

Operating manual

DryRapid Controller

Code-No.: 99-97-1696

Edition: 06/2005

M1696GB

Copyright

This software is property of Big Dutchman Pig Equipment GmbH and is protected by Copyright. It may not be copied onto another medium or be duplicated without a specific license agreement or by permission in the sales agreement.

The operating manual or parts of it may not be copied or reproduced in any way without prior agreement. It is also prohibited to misappropriate the described products and the respective information or to submit these to third parties.

Big Dutchman holds the right to change products and software as well as the operating manuals without prior notice. We cannot guarantee that you will receive notice about changes in products/software and their manuals.

© Copyright 2005 Big Dutchman

Liability

The manufacturer or distributor of the described hardware and software is not liable for any harm and damage (such as the loss or illness of animals or the loss of further profit opportunities) caused through failure of the system or through improper application and operation of the products and/or software.

We do not accept the responsibility for damages caused through errors in the operating manual.

We are constantly working on the further development of the computer and software - also considering particular suggestions and wishes of our customers. If you should have suggestions for modification or improvement, please let us know.

Big Dutchman Pig Equipment GmbH

P. O. Box 1163

49360 Vechta

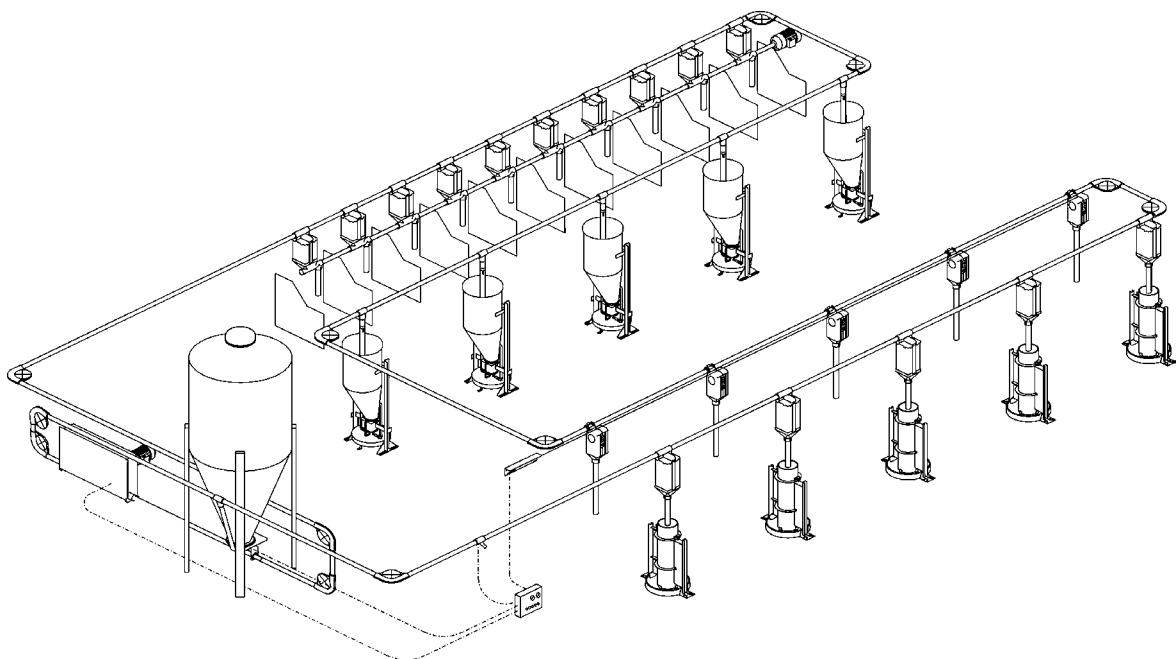
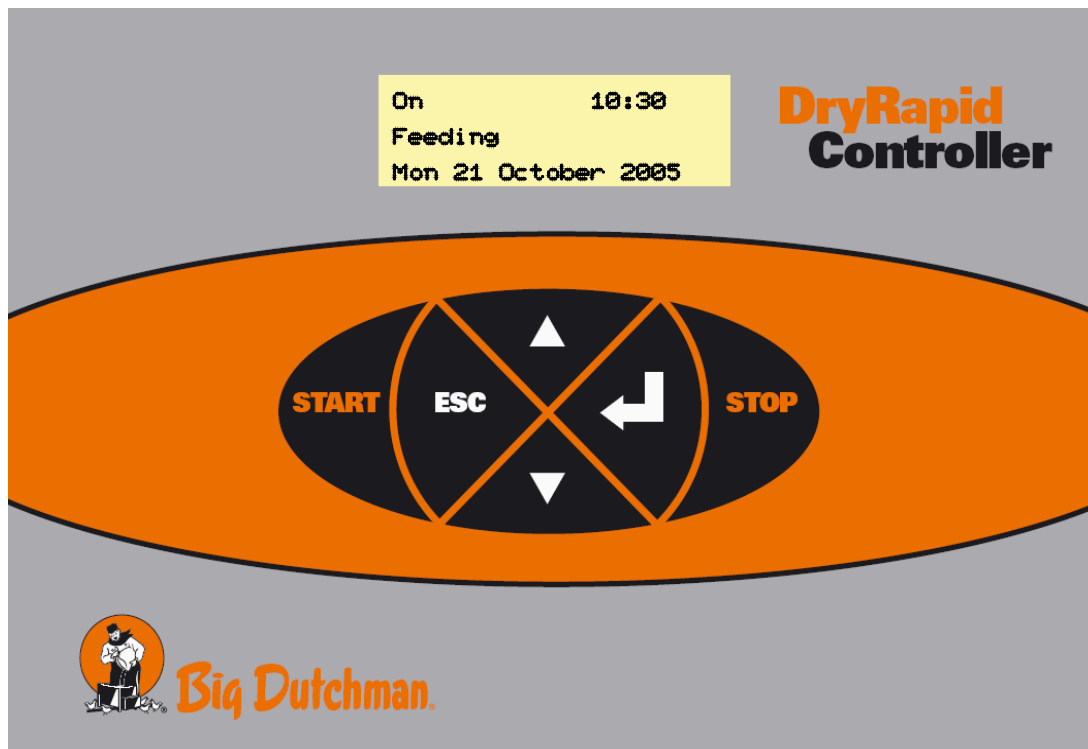
Germany

Tel: +49(0)4447-801-0 Fax: +49(0)4447-801-237 e-mail: big@bigdutchman.de

1 General information	1
2 Hardware	3
2.1 Power supply	3
2.2 Outputs	3
2.3 Inputs	4
2.4 Technical data	4
3 Software	5
3.1 Overview	5
3.2 Main menu	7
3.3 Status messages	8
3.3.1 Status information	8
3.3.2 Feeding	9
3.3.3 Mineral feeding	10
3.3.4 Dispenser open	11
3.3.5 Light ON	11
3.3.6 Soaking ON	12
3.4 Error messages	13
3.4.1 Power failure	13
3.4.2 Runtime error	13
3.4.3 Overcurrent	14
3.4.4 Cable rupture	14
3.4.5 Rotation error	14
3.4.6 Empty silo	14
3.5 Change activation times for feeding / light	15
3.6 Change activation times for soaking	16
3.7 Process variables	17
3.7.1 Light duration	17
3.7.2 Soaking duration	17
3.7.3 Vibrator time	17
3.7.4 Fill delay	18
3.7.5 Set time	18
3.7.6 Date	18
3.7.7 Soaking cycle	19
3.8 System variables	20
3.8.1 Maxm. Runtime	20
3.8.2 Turn off delay	20
3.8.3 Motor current limit	20
3.8.4 Feed supervision mode	21
3.8.5 Rotation limit	21
3.8.6 Delay sensor	22
3.8.7 After run/empty run	22
3.8.8 Open dispenser	22
3.8.9 Operating hours	23
3.8.10 Auto restart	23
3.8.11 Language selection	23
3.8.12 Delay Silo	24
3.8.13 LCD Contrast Adjustment	24
3.8.14 LCD-Light	24
3.8.15 Clear data	25

1 General information

The **DryRapid Controller** is used for controlling and monitoring of tube feeding systems that are driven either by a conveyor cable or a conveyor chain.



- a) Feeding is **started**
 - by pre-set start times
 - manually
 - automatically via a sensor
- b) Feeding is **interrupted**
 - by relative time delay
 - motor current error
 - chain or rope rupture
 - rotation error
- c) Feeding is **stopped**
 - by full sensor
 - manually

2 Hardware

2.1 Power supply

400 / 230 V	3 phase, neutral, 50 Hz	Europe	
230 V	1 phase, neutral, 50 Hz	Europe	
480 / 277 V	3 phase, neutral, 60 Hz	USA	Diagram A, World Electricity Supply
460 / 265 V	3 phase, neutral, 60 Hz	USA	Diagram A, World Electricity Supply
416 / 240 V	3 phase, neutral, 60 Hz	Canada	Diagram A, World Electricity Supply
208 / 108 V	3 phase, neutral, 60 Hz	Canada / USA	Diagram A, World Electricity Supply
240 V	3 phase, neutral, 60 Hz	Canada / USA	Diagram K, World Electricity Supply
200 / 100 V	3 phase, neutral, 50 Hz	Japan East	Diagram H, World Electricity Supply
200 / 100 V	3 phase, neutral, 60 Hz	Japan West	Diagram A, World Electricity Supply
230 V	3 phase, neutral, 60 Hz	Philippines	Diagram B, H, World Electricity Supply
380 V	3 phase, neutral, 60 Hz	Korea	Diagram A, World Electricity Supply

2.2 Outputs

The **Dry Rapid Controller** can monitor the following outputs:

rotary current output for drive motor	400 V AC, 4KW	motor contactor
potential-free output for light	230 V AC, 2 A	RL1
-- alarm output	230 V AC, 2 A	RL2
-- mineral dosing output	230 V AC, 2 A	RL3
-- servo motor output	230 V AC, 2 A	RL4
-- vibrator output	230 V AC, 2 A	RL5
-- supply auger output	230 V AC, 2 A	RL6
-- soaking system output	230 V AC, 2 A	RL7
power supply for sensors (230 V, AC)		AC
sensor 90-250 V AC		

All outputs have a LED display.

2.3 Inputs

The **Dry Rapid Controller** controls the following inputs:

digital input for "full" sensor	IN1	active	feeding "off"
-.- for rotation monitoring/rope rupture	IN2	passive	alarm rope rupture
-.- for external overcurrent	IN3	active	alarm overcurrent
-.- for sensor silo / start vibrator	IN4	passiev	alarm empty silo

All inputs have a LED display.

2.4 Technical data

Optional	serial interface RS232 / RS485 with LED-display.
Display	graphical LCD - display with backlight (yellow green), 160 x 32 pixel.
Keyboard	plastic foil keyboard with 6 keys
Regulations	VDE, CSA
Protection Class	IP54
EMR	EMR-regulation current stand

3 Software

3.1 Overview

Main menu

Input menus

Its Waiting

30.05.05 15:39

10 Activation Times
Feeding

30.05.05 15:39

20 Activation Times
Soak-System

30.05.05 15:39

30 Process variables

30.05.05 15:39

40 System variables




30.05.05 15:39

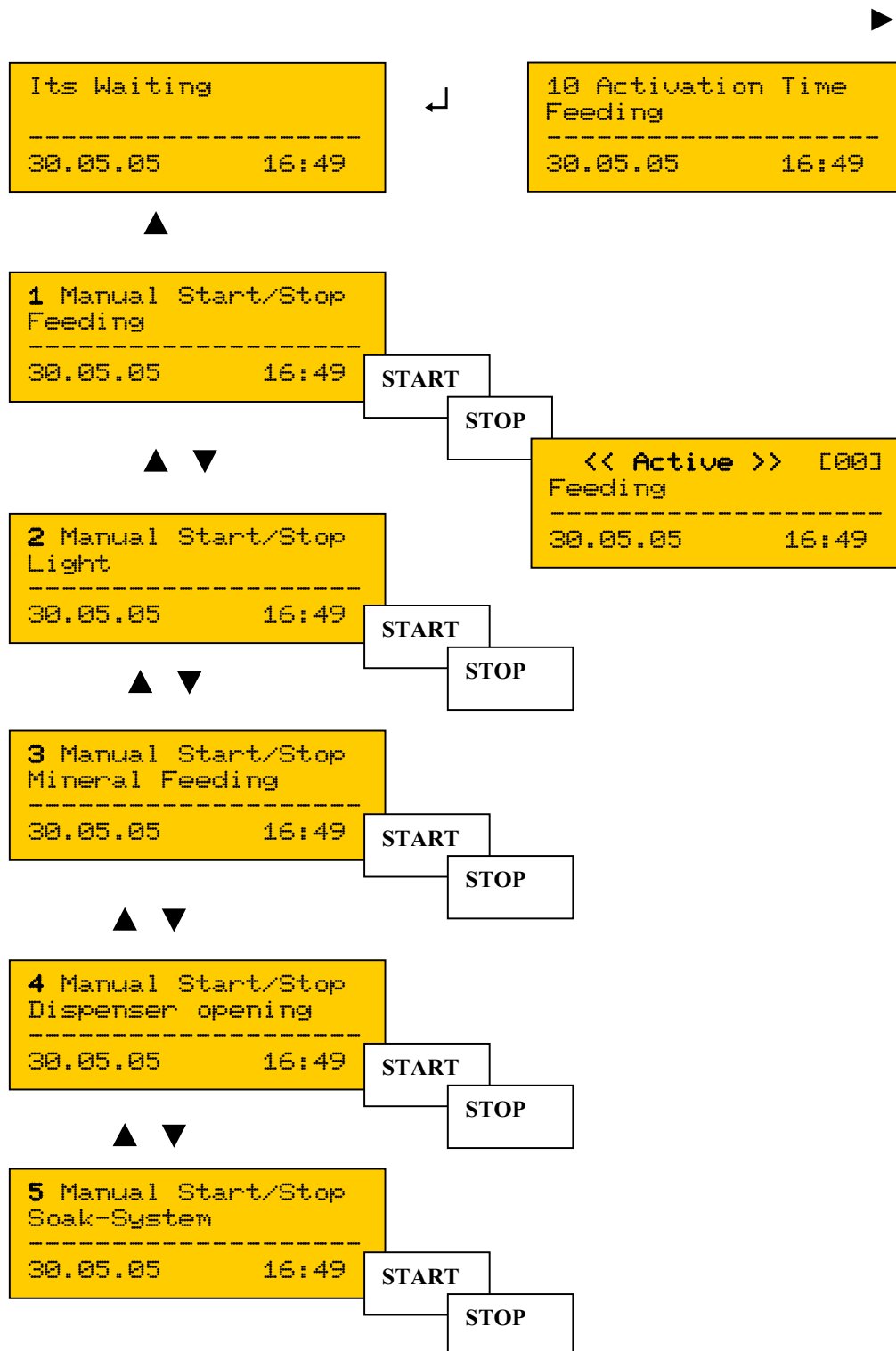
- ▲ ▼ 1 Start/Stop Feeding
 - 2 Start/Stop Light
 - 3 Start/Stop Mineral Feeding
 - 4 Start/Stop Dispenser Opening
 - 5 Start/Stop Soak System
-
- ▲ ▼ 11 Feeding 10:30 Light Mineral
 - 12 Feeding 14:00 Mineral
 - 13 Feeding 18:00 Licht
 - 14 Feeding ---:--
 - max 9 ---:--
-
- ▲ ▼ 21 Soak-System
 - 22 ---:--
 - max 9
-
- ▲ ▼ 31 Lightduration
 - 32 Soak time
 - 33 Vibration
 - 34 Fill delay
 - 35 Set hour
 - 36 Set date
 - 37 Soaking cycle
-
- ▲ ▼ 41 Max running
 - 42 Turn off delay
 - 43 Motor current limit
 - 44 Feed supervis. mode
 - 45 Rotation (imp/min)
 - 46 Delay sensor
 - 47 AfterRun/Emp.
 - 48 Dispen. open
 - 49 Operating hours
 - 4A AutoRestart Y/N
 - 4B language Selection
 - 4C Delay silo
 - 4D LCD contrast adjust
 - 4E LCD-Light-Time
 - 4F Clear all Data?

Remark:

- You may change entries only in blinking input fields.
- The ESC-button stops an entry, however, the changed value is not applied. Press the ESC-button again to switch to the input menu. Push the ESC-button a third time to switch to the main menu.
- If no key is activated within the time indicated under LCD-light (entry 4E) the system automatically switches to the main menu.
- Use the ←| - key to activate entry options and accept an entry
- Use ▲ ▼
 - to jump between the menus
 - switch from one menu to the next without activating an entry
 - change an entry
- There are two different functions for the switching times
 - feeding with/without mineral feeding (M), i.e. in addition to the feeding output, the mineral feeding output has to be activated, as well as with/without light.
 - soaking
- During feeding, the chain drive, and if set (delay silo) the silo auger, and if set and necessary (vibrator time) the vibrator are switched on.

3.2 Main menu

The main menu displays the current date and time. You can switch from the main menu to the input menus (10, 20, 30, 40) by pressing the -key. Use the  -keys to switch back and forth between the input menus.

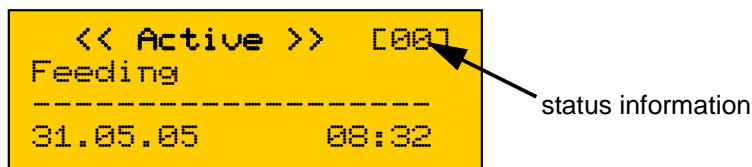


- The Start/Stop key can only be activated when the Start/Stop function has been selected.
- An automatic start that is carried out at a pre-set time terminates a manually started program.
- It is possible to connect more than one output.
- Press the ESC-key to get back to the main menu.

3.3 Status messages

3.3.1 Status information

During feeding, the current status of the feeding process is shown on the display. The status information is only displayed if no input menu is selected.



The status numbers stand for the following information messages:

- [00] light or soaking active - manually or automatically activated.
- [11] feed chain
- [12] sensor input 1 active, turn off delay is running (42)
- [13] after-flow / no load is running (47)
- [14] dispenser open (48)

Feeding status information [11] to [14] is only displayed if fill delay (34) is not activated (menu 34 = --:--).

- [21] dispenser open (48)
- [22] fill delay (34)
- [23] feed chain
- [24] sensor input 1 active, turn off delay is running (42)
- [25] after flow / no load is running (47)

Feeding status information [21] to [25] is only displayed if fill delay (34) is not activated (menu 34 = 00:30).

- [31] sensor delay
- [41] manual start open dispenser

3.3.4 Dispenser open

Dispenser "ON"

```

  << Active >> [41]
  Volume Dispenser
  -----
  31.05.05      08:49

```

manual start

The output RL4 (servo motor for volume dispenser) is activated.

Output for light (RL1) is activated under the condition that a light duration is set under process variables (entry 31).

The output RL4 becomes passive

- open for dispenser after time is up entry 48
- manually stop-key

The light is switched off

- after end of light duration period entry 31
- manually stop-key

3.3.5 Light ON

```

  << Active >> [41]
  Light
  -----
  31.05.05      08:53

```

The output RL1 (light) becomes active.

The light is switched off

- after end of light duration period entry 31
- manually stop-key

Remark:

If a feeding cycle is started over the time clock during a manually started light output, the status information "light" is overwritten.

3.3.6 Soaking ON

```
<< Active >> [00]
Soak-System
-----
31.05.05      08:59
```

The output RL7 (soaking system) becomes active.

The soaking function is switched off

- after end of soaking period entry 32
- manually stop-key

If a time is set under "soaking cycle (37)" the output is started and stopped periodically.

Remark:

If a feeding cycle is started over the time clock during a manually started soaking output, the status information "soaking" is overwritten with feeding. After the feeding cycle is over, the status information "soaking" reappears if the program was not finished.

3.4 Error messages

In case of an error message, the alarm relay RL2 is activated and the display starts to blink. Use the key (START) to erase the alarm.

A system error is displayed including type of error information (see error list) and error time.

```

  << Active >> [00]
  Feeding
  -----
  Runtime Error 09:04
  
```

The system includes the following alarm messages:

3.4.1 Power failure

If a power failure is indicated, there are two possibilities to end the alarm.

- STOP-key: the alarm is erased and the feeding is stopped.
- START-key: the alarm is erased and the feeding is re-started.

Feeding after a power failure is only started, if the ! is displayed.

```

  Its Waiting
  -----
  Power Failer 09:08
  
```

start not possible

```

  Its Waiting !
  -----
  Power Failer 09:08
  
```

restart possible

3.4.2 Runtime error

The alarm "runtime error" appears if the feeding is not finished within the maximum running time (41), that means input 1 ("full" sensor) is active.

3.4.3 Overcurrent

The alarm "overcurrent" is activated if:

- input 3 (external overcurrent relay) is active for more than 3 seconds.
- the current of one of the 3 phases is greater than 15A for a period longer than 500 ms.
- the average value of the current of the 3 phases is greater than the set value (43) for more than 60 seconds.
- the current from one of the three phase is smaller than 1.5A for more than 10 seconds.

3.4.4 Cable rupture

The alarm "cablebreak" is activated if the entry 2 becomes passive during a feeding and "contact" was enter under input 44.

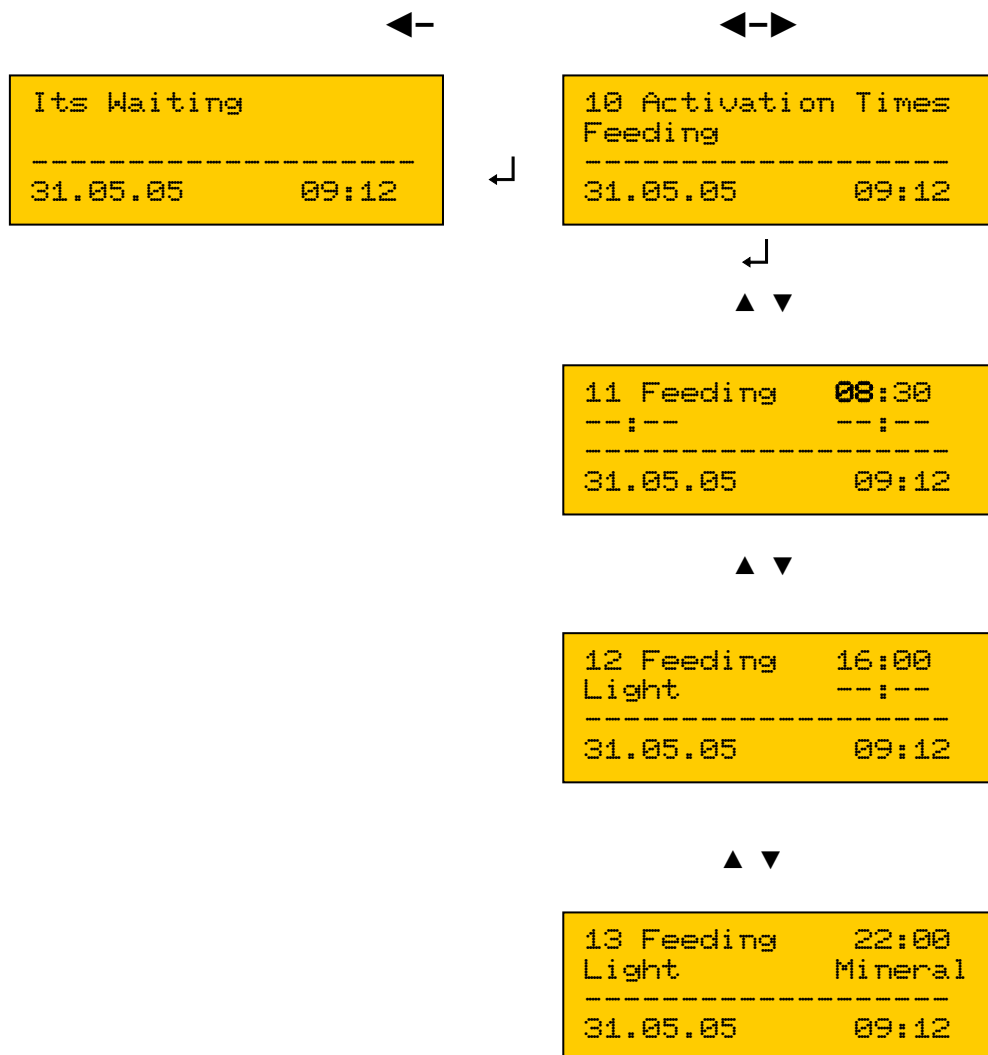
3.4.5 Rotation error

The alarm "rotation error" is activated if the nominal speed (entry 45) is not reached during a feeding cycle and if "rotation" is entered under entry 44.

3.4.6 Empty silo

The alarm "empty silo" is activated if entry 4 becomes passive and the vibrator time (33) is terminated.

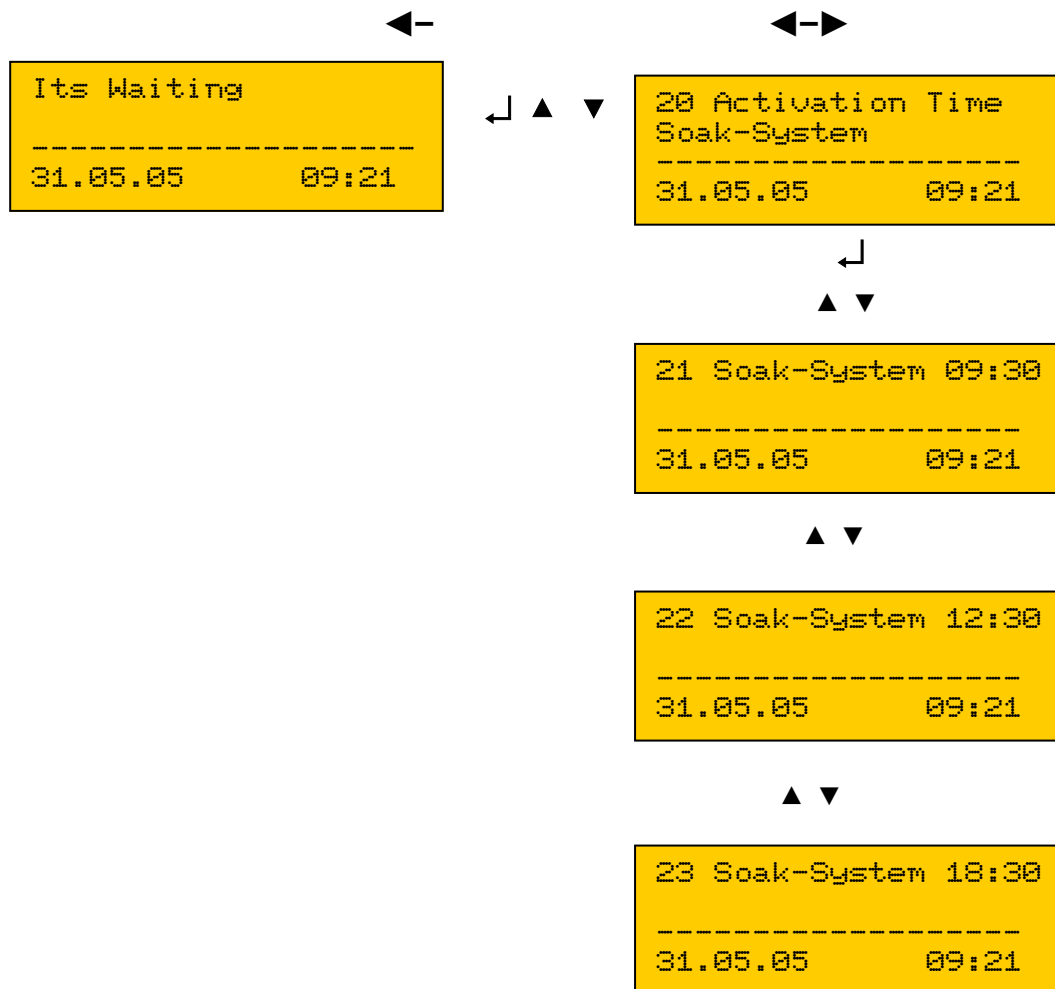
3.5 Change activation times for feeding / light



Entry changes:

- Press the -key and use the -keys to move around in the input menu.
- If you press the -key, the first input window blinks.
- Change the entry with the -keys.
- Use the -key to save the entry and get to the next entry window.
- If the last entry is confirmed with the key the system switches automatically back to the switching times level.
- Use the keys to jump to the next entry.
- You can terminate any entry in any position by means of the ESC-key. However, your entries will not be saved.

3.6 Change activation times for soaking



Entry changes:

- Press the -key and use the -keys to move around in the input menu.
- If you press the -key, the first input window blinks.
- Change the entry with the -keys.
- Use the -key to save the entry and get to the next entry window.
- If the last entry is confirmed with the key the system switches automatically back to the switching times level.
- Use the keys to jump to the next entry.
- You can terminate any entry in any position by means of the ESC-key. However, your entries will not be saved.

3.7 Process variables

3.7.1 Light duration

The light is switched of when the set time is over. The running time starts:

- if the input IN1 has been activated after starting of the feeding
- after the manual start of the dispenser

Entry: minutes(mm) : seconds (ss)
 mm:ss = 00:00 - 59:59

```

31      10:30
Light duration mm:ss
-----
31.05.05      09:58
  
```

3.7.2 Soaking duration

After the start of the soaking period, the output "soaking system" becomes active and becomes passive again when the set time is up.

Entry: hours(HH) : minutes (mm)
 HH:mm = 00:00 - 23:59

```

32      08:30
Soak time      hh:mm
-----
31.05.05      10:06
  
```

The output stays active during the feeding cycle.

3.7.3 Vibrator time

If the input "sensor vibrator" becomes passive during a feeding and a time has been set, the output "vibrator" is activated for the set time.

Entry: minutes(mm) : seconds (ss)
 mm:ss = 00:00 - 59:59
 no function = --:--

```

33      08:30
Vibration      mm:ss
-----
31.05.05      10:20
  
```

3.7.4 Fill delay

The feeding sequence changes only in case of an entry. After the start of the feeding the following processes take place:

- output RL4 (dispenser) becomes active, that means the dispensers are emptied
- after the time "dispenser open" (48) the RL4 output becomes passive
- after the time "fill delay" (34) the feeding starts and fills the dispensers until the IN1 ("full" sensor) becomes active. The input IN1 is only accepted after expiration of "delay sensor" (46).

Entry: minutes(mm) : seconds (ss)
 mm:ss = 00:00 - 59:59
 no function = --:--

```

34      01:00
Fill delay  mm:ss
-----
31.05.05   10:29
  
```

Remark: the standard procedure takes place as follows:

- Start feeding, until sensor IN1 ("full" sensor) becomes active or the max. runtime (41) is finished and the "turn off delay" (42) = "--:--" is also terminated.
- Open dispenser if a time is set under "dispenser open" (48).
- The dispenser closes after the time "dispenser open" (48) is up.

3.7.5 Set time

Use this menu to set the current time.

Entry: hours(HH) : minutes (mm)

```

35      01:00:05
Set hour   hh:mm:ss
-----
31.05.05   10:33
  
```

3.7.6 Date

Use this menu to enter the current date.

Entry: Day (dd), month (mm), year (yy)

```

36      31.05 2005
Set date   dd/mm yy
-----
31.05.05   10:37
  
```

3.7.7 Soaking cycle

During the soaking period (32) the output RL7 is periodically switched on and off.

Entry: minutes (mm)

mm = 00 - 59

no function = --:--

i.e. without entry, the output RL7 stays active for the entire soaking period.

```

37  ON 15  OFF 30
Soaking cycle   mm
-----
31.05.05      10:50
  
```

After starting of the soaking cycle, the following status information is displayed.

soaking "ON"

```

<< Active >> [00]
Soak-System
-----
31.05.05      11:08
  
```

soaking "OFF"

```

<< Passiv >> [00]
Soak-System
-----
31.05.05      11:08
  
```

After the soaking period is finished (32) the soaking cycle stops, no matter whether the output RL7 is on or off.

The output RL7 stays active during the feeding cycle.

3.8 System variables

3.8.1 Maxm. Runtime

The max. runtime is the max. operating time of the feed chain. If no "full" sensor (sensor IN1) is activated within this time, an error message "runtime error" appears. The input IN1 is accepted only after "delay sensor" (46).

Entry: hours(HH) : minutes (mm)
 HH : mm = 00.00 -23.59

```

41      01:00
Max running  hh:mm
-----
31.05.05    11:37

```

3.8.2 Turn off delay

The turn off delay is the time in which the "full" sensor has to be active before the feeding fully stopps.

Entry: seconds (ss) = 00 - 59
 no function --:--
 without entry, no runtime error

```

42      01:00
Turn off delay  ss
-----
31.05.05    11:46

```

3.8.3 Motor current limit

Use this entry to enter the max. motor current limit for the feed chain drive.

Entry: Amp. 2,0 - 13,99

	ist	max
--	-----	-----

```

43      0,0A  2,0A
Motor current limit
-----
31.05.05    11:53

```

If this value is exceeded, the conector is switched off and the display shows the error message "overcurrent".

The same function is released by the entry IN3 (external overcurrent)!

The motor current limit can be read off the display during operation.

3.8.4 Feed supervision mode

The feed chain is speed-controlled and the contacts are monitored by sensors. In both cases, the same input IN2 is used, however with different functions.

Rotation: The rotation limit is sensor-controlled and can be set in a range of 200-1600 Imp./min (impulse per minute). At the start-up of the motor the rotation is not monitored for a duration of 3 seconds. During feeding, deviations of +/- 10 % are accepted without activating an error message.

Switch: The rotation control is switched off and the input binders can now be used to connect a potential-free opening device which will monitor a rope or chain rupture. The same input is also used for the safety switch when the drive cover is opened, that means, both switches have to be connected in series.

```

44 Switch
Feed supervis. mode
-----
31.05.05      11:59
  
```

```

44 Rotation
Feed supervis. mode
-----
31.05.05      11:59
  
```

Entry: **Switch** *alternative* **Rotation**

Remark: if you change the entry, you change the text.

There are the following error messages: **cable break** *alternative* **rotation error**

3.8.5 Rotation limit

If the rotation is to be monitored as described in chapter 3.8.4 you have to enter a rotation limit.

Entry: impulse per minute (l/min) 0 - 250
 gate time 1 minute

```

45 [12] 0 - 250
Rotation (imp/Min)
-----
31.05.05      12:11
  
```

Calculate nominal speed:

Press Start-key (within 60 seconds, the nominal speed is calculated).

3.8.6 Delay sensor

This function is used to enter a delay time for the sensor ("full" sensor) after a feeding is started.

Entry: minutes(mm) : seconds (ss)
 mm:ss = 00:00 - 59:59

```

46           1:30
Delay sensor  mm:ss
-----
31.05.05     12:17
  
```

3.8.7 After run/empty run

The empty run time is the period in which the feeding is still running after the activation of the "full" sensor. This period is necessary to empty the transport tube. Under normal circumstances, this value is "0".

Entry: minutes(mm) : seconds (ss)
 mm:ss = 00:00 - 59:59
 no function = --:--

```

47           1:30
AfterRun/Emp. mm:ss
-----
31.05.05     12:23
  
```

The output "supply auger" RL6 is not active during this time.

To empty the feed chain, the feed chain recirculates over the feed silo, that means, once the sensor at the conveyor tube becomes active, the supply auger is switched off and the tube content has to be emptied into the silo within the set time period.

3.8.8 Open dispenser

This menu is used to set the duration time for which the output for the emptying of the volume dispensers (servo motor) is to be active after termination of the feeding cycle and after tun / empty run (47).

Entry: minutes(mm) : seconds (ss)
 mm:ss = 00:00 - 59:59
 no function = --:-- , that means, the
 dispenser (RL4) is not activated

```

48           1:30
Dispen. open  mm:ss
-----
31.05.05     12:28
  
```

The dispenser is switched off after the above set time.

3.8.9 Operating hours


Records the operating hours of the drive motor.

Recording: hours (HH) : minutes (mm)

```

49            00000:27
Operating hours
-----
31.05.05      13:32
  
```



Remark: To erase data, press the ENTER
()-key 10x.

```

49 [10]      00000:27
Reset opr. hours?
-----
Yes=ENTER No=Escape
  
```

Once the counter [10] reaches [00], it is reset automatically.

3.8.10 Auto restart

If auto restart is set to "ON" and the "full" sensor IN1 is passive, sensor (46) starts the feeding after the delay time.

Entry: Yes/No

```

4A   No
AutoReStart    Y/N
-----
31.05.05      13:40
  
```

During operating state (Yes) the automatic feeding does not have a function.

3.8.11 Language selection

Use this menu to select the display language:

Entry: English
 German
 Russian
 etc.

```

4B   English
Language Selection
-----
31.05.05      13:44
  
```

3.8.12 Delay Silo

After start of the feeding cycle, the output for the supplier auger is activated after the set time.

Entry: minutes(mm) : seconds (ss)
 mm:ss = 00:00 - 59:59
 no function = --:--

```

4C           00.05
Delay Silo           mm:ss
-----
31.05.05           13:48
  
```

3.8.13 LCD Contrast Adjustment

Use this function to adjust the LCD contrast. The adjustment is limited so that you will always be able to read the display.

Entry: 20 - 150

```

4D 110
LCD Contrast Adjust
-----
31.05.05           13:50
  
```

3.8.14 LCD-Light

Use this function to enter the time after which the LCD light is to be switched off, if no key is activated during this time.

Entry: minutes (mm)
 mm = 00 - 59

```

4E           10
LCD Light Time (mm)
-----
31.05.05           13:54
  
```

3.8.15 Clear data

At initial operation or in case of system failure, clear all data and enter it anew.

Entry: clear data = ENTER (↵)
do not clear data = ESC

```
4F
Clear all Data
-----
31.05.05      13:57
```

Remark: To clear all data press the ENTER (↵)-key 10x.

```
4F [10]
Clear all Data
-----
Yes=ENTER No=Escape
```

Once the counter [10] reaches [00], it is reset automatically.

Once all data has been cleared, the following standard values are entered automatically:

10-19	Activation Times Feeding	--:--
21-29	Activation Times Soak-System	--:--
31	Light duration	10:10 (10 minutes)
32	Soak time	00:10 (10 minutes)
33	Vibration	--:--
34	Fell delay	--:--
35	Set hour	HH:MM:SS not concerned
36	Set date	DD/MM YY not concerned
41	Max running	00:10 (10 minutes)
42	Turn off delay	--:--
43	Motor current limit	7,5 (7,5 A)
44	Feed supervision mode	switch
45	Rotation (imp./min)	250
46	Delay sensor	00:30 (30 seconds)
47	AfterRun/Emp.	--:--
48	Dispenser open	--:-- not concerned
49	Operating hours	HHHHHH:MM not concerned
4A	AutoReStart	no (feeding is started by start times)
4B	Language	<SPRACHE> not concerned
4C	Delay silo	00:30 (30 seconds)
4D	LCD contrast adjust.	not concerned
4E	LCD light time	<TIME> not concerned

A

activation times for feeding 15
activation times for light 15
activation times for soaking 16
After run/empty run 22
Auto restart 23

C

Cable rupture 14
Clear data 25

D

Date 18
Delay sensor 22
Delay Silo 24
Dispenser 11
Dispenser (open) 22
Display 4

E

Empty silo 14
Error messages 13

F

Feed supervision mode 21
Feeding 9
Fill delay 18

G

General information 1

H

Hardware 3

I

Inputs 4

K

Keyboard 4

L

Language selection 23
LCD Contrast 24
LCD-Light 24
Light 11
Light duration 17

M

Main menu 7
Maxm. Runtime 20
Mineral feeding 10
Motor current limit 20

O

Operating hours 23
Outputs 3
Overcurrent 14

P

Power failure 13
Power supply 3
Process variables 17
Protection Class 4

R

Rotation error 14
Rotation limit 21
Runtime error 13

S

Set time 18
Soaking 12
Soaking cycle 19
Soaking duration 17
Software 5
Status messages 8
System variables 20

T

Technical data 4
Turn off delay 20

V

Vibrator time 17