



sartorius
mechatronics

X4, X5, X6 - Application FILL Controller

Operating Manual



Operating Manual

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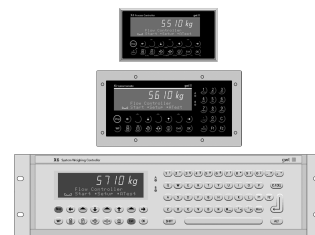
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1 Introduction

1.1 General

1.1.1 Other manuals

This operating manual describes the operation of the Fill Controller X4, X5 and X6 including the batching functions. For general adjustment and installation, see Installation Manual. The installation, configuration and calibration are described in the [Installation Manual](#).

1.1.2 Delivery state for FILL-X4

The batching license PR 1713/20 and application license 104 are part of the scope of delivery of FILL-X4.

The FILL-X4 Controller contains the following hardware options:

SLOT 1 :

Digital Input/Output Card PR 5510/12 with 6 optocoupler inputs and 12 optocoupler outputs is installed in Slot 1.

SLOT 2 :

Free

SLOT 3 :

Free

SLOT 4 :

Free

1.1.3 Delivery state for FILL-X5 and FILL-X6

The batching license PR 1713/20 and application license 104 are part of the scope of delivery of FILL-X5 and FILL-X6.

The FILL-X5 and FILL-X6 Controller contain the following hardware options:

SLOT 1 :

Digital Input/Output Card PR 1713/17 with 6 optocoupler inputs and 8 optocoupler outputs is installed in Slot 1.

SLOT 2 :

Free

SLOT 3 :

Free

SLOT 4 :

Free

1.1.4 Fill Controller

The Fill Application is used to fill tanks on a scale with liquids. Filling is done by means of a lance, which is controlled by a motor and can be dipped into the tank up to a variable depth. The lance has three positions to fill in a material.

- 1) ,Top position': The lance fills from its topmost position.
- 2) ,Bunghole position': The lance goes to a pre-defined position (below the filling hole of the barrel).
- 3) ,Below level pos.': With foaming material, the lance remains below the liquid level. It goes almost fully down to the bottom of the barrel and is drawn upwards slowly during filling, when a defined lift weight is reached.





2 Operator Interface

2.1 Display






The **Weight Display** allows display of 7 digits for weight plus a decimal point. The weight unit can be selected as tons, kilograms, grams or lbs. The display is capable of handling two lines of alphanumeric characters in addition to the numeric output. The other symbols of the display are listed below:




Status display	Description
B G	Gross weight display Gross weight = net weight + tare weight (B is only active in NTEP mode)
NET	Net weight display
T	The stored tare or initial weight is displayed.







Status display	Description
	The weight value is within +/- 1/4 d.
	Weight standstill
	Batching process is active.
	Flashing indicates an alarm.










2.2 Keypad


The Symbols of the front panel keys are given below:



Indicator keys	Description
	While pressing this key, the gross weight is displayed ($B - \text{gross weight}$).
	While pressing this key, the tare weight is displayed.
	Set/reset tare The actual gross value is stored in the tare memory, provided that: <ul style="list-style-type: none"> - weight standstill - indicator not in error status

Indicator keys	Description
	Print-out
	Key for switch-over between weighing point A, B and $C=A+B$. not valid for Fill- Controllers
	Set gross weight to zero, provided that: <ul style="list-style-type: none"> - weight standstill - weight within zero set range - not tared




Menu keys	Description
	Exit from the actual menu and continue operation at the next higher level.
	Softkey: select function
	Scroll down through menu functions
	Scroll up through menu functions
	Display of further menu functions, which are indicated by the double arrow  .

Edit keys	Description
	Move cursor left during editing and selection of values, if  is displayed.
	Move cursor right during editing and selection of values, if  is displayed.
	Enter / execute / confirm. For Fill-X6 is an additional key 
	Backspace / delete. For FILL-X4 as a 2 nd function over the key  . The LED from the More-key  has to be on.

Function keys	Description
	Stop a running batch.



Function keys	Description
	Programmable function key, not used with Fill-Controllers
	Programmable function key, not used with Fill-Controllers
































2.2.1 Exceptional feature for FILL-X4

Mode	Description
Input mode	To succeed to the input mode you have to press the More-key  until the LED from the More-key  shines. The cursor is flashing now. Numbers and characters could be entered and deleted now.
Editing mode	If the LED from the More-key shines, press shortly the More-key. Now the LED from the More-key  does not shine anymore, but the cursor still flashes. Now the cursor could be moved.

2.3 Entering alphanumerical characters

In the alphanumeric entry mode, a cursor is flashing in the entry field. This mode is accessible by pressing a key from the alphanumeric keypad. If the LED from the More-key from FILL-X4 is not flashing, press the More-key until the LED is flashing.



			<p>The alphanumeric keys have got more than one assignment. After pressing a key for the first time, the relevant first character, e.g. 'A' is displayed in the cursor position. After pressing for the second time, e.g. 'B' instead of 'A' is displayed; 'C' is displayed after pressing for the third time, etc. After the last signification, the first one is displayed again. Pressing another character key (for FILL-X5 and FILL-X6 also the right arrow key ) completes the entry of a character. To complete an entry, the key  has to be used.</p>
			<p>If only numeric values are required for an entry, letters are not selectable. Therefore, values such as 555 can be entered by pressing the key successively three times without using the arrow key.</p> <p>Because of the duplicate function keys the numbers and letters stand right at the bottom at the keys from FILL-X4.</p>

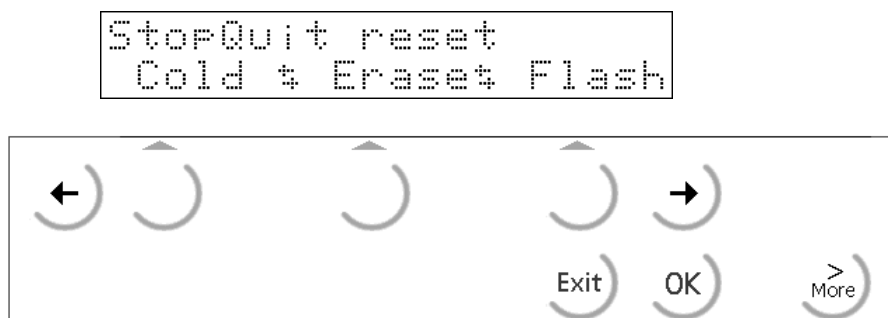
Key		Character	Remarks
X5	X4	For FILL-X4 only with the activated More-key 	
		# " () = \$? ! % 1	
		A B C a b c 2	
		D E F d e f 3	
		G H I g h i 4	
		J K L j k l 5	
		M N O m n o 6	
		P Q R S p q r s 7	
		T U V t u v 8	
		W X Y Z w x y z 9	
		- + * / : ; _ ' & , < >	If a value has a polarity sign, it can be entered by pressing the dot key  or  once for minus or twice for plus.
		A O U ä ä ö ß Ø	A space can be entered using the key  or  .
			A character will be removed by pressing the clear key  for FILL-X5 or the clear key  for FILL-X4.


2.4 Operating concept





The operating concept will be explained for the FILL-X5 System Controller, because the handling between the different Fill Controller X4, X5 and X6 is very similar. If it is necessary deviations from the operating of the different Controller will be explained.


2.4.1 Operation via softkeys

The operation of FILL-X5 is menu-guided. For this purpose, the controller is provided with a softkey functionality: The three softkeys with the upward arrow  below the display have the function described in the lower text line. For the FILL-X6 Controller these softkeys have this design .

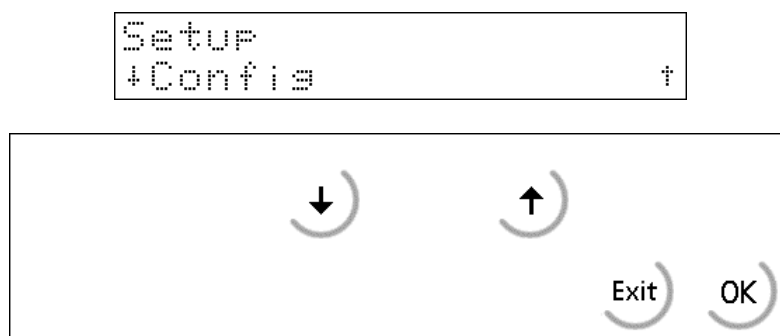




Menu items are selected with .


If more than three functions can be selected, the character  indicates that further items can be displayed with the keys ,  and .





A menu can be left with , the operation is continued at the next higher level.

2.4.2 Selection via the scroll keys



Scroll down key  permits scrolling forwards through the menus, scroll up key  permits scrolling backwards through the menu.

Key  can be used to leave the menu and to continue operation at the next higher level.




Key  permits selection of the menu item displayed between   .



2.4.3 Selection in Tables

As too many key pressing operations would be necessary when going through long tables using the scroll keys, direct access to the tables via the alphanumeric keys is also possible:

```

+Sugar - 100 †
          1234567890 ‡
  
```

Instead of pressing key  or , selection e.g. of a material from a material table is also possible by means of key . In this case, you must enter the first character of the material name for access to the material name, which starts with the entered letter. Unless the material can be identified by entry of a single letter, as many other letters as necessary for clear identification of the material have to be entered.

For FILL-X4 you have to make certain, that for the selection of a component by input of characters of the name, you have to press first briefly the More-key . Now the cursor in the highest line flashes. Press now the More-key  until the LED lights. For input you have to proceed like it is described above forwards.

Example for selection of a material:

Material table	Direct access with key 'B'	Direct access with key 'B' and 'A'
A	B_	BA_
ABC	BA	BABX300
Azucar - 500	BABX300	BCT700
B	BCT700	Bulk - 200
BA	Bulk - 200	C
BABX300	C	DEF
BCT700	DEF	Flour - 635
Bulk - 200	Flour - 635	Sugar - 100
C	Sugar - 100	
DEF		
Flour - 635		
Sugar - 100		

2.5 Input over external PC-keyboard

The Fill Controller have an alphanumeric key field and a connection for a PC keyboard with DIN- Plug (on the rear side of housing). Thus the operation of the Fill Controller can be made also by an external PC keyboard. Both functions are equivalent and are alternatively applicable.

Keyboard												
Keypad												

Keyboard					
Keypad					


In the delivering condition the external keyboard is adjusted as an US keyboard. If a German keyboard will be used, you have to change the character set with [Strg][F2] into German. With [Strg][F1] you can return again to the delivering condition (US).
The LEDs from the PC keyboard will be not triggered.

For detail informations please refer to the Installation Manual.

3 Main Menu

As soon as the unit is ready for operation, the functions of the main menu can be selected, provided that no batch operation was activated.

```
Fill Controller
Start #Setup #ATest
```

The menu items can be selected by pressing the relevant softkey .




Softkey	Function
[Start]	Batch functions
[Setup]	Configuration, calibration, determination of the serial port, initial data
[ATest]	Starts the test operation for the internal weighing point.

3.1 Switching on the Fill Controller

After switching on the mains voltage the alphanumeric display will show "Fill Controller". Only now, the main menu is activated.

Installing further options cards, or changing options cards to a different slot must be done before the entry of data (materials). After installation of the card, a [Cold] start is necessary.

There are three possibilities to reach the boot menu:

- ❖ Menu [Setup]-[Reboot], [Warm] start possible
- ❖ Press key  when switching on the instrument
- ❖ Press keys  + , ([Setup]-[Software Parameter]-[Reset on stop+exit] = 1 or 5 s.), whereby [Warm] start is not possible.



Please note that you may only do a [Cold] start when this is necessary (e.g. after installation of a new options card), because all data which were not stored in EPROM or EAROM will be delete!

For further details, see the relevant chapter in the installation manual.

4 Setup

4.1 Setup menu


The [Setup] menu is described in the installation manual.

To prevent the access to the Setup menu by unauthorized persons, this menu can be disabled by means of key switch.



Please note that you have to take care to avoid change the calibration data after material entry. Changing e.g. the weight unit from kg into lb subsequently must be followed by a cold start. Hereby all RAM data (materials, etc.) are lost.

```
Calibration changed
Make coldstart !
```

This message will be displayed if the calibration data would be changed later. Now, you have to continue with .


4.1.1 Setup menu tree


Setup


- Config	see chapter 4.2.1
- Weighingpoints	see installation manual
- Set Clock	see installation manual
- Serial Ports	see installation manual
- Software Parameter	see installation manual
- License Setup	see installation manual
- Show Boardnumber	see installation manual
- Print Setupdata	see installation manual
- Print Last Fault	see installation manual
- Refresh Display	see installation manual
- E/A Slots	see installation manual
- Show Version	see installation manual
- Enable Download	see installation manual
- Reboot	see installation manual
- Show memory	see installation manual

4.2 Configuration menu

The configuration data which are specific for Fill Controller will be entered in this menu. They will be saved in the EAROM and thus they will be secured in the case of power failures and after implementing a [Cold]-start.

Press  to select [Setup].

Select with  or  [Config] and confirm with .

Leave the 'Setup' menu with .

Main menu of the configuration

Select [Edit] to editieren the parameter

Select [Print] to print the parameter

```
Fill Controller
Start #Setup #ATest
```

```
Setup
+Config
```

```
Configuration
# Edit #Print
```

4.2.1 Config menu tree

Config

- Collisionweight
- Sequencenumber
- Start inquiry
 - No
 - Yes
- Print report
 - No
 - Yes

Configuration for FILL-Controller

Weight threshold from which a collision alarm is detected

Sequence number for the report

Dialogue [Yes], [No] is displayed before production start

No batch report
Batch report is printed

4.2.2 Change configuration

Select with  [Edit]

```
Configuration
# Edit #Print
```

Possible messages

```
System clock stopped
```

The clock has to be set.

```
Init. not ready
Make cold start!
```

The coldstart was aborted and not all parameters are initialized. Make a coldstart.

```
Calibration changed
Make cold start!
```

Calibration was modified. Some parameter must be new initialized. Make a coldstart.

4.2.3 Parameters

Press  or  to select [collisionweight].

If the weight increases above this value whilst the lance moves down, the lance is stopped, returned and a collision alarm is output.

```
↑Collisionweight ↑
                    1 kg
```

The sequence number is increased by 1 at each production. It is not stored in Earom.

```
↑Sequencenumber ↑
                    5
```

The parameter indicates, if a safety prompt before each production start is required.

```
↑Start inquiry ↑
                $ No $
```

Select if a report should be printed automatically after each filling.


```
↑Print report ↑
                $ Yes $
```

4.2.4 Factory settings

Parameter settings on delivery or after [Erase].

Parameter	Value
Collision weight	0 kg
Sequence number	0
Start inquiry	No
Print report	No

4.2.5 Exit of the configuration

Press  to leave the configuration. If parameters were changed, a prompt whether these new data shall be stored is displayed.

```
Store data ?
Yes # # No
```

Press [Yes] to store the data in EAROM.

4.2.6 Printout of configuration data

During printing the printout is checked. If the printer fails during print, each line has a timeout of 2 seconds. The printout could not be changed with 'Nice Lable Express' veränderbar.

From the main menu of the configuration

```
Configuration
# Edit #Print
```

Select key [Print]

```
Printing ...
```

If the printout could not be done

All parameters are printed.
For two seconds:

```
Error during print
```

For print-out example and layout, see chapter 8.


5 Batching


All batch functions are contained in this menu item.


```
Fill Controller
Start #Setup #ATest
```

After pressing [Start], the functions for batching [Start] and material handling [Mat.] are accessible.

```
Start #           #Mat.
```

Press  [Start] to start a filling operation.

Press  [Mat.] for material table handling.

Press  to return to the uppermost menu.

5.1.1 Messages on "Start"

After pressing the "Start"-softkey, some messages could appear.

```
No Batch License
PR1713/20 or /21
```

The batcher works with recipes. But no dosing license PR1713/20 or PR1713/21 is entered.

```
No Batch License
PR1713/30
```

The batcher works with phases. In the Software-Parameters "S88.01 Interface = on" is configured. But no dosing license PR1713/30 is entered.

```
Init. not ready
Make cold start!
```

The coldstart was aborted and not all parameters are initialized. Make a coldstart.

```
Calibration changed
Make cold start!
```

Calibration was modified. Some parameter must be new initialized. Make a coldstart.

5.2 Start menu tree

<p>Start</p> <ul style="list-style-type: none"> - Start <ul style="list-style-type: none"> - Material selection - Setpoint - Mat. <ul style="list-style-type: none"> - New - Edit <ul style="list-style-type: none"> - Preset - Overshoot - Tolerance+ - Tolerance- - Flowrate - Calmingtime - Restartmode - Fillmode - Liftweight - Delete 	<p>Start menu for FILL-Controller</p> <p>Material selection Quantity to be batched</p> <p>Name, 20 alphanumeric characters, material no. 10 numeric characters</p> <p>Select material</p> <p>Switch-over from coarse to fine, 0 – FSD Overshoot, 0 – FSD Tolerance above setpoint, 0 – FSD Tolerance below setpoint, 0 – FSD Rate per minute for coarse (12,5% for fine), 0=off Calming time (in sec.) 0-999 Restart mode, 0 – 4 Filling mode of operation Weight from which the lance is lifted</p> <p>Delete material</p>
--	---

6 Material Handling

After [Start]-[Mat.] , the following menu is displayed:


```
Material table
New $ Edit $Delete
```

Unless a material exists in the table, only the possibility for input of a new material is displayed:


```
Mat. table is empty
New # #
```

6.1 Entry of new material

Input of new materials with name and material no. is by pressing **[New]**:

Enter the material name with alphanumeric characters (max. 16) and confirm with .


```
Materialname
0e1 500-20
```

Enter digits (max. 10) to specify the material number. Confirm with .

```
Materialnumber
12345
```


```
Name already exist
# # OK
```


Error message: The name exists already.

After pressing  [OK], a new name can be entered.

```
Ident already exist
# # OK
```

Error message: The material number exists already.

After , a new material number can be entered.




The input of new materials can be left with .

6.2 Editing material

With [Edit], the material parameters can be entered / edited. Before editing, the material must have been entered with [New].

Last edited material:




```
+0e1 500          †
                  1$
```

Select the material with  or  and confirm it with .



```
+0e1 732          †
                  2$
```

The first parameter is displayed in the top line. In the top line, the parameter can be selected.

The value can be entered directly.

Press ,  or  to store the value.

```
+Preset          †
                  1 kg
```

Press  to reset a faulty input. Press  once more to cancel parameter editing.

Enter the preset.

```
+Preset          †
                  1 kg
```

Enter the overshoot.

```
+Overshoot      †
                  2 kg
```

Enter the tolerance above the set-point.

```

+Tolerance+          ↑
                    2 kg
    
```

Enter the tolerance below the set-point.

```

+Tolerance-          ↑
                    2 kg
    
```

Enter the material flowrate per minute.

```

+Minflow             ↑
                    2 kg
    
```

Enter the calming time in sec.

```

+Calminsttime       ↑
                    2 kg
    
```

Enter the restart mode from 0 – 4.

```

+Restartmode        ↑
                    0
    
```

Enter the fill mode.

There are three different fill modes: 'Top Position', 'Bunghole Position', 'Below Level Pos.'.

With mode 'Top Position', the lance goes (remains) fully up (initial position). Filling is done from this position.

In mode 'Bunghole Position', the lance goes to the position below the bunghole. After batching, the lance is withdrawn to the topmost position.

In mode 'Below Level Pos.', the lance goes fully down. Filling is started and when reaching the lift weight, the lance is drawn up slowly according to the fill weight. However, it remains below the fill level.

This parameter is relevant only for fill mode 'Below Level Pos.'.

Specify the lift weight.

A typical lift weight from which the lance is drawn up slowly is allocated to each material. Initially, the filling level must just cover the lance aperture.

```

+Fillmode            ↑
+Top position        ↓
    
```

```

+Liftweight          ↑
                    1 kg
    
```

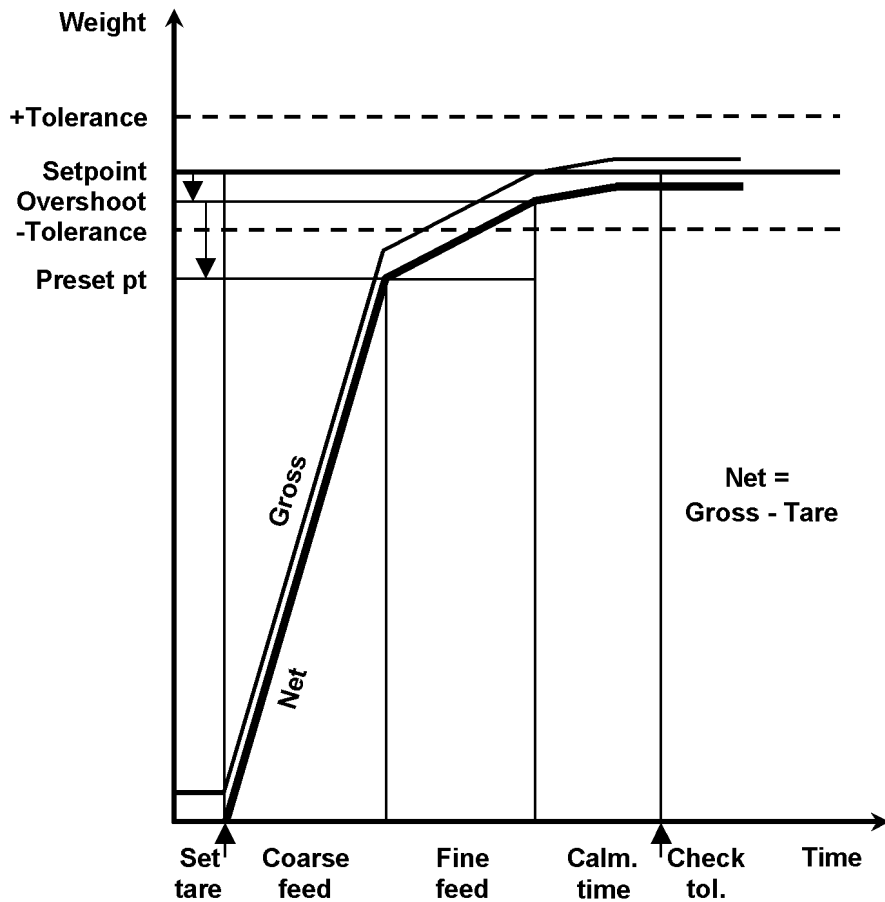
The menu can be left with  at every item.

```

Material table
New  * Edit *Delete
    
```

6.2.1 Batch mode

The batch mode is used for filling applications based on the net weight with the following steps:



- Tare: The current gross weight is stored as tare value and the net weight starts at zero.
- Coarse: The material is batched in coarse flow, until the switch-off level (preset) is reached.
- Fine: The material is batched in fine flow, until the switch-off level (overshoot) is reached.
- Calming time: Delay time until material standstill in the batch hopper.
- Tolerance check: The batched weight is checked against the tolerance values.

6.2.2 Preset

The preset determines the point (setpoint – preset – overshoot) at which batching is switched over from coarse to fine (coarse flow valve is closed).

6.2.3 Overshoot

All material which flows into the hopper after closing the fine valve is called overshoot. The initial value must be adjusted so that the material quantity which is still in flow into the hopper is taken into account. It is largely dependent of the supply system.

The initial overshoot should be set to a higher value than expected, to prevent the first batch from ending above tolerance TOL+ .

Only the overshoot portion which has flown into the hopper before elapse of the calming time is recorded.

Overshoot calculation will occur only, if the tolerance check is activated. It is optimized for the batch process and corrected in the table dependent of RST mode (1-4; 0=no correction). When batching this material for the next time, the value is corrected.

6.2.4 Tol+, Tol-

The tolerance is specified as a weight value and can be determined independently with **with Tol+ for weight above setpoint** and **with Tol- for weight below setpoint**.

Batching below Tol- is followed by postbatching, overshoot correction for the material is dependent of the selected RST mode.

Tolerance errors generate a tolerance alarm which must be acknowledged. Moreover, exceeding a setpoint tolerance causes a production stop for a process step.

With zero in the two fields, a tolerance check occurs. In this case, overshoot correction and postbatching are omitted. The overshoot value remains unchanged, the restart mode remains without effect on the batch.

6.2.5 Flowrate

For flowrate monitoring:

Enter the flowrate per minute. Monitoring is done also for short batching times. The value is converted internally into the measuring time. This is the flowrate for 'coarse flow' (or 12,5% of this value for 'fine' batching). Otherwise, a material flow warning is output after approx. 30 seconds. Dependent of measuring time, resolution and overall quantity to be batched, the material flow warning can also be output earlier.

The flowrate can vary during normal operation, when e.g. the material flows slowly into the hopper first after valve opening, until a maximum value is reached. With decreasing fill level, the flowrate is reduced again.

If flowrate monitoring is not required:

Enter zero as flowrate.

6.2.6 Calming time

Enter the time in seconds, which shall elapse before tolerance checking. This time can be dependent of

- the material consistency, or
- the mechanical construction of the batching installation.

The calming time must ensure that tolerance checking is done at a stable weight value.

6.2.7 Restart (RST) mode

When the batch is stopped by a tolerance alarm, or when a correction with weight below setpoint is possible, the behaviour is determined by the selected restart mode. A correction is possible, if the batched weight after the calming time is below the fine switch-off point. As a prerequisite, the tolerance check must always be activated.

Example: RST mode 4

After the calming time, the measured weight is below Tol-. A new overshoot value is calculated. If the setpoint tolerance is higher than the overshoot, a correction can be started. After another waiting time until elapse of the calming time, the weight is within the tolerance band, but still below the setpoint. The overshoot value is corrected again. Further correction is not possible. With tolerance alarm, batching is stopped and the operator can make an intervention into the process. In this case, the process can be continued (Con) or canceled (Abr).

Calculation of modified overshoot values:

New_overshoot	=	old_overshoot - (setpoint - actual_weight)/2
Corrected_overshoot	=	old_overshoot - (setpoint - actual_weight)

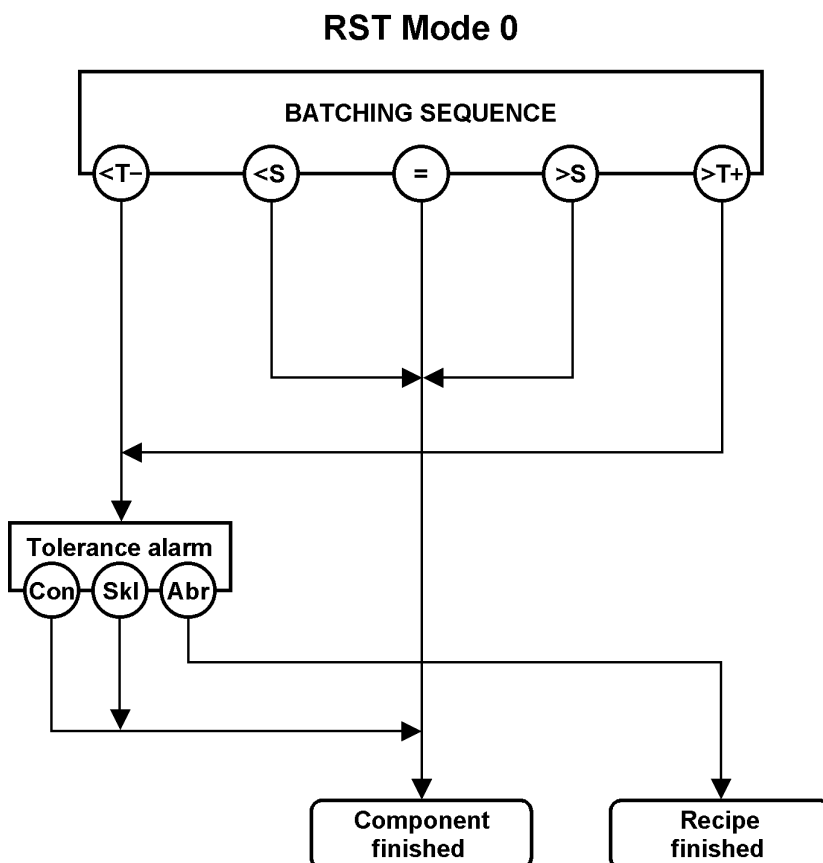
Selection of the RST mode:

Characteristics	RST mode
No postbatching, no optimization	0
Postbatching, no optimization	1
No postbatching, with optimization	2
Postbatching first before optimization	3
Optimization first before postbatching	4

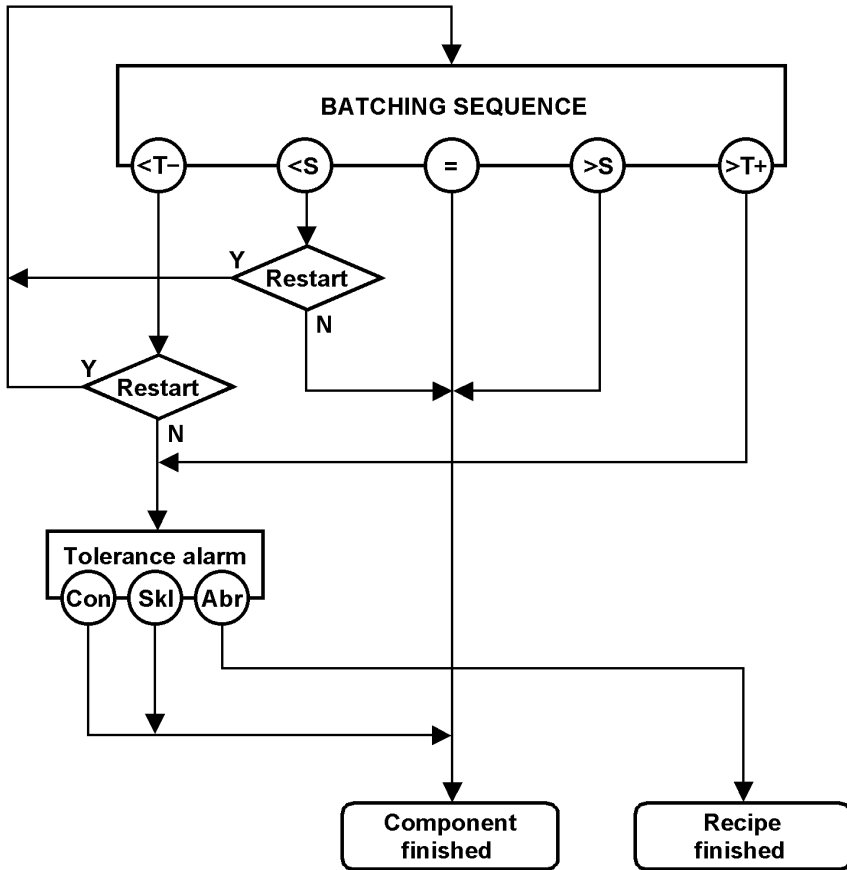
Abbreviations in the diagrams for the RST mode

- Weight below Tol-
- Weight below setpoint
- Setpoint reached exactly
- Weight above setpoint
- Weight above Tol+

- Con Continue: go on (correct overshoot with RST mode 2-4)
- Skl Skip line: terminate material. This function is not used in the Fill Controller.
- Abr Abort recipe: terminate production
- NL Overshoot

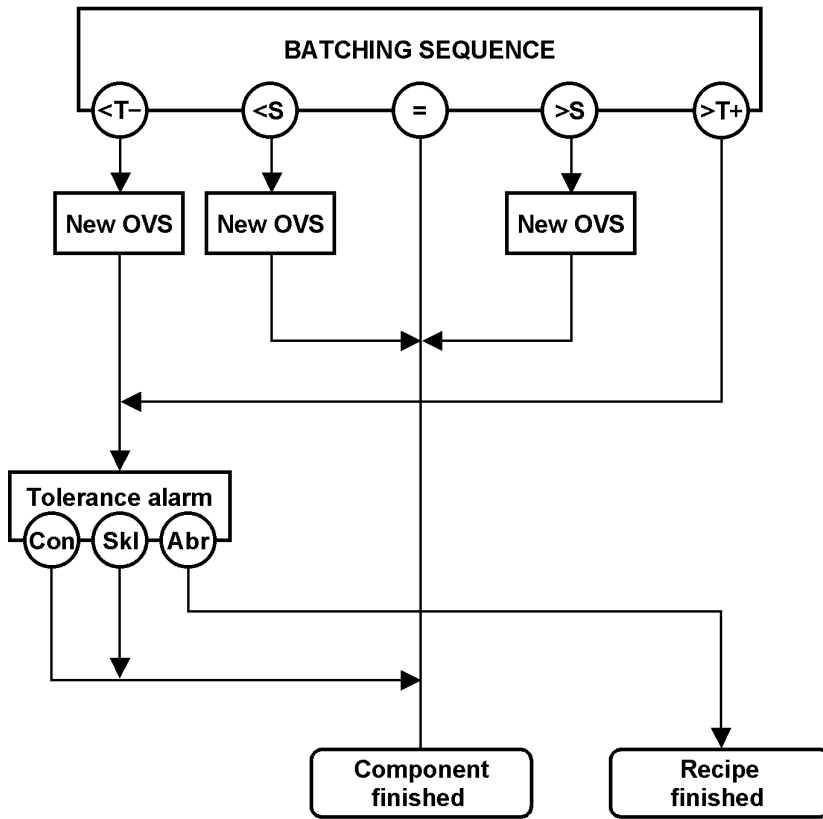


RST Mode 1



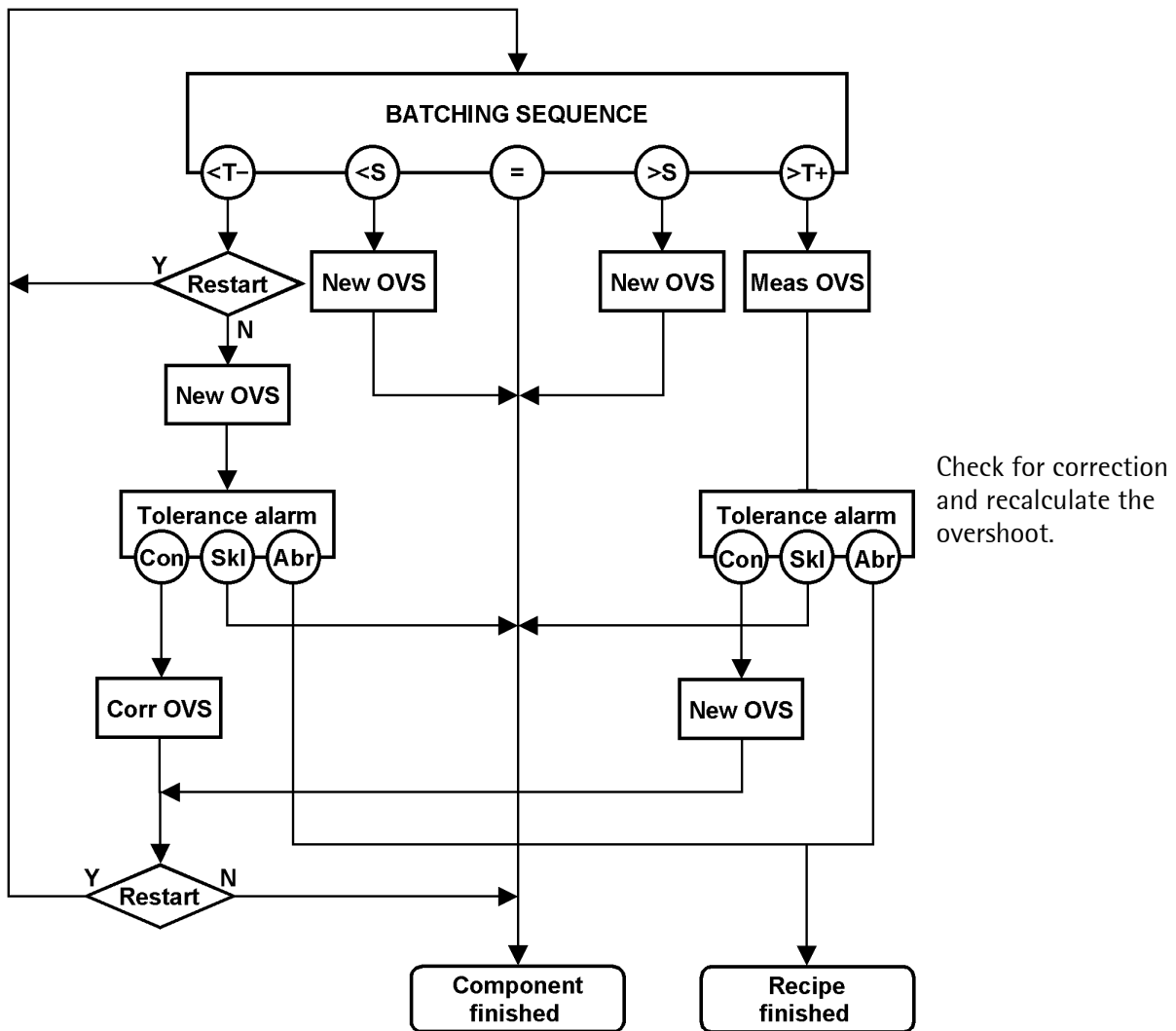
Check only, if correction is possible.

RST Mode 2

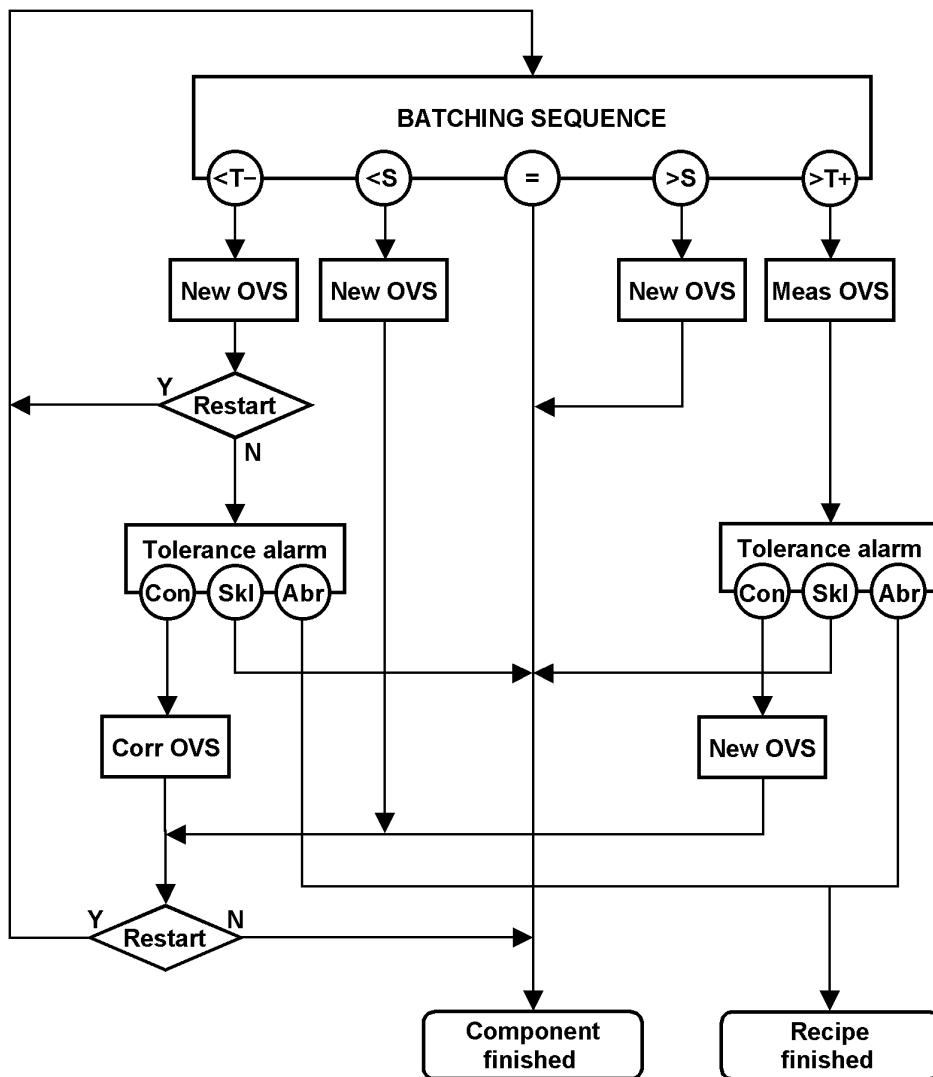


Calculate only once new overshoot.

RST Mode 3




RST Mode 4






Recalculation of the overshoot and check for correction.

6.3 Deleting material

Deleting a material is done using function [Start]-[Mat.]-[Delete]:

For deleting a material, press  [Delete] .

[Single]: delete one material
 [All]: delete all materials

Press  or  to select the material to be deleted and confirm it with .


```
Material table
New  $ Edit $Delete


Delete material
Single# All  #

+Azucar - 200 †
          2345678901 $
```




6.4 Print material

Function [Start]- [Mat.]-[Print] can be used for printing single or all materials :

Further menu items can be selected with key .

Press  to select [Print] .

[Single]: print one material
 [All]: print all materials

Press  or  to select the material to be printed and press .

```
Material table
New  $ Edit $Delete

Material table
          $Print $

Print material
Single# All  #

+Azucar - 200 †
          2345678901 $
```

Error message

```
Error during print
```

This message is displayed, when e.g. [Setup]-[SerialPorts]-[Printer device at] is set to [none].

For print-out example and layout, see chapter 8.

7 Filling Process

7.1 Process sequence

Filling is done by means of a lance which is controlled by a motor and can be dipped into the hopper to a variable depth. For each material, a fillmode can be defined. There are three different fillmodes:

1. Top Position
2. Bunghole Position
3. Below Level Position

The control sequence varies dependent of this mode.

7.1.1 Fillmode 'Top Position'

Input signal "Enable" must be active in order to start the production (e.g. detection, if the barrel is positioned correctly).

With mode 'Top Position', the lance goes fully up (remains in the topmost position) (initial position). Input signal "Lance is top position" must be active.

Filling is done from this position.

The process goes to 'Production active' immediately and the output signals for coarse and fine flow are activated.

After batching, the lance remains in this position.

The filling process is completed and a report is printed out.

7.1.2 Fillmode 'Bunghole Position'

Input signal "Enable" must be active, in order to be able to start the production (e.g. detection, if the barrel is positioned correctly).

With mode 'Bunghole Position', the lance goes to the position below the bunghole. Output signal "Motor quickly downwards" is active. The motor has reached its position, when input signal "Lance is at bunghole level" is activated. If the weight increases by more than the collision weight (-> Configuration) whilst the lance is lowered, a collision is detected.

The process goes to 'Production is active' and the output signals for coarse and fine flow are activated.

After batching, the lance is withdrawn to the top position. Output signal "Motor up quickly" is active.

The motor has reached its position, when input signal "Lance is at top" is activated.

The filling process is completed and a report is generated.

7.1.3 Fillmode 'Below Level Position'

Input signal "Enable" must be active, in order to start the production (e.g. detection, if the barrel is positioned correctly).

With mode 'Below Level Pos.', the lance goes fully down. Output signal "Motor down quickly" is active. The motor has reached its position, when input signal "Lance is in bottom position" is activated. If the weight increases by more than the collision weight (-> Configuration) whilst lowering the lance, a collision is detected.

The process goes to 'Production is active' and the output signals for coarse and fine flow are active. The lift weight must be selected so that the tip of the lance remains just below the level. When reaching the lift weight, output signal "Motor up slowly" is activated and the lance is drawn up slowly. The motor speed must be adjusted accordingly, in order for the tip of the lance to remain below the filling level during the overall filling operation.

After batching, the lance is withdrawn to the top position. Output signal "Motor quickly upwards" is active. The motor has reached its position, when input signal "Lance is in top position" is activated.

The filling process is completed and a report is created.


7.2 Starting a filling process

The start of a batch could be done on several ways:


- from the front panel
- by a digital input
- with DDE / OPC communication
- with fieldbus communication

7.2.1 Start from the front panel




The batching process is started with [Start]-[Start] :

Press  to select [Start].

```
Fill Controller
Start #Setup #ATest
```

Press  to select [Start].

```
Start #          #Mat.
```

Press  or  to select the material to be started and press .

```
+Supermix          †
                1234567890 ‡
```

Enter the numeric value for the material setpoint.

```
Setpoint
                                50 kg
```

Now, start the batch with [Yes]. The prompt is displayed only, if [Setup]-[Config]-[Start inquiry] is set to [Yes]. Store the entered data with [No].

```
Start Production ?
Yes #          # No
```

7.2.2 Start with a digital input or DDE / OPC communication

Setting the SPM Bit MX1280 to TRUE a filling process is started.

An operator message appears on the display for 2 seconds.

```
Start by PLC
```

7.2.3 Start with fieldbus communication

The recipe start via fieldbus communication is described in chapter "10.8".

An operator message appears on the display for 2 seconds.

```
Start by fieldbus
```

7.2.4 Possible Error Messages

```
Production
Not enabled!
```

Unless the enable input is active, a message is displayed during 3 seconds. Subsequently, another attempt to start the batch must be made.

```
Mat.Table is empty
```

If the material table is empty, a message is displayed during 3 seconds. Subsequently, another attempt to start the batch must be made.

All external start commands take the last used material for dosing. Therefore a start has to be done once from front panel.
The display must show this menu:

```
Start # #Mat.
```

7.3 Status display

During the process, various messages can be displayed:

At production start, a message can be displayed shortly.

```
Starting Production
```

The production is active. The batch is active.

```
Production is active
# Stop #
```

Dependent of fillmode, lance movements can be necessary.

```
Lance to top
# Stop #
```

A tolerance alarm was triggered.

```
* Tolerancealarm *
Go on # #Abort
```




By pressing the gross weight key, the gross weight is displayed during approx. 3 sec.



Pressing the tare key will display the tare weight during approx. 3 seconds.

7.4 Stopping the batch process

The batch process can be stopped manually by pressing key .



```
Production stopped
Go on # #Abort
```

A blinking message 'Batch active' indicates that the batch process was stopped.


For further procedure, see chapter 7.5.

7.5 Continue, abort


For these functions, the batch process must have been stopped. When pressing the stop key again, the following menu is displayed:

```
Production stopped
Go on #           #Abort
```

[Go on]

Press  [Go on] to instruct the FILL-Controller to continue batching in case of tolerance alarm or manual stop. Dependent of error cause and restart mode, the operation is continued with Post-batching.

[Abort]

Press  [Abort] to terminate the process. The lance returns to the initial position. The cancelation is recorded in the report.

7.6 Messages during the batch

```
* Tolerancealarm *
Go on #           #Abort
```

With tolerance monitoring by entry of Tol+ and Tol-above zero activated, a tolerance alarm can be generated during batching. If the actually batched quantity exceeds the tolerance, this message flashes in the topmost line and the process goes into stop condition automatically.

With tolerance alarm, various reactions are possible.

```
* Flow warning *
# Stop #
```

With flowrate monitoring activated, a flow warning can be generated during batching. When actual flowrate is lower than minimum flowrate limit value (e.g. lumpy material), a blinking message is displayed in the first line. The material flowrate is monitored continuously. The warning message disappears automatically, when the material flowrate is within the limits.

If necessary, the process can be stopped by pressing  (see chapter 7.4.).

7.7 Lance control

Whilst the lance is in motion, it can be stopped by a stop command at any time.

If the weight increases by more than the collision weight (-> Configuration) whilst lowering the lance, a collision is detected.

The lance is driven down. It can be stopped by [Stop].

```
Lance to fillPos.
# Stop #
```

The lance is driven up. It can be stopped by [Stop].

```
Lance to top
# Stop #
```

A collision alarm was detected. The lance is driven up with signal "Motor quickly upwards". This message must be acknowledged by the operator with [OK].

```
Collisionalarm
# Ok #
```

The lance is stopped. With [Go on], the movement continues.

```
Lance stopped
Go on # #Abort
```

[Abort] will cancel the production.

7.8 Production print-out

After completing the production, a report can be printed out.

The display is:

```
Printing...
```

For print-out example and layout, see chapter 8.

To produce a print-out the following configuration had to be done:

1. Setup -> Serial Ports -> Printer Device at -> select a port
2. Setup -> Software Parameter -> Report to applikation
3. Setup -> Config -> Report drucken -> Yes


8 Print-Outs

8.1 Print-out examples

The Fill Controller has various reports for print-out. Some of these reports can be configured freely by PC program "Nice Label Express".

	Configurable with "Nice Label Express"
1. Weight print-out.	Yes
2. Production report	Yes
3. Material data	Yes
4. Configuration data	No
5. Setup-Data	No

8.1.1 Weight print-out

By pressing the print key  on the instrument front panel, a simple weight print-out can be started. The key functions also without running main program.

With "Error ... " displayed on the scale or if the weight is below the configured parameter 'Setup -> Weighingpoints -> Calib. -> Param -> Don't print below', printing is not possible.

Unless a Nice Label Express layout was defined, a simple weight report in the following format is printed out.

When using "Nice Label Express", layout "*.lbl" must be used for editing.

The weight print-out is done in the layout (English "WGT_GB.lbl", local language "WGT_D.lbl").

The data made available in the relevant layout are explained in section "Nice Label Express".

Print-out example:

```
30.10.2003  11:06:59 Gross:  00.277 kg
```

8.1.2 Production report

How to print out a production report is described in section "Production print-out". Unless a Nice Label Express layout was defined, the report will be printed out in the following format. When using "Nice Label Express", layouts "*.lbl" must be used for editing.

The production report is done in the layout (English "Batch_GB.lbl", local language "Batch_D.lbl"). The data made available in the relevant layout are explained in section "Nice Label Express".

Print-out example:

```
Production Date/Time  2002.11.31  14:22:58
Productname           0e1501
Productnumber         12998
Setpoint              50,0 kg
Actualvalue           50,0 kg
Sequencenumber        123
Error                 OK
```

8.1.3 Material data

How to print out the material data is described in section "Print material". Unless a Nice Label Express layout was defined, the report will be printed out in the following format. When using "Nice Label Express", layouts "*.lbl" must be used for editing.

The production report is done in the layout (English "Mat_GB.lbl", local language "Mat_D.lbl"). The data made available in the relevant layout are explained in section "Nice Label Express".

Print-out example:

```
Material data
Date              2002.11.31  13:47:32

Materialname      Azucar - 200
Materialnumber    2345678901
Preset            20,0 kg
Overshoot         15,0 kg
Tolerance +       2,5 kg
Tolerance -       2,5 kg
Flowrate          1 kg
Calmingtime       3s
Restartmode       3
Fillmode          Top position
Liftweight        1,5 kg
```

8.1.4 Configuration data

The component data print-out is described in section "Printout of configuration data".

Print-out example:

```
Configurations data
Date . . . . . : 2002.10.28 12:48
Application . . . . : Fill Controller
Version . . . . . : Rel 2.20 rev. 2003-02-12
-----

Collisionsweight . . . . . : 1 kg
Sequencenumber . . . . . : 12345
Start inquiry . . . . . : No
Print report . . . . . : Yes
```

8.1.5 Setup-Data

The set-up data print-out is described in the Installation Manual.

8.2 Nice Label Express

Reports could be printed directly from the program or via a configuration file from "Nice Label Express (NLE)". With this file, the layout of a report could be altered. The name of the NLE-file is e.g. "PRINT.Ibl". Does no layout file exist from NLE, the report is printed in a fixed form.

To create a self-defined report, program Nice Label Express is required. With these reports, all variable contents (e.g. weights) and fixed texts (e.g. "Sequence number") are transmitted to the report via variables.

As fixed texts are also transmitted into the print report, the user can create his language adaptations in many cases using "Translatelt" also for NLE. In this case, "Nice Label Express" is not necessary.

For "Nice Label Express", a fixed variable structure from the application is made available.

Variable for NLE	Type	Description	Weight print-out	Production report	Material data
ActDay	STR2	Day	✗		✗
ActMonth	STR2	Month	✗		✗
ActYear	STR2	Year	✗		✗
ActTime	STR2	Time	✗		✗
gross	WEIGHT	Gross weight	✗		
net	WEIGHT	Net weight			
tare	WEIGHT	Tare weight			
ReclD	STR20	Material ident		✗	
RecNam	STR20	Material name		✗	
Setpoint	STR20	Setpoint		✗	
ActVal	STR20	actual weight		✗	
SeqNum	UDINT	Sequence number		✗	
Error	STR20	Error text		✗	
ProdDay	STR2	Day		✗	
ProdMon	STR2	Month		✗	
ProdYear	STR2	Year		✗	
ProdTime	STR2	Time		✗	
MatIdent	STR20	Material Ident			✗
MatNam	STR20	Material name			✗
Preset	STR20	Presetpoint			✗
Ovs	STR20	Overshoot			✗
PosTol	STR20	positive tolerance value			✗
NegTol	STR20	negative tolerance value			✗
Flow	STR20	minimum flow value			✗
CalmTime	STR20	Calming time			✗
RstMode	STR20	Restart mode			✗
FillMode	STR20	Fill mode			✗
FillWgt	STR20	Fill weight			✗

9 Signal Controls

9.1 Digital input and output modules

The output of internal instrument statuses or input of 'commands' are determined by the installed digital input and output cards. FILL-X5 and FILL-X6 are delivered with a plug-in card type PR 1713/17 in slot 1. FILL-X4 is delivered with a plug-in card type PR 5510/12 .

The process can be controlled via the digital inputs: e.g. stop, restart.

The lance position is defined by three position inputs.
Individual outputs are set for the motor control operations.

9.1.1 Layout for digital input/output cards for Fill-X4

Input description	Slot	Chan nel	Terminal
Lance is in top position	Card 1 PR 5510/12	1	14-32
Lance is at bunghole level		2	15-33
Lance is in bottom position		3	16-34
Start / restart		4	17-35
Stop		5	18-36
Production enabled		6	19-37

Output description	Slot	Chan nel	Terminal
Motor quickly upwards	Card 1 PR 5510/12	1	2-20
Motor slowly upwards		2	3-21
Motor quickly downwards		3	4-22
Analog part error, tolerance alarm or flow warning		4	5-23
Collision alarm		5	6-24
Coarse flow signal		6	7-25
Fine flow signal		7	8-26
Production active		8	9-27
		9	10-28
		10	11-29
		11	12-30
		12	13-31

9.1.2 Layout for digital input/output cards for Fill-X5 and Fill-X6

Input description	Slot	Chan nel	Terminal
Lance is in top position	Card 1 PR 1713/17	1	B1-B7
Lance is at bunghole level		2	B2-B7
Lance is in bottom position		3	B3-B7
Start / restart		4	B4-B7
Stop		5	B5-B7
Production enabled		6	B6-B7

Output description	Slot	Chan nel	Terminal
Motor quickly upwards	Card 1 PR 1713/17	1	A1-B8
Motor slowly upwards		2	A2-B8
Motor quickly downwards		3	A3-B8
Analog part error, tolerance alarm or flow warning		4	A4-B8
Collision alarm		5	A5-B8
Coarse flow signal		6	A6-B8
Fine flow signal		7	A7-B8
Production active		8	A8-B8

9.2 SPM-Layout

The SPM could be accessed directly via DDE, OPC, EWCOM, DUST or ModBus.

Weights are DINT-formats in 'kg', 't', 'g' or 'lb', according to the configuration of the scale.

Address	MSBit in MX	Format	Description														
MX 139	139	BOOL	WP-A Set zero														
MX 140	140	BOOL	WP-A Tare														
MX 141	141	BOOL	WP-A Reset tare														
MX 142	142	BOOL	Analogtest activ														
MX 416	416	BOOL	Powerfail														
MX 432	432	BOOL	Recipe activ														
MX 433	433	BOOL	Recipe stopped														
MD 16	512	DWORD	WP-A Weightvalue														
MX 568	568	BOOL	WP-A Standstill														
MX 569	569	BOOL	WP-A Zero inside 1/4 d														
MX 570	570	BOOL	WP-A inside zero set range														
MX 574	574	BOOL	WP-A Tared														
MX 575	575	BOOL	WP-A Sign														
before MB 128	before 1024		reserved for firmwarefunctions														
MX 1280	1280	BOOL	Start Starts the material selected last														
MX 1281	1281	BOOL	Enable (read only)														
MX 1282	1282	BOOL	Stop														
MX 1283	1283	BOOL	Restart														
MX 1284	1284	BOOL	Abort														
MD 34	1088	DINT	Sequence number														
MD 35	1120	DINT	Setpoint														
MD 36	1152	DINT	Report: Batched value (read only)														
MW 79	1264	WORD	Status (read only) <table border="1" data-bbox="598 1518 1189 1720"> <tr> <td>0 = not active</td> <td>40 = batch active</td> </tr> <tr> <td>10 = lance at top</td> <td>41 = batch stop</td> </tr> <tr> <td>11 = lance stopped</td> <td>50 = report</td> </tr> <tr> <td>20 = lance at filling position</td> <td>60 = lance at top</td> </tr> <tr> <td>21 = lance stopped</td> <td>61 = lance stopped</td> </tr> <tr> <td>22 = collision stop</td> <td>70 = abort</td> </tr> <tr> <td>30 = start batching</td> <td></td> </tr> </table>	0 = not active	40 = batch active	10 = lance at top	41 = batch stop	11 = lance stopped	50 = report	20 = lance at filling position	60 = lance at top	21 = lance stopped	61 = lance stopped	22 = collision stop	70 = abort	30 = start batching	
0 = not active	40 = batch active																
10 = lance at top	41 = batch stop																
11 = lance stopped	50 = report																
20 = lance at filling position	60 = lance at top																
21 = lance stopped	61 = lance stopped																
22 = collision stop	70 = abort																
30 = start batching																	
MB 166	1328	USINT	Start error code (read only) 1: DBase for table recipe could not be opened 2: recipe not found 3: setpoint is zero 8: Enable not set 9: parameter error														
MB 168	1344	USINT	Start mode (always 1)														
MX 1312	1312	BOOL	Coarse flow (read only)														
MX 1313	1313	BOOL	Fine flow (read only)														

MX 1314	1314	BOOL	Tolerance alarm (read only)
MX 1315	1315	BOOL	Flow warning (read only)
MX 1316	1316	BOOL	Report: Tolerance error (read only)
MX 1317	1317	BOOL	Report: Abort error (read only)
MB 704 to MB 771	5632 to 6168		reserved
MB 800 to MB 1023	6400 to 8191		reserved

10 Fieldbus

PR5610 can become a fieldbus slave for Profibus, Interbus-S or DeviceNet by inserting a fieldbus interface card (PR1721) into Slot 4 for communication of one or several PR1756 with a communication master (e.g. Siemens S7 Profibus). Data processing at the fieldbus is at intervals of 20 ms.

Weights are always DINT in in 'kg', 't', 'g' or 'lb', dependent of scale configuration.

10.1 Configuration

Configuration parameters in menu section [Setup]-[Fieldbus]:

[Protocol]	The protocol, e.g. Profibus-DP, can be selected.
[Scale Interface]	For using the fieldbus interface as described here, parameter [Scale Interface] must be set to 'enabled'.

Configuration parameters in menu [Setup]-[Software Parameter]:

[S88.01 Interface]	The fieldbus parameter [S88.01 Interface] must be set to 'off'.
--------------------	---

10.2 Application protocol

The interface works with a 8-byte write window and a 8-byte read window. The fieldbus exchanges data cyclically with each slave. This means: in every cycle, 8 bytes are written and 8 bytes are read, also if no data contents are changed. The application protocol described here is independent of the selected fieldbus and explained as seen from the fieldbus master.

10.2.1 Read window

In this window, data are transmitted from the slave (Scale) to the master.

The first four bytes are used for reading a data value. The type of these data is written in byte 4. The data type corresponds to the requirement in the write data window.

Bytes 6 and 7 contain status bits independent of the read value data type.

For status bit reading and writing of direct control bits, a procedure is not required. The general system bits and

the status bits are always present and need not be requested in particular. The direct control bits are also available continuously.

Byte 0	read data: MSB
Byte 1	"
Byte 2	"
Byte 3	read data: LSB
Byte 4	Echo of <i>read data type request</i>
Byte 5	status bits
Byte 6	status bits
Byte 7	status bits

Procedure for reading a parameter:

1. Write the data / parameter type into byte 4 of the write window (e.g. net weight) as *read data type request*.
2. Wait, until in 4th byte of the read window, the echo of *read data type request* is equal to the *read data type request* of the 4th byte in the write window.
3. Now, the value is available in byte 0 to 3.

10.2.2 Write window

This window is used to transmit data from the master to the slave (scale).

The first four bytes are used for writing a data value. The type of these data is described in byte 5.

The bits in byte 6 and 7 are independent of the write value data type in direct access.

Byte 0	write data: MSB
Byte 1	"
Byte 2	"
Byte 3	write data: LSB
Byte 4	read data type request
Byte 5	write data type
Byte 6	direct control bits
Byte 7	direct control bits

Procedure for parameter writing:

1. wait, until *write_handshake* = 0 in the read window (PR1713 is ready to receive new data)
2. write value in byte 0 to 3
3. write data type in byte 5 (*write data type request*)
4. wait, until *write_handshake* = 1 (Log Controller confirms data reception) write 0 in byte 5 (*write data type request*) -> *write_handshake* is set to 0.

10.3 Data formats

Various data formats are used in the interface description:

DINT Most data values are transmitted in the form of a four-byte double-integer value; 32-bit values with polarity sign.

Write window: byte number
value

Example: write the fixtare weight value 844.

0	1	2	3	4	5	6	7
00	01	03	4C		1F		

Read window: byte number
value

Example: read negative gross weight value -2.

0	1	2	3	4	5	6	7
FF	FF	FF	FE	08			

UINT Positive 16-bit value.

Write window: byte number
value

Example: line number = 1, 2, 3...65535

0	1	2	3	4	5	6	7
		00	1A		9D		

USINT Positive 8-bit value.

Write window: byte number
value

Example: restart mode = 0, 1, 2, 3 or 4

0	1	2	3	4	5	6	7
			01		87		

Characters ASCII characters; 8-bit number.

Write window: byte number
value

Example: recipe names [characters1...4] =
hex52, 45, 43, 31 for name 'REC1'

0	1	2	3	4	5	6	7
52	45	43	31		96		

10.4 Read data

All read values are addressed by *read data type request*

Value in byte 4 <i>Read data type request</i> All other addresses are reserved		Read data in byte 0...3 (parameters)
Dec	Hex	
4	04	Exponent/unit/step width
8	08	Gross [DINT]
9	09	Net [DINT]
10	0A	Tare [DINT]
12	0C	Gross x 100
14	0E	FSD value [DINT]
81	51	Setpoint [DINT]
82	52	Batched value [DINT]
83	53	Report: actual weight [DINT]
84	54	Report: error [DINT] 0: OK -1: Tolerance -2: Abort -3: Tolerance and Abort
85	55	Start error code (byte 1); start mode (byte 0) Start error code: 1: Database error 2: Recipe / material not found 3: Setpoint is zero 6: no Material 8: Enable input is not set 9: Faulty start mode
86	56	Sequence number [DINT]
87	57	Status [INT] 0 = not active 10 = lance at top 11 = lance stopped 20 = lance at filling position 21 = lance stopped 22 = collision stop 30 = start batching 40 = batch active 41 = batch stopped 50 = report 60 = lance at top 61 = lance stopped 70 = abort
204	CC	reserved
236	EC	reserved

Fixed functions can be activated via the bits of bytes 6 and 7 according to the table given below.

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 5	Write hand-shake	Power fail	Error 2 ²	Error 2 ¹	Error 2 ⁰	Status 2 ²	Status 2 ¹	Status 2 ⁰
Byte 6			Coarse flow	Fine flow		Tare active	Calibr. changed	Test active
Byte 7	Dimmed	Standstill	Within zero set range	Zero within 1/4 d	Below	Overload	Above FSD	Analog error

Note: The addresses and control bits shown with gray background are handled by the firmware part of the interface. All signals are edge triggered. The Controller react on changes only.

Byte 5

Write handshake	0 = PR 1713 is ready to receive new data
Power fail	RAM-data had changed due to a power failure (without batterie buffering) or a cold-start. The "Power fail" status must be reset by setting the signal "Reset power fail" (bit 5 of byte 7) of the write data.
<u>Error: (2² + 2¹ + 2⁰)</u> 0: O.K. 1: Param. error 2: Fatal error 3: Tol. error 4: Flow error	no error parameter error fatal error tolerance alarm flow warning (actual flow < minimum flow)
<u>Status: (2² + 2¹ + 2⁰)</u> 0: ready 1: run 2: done 3: hold/stop 4: abort	Batching status is ready for restart Batching runs (even if flow or tolerance alarm is present) Batching finished Batching is stopped Batching is aborted

Byte 6

<u>Batch valve signals:</u>	
Coarse	batch valve signal coarse flow
Fine	batch valve signal fine flow
Tare active	scale is tared
Calibration changed	Calibration is changed. If this bit is set, the weighing parameter (Expo/Unit/Step) had to be read again. It will be set after power-on. FSD has to be read again to reset this bit.
Test active	scale is in test mode

Byte 7

Out of calibration	Weight outside W&M conditions. Weight value shows no unit anymore. See W&M conditions: Setup -> weighingpoints
Standstill	scale is in standstill condition
Within zero set range	scale is within zero set range
Zero within 1/4d	scale is zero (+/-weight < 1/4d)
Below zero	scale is below zero
Higher than overload	scale is loaded above FSD + overload range (Err 2)
Above FSD	scale is above FSD (maximum scale value FSD e.g. 5000kg), but lower than FSD + overload.
Error in analog converter	scale is in error condition e.g. 'err 3'. Instead of a weight an error number is shown in the display and in gross, net or tare weight.

10.5 Write data

All write values are addressed by *write data type request*. The data typical for a WP are accessible via various write windows. Access to the WP-independent data is via the write window of WP A or WP B.

Value in byte 5 <i>Write data type_request</i>		Write data in byte 0...3 (parameters)	
Dec	Hex		
0 to 15	00 to 0F	reserved	
81	51	Setpoint [DINT]	
85	55	Start modes [DINT]	
86	56	Sequence number [DINT]	
112	70	Set zero	no write data required
113	71	Tare	no write data required
114	72	Reset tare	no write data required
115	73	Activate test	no write data required
116	74	Reset test	no write data required
204		reserved	
205		reserved	

Fixed functions can be activated via the bits of bytes 6 and 7 according to the table given below.

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 6	Start	Restart		Stop	Abort			
Byte 7			Reset Powerfail	Test off	Test on	Reset tare	Tare	Set zero

Note: The addresses and control bits with gray background are handled by the firmware part of the interface. All control bits react only on a 0 -> 1 transition. To detect a transition, the respective status has to be present for at least 40ms.

Byte 6

Start	start a filling process
Restart	restart batch
Stop	stop batch
Abort	abort batch

Byte 7

Reset power fail	reset power fail flag
Test off	deactivate analog test
Test on	activate the analog test
Reset tare	reset tare
Tare	set tare
Set zero	set the scale to zero, if the weight is within the zero set range

10.6 Reading weights

10.6.1 Weight value

For reading weights, only the required weight type must be written into byte 4 of the write window (*read data type request*). When the weight value is available, the type is returned in byte 4 of the read window. If the weight request remains unchanged, the most recent weight is always updated. Parallel to that, the status information in byte 7 has to be read.

Write window:	byte number value	0	1	2	3	4	5	6	7
						08			

Read window:	byte number value	0	1	2	3	4	5	6	7
		00	00	11	B4	08			

The displayed numeric value is read out without units and digits behind the decimal point. Negative values are represented in 2 complement.

Example: Negative weight is -12

Read window:	byte number value	0	1	2	3	4	5	6	7
		FF	FF	FF	F4	08			

10.6.2 Exponent, unit, step width

Exponent, weight unit and step width are normally unchanged with a scale and need to be read only once by type 4.

Write window:	byte number value	0	1	2	3	4	5	6	7
						04			

Read window:	byte number value	0	1	2	3	4	5	6	7
		02	03	02	00	04			

The signification of the first three single bytes is:

Byte 0: exponent 0 = 0000 no digits behind the decimal point

1 = 000.0

2 = 00.00

3 = 0.000

Byte 1: unit

1 = mg

2 = g

3 = kg

4 = t

5 = lb (pounds)

6 = l (liters)

Byte 2: step width

1, 2, 5, 10, 20, 50

In this example, the previous weight must be read as 45,32kg with step width 2 .

10.7 Taring, zero setting ...

For handling scale functions such as taring and zero setting, the individual bits in byte 7 of the write window are used (assignment). The relevant function is handled by a 0-1 transition of the corresponding bit. For detecting the transition, the respective status has to be present for at least 40ms.

Signification of bits in write byte 7

Bit 7

Bit 6

Bit 5 Reset power fail flag

Bit 4 Deactivate analog test

Bit 3 Activate the analog test

Bit 2 Reset tare

Bit 1 Set tare

Bit 0 Set the scale to zero, when the weight is within the zero set range.

Example:

When the scale is within the permitted zero set range, this function is handled once.

Write window:

byte number
value

0	1	2	3	4	5	6	7
							01

10.8 Starting a batch (fieldbus or scratchpad memory)

A batch process can be started via fieldbus or scratchpad memory.

- 1) Write setpoint: address 81 or MD 35
- 2) Set start mode to 1: address 85 or MB 168
- 3) Trigger start via bit 7 of byte 6 or MX 1280

The batch starts with the material selected last. As a prerequisite, a batch must have been started already once manually.

Whilst the batch is active, the batch status can be read, e.g.:

Address 87 and byte 5 and byte 6 or MW 79

Batching valve control: byte 6, bit 4 and 5 or MX1312 and MX1313

When the batch is finished, the report can be read out:

Batched weight: address 83 or MD 36

Sequence number: address 86 or MD 34

11 Analog Test



During calibration of the instrument, a test value is calculated automatically and stored in EAROM. This value is scaled so that fullscale is displayed (e.g. 5000).

```

Fill Controller
Start #Setup #ATest
```

When activating the analog test, the measuring signal is separated from the load cell. Depending on calibration, the value is displayed either as actual test value or as a difference between the originally stored test value and the actual test value (e.g. 0000).

```
Analog test active
#           # Exit
```

The analog test remains active, until it is terminated by pressing  [Exit] or .

12 Tables

12.1 Material table

```
MATERIAL :STRUCT
  MAT_IDENT : STR20;
  PL_ID     : STR1;
  WP_ID     : STR1;
  BMODE     : STR20;
  SPM_IN    : UINT;
  SPM_OUT   : UINT;
  CONSUMP   : WEIGHT;
  STOCK     : WEIGHT;
  PRESET    : WEIGHT;
  OVS       : WEIGHT;
  PTOL      : WEIGHT;
  MTOL      : WEIGHT;
  FLOW      : WEIGHT;
  CALMTIME  : TIME;
  REPMODE   : USINT;
  RSTMODE   : USINT;
  NAME      : STR30;
  TEXT      : STR240;
END_STRUCT;
```

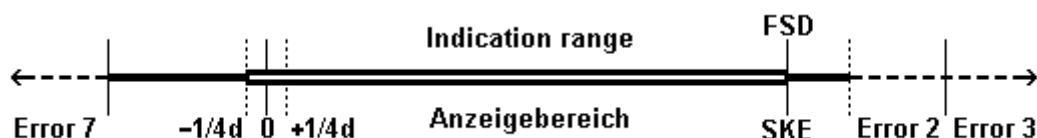

13 Error Messages

13.1 Error messages on the weight display

The error statuses of the analog part are output on the weight display. Display is coded as 'Error X' .



Display	Description
Error 1	Internal calculation overflow (faulty calibration)
Error 2	Test voltage higher than fullscale plus overflow
Error 3	Test voltage higher than the maximum value of 36mV. However, the message can indicate also an error in the analog part, load cell error or load cell cable break.
Error 6	Sense-voltage out of tolerance
Error 7	Test voltage negative or faulty load cell connection
Error 8	ADC error, e.g. hardware defect or overload



13.2 Error messages on the text display

FILL-Controller generates the following error messages.

Display	Description
DBase error	Opening a database table or writing into a database table was not possible. The table is reserved for another program, or does not exist.
Mat. table is empty	No data were found in the table.
Name already exists	Input of new data into the table under an already existing name is not possible. All table entries must have different names.
Start error: ##	<p>Error at batch start, ##=error number</p> <p>1: Recipe table cannot be opened</p> <p>2: Unknown recipe</p> <p>3: Recipe line table cannot be opened.</p> <p>4: No recipe lines available</p> <p>5: Material table cannot be opened.</p> <p>6: No material available</p> <p>7: Unknown batch mode</p> <p>8: Internal error</p> <p>9: No function block with this name provided</p> <p>10: Recipe lines not provided with successive numbering</p> <p>11: Invalid PLC address</p> <p>12: No function module provided</p> <p>13: Faulty function module type</p> <p>14: Parameter error in function module</p> <p>15: No free memory location</p> <p>16: Parameter error in function module</p> <p>17: Invalid weighing point name</p> <p>18: Analog part not installed</p> <p>19: Simulation error</p> <p>20: Weighing point cannot be reserved</p> <p>21: Weighing point in error status</p> <p>22-29: Internal error</p> <p>30: Production table cannot be opened</p> <p>31: Data writing in production table not possible</p> <p>32: A recipe is busy</p> <p>33,34: Internal error</p> <p>35: No free memory location</p> <p>36: No licence for the production</p> <p>37: Negative setpoint</p> <p>38: Too many active weighing points in the recipe</p> <p>39: Invalid weighing point</p> <p>40: Weighing point parameter in the request component invalid</p> <p>41: Invalid batch mode for the reactor</p> <p>42: No memory space for text parameter (recipe line, material)</p> <p>43: Invalid production line number</p>
Recipestartererror	The recipe controller was unable to execute the process.
No Batch License PR 1713 /21	Batch license PR 1713/21 is not activated.
Analog test failed	The analog test cannot be activated. The weighing point is not free, or in error status.

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Sartorius Mechatronics T&H GmbH
Meiendorfer Straße 205
22145 Hamburg, Germany
Tel +49.40.67960.303
Fax: +49.40.67960.383
www.sartorius-mechatronics.com

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