the lowering of the milking cups into the purge unit a disinfection of the milking cups in the interior and on the outside is accomplished. After this spray process the milking cups move into an idle position (reaction time 30 seconds!).
- Thereafter the milking cups are lowered into the purge unit and are purged with pure water so that residue-free teat rubbers are available for the next milking process.
- **Caution: peracetic acid is a highly corrosive liquid. Therefore do not contact the purge unit during the intermediate disinfection!**

At the end Multilactor® again moves into the base position and is ready for the next process.

- Milking into the bucket
- In the case of contaminated milk there is the possibility to milk into the bucket without measuring the milk amount. To this end, the milk hose may be split up upstream to the Pulsameter at the predefined disconnection point and connected to a bucket. An erroneous connection is excluded by means of the shape of milking connection of the bucket.

Figure 5: Disconnection point of milk hose

- Then start the milking process and select mode MANUAL MILKING (F8) in menu "milking". During the milking process the symbol "hand" is displayed.

Caution: in mode "manual milking" there is no automatic detachment and no intensified actuator movement. By pressing button F7 the intensified movement of the actuator may be manually activated during manual milking.

- For detaching the milking cups two options may be used:
  - Press button "Abnahme", the cups are removed immediately.
  - Deactivate "manual milking", the attachment will be carried out after expiration of the pre-set final milking time.

- While Multlactor® is pivoting the pivot arm downwards press START/STOP button ➔ Multlactor® remains in basic position.
- Empty the bucket and re-connect it.
- By pressing the button "Rückspülen" to start removal of any residual milk from the hoses.
- Multilactor® moves into basic position.
- Remove bucket, re-connect hose
- Press button for intermediate disinfection

3.6. Cleaning after milking:

After the milking process the entire milking line system is cleaned by means of the purge apparatus. The cleaning of the milking cups and the Bio-Milker valves is started by a signal provided by the purge apparatus. Multilactor® moves into the purge position and the milking cups are positioned in the purge receptacle. Please confirm that all of the milking cups are within the purge receptacles.

At first the Bio-Milker valves are cleaned. The increased vacuum of 50 kPa is activated, the pulsation is adjusted to a common-mode pulsation. The tubes of the purge receptacle are filled with a cleaning agent having a temperature of at least 45°C; the cleaning agent is sucked through the air inlet valves of the milking cups, thereby intensively purging the same.

For control purposes of the purging process the entire liquid amount flowing through the line and the corresponding flow curve are shown in the display. If there is a deviation of the amount of liquid (less than usual or less than in the other Multilactors) the Bio-Milker valves have to be controlled!

After finishing the purging of the valves the milking cups are moved upwards and the remaining liquid is drained off. Thereafter the milking cups are again lowered into the

purge unit for performing the main cleaning process.

The pre-heated cleaning agent flows through the purge line from the purge apparatus to the Multilactors so as to clean the milking cups and the milk hoses. The magnitude of the throughput is shown in the display.
Note: If the flow curves are different in the individual Multilactors it is urgently recommended to control the correct position of the milking cups. After the end of the purge program the milking cups are finally purged with pure water and the Multilactors enter the standby-mode.

4. Maintenance specifications

Interval	Action	
Upon installation, replacement of PSM2 or controller; specification of LKV or milk union	Calibrating Pulsameter2®	
daily	Check valve purging: - amount of liquid sucked through (shown on the display) - amount of liquid in the tubes of the purge box - noise control (sucking noises present?)	section 4.6.
	Check vacuum	Section 2
	Check water drain in the purge unit	
	Check smell with respect to vinegar during the intermediate disinfection	
	Check for unusual noise (spitting, squeaking,…)	
	Check pulse hoses for: damage, water in hose	
weekly	Visually check Bio-Milker valves for contamination	
monthly	Check whether components are freely movable	
	Check spray nozzles, possibly need to be calcified	
	Clean the roles in the pivot arm	
quarterly	Detach tubes from the purge unit and clean plastic supports	
after 2000 h	Change teat rubbers	
	Maintenance	
after 4.000 h	Change switch-off membranes	
	Maintenance pulsation-replace silicone parts	
after 6.000 h	Replace bearing points in the pivot arm	
according to manufacturer's specifications	Device components: compressor, purge apparatus, vacuum pump, milk pump,...	

5. Error handling

Error	Possible cause	Action
No image on display	Power supply failure	Check power supply, LED on transformer (fuses) Optionally: call service
Milking cups do not correctly enter the purge tubes	Contamination on the bearing points of the suspension Movement too slowly	Readjust throttle valve on cylinder Clean/lubricate bearing points
Hoses move too slowly	Double-cylinder possibly contaminated	Call service Clean double-cylinder
Individual movements are not or not correctly performed	Controller Pneumatic valves defective (for example due to lack of air quality) Pneumatic cylinders move tightly, adjustments of the exhaust air throttles or damping adjustment not correct Pressurised air: Pressure too low, leakage in line system At low environmental temperatures movements are slower	Check LEDs of pneumatic valves Switch outputs manually Switch valve manually (see attachment 7.2) Check generation of pressurised air (is dryer sufficient,…) for specifications see datasheet pressurised air Check cylinder and/or adjustments. Check pressure, check hose system During winter time increase pressure by about 0.5 bar

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Error	Possible cause	Action
Unusually long idle time after detachment	Failure of end switch on cylinder (cable breakage, defective)	Milking as possible Call service
Hoses lower themselves between the milking times or withdraw during milking without user interaction	Leakage in line system, cylinder or valve	Check for leakage Optionally call service
Movements are carried out although the hoses have not been withdrawn	End switch on cylinder is always on	Call service
Multilactor® does not start on its own or not at all	Failure of knee switch	Disconnect knee switch and start with the start button. Replace knee switch
Pulsation does not work	- Main filter for fresh air is clocked - Controller is defective - Contamination in pulsator	Replace filter Check LEDs of pulsator valves HINT: in case of a failure of a pulsator valve it is nevertheless possible to milk by connecting the hose of the defective valve to a functioning valve by means of a T-connection piece. -->Call service
No or insufficient vacuum	- Upper valve on PSM is closed	Open valve, check for contamination, condensed water, check membrane for damage/wear, possibly replace Check LED on control valve Y20 (see figure 7 of attachment)

Error	Possible cause	Action
Milk does not drain off from PSM	- Lower valve on PSM is closed	Open valve, check for contamination, condensed water, check membrane for damage/wear possibly replace it see figure 8 of attachment)
PSM is not flooded during purging	- Lower valve on PSM does not switch	Check drive signal (LED on valve Y7) (see figure 7 of the attachment)
Milk flow is not measured	- Failure in sensor or wiring	Check LED on sensor --> Call service
Fizzling at the PSM	- Cover is open	Close cover
Spray nozzles insufficiently spray or not at all	- Nozzles are calcified	Decalcify
There is too less or no water during purging	- Filter in the valve is clocked - Valve is defective	- Clean filter - Service
Water splashes all the time	- Contamination in water valve - Failure in wiring	Call service
Water in the purge unit does not drain off correctly	- Clogging caused by contamination or foreign body	Detach tubes of the purge box, remove foreign body and possibly back-purge with water (see figure 9 of attachment)
Purge unit draws air during purging	- Check-valve at outlet does not close correctly	Check for contamination and possibly clean check valve (see figure 9 of attachment)
Milking cup "jumps" up and down during milking	- Bio-Milker valve is defective	Clean and possibly replace Bio-Milker valve

6. Attachment

6.1. Overview of Icons

Icon	Description	Icon	Description
	Settings Service-Menu		**Forced Vacuum**
	Purge position		**Start milking**
	Basic position		**Amount of milk for this place**
	Hose up **Hose down**		**Stimulation**
	Manual milking (e.g., milking in bucket)		**Back purging**
	Detachment		**Disinfection**
	Stimulation Manual milking		

6.2. Setup Service menu
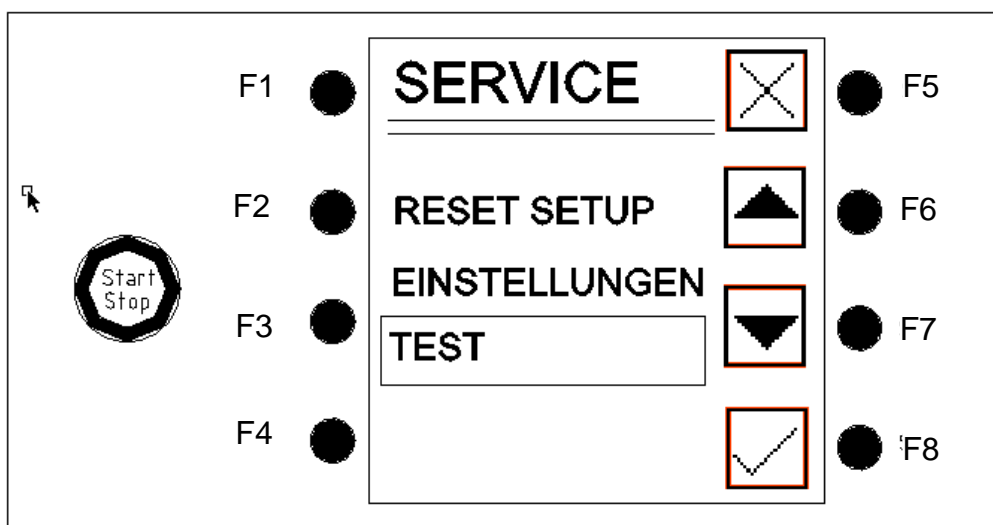Service menu may be entered via button Setup in the menu of the basic position:

Figure 6: Menu Service

RESET SETUP: Resets any parameter to factory setting (only possible via a 4-digit Super-PIN)

EINSTELLUNGEN: Parameters for cycles, switching intervals, pulsation, disinfection, milk amount measurement (PIN: 8245)

TEST: Any movements or functions can be activated manually. All of the inputs/outputs are made visible!

6.3 Adjusting the calibration value of the Pulsameter

1. Press F8 (Setup) to enter Service Menu
2. Enter **Einstellungen** via F7 (▾)
3. Confirm with F8 (✓)
4. Enter PIN 8245
    a. select digits with F2 (+) or F3 (-)
    b. move between the digits via F1 (←) and F4 (→)
5. Confirm with F8 (✓)
6. Select Pulsameter via F7 (▾)
7. Confirm with F8 (✓)

8. Select calibration value (**Eichwert**) via F7 (▾)
9. Confirm with F8 (✓)
10. Enter calibration value
      a. select digits with F2 (+) or F3 (-)
      b. move between the digits via F1 (←) and F4 (→)
11. Confirm with F8 (✓)
12. Confirm F5 3 x in order to return to start screen

* the calibration value is determined by the so-called water test; refer to the adjustment and test regulations for Pulsameter 2 (see attachment)

6.4. Purge apparatus

Milking parlours equipped with Multilactors may use different purge apparatus. The purge apparatus has to provide a floating contact for switching a 24V signal sent by Multilactor® in order to start the valve purging and the main cleaning procedure.

Note: the following purge apparatus in standard configuration supports Multilactor®:
      Flaco cleaning apparatus FRA-2 (including an additional relay)
The connection of Multilactor® to a purge apparatus of a different manufacturer is accomplished by a technician. (See connection plans)

It is thoroughly to be taken care of the fact that the valve purging is to be performed prior to the actual purge process. Therefore, the actual cleaning process has to start with an adjustable delay of time.

After finishing the cleaning process the entire equipment is switched off. The switching off has to be done such that to the Multilactors are disconnected from the grid with a certain delay (2 to 5 minutes). In this time period water purging of the milking cups is performed.

6.5. Shipment

Multilactor® (including purge box)
Milk amount gauge Pulsameter® (The controller has implemented therein the original algorithm for detecting the milk amount
Knee switch
C+D-unit (cleaning and disinfection) -   armature group -   dosing station
Power supply (depending on the number of milking places, see technical data)

Materials for mounting

6.6. Images
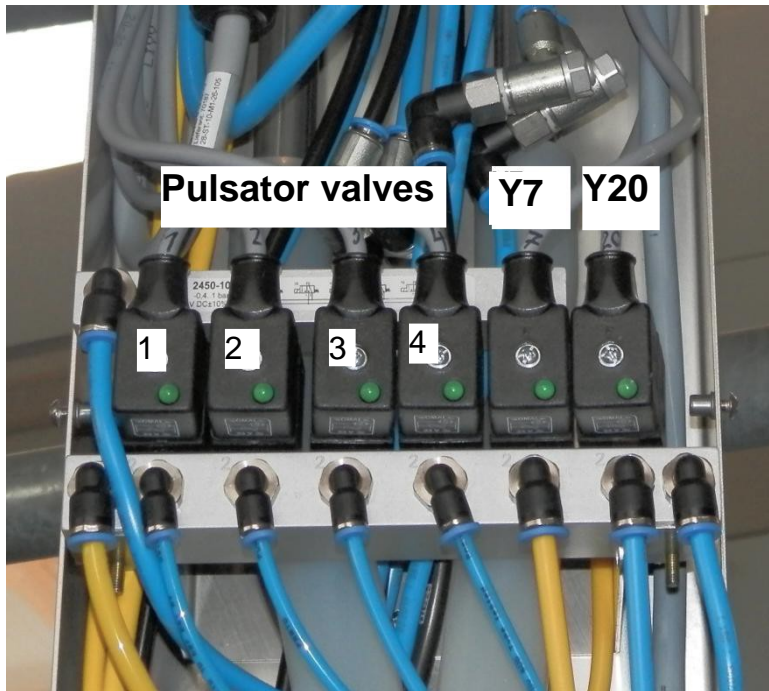
Figure 7: Control block pulsation/Pulsameter

Figure 8: Pulsameter

RV-Spülleitung

RV-Ablauf
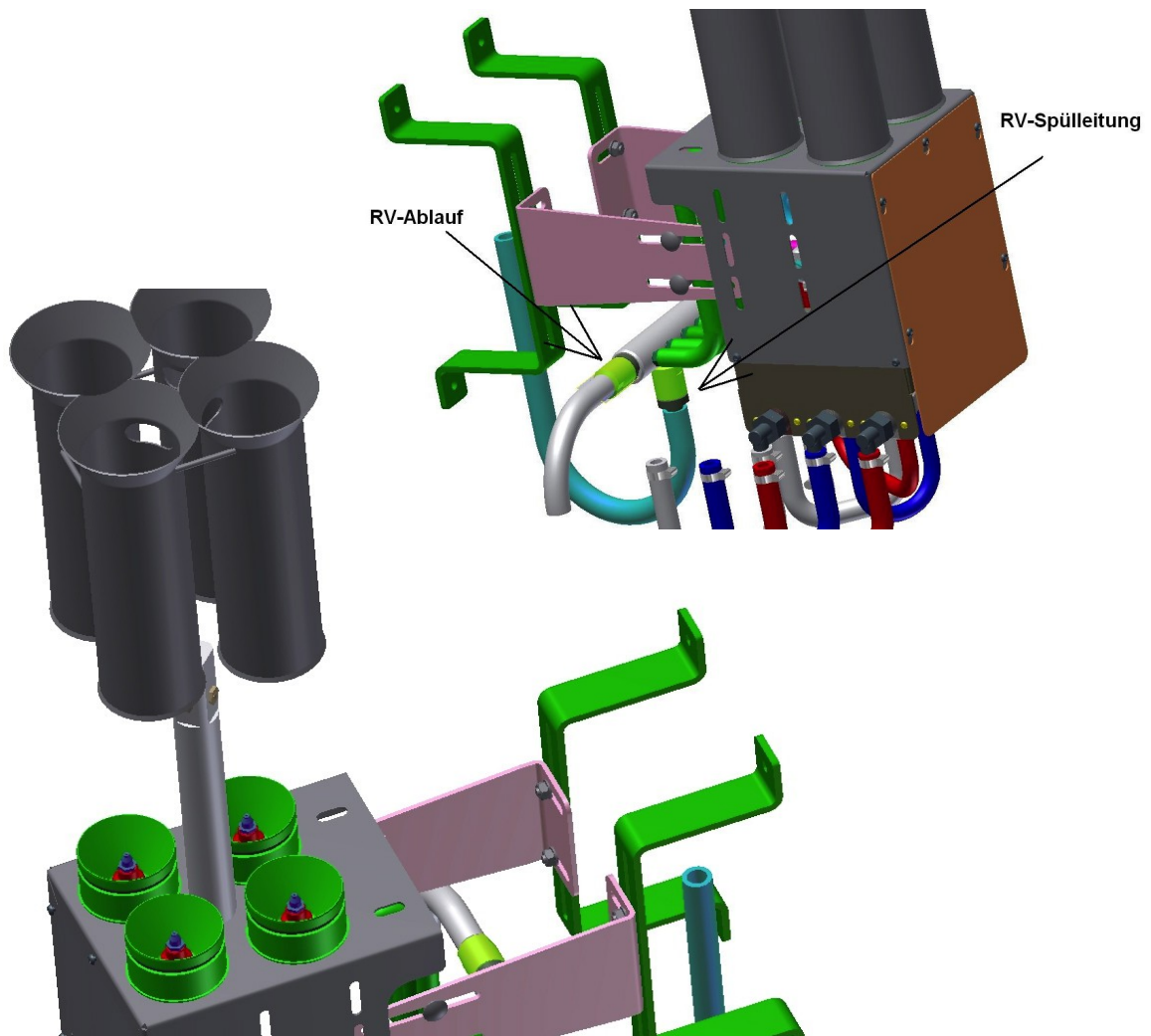
Figure 9: Purge unit / Sani-box