milkrite | InterPuls

Improving every farm we touch

ACRsmart MMV

Control

Technician and User Instruction Manual

Summary

1 GENERAL INFORMATION

1.1 Manufacturer

InterPuls S.p.A.
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Fax. +39 0522 348516
E-mail Sales.Albinea@milkrite-interpuls.com
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1.2 Copyright

2 GENERAL WARNINGS

2.1 General information and safety warnings

2.1.1 Important warnings

To safeguard the operator and prevent any damage to the equipment, before carrying out any kind of operation it is important to have read and fully understood the instruction manual.

2.1.2 Symbol used in this manual

The following symbols are used in this manual to highlight indications and warnings which are of particular importance:

WARNING
This symbol indicates health and safety regulations designed to protect operators and/or any exposed persons.

CAUTION
This symbol indicates that there is a risk of causing damage to the equipment and/or its components.

NOTE
This symbol is used to highlight useful information.

2.1.3 Rules and regulations for the user

WARNING
Any failure to observe the warnings provided in this manual may lead to equipment malfunctions or damage to the system.

2.1.4 Limitation of liability

InterPuls S.p.A. declines all liability for damage to persons, animals and/or things caused by incorrect use of the equipment.

2.2 Prior using the product

2.2.1 Requirements and rules for personnel and Safety Rules

WARNING
This appliance can be used by person aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved

WARNING
Before using the device, the operator must carefully read the manual.

During the assembly and activation of the device, follow the instructions in the manual and rules and regulations applying to health and safety at the workplace.

WARNING
Children shall not play with the appliance.
Cleaning and user maintenance shall not be made by children without supervision.

2.2.2 Connection

WARNING
Stationary appliances not fitted with means for disconnection from the supply mains having a contact separation in all poles that provide full disconnection under overvoltage category III, the instructions state that means for disconnection must be incorporated in the fixed wiring in accordance with the wiring rules

2.3 Disposal

2.3.1 General regulation

The appliances must be disposed of only and exclusively by specially authorized waste disposal companies in accordance with all relative legislation and prescriptions.
The packaging must be consigned to the relative authorized companies to be recycled.

2.4 Fire prevention

2.4.1 Fire prevention

NOTE
The machine is not equipped with fire extinguishers.
The operator must make sure that the place in which the appliance is installed is equipped with an adequate number of suitable fire extinguishers. The extinguishers must be positioned where they are clearly visible and protected from damage and improper use.

2.4.2 Safety regulations

WARNING
It is strictly prohibited to extinguish fires involving electrical equipment with water!

2.4.3 Characteristic of extinguishers

Use powder, foam or halogen extinguishers which must be positioned next to the device.
Operating personnel must receive adequate instruction on how to use the extinguishers.

2.5 Normative references applied

Europe:

- Directive no. 2014/30/EU Electromagnetic Compatibility (EMC)

USA:

- FCC Federal Communications Commission

Canada:

- IC Industry Canada

2.6 Marking

2.6.1 Dataplates affixed to the device

3 DESCRIPTION OF THE DEVICE

3.1 General features

The ACRSmart MMV is a panel designed to control all the functions of milking, washing and detachment of the unit.

Furthermore, with InterPuls Milk Meter, ACRSmart MMV is able to measure the milk production with errors below 2%.

The panel can work with Milk Meter InterPuls and also with flow sensor HFS InterPuls.

The ACRSmart MMV is able to control the milking frequency and the pulsation ratio in a wide range of values in order to meet the needs of all system (both in high line and low line) and of all type of animals (cattle – sheep – goat).

The ACRSmart MMV is able to perform a stimulation that can be forced, automatic (dependent on the flow of milk) or manual (activated directly by the milker at any time).

The panel is compatible with swing-over systems in which the unit is detached by moving the arm. In fact, with the ACRSmart MMV you can control the pneumatic cylinder responsible for moving the unit from the right hand row to the left hand row and vice versa.

It is suitable for milk transport systems thanks to the alarm indicating the end of the milking process and the possibility to restart the panel from the last active stage.

The ACRSmart MMV can be connected to remote start-up devices (AutoStart) and remote stop devices (Quick Lift Line).

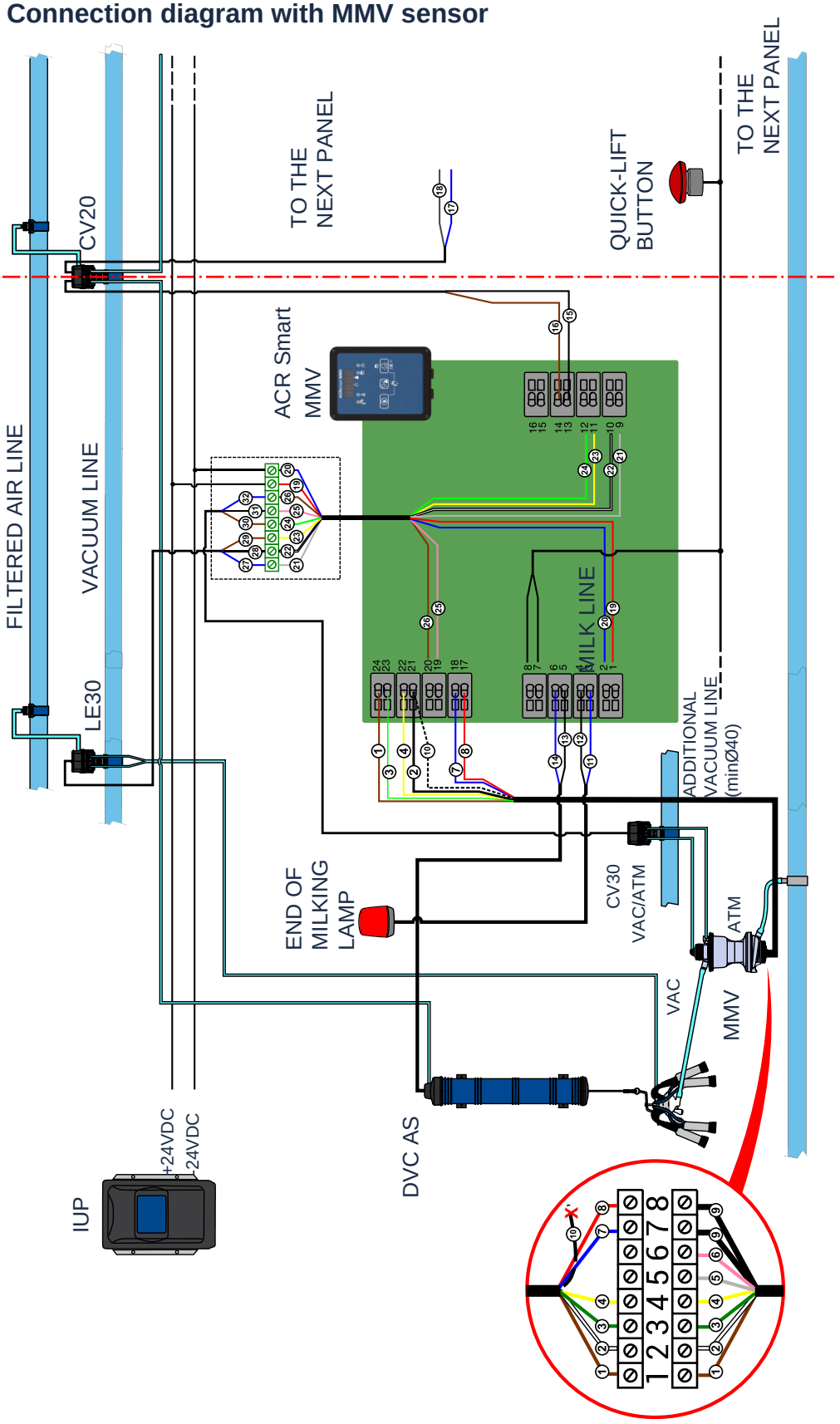
3.2 Technical features

General technical characteristics	
Dimensions	130x180x38 mm (5.12x7.08x1.5 in)
Weight	0.45 kg (0.99 lb)
Power supply	24 VDC
Power consumption (only panel)	max 60 mA
Power consumption (entire system) Panel – Milk Meter – LE30 – CV – ½ LE30 - alarm	max 600mA
Protection rating panel (cables installed properly)	IP67
Protection rating MMV sensor (cables installed properly)	IP69K
Operating vacuum	between 20 and 60kPa (between 5.9 and 17.71 “Hg)
Operating temperature (environment)	+3ºC ÷ +40ºC (+37.4°F ÷ +104°F)
Transport/storage temperature	-20ºC ÷ +50ºC (-4°F ÷ +122°F)

3.3 Wiring diagrams

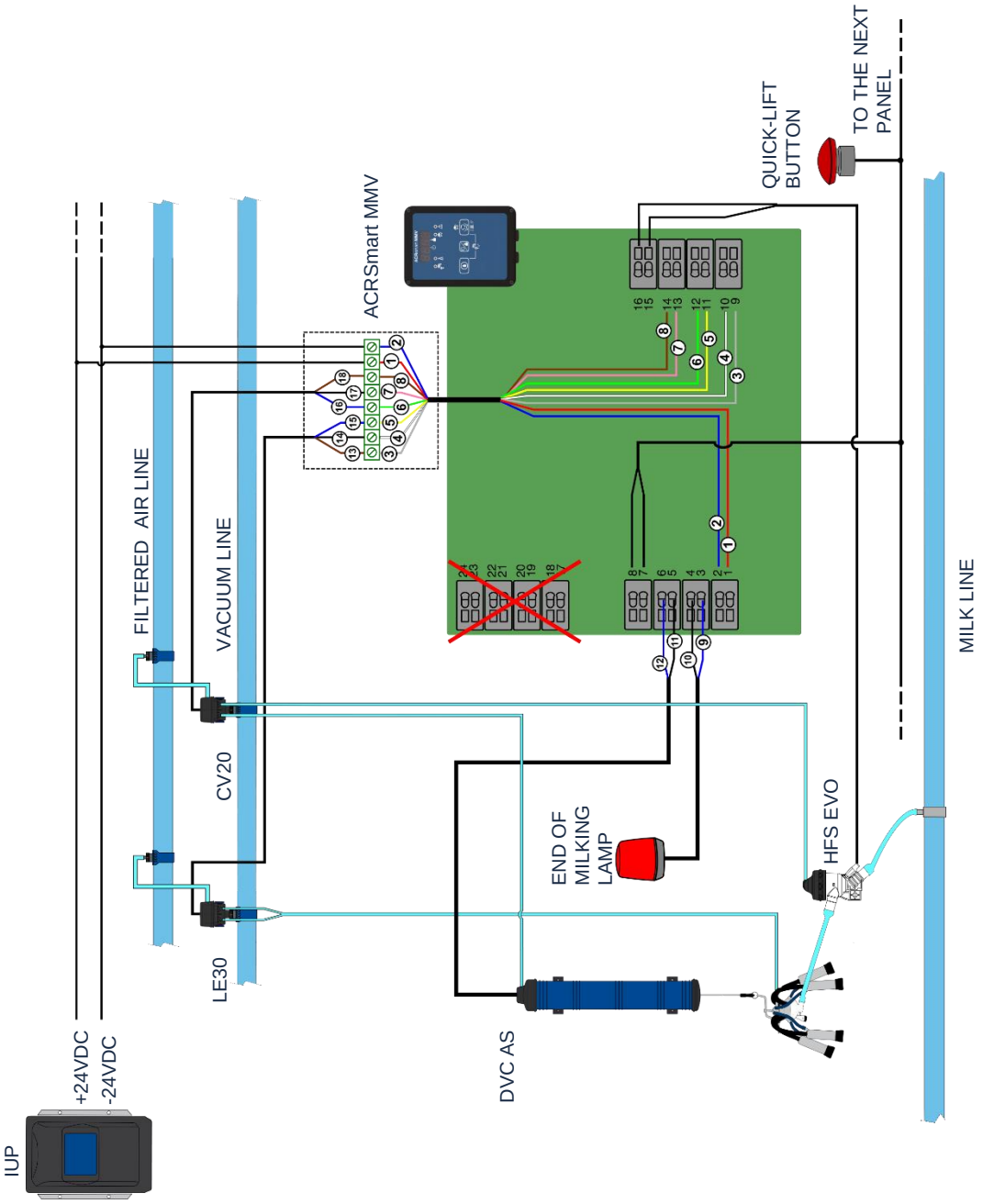
3.3.1 Connection diagram with MMV sensor

1	Brown	5	Grey	9	Black	13	Black	17	Blue	21	Grey	25	Pink	29	Brown								
2	White	6	Pink	10	Shield	14	Blue	18	Black	22	White	26	Brown	30	Brown								
3	Green	7	Blue	11	Blue	15	Black	19	Red	23	Yellow	27	Blue	31	Black								
4	Yellow	8	Red	12	Black	16	Brown	20	Blue	24	Green	28	Black	32	Blue								



N° terminal PCB	Wiring	N° wire	Color	Description	Type of wiring	Wire color (device side)	N° wire (device side)
1	8 poles cable	19	Red	PCB power supply	24 VDC (+)	-	-
2	8 poles cable	20	Blue		24 VDC (-)	-	-
3	End of milking lamp	11	Blue	Lamp power supply	24 VDC (+)	-	-
4		12	Black		24 VDC (-)	-	-
5	DVC AS	13	Black	Autostart	-	-	-
6		14	Blue		-	-	-
7	Quick lift line	-	Clean contact	-	-	-	-
8		-					
9	8 poles cable	21	Grey	LE30	Rear	Blue	27
10	8 poles cable	22	White		Common	Black	28
11	8 poles cable	23	Yellow		Front	Brown	29
12	8 poles cable	24	Green	CV	Left channel (S/O)	Brown	30
13	CV (2x2)	15	Black (blue for the second milking point)	Detachment (DVC)	Common	-	-
14		16	Brown (grey for the second milking point)		to the DVC	-	-
15							
16							
17	MMV cable	8	Red	Temperature probe	Ground	Black	9
18	MMV cable	7	Blue		IN	Black	9
19	8 poles cable	25	Pink	CV	Common	Black	31
20	8 poles cable	26	Brown		Right channel (dump valve)	Blue	32
21	MMV cable	4 e 10	White + shield	MMV power supply	5 VDC (-)	White	4
22	MMV cable	22	Yellow	Level	LIV 2	Yellow	3
23	MMV cable	23	Green		LIV 1	Green	2
24	MMV cable	24	Brown	MMV power supply	5 VDC (+)	Brown	1

3.3.2 Connection diagram with HFS Flow sensor



1	Red
2	Blue
3	Grey

4	White
5	Yellow
6	Green

7	Pink
8	Brown
9	Blue

10	Black
11	Black
12	Blue

13	Brown
14	Black
15	Blue

16	Blue
17	Black
18	Brown

N° terminal PCB	Wiring	N° wire	Color	Description	Type of wiring	Wire color (device side)	N° wire (device side)
1	8 poles cable	1	Red	PCB power supply	24 VDC (+)	-	-
2	8 poles cable	2	Blue		24 VDC (-)	-	-
3	end of milking lamp	9	Blue	Lamp power supply	24 VDC (+)	-	-
4		10	Black		24 VDC (-)	-	-
5	DVC AS	11	Black	Autostart	-	-	-
6		12	Blue		-	-	-
7	Quick lift line		Clean contact	-	-	-	-
8							
9	8 poles cable	3	Grey	LE30	Rear	Blue	15
10	8 poles cable	4	White		Common	Black	14
11	8 poles cable	5	Yellow		Front	Brown	13
12	8 poles cable	6	Green	CV30	to S/O	Blue	16
13	8 poles cable	7	Pink		Common	Black	17
14	8 poles cable	8	Brown		to the DVC	Brown	18
15	HFS		Clean contact	Milk flow	-	-	-
16							
17							
18							
19							
20							
21							
22							
23							
24							

3.3.3 Choice of CV

It's possible to set the ACRSmart MMV panel in order to use solenoid valves normally open or normally closed by setting the following parameters:

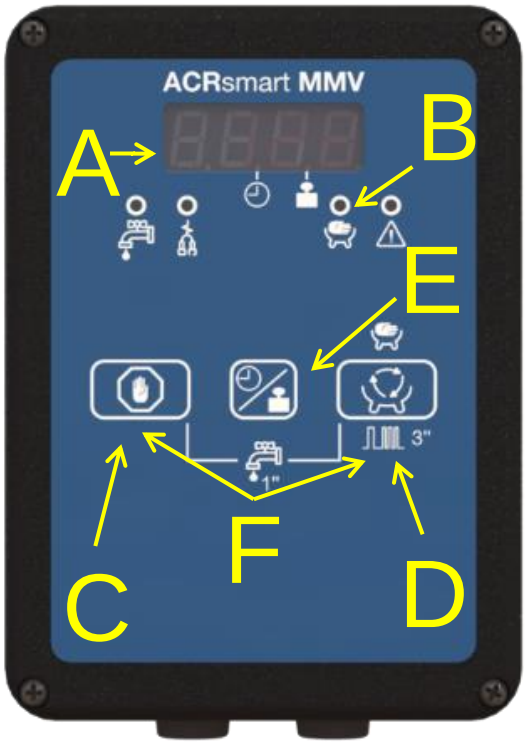
- **E.S-O** : shut-off solenoid valve
- **E.DVC** : cylinder solenoid valve
- **E.dMP**. : dump valve solenoid valve

Set these parameters on:

- **N.OP.** (normally open) → if the utility is connected to a VAC channel of the CV (eg. for CV20 or left channel of CV30 inv)
- **N.CL.** (normally closed) → if the utility is connected to a ATM channel of the CV (eg. for CV30 or right channel of CV30 inv)

The default settings require the utilization of a CV20 for cylinder (**E.DVC** = **N.OP.**) and a CV30 inv for shut-off and for dump valve (**E.S-O** = **N.OP.** , **E.dMP.** = **N.CL.**)

4 DESCRIPTION OF THE DEVICE



A) Display

B) LEDs (green and red)

C) STOP key

D) Milking process START button with automatic detachment, continuous pressure for 3'' stimulation start

E) Key to show milk production or milking time

F) Combination of key for accessing the washing or programming mode

4.1 Display during operation

Display	Indication	Meaning
	Code **St.on.**	Start of stimulation
	Code **St.oF.**	End of stimulation
	Code **diS**	Washing (only with HFS sensor)
	Code **E + temperature**	EMPTY phase during washing and temperature indication (only with MMV sensor)
	Code **F + temperature**	FILL phase during washing and temperature indication (only with MMV sensor)
	**xx.xx** with point on time symbol	Milking time
	**xx.x** with point on quantity symbol	Milk production (only with MMV sensor)
	Right point blinking	Continuous milk flow

5 DESCRIPTION OF THE FUNCTIONS

Upon start-up the panel display indicates the software version installed. Depending on the configured settings (parameter **In.P.**), then the panel starts during:

- washing
- detachment (default)
- last active phase

5.1 Detachment phase (stand-by)

Depending on the settings (parameter **dEF.P.**), the panel shows the milking production (point on  symbol) or the milking time (point on  symbol) of last animal; at the start, the display shows time and production equal to zero.

Green led of detachment  is on to signal that the cluster is in removal position. The S/O valve stays closed, while the unit position may switch from release to removal or vice versa by pressing STOP button  or via **cluster up/down** line; when the unit is released, the green led turns off.

Key	Function
 briefly	Start automatic milking (reset of milking time and milk measurement)
 briefly	Removal or release of the milking unit
 +  briefly	Start washing
 +  x 10”	Access programming mode
 briefly	Change display visualization from milking time to milk quantity and vice versa
 hold	Show the whole milking production (from last reset)
 hold + 	Reset the whole milking production
 hold + 	Reattached the same animal (keep the last milking time and the last milk production)
QUICK-LIFT operation	Removal or release of the milking unit
AUTO-START operation	Start automatic milking via remote control (cylinder with auto-start or remote button)

5.2 Washing

The wash phase can be operated:

- Manually when the system is in detachment position by pressing together + briefly
- Automatically if pre-set as the start-up phase on the programming menu (parameters **In.P.** set on **diS.**)

By pressing STOP button during washing, the phase stops and the panel returns to stand-by mode, the unit is not removed from washing plate.

By pressing again the STOP button the cluster is removed.

CAUTION
At the end of washing phase it's recommended to power off the ACRSmart MMV panels to avoid that the coils of control valves stay powered for long time and being damaged. Upon start-up, the panel may restart in washing phase or detachment phase according to the parameter In.PH.

5.2.1 Washing with HFS

Washing visualization with HFS

The display features the code **diS.** And the green washing led starts blinking. The unit is released and the count relating to the shut-off closure delay starts (parameter **c.S.d.**). When it is elapsed, the shut-off valve is opened and the washing stage starts.
It's possible to change the frequency during washing (parameter **diS.F.**).

Press the STOP button or the cluster up/down command to stop washing cycle and retract the unit.

5.2.2 Washing with Milk Meter

The panel alternates FILL phase and EMPTY phase; between the two phases, the dump-valve is activated to allow the emptying of the sensor.

During the FILL phase, the dump-valve stays closed to permit the complete filling of the milk meter to wash it in each of his part. The FILL phase lasts for the Fill time (parameter **FILL**).

The display features code "**F**" and the temperature of the water.

FILL phase with water at 63°C (145.4°F)

During the EMPTY phase, the dump-valve is closed until the floater reaches the second level. Then the shut-off stays open as setting in the parameter Dump time (parameter **dMP.t.**) to discharge the water. After that the milk meter starts again to fill and to discharge until the Empty time elapsed (parameter **EMPt**).

The display features code "**E**" and the temperature of the water.

EMPTY phase with water at 51°C (123.8°F)

The washing parameters have to be modified to allow the complete filling and emptying of the sensors.

Depending from the parlour configuration, you may need to set different values of **FILL** and **EMPt** parameters to allow the correct washing of each sensor.

In the milking points far from the water entrance, if there isn't enough water to completely filling of the sensor (FILL PHASE), it's necessary to increase fill time (parameter **FILL**); equally, to make available more water, it's also possible to increase empty time (parameter **EMPt**).

5.3 Milking

5.3.1 Milking with automatic cluster removal

To start the milking process with automatic detachment press the START button  during detachment phase or operate the Auto-start contact.

NOTE
The connectors 5-6 (clean contact) can be connected to a REMOTE BUTTON or an AUTO-START cylinder to start a milking without using  **button.**

When the milking with automatic detachment starts:

- Cylinder releases the unit
- After the Vacuum/pulsation delay (parameter **PuL.d.**), the pulsator is activates and the shut-off valve is opened.

5.3.2 Milking with HFS

At the beginning of the milking, the display shows the milking time and the panel counts of Initial delay (parameter **In.d.**).
When the milking presence signal constantly exceeds the value defined by the position of the jumpers, the panel detects a presence of milk and the first dot on the right starts blinking.
If the presence of milk lasts more than Continuous flux time (parameter **M.d.F.**), the panel detects a real milk flux.

The panel shows the milking time in MM.SS size; the central dot is on clock symbol  .
At the end of Initial delay (parameter **In.d.**) when there's no longer milk flux, the count of Final delay (parameter **Fin.d.**) starts; the detachment operations start when this delay has elapsed.

Milking time (4minutes and 58 seconds) with milk flow

During all milking stages, press the START button  to switch from automatic to manual milking and vice versa.

Press STOP button  (or activate the **Cluster up/down button**) to immediately stop the milking and start the detachment operations.

5.3.3 Milking with MMV

At the beginning of the milking, the panel starts counting of Initial delay (parameter **In.d.**).
The display can show:

- Milk yield (if parameter **dEF.P** = **MiLK**) – point on symbol 

Milk yield (14.8 Kg)

- Milking time (if parameter **dEF.P** = **tiME**) – point on symbol 

Milking time (2 minutes and 17 seconds) with milk flow

It's always possible to pass from milk yield to milking time visualization and vice versa by pressing  button.
During milking, the point in the right corner of the display shows if in that moment there's milk in the sensor. If the milk flow is higher than the parameter Detachment flow (parameter **dEt.F.**), the panel detects a continuous flow.
At the end of Initial delay (parameter **In.d.**), when there is no longer any milk flow, the panel start counting final delay (parameter **Fin.d.**). The detachment operations start when this delay has elapsed.

During all milking stages, press the key  to switch from automatic milking to manual milking and vice versa.

Press the key  (or activate the quick-lift button) to immediately stop the milking operations and start the detachment operations.

5.3.4 Manual milking

To start milking with manual unit removal, press the key  after the system has been started in automatic milking mode:

- The red led of manual milking  stays on

The panel stays in the manual milking mode as long as:

- the button  is pressed to switch to the automatic milking mode

or

- the button  is pressed to start the detachment operations

Press the key  to switch from the manual milking mode to the automatic milking mode and vice versa, at any time.

5.3.5 Maximum milking time

WARNING
You can envisage a maximum milking time, which can be set or disabled in the programming menu (parameter M.M.t.)
If this limit is reached, the unit detachment operations start automatically and, in the event of no flow during the milking process, the anomaly is signaled via an alarm (see chapter *5.7 Alarm*)

WARNING
If parameter Alarm AlrM = oFF, milking will only stop when the maximum milking time elapses (M.M.t.), regardless of the flow. Use this setting for timed milking without sensor

5.4 Detachment operation

When the Initial delay (parameter **In.d.**) has elapsed, if the panel does not detect a continuous flow (HFS) or a minimum flow (MMV) of milk, the final delay count starts (parameter **Fin.d.**) and the green led of detachment starts flashing  .

If the flow of milk is resumed, the delay is reset. The unit removal operations start when the final delay has elapsed.

The removal procedure can also be started manually by pressing the key  o by activating Quick-Lift button.

When the detachment operation start:

- the pulsator stops
- the S/O Valve closes the vacuum passage
- the detachment delay time count starts (parameter **det.d.**), in order to wait for a certain amount of air to leak through the collection unit hole, lowering the vacuum level under the nipples before removing the unit
- when the delay has elapsed, the cylinder gently removes the unit and the green led  stays fixed on.
- if the suction function has been activated (parameter **SPt.L.**), when the suction delay time has elapsed (parameter **SPt.d.**) the residue milk in the collection unit and in the milk pipe is aspirated through the flow meter.
- With MMV, the dump valve stays open for 60 seconds to permit the complete emptying of the chambers
- if the automatic unit release function has been activated, when the automatic release delay has elapsed (parameter **A.r.d.**) the unit is released automatically to start a new milking session.

At the end of detachment operation the green led of detachment  stays fixed on and the display shows the milking time or the milk yield (only with MMV). The pair of terminals **3-4** is powered at 24VDC; the pair of terminals can be connected to a flashing light for indicating the end of milking.

Press the  key to switch off the flashing light and the cylinder releases the milking unit (you can put it on washing plates).

Press  key to start a new milking session.

Press  key to switch the display visualization from milking time to milk yield and vice versa (only with MMV).

If you press and hold  key, the display shows the total milk yield from the last reset (only with MMV).

If you press and hold  key and then press also  key, the total milk yield is reset.

5.5 Reattachment

At the end of detachment operation, if the farmer believes that the animal still has milk, it's possible to make a reattachment, that is a new milking but without milking time and milk yield reset (these data restart from the values of the last detachment).

To make a reattachment, press and hold  key and then press also  key. The reattachment is like a normal milking and at the end start the detachment operation.

5.6 Stimulation

At the beginning of stimulation, the display features the code **St.on.** for 3 seconds.

On the programming menu you can define the type of stimulation (parameter **St.tY.**) which may be:

- Forced (**Forc**)
- Automatic (**Auto**)
- OFF (**oFF**) – can only be activated manually

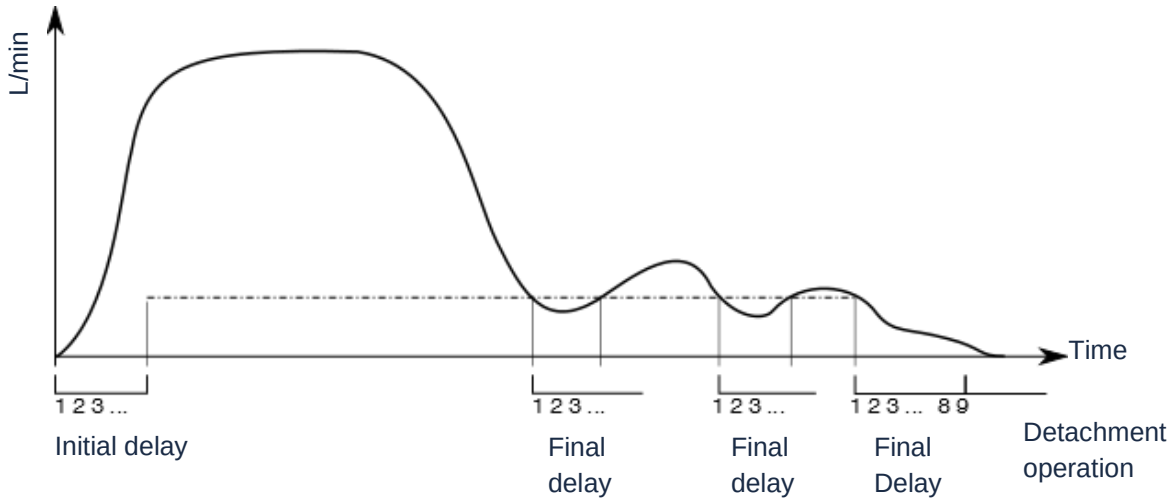
- **FORCED STIMULATION**
  During programming you can set a forced stimulation cycle at the beginning of each milking process. For a certain period of time (stimulation time, which can be set via parameter **St.t.**) the frequency and pulsation ratio are gradually modified in order to reach the set values (stimulation frequency **St.F.**, stimulation ratio **St.r.**)

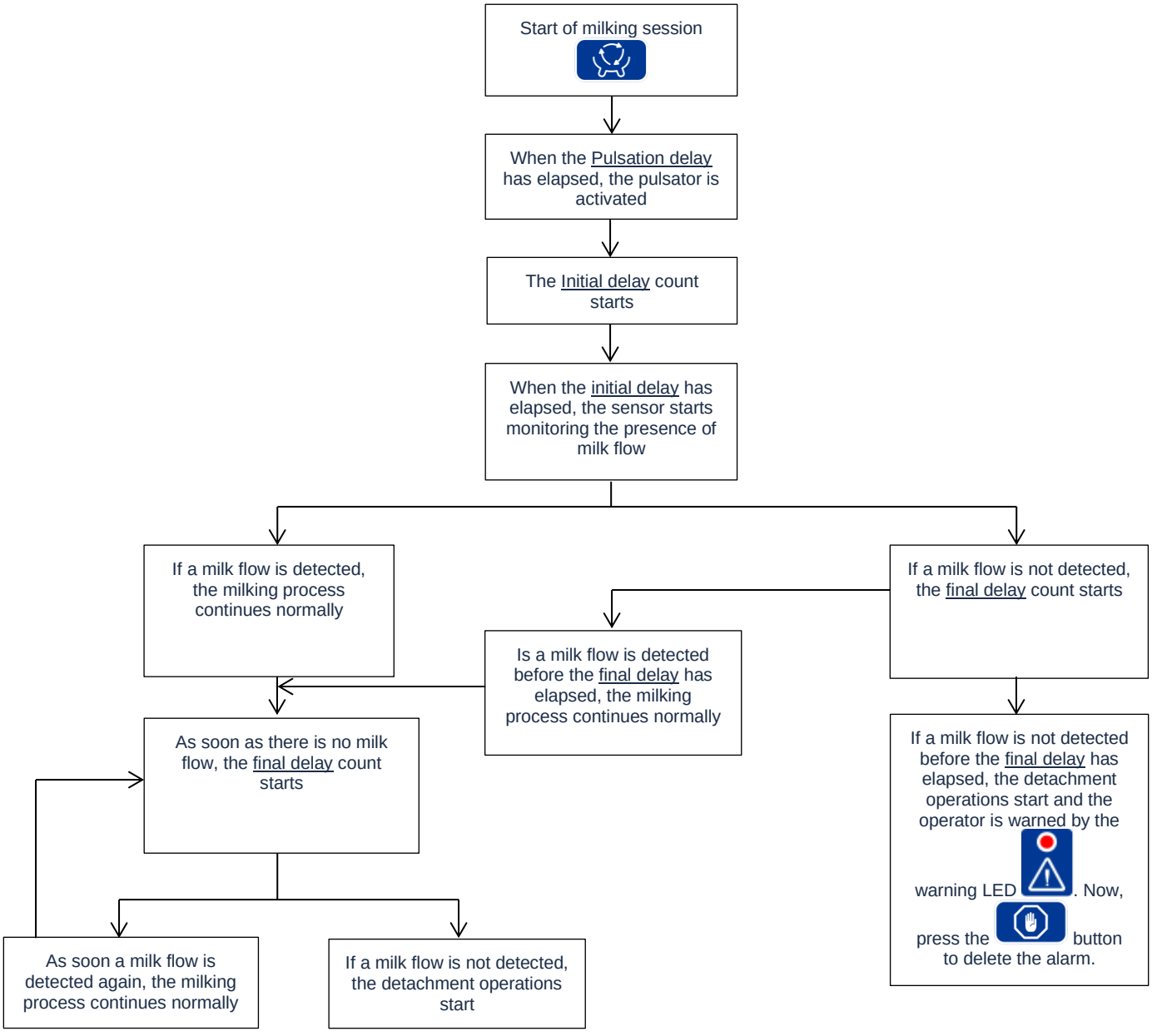
- **AUTOMATIC STIMULATION**
  Stimulation starts if the function is enabled and if during milking the sensor does not detect presence of milk for a certain period of time (called neutral time, which can be set via parameter **nEU.t.** Therefore the frequency and pulsation ratio vary gradually until reaching the values set for stimulation (stimulation frequency **St.F.**, stimulation ratio **St.r.**)
  Stimulation stops when the flow meter starts detecting a presence of milk again or when the stimulation time elapses (parameter **St.t.**)

- **MANUAL STIMULATION**
  Press and hold the key  for 3" during the milking cycle (with any value set for parameter **St.tY.**) to start the manual stimulation process: the frequency and pulsation ratio vary gradually until reaching the values set for stimulation (stimulation frequency **St.F.**, stimulation ratio **St.r.**).
  Stimulation stops when the stimulation time has elapsed (parameter **St.t.**).

A couple of second before the stop of stimulation, the display features the code **St.oF.** for 3 seconds, after that the frequency and pulsation ratio gradually go back to the values set for milking. Then the display features again the milking time or the milk yield

NOTE
By setting stimulation ratio (parameter St.r.) on value 0, upon start of the stimulation, the liners stay completely closed and the pulsation stops until the end of stimulation time (St.t.).





5.7 Alarm

If parameter Alarm AlrM = on, if in the course of a milking process the presence of continuous flow is not detected up to reaching the end of the Final delay time count, the panel will report the anomaly by flashing the red alarm LED  and any flashing warning light, and then starting the detaching operations.
Press the  to reset the alarm and switch to the detachment mode (stand-by), the alarm lamp and the alarm LED  stop flashing and detachment led  stays fixed on.

Press the  to start a new milking session.

5.8 Quick-Lift

The quick-lift button corresponds to pressing the  key on the panel.
If terminals **7-8** on all the panels are connected to an external button, by pressing this key you can lift or release all the units at the same time. This way, at the beginning of the milking process, you can release all the units at the same time.

WARNING
Do not activate the quick-lift button during washing or during milking; milking units would be all removed from animals or from washing dishes.

5.9 Swing-over (only with detachment made by pneumatic cylinder)

By activating the Swing-Over mode (type of detachment **dEt.t = S.OVE.** parameter) the ACRSmart MMV panel can manage systems in which the unit is detached via a pneumatic piston that moves the Swing-Over arm from one side to the other.
By connecting this piston to the CV output, normally dedicated to the DVC, and setting Type of System parameter (**det.t.**) on value **S.OVE.**, at the end of the milking process the panel will automatically move the arm in order to start milking again on the other side.
Therefore, via the  button or via the remote Quick-Lift button, you can move arms from one side of the milking parlour to the other.

6 Calibration (with MMV)

The panels that can be combined with the MMV are factory set with a typical average calibration parameter.

Each parlour may require a different setting due to the different vacuum level, pipe length, type of claw and installation of the MMV (in high or low line).

For an average accuracy calibration, it is sufficient to calibrate 1 or 2 stalls of the milking parlour and extend the calibration parameter to the rest of the parlour.

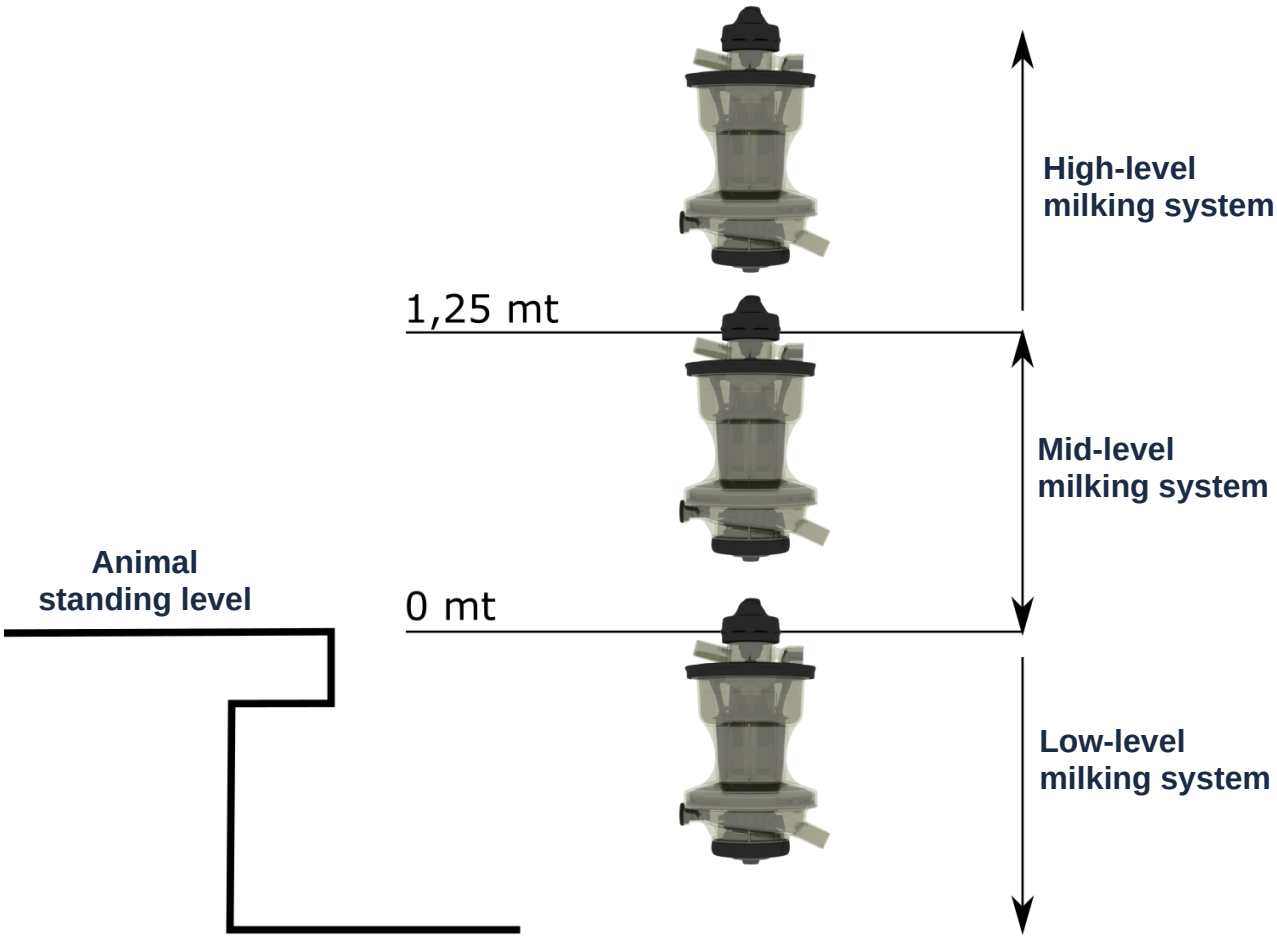
To ensure the maximum measurement accuracy specified in the "Technical features" of the MMV, proceed with calibration of one station at a time as indicated below.

CAUTION
We suggest calibrating the system after one week of system operation because the parts must adapt to function properly. On average, the calibration parameter fluctuates by 2 points after the parts have settled.
We suggest calibrating the system at least once a year for best operation.

6.1 Definition of low-level, mid-level and high-level milking system

A milking plant is considered:

- Low-level milking system if the milkline is situated below the animal standing level;
- Mid-level milking systems if the milkline is situated between 0 and 1,25mt (4,10 ft) above the animal standing level;
- High-level milking systems if the milkline is situated more than 1,25mt (4,10 ft) above the animal standing level.

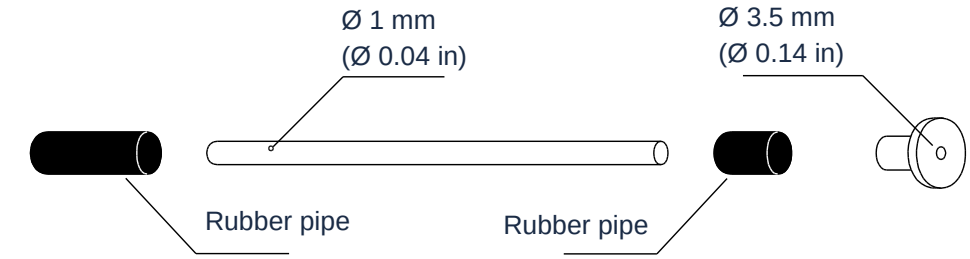


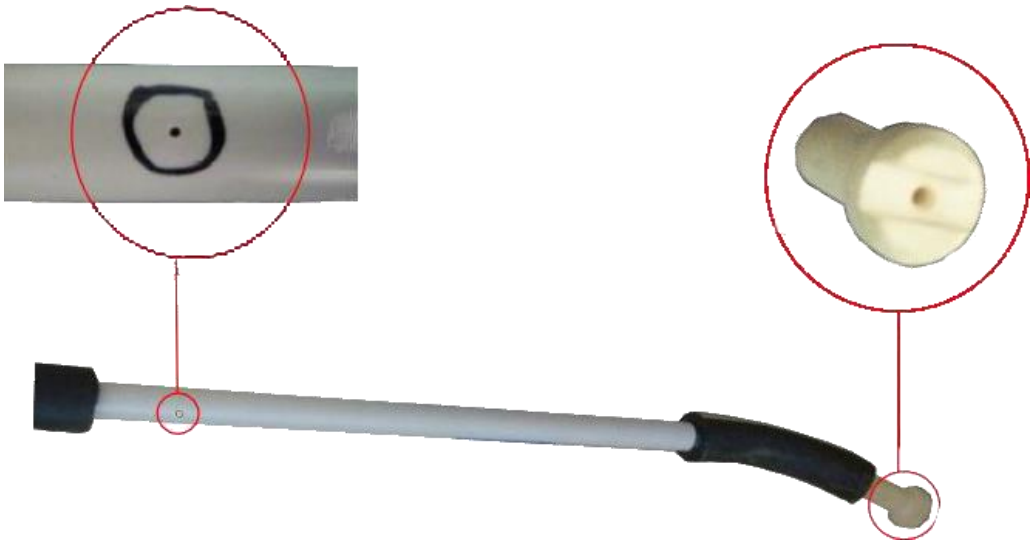
6.2 Procedure for low-level milking system

6.2.1 Equipment required

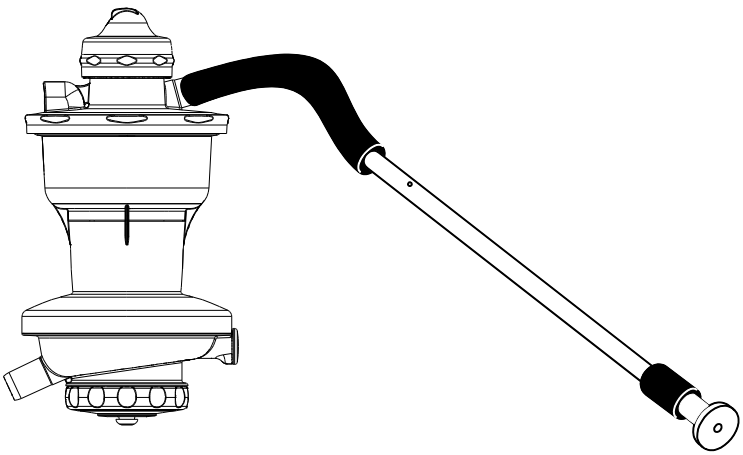
A **SUCTION SET** composed by:
- Plastic pipe with a sucking hole of Ø 3.5mm
- Plastic pipe with an air inlet 1 mm

Connect the two parts with a piece of rubber hose and prepare a second tube to connect the set to the sensor.





A narrow and high **BUCKET** of sufficient capacity (more than 10l – more than 0.35 ft^3)



6.2.2 Testing proceeding

1. Remove the cluster from the milk pipe and connect the suction device with a rubber clamp.
2. Fill the bucket with 10 l (0.35 ft^3) of water (=10Kg - 22.04 lb). The temperature of the water should be approximately 25°C - 77°F (±10°C – ±50°F) without salt or acid.
3. Start a new milking cycle
4. Put the suction device in the bucket until the container has completely emptied; make sure the 3.5 mm (0.13 in) hole always remains below the water level while the air input hole remains above the water level.
5. When detached, take note of the quantity of milk measured on the panel.
   If it has been suitably calibrated, the display will show 9.6±0.1 kg (21.16±0.22 lb).
6. If the measurement deviates from the reference value (9.6 kg – 21.16 lb) by less than ±0.1 kg (±0.22 lb), then calibration is correct and no further assessments are required.
7. If the measurement deviates by more than ±0.1 kg (±0.22 lb), then another two suction cycles must be performed with 10l (0.35 ft^3) of water; take note of the values obtained each time.
8. Calculate the average value of the errors of the 3 measurements by rounding to the 1st decimal.
9. It is therefore necessary to change the calibration parameter until suction of 10l (0.35 ft3) of water leads to kg 9.6±0.1 (21.16±0.22 lb). Each parameter point affects the measurement accuracy by ±100gr (±3.52oz) (1%). In the event the average value read from three milking clusters is higher compared to 9.6 kg (21.16 lb), lower the calibration parameter; on the contrary, if the average value read from three milking clusters is lower compared to 9.6 kg (21.16 lb), raise the calibration parameter.

CAUTION
If calibration is carried out during plant testing (or just after having carried out routine maintenance on the MMV), without waiting for the week suggested to allow the parts to settle, with 10 kg (22.04 lb) of water in the bucket the panel must measure 9.8±0.1 kg (21.6±0.22 lb) and not 9.6 kg (21.16 lb) as specified in the standard procedure.

Below is a table showing some examples of calibration:

Calibration result	Calibration N1 kg (lb)	Calibration N2 kg (lb)	Calibration N3 kg (lb)	Average value kg (lb)	Calibration parameter to be set
OK	9.6 kg (21.16 lb)	---	---	9.6 kg (21.16 lb)	0.0
OK	9.7 kg (21.38 lb)	---	---	9.7 kg (21.38 lb)	0.0
OK	9.5 kg (20.94 lb)	---	---	9.5 kg (20.94 lb)	0.0
OVERESTIMATION	9.9 kg (21.82 lb)	10 kg (22.04 lb)	9.8 kg (21.6 lb)	9.9 kg (21.82 lb)	-0.3
OVERESTIMATION	10 kg (22.04 lb)	10 kg (22.04 lb)	10.1 kg (22.26 lb)	10 kg (22.04 lb)	-0.4
UNDERESTIMATION	9.5 kg (20.94 lb)	9.4 kg (20.72 lb)	9.5 kg (20.94 lb)	9.5 kg (20.94 lb)	0.1
UNDERESTIMATION	9.4 kg (20.72 lb)	9.3 kg (20.5 lb)	9.4 kg (20.72 lb)	9.4 kg (20.72 lb)	0.2

6.2.3 Specific application: set-up of the MMV in application using Impulse Air Liner

In application with m**ilkrite | Interpuls Impulse Air Liner Premium Technology** a particular setting of **parameter “Lin”** must be applied in order to have correct milk yield measurement.

Parameter “Lin”: for Impulse Air Liner application choose **CAL1** in the menu

6.3 Procedure for mid-level milking system

This procedure must be done during milking for each milking point at least 15 days after the installation. In fact, in mid-level milking systems, the variability between milking points does not permit to apply a calibration procedure with water without a reference value taken during milking.

1. Set parameters as follows

Calibration	CAL.M = 0
Liners	Lin = CAL1

2. Remove the outlet tube from the MMV and connect it to a bucket.
3. Connect the bucket to the milk line
4. Start a new milking cycle
5. Wait until the end of milking with automatic detachment
6. When detached, take note of the quantity of milk measured on the panel.
7. Remove the bucket from the milk line and weigh the milk inside it
8. Take note of the weight of the milk
9. Repeat points from 2 to 8 for a total of 3 milking.
10. Calculate the average percentage error
11. For each percentage point modify calibration parameter of 0.1 of the same value

Below is a table showing some examples of calibration:

	Panel (Kg)	Scale(Kg)	Error (%)
Milking 1	9.5	9.9	-4.04 %
Milking 2	21.6	22.5	-4.00 %
Milking 3	15.1	15.7	-3.82 %
		AVERAGE	-3.95 %

Average percentage error -4% ➔ Set calibration parameter at -0.4

6.4 Procedure for high-level milking system

This procedure must be done during milking for each milking point at least 15 days after the installation. In fact, in high-level milking systems, the variability between milking points does not permit to apply a calibration procedure with water without a reference value taken during milking.

1. Set parameters as follows

Calibration	CAL.M = 1.2
Liners	Lin = CAL1

2. Remove the outlet tube from the MMV and connect it to a bucket.
3. Connect the bucket to the milk line
4. Start a new milking cycle
5. Wait until the end of milking with automatic detachment
6. When detached, take note of the quantity of milk measured on the panel.
7. Remove the bucket from the milk line and weigh the milk inside it
8. Take note of the weight of the milk
9. Repeat points from 2 to 8 for a total of 3 milking.
10. Calculate the average percentage error
11. For each percentage point modify calibration parameter of 0.1 of the same value

Below is a table showing some examples of calibration:

	Panel (Kg)	Scale(Kg)	Error (%)
Milking 1	10.7	10.9	-1.83 %
Milking 2	7.8	8.0	-2.50 %
Milking 3	22.2	22.6	- 1.77 %
		AVERAGE	-2.03 %

Average percentage error -2% ➔ Set calibration parameter at -1.4 (-1.2 - 0.2)

7 PROGRAMMING MODE

7.1 Accessing the programming mode

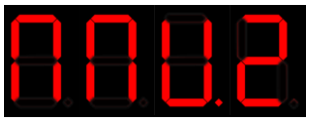
To access the Programming menu, press the  +  keys for 10” while the system is in detachment mode.
The display features the first parameter identified by its code and the LEDs start flashing alternately.

7.2 Modifying parameters

In the programming menu, you can edit the values associated to the parameters in order to optimize the milking, stimulation, detachment and washing operations.
The display features the code of the selected parameter.

Press the  or  keys to scroll the available parameters, each identified by its code.

Press the  key to access the parameter and modify it. The current value of the selected parameter is displayed.



Press the  or  keys to scroll the parameter values.

Press the  key to confirm the value assigned to the parameter and go back to the previous menu. If the parameter has been modified, the display flashes.

To exit the programming mode press and hold the  +  keys for 10”; the panel is then automatically restarted and the version of the software currently installed in displayed.

7.3 Programming parameter table

Parameter name	Code	Description	Range	Unit of measure	Default
TYPE OF SENSOR	SEnS	Definition of the type of sensor is used (volumetric milk meter MMV or flux sensor HFS)	MMV.2 MMV.1 (NOT USED) HFS	//	MMV.2
SHUT OFF SOLENOID VALVE	E.S-O	Select the type of solenoid valve used for shut-off, N.OP. - normally open (vac channel) or N.CL. - normally closed (atm channel)	N.OP – N.CL	//	N.OP.
CYLINDER SOLENOID VALVE	E.DVC	Select the type of solenoid valve used for DVC, N.OP. - normally open (vac channel) or N.CL. - normally closed (atm channel)	N.OP – N.CL	//	N.OP.
DUMP VALVE SOLENOID VALVE	E.dMP	Select the type of solenoid valve used for dump valve, N.Op. - normally open (vac channel) or N.Cl. - normally closed (atm channel)	N.OP – N.CL	//	N.CL.
INITIAL DELAY	In.d	Time at the beginning of the milking process in which milk presence is not checked	0÷190	seconds	80
PULSATION DELAY	PuL.d	Delay between the beginning of the milking process and the pulsation starting	0÷9	seconds	0
FRONT PULSATION RATIO	Mi.r.F.	Pulsation ratio of the hindquarters during the milking process	10:90÷90:10	Pulsation ratio	60:40
REAR PULSATION RATIO	Mi.r.r.	Pulsation ratio of the forequarters during the milking process	10:90÷90:10	Pulsation ratio	60:40
PULSATION FREQUENCY	Mi.Fr.	Pulsation frequency during the milking process	50÷180 LP	Ppm	60
FINAL DELAY	Fin.d	If the panel does not detect a continuous flow of milk throughout the entire delay, it starts the detachment operations	0÷30	seconds	9
CONTINUOS FLOW TIME	M.d.F.	If the sensor detects the presence of milk for a period equal to the continuous flow time, then there is an actual flow of milk	0÷4.0	seconds	1.0
DETACHEMNT FLOW	dEt.F.	If the MMV detects a milk flow lower than the parameters, the final delay count starts	0÷1000	gr/min	250 gr/min
MAX MILKING TIME	M.M.t.	The detachment operations always start when this time has elapsed	1÷1800 – OFF	seconds	1200
DETACHMENT TYPE	dEt.t	Definition of the type of system in which the panel is used: - CYL: Standard system - S.OVE: Swing-Over	CYL – S.OVE	//	CY
DETACHEMENT DELAY	dEt.d	At the end of the milking process, it is the delay between the closure of the s/o valve and the unit removal	0÷9	seconds	3

TYPE OF STIMULATION	St.tY.	Selection of type of stimulation - Forc: forced stimulation - Auto: automatic stimulation - oFF: stimulation that can only be activated manually See chapter *5.6 Stimulation*	Forc - Auto - oFF	//	Auto
STIMULATION RATIO	St.r	Pulsation ratio during stimulation	0:100 ÷ 100:0	Pulsation ratio	30:70
STIMULATION FREQUENCY	St.Fr	Pulsation frequency during the stimulation stage	30 ÷ 240	Ppm	120
STIMULATION TIME	St.t	Duration of stimulation	10÷90	seconds	20
NEUTRAL TIME	nEU.t.	When this time has elapsed, if there has not been a continuous flow of milk, automatic stimulation starts if it has been set	0÷240	seconds	20
FINAL SUCTION DELAY	SPt.d	Delay between the end of the milking session and the opening of the s/o valve for suction	0÷9	seconds	3
FINAL SUCTION LENGHT	SPt.L	During opening of the s/o valve to drain the pipe completely at the end of the milking session	oFF ÷ 9	seconds	oFF
AUTOMATIC RELEASE DELAY	A.r.d.	When the delay has elapsed, after detachment, the unit is released	oFF - 5 - 15 - 30 - 45 - 60	seconds	oFF
SHUT-OFF CLOSURE DELAY	c.S.d.	Before starting the washing cycle, the s/o valve stays closed throughout the delay period, in order for the system to create vacuum	oFF ÷ 90	seconds	oFF
WASHING FREQUENCY	diS.F	Pulsation frequency during the washing cycle	0÷150	ppm	20
WASHING EMPTY TIME	EMPt	Duration of empty phase during washing with MMV	0÷99	seconds	20
WASHING FILL TIME	FILL	Duration of fill phase during washing with MMV	0÷99	seconds	40
DUMP VALVE TIME	dMP.t	The dump-valve of MMV stays open for this time for emptying the sensor	0÷2000	milliseconds	550 mS
CALIBRATION	CAL.M	It enables you to modify calculation of the quantity milked. Each step is 0,1Kg	-15÷15	//	0
INITIAL PHASE	In.p.	Select in which stage the panel must start - dEt: start in detachment mode - diS: start in washing mode - LASt: start from last active stage	dEt – diS - LASt	//	diS
UNIT OF MEAUSEREMENT	Unit	Set to: - Kg.C: kilograms - °Celsius - Lb.F: pounds - ° Fahrenheit	Kg.C – Lb.F	//	Kg.C
DEFAULT VISUALIZATION	dEF.P	Select if the display shows milking time or milk yield	MiLk – tiME	//	MiLk

LINERS	Lin	Used to calibrate milk production at high flow rate (typically over 6 Kg/min or 13 lb/min) with vented liners.	OFF – CAL1 – CAL2 (not used)	//	OFF
ALARM	AlrM	Deactivate this parameter with timed milking for which the panel will not control the milk flow **WARNINGS** **It will only detach when the maximum milking time elapses (M.M.t.)**	oFF - on	//	On

8 GENERAL RECCOMENDATION

CAUTION
It is forbidden to clean the device with a pressure washer.

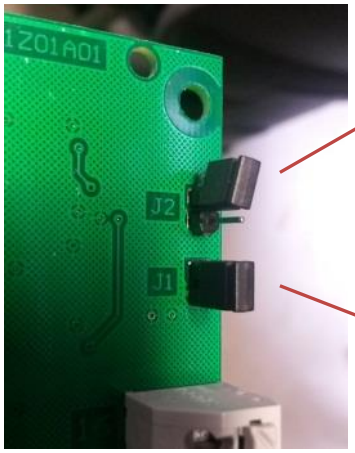
8.1 Positioning

Make sure that the volumetric milk meter MMV or the flow sensor HFS are in vertical position

8.2 Sensitivity (only with HFS)

The ACR panel is designed to detect milk flows below the 100 gr/min limit (preferably with the HFS sensor). It is possible (but NOT recommended) to increase or decrease this threshold via the jumpers on the board.

Milk Flow	OHM	Volt	ACR Jumpers
> 500 gr/min	700	6,10 +/- 0,07	JUMPER 1 CLOSED JUMPER 2 CLOSED
300 gr/min	1270	6,20 +/- 0,07	JUMPER 1 OPEN JUMPER 2 CLOSED
100 gr/min	2000	6,32 +/- 0,07	JUMPER 1 CLOSED JUMPER 2 OPEN
< 100 gr/min	2660	6,42 +/- 0,07	JUMPER 1 OPEN JUMPER 2 OPEN



JUMPER 2 - OPEN

JUMPER 1 - CLOSED

8.3 Power off

CAUTION
At the end of washing phase, it's recommended to power off the ACRSmart MMV panels to avoid that the coils of control valves stay powered for long time and being damaged. Upon start-up, the panel may restart in washing phase or detachment phase according to the parameter In.p.

8.4 Configurations (only with HFS)

Type of system	Recommended settings
High line	Decrease parameter Continuous flow time **M.d.F.** = 0,3 seconds
Low line	Decrease parameter Final delay **Fin.d.** = 8 secondi
Sheep and goats	Decrease parameter Continuous flow time **M.d.F.** = 0,2 seconds
	Decrease parameter Final delay **Fin.d.** = 8 seconds
	If the system continues to detach too soon, open both jumpers

9 TROUBLESHOOTING

Problem	Cause	Solution
The unit is detached too soon	Incorrect setting of Final delay, Detachment flow, Continuous flow time.	Increase parameter **Fin.d.** (Final delay). With MMV, decrease parameter **dEt.F** (Detachment flow) With HFS, decrease parameter **M.d.F.** (Continuous flow time.)
The unit is detached too late	Incorrect setting of Final delay, Detachment flow, Continuous flow time.	Decrease parameter **Fin.d.** (Final delay). With MMV, increase parameter **dEt.F** (Detachment flow) With HFS, increase parameter **M.d.F.** (Continuous flow time.)
The Milk Meter MMV underrates or overrates the milk yield	Foreign bodies inside the MMV	Check that there are no foreign bodies, such as straw, inside the sensor
	Wrong calibration parameter	See chapter ***6 - Calibration (with MMV)***
	The dump-valve time of MMV is not enough for emptying completely the sensor	Increase parameter **dMP.t** (Dump valve time)
During washing FILL phase, some sensors are not completely filled	There's no enough water	increase parameter **FiLL** (Fill Time) on these panels (see chapter ***5.2.2 - Washing with Milk Meter***)

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