User manual

Control box CulinaCup BD105

Code No. 99-94-0887 GB

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EC Declaration of Conformity

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In accordance with the EC directive:

- Electromagnetic Compatibility (EMC) Directive 2014/30/EU
- Low Voltage Directive 2014/35/EU
- RoHS Directive 2011/65/EU

CE

The product named below was developed, designed and manufactured in accordance with the above mentioned EC / EU Directives and under the sole responsibility of Big Dutchman.

Description	BD105 control box
Serial number and year of construction	According to the customer order no.

The following harmonised standards were applied:

- DIN EN 61000-4-4:2004: Electrical fast transient / burst immunity test
- DIN EN 61000-4-5:2005: Surge immunity test
- DIN EN 61000-6-4:2020-09 Electromagnetic compatibility (EMC) – Part 6-4: Generic standards – Emission standard for industrial environments

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Vechta, 15 January 2022
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1 About this manual

Observe the instructions in this manual to ensure correct and safe use of the system.

Keep this manual safe for future use.

All persons assembling, operating, cleaning and servicing this system must be familiar with the contents of this manual.

These persons must always have access to the manual. Keep this manual in the immediate vicinity of the system for this reason.

Observe the comprised safety instructions!

If this manual is damaged or lost, request a new copy from **Big Dutchman**.

The contents of this manual may be altered without prior notice.

If you find mistakes or unclear information in this manual, please do not hesitate to let us know.

For further information please contact:

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1.1 Structure of the safety instructions

⚠ DANGER!

This indicates risks that will lead to personal injury resulting in death or to serious injuries.

⚠ WARNING!

This indicates risks that could lead to personal injury resulting in death or to serious injuries.

⚠ CAUTION!

This indicates risks or insecure procedures that could lead to moderate or minor injuries.

NOTICE!

This indicates notes preventing property damage and leading to an effective, economic and environmentally-conscious handling of the system.

2 Safety

2.1 General safety regulations

Only work with suitable tools and observe the local accident prevention regulations.

⚠ WARNING!

Live parts may be bare when performing different types of tasks. Touching live parts can lead to injuries caused by electric shock and short circuits.

- ► Set the main switch to "Off" before starting any repair or maintenance tasks.
- ► Secure the system against reactivation.
- ► Attach a fixed sign to indicate that maintenance and repair tasks are in process!
- ► Never touch bare electrical components.
- ► Equipment with bare electrical components must not be used by the operating staff.

Check safety and function control devices to ensure safe and accurate operation after carrying out any tasks.

Observe the regulations of local water distribution and power supply companies.

⚠ WARNING!

Defective or disassembled safety devices can lead to serious injuries or to death!

- ► It is strictly forbidden to remove or put out of operation any safety device.
- ► If safety devices are damaged, immediately put the system out of operation. Lock the main switch in zero position and eliminate any damage.
- ► Make sure that all safety devices are properly mounted and function after work on the system has been completed and before putting the system into operation (again).

⚠ WARNING!

- ► Parts lying about on the system and in its vicinity can cause persons to stumble and / or fall and thus risk injuring themselves by contact with system components.
- ► Parts lying about in or on the components can lead to serious damage of the system.
- ► Never deposit objects (e.g. spare parts, replaced parts, tools, cleaning tools etc.) in the accessible areas of the system or in the surrounding areas after having worked on the system!
- ► **Before** putting the system into operation again, assure yourself that all loose or replaced parts have been removed from the system components!

⚠ DANGER!

Persons may be electrocuted or suffer serious electrical injuries if water from leaking hoses, seals and pipes reaches live parts.

- ► Disconnect the main power supply.
- ► Interrupt the main water supply.
- ► Only now may you enter the part of the house where large quantities of water have escaped.

NOTICE!

Leaking hoses, seals and pipes can cause structural damage or destroy electrical systems by short circuits.

- ► Check regularly whether large quantities of water are escaping and eliminate the leaks as soon as possible.

⚠ WARNING!

Children must not access the system. The safety distances for the system are not designed for children. A risk of injury cannot be excluded, even for supervised children.

2.2 Operator's responsibility

The operator is subject to the legal obligations regarding occupational safety and is responsible for the staff's safety. All safety, accident prevention and environmental protection regulations applicable for the area of use of the system must be observed. The following is especially important:

The operator must clearly specify responsibilities for operation, maintenance and cleaning.

The operator must provide the staff with the necessary personal protective equipment.

The operator is responsible for

- using the system in compliance with the designated use;
- ensuring that the system is only operated in an excellent state from the technical point of view and that maintenance intervals are observed;
- ensuring that his staff is trained to use the system;
- ensuring that operation instructions are prepared for the system.

2.3 Staff qualifications

Staff must consist of qualified persons who can be expected to perform their tasks reliably. Persons whose ability to respond is impaired, e.g. by alcohol, drugs or medication, must not work on the system. The operator is responsible for which persons he employs. **Big Dutchman** does not assume any liability for personal injury and property damage caused by insufficiently qualified staff.

2.4 Personal protective equipment

⚠ WARNING!

The following instructions apply to any task carried out on the system.

- ► Wear **close-fitting protective clothing** and **protective footwear**.
- ► Use **protective gloves** where there is a risk of hand injuries and **safety goggles** where there is a risk of eye injuries.
- ► Do not wear **any rings, necklaces, watches, scarves, ties or other items** which could get caught in parts of the system.
- ► Make sure that **long hair is always tied back**. Hair can get caught in driven or rotating working units or parts of the system, resulting in serious injuries.
- ► When working underneath the system **always** wear a **hard hat**!

2.5 Designated use

The **Big Dutchman** system may only be used for the purpose for which it is designated.

Any deviating use is considered non-designated use. The manufacturer shall not be liable for any damage resulting from such non-designated use. The user alone bears the risk. The designated use also includes the exact compliance with operating, maintenance and assembly requirements of the manufacturer.

2.6 Ordering of spare parts

⚠ CAUTION!

For you own safety, use original **Big Dutchman** spare parts only. For third-party products that have not been released or recommended and for modifications (e.g. software, control units), judging whether there is a safety risk in connection with **Big Dutchman** systems is not possible.

NOTICE!

The exact description of the spare parts to be ordered can be found by means of the position number in the spare parts list.

Indicate the following when ordering spare parts:

- the code number and description of the spare part;
- the customer number or order number;
- the current supply, e.g. 230 / 400 V – 3 Ph – 50 / 60 Hz.

2.7 Safety instructions when operating electrical appliances

NOTICE!

Only qualified electricians may install and work on electric parts / assembly groups in accordance with electro-technical regulations (e.g. EN 60204, DIN VDE 0100/0113/0160).

WARNING!

If an electric part is open, dangerous electric tensions are bare. Be aware of the danger and keep staff of other professions away from the danger zone.

NOTICE!

Do not install control devices directly in the house but in the service room to prevent corrosion caused by e.g. ammonia gas.

2.7.1 Protective-equipotential bonding (earthing) of the system

The system must be earthed professionally by the operator or a company commissioned by him at suitable points and according to the valid local guidelines and standards (e.g. IEC 60364-7-705 mod. 2006 / DIN VDE 0100-705: Low-voltage electrical installations – part 7-705: Requirements for special installations or locations – Agricultural and horticultural premises) for protective-equipotential bonding.

The earthing points must be connected with the foundation earth electrode.

Recommended earthing points:

1 x per system row near the foundation earth electrode.

The material required for earthing is not included in the Big Dutchman delivery.

3 System description

The control box CulinaCup BD105 controls the CulinaCup system for the feeding of suckling pigs. The control box uses a software and is available for the following system versions, which differ only with regard to the mixing tank size:

System 300 litres / 500 litres

Code no.	Description
91-00-3673	Control box CulinaCup BD105 pump 0.65 kW – agitator 3 Ph 0.55 kW

System 250 litres

Code no.	Description
91-00-3674	Control box CulinaCup BD105 pump 0.65 kW – agitator 1 Ph 0.55 kW

Extension unit

Code no.	Description
91-00-3676	Control box CulinaCup BD105 extension 1 component 0.55 kW

Depending on the use of either milk and/or pre-starters, up to two mixing programs can be defined.

The control box is operated via the touch screen.

Figure 3-1: Control box BD105

3.1 Software version

Software version 02.00 B1

3.2 Technical data

Control box CulinaCup BD105 single-phase

Code no.	91-00-3674
Supply voltage	230/400 V 50 Hz
Input power	approx. 4 kVA
Dimensions	284 mm x 364 mm x 120 mm
Housing / Protection rating	IP66
Weight	4.05 kg
Ambient temperature	0-50 °

Control box CulinaCup BD105 three-phase

Code no.	91-00-3673
Supply voltage	230/400 V 50 Hz
Input power	approx. 4 kVA
Dimensions	284 mm x 364 mm x 120 mm
Housing / Protection rating	IP66
Weight	4.7 kg
Ambient temperature	0-50 °

4 Electrical connection

The specific wiring diagram indicates how to connect the control box. The wiring diagram is enclosed with the control box.

⚠ WARNING!

Any connected tasks may only be carried out by authorized and qualified personnel and under consideration of local regulations (e.g. VDE)!

5 Operation of the system

5.1 Switching on

Set the main switch to "ON".

The control box resumes operation exactly where it was switched off.

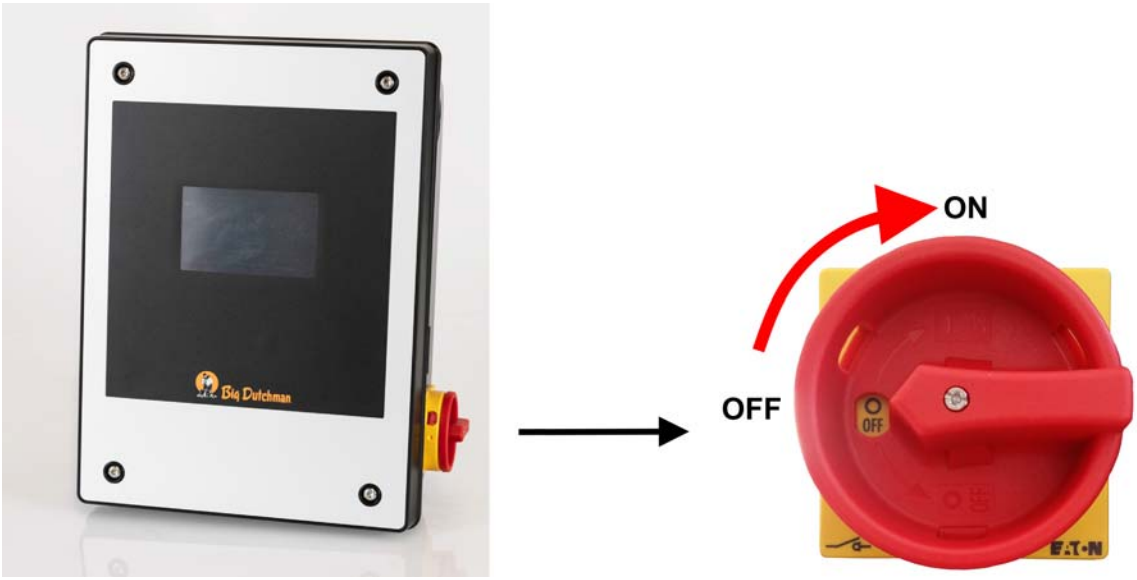


Figure 5-1: Switching on the control box

5.2 Start screen

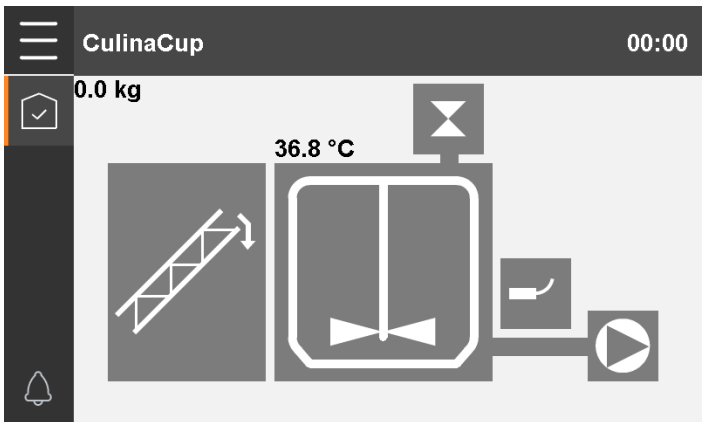
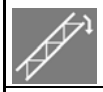


Figure 5-2: Start screen

Icon	Explanation
	Automatic preparation
	Mixing tank with agitator
	Pump
	Water valve
	Sensor to measure the mixing tank's fill level If the sensor is active  , this is indicated automatically as soon as the input is switched.
	Menu
0.0 kg	Contents of the mixing tank (scale value)
36.8 °C	Temperature in the mixing tank

System components that are switched on (manual operation) or active (automatic operation) are coloured orange.

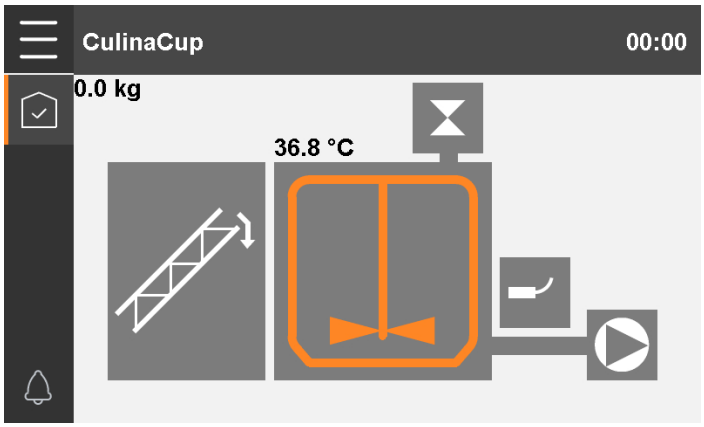


Figure 5-3: Example: mixing tank with switched on/active agitator, remaining components switched off/inactive

5.3 Menu

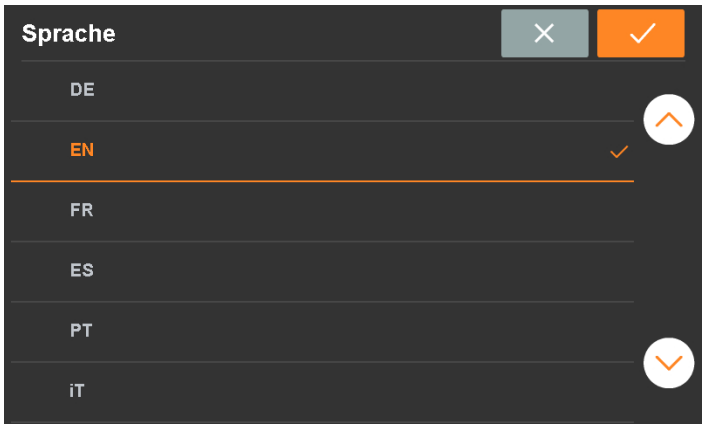
On the start screen, tap on ☰ to switch to the menu.

Tap on ✕ if you want to return to the start screen.

5.3.1 Language

Configure the system language in the "Language" submenu.

1. In the menu, tap on 🌐 to switch to the "Language" submenu.

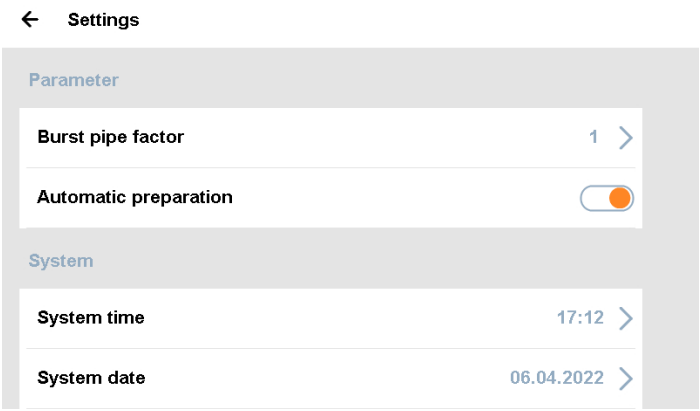


2. Select the required language from the list.
3. Save your input by tapping on ✓.

5.3.2 Settings

Configure basic parameters and system settings in the "Settings" submenu.

In the menu, tap on to switch to the "Settings" submenu.



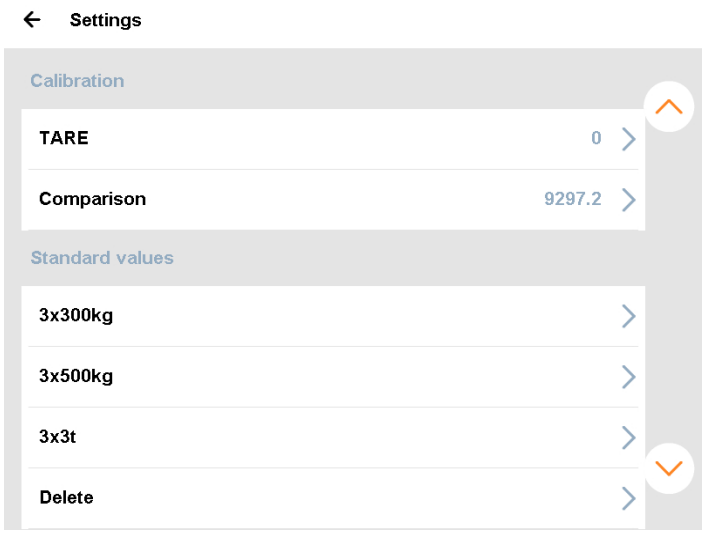
- **Burst pipe factor:** This value is used to determine a possible burst pipe when the water valve is in automatic mode. The factor is multiplied with the value **Dosing time** (see chapter 5.4.2 ”Water valve”):

  Burst pipe factor x dosing time = time period for a new request for water

  If the control box receives a new request for water within the calculated time period, it detects a burst pipe and the message "Alarm: Burst pipe" is generated.
- **Automatic preparation:** This parameter must be activated when a supply auger is connected.
- **System time / System date**

5.3.3 Animal scale

In the menu, tap on to switch to the "Scale" submenu.



5.3.3.1 Calibration

Calibrate the scale manually when using weigh bars that are not listed under "Standard values".

Tare

Tapping on "TARA" sets the scale value to 0.

NOTICE!

The mixing tank must be empty!

Comparison

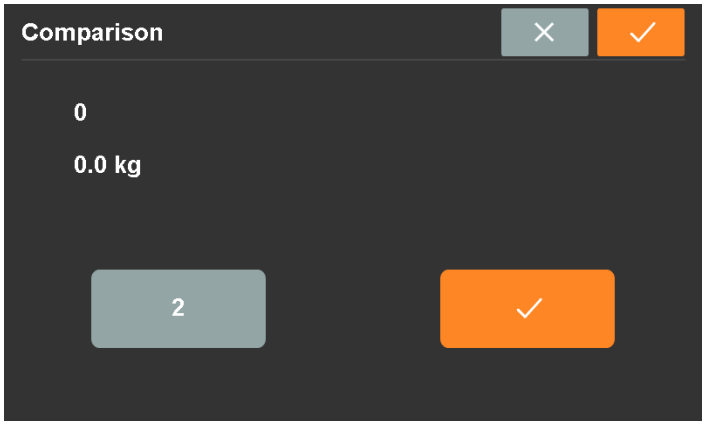


Figure 5-4: "Comparison" screen

Icon	Explanation	Limitation
	Discard comparison	
	Save comparison (*)	
	Switch to "Comparison weight" screen (**)	
	Make comparison (***)	
0	Raw value of the weigh bars without unit	Only for service technicians
0.0 kg	Weighed mass	

1. Set the scale value to "0" by tapping on "TARE" when the mixing tank is empty.
2. Place a defined and known weight (e.g. 20 kg) on the mixing tank.
3. Switch to the "Comparison" screen.
4. Switch to the "Comparison weight" screen. (**)
5. Enter the known weight (e.g. 20 kg) and confirm your input.
6. Make the comparison. (***)
7. Save the comparison. (*)

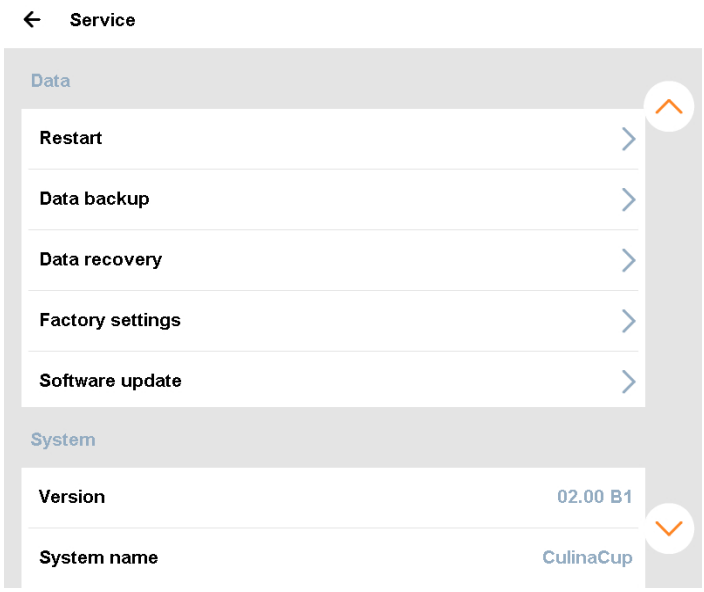
5.3.3.2 Standard values

The "Standard values" list shows common values for weigh bars.

Should the weigh bars of the mixing tank correspond to one of the listed values, use the respective value. No calibration is necessary in this case.

5.3.4 Service

In the menu, tap on to switch to the "Service" submenu.



5.3.4.1 Reboot

If necessary, reboot the control box by tapping on "Restart", e.g. after a software update.

5.3.4.2 Data backup

Go to "Data backup" to save all data on a USB flash drive, e.g. directly after initial operation or before a software update.

NOTICE!

The USB flash drive is not included in the scope of delivery. It must be formatted with FAT32 and have at least 1 MB of free storage.

NOTICE!

Data loss

All data saved on a USB flash drive are lost when formatting the drive.

► Copy important data to a different data carrier before formatting or use a USB flash drive without important data.

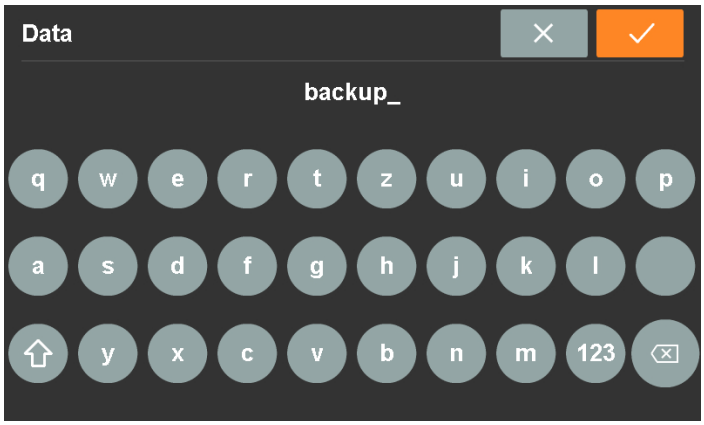


Figure 5-5: "Data backup" screen

1. Insert the USB flash drive into the control box.
2. Switch to the "Data backup" screen.
3. Assign a unique file name to the backup file.
   The system suggest the name "backup" and can be changed or extended.
4. Tap on ✓ to save the backup file on the USB flash drive.
5. Remove the USB flash drive from the control box and store it in a save place.

5.3.4.3 Data recovery

Go to "Data recovery" to reset the control box to a data status that was previously saved on a USB flash drive through a data backup, e.g. after

- replacement of a defective controller;
- accidental data modification;
- a failed software update.

1. Insert the USB flash drive into the control box.
2. Switch to the "Data recovery" screen.
3. Select the correct backup file from the list.

NOTICE!

Data loss

All data currently saved on the control box are overwritten.

► If necessary, save the current data in a different backup file on the USB flash drive first through a data backup.

4. Remove the USB flash drive from the control box and store it in a save place.

5.3.4.4 Factory settings

Go to "Factory settings" to reset the control box to the factory settings.

NOTICE!

Data loss

All data currently saved on the control box are deleted.

► If necessary, save the current data status first through a data backup.

5.3.4.5 Software update

Go to "Software update" to update the control box firmware.

NOTICE!

Data loss

When a software update fails, data saved on the control box may be lost.

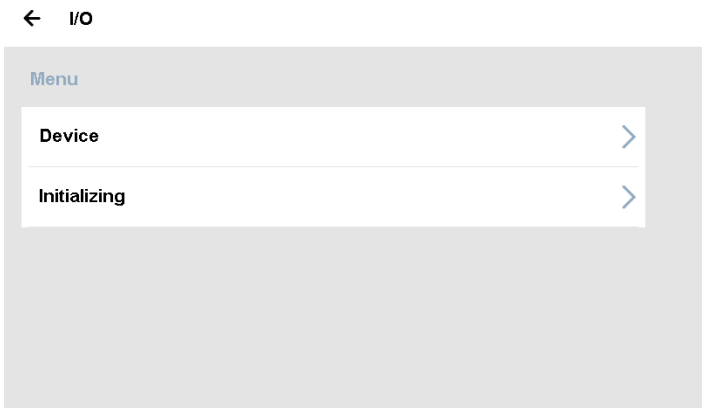
► Save the current data status first through a data backup.

5.3.5 I/O

NOTICE!

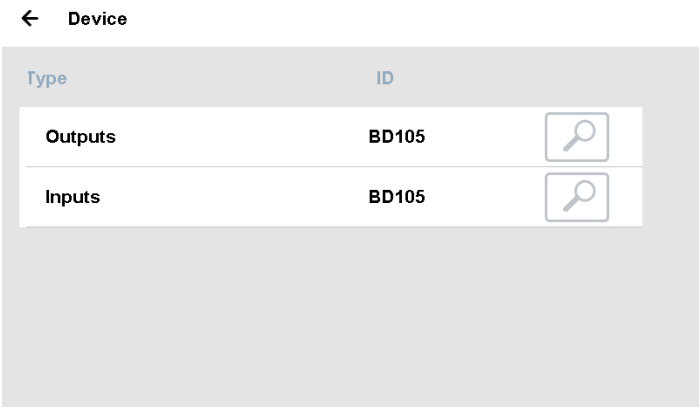
The "I/O" submenu and its functions are intended for service technicians only.

In the menu, tap on IO to switch to the "I/O" submenu.



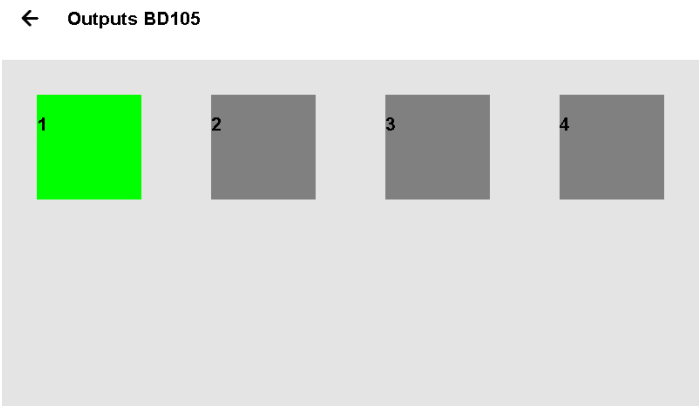
5.3.5.1 Device

All I/O cards are listed under "Device".



Outputs

In the corresponding line, tap on to switch to the "Outputs" screen. The current status of the outputs is displayed.



Tap on the outputs to toggle their corresponding function manually. The colour changes from green = active to grey = inactive.

NOTICE!

Material damage

Lack of knowledge about the functions of the individual outputs can damage the system.

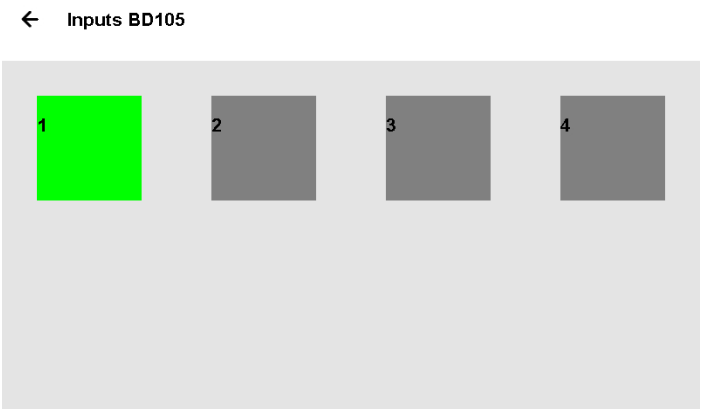
► Only change functions manually when you know the functions of the individual outputs.

When an extension unit is installed, 8 further outputs are listed in addition to the 4 standard outputs

Inputs

In the corresponding line, tap on 🔎 to switch to the "Inputs" screen. The current status of the 4 inputs is displayed:

green = active; grey = inactive



5.3.5.2 Initializing

Go to "Initializing" to re-initialize the CAN bus, e.g. when an I/O card is not accessible.

5.4 Settings in the selection menu

Open the selection menu of a system component by tapping on this system component on the start screen (see figure 5-6).

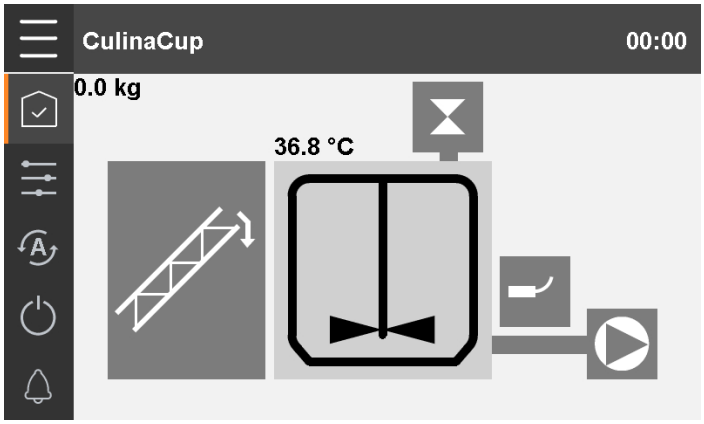
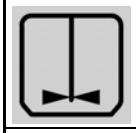
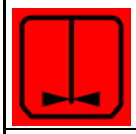


Figure 5-6: Example: selected mixing tank with open selection menu on the left

System components selected in this manner are coloured according to the table below (example: mixing tank).

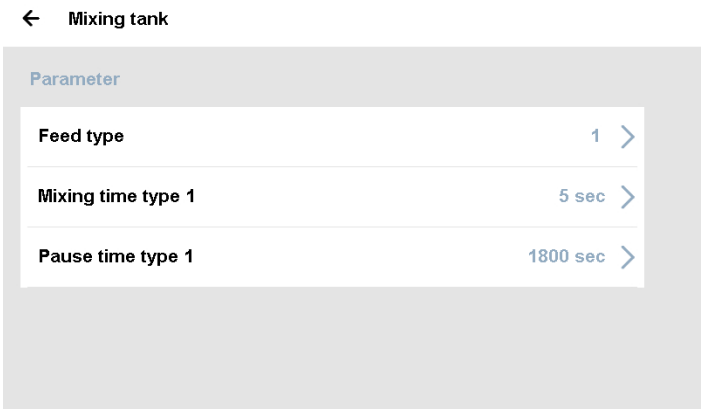
Icon	Colour		Component status	
	Foreground	Background	ON/active	Error
	inverted (black)	inverted (light grey)	no	no
	orange	inverted (light grey)	yes	no
	inverted (black)	red	no	yes
	orange	red	yes	yes
	Note: The selected system component has the same colour as an unselected system component. If the selection menu is not open, tap on the system component once more.			

In the selection menu, you may

- define settings for the automatic mode of the system component;
- switch between automatic and manual mode of the system component;
- switch the system component on and off in manual mode.

5.4.1 Mixing tank with agitator

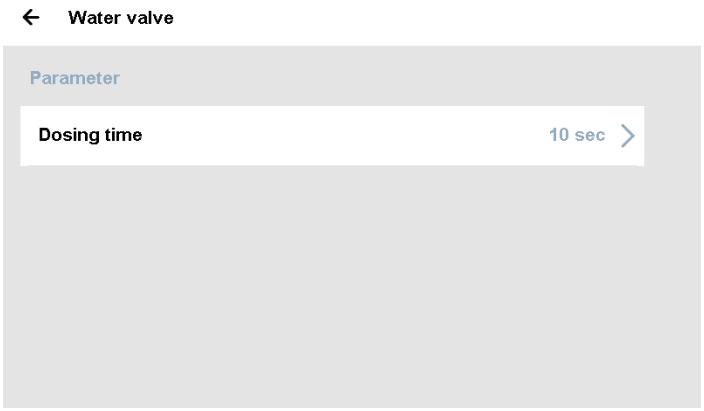
1. Tap on  .
2. In the selection menu, tap on  .



3. Tap on the correct parameter and change the value:
   - **Feed type:** selection of feed type 1 or 2.
   - **Mixing time:** time for which the agitator runs.
   - **Pause time:** time for which the agitator is idle (between the mixing times).
4. Save your input by tapping on  .

5.4.2 Water valve

1. Tap on  .
2. In the selection menu, tap on  .



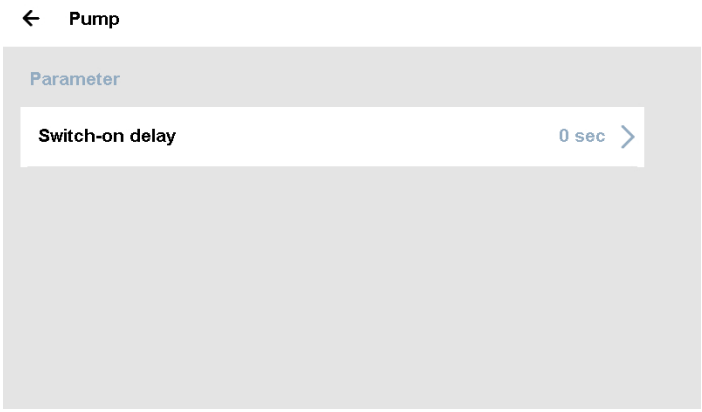
3. Tap on the parameter and change the value:

   Dosing time is the residual flow time for water in automatic mode. When the tank is empty, a corresponding amount of water is retrieved during the set time.

4. Save your input by tapping on ✓.

5.4.3 Pump

1. Tap on  .
2. In the selection menu, tap on  .



3. Tap on the parameter and change the value:

   The **switch-on delay** prevents continuous on/off operation in specific situations.
4. Save your input by tapping on  .

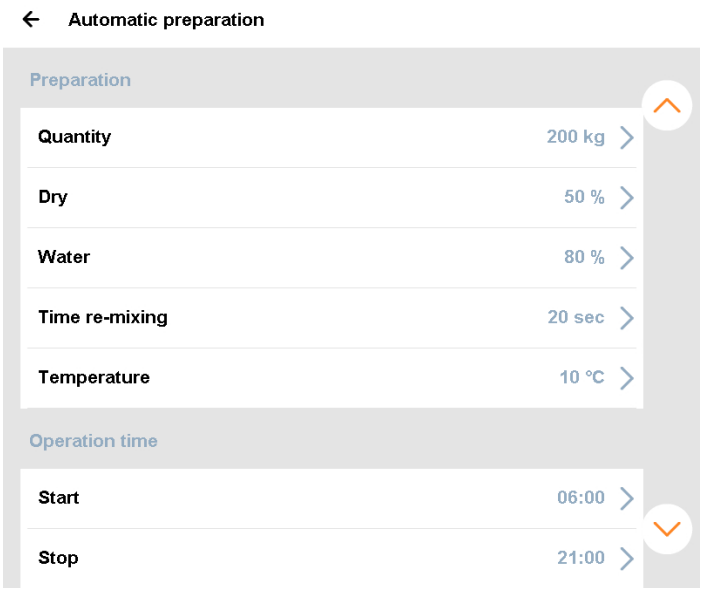
5.4.4 Automatic preparation

Select automatic preparation when a supply auger and the corresponding load cells are installed.

The supply auger is mounted underneath the silo and automatically transports dry feed into the mixing tank, when necessary. The preparation process is then repeated continuously within the daily time frame.

1. Activate "Automatic preparation" (see chapter 5.3.2 ”Settings”).
2. Tap on  .

3. In the selection menu, tap on .



Preparation

– **Quantity:** quantity of the completed prepared mixture
– **Dry:** share of dry feed in the prepared mixture
– **Water:** share of water in the mixture
– **Time re-mixing:** time between reaching the target quantity and dispensing
– **Temperature:** target temperature of the water (mere display that can generate the message "Alarm: Water temperature")

Operation time

– **Start:** daily start of the preparation process
– **Stop:** daily end of the preparation process

During the set time, mixing always starts when the sensor reports "empty".

5.4.5 Manual mode: agitator / water valve

1. Tap on  or  .
2. In the selection menu, tap on  to operate the agitator or water valve in manual mode.

   If the selection menu shows the icon  instead, manual mode is already active.
3. Tap on  to switch the agitator or water valve on and off manually.

   Upon switching, the colour of the agitator or water valve changes from black = switched off (see figure 5-7) to orange = switched on (see figure 5-8) and vice versa.

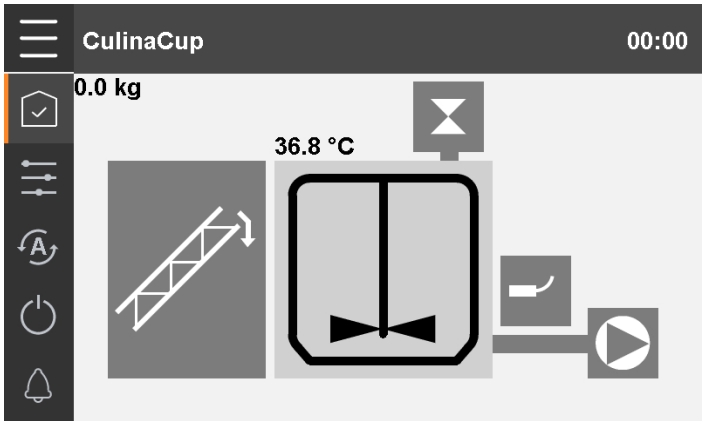


Figure 5-7: Example manual mode: agitator switched off

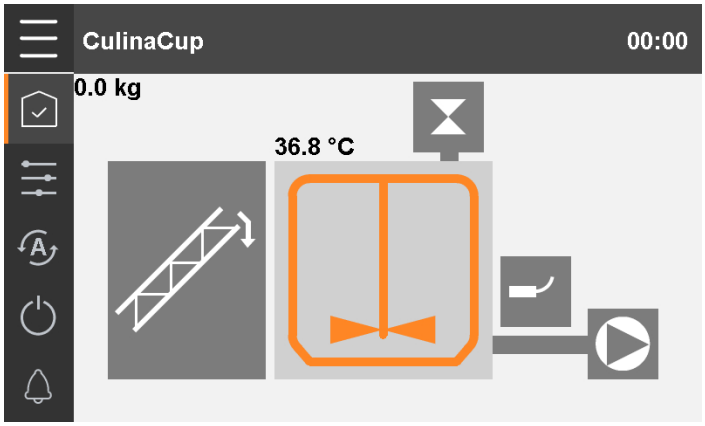


Figure 5-8: Example manual mode: agitator switched on

5.4.6 Manual mode: pump

The pump can be controlled manually to pump the remaining amount of feed from the mixing tank.

1. Tap on  .
2. In the selection menu, tap on  to operate the pump in manual mode.

   If the selection menu shows the icon  instead, manual mode is already active.
3. Tap on  to switch the pump on manually.

   Use the  button as follows: Tap on the button to switch on the pump (colour changes from black to orange) and hold it to keep the pump activated. Release the button to switch off the pump (colour changes from orange to black).

5.4.7 Automatic mode: agitator / water valve / pump

1. Tap on  ,  or  .
2. In the selection menu, tap on  to operate the agitator, water valve or pump in automatic mode.

   If the selection menu shows the icon  instead and the agitator, water valve or pump are marked by the icon  , this means that automatic mode is already active.

   In case of automatic (de)activation, the colour of the agitator, water valve or pump changes from white (if not selected) or black (if selected) = inactive (see figure 5-9) to orange = active (see figure 5-10) and vice versa.

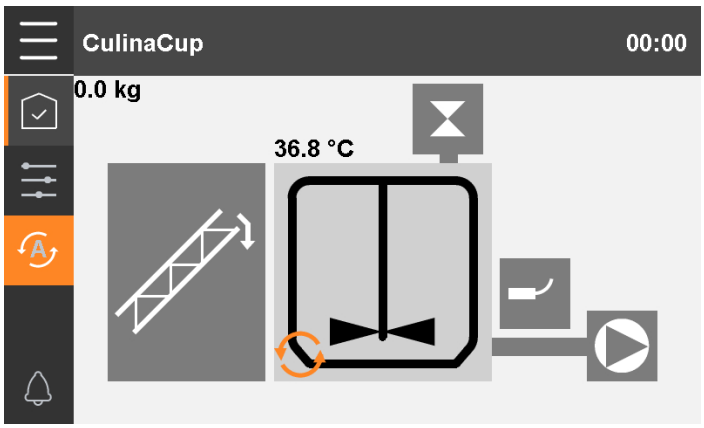


Figure 5-9: Example automatic mode: agitator inactive (and selected)

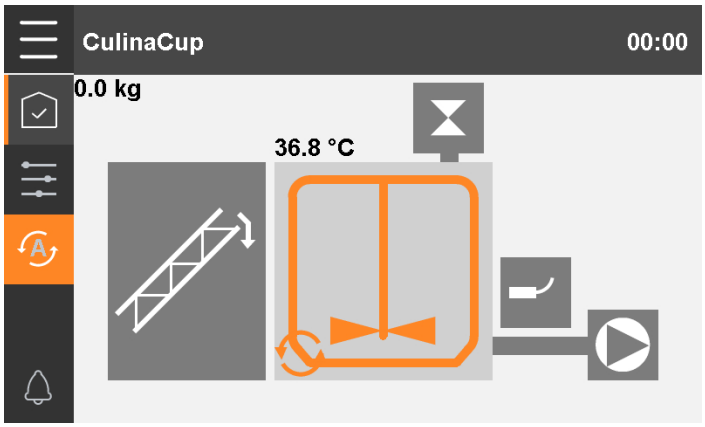


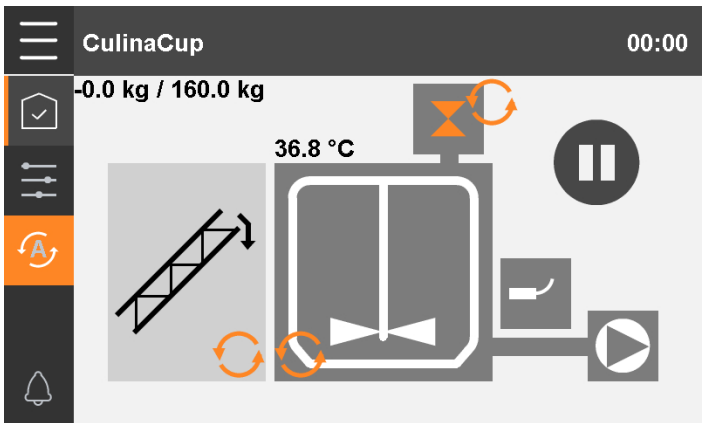
Figure 5-10: Example automatic mode: agitator active (and selected)

5.4.8 Automatic mode: automatic preparation

For preparation to be carried out automatically, agitator and water valve also must be in automatic mode.

1. Operate the agitator and water valve in automatic mode (see chapter 5.4.7 ”Automatic mode: agitator / water valve / pump”).
2. Tap on  .
3. In the selection menu, tap on  to operate automatic preparation in automatic mode.

   If the selection menu shows the icon  instead and automatic preparation is marked by the icon  , this means that automatic mode is already active.



Process of automatic preparation

1. The defined water quantity is pumped into the mixing tank.

2. The water temperature is checked according to the set temperature.

   If applicable, a message reading "Alarm: Water temperature" appears.

3. The mixing tank's agitator starts.

4. Dry feed is added to the mixing tank until the target quantity has been reached.

   During filling, the scale value for the current quantity / set target quantity above the icon for the automatic preparation changes.

5. The mixture is mixed until the set time for re-mixing has been reached.

   The remaining mixing time is displayed below the mixing tank icon.

   During preparation, the icon is displayed.

   - To interrupt the process, tap on .
   - To cancel the process, hold for a while.

5.5 Retrieving water for mixing

To mix a specific quantity of feed, you can set the dosing time for the required quantity of water. The water valve must be in manual mode.

1. Operate the water valve in manual mode (see chapter 5.4.5 ”Manual mode: agitator / water valve”).
2. Hold until the "Manual dosing time water" screen opens.
3. Enter the desired time.

   NOTICE!

   The relation between time and required quantity of water depends on the situation on site, e.g. the water source.

4. Save your input by tapping on .

5.6 Switching off

Switch off the control box before working on the system, especially the mixing tank:

Set the main switch to "OFF" to disconnect the control box from power.

All entered values will be saved!

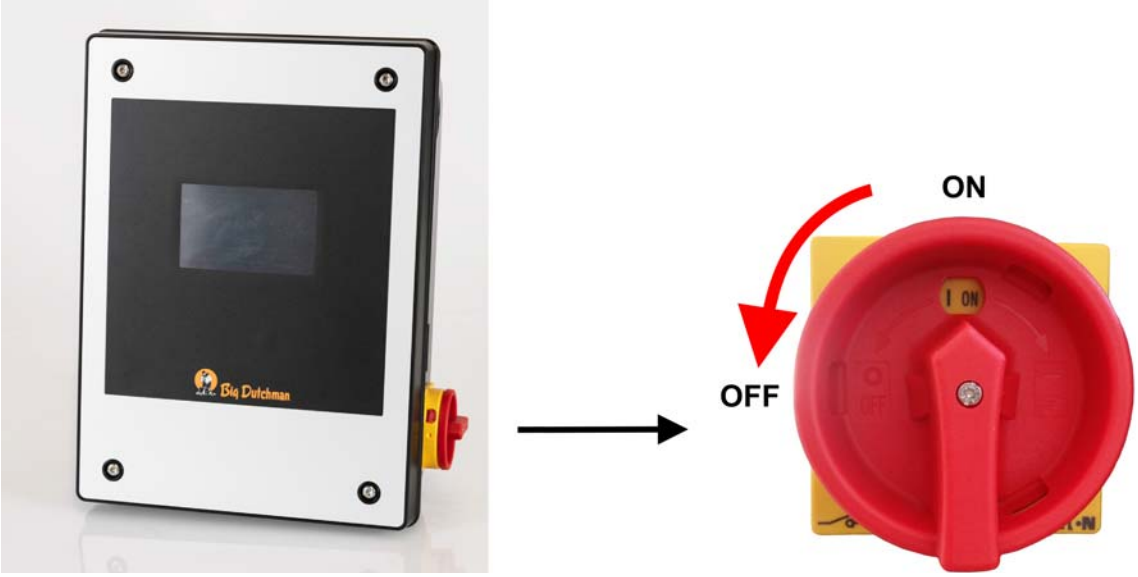


Figure 5-11: Switching off the control box

6 Troubleshooting

⚠ WARNING!

Switch off the system before performing any repair, maintenance or cleaning tasks and before eliminating functional errors. Disconnect the system from the power supply and secure it against reactivation.

Secure the system by fixing a sign to the main switch reading "Do not put into operation!" and add a note about ongoing maintenance work, if necessary.

System components affected by errors sometimes have a red background.

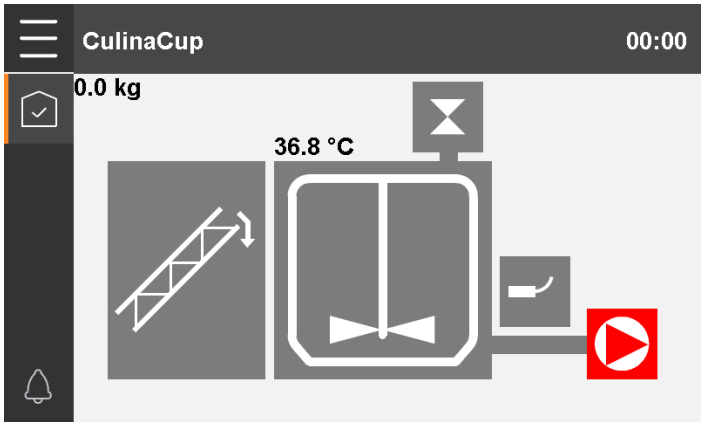
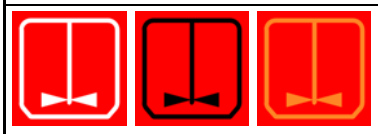


Figure 6-1: Example: "Alarm: Motor protection" (pump)

Fault / Error	Possible cause
 Alarm: Motor protection	• Feed mixture too viscous • Foreign object in pump body • Motor protection switch set incorrectly
 Alarm: Motor protection	• Feed mixture too viscous • Foreign object in agitator • Motor protection switch set incorrectly
Message "Alarm: Burst pipe"	• Milk intake very high • Ring line broken and milk escaping • Burst pipe factor (see chapter 5.3.2 ”Settings”) not set correctly
Message "Alarm: Fill level"	• Litre output of water supply too little • Water supply interrupted • Sensor defective
Message "Alarm: Water temperature"	• Water does not have the set temperature

Fault / Error	Possible cause
Message "Alarm: Preparation water"	• Water valve did not switch • Water not calibrated correctly or defective • Water connection closed
Message "Alarm: Preparation milk powder"	• Motor protection switch of supply auger triggered • Motor of supply auger defective • Supply auger clogged • No milk powder left
Message "Alarm: Start preparation feed amount"	• Scale defective • Mixing tank stuck (foreign object under mixing tank)

7 Cleaning

Clean the exterior of the control box with a damp cloth in case it is dirty.

NOTICE!

Make sure that the control box is not damaged by a high-pressure cleaner.

8 Dismantling and disposal

NOTICE!

When disposing of the system, commission experts only.

The operator is responsible for disposing of the system at the end of its service life. Observe the applicable statutory provisions when disposing of the system.

NOTICE!

Incorrect disposal can lead to environmental damage.

- ► The system and individual parts must be disposed of properly!
- ► If necessary, commission a specialised company with the disposal.

NOTICE!

Observe system-specific safety instructions during dismantling.

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