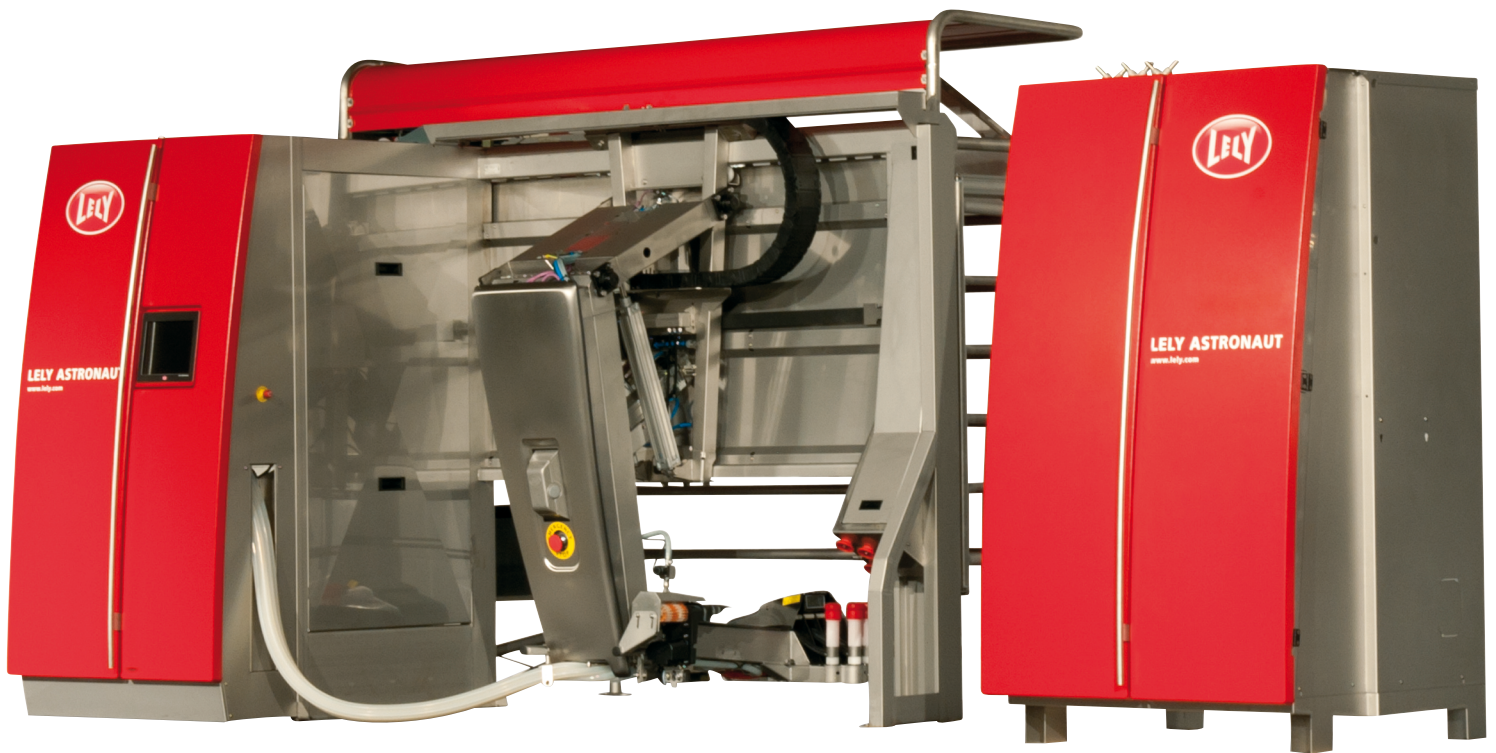


Lely Astronaut A4

Milking Robot



Operator Manual (Addendum)

en-US - English Original

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List of Included Amendments

Issue Date (yy/mm)	Revision	Chapter(s)	Remarks
2018/11	A		<ul style="list-style-type: none"> Initial release.
2019/05	B		<p>Added:</p> <ul style="list-style-type: none"> Operating Instructions/Feed Unit/ Commodity Feed Hopper. Maintenance Procedures/Calibrate the feed Portion. Maintenance Procedures/Calibrate the feed Presence sensor.



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Preface

Manual Contents

This manual contains the information necessary to operate the .

The information in this manual is for operators.



Study and understand this information thoroughly before you operate the machine. Failure to do so could result in damage to equipment or personal injury (see Signal Icons on page 1-4). Please consult your local Lely service provider if you do not understand the information in this manual, or if you need additional information. Store this manual in a safe place for future reference.

All information in this manual has been compiled with care. Lely shall not be liable for errors or faults in this manual. The recommendations are meant to serve as guidelines. All instructions, pictures and specifications in this manual are based on the latest information that was available at the time of publication. Your machine may comprise improvements, features or options that are not covered in this manual.

Applicability

The table below shows the type numbers of the milking robot for which this manual is applicable.

Model designation

Model	Type number	Serial number
Astronaut A4 robot unit left-hand (LH).	5.1104.00X0-XXX	< 0003165447
	5.1104.001X-XXX	> 0003166452
Astronaut A4 robot unit right-hand (RH).	5.1004.00X0-XXX	< 0003165447
	5.1004.001X-XXX	> 0003166452
Astronaut A4 Central Unit.	5.1004.0600-XXX	
	5.1005.2700-XXX	

Standard Torque Loading of Parts

All the nuts, bolts and screws used on the machine are torque tightened to standard torque loadings applicable to the construction materials used.

If a part has a non-standard torque loading, it is specified in the applicable part of the manual.

Registration

The type and serial number plate is attached to:

- In the robot control room above the beam of the milk jar.
- In the central unit on the front side behind the right door under the bottom hinge.

Always include the type and serial numbers of your milking robot when you contact your local Lely service provider or order spare parts.

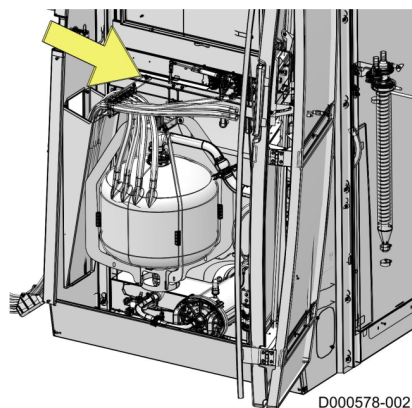


Figure 1. Location CE type plate robot unit

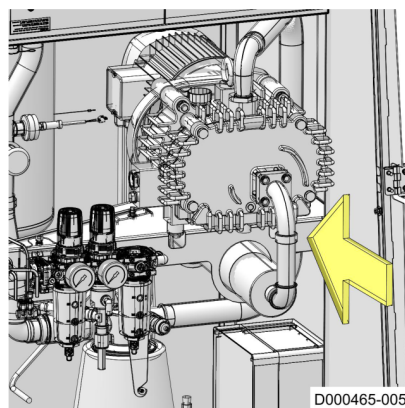


Figure 2. Location CE type plate central unit

Personnel Requirements



***Risk of accident from insufficiently qualified personnel.
Unqualified personnel working on or in the danger zone of the machine
can be the cause of serious injuries and considerable damage to
material.***

- ***All activities must only be carried out by qualified personnel.***
- ***Keep unqualified personnel away from the danger zones.***
- ***Only persons who can be expected to carry out their job reliably are authorized as personnel. Persons whose reactions are impaired, e.g. by drugs, alcohol medications are not authorized to work with the machine.***

Maintenance Authorization



Risk of accident from uncertified technicians.

Uncertified technicians doing maintenance on the machine can be the cause of serious injuries and considerable damage to material.

Only technicians certified by Lely Industries are authorized to do maintenance on the machine, except for the maintenance done by the operator as indicated in the operator manual. If people who are not certified by Lely Industries do maintenance on the machine, the warranty on the machine becomes invalid.

At the end of each visit, all work done on the Astronaut A5 must be written in the logbook and the logbook must be signed by the certified technician. The logbook must always be kept near the Astronaut A5 for the entire life of the product. The information in the logbook must include:

- The maintenance done (includes also the parts exchanged).
- The date of the maintenance.
- The name of the technician.
- The certification level and ID of the technician.

Technician Training

All the technicians certified by Lely International have completed an approved training program, and passed written and practical examinations during and at the end of the training program. The training is given by a product specialist. The examinations are done under supervision of a master product specialist and include troubleshooting and corrective maintenance of the Astronaut A5.

There are four certification levels:

- (IT) Installation Technician (certification valid for two years).
- (SL1) Service Engineer (certification valid for two years).
- (SL2) Senior Service Engineer (certification valid for two years).
- (PS) Product Specialist (certification valid for two years).

All the technicians certified by Lely International for the A4 needs to have completed an additional training to be certified for the A5.

During training, a trainee is permitted to work for up to a maximum of six months under close supervision of a certified technician. A trainee can only do work on the Astronaut A5 in the presence of an A5 certified technician.



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1 Safety

This chapter contains safety instructions you must obey when you install, use, or do maintenance on the machine. It also explains the safety decals on the machine.

1.1 Safety Instructions

YOU are responsible for the SAFE operation and maintenance of your machine. YOU must make sure that you and anyone else who is going to operate, maintain or work in the vicinity of the machine knows all the related SAFETY information in this manual.

YOU are the key to safety. Good safety practices protect you and the people around you. Make these practices a working part of your safety program. Make sure that EVERYONE who operates, maintains or works near the machine obeys the safety precautions. Do not risk injury or death by ignoring good safety practices.

- Owners must train operators before they operate the machine. This training must be repeated at least annually.
- The operator must read, understand and obey all safety and operating instructions in the manual.
- A person who has not read and understood all safety and operating instructions is not permitted to operate the machine.
- Do not modify the equipment in any way. Unauthorized modification may impair the function and/or safety and could affect the life of the equipment and persons.
- Only use approved spare parts and make sure that they are only installed by authorized technicians.



The hazards in the operating zone and working area pose a risk of fatal injury to unauthorized persons.

Unauthorized persons who do not satisfy the requirements described herein are not aware of the hazards in the work area. Unauthorized persons are therefore at risk of serious or fatal injury.

- ***Keep unauthorized persons away from the operating zone and work area.***
- ***If in doubt, approach unauthorized persons and ask them to leave the operating zone and work area.***
- ***Stop work as long as unauthorized persons are within the operating zone and work area.***

1.1.1 General Safety

- Read and understand the manual and all safety signs before you connect power supplies to operate, maintain or adjust the milking robot.
- Only trained persons are permitted to operate the milking robot.

- Only use the robot unit to milk cows. Do not use the robot unit for other purposes, such as medical treatment.
- A first-aid kit must be available near the central unit and the robot unit(s). Store in a highly visible place.
- A carbon dioxide or foam fire extinguisher must be available near the central unit and robot unit(s). Store in a highly visible place. Install all protective covers and guards before you operate the milking robot.
- Wear the correct protective clothing and equipment. SWITCH OFF the milking robot, disconnect and isolate the electrical power supply, release pneumatic pressure and wait for all moving parts to stop before you clean or do maintenance on the milking robot.
- Know the emergency medical center number for your area.
- Contact your nearest Lely service provider if you have any questions.
- Review safety related items with all operators frequently (annually).
- Industrial electronic equipment may cause interference with household electronic equipment. In such an event the affected equipment must be removed.

1.1.2 Electrical Safety

- Only an authorized electrician must install the electrical power supply for the machine.
- Make sure the electrical grounding of the electrical system and all parts of the machine meet the local rules and regulations.
- Make sure all electrical switches are in the OFF position before you switch on the electrical power supply.
- Prevent damage by vermin.
- Replace any damaged electrical lines, conduits, switches and components immediately.
- Isolate the electrical power supply at the master panel before you open the electrical panel to work on the electrical system.

1.1.3 Chemical Safety

- The machine uses chemicals for cleaning and disinfection purposes. There is space in the central unit to store the jerrycans for the chemicals (acid based liquid, alkaline based liquid and brush cleaner liquid). The udder care drum must be stored away from the chemical jerrycans, but within 5 m (16.4 ft) from the central unit.
- The stock of each chemical must be stored outside the robot control/compressor room according to local rules and regulations. Contact your local Lely service provider for more information.
- Store the udder care products outside the robot control/compressor room, but at a different location than the chemicals.
- To prevent exchange of the chemicals, make sure the correct tube is connected to the correct cleaning detergent can. Severe damage to the live stock, humans and parts of the robot can occur when chemical products are exchanged.
- Each chemical has a color code. Each suck tube has a color corresponding with the chemical. Each suck tube has a disk with the name of the chemical.
- Read the safety instructions on the cans.

- Always wear protective gloves and safety goggles when you do work on parts where a chemical product flows through.
- We always recommend to use the Lely Astri products for cleaning and disinfection, as their use in the Lely system is proven and does not harm or damage the Lely equipment.
- Do NOT use chlorine, or other acids than phosphor and citric acid products in the cleaning system.
- Lely Industries N.V. is not liable for, and does not cover under warranty, any damage or harm due to the use of other cleaning products not meeting the Lely specifications.
- Do NOT mix up the chemical products when you replace the jerry cans. Use only the correct chemicals for a hot cleaning.
- The safety data sheets of the Lely products are available at www.lely.com

1.1.4 Operating Safety

- Read and understand the applicable manual and all safety signs before you connect power supplies to operate, maintain or adjust the machine.
- Only trained persons are permitted to operate the machine.
- Do NOT use chlorine products in the cleaning system. Lely Industries N.V. is not liable for, and does not cover under warranty, any damage or harm due to the use of other cleaning products in the cleaning system which do not meet the Chemicals Specifications (see Acid based on page 2-1).
- Do NOT mix up the chemicals when you replace the jerrycans.
- Install all covers and guards before you operate the machine.
- Keep hands, feet, hair and clothing away from all moving parts.
- Keep unauthorized persons, especially small children away from the machine at all times.
- Before the pneumatic pressure is supplied to the machine, make sure all parts are tight and that all hoses and fittings are in good condition.
- Make sure the cow detection camera is free of dirt and debris.
- Do not enter the operating area of the robot arm.
- Do not block the robot arm. It can move with sufficient force to cause injury to you and/or the cow.
- Do not help the machine when it is attaching the teat cups to the cow.
- All cows that can enter the milking robot, must have a tag. The cow data must be entered in T4C with correct reproduction status and up to date health treatment information.
- Always be alert for unexpected movement of the cow. Cows can transmit large forces to parts of the machine.
- Do not look directly into the laser light of the TDS II. Keep the working area as clean and as dry as possible.
- Contact your nearest Lely service provider if you have any questions.
- Review safety related items with all operators frequently (annually).




1.1.5 Maintenance Safety

- Read and understand the applicable manual and all safety signs before you connect power supplies to operate, maintain or adjust the machine.

- Only trained persons are permitted to maintain the machine. Technicians working on the machine must be certified by Lely Industries N.V. The required level is at least Service Level 1.
- SWITCH OFF the machine, disconnect and isolate the electrical power supply, release pneumatic pressure and wait for all moving parts to stop before you do work on the machine.
- Take extreme care when you work near or with high-pressure pneumatic systems. If possible, depressurize the system before you do work on it.
- Wear protective clothing and safety goggles when you do work on the pneumatic system.
- Wear protective gloves and safety goggles when you do work on parts where disinfective and cleaning fluids flow through.
- Make sure all covers and guards are installed when maintenance work is complete.
- Some parts (vacuum pump, pura, parts where cleaning fluid flows through) can have a hot surface. Make sure they are cooled down before you do maintenance.
- Do not climb on the machine.
- Always use a proper scaffold or a double sided ladder when you do maintenance on the machine.
- Block the cow traffic to the robot unit when you do maintenance on the cow side of the robot unit.

1.2 Signal Icons

Note the use of the signal words DANGER, WARNING and CAUTION with the safety messages. The signal word for each message uses the following guidelines:

	<p>Danger Indicates a hazardous situation which, if not avoided, will result in death or serious injury.</p>
	<p>Warning Indicates a hazardous situation which, if not avoided, could result in death or serious injury.</p>
	<p>Caution Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.</p>

NOTICE

Notice
Is used to address practices not related to physical injury e.g. property damage.



Tip
Indicates information that may help the reader, but not hazard related.

1.3 Safety Decals

1.3.1 Location of Safety Decals

1.3.1.1 Central Unit

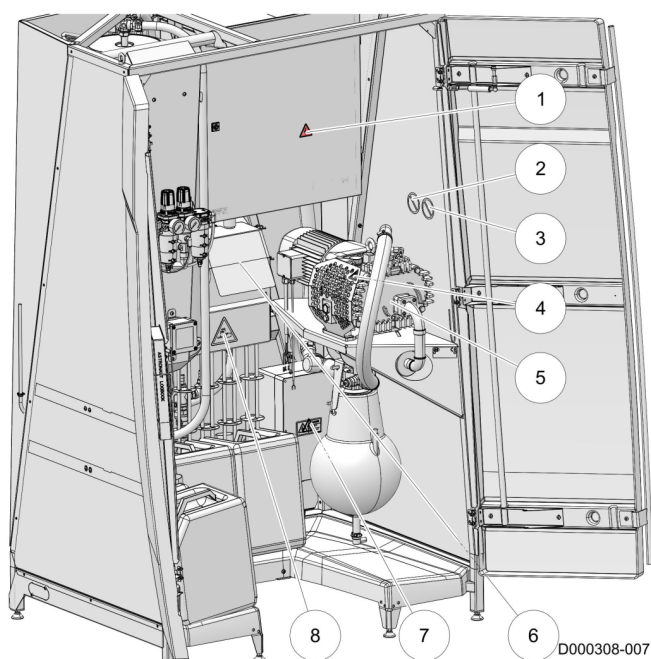
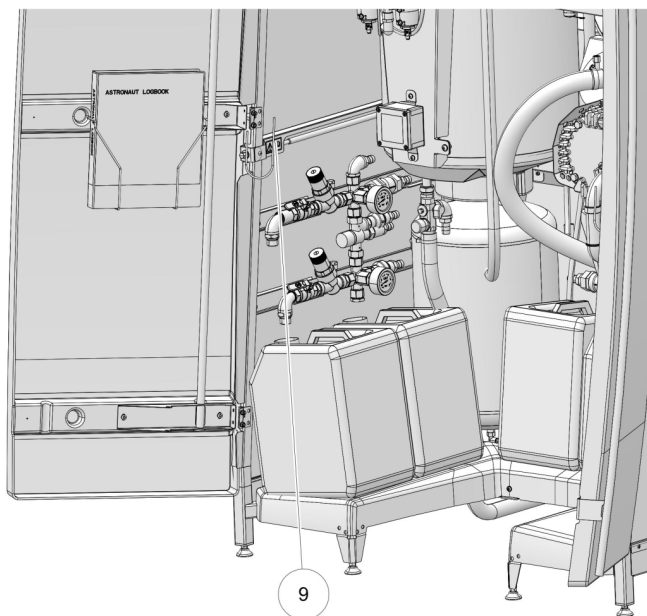


Figure 3. Location of the safety decals central unit

KEY: 1. Electrocution hazard - 2. Do not use hammer - 3. No fluids in vacuum pump - 4. Temperature hazard - 5. Temperature hazard - 6. Chemical replacement instruction - 7. Electrocution hazard - 8. Chemical hazard

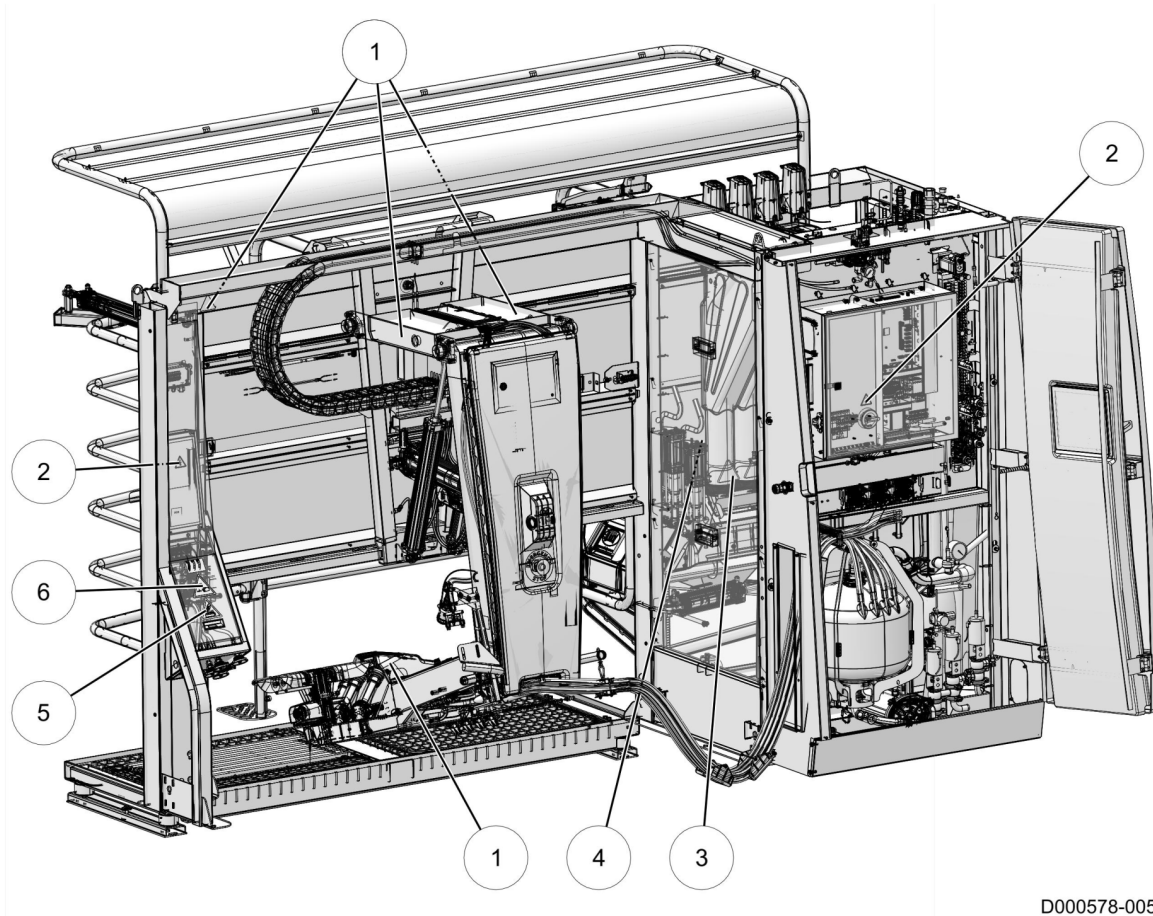


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Figure 4. Location of the safety decals central unit

KEY: 9. Read the manual -

1.3.1.2 Robot Unit



D000578-005

Figure 5. Location of the safety decals robot unit

KEY: 1. Pinching hazard - 2. Electrocutation hazard - 3. Rotating parts, entanglement hazard - 4. Read the manual - 5. Chemical hazard - 6. Temperature hazard

1.3.1.3 M4USE (optional)

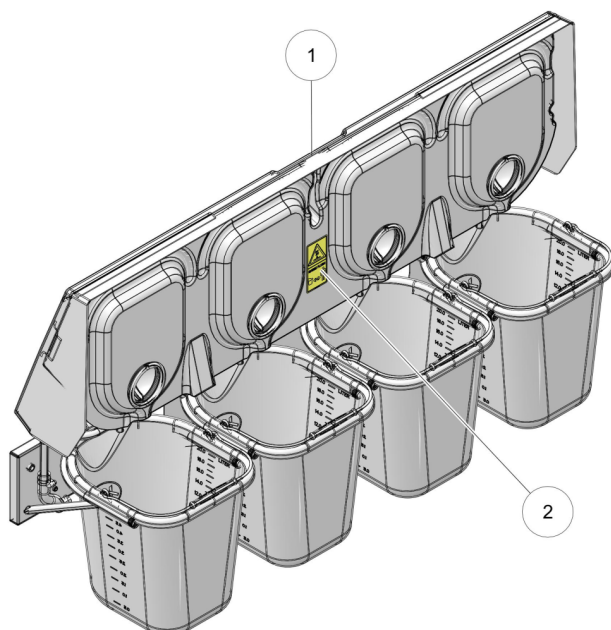

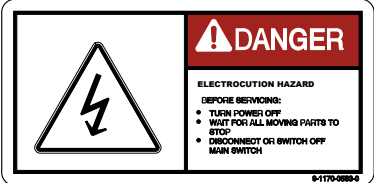

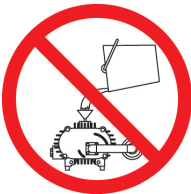

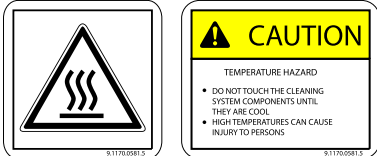


Figure 6. Location of the safety decals M4USE

KEY: 1. Read the manual - 2. Temperature hazard

1.3.2 Explanation of Safety Decals

1.3.2.1 Central Unit


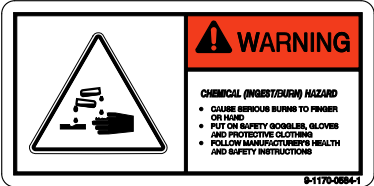

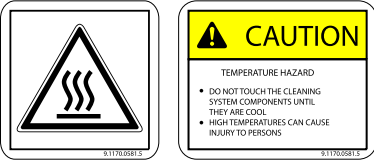

Central Unit (see page 1-5).	
Decal	Explanation
 <p>Hazardous voltage decal (except Canada and USA)</p>  <p>Hazardous voltage decal (Canada and USA)</p>	<p>Danger: Hazardous voltage Contact will cause electric shock or burn. Disconnect power before servicing.</p>
	<p>Notice: Risk for material damage Do not use a hammer on the rotor blades of the vacuum pump.</p>
	<p>Notice: Risk for material damage No additional fluids allowed in the vacuum pump.</p>
 <p>Hot surface (except Canada and USA)</p>  <p>Hot surface (Canada and USA)</p>	<p>Caution: Hot surface Contact with skin may cause burns. Do not touch.</p>

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Central Unit (see page 1-5).	
Decal	Explanation
	Safety Instructions: Chemical replacement Shows how to replace the chemicals.
<p>Corrosive liquid (except Canada and USA)</p> <p>Corrosive liquid (Canada and USA)</p>	Warning: Corrosive liquid Risk for serious injury. Obey all applicable health and safety rules. Avoid contact between the liquid and your skin or eyes. Wear gloves, safety goggles and protective clothing.
<p>Rotating parts decal</p>	Warning: Rotating parts Moving parts can crush or cut. Keep hands, loose clothing and long hair away from moving parts during operation of the machine.
	WARNING Read and understand the operator manual before using this machine. Failure to follow operating instructions could result in death or serious injury.

1.3.2.2 Robot Unit

Robot Unit (see page 1-7).	
Decal	Explanation
<p>Pinch point (except Canada and USA)</p> <p>Pinch point (Canada and USA)</p>	<p>Caution: Pinch point Moving parts can crush or cut. Keep hands clear.</p>
<p>Hazardous voltage decal (except Canada and USA)</p> <p>Hazardous voltage decal (Canada and USA)</p>	<p>Danger: Hazardous voltage Contact will cause electric shock or burn. Disconnect power before servicing.</p>
<p>(except Canada and USA) Rotating parts decal</p> <p>Rotating parts decal (Canada and USA)</p>	<p>Warning: Rotating parts Moving parts can crush or cut. Keep hands, loose clothing and long hair away from moving parts during operation of the machine.</p>


Robot Unit (see page 1-7).	
Decal	Explanation
 <p>Corrosive liquid (except Canada and USA)</p>  <p>Corrosive liquid (Canada and USA)</p>	<p>Warning: Corrosive liquid Risk for serious injury. Obey all applicable health and safety rules. Avoid contact between the liquid and your skin or eyes. Wear gloves, safety goggles and protective clothing.</p>
 <p>Hot surface (except Canada and USA)</p>  <p>Hot surface (Canada and USA)</p>	<p>Caution: Hot surface Contact with skin may cause burns. Do not touch.</p>
	<p>WARNING Read and understand the operator manual before using this machine. Failure to follow operating instructions could result in death or serious injury.</p>

1.3.2.3 M4USE (optional)

M4USE (optional) (see page 1-8).		
Decal		Explanation
 <p>Hot surface (except Canada and USA)</p>	 <p>Hot surface (Canada and USA)</p>	<p>Caution: Hot water and steam Contact with hot water and steam may cause burns. During M4use flush, keep the M4USE cover closed and keep safe distance.</p>
		<p>WARNING Read and understand the operator manual before using this machine. Failure to follow operating instructions could result in death or serious injury.</p>

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1.3.2.4 Other Safety Decals

Other safety decals	
Decal	Explanation
	<p>Warning: Risk for personal injury Authorized persons only. Only persons who have read and understood all applicable safety instructions are allowed to enter the area.</p>

1.3.3 Installation of Safety Decals

1. Make sure that the installation surface is clean and dry.
2. Make sure that the temperature of the mounting surface is not less than 5 °C (41 °F).
3. Find the correct position for the decal before you remove the backing paper.
4. Remove a small part of the cover paper.
5. Put the decal in the correct position on the installation surface and carefully push the small part of exposed adhesive surface of the decal onto the installation surface.

6. Slowly remove the cover paper and attach the rest of the decal to the installation surface.
7. Puncture small air pockets in the decal with a pin and use the cover paper to smoothen the decal.

1.3.4 Safety Decal Maintenance

Safety decals on the machine display important and useful information that will help you safely operate and maintain the machine.

Obey the instructions below to make sure all the decals stay in the correct position and condition.

- Keep the safety decals clean and legible at all times. Clean the safety decals with soap and water. Do not use mineral spirits, abrasive cleaners or other similar agents that may damage the safety decals.
- Replace safety decals that are missing or are illegible.
- Safety decals can be purchased from your local Lely service provider.

1.4 Emergency Stop Buttons

Central unit

In case of an emergency, remove the power supply plug from the wall socket or switch off the main switch.

Robot unit

Two emergency stop buttons are installed on the robot unit (see figure 7 on page 1-15):

- On the rear of the robot arm.
- On the side of the robot control room cover.

When one of these buttons is pressed, the robot unit immediately stops operation and there is no movement of the robot arm. The switched power on the robot unit is switched off.



Risk of personal injury.

When one of the emergency stop buttons is pressed the electrical and pneumatic power supply are still partially supplied to the milking robot.

Make sure you switch off the electrical and pneumatic power supplies on the central unit immediately after an emergency stop button is pressed.

To reset an emergency stop button, turn the button to the direction of the arrow shown on the button and pull it out until it unlocks. The robot unit must be reset and the robot arm must be re-calibrated before it can operate.

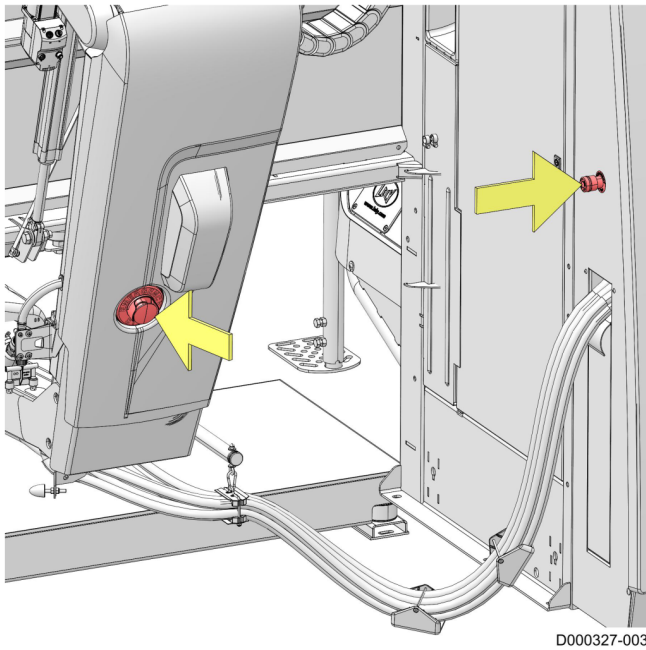


Figure 7. Location of the emergency stop buttons



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2 Specifications

2.1 Chemicals Specifications

The milking robot uses chemicals for cleaning and disinfection purposes. There is space in the central unit to store the jerrycans for the chemicals (acids based liquid, alkaline based liquid and brush cleaner liquid).

2.1.1 Acid based



Corrosive liquid.
Risk for serious burns to fingers or hands.
Obey all applicable health and safety rules. Avoid contact between the liquid and your skin or eyes. Wear gloves, safety goggles and protective clothing. If the liquid comes into contact with your eyes: rinse immediately with water and get medical advice.



Product/ingredient name	Identifiers	%
Phosphoric acid.	REACH #.01–2119485924–24. EC: 231–633–2. CAS: 7664–38–2. Index: 015–011–00–6.	25–35.
Citric acid.	EC: 201–069–1. CAS: 5949–29–1.	5–10.

UN specification

ADR/RID
UN1805.
PHOSPHORIC ACID SOLUTION.

The safety data sheets of the Lely products are available at <https://www.lely.com/techdocs/consumables/>

2.1.2 Alkaline based



Corrosive liquid.
Risk for serious burns to fingers or hands.
Obey all applicable health and safety rules. Avoid contact between the liquid and your skin or eyes. Wear gloves, safety goggles and protective clothing. If the liquid comes into contact with your eyes: rinse immediately with water and get medical advice.



Product/ingredient name	Identifiers	%
Sodium hydroxide.	REACH #: 01-2119457892-27. EC: 215-185-5. CAS: 1310-73-2. Index: 011-002-00-6.	25-35.

UN specification:

ADR/RID
UN1824.
SODIUM HYDROXIDE SOLUTION.

The safety data sheets of the Lely products are available at <https://www.lely.com/techdocs/consumables/>

2.1.3 Brush Disinfectant



Corrosive liquid.
Risk for serious burns to fingers or hands.
Obey all applicable health and safety rules. Avoid contact between the liquid and your skin or eyes. Wear gloves, safety goggles and protective clothing. If the liquid comes into contact with your eyes: rinse immediately with water and get medical advice.



Product/ingredient name	Identifiers	%
Hydrogen peroxide.	RRN: 01-2119485845-22. EC: 231-765-0. CAS: 7722-84-1. Index: 008-003-00-9.	8-35.
Acetic acid.	RRN: 01-2119475328-30. EC: 200-580-7. CAS: 64-19-7. Index: 607-002-00-6.	< 10.
Peroxyacetic acid.	EC: 201-186-8. CAS: 79-21-0. Index: 607-094-00-8.	1-5.

UN specification:

ADR/RID
UN3149.
HYDROGEN PEROXIDE AND PEROXYACETIC ACID MIXTURE STABILIZED.

The safety data sheets of the Lely products are available at <https://www.lely.com/techdocs/consumables/>

2.1.4 Reagent



Corrosive liquid.

Risk for serious burns to fingers or hands.
Obey all applicable health and safety rules. Avoid contact between the liquid and your skin or eyes. Wear gloves, safety goggles and protective clothing. If the liquid comes into contact with your eyes: rinse immediately with water and get medical advice.



Product/ingredient name	Identifiers	%
Alkylethersulphates.	EC: 500-465-4. CAS: 160901-28-0.	25-35.
Fattyalcohol ethoxylates > 5EO.	CAS: 68439-46-3.	1-3.

The safety data sheets of the Lely products are available at <https://www.lely.com/techdocs/consumables/>

2.1.5 TDS lens cleaner



Corrosive liquid.
Risk for serious burns to fingers or hands.
Obey all applicable health and safety rules. Avoid
contact between the liquid and your skin or eyes. Wear
gloves, safety goggles and protective clothing. If the
liquid comes into contact with your eyes: rinse
immediately with water and get medical advice.



Product/ingredient name	Identifiers	%
Sulphamic acid.	EC: 226-218-8. CAS: 5329-14-6. Index: 016-026-00-0.	5-10.
Fattyalcohol. ethoxylates > 5EO.	-	1-3.
Ethanol.	REACH #: 01-2119457610-43. EC: 200-578-6. CAS: 64-17-5. Index: 603-002-00-5.	1-5.

The safety data sheets of the Lely products are available at <https://www.lely.com/techdocs/consumables/>

2.1.6 Udder care



The conductivity of the udder care must be < 13mS/cm.



Foaming of the udder care is not allowed.

NOTICE

Udder care must be colored.

NOTICE

The optical- and conductivity characteristic of the udder care must be stable.

The safety data sheets of the Lely products are available at <https://www.lely.com/techdocs/consumables/>.

2.2 Water Supply

2.2.1 Building Specifications

- Tap connection(s): $\frac{3}{4}$ " outside thread.
- The central unit must be supplied with cold water.
- Option: the central unit can be supplied with cold and hot water.



The hot water supply is used to fill the boiler to save energy and heating time.

- A KIWA approved backflow preventer (type B/A) or equivalent, with a KIWA approved filter and two KIWA approved shutoff valves, must be installed in the water supply. The B/A backflow preventer should be installed in the same room as the central unit (Two central units in two separate rooms = two B/A backflow preventers). The hot water supply requires its own backflow preventer. When a separate water source is used to supply the central unit with water, a backflow preventer is not required.



The B/A backflow preventer is supplied with the robots.

2.2.2 Supply Requirements

NOTICE

Always use potable water (fresh tap water, not stored in a reservoir because of micro-organism growth) for internal and external use (because of food safety).

Input central unit

- Water temperature:
 - Cold water supply: min 5 °C (41 °F), max. 40 °C (104 °F).
 - Hot water supply (hot fill option): min. 5 °C (41 °F), max. 99 °C (210 °F).
The hotter the water, the less time it takes to heat the water in the boiler.
- Input pressure:
 - At a flow of 16 l/min (4.2 gal/min), the dynamic pressure is > 0.5 bar (22 PSI).
 - Static pressure <4 bar (56 PSI).

Preconditions

- The water supply must be available under all circumstances.
- The sum of the water lines between central unit and robot unit(s) ≤ 30 m (32.8 yrd).
- The water supply is measured directly at the (future) connection for the central unit.
- The water supply line inner diameter to the central unit ≥ 19 mm (0.75 in).

NOTICE

The flow rate to one central unit has to be at least 16 l/min (4.2 gal/min) at all times. Take into account that the flow rate can decrease, if other equipment also uses water at the same time:

- Tank cleaning.
- Pre-cooler.
- Drinking water supply for the cows.
- Shower.
- Washing machine/dishwasher.

Water supply tubes

- Diameter water supply tube from the CU to one RU: 16 mm (0.63 in).
- Diameter water supply tube from the CU to two RUs:
 - From CU to Y-piece: 19 mm (0.75 in).
 - From Y-piece to RU: 16 mm (0.63 in).

2.2.2.1 Water Specifications

The water quality worldwide differs from area to area. The water quality can have influence on the life time of certain components (e.g. boiler, Pura) of the robots. Also the water used for the outside cleaning of the robots could harm certain components (e.g. frame,) even if it is made of stainless steel.

NOTICE

Always use potable water (fresh tap water, not stored in a reservoir because of micro-organism growth) for internal and external use (because of food safety).

NOTICE

Do not use distilled water, conductivity must be min. 100µS/cm — max. 500µS/cm.

NOTICE

The pH value must be 7.5 +/- 1.0.

The water used for the outside cleaning of the robot and inside (e.g. milking system) has to meet the following minimum requirements.

Parameter	Unit	Specifications	Rationale
Anions			
Bromide (Br ⁻)	mg/l	<0.01	
Fluoride (F ⁻)	mg/l	<1.5	
Chloride (Cl ⁻)	mg/l	<150	<250 is acceptable in combination with pH >7.5. Higher levels of chloride or lower pH levels will increase the occurrence of corrosion of stainless steel
Active Chloride (ClO ⁻)	mg/l	<0.1	Is used by some treatment systems. This increases corrosion of stainless steel
Nitrite (NO ₂ ⁻)	mg/l	<3	
Nitrate (NO ₃ ⁻)	mg/l	<50	
Sulphate (SO ₄ ⁻)	mg/l	<500	
Cations			

Parameter	Unit	Specifications	Rationale
Iron (Fe ²⁺ , Fe ³⁺)	mg/l	<0.2	
Manganese (Mn ²⁺ , Mn ³⁺)	mg/l	<0.05	
Cadmium (Cd ²⁺)	mg/l	<0.003	
Physical			
Hardness (Ca ²⁺ , Mg ²⁺)	°dH	6-9	Closer to 6 is better. Above 9 causes boiler and Pura to silt
Acidity (H ⁺)	pH	6.5-8.5	>7.5 is acceptable in combination with Chloride <250. Higher levels of chloride or lower pH levels will increase the occurrence of corrosion of stainless steel
Conductivity @20°C	µS/cm	100-500	Conductivity is used to detect availability of cleaning detergent
Oxygen (O ₂)	mg/l	>2	
Bacterial properties			
Colony count 22°C	cfu/ml	<100	(sum of bacteria types: IRB*, SRB*, SLYM*, HAB*, APB*)
Coliform bacteria	#/100ml	<1	

*IRB: Iron Related Bacteria.

*SRB: Sulfate Reducing Bacteria.

*SLYM: Slime Forming Bacteria.

*HAB: Heterofe Aerobe Bacteria.

*APB: Acid Producing Bacteria.

Lely Industries N.V. is not liable for, and does not cover under warranty, any damage or harm due to the use of water (inside or outside) of the robots not meeting the Lely specifications.

2.2.2.2 Water Consumption

The table below shows the water consumption of each robot unit, based on:

- 170 milkings per day.
- 3 cluster cleanings per day.
- 32 l (8.5 gal) of hot water per cluster cleaning.

Water consumption for each RU		
Cluster cleaning		60 l (15.9 gal)
• Pre-rinse.	12 l (3.2 gal)	
• Main cleaning (hot water).	37 l (9.7 gal)	
• Post-rinse.	16 l (4.2 gal)	
Milking		1.31 l (0.35 gal)
• Brush cleaning.	0.6 l (0.16 gal)	
• Lelywash.	0.6 l (0.16 gal)	
• Pura.	0.04 l (0.01 gal)	
• Pure Water Unit.	0.07 l (0.02 gal)	
Total per milking based on 170 milkings and 3 cluster cleanings per day (local rinses excluded)		2.4 l (0.6 gal)
Local rinse		12 l (3.2 gal)

Calculation: Total Water Consumption per Milking.

$$a = \frac{(b * c) + (d * e) + (f * g)}{e}$$

KEY: a. Total water consumption per milking — b. Water consumption per cluster cleaning — c. Number of cluster cleanings per day — d. Water consumption per milking — e. Number of milkings per day — f. Water consumption per local rinse — g. Number of local rinses per day



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3 Description and Operation

3.1 Description

3.1.1 Cleaning System

3.1.1.1 Operation

Cleanings and Rinses

A cleaning or rinsing starts:

- Automatically with the settings in the E-Link or T4C.
- Manually when started on the E-Link or CRS web interface.

A rinsing or cleaning is done when the robot arm is in the home position.

The following rinsings and cleanings are available:

- Lelywash.
- Local rinse.
- Cluster cleaning.
- Milk line rinse.
- M4Use flush.
- TDS II screen cleaning.
- Local main cleaning (only USA cleaning).

Lelywash

All parts that make contact with milk from the teat cups to the pre-milk device are rinsed during a Lelywash. A Lelywash starts after the number of milkings set on the E-Link, and on the settings in T4C. If either the E-Link or the T4C settings indicate the need for a Lelywash, the Lelywash is activated. When the number of milkings is set to 1 (default) and a Pura is installed, the use of steam depends on the settings in T4C. If the water supply has a USA configuration and the USA cleaning is set, the Lelywash is done with warm water with a sanitizer solution.

Local Rinse

During a local rinse, water flows through the milk jar, teat cups and milk tubes to the milk jar, and the pre-milk device. All parts that make contact with milk from the teat cups to the 3-way valves on the robot unit are flushed. If the water supply has a USA configuration and the USA cleaning is set, a local main cleaning is done instead of a local rinse.

A local rinse starts:

- When a set interval time on the E-Link has passed since the last milking.
- When a set interval time on the E-Link has passed since the last rinsing or cleaning.

Choices are:

- Standard.

- USA cleaning.
- Local cleaning extra water.
- Local cleaning hot water.

Cluster Cleaning

All parts that make contact with milk on all the robot units and the milk line in a cluster are rinsed and cleaned during a cluster cleaning. All milking robots in the cluster do a pre-rinse, a main cleaning and a post-rinse. The amount of hot water to clean the robot unit and the duration for the pre-rinse and post-rinse is set on the E-Link. A cluster cleaning starts at the time set on CRS. If the water supply has a USA configuration and the USA cleaning is set, the post-rinse is done with warm water with a sanitizer solution.

Pre-Rinse

During a pre-rinse water flows through the milk jar, teat cups and milk tubes to the milk jar, and the pre-milk device. At the start of the pre-rinse the milk line is blown empty.

Main Cleaning

During a main cleaning a hot cleaning solution flows through the milk jar, teat cups and milk tubes to the milk jar, and the pre-milk device.

Post-Rinse

During a post-rinse water flows through the top milk jar, teat cups, milk tubes to the milk jar. Alternately water is blown from the teat cups through the pre-milk device. At the end of the post-rinse water is drained from the teat cups, milk tube and pre-milk device. After draining the water in the milk jar, the water is pumped into the milk line and the milk line is blown empty.

If the water supply has a USA configuration and the USA cleaning is set, the post-rinse is done with warm water with a sanitizer solution.

Milk Line Rinse

During a milk line rinse all milking robots in the cluster do a local rinse. All parts that make contact with milk on all the robots and the milk line in a cluster are flushed with water. If the water supply has a USA configuration and the USA cleaning is set, the cluster rinse is done with warm water with a sanitizer solution. A milk line rinse starts when a set interval time on the CRS has passed since the last milking.

M4Use Flush

The M4Use flush will take approximately 6 minutes to complete and the buckets are filled with lukewarm water. During a M4Use flush the robot unit does:

1. A cold water pre-rinse.
2. A blow empty cycle and a nozzle blow.
3. A hot water cleaning with chemicals will rinse the lines and nozzle.
4. Finish with a cold water post-rinse and nozzle blow.

Local Main Cleaning

During a local main cleaning the robot unit does a pre-rinse, a cleaning and a post-rinse. The duration for the pre-rinse and post-rinse is set on the E-Link. The pre-rinse cleaning and post-rinse are similar to the cluster cleaning. All parts that make contact with milk from the teat cups to the 3-way valves on the robot unit are rinsed and cleaned with:

- Cold water.
- Hot water and alkaline.

- Warm water and sanitizer.

If the water supply has a USA configuration and the USA cleaning is set a local main cleaning starts:

- Instead of a local rinse.
- After milk has been separated.

3.1.2 Feed Unit

3.1.2.1 Commodity Feed Hopper (optional)

Feed Types and Rations

The farmer and his feed advisor are responsible for a balanced feed ration for the cows.

The risk of poor feed choices can lead to less robot visits and general malnutrition of the cows.



Always keep a close eye on the herd and their visiting behaviour. In case of problems or for improving the feed ration, contact your nutritionist or Lely Farm Management Support.

Demixing of Feed and Variation in Particle Size

Different sizes of feed particles can lead to segregation or demixing. Larger light particles have the tendency to stay on top while smaller heavy particles will lower down in the silo.

NOTICE

To examine if the feed is demixing in the silo, frequent calibration of the Commodity Feed Hopper is recommended

Feed Presence Sensor Calibration

If the robot unit is provided with a feed presence sensor (FPS), the farmer needs to calibrate the FPS after:

- Replacing the (regularly) feed hopper for the commodity feed hopper.
- Switching between different feed types.

To calibrate the feed presence sensor, See Calibrate the Feed Presence Sensor on page 5-8.



Calibrate the FPS when the alarm **No feed detected** is generated.

If the feed type is too soft, it can happen that the FPS does not detect the feed reliably. Ignore the alarm or switch off the FPS and frequently examine if the feed hopper works properly.

Feed Hopper Calibration



It is advised to calibrate the feed hopper frequently to examine the feed hopper on demixing and segregation of feed.

To calibrate the feed hopper, See Calibrate the Feed Portion on page 5-6.

Examine the Feed Type Suitability

Provide an Indication if the Feed is Suitable for the Hopper



Figure 8. Fill a cup



Figure 9. Press the feed down



Figure 10. Wipe off the excess of feed



Figure 11. Carefully tilt the cup



Figure 12. Wipe the surface clean, reposition of feed particles



Figure 13. Wipe the surface clean

1. Fill a cup with feed (see figure 8 on page 3-5).
2. Press the feed down with medium force (see figure 9 on page 3-5).
If the feed level is below the cups edge, fill it up and press it down again with (reasonable) force.
3. Wipe off the excess of feed above the cups edge (see figure 10 on page 3-5).
4. Place the cup on a flat surface and carefully tilt the cup on its side (see figure 11 on page 3-5).

5. Wipe away the feed on the surface that falls out of the cup. (see figure 12 on page 3-5).
After wiping away the excess of feed in front of the cup, the feed will repositioning in the cup.
6. Wipe again the excess of feed that falls out of the cup (see figure 13 on page 3-5).
7. Determine the angle (α°) of the feed in the cup (see figure 14 on page 3-6).
8. Determine the feed suitability (see table 1 on page 3-7).



Use a protractor ruler to determine the angle of the feed in the cup.

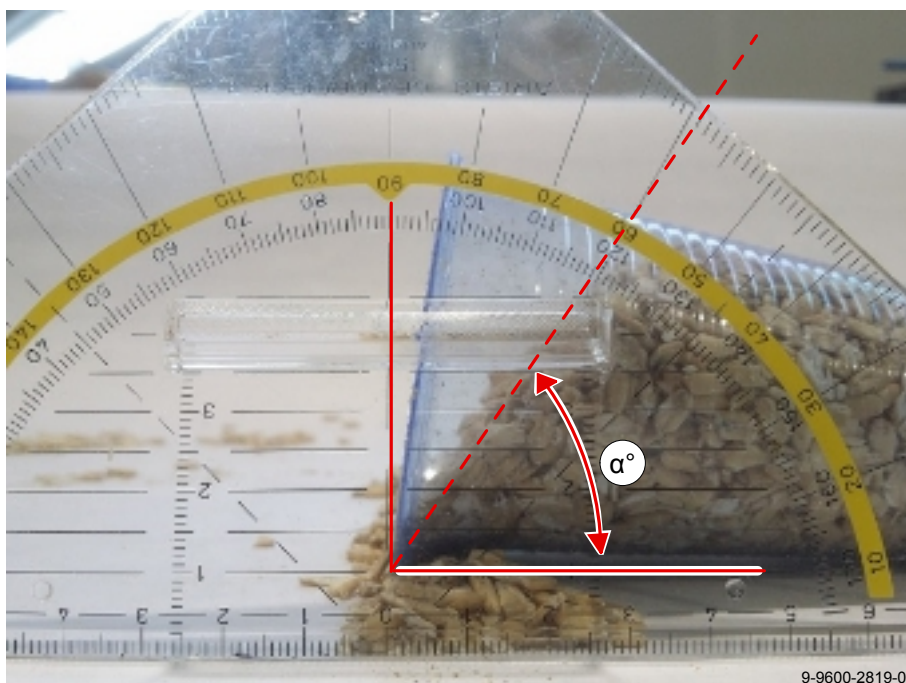


Figure 14. Determine the feed angle

Examine the Feed Suitability

Different types of Feed



Figure 15. Different type of feeds

KEY: From left to right, the feed types become more difficult to feed.

Risk indication and Feed Suitability

The steeper the angle (α°), the more likely it will cause bridging problems in the feed hopper. The angle vs risk analysis (see Provide an Indication if the Feed is Suitable for the Hopper on page 3-5) can be made on this test (see table 1 on page 3-7).

Table 1. Angle vs risk indication

Angle (α°)	Risk	Bridging
Angle (α°) < 45°.	Very low.	No bridging problems are expected.
45° ≤ Angle (α°) < 65°.	Low.	The chance of bridging problems in the hopper is low.
65° ≤ Angle (α°) < 75°.	Medium.	Occasional bridging problems can be expected. <ul style="list-style-type: none"> The farmer should be aware of increased risk.
75° ≤ Angle (α°).	High.	Bridging problems are very likely. <ul style="list-style-type: none"> The farmer should be aware of substantial risk. Using a different feed type is advised.



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4 Operating Instructions

4.1 Cleaning

4.1.1 Start Cleaning

1. On the E-Link select:

1. Button  to open the quick launch bar.
2. Button  to open the second set of the quick launch buttons.

3. Button .

2. Choose a local cleaning or a cluster cleaning:

- For a Lelywash, select button **Lelywash**.
- For a Lelywash combined with a steam cleaning, select button **Steam & LelyWash**.
- For a local rinse, select button **Local rinse**.
- For a local rinse combined with a steam cleaning, select button **Steam & local rinse**.
- For M4Use Flush, See M4USE Flush on page 4-1.
- To clean the (visor/window) of the sTDS, select button **sTDS cleaning**.
- For a cluster rinse, select button **Rinse** and the applicable cluster [1] or [2].
- For a cluster cleaning, select the detergent button **Alkaline** or **Acid** or select **Automatic** at the applicable cluster: [1] or [2].

3. Select button **OK**.

The milking robot starts to prepare the cleaning immediately and starts cleaning when the milking is ready.

4.1.2 M4USE Flush



*Hot water and steam.
Contact with hot water and steam may
cause burns.
During M4use flush, keep the M4USE cover
closed and keep safe distance.*



NOTICE

It is not advised to perform an M4USE Flush within an hour before a cluster cleaning, to make sure the cleaning water has the optimal temperature during the cluster cleaning.

1. On the E-Link/ X-Link select:



1. Button

2. A pop up window will appear, presenting one of the following situations:

1. All the M4USE buckets are empty (see figure 16 on page 4-2).

When the Flush starts, the Flush will rinse all the buckets.

2. During the M4USE Flush, buckets filled with milk will not be rinsed (see figure 17 on page 4-2).

If a full rinse is wanted, empty the filled buckets first.

The following buckets are free / in use:

Bucke	Cow nr.	Cow name	Responder	Time	Quantity	Reason	Flush	Empty all
1							Empty	
2							Empty	
3							Empty	
4							Empty	

M4USE bucket size: 14 kg

Edit Close

Figure 16. Empty buckets

The following buckets are free / in use:

Bucke	Cow nr.	Cow name	Responder	Time	Quantity	Reason	Flush	Empty all
1	108	Berta8	2000	10:05	1.0 kg	0	Empty	
2	109	Berta9	2001	10:05	1.1 kg	0	Empty	
3							Empty	
4							Empty	

M4USE bucket size: 14 kg

Edit Close

Figure 17. Filled buckets

NOTICE

The M4USE Flush will take approximately 6 minutes to complete. The process will:

1. Start a cold water pre-rinse.
2. After the pre-rinse, a hot water cleaning with chemicals will rinse the lines and nozzle.
3. Finish with a cold water post-rinse.

The pre and post-rinse durations can be changed by the settings on the robot for the local pre and local post-rinse duration. However, this also affects the local rinse hot water and the USA local rinse.

3. To start the M4USE Flush select:

1. Button **Flush** (see figure 18 on page 4-3).
2. After the M4USE Flush is started, take the robot unit(s) out of operation with the E-Link/ X-Link.

4. After the M4USE Flush the buckets are filled with lukewarm water.

1. Use the lukewarm water to clean the buckets manually with a brush.
2. Empty the buckets and rinse the buckets manually with cold water.
3. Place the empty buckets back in the rack.

5. Empty the filled buckets in the E-Link/ X-Link after the M4USE Flush.
On the E-Link/ X-Link select for the filled buckets the:

1. Button **Empty** to empty the selected buckets, or
2. Button **Empty all** (see figure 19 on page 4-3).

The M4USE Flush is finished.

6. Put the robot unit(s) in operation with the E-Link/ X-Link.

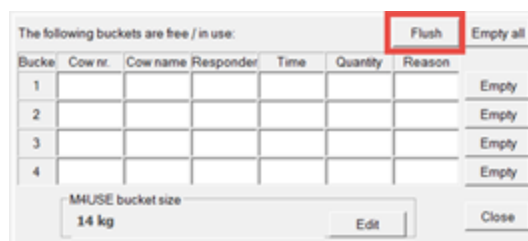


Figure 18. M4USE Flush

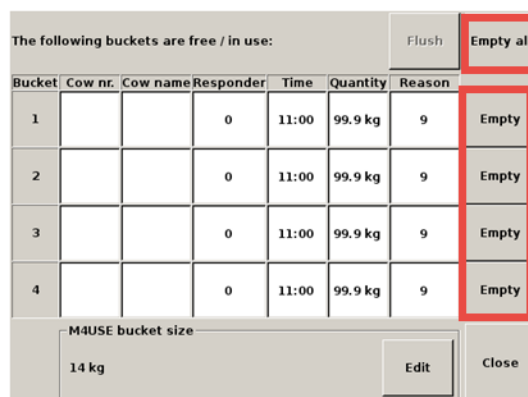



Figure 19. Empty the buckets

4.2 Start Up and Reset

4.2.1 Take One Robot Unit Out of Operation with the E-Link

1. On the E-Link select:

1. Button  to open the quick launch buttons bar.




2. Button .

When the ongoing milking or cleaning process is finished, the ASTRONAUT A4 stops,




meanwhile button  is displayed.



When the milking robot is out of operation, button  (start) is displayed.

4.2.2 Put the Robot Unit in Operation with the E-Link

1. On the E-Link select:

1. Button  to open the quick launch buttons bar.




2. Button .



During start up, button  is displayed.



When the milking robot is in operation, button  (stop) is displayed.

5 Maintenance

5.1 Preventive Maintenance Schedule

The following tables show the preventive maintenance schedule for the milking robot defined by Lely. Preventive maintenance must also be done as specified by local regulations.

Each task mentioned in these tables is linked to its description.

NOTICE

The frequency of tasks shown in the table is the minimum recommended frequency.

Maintenance during the day

Task	Hours
Examine the attention alarms on the E-Link	8
Examine the attention list on the E-Link	8
Examine the attention alarms on the CRS+ (Examine the Attention Alarms, Show List of Active Alarms).	8
Examine the attention alarms on T4C, refer to the T4C manual.	8
Examine the attention list on T4C, refer to the T4C manual.	8
Replace the filter element of the single filter.	8
Replace the filter element of the twin filter.	8–15
Clean the sTDS screen.	12
Clean the field of vision of the 3D camera.	12

Daily maintenance

Task	Day
Clean the touch screen of the E-Link	1
Clean the bleed holes	1
Clean the robot arm and the box	1
Clean the outside of the teat cups	1
Examine the cleaning brushes	1
Examine the twin tubes	1
Examine the 6-fold tube	1
Examine the cup centering	1
Examine the shells	1
Examine the quantity of udder care liquid	1

Examine the quantity of MQC-C reagent	1
Examine the quantity of chemical products in the central unit	1
Examine the air compressor and the air dryer	1
Examine the robot performance list, refer to the T4C manual	1

Weekly maintenance

Task	Week
Clean the feeding system	1
Calibrate the feed portion	1
Measure the concentration of Brush-dis	1
Test the spray beam of the teat disinfection nozzle	1
Examine the liners	1
Measure the temperature of the hot cleaning water	1
Examine the cup cords	

Maintenance during the year

Task	Months	Milkings
Test the save life switch	1	
Clean the Waste Tube (see page 5-13).	1	
Replace the liners	2	silicon 10.000 rubber 2.500
Examine the air compressor and the air dryer	3	
Cut the tails of the cows approximately 3 cm (1.2 in) below the tail bone	3	
Shave the udders	3	
Examine the oil level of the vacuum pump	3	
Replace the shut-off sleeves		30.000
Clean the exterior of the vacuum pump	6	
Replace the Twin Tube Cover	6	
Replace the cleaning brushes		30.000
Test the earthing of the robot unit	12	
Let a certified company examine the correct functioning of the BA backflow preventer	12	
Confirm the quality of the supplied water	12	
Replace the Twin Tubes (See page 5-16).	12	

5.2 Move the Robot Arm

5.2.1 Move the Robot Arm to the Service Position

1. Take the robot unit out of operation with the E-Link (see Take One Robot Unit Out of Operation with the E-Link on page 4-4).
2. On the E-link select:
 1. Tab **Test**.
 2. Select **Robot arm**.
 3. Select the applicable service position with button:
 - **Service-1**.
 - **Service-2**.
 - **Service-3**.
 - **Service-4**.



*Moving robot arm.
Risk of being hit by the robot arm.
Keep obstacles away from the robot arm.*

3. Button **Move robotarm**.
Wait until the robot arm stops in the service position.

5.2.2 Move the Robot Arm to the Home Position

1. On the E-Link select:
 1. Tab **Test**.
 2. Select **Robot arm**.
 3. Select **Home**.



*Moving robot arm.
Risk of being hit by the robot arm.
Keep obstacles away from the robot arm.*

1.
 1. Button **Move robotarm**.
Wait until the robot arm stops in the home position.

5.3 Covers and Doors

5.3.1 Lower Arm Cover

5.3.1.1 Remove the Lower Arm Cover

1. Remove the screws and watertight washers (1).
2. Remove the cover (2).

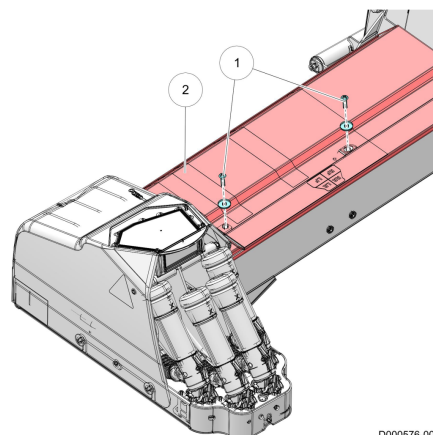


Figure 20. Lower arm cover

KEY: 1. Screws and watertight washers - 2. Cover

5.3.1.2 Install the Lower Arm Cover

NOTICE

Make sure the tubes and cables are in the correct position.

1. Install the cover (2) (see figure 20 on page 5-4).
2. Install the watertight washers and screws (1).

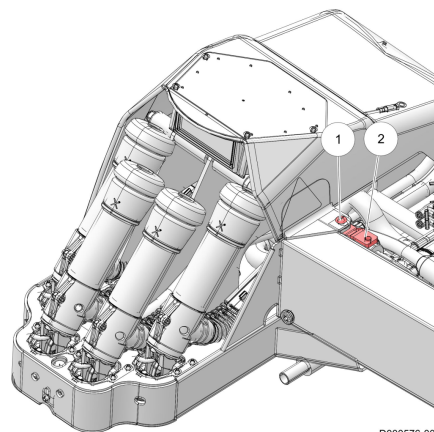
5.3.2 Mothership Cover

5.3.2.1 Remove the Mothership Cover

1. Remove the Lower Arm Cover (see page 5-4).

2. Remove the screw (1) while holding the threaded bracket (2).

Put the screw and threaded bracket on a safe place.



D000576-002

Figure 21. Bracket with screw

KEY: 1. Screw - 2. Threaded bracket

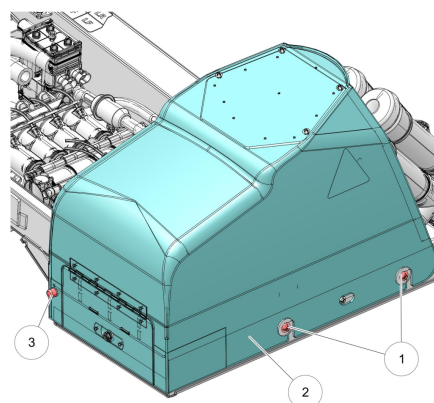
NOTICE

Make sure the sTDS cable does not become tight or damaged when you remove the cover.

3. Loosen the bolts (1) until the cover (2) can move easily.

4. Carefully move the cover over the pin (3) and away from the teat cups and the mothership.

Carefully put the mothership cover on the ground next to the mothership.



D000576-003

Figure 22. Mothership Cover

KEY: 1. Bolt (2x) - 2. Cover - 3. Pin

5.3.2.2 Install the Mothership Cover

NOTICE

Make sure the sTDS cable does not become tight or damaged when you remove the cover.

1. Carefully position the cover on the mothership (see figure 22 on page 5-5).
2. Tighten the two bolts (1).
3. Install the threaded bracket (2) and screw (1) (see figure 21 on page 5-5).
4. Install the Lower Arm Cover (see page 5-4).

5.4 Maintenance Procedures

5.4.1 Feed Unit

5.4.1.1 Calibrate the Feed Portion



Rotating parts
Moving parts can crush or cut.
Keep hands, loose clothing and long hair
away from moving parts during
operation of the machine.



NOTICE

1. Take the robot unit out of operation with the E-Link.
2. Empty the Feed Bin (see page 5-6).
3. Measure the feed Portion (see page 5-7).
4. Adjust the Feed Portion (see page 5-7).
5. Put the robot unit in operation with the E-Link.
6. Unblock the cow traffic.

Empty the Feed Bin

1. On the E-link:
2. Select tab **Test**.

3. Select **Tasks**.
4. Select **Feed portion**.
5. At **Entry gate** button **Open**.
6. Go into the box through the entry gate.
7. Empty the feed bin.
8. Go out of the box through the entry gate.

Measure the feed Portion

NOTICE

The steps below must be done for all installed feeding valves.

1. In the field **Select feed type** select **Edit** and select the feed type.
2. Select **Start dose**.
3. Wait until the feed unit is finished.
4. Put a bucket on the scales.
5. Reset the scales to zero.
6. Remove the bucket.
7. Go into the box through the entry gate.
8. Put the feed from the feed bin into the bucket.
9. Go out of the box through the entry gate.
10. Put the bucket with the feed on the scales.
11. Calculate the weight of the feed and make a note of the weight.
12. Empty the bucket.

Adjust the Feed Portion

NOTICE

The steps below must be done for all installed feeding valves.

1. In the field **Feed portion #** and **Calculated** fill in the calculated weight.
2. Select **Save portion sizes**.

5.4.1.2 Calibrate the Feed Presence Sensor



Rotating parts
Moving parts can crush or cut.
Keep hands, loose clothing and long hair
away from moving parts during
operation of the machine.



NOTICE

The calibration process uses an average of two or three feed portions, with a maximum of ten feed portions. During calibration the field **Feed sensor value** changes between the number of feed portion (starts at 10, ends at 1) and the measured value related to the feed portion number (value between '0' and '4095'). The first **Status** field shows **Calibrating Sensor for feed tube X** and the second **Status** field shows **Calibrating Sensor**. If no feed is detected the **Feed sensor value** is '0' and the second **Status** field shows **No feed detected**.

1. Make sure that feed is available for all available feed types.
2. Make sure that all available feed motors operate correctly.
3. Calibrate the Feed Presence Sensor on the E-Link (see page 5-8).
4. View the Calibration Values (see page 5-9).

Calibrate the Feed Presence Sensor on the E-Link

On the E-Link select:

1. Tab **Test**.
2. At **Tasks** select **FPS Calibration**.
3. Make sure that the second **Status** shows **Standby**.
4. Select the feed type that must be calibrated: button **Calibrate feed X**.
5. When the calibration process is finished (see table on page 5-9):

Second 'Status' field shows	Action	Result	Action
Calibration done (calibration succeeded).	1. Select the button Store Calibration Results .	Second Status field shows Standby .	1. Do the calibration procedure for the other feed pipes.
Calibration Failure (calibration failed).	1. Select the button Store Calibration Results .	A pop-up window appears that shows which feed type(s) failed to calibrate.	1. Select Continue to save the failed calibration, the feed presence sensor does not operate for this feed type. OR 1. Select Cancel . 2. Do the calibration procedure again for this feed type.

View the Calibration Values

On the E-Link select:

1. On the E-Link select:
2. Tab **Indications**.
3. At **Reports** button **Refresh**.
4. The field shows **Feed Presence Sensor has been calibrated with the following values <US1> <US2> <US3> <US4>**.

5.4.2 MQC-C

5.4.2.1 Daily maintenance of MQC-C

Examine the Quantity of MQC-C Reagent

1. Open the door of the robot unit.
2. If the reagent container is nearly empty follow procedure: Fill the MQC-C Reagent Container (See page 5-10).
3. Close the door of the robot unit.

Fill the MQC-C Reagent Container

1. Prepare the MQC-C Reagent Solution (see page 5-10).
2. Take one robot unit out of operation with the E-Link.
3. Fill the Reagent Container (see page 5-10).
4. Restart the MQC-C on the E-Link (see page 5-12).

5. Close the door of the robot unit.
6. Put the robot unit in operation with the E-Link.

Prepare the MQC-C Reagent Solution

NOTICE

Safety data sheets and specifications of the MQC-C reagent are available at www.Lely.com

NOTICE

The shelf lifetime of the MQC-C reagent solution is 3 months. Store the MQC-C reagent solution in a closed container at a temperature of 4 to 30 °C (29 to 86 °F). Do not store the MQC-C solution in the central unit.



At Lely consumables a large container for mixing the MQC-C reagent solution can be ordered.

If necessary, prepare the MQC-C reagent solution:

1. Use a mixing container that can be closed.
2. Make sure the mixing container is empty.
3. Clean the mixing container with hot water.
4. Make sure the expiration date of the MQC-C reagent concentrate has not passed.
5. Remove the cap of the mixing container.
6. The ratio of potable water to MQC-C reagent concentrate is 15 to 1:
 1. First add 15 parts of potable water.
 2. Then add 1 part of MQC-C reagent concentrate.
7. Install the cap of the mixing container.
8. Shake the mixing container for 5 seconds and make sure the solution is mixed thoroughly.
9. Make sure there is a spare bottle of MQC-C reagent concentrate available. If not, order a new one.

Fill the Reagent Container

1. Open the door of the robot unit.

2. Disconnect the reagent supply tube (1) from the reagent container (see figure 23 on page 5-11).
3. Remove the reagent container from the robot unit and put it on a clean surface.
 1. Remove the cap of the reagent container.
 2. Clean the container with hot water.

Make sure no residue is left at the bottom of the container.

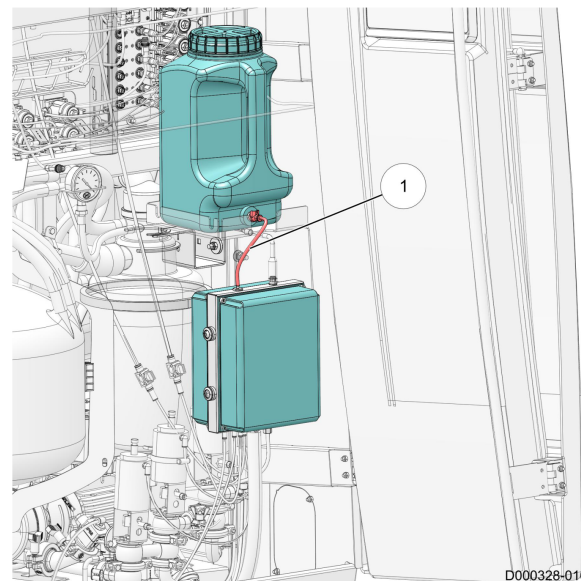


Figure 23. Reagent container

KEY: 1. Reagent supply tube

4. Shake the mixing container for 5 seconds (see figure 24 on page 5-11).
Make sure the solution is mixed thoroughly.
5. Remove the cap of the mixing container.

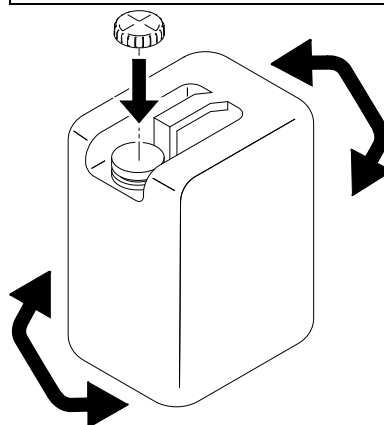


Figure 24. Mixing container

6. Fill the reagent container with the MQC-C reagent solution (see figure 25 on page 5-12).
7. Install the cap on the mixing container.
8. Install the cap on the reagent container.
9. Install the reagent container on the MQC-C bracket (see figure 23 on page 5-11).
10. Connect the reagent supply tube (1) to the reagent container.

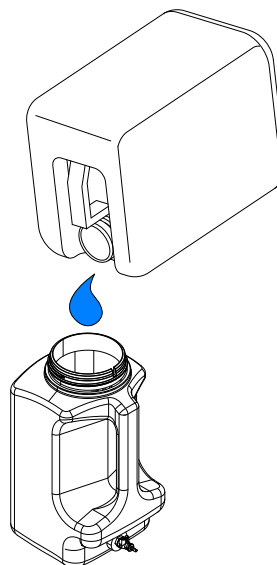


Figure 25. Fill reagent container

Restart the MQC-C on the E-Link

NOTICE

If the MQC-C stopped automatically because of an empty reagent container, the MQC-C must be restarted with the E-Link.

On the E-Link select:

1. Tab **Test**.
2. select **Test menu**
3. select **Accessories**.
4. select **MQC-C2**.
5. select **Service**.
6. In the field **Reset MQC-C2 errors** push the button **Reset errors**.

Remove a Blockage from the Reagent Supply Tube

To remove a blockage from the reagent supply tube follow the steps below:

1. Take one robot unit out of operation with the E-Link.
2. Clean the Reagent Supply Tube (see page 5-12).
3. Put the robot unit in operation with the E-Link.

Clean the Reagent Supply Tube

1. Open the door of the robot unit.

2. Disconnect the reagent supply tube (1) with connector from the safety valve of the reagent container (see figure 26 on page 5-13).
3. Disconnect the reagent supply tube (1) from the MQC-C.
4. Clean the reagent supply tube.
5. Connect the reagent supply tube (1) to the MQC-C.
6. Connect the reagent supply tube (1) to the safety valve of the reagent container.
7. Close the door of the robot unit.

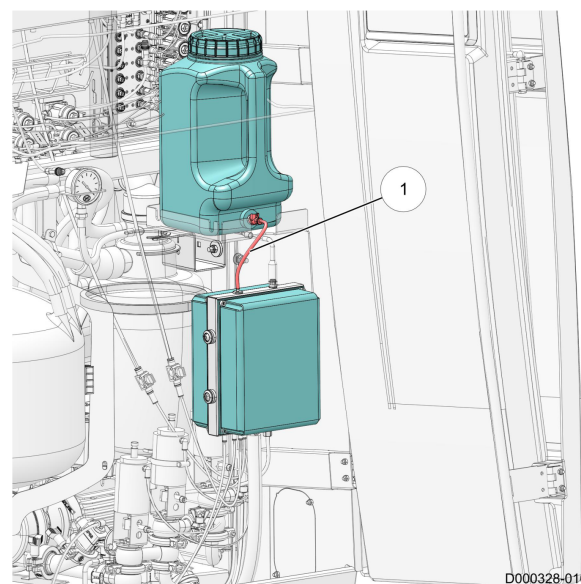


Figure 26. Reagent container

KEY: 1. Reagent supply tube

5.4.2.2 Clean the Waste Tube

To clean the waste tube follow the steps below:

1. Take the robot unit out of operation.
2. Remove the waste tube from the MQC-C (see figure 27 on page 5-13).
3. Flush the waste tube with water.
Make sure no residues are left behind.

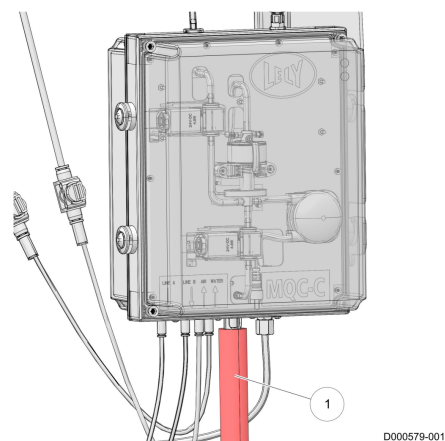


Figure 27. Remove the waste tube

KEY: 1. Waste tube

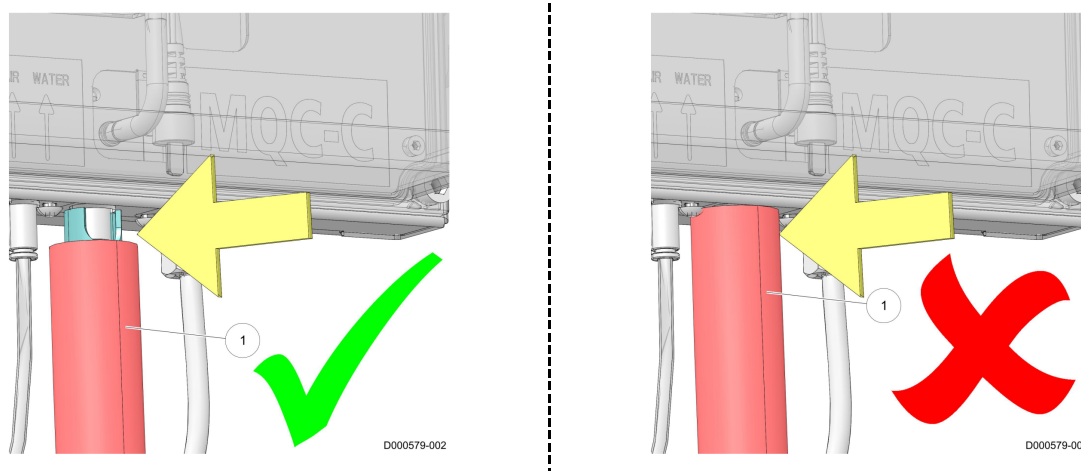


Figure 28. Install the waste tube

KEY: 1. Waste tube

5. Install the waste tube on the MQC-C (see figure 28 on page 5-14).
Make sure the waste tube is not placed to the top.
6. Put the robot unit in operation with the E-Link.

5.4.3 Teat Cups

5.4.3.1 Replace the Twin Tubes

Follow the steps below to replace the twin tubes.

1. Preparation to Replace the Twin Tubes (See page 5-14)
2. Remove the Twin Tube (see page 5-16).
3. Install the Twin Tubes (see page 5-17).
4. Cord Cups Fixed at the E-Link (see page 5-19).
5. Close-up for Replace the twin Tubes (see page 5-20).

Preparation to Replace the Twin Tubes

Preparation to Replace the Twin Tubes

1. Take One Robot Unit Out of Operation with the E-Link (see page 4-4).
2. Move the Robot Arm to the Service Position (see page 5-3).
3. Remove the Lower Arm Cover (see page 5-4).
4. Remove the Mothership Cover (see page 5-4).
5. Special Tools to Replace the Twin Tube (see page 5-15).
6. Loosen the Cord Cups and Straighten the Tilt Cups at the E-Link (see page 5-15).

Special Tools to Replace the Twin Tube

- Clamp pliers.
- Tube cutter.

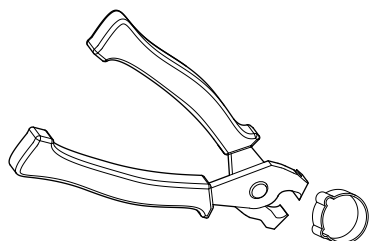
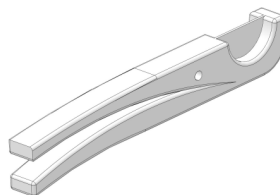


Figure 29. Clamp pliers



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Figure 30. Tube cutter

Loosen the Cord Cups and Straighten the Tilt Cups at the E-Link

On the E-Link select:

1. Tab **Test**.
2. Select **Test menu**.
3. Select **Mothership**.
4. Select **Cups**.
5. At **Cord cups** select:
 1. LF **Loose**.
 2. LR **Loose**.
 3. RF **Loose**.
 4. RR **Loose**.
6. At **Tilt cups** select:
 1. LF **Straight**.
 2. LR **Straight**.
 3. RF **Straight**.
 4. RR **Straight**.

Remove the Twin Tube

1. Remove the bolts (2) and the locking strip (3).
2. Slide the twin tube segregator in the direction of the teat cups.

Take the twin tube segregator away.

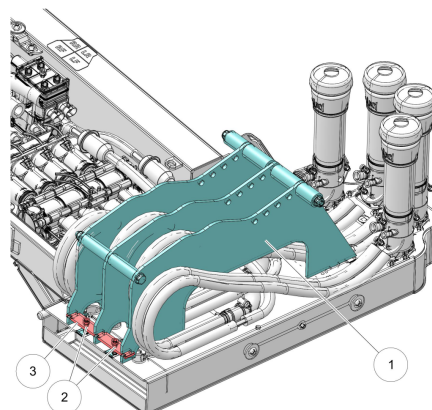


Figure 31. Twin tube segregator

KEY: 1. Twin tube segregator - 2. Bolt (2x) - 3. Locking strip

3. Remove the three bolts (3), nuts (8) and remove the twin tube cover (10) (see figure 32 on page 5-16).
4. Disconnect the twin tube from the milk collector.

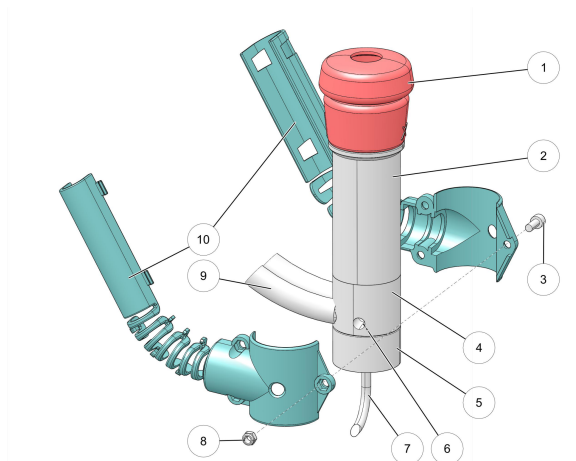
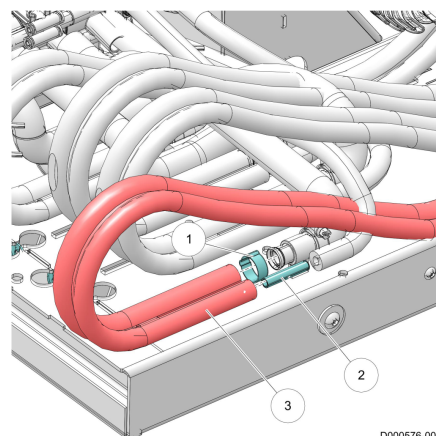


Figure 32. Teat cup

KEY: 1. Teat cup liner - 2. Teat cup shell - 3. Bolt - 4. Milk collection cup - 5. Centering cup - 6. Bleed hole - 7. Cup cord - 8. Nut - 9. Twin tube - 10. Twin tube cover

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5. Use the clamp pliers to release the clamps (1) on the connection pieces to the preformed milk tubes (see figure 33 on page 5-17).
6. Disconnect the twin tube from the connection piece (2) to the 4effect pulsator tubes.
7. Remove the twin tube from the area.



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Figure 33. Connection pieces

KEY: 1. Clamp - 2. Connection piece - 3. Twin tube

Install the Twin Tubes

1. Make an incision (see figure 34 on page 5-17) in the twin tube from:
 1. The right end to the first hole.
 2. The left end to the first hole.

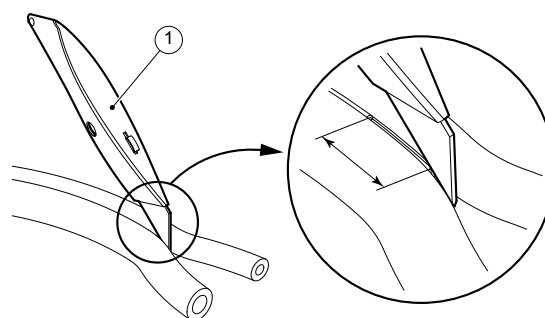
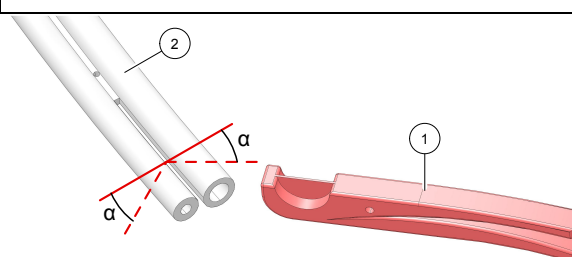


Figure 34. Make an incision in the twin tube

KEY: 1. Knife

2. Cut off the tubes (2) under an angle of 30° (see figure 35 on page 5-17).
Make sure the inside of the twin tubes are clean and dry.



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Figure 35. Cut off the tubes

KEY:
1. Tube cutter - 2. Twin tube
 $\alpha = 30^\circ$

3. Clean and dry the milk collection cup (2) (see figure 36 on page 5-18).
4. Fully connect the twin tube (1) to the milk collection cup (2) of the teat cup.

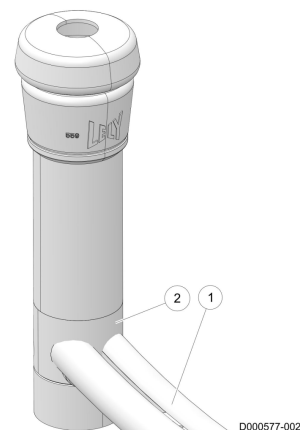


Figure 36. Connect the twin tube to the teat cup

KEY: 1. Twin tube - 2. Milk collection cup

5. Install the (smaller) part (2) of the twin tube cover over the pulsation tube of the twin tube (1) (see figure 37 on page 5-18).

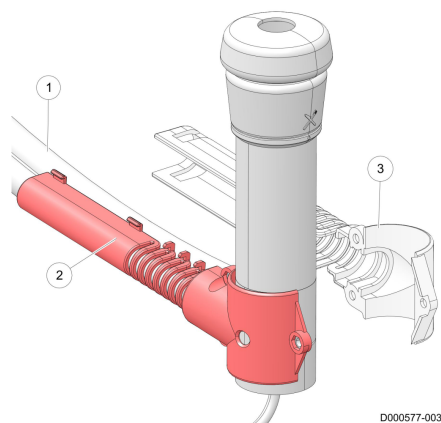


Figure 37. Install the first part of the twin tube cover

KEY: 1. Twin tube - 2. Part of twin tube cover - 3. Part of twin tube cover

NOTICE

Use anti-seize paste on all bolts to prevent seizing.

6. Install the second (larger) part of the twin tube cover (2) with the bolts to the smaller part of the twin tube cover with a torque of 1.5 Nm (see figure 38 on page 5-19).

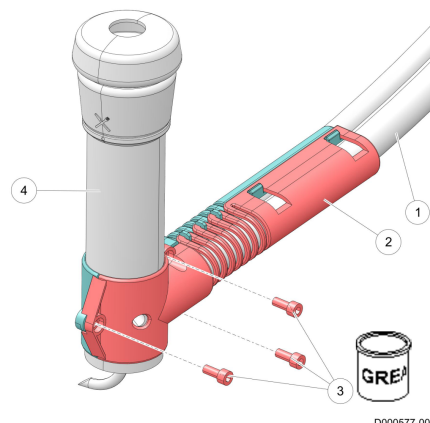


Figure 38. Install the second part of the twin tube cover

KEY: 1. Twin tube - 2. Part of twin tube cover - 3. Bolts (2x)

7. Push the two parts of the twin tube cover together (see figure 39 on page 5-19).

Make sure the snap connections (1) on both sides of the twin tube cover are connected correctly.

8. Connect the flexible parts (2) at both sides of the twin tube cover (see figure 39 on page 5-19).
9. Connect the milk tube (3) to the connection piece (1) of the preformed milk tube (see figure 33 on page 5-17).

Tighten the clamp with the special tool.

10. Connect the vacuum tube (3) to the connection piece (2) of the 4effect pulsator tube.
11. Hold the teat cup with one finger in the line and make sure that the teat cup does not turn.

If necessary, turn the twin tubes at the connection with the milk collection cup and align the teat cup.

12. Install the twin tube segregation (1) to the mothership and slide it away from the teat cups to bring it in locking position (see figure 31 on page 5-16).
13. Install the locking strip (3) with the two bolts (2).

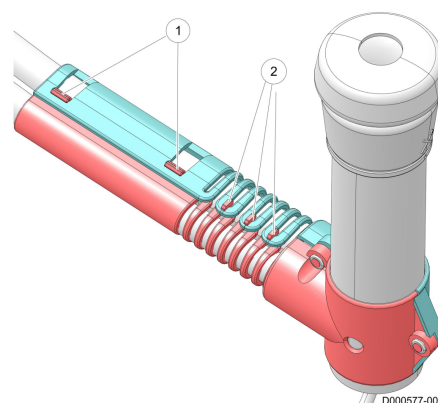


Figure 39. Install the twin tube cover

KEY: 1. Snap connections - 2. Snap connections

Cord Cups Fixed at the E-Link

At the E-Link select:

1. Tab **Test**.
2. Select **Test menu**.
3. Select **Mothership**.
4. Select **Cups**.

5. At **Cord cups** select:

1. LF **Fixed**.
2. LR **Fixed**.
3. RF **Fixed**.
4. RR **Fixed**.

Close-up for Replace the twin Tubes

1. Install the Mothership Cover (see page 5-6).
2. Install the Lower Arm Cover (see page 5-4).
3. Start the local rinse procedure Start Cleaning (see page 4-1).
4. Put the Robot Unit in Operation with the E-Link (see page 4-4).

6 Diagrams

6.1 Gate Guard Set

6.1.1 Gate Guard Set Examples



The stand poles and additional tubing for the gate guard set are not provided in the set and must be bought externally. The diameter of the stand poles must be 76 mm (2.5 in).

NOTICE

To avoid cows are harmed, avoid protruding parts. Make sure the height (E, F) of the stand poles (4) does not extend the t-clamps (5) (see figure 41 on page 6-3).

NOTICE

Make sure the stand poles are not installed to the robot unit.

NOTICE

Always install the guard set in line with the side fence of the milking robot.

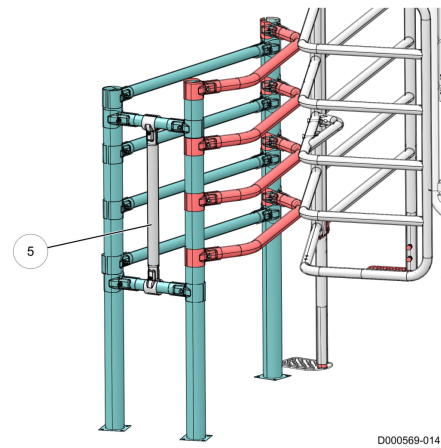
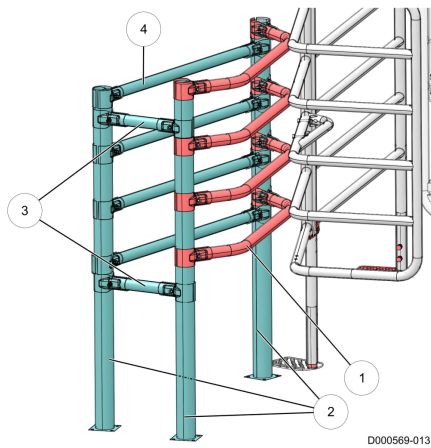
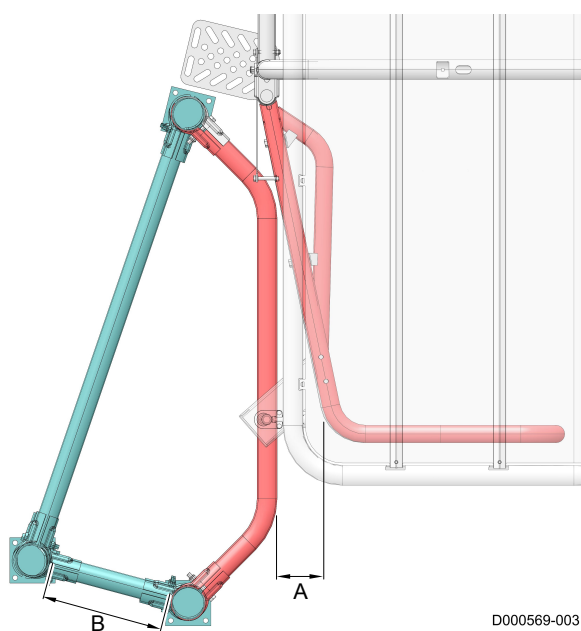


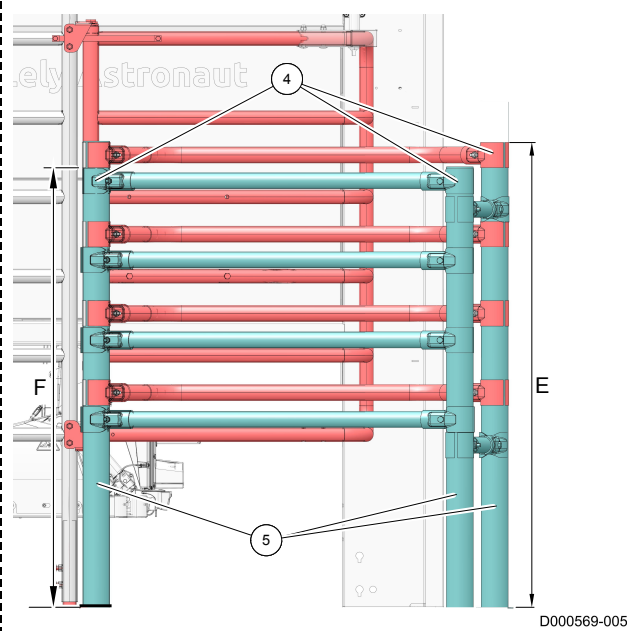
Figure 40. Examples of a gate guard set with self-made additional tubing

KEY: 1. Gate guard set - 2. Stand pole (3x) - 3. Additional tubing (2x) - 4. Additional tubing (4x) - 5. Additional tubing (1x)

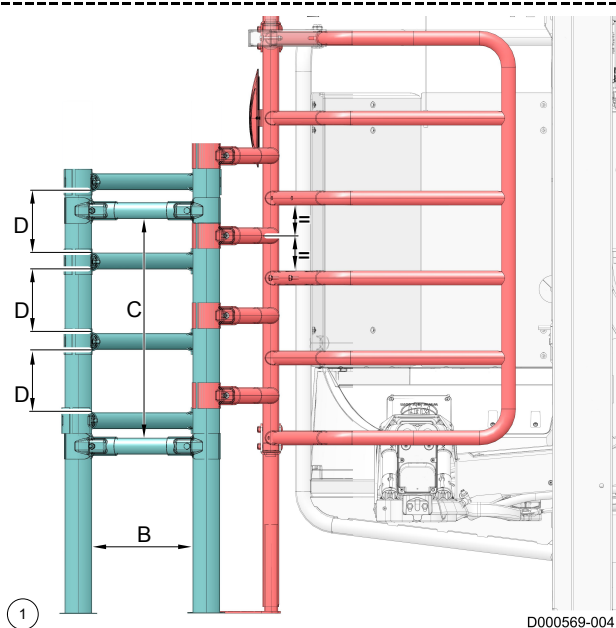
6.1.2 Gate Guard Set Dimensions



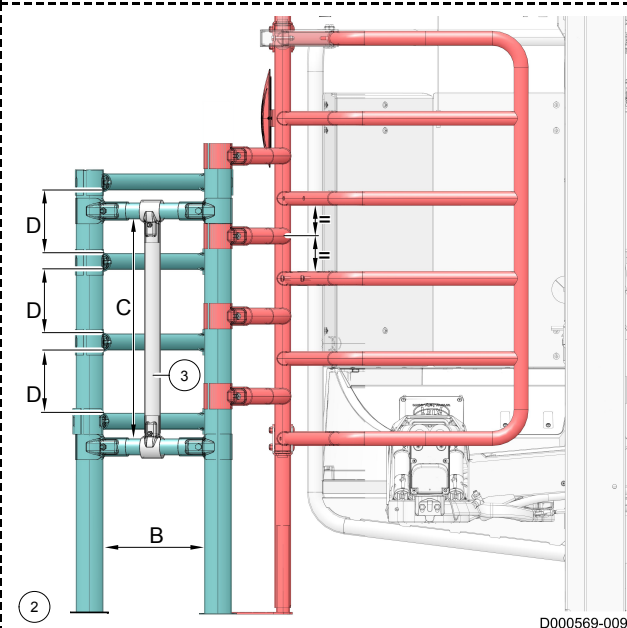
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D000569-009

Figure 41. Gate guard set with self-made additional tubing

KEY: 1. B = <235 mm (9.3 in) or >300 mm (11.8 in) - 2. B = >235 mm (9.3 in) and <300 mm (11.8 in) - 3. Extra additional tubing - 4. T-clamp - 5. Stand pole (3x)

For dimensions see (see table 2 on page 6-4).

Table 2. Dimensions

A	B	C	D	E
<235 mm (9.3 in) OR >300 mm (11.8 in).	<235 mm (9.3 in).	<235 mm (9.3 in).	<235 mm (9.3 in).	max. 1400 mm (55.1 in).
	>300 mm (11.8 in).	>500 mm (19.7 in).		
	>400 mm (15.7 in).	>400 mm (15.7 in).		
	>500 mm (19.7 in).	>300 mm (11.8 in).		

7 Disposal

7.1 Disposal

Disposing this product correctly will help save valuable resources and prevent any potential negative effects on human health and the environment, which could otherwise arise from inappropriate waste handling.

Decommissioning and disassembly of the product can be dangerous and must be done only by qualified recycling organizations. All components must be disposed in compliance with the local rules and regulations.

Lubricants and fluids must be disposed correctly to prevent pollution of the environment. Read the safety data sheets of the used lubricants and fluids for correct disposal. All lubricants and fluids must be disposed in compliance with the local rules and regulations.

Contact your local authority or local Lely service provider for further details.



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