GRAVIMIX®

GRAVIMETRIC BLENDING SYSTEM

MANUAL

windows W7

windows NT

TYPE: FGB MECS, FLECS, 5, 10, 25

Ferlin Plastics Automation
Galileistraat 29
7701 SK Dedemsvaart
The Netherlands

EC DECLARATION OF CONFORMITY OF THE MACHINERY

Declaration according to Directive 2006/42/EC, as amended (hereafter called Machinery Directive). This language version of the declaration is verified a translated version.

We (manufacturer):

Business name:	Ferlin Plastics Automation
Address:	Galileistraat 29, 7701 SK DEDEMSVAART
Country:	Nederland

declare for the product described below:

Generic denomination:	Dosing-blending system
Commercial name:	GRAVIMIX
Model:	FGB
Type:	
Serial number:	
Function:	The GRAVIMIX blendingsystem FGB, is suitable for efficient and accurate dosing of dry and free-flowing thermoplastic materials.

that all the relevant provisions of the Machinery Directive are fulfilled;

that the product also complies with the provisions of the following European Directives:

- 2004/108/EC | Directive 2004/108/EC of the European Parliament and of the Council of 15 December 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility and repealing Directive 89/336/EEC | OJ L 390, 31.12.2004, p. 24–37

that the following harmonized standards have been used:

- EN-ISO 12100:2010 | Safety of machinery - General principles for design - Risk assessment and risk reduction
- EN 349:1993+A1:2008 | Safety of machinery — Minimum gaps to avoid crushing of parts of the human body
- EN 1088:1995+A2:2008 | Safety of machinery — Interlocking devices associated with guards — Principles for design and selection
- EN ISO 13849-1:2008/AC:2009 | Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design
- EN ISO 13849-2:2008 | Safety of machinery — Safety-related parts of control systems — Part 2: Validation
- EN ISO 13850:2008 | Safety of machinery — Emergency stop — Principles for design
- EN ISO 13857:2008 | Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs
- EN 60204-1:2006 | Safety of machinery — Electrical equipment of machines — Part 1: General requirements
- EN 61000-6-4 | Electromagnetic compatibility (EMC) - Part 6-4: General standards – Emission standards for industrial environments
- EN 61000-6-2 | Electromagnetic compatibility (EMC) - Part 6-2: General standards - Immunity for industrial environments
- EN 1037:1995+A1:2008 | Safety of machinery — Prevention of unexpected start-up
- EN-ISO 4414:2010 | General rules for pneumatic systems

and that the following natural or legal person established in the Community is authorized to compile the technical file:

Business name:	Ferlin Plastics Automation
Name and position:	Wouter Maathuis, Managing Director
Address:	Galileistraat 29, 7701 SK DEDEMSVAART
Country:	Nederland

Dedemsvaart 2018

Wouter Maathuis
Managing Director, Ferlin Plastics Automation

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1 INTRODUCTION

When precision and quality comes in first place.
In the modern plastics processing industry with constantly rising quality demands and the necessity of cost reduction require efficient, high-precision dosing and blending of materials for all applications.
GRAVIMIX doses all material components gravimetrically, exactly to the programmed recipe. In this way, fluctuations in bulk density, changes in particle size, or changes in the flow properties have no effect on the dosing accuracy. The GRAVIMIX records the exact consumption of materials, allowing for a precise calculation of the production costs. The simple operation and self-calibration of the system guarantee fast recipe and material changes, even during night or weekend shifts when few personnel are present.

Due to these features, GRAVIMIX is particularly suitable for use in the following applications: Injection-moulding, Extrusion, Blow-moulding and Central-blending.
Due to the high, consistent dosing accuracy of GRAVIMIX, the additive percentage can be reduced to lower tolerance limits without rejects or a loss in quality. The resulting savings in additives leads to a direct reduction in production costs.

Further advantage of GRAVIMIX:
- direct entry of the desired percentages of all components, even during operation
- gravimetric recording of individual and total throughput
- continuous monitoring of dosing process
- constantly updated display of actual and desired setpoints
- monitoring of manufacturing process due to event and time journals
- fast, simple material changes due to self-calibration of the system
- reduction in downtime due to very simple, fast set-up
- savings in material due to precise gain-in-weight dosing
- individual regrind processing due to adjustable regrind priority circuit

The compact and modular construction allows for problem-free adaption and expansion of the system, as required. All parts which are in contact with the materials are made of wear resistant, stainless steel. Refill systems are generally mounted directly to the dosing hoppers, without additional support frames. With up to 10 stations, throughputs of a maximum of 2500 kg/h can be achieved. In the process, up to four stations and for larger systems up to eight stations with slide valves are used for the free-flowing components. In addition, one to two precision screw feeders can be used for small quantities of additives which are free-flowing.

Due to the self-calibration of the system, the sample dosing of new material required with volumetric devices is no longer necessary. In case of a change in colour or material, the device can be taken apart and cleaned without tools in a very short period of time. GRAVIMIX can be mounted or installed on, above, or even next to the processing machine. Also the use of larger systems as central-blender for the simultaneous supply of several processing machines is possible.

The components are dosed one after the other and weighed in a weighing container. If all components have been added precisely to the recipe, they will be mixed homogeneously in the separate mixing chamber. From there, the mixture is conveyed directly to the processing machine or deposited in a vacuum take-off box.
The high dosing accuracy with which GRAVIMIX works is based on the most modern weighing and control technology and proven application-specific software. The microprocessor controlled closed-loop control system constantly monitors all dosing and weighing functions. The first signs of any deviations are recognized and compensated immediately. The optimized material feed system is unaffected by the height of the material in the feed hopper. GRAVIMIX achieves a total dosing accuracy up to ± 0,1 %. This also applies to small quantities and extreme dosing conditions.

GRAVIMIX-controls demonstrate how easy it is to operate a gravimetric blending system in spite of high technical standard. The desired component ratio or percentages are directly entered and can even be changed during operation.

Features of GRAVIMIX-controls:
- microprocessor- or computercontrol
- easy operating through simple entering
- menu-driven operation
- storage of components and recipes
- different languages on the display
- password protection for unauthorized access
- gravimetric / volumetric mode
- printing of used materials and data
- adjustable regrind processing
- additive to regrind control
- operating several systems from one control

2 INSTALLATION GRAVIMIX (Series FGB 5, 10 and 25)

2.1 Required connections

Before installation the following connections should be available:
- power supply 240V 50/60Hz (P+N+PE) and 400V 50/60Hz (3P+N+PE)
- clean and dry compressed air supply with a constant pressure; **minimum** 6 bar, 1/4" BSP connection Figure 2.2

2.2 Installation

There are several ways to install the GRAVIMIX blender, for example;
- on a stand with integrated vacuum take-off box next to the processing machine (option)
- on a platform / frame above the processing machine
- directly on the processing machine

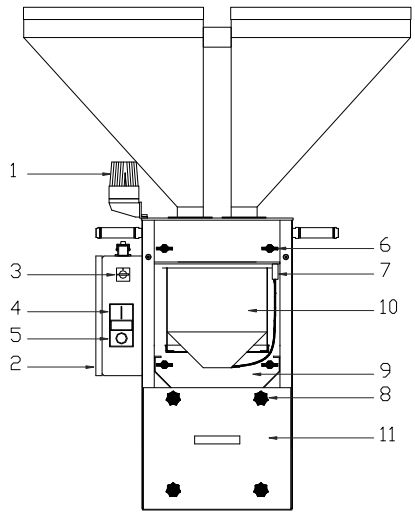
Before installation of the blender open or remove the front panel. At the same time remove the weighbin, mixing chamber and mixer.

To prevent the loadcells from damage during transport, the weighbin must be removed from the blender !

The front panel can be opened by turning the pawl latches. The weighbin can be removed after the quick release coupling air line is disconnected. The mixing chamber can be taken out by removing the star handles or by turning the pawl latches. The mixer blade (FGB 1, 2 and 5 series) can be removed by turning this in the direction of rotation (counter-clockwise) and pulling (bayonet coupling). The mixing chamber and mixer (FGB 10 and 25 series) can be removed completely. To reassemble reverse the process.

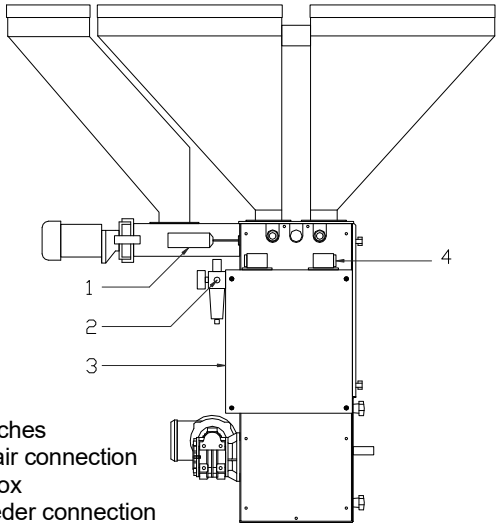
If the GRAVIMIX blender is provided with extra screw feeders at the back and/or the front side, then they should be removed before installation. The screw feeders can be removed from the mounting-pins as follows; disconnect the plug from the control box (draw. 2.2), open the toggle latches, remove the safety screw (draw. 2.3) and pull the complete screw feeder from the mounting-pins. The assembly takes place in the reverse way.

ATTENTION: **do not connect the power and compressed air before the GRAVIMIX blender is finally installed.**



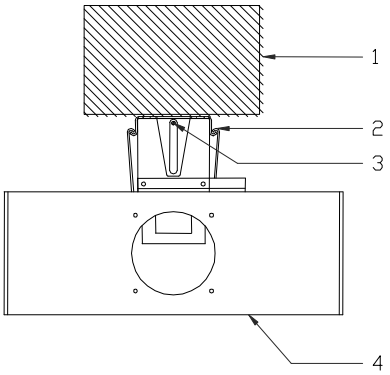
1 – alarm lamp
2 – control box
3 – main switch
4 - control voltage (on)
5 - control voltage (off)
6 - pawl latches
7 - compressed air coupling
8 - star handles / pawl latches
9 – front panel
10 - weighbin
11 - mixing chamber

Figure 2.1 Frontview GRAVIMIX



1 - toggle latches
2 – compr.. air connection
3 – control box
4 - screw feeder connection

Figure 2.2 Sideview GRAVIMIX



1 - blender
2 - toggle latches
3 - safety screw
4 - hopper

Figure 2.3 Extra screw feeder

2.3 INSTALLATION GRAVIMIX (Series FGB MECS and FGB FLECS)

2.3.1 Required connections

Before installation the following connections should be available:
- power supply 240V 50/60Hz (P+N+PE)
- clean and dry compressed air supply with a constant pressure; **minimum** 6 bar, ¼" BSP connection

2.3.2 Installation

The GRAVIMIX FGB MECS (draw. 2.4) can be installed in several ways, for example:
- directly on the throat of a processing machine
- on a frame above the machine hopper of the processing machine

Before installation of the blender, open the front panel and remove the weighbin and mixing chamber.

To prevent the loadcell from damage during transport, the weighbin has to be removed from the blender !

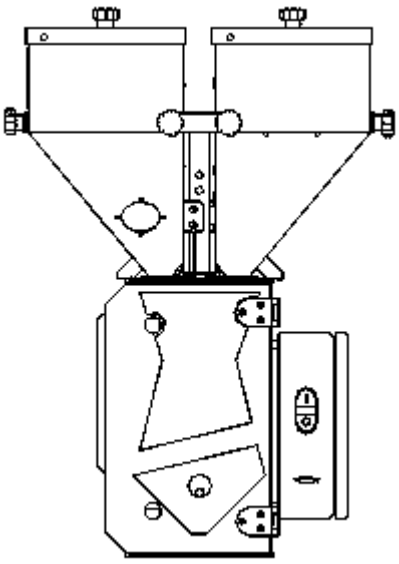


Figure 2.4 Frontview FGB MECS

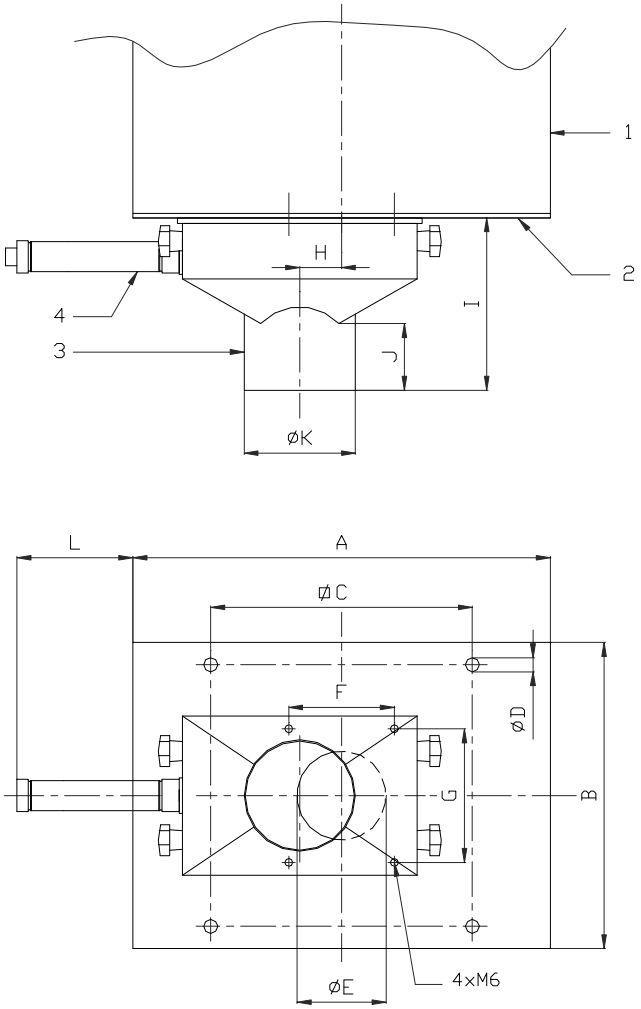
The front panel can be opened by releasing the toggle latches. The weighbin can be simply removed from the suspension to the front. The mixing chamber with shut off valve can be removed completely to the front side of the blender.
The hoppers with dosing-valve are removable and can be removed after the quick release lines are disconnected and the star handles are unscrewed. To reassemble reverse the operation.

It is only allowed to connect or disconnect the control cable (from the FGB-M05) between the control box and the connection box of the blender when the power is switched off !

ATTENTION: **do not connect the power and compressed air before the GRAVIMIX blender is completely installed.**

The GRAVIMX blender can be fixed by means of the mounting holes in the foot plate:
- on a frame with fixing plate and an integrated vacuum take-off box (option)
- on a platform on / or above the processing machine
- on a flange of the throat of a processing machine (if there is no such a flange or attachment present, there should be one designed in consultation with your supplier).

The mounting holes are positioned as mentioned in figure 2.5.



	FGB 0,5	FGB 1	FGB 2
A	170	275	375
B	167	275	275
C	120	185	235
D	9	10,5	10,5
E	50	50,5	80
F	n.v.t.	80	95
G	n.v.t.	60	120
H	n.v.t.	0	38
I	n.v.t.	130	155
J	n.v.t.	55	60
K	n.v.t.	78	100
L	n.v.t.	90	105

	FGB 5	FGB 10	FGB 25
A	375	495	650
B	275	455	650
C	235	340	480
D	10,5	12,5	12,5
E	80	125	2 x 110
F	95	120	120
G	120	120	
H	38	0	
I	155	175	175
J	60	40	40
K	100	124	2 x 124
L	105	170	

1 - blender
2 - foot plate
3 - material control valve
4 - pneum. cylinder

Figure 2.5 Foot plate & Material control valve

The GRAVIMIX blender should be installed as stable as possible, in connection with the accuracy of the loadcells.

If the blender is provided with a material control valve (underneath the mixing chamber), then this valve should be mounted under the foot plate of the blender with 4 screws after the blender is installed. Then the pneumatic cylinder of the control valve should be connected to the redesignated pneumatic solenoid valve (for instruction see chapter 13.4).

After the blender is finally installed, the mixer, mixing chamber and weighbin can be replaced and the front panel can be closed. The compressed air supply can be connected to the pressure regulator (max. 12 bar). The power supply (240V and/or 400V) can be connected to the control box of the blender and/or to the separate user-interface. The power supply should be “clean” with regard to fluctuation and interference. Then the communication cable between the user-interface and the control box should be plugged in. It is **not** permitted to put this cable (particularly the RS-422 communication cable) in a cable-way with high power (flux) cables, this is in connection with interference (induction).

Finally the raw material supply should be connected to the hoppers of the GRAVIMIX blender.

It is advisable, that the hopper loaders mounted on the GRAVIMIX, are provided with a good connection with earth (PE). This because of the static electricity generated by the transport of raw materials.

For start-up of the blender refer to chapter 4.

3 GETTING STARTED

If you are using the standard user-interface (industrial PC with touch-screen) supplied with the GRAVIMIX, than Windows CE 3.00 is already pre-installed. The licence will be supplied as well.
When data should be added, a keyboard will be automatically shown on the screen.

ATTENTION: **when using your <u>own</u> PC with GRAVIMIX software supplied by the manufacturer, your PC should be provided with Windows NT 4.0 with servicepack 6 or higher !**

The manual assumes, that you are using a mouse to operate the GRAVIMIX blender. Operating in combination with a keyboard is also possible.

3.1 Software installation on PC

The GRAVIMIX software must be installed from the CD-Rom on your PC.

[1] Double click on the icon 'My computer' on your desktop.
[2] Than double click the icon 'CD-Rom Drive'.
[3] Double click on the file **Setup.exe.**
[4] The installation program is now running and the welcome-screen will be shown. Click on 'Next'.
[5] Enter your name and company name. Click on 'Next'.
[6] Where would you like to install the GRAVIMIX software? Standard it is on the hard disk in location **C:\GRAVIMIX**. Would you like to install the program on a different disk or in another directory? Then change the name of the disk and the directory. Click on 'Next'.
[7] GRAVIMIX will be added to the startmenu in a new folder **GRAVIMIX**. Would you like to add the program to a different folder? You can select a different folder or type a new foldername. Click on 'Next'.
[8] Check the entered data. If all data is correct just click on 'Next'.
[9] The program will be installed. Click on 'Finish' to end the setup.

3.2 Select COM-port

Select the folder **GRAVIMIX** by means of the explorer program. In here you will find **portsetting.ini**.
Double click the program. Add the necessary com-port(s) to the list, or remove the unnecessary com-port(s).
Save possible changes.

3.3 Select printerport

Select the folder **GRAVIMIX** by means of the explorer program. In here you will find **prtsetting.ini**.
Double click the program. Add the necessary printerport to the list, or remove the unnecessary printerport.
Save possible changes.

4 START-UP

The general working of the system is as follows (on the basis of the standard dosing method and the selected recipe); if all components are present, dosing of a batch starts. The cycle starts by closing the weighbin. Then each of the requested components will be dispensed and weighed one by one into the weighbin. After all components of the recipe are dosed, the contents of the weighbin will be discharged into the mixing chamber. In the mixing chamber the material will be mixed and then after opening the material control valve (if fitted) it will be discharged into a machine hopper, processing machine or vacuum take-off box.

4.1 Blender start-up

The user of the GRAVIMIX blender should have read and understood this manual, before operating the blender.

In this chapter you will find a short description of the normal starting procedure of the dosing system. Details of the control will be described in the following chapters.

An emergency stop can be operated to shut down the blender, by pushing the button on the control box, as indicated in figure 2.1 and 2.4 in chapter 2.

Steps to follow for the start-up of the blender:

[1] Connect the blender with the user-interface by means of the communication-cable.
[2] Turn on the compressed air (**max. 6 bar**).
[3] Switch on the power.
[4] Start the GRAVIMIX program.

Menu's will be selected by touching the screen (touch-screen) or with the mouse and keyboard of the PC. (Function-keys are between brackets).

[5] Select the correct language. Using ***Menu (F1) → System → Change language***. The pre-selected language is indicated.

[6] If necessary adjust date and time. Using ***Menu(F1) → System → Date and time.***

[7] Login. ***Menu (F1) → System → Login***
Enter login code, standard factory code is '2222', confirm with ***<Enter>.*** (See chapter 7.1)

[8] Select the COM-port which belongs to the station number. The station number is equal to the node- number, which will be adjusted in the hardware of the FGB control. ***Menu (F1) →System → Node adjusting***

[9] Select the blender (station) which should be started.
Stationnumber (F4) → Arrow-keys ⇕

[10] Select per blender the requested recipe. Using ***Menu (F1) → Control → Recipe selection.***
If there is no recipe available, a recipe should be made. (See chapter 6.1)

[11] Take care that there are no alarms active. (See chapter 5.4)

[12] Start the blender with ***START (F5).***

Now the blender will operate automatically on the select recipe.

4.2 Blender status

The control of the blender varies according to the status. Each status gives an exact description of the situation the controller is in. The controller has the following status:

Inactive (black)*

At the start-up of the blender several internal tests will be done automatically, therefor the controller cannot find a recipe. In this status the blender will not start until a recipe is entered.

Standby (green)

The blender is stopped, but can be started any moment by giving a start-command. Ie Ready for use.

Operating (yellow)

The blender is producing blends of the selected recipe.

Pause (blue)

The blender is producing but a pause-command has been given by the operator for a temporary stop, the blender will stop after the current component is dispensed.

Stop requested (orange)

The blender is operating but has received a stop-command. The stop-command will be executed at the end of the batch-cycle. This status will be replaced automatically by 'standby' if nothing else is done. If a start-command is given during the status, 'stop requested' the status change to 'operating' again.

Error (red)

The controller has detected an error and therefore the system will stop. In a sub-menu at the user-interface the error will be displayed. The error situation can be recovered using the ***<Enter>*** command. However the error must then be solved.

Automatic ET LOCAL

The blender is also controlled by a PLUG-IN interface, and the PLUG-IN has the status of LOCAL.

Automatic ET -REMOTE

The machine is also controlled by a PLUG-IN interface. The PLUG-IN has the status of REMOTE.

**) Between the brackets is the (colour), which stands at a station number in the production status menu and indicates the present blender status.*

4.3 Operation Local / Remote

The operation of a Gravimix can happen in different ways. An industrial PC (standard control CE or NT) or a plug-in interface can be used. Also a combination of both is possible. To avoid any conflicts and to unexpected situations, a certain protocol is used while operating with more than one control. Through the recipe status the protocol with which the machine operates is made visible to the operator.
Below is the explanation of the different status.

Local

Local is reflected in the menu "change recipe" of the PLUG-IN. When the machine operates on local it is possible to make a new recipe in the menu "change recipe" of the PLUG-IN. This new recipe will be stored at the standard control under recipe number 0 in case of a combined operation.

Remote

Remote is reflected in the menu "change recipe" of the PLUG-IN. The machine is operated with more than one control. The standard control sends the recipes. Only percentages can be adjusted in the recipe of the PLUG-IN, also in specific menu's the access rights have expired. Only through the standard control now those orders can be carried out of which the access rights were denied. When the recipe parameters are adjusted in the PLUG-IN the standard control will make a new recipe with ET(X) standing before it., (X) is the recipe number of the original recipe.

5 CONTROLLER

Different adjustments of the GRAVIMIX can be entered through the “controller” menu.

5.1 Select recipe

If a new product or product-composition is required, select an existing recipe or compose a new one.

To select a recipe use ***Menu (F1) → Controller → Select recipe.*** The system now shows a list of all recipes and one of them can be selected. (Edit recipes see chapter 6.1)

The recipe number which is marked with a (*) is the actual (selected) recipe.

> **IMPORTANT**
>
> When a new recipe is selected, be sure that all hoppers and screw feeders are completely filled with material. This is in connection with the calibration of the system.

5.2 Public parameters

The controller stores a great number of parameters necessary for the control of the blender with all its features. Public parameters are parameters that can be changed by the operator, they only have influence on the result of the production process. These parameters can be reached by selecting ***Menu (F1) → Controller → Public parameters.*** The parameters can be printed out via ***option (F2)***.

5.2.1 Production-mode

The production-mode of the blender shows which condition the production will stop in automatic operating- mode. This parameter can be changed by ***Menu (F1) → Controller → Public parameters → Production mode.*** The production-mode has the following three options:

Continue

The blender will not stop automatically after a start-command is given. The blender will continue production, unless the blender runs out of material or an error occurs.

Weight->Alarm

If the option ‘Weight-Alarm’ has been chosen, a requested weight has to be added. After a start the requested weight will be compared with the 'produced-weight'. If both are the same or the ‘produced-weight’ is higher, the controller will send an alarm to the user-interface. The production will continue.

The alarm can be recovered by the reset of produced weight. The command for this is ***Option (F2)*** → ***Reset produced weight*** in the production status screen.

Weight

When using the option 'Weight' a weight should be added as well. After a start the requested weight will be compared with the ‘production-weight’. If both are the same or the ‘produced-weight’ is higher, the controller will send an alarm message to the user-interface. The production will not continue in this case.

5.2.2 Dispense mode

The blender has two different dispense modes: gravimetric and volumetric. Before operation one of the modes can be selected or a combination of both. This parameter can be adjusted via ***Menu (F1) → Controller → Public parameters → Dispense mode.***

Gravimetric

Re- and after-calculations are possible, because all components of a batch are dispensed and weighed separately. Gravimetric is the most accurate dosing method, but the throughput is lower compared with volumetric. This is the recommended method of dispensing.

Volumetric

All components of a batch are dispensed at the same time using the dispense time of each component (calculated by the system). The components are discharged directly into the mixing chamber. No measurement is done in this method. Volumetric is less accurate but has a higher throughput.
This method is not recommended for normal running.
If you run in the volumetric mode the operator must make sure that the grams per sec values used in the recipe are based on actual rates that have been previously run in production.

Combination

When combination is defined, one gravimetric dispense will be followed by a defined number of volumetric dispenses (combinationRatio). This parameter can only be defined after 'combination' is chosen. This method offers the advantages of both methods; accuracy of gravimetric and the high throughput of volumetric.

After a start of the production or after the mixing chamber is discharged, a gravimetric dispense will be completed. It is possible that the number of volumetric dispenses is too high (for instance combination 1:3). If the mixing chamber is already full after two volumetric dispenses, the control will not dispense the third one, but will start again with a gravimetric dispense.

5.2.3 Mixer-mode

When all components are dispensed, the contents of the weighbin will be discharged into the mixing chamber. A horizontal mixer in the mixing chamber provides a homogeneous blend. The mixer can be put in different modes via ***Menu (F1) → Controller → Public parameters → Mix mode***.

Normal

The mixer is off during operation. But when the contents of the weighbin are discharged into the mixing chamber, the mixer will be on for a predefined time 'On time'. This parameter can be added at the moment the mix-mode 'normal' is selected.

Pulse

During operation the mixer will be pulse on and off . The time the mixer is on (Pulse on time) and the time is off (Pulse off time) can be added at the moment the mode 'pulse' is selected. Also the 'On time' should be added (see Normal).

Off

The mixer is always off.

Continue

The mixer is always on, when the machine status is 'operating'.

5.2.4 Reports and overviews

It is possible to print or to save different reports and overviews in a file (CSV format) via ***Menu (F1) → Controller → Public parameters → Reports***

The reports are:

- Alarm report
- Print batch report
- Print on recipe change
- Print production report

Selections for a file can be made in ***Menu (F1) → System → Report*** (see chapter 7.9)
Selections for the printer can be made in ***Menu (F1) → System → Printer*** (see chapter 7.10)

5.2.5 Timers

After the different components are dispensed, the contents of the weighbin are discharged into the mixing chamber. Via ***Menu (F1) → Controller → Public parameters → Timers*** the time of the discharge into the weighbin and the mixing time after the level in the mixing chamber is reached (mixer full sensor), can be adjusted .

Weighbin dumptime

Time that the weighbin valve is open.

Level control waittime

Time delay before the mixing chamber is accepted to be full and the opening of the material control valve.

Level control dumptime

Time that the material control valve remains open from the moment that the level sensor in the mixing chamber shows low level.

5.3 Protected parameters

The controller has a number of system adjustments which have to be added once-only. Through these adjustments the controller is able to interpret the weigh-signal of the loadcells and to control the slidevalves and screw feeders. Protected parameters should not be changed by an operator, but only by a authorised person. Protected parameters have influence on the basic adjustments of the GRAVIMIX blender. These parameters can be reached by selecting ***Menu (F1) → Controller → Protected parameters***. The parameters can be printed out through the ***Option (F2***) in the parameter-screen.

5.3.1 Weigh settletime

Waiting time between the dispense of a component and the measuring of the weight, to stabilise the weighbin.

5.3.2 Weight variationband

Superior weightings should be within this band, with regard to the average weight.
The average of the eight samples taken from the loadcells is the zero point at which the control system checks to make sure that the samples taken are within half of the weight variation band parameter i.e. if the setting is 10g then the control is checking to make sure that the samples are +/- 5g. If three or more samples are outside this band then the machine will take eight more samples to recalculate if the loadcells are stable. If the samples fail the check approximately ten times the control will generate an “Loadcell Not Stable” alarm.

5.3.3 Dispense efforts

Number of dispense tries per component whereby no or too little material is dispensed. After the number of dispense efforts the blender gives an alarm (type of alarm to be defined in the recipe). This is also the maximum number of closing efforts of the weighbin valve (if the weighbin is out of tare band). Note triggered by.

5.3.4 Dispense accuracy

The minimum dispense accuracy of each component.
The dispense accuracy parameter is set so that the control can detect whether the component dispensed is within a set tolerance i.e. If the dispense accuracy is set to twenty percent and the weight required is 100g the dispensed weight must be within 80-100g range. If the material dispensed is below 80g then the control will try to dispense again unless the unit is set to ignore in the recipe. Care must be taken when setting this tolerance as when the unit tries to dispense small weights the percentage is applied to each component weight this could mean you are only allowing a very small deviation from the required weight and can cause the machine to constantly generate alarms. If the unit is set up to generate overdosing alarms this parameter is the tolerance used as the higher limit, this is also applied to each component.

5.3.5 Dispenserate correctionband

Maximum deviation of the dispense-rate wherein a correction of the dispense-rate will be done.

5.3.6 Batchweight

Total weight of all dispensed components. This value will be copied automatically into a new added recipe.
When Idle the default batch weight.

5.3.7 Loadcell range

Maximum weight of a batch before an overload alarm-message appears. This weight depends on the type of loadcell in the blender.

5.3.8 Maximum tare variation

Maximum deviation from the zeropoint of the weighbin at the start of a batch.

5.3.9 FGB name

Name of the controller (blender); this name is used by the user-interface for recognition.

5.3.10 Dispense Guard

The dispensing control will check the dosed weight of a component during the dispensing. Is the required weight already reached within the calculated time, the dispensing control will close the valve, so that there will not be a large exceeding of the required weight.

Dispensing control

OFF Dispensing control turned off

ON Dispensing control always turned on
(To use when the material does not go very well, to avoid overload.)

After recipe change Dispensing control only turned on during calibration
(With vibrations of the machine, if it is on a drawn in opening for example, to avoid unnecessary empty reports.)

After the dispensing control has intervened, immediately there is a calculation of the dump rate on the basis of the last dispensing. Normally this is (4 x the old dump rate + the new dump rate) / 5. Last is used to avoid too much fluctuation.

5.3.11 Overload alarm

After overloading a component there is an alarm, depending on the chosen alarm type with the recipe.

IGNORE No alarm

WARNING There is an alarm send to the user-interface. The control will continue with the next component.

ERROR Equal to “Warning”, but after the control sends an alarm, the machine does not start with the next component. The control will wait for a command. With “↵ Enter” the control will start with the next component and the alarm will be cancelled. By pressing the “stop” (emergency button) twice the dispensing will be interrupted.

The overload alarm is dependent on the tare rate, which is indicated with the dispensing accuracy. Is the abnormality too big, so that it is outside the tare rate, only then will the overload alarm come into effect

5.4 Alarmhistory

The controller sends a message to the user-interface when an error is detected. The message will be displayed on the screen and will be stored with date and time in the alarm-history. Underneath is a list of all possible messages, descriptions and instructions to solve the error.

ALARMS		
Alarm-message	Description	Action to solve the error
No control voltage	No control voltage (24V) present	Switch on control voltage and press enter
Covers are open	Front cover is open and/or mixing chamber is not in place	Close front cover and/or place mixing chamber, switch on control voltage
Production weight reached	Adjusted production weight is reached	Reset 'Produced weight' in the production status (option F2) screen
Loadcell out of tare band	Deviation from the zeropoint of the weighbin is too high (Max. tare variation)	Tare or calibrate the weighbin. Or check level-sensor adjustment in the mixing chamber **)
Parameters are not correct	The checksum of the stored parameters is wrong, all parameters get a default value	Only a message! Check parameters and battery voltage ≥ 2,5 V
Production data not correct	The checksum of the stored data (status-screen) is wrong, all data will be cleared	Only a message! Check battery voltage ≥ 2,5 V
Low level in hopper	The controller notice via a level sensor (option) that a hopper runs out of material (signal)	Fill the hopper with material
Loadcell is not calibrated	The checksum of the stored loadcell-parameters is wrong	Calibrate the weighbin
Loadcell overload	Weight in the weighbin is higher than the adjusted maximum weight in the protected parameter	Remove material from the weighbin. Check in recipe the dispense-rate
Loadcell not stable	Weight in the weighbin does not fall in the adjusted band within a certain time	Confirm *) **)
Communication with FGB lost	There is no communication between controller (blender) and the user-interface	Check the communication-cable (connections and cable) and check if the blender is switched on
Loadcell needs more samples	There are not enough samples for setting (generate) a stable weight	Confirm *)
Loadcell boundary error	Too much weigh-samples outside the range	Confirm *)
Silo fulll error	The regrind stock-silo remains full during the adjusted number of batches (high-level sensor activated)	The use of regrind is too low -> increase use or decrease supply
Silo empty error	The regrind stock-silo remains empty during the adjusted number of batches (low-level sensor not activated)	The use of regrind is too high -> decrease use or increase supply
Conflict with regrind parameter	The mentioned hoppernumber contains no regrind	Compare the 'Regrind Control' parameters with the values in the recipe
Conflict with additive – regrind parameter	The mentioned hoppernumber contains no additive	Compare the 'AdditiveToRegrind' parameters with the values in the recipe
Hopper is empty	No material has been dispensed so the controller indicates that a hopper must be empty	Fill hopper with material and start blender again ***) Reselect recipe
Internal error in FGB	Internal the controller executes wrong calculation	Confirm *)
Emergency stop executed	The ***stop(F6)*** key is pressed twice, emergency stop	Confirm
Motor thermal overload	The thermal overload (in the controlbox) of the motor has tripped	Check current of mixer motor and check mixer blade is fitted correctly

*) *If this message occurs frequently, please contact your dealer.*

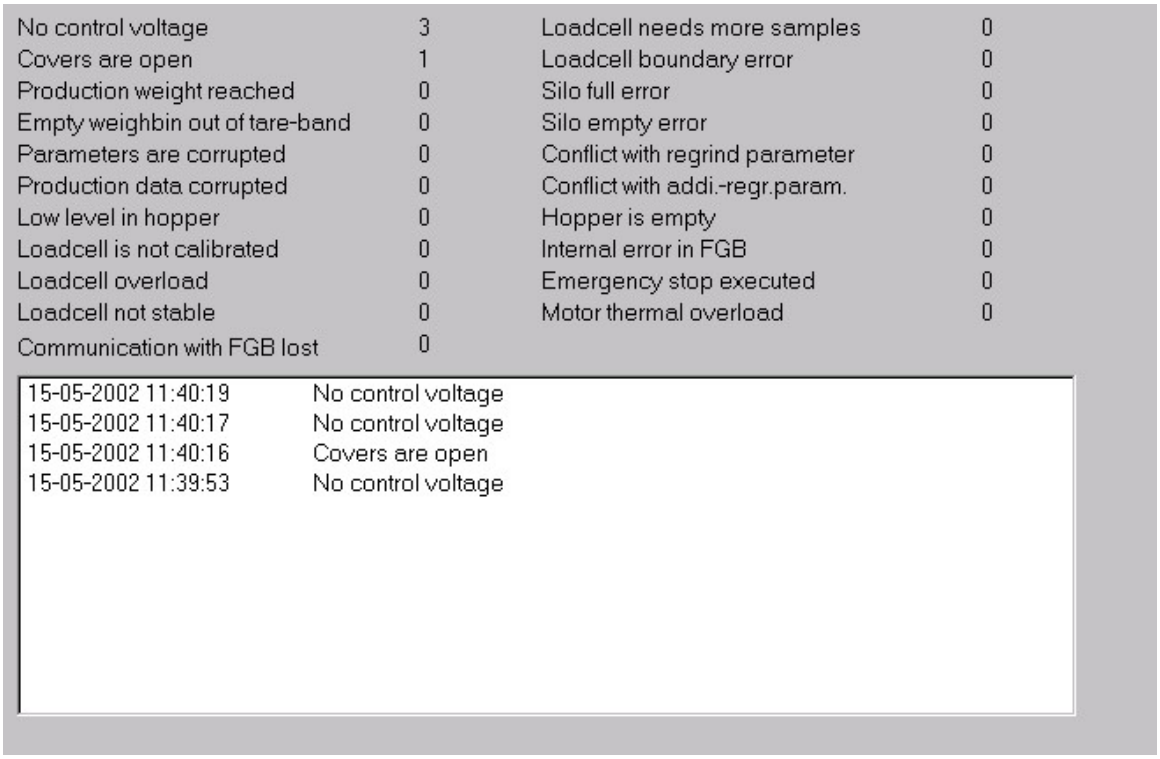
**) *If this message occurs, it is possible that the adjustment of the weighbin dumptime is too short (see Public parameters). It is also possible that the weighbin-dumpvalve is touching the material in the mixing chamber if the level is too high. In this case the level sensor in the mixing chamber should be lower or the batchweight should be reduced. The last mentioned will reduce the total throughput of the blender.*

***) *If the dispense valve does not open for long enough is it possible that no material is dispensed, so the blender indicates that a hopper is empty. There are three possible reasons for this:*

-1 dispense accuracy is too small
-2 adjusted dispense-rate is too high

-3 number of dispense tries is too low
Solutions:
-1 increase the dispense accuracy (see chapter 5.3.4)
-2 adjust dispense-rate in recipe (see chapter 6.1.1)
-3 increase number of dispense tries (see chapter 5.3.3)

The user-interface stores all the displayed messages, these can be displayed in the screen by the ***Menu (F1) → Controller → Alarm history.*** This screen shows the last 256 errors and the number of times each error occurred. The screen can be cleared by ***F2 option → Reset alarm history***. With the same key it is also possible to print a copy of the alarms by selecting ***Print alarm report***.



If it is not possible to solve the fault according to these instructions, please contact your dealer.

5.5 Calibration

The calibration of the loadcells and the hardware-reactiontime of the dispense valves can be carried out in the calibration menu. These parameters can be reached by selecting ***Menu (F1) → Controller → Calibration.***

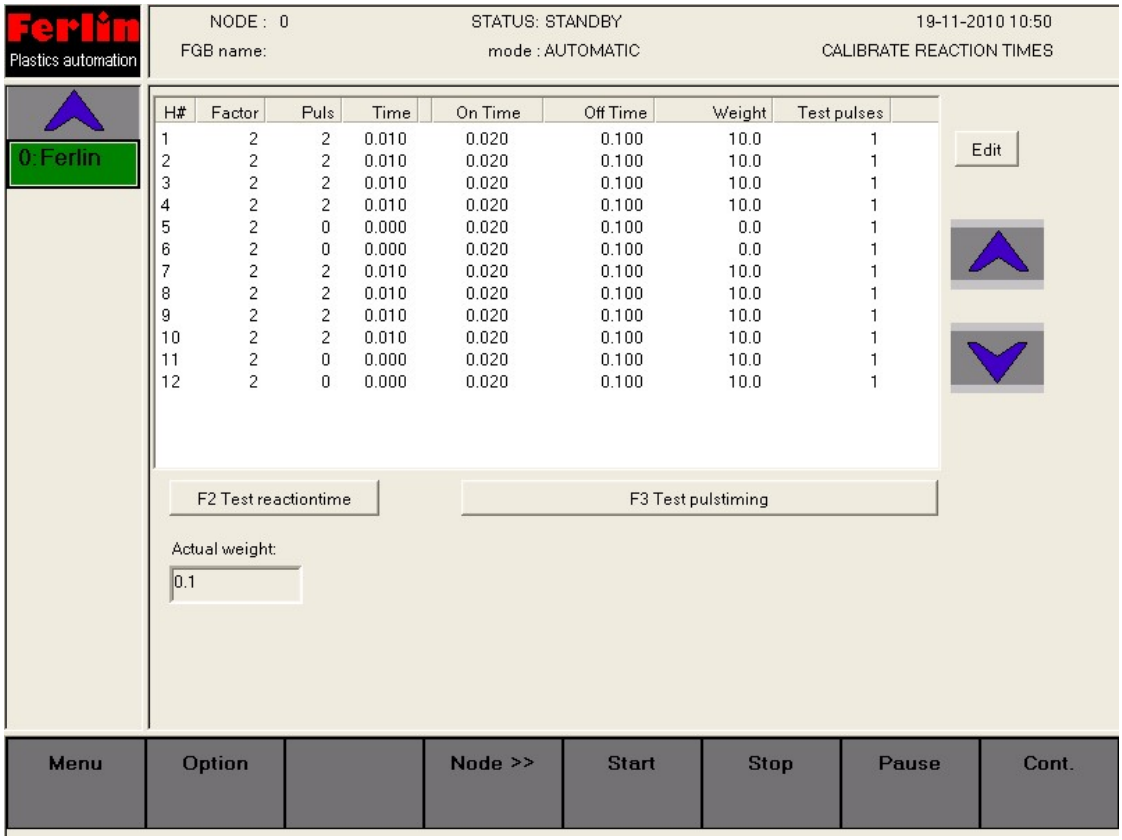
5.5.1 Hardware-reactiontime

The controller uses pulses to handle the dispense-process. One pulse corresponds with 5ms, however the reaction time of a dispense valve or a screw feeder is larger. There is a minimum reaction time for the valves and screws. The hardware reactiontime is added to the calculated dispense time to eliminate the mechanical delay. If a hardware reaction time is not entered it causes a large deviation, see table below:

Dispense **without** hardware reactiontime (suppose 6 pulses = 30ms)						
Dispense	Dispense-rate	Recipe	Dispense-time	Dispense-time excl. hrt	Actual	Deviation
Screw	7 g/s	14 g	2 sec	1,97 sec	13,79 g	1,5 %
Valve	800 g/s	600 g	0,75 sec	0,72 sec	576 g	4 %

Dispense **with** hardware reactiontime (suppose 6 pulses = 30ms)						
Dispense	Dispense-rate	Recipe	Calculated Dispense-time	Actual Dispense-time **incl.** hrt	Actual	Deviation
Screw	7 g/s	14 g	2 sec	1,97 + 0,03 = 2 sec	14 g	0 %
Valve	800 g/s	600 g	0,75 sec	0,72 + 0,03 = 0,75 sec	600 g	0 %

The hardware reactiontime can be entered in the ***Menu (F1) → Controller → Calibration → Hardware reactiontime***. To change a value the whole row should be selected and after that ***Edit***. Below is an explanation per column.



H#
Hopper number

F = Factor
Factor times the pulse time is the minimum opening time at a dosing effort. If the machine calculates an opening time lower than the factor times pulse time (2x0,010 s = 0,020 s) the machine will use the 0,02 seconds for controlling the output. When facing problems with empty hopper alarm while the hopper is filled with material, increase the factor. The maximum setting is 10.

Pulse
The reactiontime in pulses

Time
The reactiontime in seconds

With ***Test reactiontime(F2)*** the adjusted value can be tested.

The value of the hardware reactiontime for normal use has already been adjusted by the manufacturer. These values are:

- Hopper with dispense valve : 4 pulses
- Hopper with screw feeder : 2 pulses

5.5.1.1 Pulse dispensing ('Auto-Pulse')

To increase the accuracy when dispensing small quantities of material with a dispense valve, the method 'pulse dispensing' can be chosen. This is possible up to a certain weight. The adjustment of the pulsetime can be done through ***Menu (F1) → Controller → Calibration → Hardware reactiontime.*** The screen shows different columns, for an explanation see the description below. To change a value the whole row should be selected and after that ***Edit***.
The dispense-rate of pulse dispensing should be ± 0,5g per pulse. The adjustment of the dispense-rate is very much dependant on the used material, that is why the times should be adjusted manually; this is completed as follows:

Put the blender on manual. Close the ***Weighbin (F7)***, make a note of the actual weight and press ***Test pulstiming (F3)*** so one testpulse will follow. Check the increased weight. By increasing or decreasing the 'On time' (0.010 – 0.040 sec.) more or less material will be dispensed. The 'Off time' (0.050 – 0.300 sec.) gives the material more time to flow through the valve. The 'Off time' should not be too short. If the result is o.k. after one testpulse, also test with more pulses (appr. 10 pulses) to be sure the average is o.k. as well. Put the blender back to automatic.

H#

Hopper number

On time

Time that the dispense valve is open per pulse

Off time

The waittime between two pulses

Weight

If the quantity of material to dispense is below the added weight, the pulse dispensing starts automatically

Test pulses

The number of pulses for the manual testing of pulse dispensing.
To be sure that the adjusted times are sufficient to dose, they can be tested manual by means of ***Test pulstiming(F3)***.

5.5.2 Loadcell calibration

The controller uses two known (entered) calibration-points to calculate a weightline. With this line it is possible to recalculate a weight by means of the input-signal of the loadcells (weighbin). The two calibration-points must be entered by the operator in the ***Menu (F1) → Controller → Calibration → Loadcell***.

The calibration-procedure of the loadcells has two steps and both should be executed. Extra information on the screen is given with regard to each step. First be sure that the weighbin is empty, after which via ***Calibration*** the weight of the empty weighbin is measured and stored by the controller. Next step is to fill the weighbin with a reference-weight and be

sure that the input-field on the screen shows the same value. Via ***Calibration*** the second calibration-point is measured and stored. The calibration-procedure is complete.

IMPORTANT

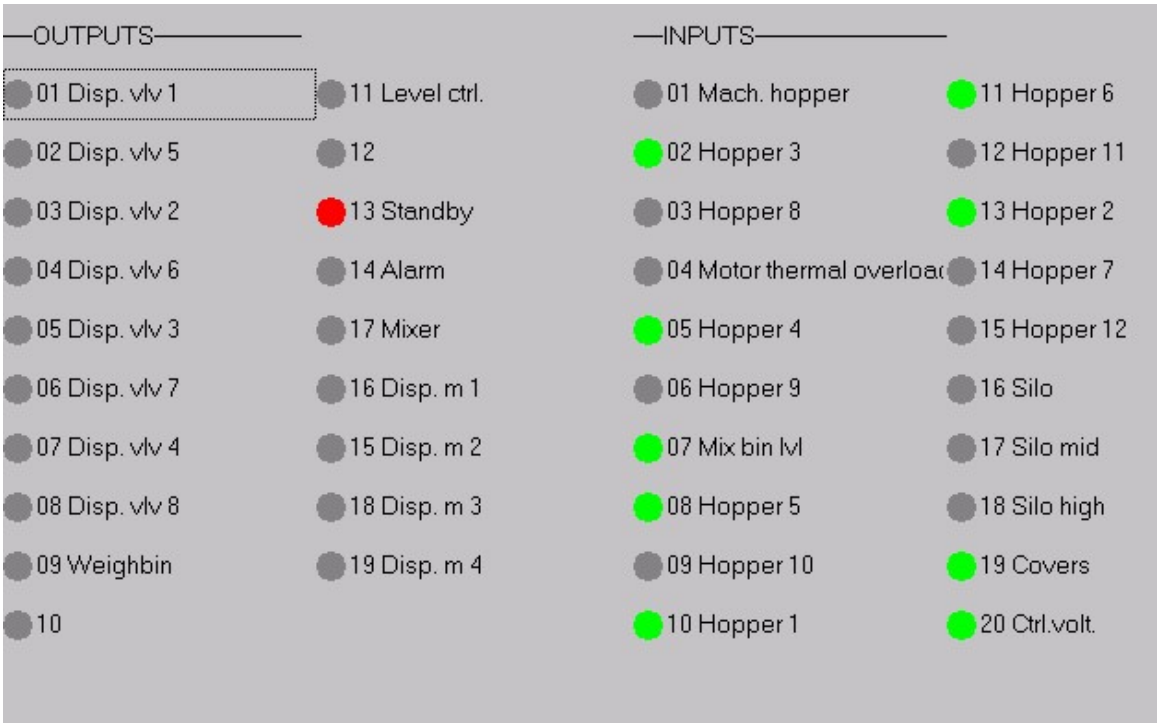
The second calibration-weight must be larger
then the first one.
% off the total scale should be no more than 96%

5.5.3 Loadcell (weighbin) tarration

Due to external factors, temperature, age, overload etc. it is possible that the weightline of the loadcells 'moves'. When the blender is in standby the display shows the deviation of the zero-weight. It is possible to remove the deviation by a new calibration procedure, but it takes time and not always necessary. The weightline is correct, it has only moved. The tare-function correct the deviation and the screen shows its zero-weight.
The tarration can be completed in the ***Menu (F1) → Controller → Calibration → Loadcell tarration***.

5.6 Digital Input & Output monitor

The input & output monitor ***Menu (F1) → Controller → Digital I/O monitor*** shows the status of all out-going (outputs) and incoming (inputs) signals in the controller can be activated manually, ***this can only be done in 'manual mode'.***
On the screen the outputs can be activated by means of selecting.



5.7 Automatic mode

The controller has two modes; **Automatic** and **Manual**. The operator can change the mode in the controller-menu. It is only possible to change the mode while the blender has status of 'standby'.

If the controller is in automatic mode ***Menu (F1) → Controller → Select automatic mode*** the recipe will be dispensed automatically. This mode is used for continuous production.

The following keys are specific to Automatic mode:

F5	Start-command (start)
F6	Stop-command (stop)
F7	Pause-command
F8	Continue-command (clear pause)

5.8 Manual mode

The controller has two modes; **Automatic** and **Manual**. The operator can change the mode in the controller-menu. It is only possible to change the mode while the blender has status of ‘standby'.

After a start-command in Manual mode one dispense will be executed. After this the machine-status will be 'standby' again. Via ***Menu (F1) → Controller → Select manual mode*** the manual mode can be selected. The weighbin and material control valve can be operated manually in this mode.

The following keys are specific for Manual mode:

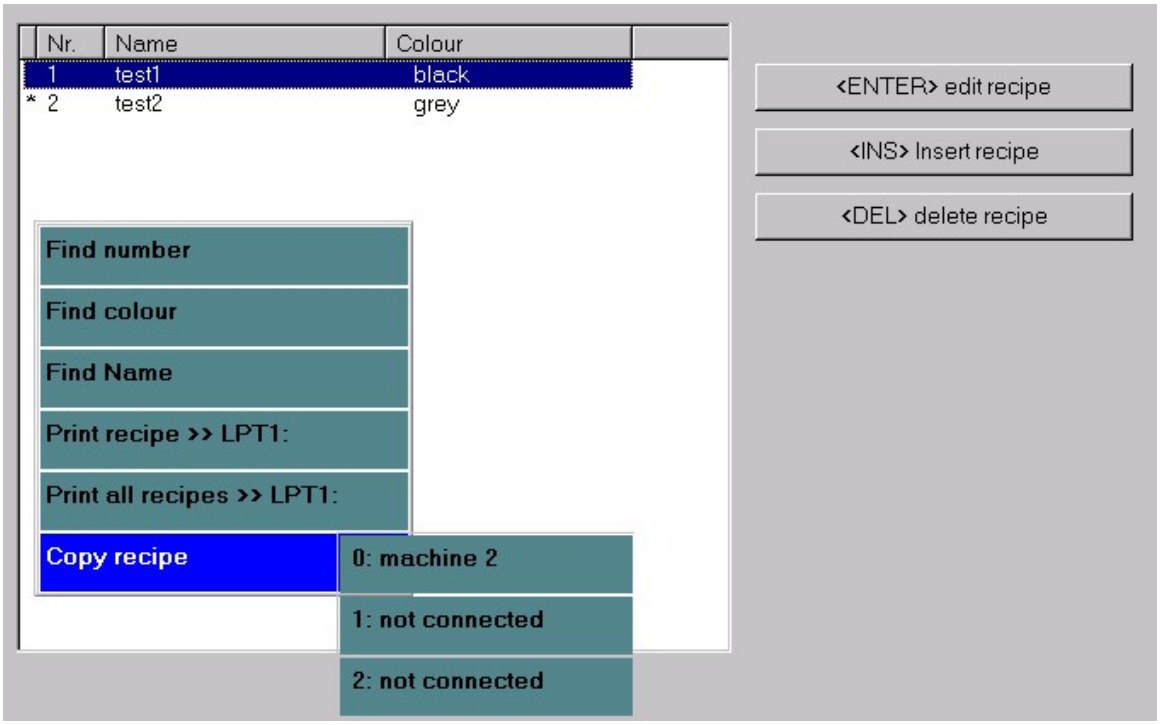
F5	Step-command (one component of the recipe)
F6	Start and stop of the mixer
F7	Close and open of the weighbin
F8	Close and open of the material control valve

6 RECIPES

Recipes are the core of the controller. They contain all information about the material to be produced.

6.1 Edit recipes

Via ***Menu (F1) → Recipes → Edit recipes*** recipe can be added. The recipe exists of a number of components (materials) which can be changed. A PC has a certain storage capacity of recipes which is dependent on the memory capacity of the PC.
When putting recipes on a USB flash disk, the maximum is at least 1000.



On the screen '**edit recipes**', recipes can be deleted, added or changed. A recipe can be selected. With ***<ENTER> Edit recipe*** it is possible to change a recipe, with ***<INS> Insert recipe*** a recipe can be added and with ***<DEL> Delete recipe*** a recipe can be deleted. Changes have to be confirmed.

Option (F2) contains other functions in the screen 'edit recipes'. The following functions are available:

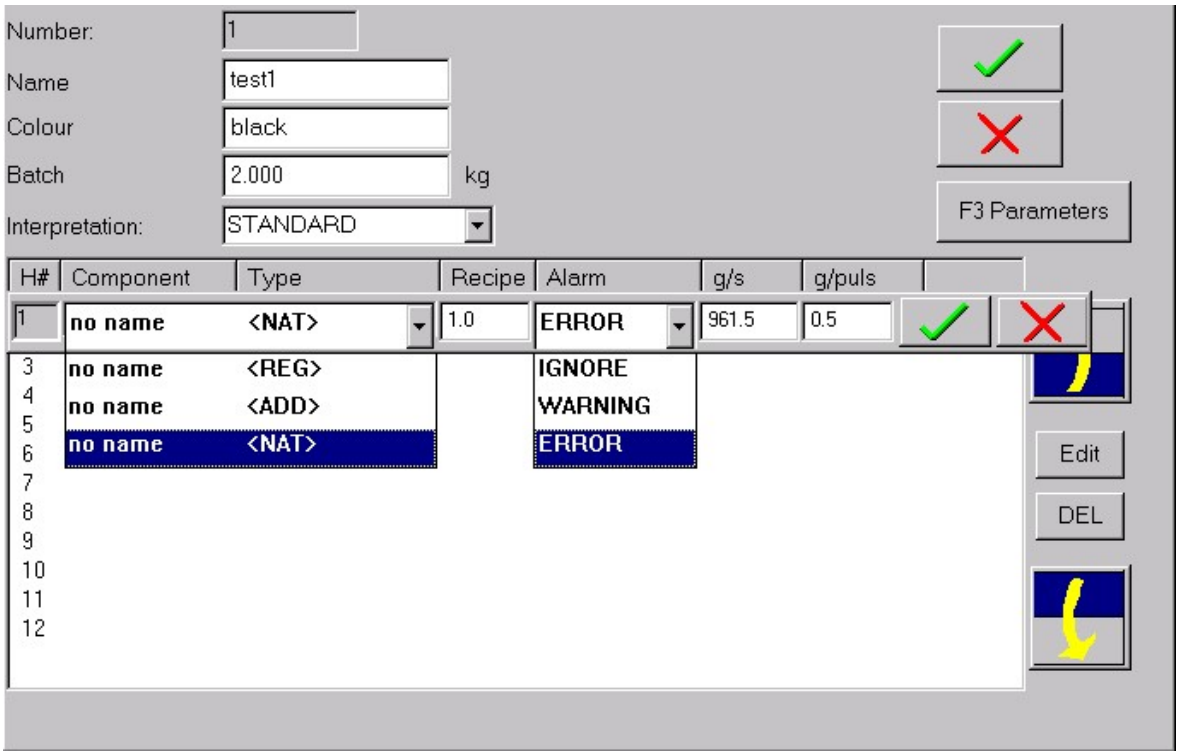
OPTION MENU IN EDIT RECIPE	
Option	Description
Find number	Searching the recipe with the given number
Find colour	Searching the recipe with the given colour
Find name	Searching the recip with the given name
Print recipe >>LPT1	Prints the selected recipe
Print all recipes>>LPT1	Prints all recipes of the actual controller
Copy to stationnumber	Copies selected recipe to the indicated stationnumber

6.1.1 Change recipes

In ***Menu (F1) → Recipes → Edit recipes*** a selected recipe can be changed.

6.1.2 Insert recipe

In ***Menu (F1) → Recipes → Edit recipes*** a recipe can be added.



All fields of the recipe are shown in the screen and can be selected individually.

6.1.3 Recipe interpretation

At the moment the controller has accepted a start-command (all system functions operational and are checked) it starts with the calculation of the requested values for each component.

A recipe can be defined in two ways: 'Standard' or 'Percentage'. The methods 'Standard' and 'Percentage' define the relation of the different components (Regrind, Natural and Additive) in a recipe.

6.1.3.1 Standard Method

The different components are defined as follows:

Regrind :	Percentage of the batchweight
Natural :	Relation between other naturals
Additive :	Percentage of the total of all naturals

Example :

Batchweight	2000.0 gr.
Regrind	20.0%
Natural 1	4
Natural 2	1
Additive	5.0%

Regrind :	20.0% of 2000.0 gr.		400.0
Naturals :	naturals + additive = 80.0%		
	naturals + (0,05 * naturals) = 80.0%		
	naturals = 80.0/1.05 = 76.2%		
	natural 1 = 4/5 * 76.2 = 61.0%		1220.0
	natural 2 = 1/5 * 76.2 = 15.2%		304.0
Additive :	80.0 - 61.0 - 15.2 = 3,8%		76.0

		TOTAL	2000.0

6.1.3.2 Percentage Method

The different components are defined as follows:

Regrind :	Percentage of the batchweight
Natural :	Percentage of the batchweight
Additive :	Percentage of the batchweight

The total sum must be 100%.

Example:

Batchweight	2000 g.
Regrind	20.0%
Natural 1	60.0%
Natural 2	15.0%
Additive	5.0%

Regrind :	20.0% of 2000.0		400.0
Natural 1:	60.0% of 2000.0		1200.0
Natural 2:	15.0% of 2000.0		300.0
Additive :	5.0% of 2000.0		100.0

		TOTAL	2000.0

REMARK
A disadvantage with regard to the 'standard method' is that there is no automatic correction during the complete of the batch. This results in a less accurate ratio.

6.1.4 Recipe parameters

Apart from the amount of component defined in the recipe, it is possible by means of parameter adjustments to add extra component. The controller knows two methods: 'Regrind control' and 'Additive to regrind'. This parameter ***F3 Parameters*** can be adjusted in 'insert recipe'.

IMPORTANT

Addition of extra material using 'Regrind control' or 'Additive to regrind' is only possible when the 'standard method' is used.

6.1.4.1 Regrind control

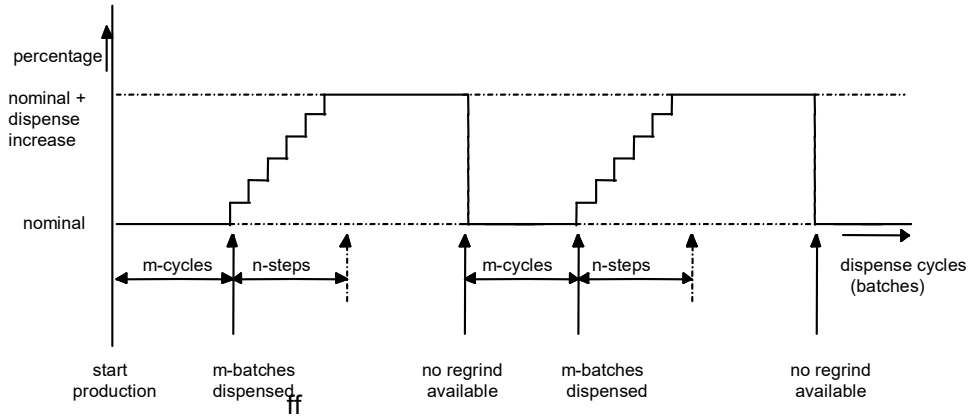
The supply of 'regrind' material is often not continuous due to the process. There are two methods to adjust the amount of regrind to the actual process: 'Empty regrind control' or 'Stock silo control'.

6.1.4.2 Empty regrind control

Empty regrind control means: keep the regrind-hopper empty. The regrind-material must be dispensed, especially if there is a granulator near the processing machine and the material is conveyed back into the regrind-hopper, otherwise there will be a blockage in the granulator.

In each recipe this process can be activated, the regrind-hopper must be defined. After the process is activated, a number of batches (Empty regrind wait) must be completed before the percentage of regrind will be increased. The percentage will be increased in the defined number of steps from nominal (added in the recipe) until the requested percentage is reached (Dispense increase).
If not enough material (within the range) can be dispensed from the regrind-hopper, it indicates that the hopper is empty. The percentage of regrind will be reset to nominal (recipe) and the process will wait for the set number of batches (Empty regrind wait) before it starts to increase again.

Other possibility is to put a sensor in the regrind hopper and instead of number of wait count batches, the sensor detects when there is enough regrind material to increase the percentage. If no material is detected, the nominal regrind percentage will be dosed.
To activate the sensor method, adjust the "Empty regrind wait count" parameter into 0 batches.



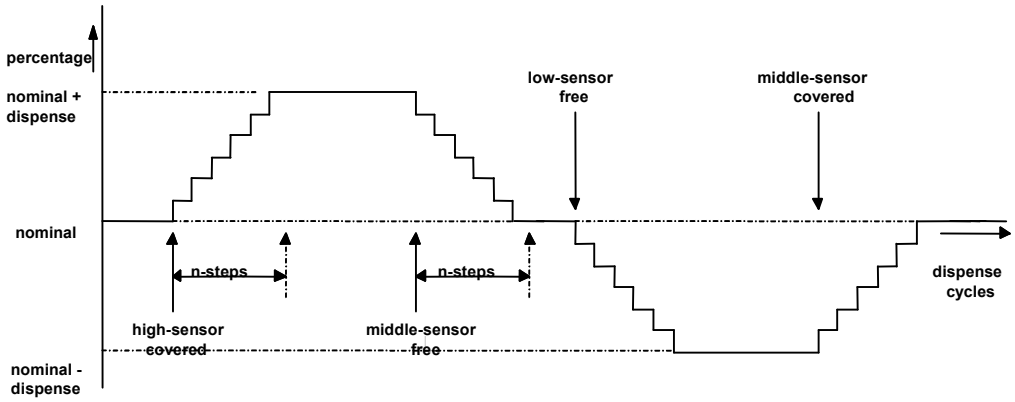
ff

6.1.4.3 Stock silo control (option)

A regrind silo can be supplied with three level-indicators (option) to detect high-, middle- and low level. If the system is supplied with these indicators 'stock silo control' can be activated.

The start condition for this process is the high level indicator, silo almost full. The percentage of regrind will be increased by a number of steps from nominal (recipe) up to the defined percentage (Dispense increase/ decrease). The percentage will be maintained until the middle level indicator indicates no more material. In a defined number of steps the dispense will return to the nominal.

The dispense decrease starts in the same way when the low level indicator is reached. The percentage of regrind will be decreased by a number of steps (Number of steps) to the defined percentage (Dispense increase/decrease). The defined percentage will be maintained until the middle level indicator detects material. In a defined number of steps the dispense will return to the nominal.



The value added at the number of batches (Silo low alarm) or (Silo high alarm) gives a warning- signal so that where necessary the nominal percentage can be adjusted.

6.1.4.4 Additive to regrind

It is possible to dispense extra additive in relation to the amount of regrind material. A maximum of two hoppers can be defined as (‘additive to regrind’ hoppers). The definition must be completed defining the requested percentage per hopper (‘additive to regrind’ percentage).

ADDITIVE TO REGRIND				
	Not activated		Activated with 2.0%	
Component	Recipe	Weight (g)	Recipe	Weight (g)
Regrind	20.0%	400.0	20.0%	400.0
Natural 1	4	1219.0	4	1213.0
Natural 2	1	304.8	1	303.2
Additive	5.0%	76.2	5.0% + 2.0%	83.8

This function can be used if a regrind, when reprocessed gives a light or different colour to the original blend of material. This function allows the operator to add colour to top up the depth of colour required.

6.1.5 Type of alarm

It is possible to select different types of alarm per dispensed component. For instance, if the regrind hopper is empty, it is not always necessary that the blender goes into an error, a warning is enough.

IGNORE No extra dispense tries. Relations within the recipe will be corrected by a re-calculation.

WARNING The controller tries to reach the dispense-accuracy by extra dispenses. If after a maximum number of dispense tries the accuracy is not reached, the controller sends a warning to the user-interface. The controller continues with the next component.

ERROR This is similar to 'warning' however after the controller has sent an error message it will not continue with the next component. The controller waits for a confirmation and will try again to reach the dispense-accuracy. This process will go on until the dispense accuracy is reached.

6.1.6 How to insert recipes

Examples how to insert recipes

Goal: add a recipe

Remark: The required component names should have been added (see chapter 6.2).
To change a recipe the operator must be authorised (see login chapter 7.1).

Actions:

Step: ***Menu (F1) → Recipes → Insert Recipes***

Step: Select ***<INS> Insert recipe*** (ins(insert) = add)

Step: Select name and insert recipe name.

Step: Select colour and insert recipe colour.

Step: If the batchweight has to be changed, insert the relevant weight by means of the numeric keys.

Step: The default of interpretation is **STANDARD**. If the interpretation should be **PERCENTAGE**, select **PERCENTAGE**.

Step: Select the required hopper (H#). Press <***EDIT***>.

Step: Select component and type of component.

Step: Select recipe, a percentage or a ratio can be added.

IMPORTANT

When setting a recipe with naturals you must give the recipe a value for the natural component to allow this component to be dosed i.e. 1 part natural. When setting a recipe with more than one natural the naturals are related to each other i.e. 1 part natural to 2 parts natural gives a 1:2 ratio.

Step: Select alarm, and select a type of alarm.

Step: Select dispense rate (g/s).
It is often not necessary to change the dispense rate, because the entered value by the manufacturer is sufficient for the GRAVIMIX blender to calculate this itself.

Step: Select dispense rate (g/pulse).
It is often necessary to change the dispense rate per pulse, because the entered value by the manufacturer is not sufficient for the GRAVIMIX blender to calculate this itself. This because the dispense rate per pulse is depending on the type of material (see chapter 5.5.1.1).Press ☑ to confirm.

Step: Select the next required hoppernumber (H#).

Depending on the GRAVIMIX model it is possible to use up to 12 hoppers.

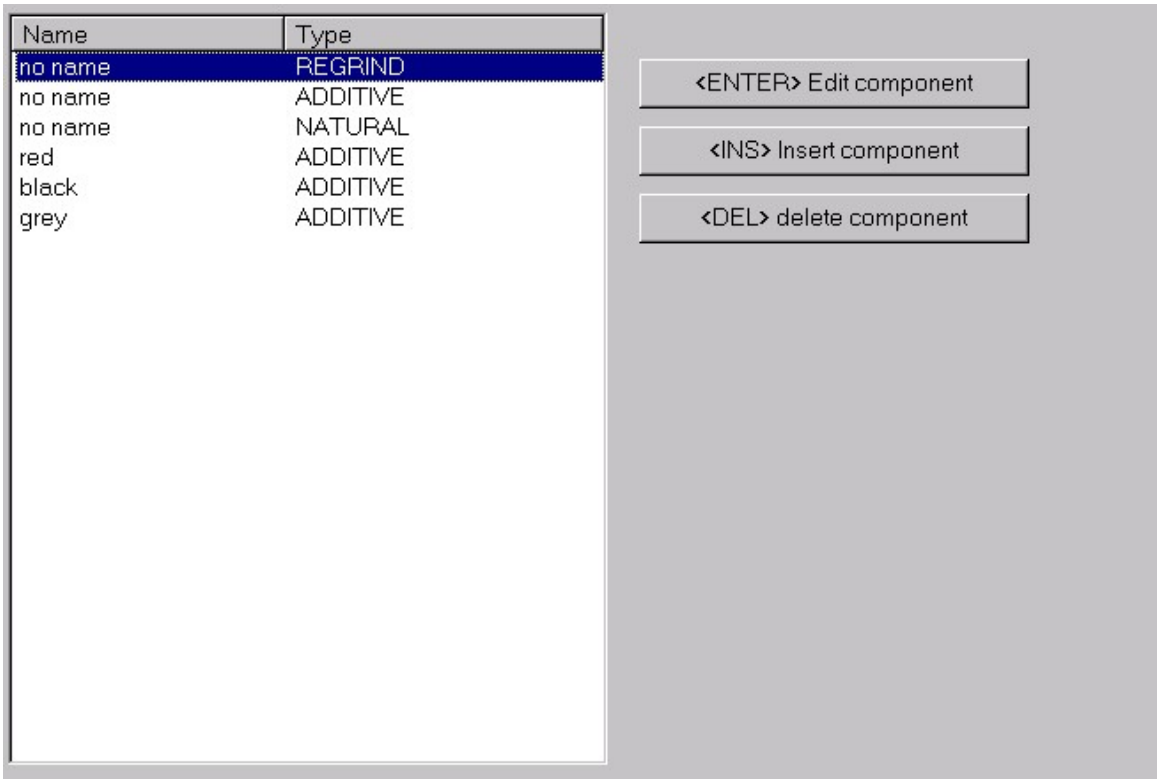
6.2 Add / change components

To define recipes a number of components are necessary. The component list can be requested to define recipes. From this list a selection can be made. The components list stores the name and type of a component and has a maximum of 100 components. There are three different types of components:

Regrind	Reclaim material
Natural	Virgin material
Additive	Additive material, e.g. masterbatch

One component of every type is already present in the list. These components have the name 'no name' and can not be deleted from the list.

To add and or modify the list of components chose ***Menu (F1) → Recipes → Insert component***.
The next screen will be displayed:



In this screen it is possible to select a component. After a component is selected, the fields of the component (name and type) can be selected by ***<ENTER> Edit component***. In the field name a component-name will be shown. The field type shows a list of possible options namely; additive, natural and regrind and one of them has to be chosen.

By selecting ***<INS> Insert component*** a new component can be added to the list.

To delete a component select ***<DEL> Delete component***. After a selection is made the actual line will be deleted from the list, provided that the component is not used in one of the recipes. Confirm with yes or no.

Under 'insert component' the ***Option <F2>*** contains two functions namely:

- ***Find component***
- ***Print components***

To realize one of these actions, select one of the functions. In 'find component' a name can be inserted.

6.2.1 How to add components

Example how to add components

Goal: Add component with name "WHITE" and with type "ADDITIVE".

Remark: The operator should be authorised to change and or add components (see login chapter 7.1).

Actions:

Step: ***Menu (F1) → Recipes → Insert Component***

Step: Press ***<INS> Insert component*** (ins(insert) = add)

Step: Insert component name, for instance WHITE.

Step: Select type indication, and select ADDITIVE.

Action: Press ☑ By pressing ☒ the component name will not be added to the list.

Now the component with name "WHITE" and with type "ADDITIVE" is added to the list.

7 SYSTEM

7.1 Login

The system contains some areas for which the operator should be authorised, like protected parameters, I/O monitor screen, etc. Before an operator can use or modify these areas, the operator has to perform a login procedure. This procedure starts by choosing ***Menu (F1) → System → Login***. The system will ask for an ID code (see below). When the ID code is correct the menu item '**login**' changes into '**logout**'. Now the operator has the maximum rights. The manager has his own ID code to make extra system adjustments, like calibration, node-, report- and printer adjustments.

After approximately two minutes the system will automatically logout, or use ***Menu (F1) → System → Logout***.

IMPORTANT

The standard ID code for the operator is 1111.
The standard ID code for the manager is 2222.
After a change of the ID code, the old code cannot be used.
Therefore save the new ID code in a safe place.
If you have lost your new ID code, please contact your dealer.

7.2 Change ID code

By choosing ***Menu (F1) → System → Change ID code*** the operator or manager can change the ID code.

Insert the new code and press ***<Enter>,*** the system will ask you to repeat the code. Insert the new code again and press ***<Enter>***.

7.3 Revisioncode of the system

By choosing ***Menu (F1) → System → Revision*** the revision date and number of the software in the user-interface and the GRAVIMIX controller will be displayed. This information is important when you report a system-error to your dealer.

7.4 Load recipes

Place an USB Flash disk with recipes in the USB adapter

By choosing ***Menu (F1) → System → Load recipes*** the screen will display ***Start Copy*** and can be selected.

7.5 Save recipes

Place an USB Flash disk in the USB adapter

By choosing ***Menu (F1) → System → Save recipes*** the screen will display ***Start Copy*** and can be selected. Recipes are stored on the USB Flash disk in recipes2.dat.file.

7.6 Change date and time

By choosing ***Menu (F1) → System → Date and time***, the date and time can be changed (select the box and use the numeric keys displayed on the screen).

7.7 Change language

By choosing ***Menu (F1) → System → Change language*** the language can be selected.
Select the language and confirm with ☑

7.8 Node settings

Node settings have to be made to see the blender in the production status menu. The node number is equal to the stationnumber (STATN). The node number must be adjusted in the hardware of the controller. Every blender has an unique node number. The node number is corresponds with one off the com-ports of the user-interface or PC. The com-port(s) should be selected by means of the software (see chapter 3.2).
If the **operator** is logged in ***Menu (F1) → System → Node settings*** the node settings-menu can be opened.
The communication can be switched on or off at each stationnumber.
If the **manager** is logged in, the com-port(s) can be selected. In this case the operator can switch on or off the communication at a later stage. When no com-port is chosen, communication is not possible.

7.9 Report settings

At the end of a batch the production-data will be stored. This data will be used by the user-interface for visualising, report-generation and production overview (see chapter 9.7). The activation of the report can be completed in the public parameters. The following production data will be stored:

- Batch report
  - ❑ measured weight of each component
  - ❑ dispense rate of each component
  - ❑ re-calculation to recipe

- Production report
  - ❑ total of the batches
  - ❑ alarm report
  - ❑ total overview of alarms

- Alarm report
  - ❑ total overview of all alarms

- Material usage
  - ❑ dispensed amount per hopper
  - ❑ percentages

- Component total
  - ❑ material usage per component

The controller saves all data in the battery-backup memory. In case of a power failure the battery will take it over. Whenever the controller sends data to memory a checknumber over the information will be calculated and stored with the information. During start-up a checknumber will be calculated over all data and compared with the stored value.
If both values are <u>not</u> the same, it is supposed that the information is incorrect and all parameters will be provided with standard values and all data will be reset. To store the different information Menu ***(F1) → System → Report → Report settings*** should be selected.

In the menu report setting there are two options; **NONE** and **FILE (CSV)**. If file is selected, the information will be stored in the directory which is indicated in the **Report directory**. A copy file will be stored in the directory as indicated in **Report copy directory**. This necessary because an opened file can't be transferred to another system.

Below is an example of how to write data to an USB MEMORY DRIVE*(windows CE and NT are different)*

<u>Standard user-interface (windows CE 5.0)</u>	<u>PC with (windows NT or XP)</u>
Report directory: \hard disk\	Report directory: (browse drive)
Report copy directory: \hard disk2\ (USB drive)	Report copy directory: (browse drive)

Test destination checks if the directory exists.

Batch-report, alarm-report and production-report can be activated in the menu of public parameters.

7.10 Printer settings

All reports (chapter 9.7) and parameters can be printed or stored in a printer file. The printer port **LPT1** or **File** can be selected in ***Menu (F1) → System → Printer → Printer settings***. The information send to a file will be stored in the directory **Print directory**. A copy file will be stored in the directory as indicated in **Print copy directory**. This necessary because an opened file can't be transferred to another system.

Below is an example of how to write data to a diskette *(windows CE and NT/ XP are different)*

Standard user-interface (windows CE 5.0)	PC with (windows NT or XP)
Report directory: \hard disk\	Report directory: (browse drive)
Report copy directory: \hard disk2\ (USB drive)	Report copy directory: (browse drive)

Test destination checks existing of the directory.
The printer-port should be selected by means of the software (see chapter 3.3).

Production report will be generated via ***Option (F2) → Print production report*** in the production status menu.
Component total will be generated in the component total menu via ***Option → Send component total***.

7.11 Network settings

Windows CE needs you to change the Device Name, for your own network, in the Control Panel before using the network functions.

Please follow the procedure below:

Connect an USB-keyboard at USB-connector at the bottom of the touchscreen cabinet.
Close the Ferlin application by pressing:
"ALT+tab" together followed by two times "tab" and after this "Enter"

Open by means of windows-key on the key-board start menu
Go to "**start > settings > Control Panel** > **Network and Dial-up connections**" and change the network settings of the DM9CE1(port1) or the DN9CE2(port2) adapter.
The default IP setting is to obtain an IP address via DHCP, it is possible to change this to static IP.

The touch screen Ethernet adapter is Disabled, enable the adapter

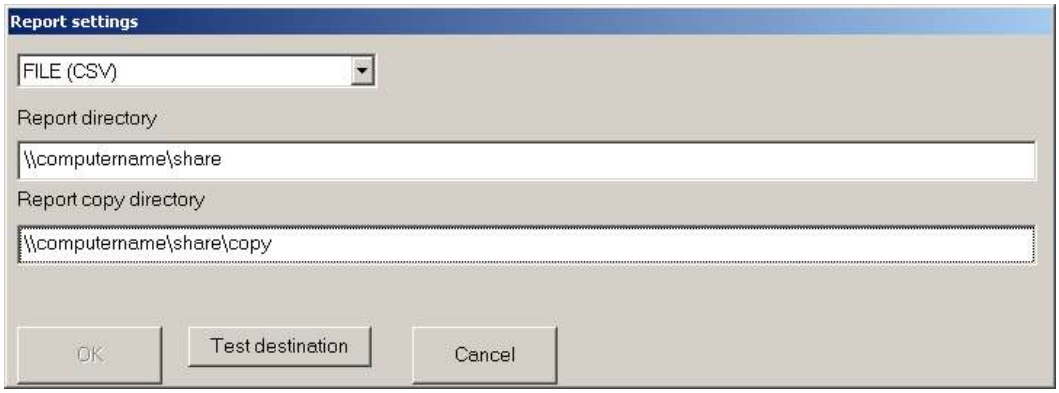
Standard network adapters are disabled. Enable concerning adapter by selecting the adapter, and choose “Enable” in the File menu (File menu at the top left).

Fill-in at "**Owner"** in **"control panel"** your Network ID

Save the settings by going to "**start > run** " open with "**browse” > Hard disk/ System** program "**SaveRegistery.exe**"

Fill-in the network address in the Report setting, see figure below, and test the destination.

After this it is possible to share the reports on a LAN, but the data will be only generated if it is activated in one of the menus.



7.12 CSV-file

column	Batch report (BR041202)	Production report (PR041202)	Alarm report (ER041202)	Material report. (MR041202)	Totals report (TR041202)
A	Node number	Node number	Node number	Node number	Date
B	Date	Date	Date	Date	Time
C	Time	Time	Time	Time	Component name
D	Recipe number	Recipe number	Alarm message	Recipe number	Component type
E	Recipe name	Recipe name		Recipe name	Usage total [kg]
F	Recipe colour	Recipe colour		Recipe colour	
G	Dosing method	Hopper number		Hopper number	
H	Hopper number	Component name		Component name	
I	Component name	Component type		Component type	
J	Component type	Recipe (asked)		Kg since reset	
K	Weight asked	Weight dosed		% since reset	
L	Weight dosed	Recipe dosed		Kg since print	
M	% dosed	Total dosed [kg]		% since print	
N	Dosed total [kg]			Total [kg]	
O	Flowrate [gr/s]			# batches since reset	
P	Pulse flowrate [gr/puls]			# batches since print	
Q				Kg/h	

Batch report: reports for each batch.

Production report: dosed since last recipe choice.

Alarm report: each alarm

Material usage report: usage for each hopper (it is possible that this is an addition of more than one component) since de last reset or last print out

Totals report: dosed weight for each component (name) since last reset

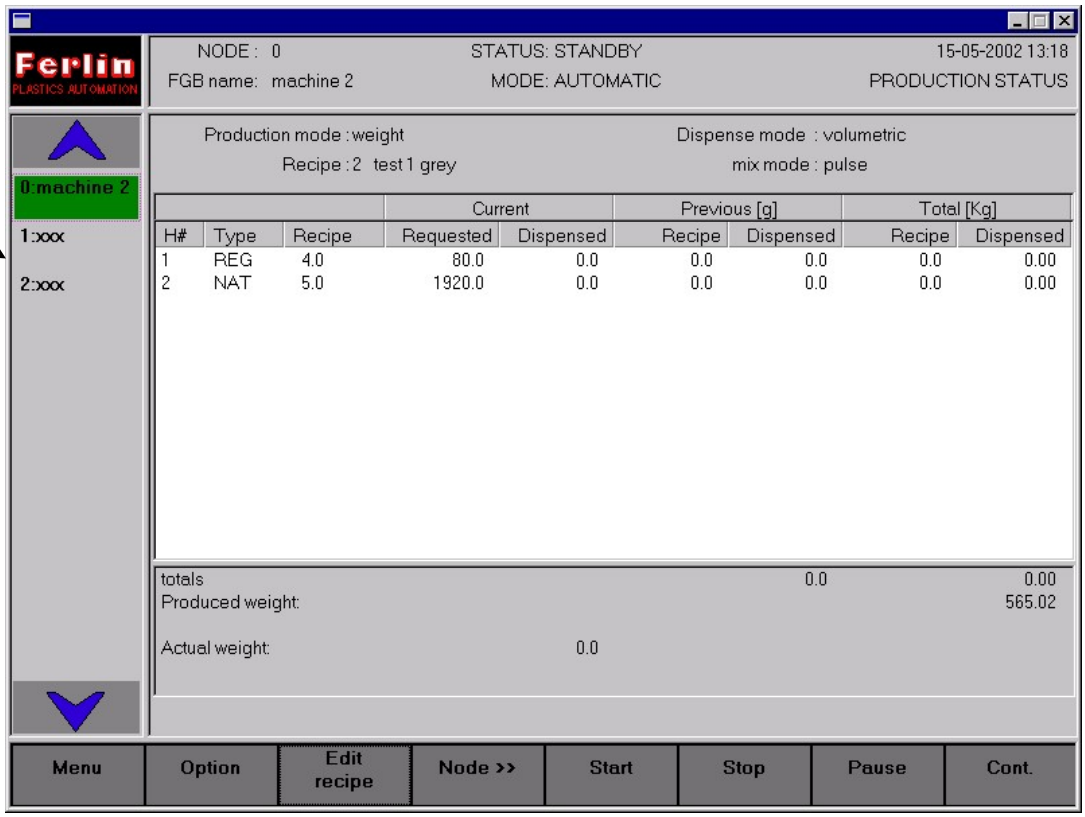
8 PRODUCTION

In the production menu you can see the production data, such as; current recipe, recipe adjustments, material use and blender adjustments.

8.1 Production status

The status-screen reached by selecting ***Menu (F1) → Production → Production status*** displays information about the current controller. The information on the status-screen is updated once per second.

Choice of nodenumber



Below a description of the different keys:

F1 Open main menu. All other sub-menu's can be selected.
F2* Open option menu. The contents is dependent on the actual screen.
F3 Recipe change during production and will be used during calibration.
F4 Choose node number.
F5 to F8 is dependent on the machine mode, see table below.

FUNCTION-KEYS IN MACHINE-MODE		
Function key	Automatic mode	Manual mode
F5	Start production	Dispense one component
F6	Stop production	Mixer on/off
F7	Pause	Dump weighbin
F8	Continuation after pause	Dump mixing chamber

**) Via **Option (F2)** the option menu will be activated:*

- *Reset produced weight*
- *Reset totals*
- *Print batch report*
- *Print production report*

8.2 Material usage

The material usage screen ***Menu (F1) → Production → Material usage***, displays an overview of the used quantity of material per hopper. These quantities are mentioned per hopper and therefore not dependent on the current recipe. The material usage overview is erased by one of the following actions; command via Option Reset totals or Print material usage.

Option (F2) gives the following functions:

- Reset material usage
- Print material usage
- Add to report file

Other values which are stored in the material usage screen are: date and time of the last erase-actions, the number of batch-cycles and throughput in kg/hour.

8.3 Component total

The component total screen displays the usage of each component. Via ***Menu (F1) → Production → Component total***, the screen can be selected.

Option (F2) gives the following facilities:

- Reset selected total
- Reset all component totals
- Print component usage
- Send component total to CSV file

8.4 Co-extruder (option)

The co-extrusion screen displays in one screen the different stations. This to see at a glance the different information on behalf of the co-extrusion. Via ***Menu (F1) → Production → Co-extruder*** the screen can be selected.

On each stationnumber the hopper-numbers are mentioned separately with the following information:

1) Station-number (No #)
2) Hopper-number (H #)
3) Component
4) Component type (type)
5) Batch
6) Recipe ratio
7) Total in kilogram of the concerning component (total kg)
8) Percentage of the total produced weight (PCT)
9) Throughput in kilogram / hour (kg/h)

No.#	H#	Component	Type	Batch [g]	Pct	Total [Kg]	Pct	Kg/h
0	1	no name	REG	80	4.0	5.60	3.8	
	2	no name	NAT	1920	5.0	134.40	92.1	
				2000		140.00		348.00
1	1	no name	NAT	1905	1.0	3.81	2.6	
	2	no name	ADD	95	5.0	0.19	0.1	
				2000		4.00		38.00
2	2	no name	REG	1000	50.0	1.00	0.7	
	1	no name	NAT	1000	1.0	1.00	0.7	
				2000		2.00		134.00
				6000		146.00	100.0	520.00

9 PRODUCE

9.1 Production control

After a start-command is given, the controller checks if the blender can be started. If one of the used hoppers gives a low-level indication (**option**) this will be signalled via an alarm.

9.2 Recipe to weight calculation

After the controller has accepted a start-command (all system functions operate are correct) the controller starts with the calculation of the requested values for each component.

A recipe can be defined in two ways: 'Standard' or 'Percentage'. The methods 'Standard' and 'Percentage' define the relation of the different components (Regrind, Natural and Additive) in a recipe (see chapter 6.1.3).

9.3 Dispensing

Dispensing of the different components starts after calculation of the related weights of the current recipe and the adjusted parameters.

The example below is only valid for gravimetric blending in the standard recipe

The components are dispensed in order as defined in the recipe. The controller uses the 'hardware reaction time' to calculate the time which the dispense valve must be activated. This 'hardware reaction time' is the minimum active time the dispense valve needs to dispense material. The controller uses pulses of 5ms in the following algorithm:

OpenTime [s] = Weight [g] / dispense rate [g/s]

OpenPulses [Puls] = (OpenTime [s] / 0,005 [s]) + hardware reaction time [Pulse]

After each dispense the weight will be measured. The weighbin must be stable before the weight can be measured, therefore a time delay 'weigh settletime' is inserted between dispense and measuring. Superior weigh-samples will be taken within one second and the weight will be settled. The greater number of weigh-samples must be within the 'weight variationband'.

If the weight of the dispense is settled, a number of calculations will be done and some parameters may be changed. After the first dispense of a component one the following occurs:

Dispense is correct

The measured weight is within the 'dispense accuracy' so that extra dispense tries are not necessary.

Dispense not correct **(too little)**

The measured weight is not within the 'dispense accuracy' and is less than the requested quantity. Dependent on the 'type of alarm' selected in the recipe of each component, action will be undertaken. The following 'types of alarm' are possible:

IGNORE No extra dispenses (tries). The ratio in the recipe will be corrected by a re-calculation.

ATTENTION: If one component is dispensed correctly and the next one is dispensed in an incorrect ratio (e.g. empty hopper) it can result in an incorrect ratio in the batch.

WARNING The controller tries to reach the dispense-accuracy by extra dispenses. If after a maximum number of dispense tries the accuracy is not reached, the controller sends a warning to the user-interface. The controller continues with the next component.

ATTENTION: If one component is dispensed correctly and the next one is dispensed in an incorrect ratio (e.g. empty hopper) it can result in an incorrect ratio in the batch.

ERROR Is similar to 'warning' however the controller has send an error message to the user-interface and will not continue with the next component. The controller waits for a confirmation and will try again to reach the dispense-accuracy. The controller will not start with the next component until the dispense-accuracy is reached.

Dispense not correct **(too much)**

If the measured weight is more than requested, so no action can be undertaken by the controller. Only the following components will be dispensed in relation to the recipe, that means also more than requested.

If one of the first components is far in excess of the required weight and overdosing is not activated the unit will recalculate the subsequent components in such a way that it will cause the unit to exceed the loadcell range parameter, generating an "Loadcell Overload" alarm.

After the first dispense in all of the above mentioned cases the dispense rate will be checked. If the measured dispense rate (measured weight / dispense time) differs from the adjusted value a correction can be made. A correction of the dispense rate is only made if the measured dispense rate is within the 'dispense rate correctionband'. This method prevents the controller calculating incorrect values of the dispense rate e.g. if a hopper runs out of material. The new dispense rate is calculated by the following algorithm:

Dispense rate = ((4 * dispense rate) + (measured weight / dispense time)) / 5

After all components of a recipe are dispensed the contents of the weighbin are discharged in to the mixing chamber. The time that the weighbin remains open can be changed by the parameter 'weighbin dump time'. It is also possible to start the mixer automatically during the discharge of the weighbin (see mixer-mode, chapter 5.2.3).

To discharge the weighbin there are two conditions:

Condition 1. The material control valve underneath the mixing chamber should be not open (if present)

The dispensed components must be mixed first, therefore the material control valve should be closed before the contents of the weighbin is discharged in to the mixing chamber.

Condition 2. The mixing chamber must be empty

If the level sensor of the mixing chamber indicates a high level, discharge is not possible.
(The mixing chamber is full).

9.4 Calculations

In standard mode the first priority of the unit is to make sure that the relationship between the components is always maintained this is to the detriment of the batch weight.

IMPORTANT

Best dispense order is:

Regrind, Natural, Additive

9.5 Operating

The user-interface consist of several screens which can be selected by a menu. This screens are built-up out of objects and can be selected, in an opened screen only one object can be selected. In a menu an object can be selected by means of the touch-screen or a mouse (windows NT).

9.6 Actual information

Via the screen of the user-interface it is possible to get a overview of the actual controller. Therefore the following screens are available on the user-interface: production-screen, material usage-screen and input/output monitor.

9.7 Reports

During production it is possible to generate different reports, below is a overview of the reports.

Batch report

```
-------------------------------------------------------------------------------
BATCH REPORT  15-05-2002 13:57:52   FGB:0 machine 2
Recipe 1 testl  :  Colour black  :  Dispense mode  volumetric
-------------------------------------------------------------------------------
H# Component       Type   Requested Dispensed    Result     Total    g/s  g/puls
-------------------------------------------------------------------------------
1   no name        NAT       1904.8    1904.8       1.0       1.9  961.5  0.500
2   red            ADD         95.2      95.2       5.0       0.1  200.0  0.500
-------------------------------------------------------------------------------
Total                                  2000.0
Produced weight:  587.02
-------------------------------------------------------------------------------
```

Production report

```
-------------------------------------------------------------------------------
PRODUCTION REPORT  15-05-2002 13:58:03   FGB:0 machine 2
-------------------------------------------------------------------------------
Recipe 1 testl black
-------------------------------------------------------------------------------
H# Component          Type        Recipe          Result   Dispensed [Kg]
-------------------------------------------------------------------------------
1   no name            NAT          1.00            1.0          1.90
2   red                ADD          5.00            5.0          0.10
-------------------------------------------------------------------------------
Total                                                            2.00
-------------------------------------------------------------------------------
```

Alarm report

```
-------------------------------------------------------------------------------
ALARM HISTORY  15-05-2002 14:03:05   FGB:0 machine 2
-------------------------------------------------------------------------------
Description                                      Date       Time
-------------------------------------------------------------------------------
No control voltage                               15-05-2002 14:01:21
No control voltage                               15-05-2002 14:01:19
No control voltage                               15-05-2002 14:01:18
Emergency stop executed                          15-05-2002 13:57:00
Communication with FGB lost                      15-05-2002 13:22:11
No control voltage                               15-05-2002 11:40:19
No control voltage                               15-05-2002 11:40:17
Covers are open                                  15-05-2002 11:40:16
No control voltage                               15-05-2002 11:39:53
-------------------------------------------------------------------------------
ALARMS OCCURED (Last cleared)          Counted
-------------------------------------------------------------------------------
No control voltage                          6
Covers are open                             1
Production weight reached                   0
Empty weighbin out of tare-band             0
Parameters are corrupted                    0
Production data corrupted                   0
Low level in hopper                         0
Loadcell is not calibrated                  0
Loadcell overload                           0
Loadcell not stable                         0
Loadcell needs more samples                 0
Loadcell boundary error                     0
Silo full error                             0
Silo empty error                            0
Conflict with regrind parameter             0
Conflict with addi.-regr.param.             0
Hopper is empty                             0
Internal error in FGB                       0
Emergency stop executed                     1
Communication with FGB lost                 1
Motor thermal overload                      0
-------------------------------------------------------------------------------
```

Material usage report

```
--------------------------------------------------------------------------------
MATERIAL USAGE REPORT  15-05-2002 14:09:49   FGB:0 machine 2
Order number : test 321
Recipe  1 test1 black
--------------------------------------------------------------------------------
H# Component      Type      Since last cleared   Pct   Since last printed    Pct
1   no name        NAT                   21.0   95.2                 21.0   95.2
2   red            ADD                    1.0    4.8                  1.0    4.8
--------------------------------------------------------------------------------
Total weight                              22.0                        22.0
Total cycles                                11                          11
Kg/h                                     426.0
--------------------------------------------------------------------------------
Date/Time last printed           15-05-2002 13:57:57
Date/Time last cleared           15-05-2002 13:57:57
--------------------------------------------------------------------------------
```

Components total report

```
--------------------------------------------------------------------------------
COMPONENT TOTAL 15-05-2002 14:08:00
--------------------------------------------------------------------------------
Name                Type                       Total
--------------------------------------------------------------------------------
no name             REGRIND                      4.2
no name             ADDITIVE                     0.2
no name             NATURAL                    556.5
red                 ADDITIVE                     1.0
--------------------------------------------------------------------------------
```

10 OVERVIEW OF PARAMETERS

10.1 Public parameters

Below a list of all public parameters which are attainable via ***Menu (F1) → Controller → Public parameters***.

PUBLIC PARAMETERS		
Parameter	Description	Standard or default setting
Production mode	Actual production mode, the following modes are possible: CONTINUE, WEIGHT and ALARM–WEIGHT. If the mode WEIGHT or ALARM–WEIGHT has been selected, the parameter 'produced weight' must be added at the same time.	CONTINUE
Dispense mode	Actual dispense mode, the following modes are possible: GRAVIMETRIC, VOLUMETRIC and COMBINATION. If the mode COMBINATION has been selected, the parameter 'combination ratio' must be added at the same time.	GRAVIMETRIC
Mixer mode	Actual mixer mode, the following modes are possible: OFF, CONTINUE, NORMAL and PULSE. If the mode NORMAL has been selected, the parameter 'on time'must be added at the same time. If the mode PULSE has been selected, the parameters 'pulse on time' and 'pulse off time' must be added at the same time.	PULSE
On time (mixer)	Time the mixer is activated after a batch is discharged out of the weighbin.	10 [s] (15 [s] M05)
Pulse on time (mixer)	Time the mixer is activated in the pulse mode.	2 [s] (4 [s] M05)
Pulse off time (mixer)	Time the mixer is not activated in the pulse mode.	15 [s]
Alarm report	Indicates if alarm-reports must be printed and / or saved in a CSV-file.	No *)
Print batchreport	Indicates if batch-reports must be printed and / or saved in a CSV-file.	No *)
Print on recipe change	Indicates if a material usage report must be printed and / or saved in a CSV-file.	No *)
Print produktionreport	Indicates if a production-report must be printed and / or saved in a CSV-file.	No *)
Interval time	Cycle time between the print-out of a production-report.	01:00
Weighbin dumptime	Time the weighbin-valve will be open.	6 [s]
Level control waittime	Time between the full signal of the mixing-chamber sensor and opening of the material control valve (if present).	8 [s]
Level control dumptime	Time between the low-level signal of the mixing-chamber sensor and closing of the material control valve (if present).	1 [s]

**)* *No = [ ], Yes = [✓]*

10.2 Protected parameters

Below a list of all protected parameters which are attainable via ***Menu (F1) → Controller → Protected parameters***. To have a look at or change these parameters the operator has to perform a login procedure (see chapter 7.1).

PROTECTED PARAMETERS		
Parameter	Description	Standard institution
Weigh settletime	Waiting time between the dispense of a component and the measuring of the weight, to eliminate vibration of the weighbin (loadcells).	1 [s] 2 [s] FGB 25
Weight variationband	Superior weighings should be within this band, with regard to the average weight.	10 [g]
Dispense tries	Maximum number of tries per component to reach maximum accuracy.	4
Dispense accuracy	The minimum dispense accuracy of each component.	15 [%]
Dispenserate correctionband	Maximum deviation of the dispenserate wherein a correction of the rate will be done .	20 [%]
Batchweight	Total weight of a batch. This value will be copied automatically into a new added recipe.	2.0 [kg] *)
Loadcell range	Maximum weight of a batch before an overload alarm-message appears.	3.0 [kg] **)
Maximum tare variation	Maximum absolute deviation from the zeropoint of the weighbin.	40 [g] 100 [g] FGB 25
FGB name	Name of the controller (blender), this name is used by the user-interface for recognition.	

*) Dependent on the type of GRAVIMIX

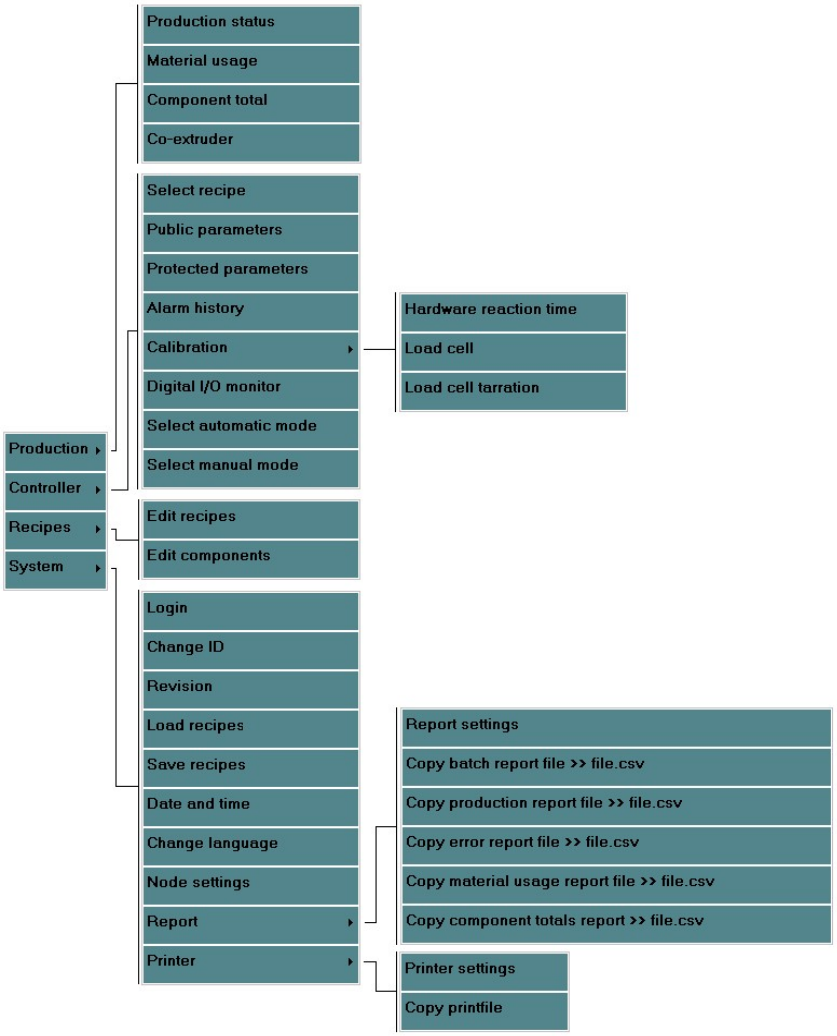
- Series FGB MECS 0,5 kg
- Series FGB FLECS 1,5 kg
- Series FGB-5 5,0 kg
- Series FGB-10 10,0 kg
- Series FGB-25 25,0 kg

**) Dependent on the type of GRAVIMIX

- Series FGB MECS 0,8 kg
- Series FGB FLECS 2,0 kg
- Series FGB-5 6.0 kg
- Series FGB-10 12,0 kg
- Series FGB-25 30.0 kg

11 MENU STRUCTURE

Below a diagram of the menu structure of the user-interface.



Reference to chapter:

Production

Production status	§ 8.1
Material usage	§ 8.2
Component total	§ 8.3
Co-extruder	§ 8.4

Controller

Select recipe	§ 5.1
Public parameters	§ 5.2
Protected parameters	§ 5.3
Alarm history	§ 5.4
Calibration	§ 5.5
Hardware reaction time	§ 5.5.1
Loadcell calibration	§ 5.5.2
Loadcell tarration	§ 5.5.3
Digital I/O monitor	§ 5.6
Select automatic mode	§ 5.7
Select manual mode	§ 5.8

Recipes

Edit recipes	§ 6.1
Edit components	§ 6.2

System

Login/logout	§ 7.1
Change ID code	§ 7.2
Date and time	§ 7.3
Revision	§ 7.4
Save recipes	§ 7.5
Load recipes	§ 7.6
Change language	§ 7.7
Node settings	§ 7.8
Report	§ 7.9
Report settings	
Copy batch report >> file.csv	
Copy production report >> file.csv	
Copy error report>>file.csv	
Copy material usage report >> file.csv	
Copy component totals report >> file.csv	
Printer	§ 7.10
Printer settings	
Copy printfile	

12 MAINTENANCE AND REPAIR

ATTENTION: make sure, before maintenance or repair is carried out, the power is switched off *(by pulling out the plugs)* and the compressed air is shut off *(by disconnecting the air pressure).*

12.1 Maintenance

Everything is set right and tested in the factory, adjustments should be carried out only if one of the following is not working correctly.

Air pressure: Set air pressure to approximately 6 bar for the best results.
However, the blender will work with a lower air pressure (minimum 4 bar).

Level sensor: The level sensor should protrude into the mixing chamber for about 10 mm.
If it protrudes too far, it will detects the mixer blades. If it does not protrude far enough, it willdetect the mounting plate itself and not the material. (The FGB-10 and FGB-25 are different)

Adjusting the sensor sensibility. In the sensor is a small screw, with this screw the sensibility can be adjust as follows:

step 1: fill the mixing chamber with material until the sensor is covered.
step 2: turn the screw counter-clockwise until the 'led' goes on (if the 'led' already is on, then turn clockwise until the 'led' goes off and proceed with step 4).
step 3: turn the screw clockwise until the 'led' goes off.
step 4: turn the screw another ¾ turn clockwise.
step 5: empty the mixing chamber and check to be sure the sensor does not detect the mixer blades.

Weighbin valve: The weighbin valve should close quietly. An airflow regulating valve is mounted on the most left pneumatic valve. This can be adjusted by means of the screw on top of the valve.

12.2 Replacement of parts

12.2.1 Replacement of printed circuit

For the replacement of the printed circuit board of the controlbox the cover should be removed first. Unplug the connectors which are attached to the printed circuit. Now unscrew all M3 screws and remove the circuit board. It is important to disconnect the connectors first and then unscrew the screws. Fir the replacement circuit board in the reverse way. **It is wise to use a wristband with ground cord which is connected with earth (PE). This because of the static electricity.**

IMPORTANT

When ordering spare parts always mention type- and serialnumber !
For partnumbers see list at the back of this manual.

12.3 Cleaning of the blender

The frequency of cleaning will depend on the number of times the raw material is changed.

For cleaning the blender the front panel, the weighbin, the mixing chamber and mixer should be removed (as described in chapter 2).

ATTENTION: **make sure, when cleaning is carried out, the power and compressed air are switched off.**

Clean the blender with a vacuum cleaner. Use safety-goggles when cleaning ! After cleaning the parts can be placed back in the reverse way.

12.4 Transport of the GRAVIMIX blender

Before moving the blender the weighbin must be removed, to prevent the loadcells from being damaged, this can be done as described in the previous chapter. The blender can now be moved on a solid pallet.

13 TECHNICAL INFORMATION

13.1 General blender specifications

For general information and blender specifications we refer to the brochure at the back of this manual.

13.2 Safety measures

The GRAVIMIX blenders are protected by two safety devices, which are positioned on the front panel and the mixing chamber, if one of them is removed, the power will be cut-off and the blender stops.
Further some warning-stickers are placed on the motor(s), controlbox, user-interface and front panel.
Several warnings are mentioned the manual in order to work with the blender as safe as possible.

The blenders are provided with the following warning labels (diagram):

- **Danger high voltage**

- **Caution rotating parts**

- **Direction of rotation motor(s)**

13.3 Electric connections and diagrams

For the electric connections of the blender, the control box and the user-interface we refer to the diagrams in this manual.
For the specification of the electric motor(s) we refer to the data on the motors.

13.4 Pneumatics

The blender ia standard is supplied with a filter-pressure regulator and a number of pneumatic solenoid valves. The number of valves is equal to the number of material hoppers plus one or two for the weighbin and if present one or two for the material control valve underneath the mixing chamber (option).

For connection of the pneumatic valves see figure 13.4 and 13.5
The valve of the weighbin is sealed at connection (W1) so only connection (W2) can be used, except in the series FGB- M05 and FGB-25 there both connections are used..
The connection of the dispense valves H1, H2, H3 etc. are as following; ;

* H1-1 of the valve to C1 of the cylinder, also H2-1 of the valve to C1 of the cylinder etc.
* H1-2 of the valve to C2 of the cylinder, also H2-2 of the valve to C2 of the cylinder etc.

H1-1 and H1-2 should be connected to the cylinder of hopper number 1, H2-1 and H2-2 to the cylinder of hopper
number 2 etc.
If a material control valve is used it should be connected to B1 en B2, one of the lines has a mark like one side of the cylinder, connect the corresponding marks.

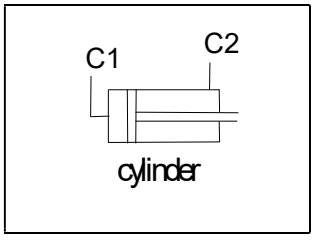


Figure 13.4

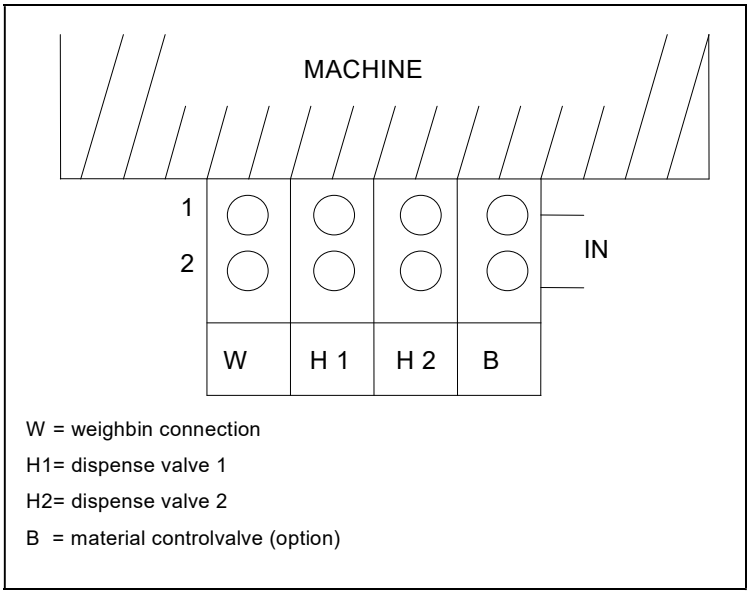


Figure 13.5 Topview pneumatic valves

14 ENCLOSURES