June 19, 2017

Original operating manual

Concentrate Feeder KFA3-MA3

Version: IFS 6.05 / device: starting with H 8.13 and S 1.10

Table of contents

1 Introduction

This operating manual puts you in the position to operate the concentrate feeder safely and as intended.

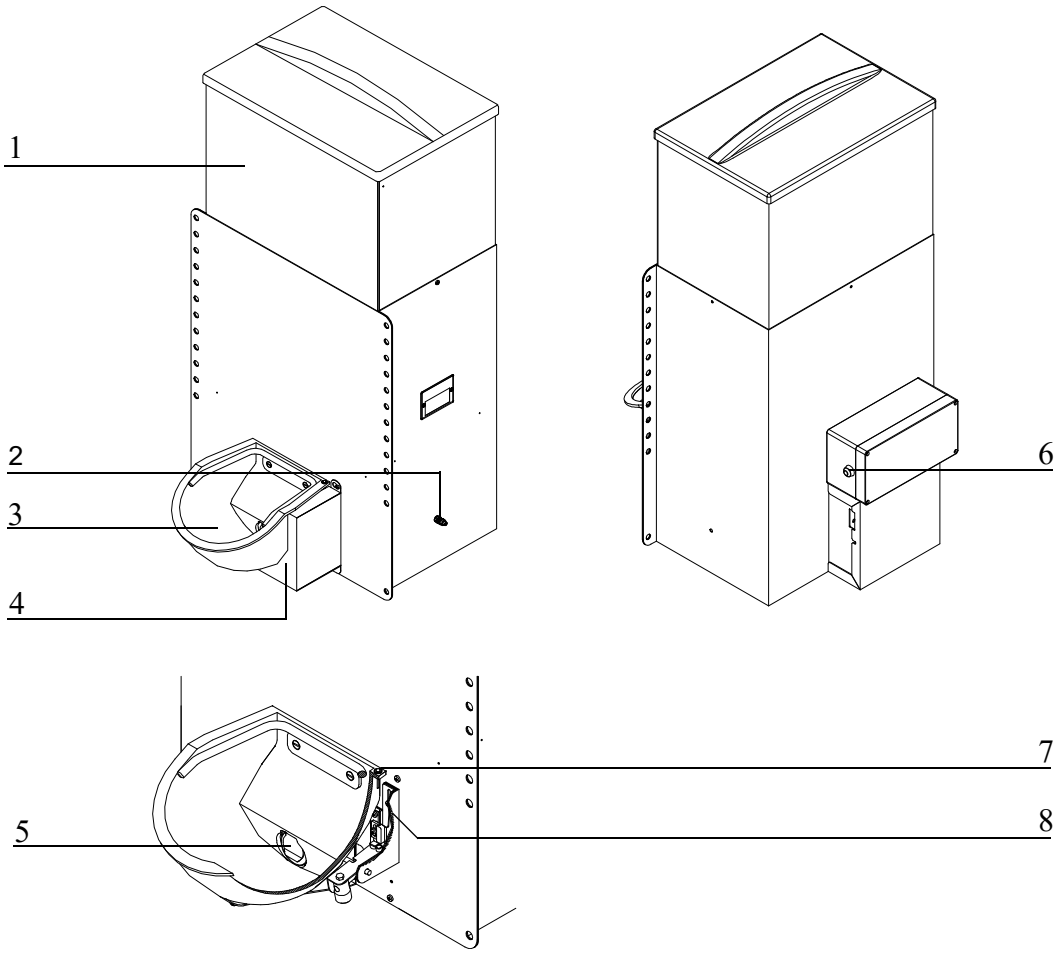
- Please read the operating manual carefully before putting the concentrate feeder into service.
- Keep the operating manual and pass it on to the next user.
- Observe all of the warnings and safety instructions in this operating manual at all times.
- The concentrate feeder is connected to an automatic feeder. You must also observe the separate operating manuals, safety instructions and warnings of the automatic feeder.

1.1 Functional description

Feeding a high-quality concentrate is recommended as early as possible. At the concentrate feeder with consumption control, the calves receive concentrate that is fresh and adjusted individually to them. The quantity consumed is registered in the automatic feeder and can also be displayed there.

Automatic weaning can be activated: As soon as the concentrate consumption reaches a certain threshold, e.g. 1 kg per day, the feed quantity is automatically reduced.

1.2 Components



1 Storage container for concentrate (with attachment)
2 Ground connection screw
3 Feed bowl
4 Dosing mechanism cover
5 Dosing flap
6 Calibration button on the control box
7 Illuminated diode (LED) of the feed sensor
8 Stop, dosing flap with feed sensor

1.3 Technical data

The concentrate feeder can be connected up to all automatic feeders equipped with an H or S program.

1.3.1 Mass

Height:	955 mm
Width:	496 mm
Depth:	without feed bowl: 383 mm
	with feed bowl: 650 mm

1.3.2 Electrical connection

Note: The specifications for the electrical connection to your concentrate feeder are on its name plate on the concentrate container (see 1.3.6 "Name plate" - 7).

1.3.3 Capacity of the concentrate container

Depending on the concentrate, up to 70 kg

Volume: approx. 95 l

1.3.4 Number of concentrate dosing units and number of animals

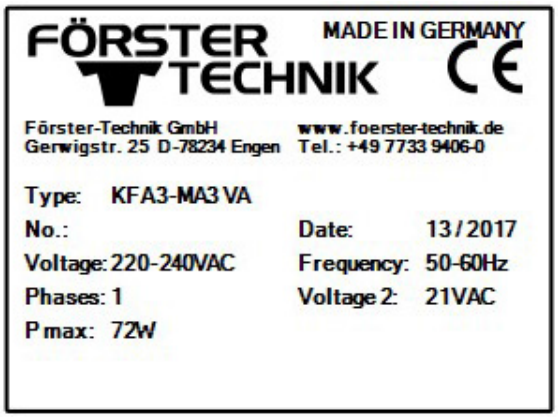
You can connect up to eight concentrate feeders to one automatic feeder. Depending on the concentrate feeder, 25 to 30 animals can be fed.

1.3.5 Distance between concentrate feeder(s) and automatic feeder

Since concentrate station(s) and automatic feeder are connected via CAN bus, the distance between the individual devices can be chosen as required. The length of the CAN bus cables, which must not exceed 400 m in total, is the limiting factor.

1.3.6 Name plate

Each concentrate feeder is equipped with its own name plate. The name plate is on the left side of the concentrate container. An example of a name plate is illustrated below:



1.4 Manufacturer's contact details

Please get in touch with us if you have any questions on our products or require technical support.

Please note down accordingly the device date stated on your device to have it ready and available whenever you make a call.

TYPE:

NO.

Our contact details:

Förster-Technik GmbH
Gerwigstrasse 25
78234 Engen, Germany
Phone: +49/ (0)7733/ 9406- 0
Fax: +49/ (0)7733/ 9406- 99
info@foerster-technik.de
www.foerster-technik.de

2 Important safety instructions

This chapter outlines:

- The hazards caused by your concentrate feeder and how to avoid them.
- The safety labels attached to the concentrate feeder and what they mean.
- How to operate the concentrate feeder safely.

The concentrate feeder is state-of-the-art and is produced in compliance with recognized safety regulations. However, hazards and adverse effects may arise when using it. Both warning signs directly on the concentrate feeder and warning notices in this manual provide warning of these hazards.

2.1 Intended use

The concentrate feeder may only be used for the automatic dosage of ground or pelleted animal feed for calves.

2.2 Target group

2.2.1 Necessary qualifications of the owner

The owner must be a trained farmer or have good practical experience in farming. He must know the relevant accident prevention regulations and generally accepted safety regulations.

2.2.2 Necessary qualifications of the service technician

Only trained service technicians are authorized to install the concentrate feeder, put it into service and subject it to maintenance and repairs.

Service technicians are specialists with appropriate qualifications. They are able to assess the work assigned to them and detect potential risks on the basis of their technical training as well as their knowledge of the relevant standards. They have knowledge of relevant accident prevention regulations, generally accepted safety regulations and country-specific standards and provisions.

2.3 Residual risks

2.3.1 Potentially fatal hazards or health hazards

Hazards to health caused by the concentrate feeder:

⚠ WARNING!

Danger from electric current

The concentrate feeder is powered by electricity.

► You must observe the general precautions for handling electrical equipment.

- Read the operating manual before operating the concentrate feeder.
- Keep children away from the concentrate feeder.

- Only electricians are allowed to open the cover of the transformer.
- Do not touch any moving parts of the concentrate feeder, for example the worm conveyor.
- Only use genuine spare parts from the manufacturer.
- Always disconnect the mains plug of the concentrate feeder before performing any maintenance or cleaning on it.
- If you are operating the concentrate feeder outside of closed spaces, you must protect it against rain and moisture, for example with a roof.
- The electrical system of the concentrate feeder can present the following special hazards:
  - **Electrical discharge**. If there is an electrical or voltage breakdown, electric current flows through parts of the concentrate feeder that are normally insulated. Touching the unit can cause a fatal electric shock. The concentrate feeder must be checked regularly for electrical safety in compliance with national regulations (repeated inspection). Make sure that a 30 mA residual current device (RCD) is installed.
  - **Short circuit, indirect contact**. If there is a short circuit, current at many times the level of the operating current can flow. Touching the unit can cause a fatal electric shock. Make sure you install a fuse (provided by the customer) corresponding to the rating on the name plate and a 30 mA residual current device (RCD) in compliance with local regulations.
- The worm conveyor can start up unexpectedly. This can crush or chop off fingers or hands. Never reach into the area of the worm conveyor while the concentrate feeder is in operation.

2.3.2 Material damage

Material damage caused by the concentrate feeder

The concentrate feeder can cause the following types of material damage:

- **Infection**. Improper cleaning or incorrect operation can result in calves becoming infected by pathogens from the concentrate feeder. This can lead to medical costs or cause the death of the calves. Check whether the animal feed is in perfect microbiological condition and give it swiftly to the animals after preparing it.
- **Corrosion**. Remove all coolants and lubricants completely in accordance with the cleaning specifications in 6 "Cleaning" - 32 when putting the concentrate feeder into service for the first time.
- **Loss of stability**. The concentrate feeder must be sufficiently fastened in place. Otherwise, the concentrate feeder could tip over and become damaged.

2.4 Your duties

The owner is obliged to:

- Prevent misuse by children.
- Carefully read and understand this operating manual before putting the concentrate feeder into service.
- Allow only operating personnel to work with/on the concentrate feeder who:
  - Are familiar with the basic operational safety and accident prevention regulations.
  - Have been instructed in work with/on the concentrate feeder.
  - Have read and understood this operating manual.
- Operate the concentrate feeder only as intended.
- Keep all safety signs on the concentrate feeder in legible condition and renew damaged ones.
- Not change the design or functions of the concentrate feeder.
- Operate the concentrate feeder only in perfect functional condition.
- Subject the concentrate feeder to regular visual inspection for possible damage and have it rectified by a service technician if necessary.
- Make sure the mains sockets of the concentrate feeder and the power supply provided by the customer are easy to access at all times.
- Check the animal feed to be fed to the animals for perfect microbiological condition to avoid damaging the health of the animals.
- Make sure that all cable and hose connections are installed outside the animal area.
- Protect the concentrate feeder and all corresponding cables from exposure to sunlight.

2.5 How am I warned of hazards?

Hazards are indicated directly on the concentrate feeder by safety labels (warning signs, instruction and prohibition notices), and in the operating manual by specially marked hazard descriptions.

The warnings for hazards that can cause death or injury to people are emphasized more than those for material damage, for example through the colors, hazard words or symbols used.

Safety labels are an important element of the overall concentrate feeder safety concept. They provide warnings about hazards and explain how to avoid them.

Make sure that all the specified safety labels are fitted to your concentrate feeder and that they are in a legible condition. If the safety labels are difficult to read, replace them immediately. New safety labels are available from Förster-Technik GmbH.

2.5.1 What are the components of a hazard description?

A hazard description always consists of the following elements:

- Hazard word (danger, warning, caution, attention)
- Type of hazard (what can happen?)
- Location of hazard (where can it happen?)
- Actions necessary for preventing the hazard (what should I do?).

2.5.2 Potentially fatal hazards or health hazards

Depending on their severity and the probability of them occurring, hazards that can cause death or injury to people are indicated by a hazard symbol ⚠ (warning triangle with exclamation mark) and the following hazard words:

⚠ DANGER!

The word DANGER indicates an imminent hazard that will lead to death or serious injury.

Warning signs in the operating manual: **DANGER** (white text on red background).

⚠ WARNING!

The word WARNING indicates a potentially hazardous situation that could lead to death or serious injury.

Warning signs in the operating manual: **WARNING** (black text on orange background).

⚠ CAUTION!

The word CAUTION indicates a potentially hazardous situation that could lead to minor injury.

Warning signs in the operating manual: **CAUTION** (black text on yellow background).

2.5.3 Material damage

NOTICE!

The word ATTENTION indicates possible material damage. The concentrate feeder or an object in its vicinity may be damaged, for example a calf.

Prohibition notice on the concentrate feeder: a pictogram crossed out in red in a white circle with a red border indicates something you are not allowed to do.

Operating manual: white text on blue background

2.6 Safety signs

What are warning signs?

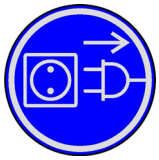
Warning signs consist of:

- A pictogram in a yellow triangle illustrating the potential hazard.

What are prohibitory signs?

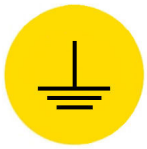
Prohibitory signs have a pictogram of the prohibited action in a red circle with a line through it. See the adjacent example. They graphically depict the prohibited action. In this example, the hose with a line through it means that you may not use high-pressure cleaners.

What are mandatory signs?



Mandatory signs show a pictogram of the mandatory action in a blue circle. They graphically depict the mandatory action. In this example, the pictogram means that you must always disconnect the plug first.

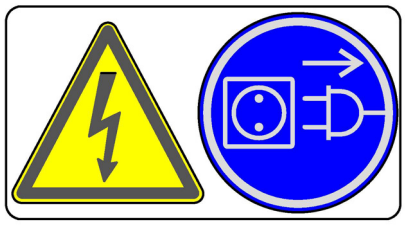
Other signs



Earthing symbol. This symbol is placed in the locations where you must perform potential equalization.

2.6.1 Warning signs on the machine

Danger of death by electric shock



Automatic start-up

No spraying

Earthing symbol

2.7 Safety devices

The safety devices at the machine are an important part of the safety concept and help prevent accidents.

- Do not remove or change the safety devices unless the corresponding safety instructions have been complied with.
- Put the machine into service only once all safety devices have been fitted and are in the guard position!

3 Commissioning

The concentrate feeder may be commissioned only by a service technician.

3.1 Electrical connection provided by the customer

The concentrate feeder needs its own current circuit.

- Have the electrical connection (provided by the customer) installed by a qualified electrician.
- Comply with the local regulations and safety measures.
- A 30 mA residual current circuit breaker in the power supply (provided by the customer) is compulsory for the operation of the concentrate feeder.
- The power supply must meet the voltage and frequency specifications. The specified supply voltage must correspond to that of the power supply.
- Have excess voltage limiters installed as a lightning protection measure by a qualified electrician in your power supply (provided by the customer).
- Protect the concentrate feeder and all corresponding cables from exposure to sunlight.

Potential equalization

To protect the animals and prevent electrical failures, all metallic objects, such as the stand partition and concentrate feeder must be grounded. These locations are indicated by the grounding label (see 2.6 "Safety signs" - 12). The connecting screw to ground the concentrate feeder is on the right-hand side of the device housing. Connect this screw to the local ground via a short, flexible copper cable (minimum cross-section of 4 mm²).

3.2 Cleaning

For reasons of hygiene, the concentrate feeder must be cleaned thoroughly before putting it into service to completely remove any existing coolant or lubricant residue (see 6.3.2 "Thorough cleaning" - 32).

3.3 Assembling the concentrate feeder

1. When setting up the concentrate feeder, observe the occupational safety measures.

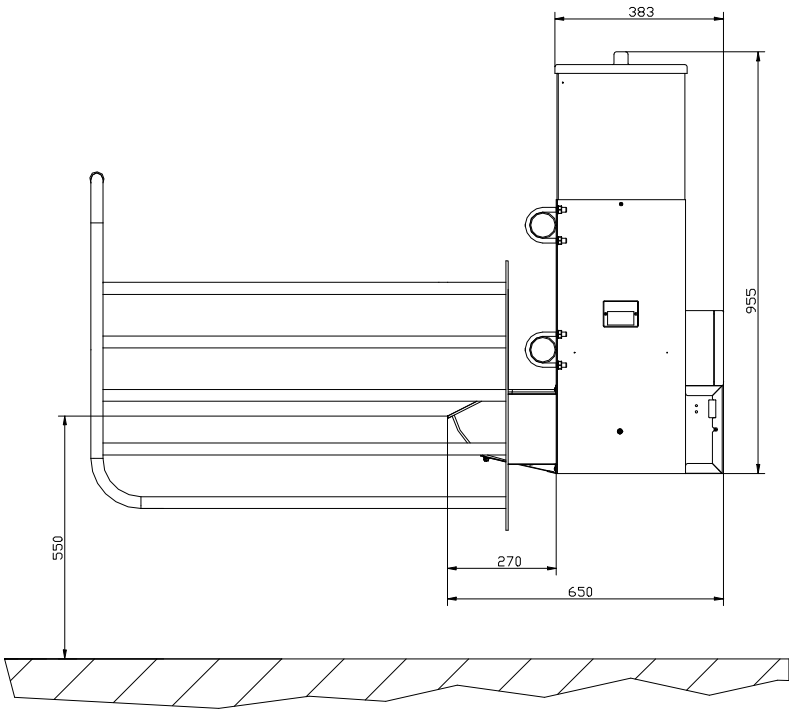
⚠ CAUTION!

Beware of the health hazards caused by lifting heavy loads.

► Never carry the concentrate feeder by yourself.

2. Assemble the concentrate feeder in such a way that the concentrate can be filled easily and so that maintenance work is possible without problems.

   Note: The distance between the feed bowl and the installation space must not exceed 55 cm.



NOTICE!

Make sure that the concentrate feeder is sufficiently fastened.

3. Inform the user that the concentrate feeder and its cables must be protected from exposure to sunlight.

3.4 Assembling the concentrate station

1. Assemble the partition and install the antennas (see installation instructions for MultiReader identification).

NOTICE!

Install the antenna cables in such a way that they cannot be damaged by the animals.

2. Connect the antenna/s to the control unit as indicated in the machine's circuit diagram (also see illustration).

1 Connection for antenna

3.5 Filling the concentrate feeder

You can fill the concentrate feeder with commercially available calf pellets, calf flakes or crushed or coarsely ground cereals (with low glume content).

NOTICE!

Make sure the concentrate is in perfect microbiological condition.

The concentrate feeder may not be used to feed floury concentrate that cannot be poured, since such feed does not ensure constant dosage.

Note: Fill the concentrate feeder only with dry feed!

3.6 Connecting the CAN bus cable

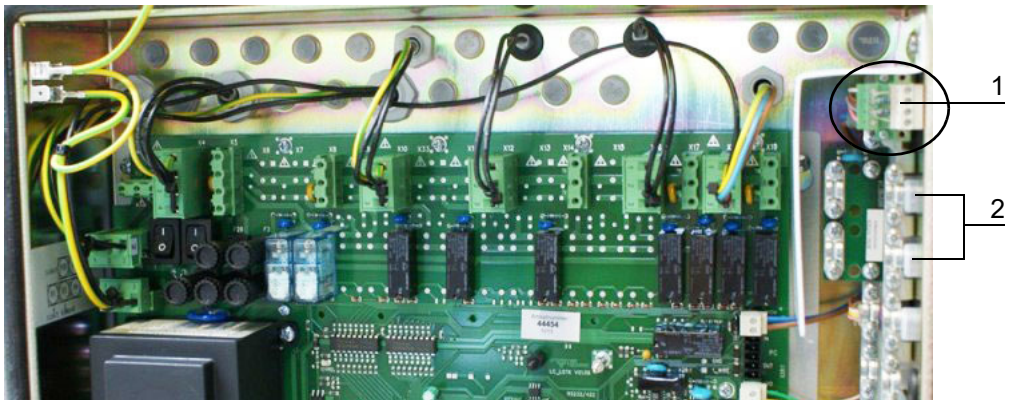
⚠ DANGER!

Lethal electric shock

The electrical components of the automatic feeder are live.

► Always disconnect the mains plug before opening the control station of the automatic feeder.

1. Connect the CAN bus cable to the main board of the automatic feeder as indicated in the machine's circuit diagram (also see illustration). You can choose the distance between the individual devices as desired. The length of the CAN bus cables, which must not exceed 400 m in total, is the limiting factor.



1 Connection for CAN bus
2 Access

3.7 Connecting the concentrate feeder to the power supply

- Insert the mains plug of the concentrate feeder into the socket.

⚠ CAUTION!

Observe the electrical power ratings (see 1.3 "Technical data" - 6).

3.8 Registering the concentrate feeder

The concentrate feeder must be activated in the setup for the automatic feeder.

Note: Also observe the operating manual for the automatic feeder.

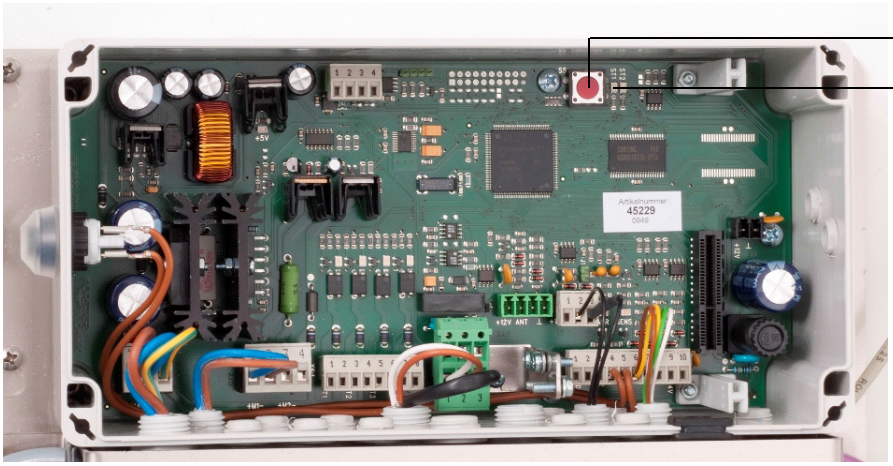
1. Plug the power plug of the automatic feeder into the appropriate socket.
2. Press [📖2] on the hand terminal of your automatic feeder and hold down this key when you switch on the device.

   After a short time, the **Setup menu** will appear on the display.
3. In the setup menu, choose the **Stations > Concentrate** option.
4. Use [<] [>] to select the desired concentrate station.
5. In the **Allocation** menu, select the station to which you want to assign the concentrate station.
6. In **Address**, select an address with which the concentrate station can be identified in the CAN bus system. The address range is between 51 and 60.
7. Under Type, select the value **Standard**.
8. Remove the cover of the control unit.

   In order for a data exchange between automatic feeder and concentrate station to be able to take place, the selected CAN bus address needs to be transferred.
9. Confirm **Search?** with [Enter].

   The message **Searching for IFS-C!** appears on the display.

10. Press the **S5** button on the main board of the concentrate feeder to activate search mode. The green LED (ST1) next to the button flashes (ten times a second).



1 Button S5
2 LED ST1

11. The message **IFS-C found!** appears on the display when the concentrate station is detected on the CAN bus.

    Note: Please check the CAN bus line if this message is not displayed.

12. To exit setup, repeatedly press Esc until the message **End setup?** appears. Confirm with Enter.

13. Screw the cover of the control unit back on.

14. Activate other concentrate stations the same way. Be sure that each concentrate station is allocated to a different address.

3.9 Filling the dosing unit

1. Select > **Diagnosis** to switch to the **Motors** submenu.
2. In Concentrate, press Enter and hold down the key until the concentrate is dispensed into the feed bowl.

3.10 Setting the feed type

If several concentrate stations are registered, you can choose between two different feed types for each station (feed type 1 or feed type 2). Specification must be made for each station as to which type of feed is to be dispensed or which feed plan is to be applied for this station.

The feed type is defined as follows:

1. > **Device data > Stations > Concentrate**.
2. Use > to select a concentrate station. The feed type specified for this station is displayed.
3. Press Enter if necessary and change the desired feed type.

3.11 Calibration

Like all other feed components, the concentrate feeder must also be calibrated. You can perform the calibration directly at the concentrate feeder or via the automatic feeder.

Note: Please observe the **Calibration chapter** in the operating manual for the automatic feeder.

Note: Have a set of scales ready for the calibration process.

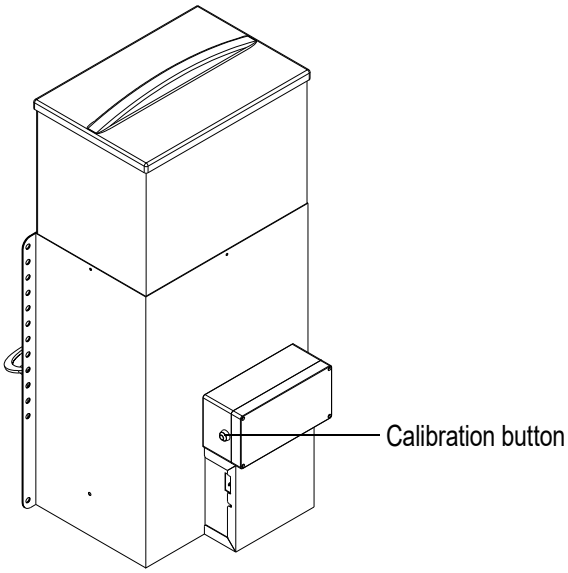
3.11.1 Calibration via automatic feeder

1. Remove the concentrate from the feed bowl.
2. [book 2] **> Calibration > Components > Concentrate**.
3. Use [<] [>] to select the desired concentrate station.
   3.1. **Set qty** shows the quantity of concentrate to be dispensed by the concentrate feeder.
   3.2. In **Pulses**, the motor pulses of the concentrate station are displayed.
   3.3. **Date** shows when the concentrate was last calibrated.
4. In **start?**, press [Enter].

   The calibration procedure begins and concentrate is dispensed. The set value of 500 g will be shown first in the display. The actual value flashes on the display shortly afterwards.
5. Weigh the material to be conveyed.
6. Enter the determined weight of the material to be conveyed in the **Current** input field. Complete your entry by pressing [Enter].
7. **Date** now shows the current date.
8. Repeat the calibration to check your results.

3.11.2 Calibration via concentrate feeder

1. Remove the concentrate from the feed bowl.
2. Press the calibration button on the concentrate feeder and keep the button pressed until the conveyor automatically stops. The calibration button is on the left side of the control housing (see illustration).



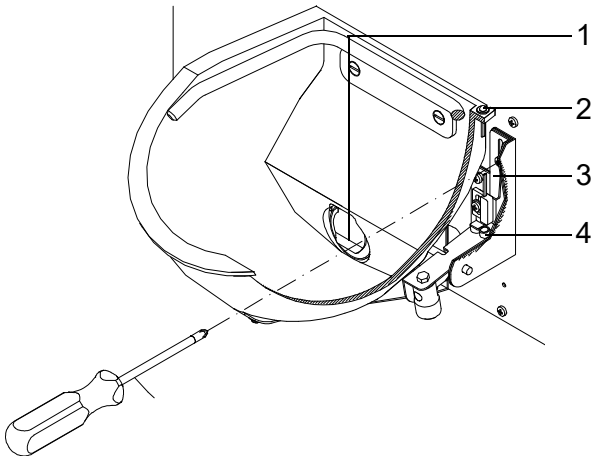
3. Weigh the material to be conveyed and note down the value.
4. Call up the following menu:
   > Calibration > Components > Concentrate
5. Use [<] [>] to select the desired concentrate station.
6. Navigate to the **measured?** menu item and press [Enter].
7. Enter the determined weight of the material to be conveyed in the **Current** input field. Complete your entry by pressing [Enter].
8. Press the calibration button on the concentrate feeder again and check whether target weight and actual weight of the material to be conveyed match.

3.12 Monitoring the portion size

1. Remove the concentrate from the feed bowl.
2. Hold a transmitter next to the identification unit.
3. Check whether the dispensed concentrate quantity corresponds to the value intended for the relevant day according to the group plan.
4. If the concentrate quantity is too high or low, you must change the portion size plan of the respective group (see 4.2.2 "Portion size plan" - 25).

3.13 Define the concentrate replenishment

Whether the feed bowl needs to be emptied first by the calf before a new portion is dispensed or whether it may still contain feed residue is defined by the position of the dosing flap.



1 Dosing flap
2 LED for empty signal unit
3 Stop, dosing flap with reed contact
4 Magnet for reed contact

To change the position of the dosing flap, you must move the dosing flap's stop up or down.

1. Remove the feed from the feed bowl.
2. Remove the cover of the dosing mechanism on the right from the feed bowl.
3. Undo the upper screw on the dosing flap's stop.
4. Define the replenishment time

   Replenishment when feed bowl is empty:

   4.1. Push the stop plate up if the feed bowl needs to be emptied before feed is replenished.

   Note: If the feed bowl is empty and the dosing flap is free, the empty indication LED should light up. If not, you should change the position of the stop plate.

   Replenishment if feed bowl is not empty:

   4.1. Push the stop plate down.

   Note: The more you move the stop plate down, the sooner concentrate is replenished in the feeder. That also and especially applies if the concentrate pan still has a certain level.

   4.2. Press the calibration button and keep it pressed. The feed bowl is filled. When the desired level is reached, the LED should go out. When the animals have emptied the feed bowl to this level, concentrate is dispensed again, provided an animal entitled to feed enters the concentrate station.
5. Tighten the screw at the stop and fasten the cover.
6. Calibrate the concentrate feeder.

4 Feeding

4.1 Operating modes

4.1.1 Rationed mode

The concentrate feeder works in rationed mode by default. Like the distribution of feed, concentrate is always dispensed in portions if an animal entitled to feed is identified by the identification unit and the reed contact indicates empty.

The green **Entitled LED** lights up (see circuit diagram for machine).

When a calf is registered in a group, the concentrate plan of the respective group will be assigned to it automatically.

Note: The correct. days are also applied in the concentrate plan. Calf 1 will for example be registered in group A with seven correct. days. The calf will be shifted in group A to plan day 7.

4.1.2 Ad lib mode

In ad lib mode, concentrate is always dispensed if the dosing flap is free. In this operating mode, the **LED ST1** on the main board of the concentrate feeder flashes once a second (see illustration 3.8 "Registering the concentrate feeder" - 18).

Activating ad lib mode

1. Disconnect the concentrate feeder from the voltage supply. To do this, pull the mains plug out of the socket.
2. Press the calibration button and keep it pressed when you reconnect the concentrate feeder to the power supply.
3. The concentrate feeder is in ad lib mode. In this operating mode, the green ST1 LED (see circuit diagram for machine) flashes once per second.

Deactivation of ad lib mode (= switch the concentrate feeder back to rationed mode)

1. Disconnect the concentrate feeder from the power supply again. To do this, pull the mains plug out of the socket.
2. Insert the mains plug again without pressing the calibration button.

4.2 Plans

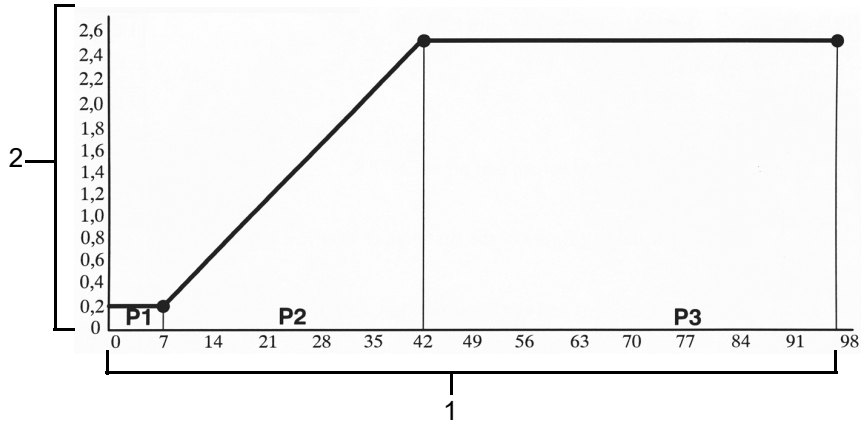
When feeding concentrate, the following plans are taken into account:

- Concentrate plan
- Portion size plan
- Quantity limitation plan
- Weaning plan

In addition, a specific quantity of attractant can be agreed on for young animals.

4.2.1 Changing the concentrate plan

You can choose between two different types of concentrate (C1 and C2). If two concentrate feeders are installed, you can feed both concentrate types, e.g. a calf starter and a cereal mix of your own. The feeding plan for concentrate type 1 is split up into three periods by default. Periods 4 to 5 are not activated. In the standard concentrate plan for concentrate type 2, no period is activated in the default settings. However, you can define up to 5 periods in this plan.



1 Plan days
2 Concentrate quantity in kg/day

You change the concentrate plan as follows:

1. **> Feeding > Plans > Concentrate 1/2 > Quantity**.
2. Use < or > to select a group. The corresponding standard concentrate plan is displayed.
3. In the **P1** line, press Enter. That takes you to the input field for period 1. First enter the length (number of days) of the first concentrate period.
4. Then use Enter to switch to the next column, **from**, and enter the initial concentrate quantity for **P1** (period 1).
5. Then use Enter to switch to the last column, **to**, and enter the final concentrate quantity for the period P1 there.

   Note: By default, three periods (no period for concentrate plan 2) are assigned values in concentrate plan 1. However, you can define up to 5 periods. At the end of the list of periods, a period is always displayed with a length of zero days. If you define this last period (= by assigning it a length greater than zero), a period is added to the end that at first has a length of zero days.

   Note: You can increase or reduce the concentrate quantity in increments of 0.1 kg.
6. For **P2-5** you need only enter the length of the concentrate period and the final concentrate quantity. As you can see in the display fields, the final value of a concentrate period always corresponds to the initial value of the next period.
7. You can read the total duration of the concentrate plan and the concentrate quantity up to the end of the respective plan in the lines at the bottom of the menu.

Default values for concentrate type 1 **Groups A, B, C and D**
P(eriod) 1: 7 days from 0.2 to 0.2 kg
P(eriod) 2: 42 days from 0.2 to 2.5 kg
P(eriod) 3: 41 days from 2.5 to 2.5 kg
By default, periods 4 and 5 are not activated
Duration = 90 days; total quantity = 158 kg
Default values for concentrate type 2 **Groups A, B, C and D**
By default, periods 1 to 5 are not activated

4.2.2 Portion size plan

There is a portion size plan like the concentrate plan. It defines which concentrate quantity is dispensed in groups, if the dosing flap is free.

Note: You can use the portion size plan to specify that young calves are to be given only small portions. That prevents older calves from eating up concentrate of young calves ("stealing" feed).

You change the portion size plan as follows:

1. [Menu] **> Feeding > Plans > Concentrate 1 / C2 > Portion size**.
2. Use [<] or [>] to select the desired group. The portion size plan for this group is displayed.
3. In the **P1** line, press [Enter]. That takes you to the input field for period 1. First enter the length (number of days) of the first period of the portion size plan.
4. Then use [Enter] to switch to the next column, **from**, and enter the initial portion size for **P1** (period 1).
5. Then use [Enter] to switch to the last column, **to**, and enter the final portion size value for the period **P1**.

Default values Portion size **Groups A, B, C and D**
P(eriod) 1: 7 days from 20 to 20 g
P(eriod) 2: 42 days from 20 to 50 g
P(eriod) 3: 41 days from 50 to 50 g
By default, periods 4 and 5 are not activated
Duration = 90 days

4.2.3 Quantity limitation plan

The minimum saved-up quantity and the maximum quantity of concentrate depend on groups. These amounts are calculated as a percentage of the concentrate quantity available to the animal according to the concentrate plan for the current day.

Example: Calf 1A can consume 1 kg of concentrate according to the plan, animal 2A 2 kg. If you have specified the minimum saved-up quantity of group A as 10%, calf 1A is only able to consume concentrate if the saved-up quantity is greater than or equal to 100 g. Calf 2A must save up at least 200 g.

You change a default quantity limitation plan as follows:

1. **> Feeding > Plans > C1 / C2 > Limitation**.
2. Use < or > to select the desired group. The standard minimum quantity and the standard maximum quantity are displayed.
3. If required, change the percentage value in **Min. quantity** and **Max. quantity**.

Values in the quantity limitation plan (Concentrate type 1, all groups A, B, C and D)		
	Min.quantity	**Max.quantity**
Default value	10%	50%
Possible range of values:	5 to 30%	30 to 50%

4.2.4 Quantity of attractant

For young calves to get used to feeding concentrate, the quantity of attractant can be activated in groups.

Set the quantity of attractant as follows:

1. **> Feeding > Plans > C1 / C2 > Quantity of attractant**.
2. Use < or > to select the desired group.
3. Specify whether the animals of this group are to be given attractant in the **activated** input field. If the attracting function is activated for a group, a small quantity of feed is always dispensed when a calf of this group enters the concentrate station.
4. If the concentrate consumption of an individual animal exceeds a specific threshold value, the attracting function is deactivated for this animal. You enter the threshold value for this animal in the **Threshold** input field.
5. Enter how much concentrate is dispensed as attractant portion when a calf enters the concentrate station in **Quantity**.

Values in the attractant quantity plan		
	Threshold	**Quantity**
Default value:	0.2 kg	10 g
Possible range of values:	0.1 to 9.9 kg	5 to 50 g

4.2.5 Weaning

You can wean the animals in groups, according to either the feed plan or the concentrate consumption.

1. **> Feeding > Plans > Feed > Wean**.

   If you want to wean the animal group according to the feeding plan, do not change the default setting (Plan).

   If the **group of animals is to be weaned according to concentrate consumption**, the value **Concentrate consumption** must be set in the **Mode** line.

2. If weaning of the animal group is performed according to concentrate consumption, the corresponding feed plan is adapted automatically. A calf is weaned when the average concentrate consumption of the last three days is above the value set in **Start**. If the concentrate consumption of the calf corresponds to the value entered in **End**, the animal will receive no additional feed until it is removed from the barn.

3. Enter in **Increase** whether the animals are to be given more feed once again if concentrate consumption falls. If this value is set to yes, the feed quantity is increased according to the reduction of the animal's concentrate consumption. The animal will never receive more feed than assigned to it in the feed plan for the corresponding day.

Values in the weaning plan according to concentrate consumption		
	Start	**End**
Default value:	0.5 kg	2.0 kg
Possible range of values:	0.1 to 1.9 kg	0.2 to 9.9 kg

4.3 Changing an animal's individual concentrate quantity (increases/reductions)

In the Increases or reductions menu, enter

- by how much the current concentrate quantity of an animal is to be increased or reduced,
- and for how long this change is to apply.

The total feeding duration is changed as follows:

1. **> Feeding > Individual animal**.
2. Use < or > to select the desired animal.
3. In **C1**, press Enter.
4. Enter the period of validity in **Deviations**.
5. Enter the desired quantity in **Quantity**. Use the (+/-) key to enter a minus sign (-) before the number (for example -1 kg to reduce the dosage) or a plus sign (+) (for example, +1 kg) to increase the dosage. The default setting is 0.
6. You can use the following display lines to check:
   6.1. the daily concentrate quantity to which the animal is entitled according to the plan (**Plan**),
   6.2. the concentrate quantity that can be consumed after the correction (**C1**).

Note: Once the corrections have been made, the animal becomes an expire animal and is once again fed automatically according to the concentrate plan.

4.4 Alarm level

You use alarm levels to determine the time or value that triggers an alarm. Alarm levels are defined in groups.

For every concentrate type, there is an alarm level for **Alarm today, Alarm yesterday** and **Alarm plan**. It is also possible to suppress the alarm, which is a practical option for small calves that initially do not eat concentrate reliably.

An alarm is set as follows:

1. **> Feeding > Alarm level > Concentrate 1/2**.
2. Use < or > to select the desired group for which the alarm level is to apply.
3. Enter the desired time and the percentage value for **Alarm today** in the input field on the right next to "from".

   Example: Today, a calf consumed 0.5 kg of concentrate between 8:00 AM and 1:00 PM (= current time). Since the same animal consumed on average 1 kg during the past three days from 8:00 AM to 1:00 PM, the alarm is triggered. This is because the 70 percent mark is fallen short of: 1 kg x 70% = 0.7 kg.

	Time	Limit
Default value:	8:00 AM	70%
Possible range of values:	8:00 AM to 12:00 PM	0 to 99%

4. Enter the desired percentage value for **Alarm yesterday** in the input field on the right next to **yesterday**.

   Example: Today, a calf consumed 0.5 kg of concentrate between 8:00 AM and 1:00 PM (= current time). Since the same animal consumed on average 1 kg during the past three days from 8:00 AM to 1:00 PM, the alarm is triggered. This is because the 70 percent mark is fallen short of: 1 kg x 70% = 0.7 kg.

Default value:	70%
Possible values:	0 to 99%

5. Enter the desired percentage value in **Plan**.

   Example: Today, an animal may consume 2.5 kg of concentrate according to the plan. During the last three days, the animal only consumed 0.8 kg on average. An alarm is triggered. This is because the 40 percent mark is fallen short of: 2.5 kg x 40% = 1 kg.

Default value:	40%
Possible values:	0 to 99%

6. Enter the desired number of feed days in **No alarm**

Example: If a value of 25 days is stored, concentrate alarms are suppressed during the first 25 feed days for all animals of the respective group.

Default value:	40 days
Possible values:	0 to 99 days

5 Animal control

5.1 Monitoring concentrate consumption

You can monitor the concentrate consumption of each individual animal under **Animal control**. You also have the option of increasing or reducing the daily quantity here.

Check the concentrate consumption as follows:

1. Select the following menu item:
   [i] **> all**.
2. Use [<] or [>] to access the individual animal you want to monitor. How much percent of its concentrate ration the animal consumed today or yesterday is displayed in the **C1 %** line.
   In the **C1 %** line, press [Enter]. That opens a submenu with more details on the concentrate consumption of the animal.
3. The plan tendency and the feed entitlement for the current day are displayed in the first line of the display, next to the animal number.
   The second line, **from**, displays the time since when the animal is entitled to concentrate and the concentrate quantity saved-up by the monitoring time.
   The absolute and relative concentrate quantities consumed today and yesterday are listed in the third and fourth lines, **Consumption %** and **Consumption kg**.
   The fifth line, **3 days kg**, lists the average concentrate consumption of the last three days.
   Note: If the animal is not entitled to concentrate (in the example on the right until 12:00 noon), the second line is displayed in a slightly different form.
4. If you press [Enter] in the **C1 kg** line, a submenu appears that you can use to select an individual increase or reduction for the concentrate quantity to be dispensed to an animal.
   An increase or reduction can be defined accordingly for the feed quantity in the **Feed I** line below.

5.2 Displaying the concentrate consumption in the animal list

The animal list can be used to display the concentrate consumption. The animal list can be accessed directly via the key [5].

Note: For more information, see the original operating manual for your automatic feeder.

1. [2] **> Device data > Animal list**.
2. Choose the selection value **Conc. cons.** 1 or **2** in the **Column 1** or **Column 2** line.

5.3 Alarm and plan over messages

Messages of different categories are for drawing your attention to certain individual animals that require special attention. A list of the message categories is displayed by pressing [i]. Alarm and plan over messages can be displayed in the context of the concentrate feeder.

5.3.1 Alarm messages

An animal becomes an alarm animal if the specified limit values for concentrate consumption for today and yesterday are exceeded or fallen short of (see 4.4 "Alarm level" - 28).

1. Select the following menu item:
   [i] **> Alarm**.
2. Use [<] or [>] to access the individual animal you want to monitor.
3. If there is a **Conc. cons. % ...** line under the first line with the animal number, an alarm was triggered in the context of the concentrate consumption of this animal. The percentage value of today and yesterday are also displayed in this line.
   Pressing [Enter] opens a menu with detailed information.
4. All alarms of the animal can be deleted in the **delete all!** line.

5.3.2 Plan over messages

Two days before the concentrate plan or the deviation plan for concentrate expires, a plan over message is displayed for the corresponding event.

1. Select the following menu item:
   [i] **> Plan over**.
2. Using [<] or [>] to see the animals with plan over messages.

End of the concentrate plan

When the concentrate plan has been completed, the animals are not given any more concentrate. The corresponding plan over message that reminds you of the discontinuation of the plan is shown in the display.

Deviation plans

When the deviation plan for concentrate expires, a plan over message is also displayed to remind you that the respective animal is being fed again exactly according to the concentrate plan for the group.

Note: Press [C] to have the message hidden from view. The message is displayed again on the next day and can be deleted by pressing [C] again.

5.3.3 Deleting alarm and plan over messages

Navigate to the last line with **delete all?** under all alarm or plan over messages and press [Enter] there. All available alarms or plan over messages for the respective animal are deleted.

Note: Alarms of the current feeding day cannot be deleted until the following day.

6 Cleaning

6.1 Specifications for cleaning

What must be cleaned?

The feed bowl, the dosing unit and the storage container for the concentrate must be cleaned.

NOTICE!

Never use a high-pressure cleaner or similar equipment for cleaning, since the concentrate feeder may otherwise become damaged.

How often does cleaning have to be performed?

- The feed bowl and the dosing unit must be checked on a daily basis and, if necessary, cleaned dry or, for example, using a damp cloth (e.g. removing manure or residual feed).
- The container for the concentrate is cleaned, dry or wet, as required, but at least once a year.

6.2 Safety instructions

⚠ **WARNING!**

There is a risk of injury due to automatic start-up.

The worm conveyor can start up automatically at any time, crushing or cutting off your fingers.

► Always pull the mains plugs before beginning cleaning.

NOTICE!

Damage caused by high-pressure cleaner.

Damage to the housing of the concentrate feeder causes corrosion and impairs its function.

► Never use a high-pressure spray to clean the concentrate feeder.

6.3 Cleaning procedure

6.3.1 Manual cleaning of the feed bowl and the dosing mechanism

1. Disconnect the concentrate feeder from the voltage supply. To do this, pull the mains plug out of the socket.
2. Remove any residual feed and deposits from the feed bowl. Clean the dosing mechanism and the feed bowl with a dry or damp cloth.
3. Insert the mains plug back into the power supply.

6.3.2 Thorough cleaning

If the concentrate feeder is not going to be in use for a lengthy period, it should be thoroughly cleaned first and then again at least once a year during downtime.

Proceed as follows for thorough cleaning:

1. Disconnect the concentrate feeder from the voltage supply. To do this, pull the mains plug out of the socket.
2. Remove any larger residual feed manually from the storage container.
3. Reconnect the mains plug to the power supply. Remove any smaller residual quantities by dispensing them into the feed bowl via the dosing worm.
4. Switch off the concentrate feeder again and disconnect the mains plug.
5. Remove all residual feed from the storage container manually using a brush or scraper. You can also clean the storage container with a moist sponge or cloth.
6. Remove any residual feed and deposits from the feed bowl. Clean the dosing mechanism and the feed bowl with a dry or damp cloth.
7. Clean the outer shell of the concentrate feeder with a damp cloth.
8. Before you fill the concentrate feeder, make sure that all components of the feeder are quite dry.
9. Reconnect the mains plug to the power supply.
10. Select  **> Diagnosis** to switch to the **Motors** submenu.
11. In Concentrate, press Enter and hold down the key until the concentrate is dispensed into the feed bowl.
12. Calibrate the concentrate feeder according to the instructions in Chapter 3.11 "Calibration" - 20.

7 Failures and warnings

When an error occurs while the concentrate feeder is running, the Auto LED on the hand terminal will flash. The error is described in fault or warning messages displayed on your automatic feeder.

You must immediately rectify errors that occur during operation. Unresolved errors, for example during preparation of feed, could cause your calves to suffer from malnutrition.

NOTICE!

An interruption in feeding operation means that your calves will not receive any feed or any concentrate. This can lead to malnutrition.

Malnutrition can cause impaired growth and development, increased susceptibility to illness or even the death of your calves.

► You must use an alternative method to supply your calves with feed as long as the automatic feeder is out of service.

You can fix some of the faults yourself. Faults that only a service technician can eliminate are indicated as such.

7.1 Faults

In the event of a **failure**, automatic mode is interrupted and no feed is prepared. Respond immediately to the failure and ensure that your calves are supplied with feed using an alternative method as long as the automatic feeder is out of service.

NOTICE!

An interruption in feeding operation means that your calves will not receive any feed or any concentrate. This can lead to malnutrition.

Malnutrition can cause impaired growth and development, increased susceptibility to illness or even the death of your calves.

► You must use an alternative method to supply your calves with feed as long as the automatic feeder is out of service.

7.1.1 Calibration

Calibration of the concentrate feeder is mandatory at the time of the **commissioning** of the concentrate feeder or after a **reinstallation**. To enforce this initial calibration, the automatic feeder shows **Calibration fault**.

1. Calibrate the concentrate feeder according to the instructions in Chapter 3.11 "Calibration" - 20.

Note: As long as this fault has not been corrected, the automatic feeder cannot be used to feed animals.

7.2 Warnings

Warnings indicate problems that do **not interrupt the automatic mode of the automatic feeder**. Warnings are indicated by the LED flashing on the hand terminal of the automatic feeder.

Some warnings disappear when the fault has been rectified. Some must be (additionally) deleted by pressing C.

7.2.1 C-station connection problems

The **IFS-C warning** is displayed if the connection between the automatic feeder and the concentrate feeder is faulty.

1. Check the CAN bus cable for damage.
2. Check the concentrate feeder's power supply.
3. Check the CAN bus address.

7.2.2 Motor C-station

If the **Motor C-station warning** appears, then

- a foreign object might be blocking the conveyor worm,
- the motor of the concentrate feeder might be defective,
- the motor sensor might be defective.

The fault is corrected as follows:

1. Check the motor for damage. To do this, press the calibration button on the concentrate feeder.
2. Check the motor pulses (see 7.3.1.3 "Checking motor pulses" - 36).
3. Have the motor and motor sensor checked by your service technician and replaced if necessary.

7.2.3 Concentrate container empty

The **Concentrate empty warning** is displayed if

- e.g. the concentrate container is empty,
- the concentrate sticks in the storage container (e.g. due to bridging),
- the feeding sensor is defective.

Have the feeding sensor checked by your service technician and replaced if necessary.

7.2.4 Other warnings

The following additional warnings may occur:

- **Double address**

  If this warning is displayed, please consult the original operating manual for your automatic feeder.
- **Incorrect ID**

  This message indicates that probably an incorrect IFS version has been installed.
  - Version < H4.x of the automatic feeder requires IFS version 1.10.
  - Version H4.x or > higher requires IFS version 6.x (currently 6.05).

7.3 Diagnosis

The **Diagnosis** menu is for checking the concentrate feeder and its functions. It facilitates troubleshooting in the event of a technical problem at the concentrate feeder. The menus relevant for the concentrate feeder are available via the following menu path:

> Diagnosis > Stations.

7.3.1 Checking the concentrate station

Not only the identification function but also the motor of the concentrate station can be checked. The first two inspection steps are identical for both components:

1. Select the following menu item:

   > Diagnosis > Stations > Concentrate.
2. Then use < or > to select the concentrate station you want to check.

7.3.1.1 Checking the identification feature

Hold a transmitter near the antenna. If the identification is working correctly, the transmitter number (in the example here: 21968395) is shown on the display in the **No.** line.

7.3.1.2 Checking the motor

Navigate to the **Motor** line and press Enter. The motor of the concentrate station should start up and dispense concentrate in the feed bowl if the storage container is full.

7.3.1.3 Checking motor pulses

While you check the motor of the concentrate station, the asterisk (*****) in the **Motor pulses** line should rotate. That indicates that the motor is generating pulses. Missing motor pulses may be the cause for warnings of the automatic feeder if the motor of the concentrate station is generally intact.

7.3.1.4 Checking feeding sensors

A feeding sensor, which controls the continued flow of concentrate, is switched via the dosing flap of the device. You can view the level of the feed bowl in the **Feed bowl** line.

7.3.1.5 Checking the control

Which IFS control controls your concentrate feeder is displayed in the **Control** line.

7.3.1.6 Integrating the concentrate feeder at the CAN bus

The concentrate feeder is controlled via an **Intelligent Feed Station** (= IFS) and communication with the IFS takes place via CAN bus. A unique CAN bus address is assigned to every IFS in the CAN bus. Changes to the IFS (e.g. a change of PCB) can also result in a changed CAN address of the IFS, which means that you can no longer communicate with this IFS. In this case, the correct CAN address must be reassigned to the IFS. This is achieved as follows:

1. Activate **Search mode** at the concentrate feeder. To do this, briefly press the **S5 key** on the main board of the IFS (see circuit diagram for concentrate feeder in the appendix of this operating manual). The green LED (ST1) next to the button flashes (ten times a second).
2. Change over using [📖2] **> Diagnosis > Stations > Concentrate**.
3. Then use [<] or [>] to select the concentrate station you want to check.
4. In **search?**, press [Enter].

   If the IFS is identified on the CAN bus, the address stored in the device setup is transferred. The success message **IFS-C found!** appears on the display. The green LED (ST1) on the main board of the concentrate feeder no longer flashes.

   Note: If you accidentally activated **Search mode**, press the S5 button once again. That **exits** search mode once again.

7.3.2 Monitoring

If a fault occurs at the IFS or at the identification unit of the concentrate station, it may be helpful to know whether and how frequently this fault has already occurred in the past. The first step of such a query is always the same:

Select the following menu item:

[📖2] **> Diagnosis > Control**.

7.3.2.1 Number of failures at the IFS

1. Use [<] or [>] to select the IFS concentrate station for which you want to determine the number of failures.
2. The desired values are displayed in the **number** and **since** lines.
3. Navigate to the last line containing **delete?** and press [Enter] in this line.
4. The number of failures is reset and the **since** line is updated with the current date.

7.3.2.2 Number of failures at the identification unit

1. Then use [<] or [>] to select the identification (C-station) for which you want to determine the number of failures that occurred.
2. Read the desired values in the **number** and **since** lines.
3. Navigate to the last line containing **delete?** and press [Enter] in this line.

4. The **number** of failures is reset and the **since** line is updated with the current date.

7.3.2.3 Number of failures at the motor of the concentrate station

Like the procedure described in the last section, the number of failures can also be read that occurred at the motor of the concentrate station.

7.3.2.4 Other fault counters

There are more fault counters similar to the counters described above for running the concentrate container empty, for omitted calibrations, for ID faults, for assignment faults and for the occurrence of double addresses in the CAN bus.

Note: For more information, see the original operating manual for your automatic feeder.

7.3.2.5 Resetting fault counters

1. Navigate to the last line containing **delete?** and press Enter in this line.
2. The **number** of failures is reset and the **since** line is updated with the current date.

7.3.3 Version

If faults occur, it might be helpful to know the version of the IFS control.

7.3.3.1 IFS-C

1. Select the following menu item:
   > Diagnosis > Version > Peripheral device > IFS-C.
2. Use < or > to select the IFS for which you want to determine the program version.
3. The desired values are displayed in the lines Program (PRG), Minibootloader (MBL) and Bootloader (BL).

8 Care and maintenance

The visual and functional inspection of the components can be conducted by the owner/operator.

Repair work must **always** be performed by a service technician.

8.1 Safety instructions

⚠ WARNING!

There is a risk of injury due to automatic start-up.

The worm conveyor can start up automatically at any time, crushing or cutting off your fingers.

► Do not reach into the hazardous area of the conveyor worm. Always pull the mains plug before beginning maintenance work.

8.2 Maintenance intervals and activities

Note: If you detect any faults or damage to the concentrate feeder between the maintenance intervals recommended below, you must make sure they are rectified immediately by a service technician as required.

8.2.1 Daily

Visual inspection of the components

- All mechanical and electrical components must be subjected to visual inspection for damage and deposits every day. If any damage is detected during the visual inspection, the faulty components have to be replaced by a service technician before work can be resumed with the concentrate feeder.
- Check the level of the storage container on a daily basis and top up with concentrate as required.
- Thoroughly clean it, in particular the area in and on the feed bowl (see 6.3.1 "Manual cleaning of the feed bowl and the dosing mechanism" - 32).

8.2.2 Every 3 months

The calibration of the concentrate feeder must be performed every three months or after each new delivery of concentrate (see 3.11 "Calibration" - 20).

If any faults are detected during the calibration, they must be rectified by a service technician.

8.2.3 Annually

The concentrate container must be emptied every 12 months and a functional inspection performed. In addition, thorough cleaning is required according to the cleaning concept (see 6 "Cleaning" - 32).

If any faults are detected during the functional inspection, they must be rectified by a service technician.

8.3 Testing components for compliance with national regulations

This inspection may be conducted **only** by a service technician!

All electrical components must be checked regularly for electrical safety in accordance with the intervals and test methods defined in the national regulations.

If any faults or damage is detected during the inspection, the faulty components must be replaced by a service technician before work can be resumed with the concentrate feeder.

9 Shutdown

You must remove the concentrate feeder from service if you do not intend to operate it for a long period of time. You can shut down the concentrate feeder temporarily or permanently.

9.1 Temporary shutdown

To shut down the automatic feeder temporarily, proceed as follows:

1. Remove the concentrate from the storage container and perform a thorough cleaning (see 6 "Cleaning" - 32).
2. Cancel the registration of the concentrate station in the setup of your automatic feeder:
   2.1. Switch off the automatic feeder using the main switch.
   2.2. Press [📖2] on the hand terminal of your automatic feeder and hold down this key when you switch on the device.
   After a short time, the setup menu will appear on the display.
   2.3. In the setup menu, choose the Stations > Feed > Concentrate option.
   2.4. Use [<] [>] to select the desired concentrate station.
   2.5. In **Allocation**, select the value **None**.
   2.6. Cancel the registration of all of the concentrate stations the same way.
   2.7. To exit setup, repeatedly press [Esc] until the message **End setup?** appears. Confirm with [Enter].
3. Disconnect the concentrate feeder from the voltage supply. To do this, pull the mains plug out of the socket.

9.2 Permanent shutdown

If you want to permanently shut down the concentrate feeder, you must dispose of it in accordance with the legal regulations. To find out which regulations apply to you, contact your waste disposal company or a waste disposal center listed in the yellow pages.

To shut down the automatic feeder permanently, proceed as follows:

1. Cancel the registration of the concentrate station in the setup of your automatic feeder (see 9.1 "Temporary shutdown" - 41).

⚠ DANGER!

Lethal electric shock.

The electrical components of the automatic feeder are live.

► Always disconnect the mains plug before opening the control station of the automatic feeder.

2. Disconnect the concentrate feeder from the voltage supply. To do this, pull the mains plug out of the socket.
3. Remove the CAN bus cable of the control unit from the main board of the automatic feeder and replace it with a resistor.

4. Dispose of the concentrate feeder as described in the disposal chapter (see 10 "Disposal" - 43).

10 Disposal

10.1 Disposing of cables

Depending on the material, dispose of the cables as hazardous waste or household waste. Read the disposal instructions on the packaging of the cables, or request instructions from the relevant authorities.

10.2 Disposing of the board

The IFS control contains a board. You must dispose of this component separately. Ask your waste disposal company where you can dispose of electronic waste.

10.3 Disposing of the concentrate feeder

For disposal instructions, contact the appropriate authorities, such as your waste disposal company or local government agency.

Dispose of the concentrate feeder.

Index

EC declaration of conformity

according to the EU Machinery Directive 2006/42/EG, Annex II, 1.A

Manufacturer:
Förster-Technik GmbH,
Gerwigstr. 25
78234 Engen

Person residing within the Community authorised to compile the relevant technical documentation:
Müller Barbara
Förster-Technik GmbH,
Gerwigstr. 25
78234 Engen

Description and identification of the machinery:

Make:	Peripheral device
Type:	KFA3-MA2, KFA3-MA3, KFA3-SL2, KFA3-SL2-L VEW1-30-2, VEW1-50-2, VEW1-50-2 for MilchMobil, VEW1-50-2 Compact Front plate with teat slider; CalfProtect

It is expressly declared that the machinery fulfils all relevant provisions of the following EU Directives:

2006/42/EG	Directive 2006/42/EG of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EG (recast)
2014/30/EU	Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility (recast)

Reference to the harmonised standards used, as referred to in Article 7(2):

EN ISO 12100:2010-11	Safety of machinery - Electrical equipment of machines - Part 1: General requirements (ISO 12100:2010)
EN 60335-1:2012/A11:2014	Household and similar electrical appliances - Safety - Part 1: General requirements IEC 60335-1:2010 (modified)
EN 61000-6-2:2005/AC:2005	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
EN 61000-6-3:2007/A1:2011/ AC:2012	Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments

Engen, 20.04.2016

Place, date

Signature
Markus Förster
CEO