

*(Intrinsically safe) batch and loading controller*  
**Batching Master 110 (i) and 210 (i)**



**Programming manual**  
**only valid in combination with the installation manual**  
**Batching Master 110 (i) / 210 (i)**

Software Version 2.19

Revision 15.1  
21.12.2011

Construction Year see type plate

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## **Safety information**



The Batching Master must only be installed by process electronics engineers or qualified electricians who are authorised by the plant operator to carry out these tasks.

The instrument may only be operated by personnel who are authorised and trained by the plant operator.

The Batching Master must only be connected as specified in the electrical data. The upper part of the housing must not be opened, otherwise maintenance of the electrical data is not ensured and the guarantee becomes null and void.

## **Validity of Installation and Operating Instructions**

- These Installation and Operating Instructions apply to all Batching Master models. It is valid only in conjunction with the installation manual Batching Master.
- Your IBS agent will be able to give you information about any improvements or modifications.
- The manufacturer is not responsible for damage caused by incorrect or unauthorised use. Conversions and changes to the instrument must not be made, otherwise the certification and guarantee become invalid.

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# 1 Operation

The upper line of the display indicates the preset quantity. In programming mode, the function to be executed is displayed.

The lower line indicates the quantity batched. In programming mode, the value of the function or setting is shown.

You can switch the lower display to flow indication with the [#] key. You can switch to totaliser by pressing the key again. The totaliser indication is only possible when batching is not taking place. The display resets itself after about 4 seconds.

If the flow controller is active, the flow setpoint is displayed in the upper display by pressing the [#] key at the same time as the flow is being indicated in the lower display.

If a limiting controller is switched on, the lower display will show the controlled variable rather than the flow when the [RC] key is pressed. The upper display shows the reference variable. The controller display resets itself to the batched quantity after about 4 seconds.

If the flow conversion mode is active, different values e. g. mass flow, volume flow, standard volume flow, temperature... can be displayed by pressing the up or down arrow keys.

If the lower display indicates flow at the start of batching, it will switch automatically to the batched quantity. The flow can then be displayed again by pressing the [#] key. The display will not automatically revert to batched quantity.

The quantity is always shown with the appropriate unit in each case.

The RC key also contains a red LED to indicate that the remote control interface is on.

Keys F1 to F3 contain additional indicator LEDs. Functions can be assigned to these LEDs.

These LEDs can also be activated via the interface. Keys F1 to F3 and RC can be interrogated via the interface.

## 1.1 Switching on the Batching Masters

The instrument carries out a self-test as soon as it is connected to the power supply. The instrument number and software version are displayed. All data stored in the FRAM (ferro-electric non-volatile RAM, a non-volatile data memory) is then read. The most recent preselected and batched quantities are displayed. The instrument waits for an input.

## 1.2 Batching with the Batching Master

You must press the [Reset] key before the first batching process. The last preselection is reset.

Enter the preselected quantity using the numeric keys [1 to 9]. A decimal point will be displayed in a fixed position.

The preselected value must be confirmed with [Set]. The last batched quantity is set to 0. The Batching Master is now ready to start batching.

Press the [Start] key to start batching. The digital shutoff steps switch on, the current output runs up to 20 mA. Active batching is indicated on the display (B appears at the bottom left). You can interrupt the batching with [Stop] or OFF at any time.

Batching interrupted with Stop can be continued immediately with [Start]. If batching is stopped as the result of an OFF, the fault message must first be reset with [Reset]. You can then continue batching with [Start].

A new batching process can be started immediately with [Set] [Start] if the preselected quantity does not need to be changed.

After stopping, batching can be terminated with [Reset].

After a supply break down you can take up the batch with [Start] again.

### 1.3 Fault messages

The Batching Master can detect various faults. Batching is interrupted immediately. The fault is reset by pressing the RESET key (see Holding Register 5 and 6).

<b>No.</b>	<b>Lower Display</b>	<b>Upper Display</b>	<b>Fault Type</b>
1	FRAM	Error in	Memory error
2	<b>ERR S.-Break NK1</b> altern. with batched quantity	Preselected quantity	Namur contact 1 sensor break
3	<b>ERR S.-Break NK2</b> altern. with batched quantity	Preselected quantity	Namur contact 2 sensor break
4	<b>ERR S.-Break mA1</b> altern. with batched quantity	Preselected quantity	Analogue input 1 sensor break
5	<b>ERR S.-Break mA2</b> altern. with batched quantity	Preselected quantity	Analogue input 2 sensor break
6	<b>ERR S.-Break mA3</b> altern. with batched quantity	Preselected quantity	Analogue input 3 sensor break
7	<b>ERR M.-range mA1</b> altern. with batched quantity	Preselected quantity	Analogue input 1 measurement range violation
8	<b>ERR M.-range mA2</b> altern. with batched quantity	Preselected quantity	Analogue input 2 measurement range violation
9	<b>ERR M.-range mA3</b> altern. with batched quantity	Preselected quantity	Analogue input 3 measurement range violation
10	<b>ERR MIN. FLOW</b> altern. with batched quantity	Preselected quantity	Flowrate lower than permitted minimum
11	<b>ERR sensor</b> altern. with batched quantity	Preselected quantity	External fault message (e. g. mass measurement fault)
12	<b>free text1</b> altern. with batched quantity	Preselected quantity	release 1 not enabled

<b>No.</b>	<b>Lower Display</b>	<b>Upper Display</b>	<b>Fault Type</b>
13	<b>free text 2</b> altern. with batched quantity	Preselected quantity	release 2 not enabled
14	<b>ERR Over batched</b> altern. with batched quantity	Preselected quantity	Over-batching
15	<b>ERR OFF</b> altern. with batched quantity	Preselected quantity	OFF
16	<b>ERR Printer</b> altern. with batched quantity	Preselected quantity	Printer fault
17	<b>Pres. too less</b>	Pres. quantity	Preselection too small
18	<b>Pres. too great</b>	Pres. quantity	Preselection too large
19	<b>Error pulse</b> altern. with batched quantity	Preselected quantity	Pulse faulty (in case of double pulse)
20	<b>Release x (Text)</b> altern. with batched quantity	Preselected quantity	Batch confirmation not present
21	<b>Printer Error</b> altern. with batched quantity	Preselected quantity	Printer ERR. Communication error
22	not used	Pres. quantity	Printer Busy
23	not used	Pres. quantity	Printer ERR. Paper OUT
24	<b>Product Selection Error</b> altern. with batched quantity	Preselected quantity	No product selected
25	extended area crc bad	Preselected quantity	checksum failure
26	API-Calculation Error	Pres. quantity	
27	External Sensor Error	Pres. quantity	Sensor Error at Modbus Master
28	Valve not open	Pres. quantity	Valve open contact not active
29	Valve not closed	Pres. quantity	Valve closed contact not active
30	ERR Communic.	Pres. quantity	Interface: No Watchdog Trigger

Faults 1 and 15 are monitored continuously. Faults 2 to 13 are monitored following start. Fault 16 is monitored before starting and after stopping batching. Fault 14 is monitored after stopping batching.

## 1.4 Programming

To enter the programming level, press the Menu key. The Batching Master displays the current software version and the instrument number for a short time.

If a sub-menu is selected, you can access the next level using the  $\blacktriangleright$  key. A code is requested if one has been entered. The code request is by-passed if the programming enable switch is on. For certified instruments, the certification data can only be changed by switching on the programming enable switch (install, calibration and characteristic level).

Programming is only implemented when the “Quit programming” menu level is correctly terminated. The programming level is quit via a selection menu by pressing the  $\blacktriangleleft$  key to exit all levels. The “Save” prompt appears. You can change from “No” to “Yes” using the  $\blacktriangleup$ / $\blacktriangledown$  keys. The setting is then confirmed by pressing the  $\blacktriangleleft$  or Set key. All data are saved. The batch controller is now in batching mode again. Programming cannot take place during batching (except for the controller function).

If the Batching Master detects invalid data in FRAM, a fault message is issued. A COLD-START can be initiated by pressing the RC key when switching on. A prompt appears asking whether all data is to be deleted (factory) or whether just the settings (basic settings) are to be reset (software options, characteristic and instrument number). The factory reset cannot be accessed by the user.

<b><i>Cold-Start</i></b>	<b><i>Upper Display</i></b>	<b><i>Lower Display</i></b>
The LCD indicates Cold Start after switching on. Entries are made using the $\blacktriangleright$ key. The upper display flashes. You can change between the levels with the $\blacktriangleup$ / $\blacktriangledown$ arrow keys and confirm with the $\blacktriangleleft$ or SET keys. When the setting has been confirmed, the associated code is requested. The setting is only deleted if the code is entered correctly. Settings:      Basic setting Factory setting Display basic setting at first	Cold-Start	Factory setting
Basic setting	Code Install code request	Each key pressed is shown as a field.
Factory	Code Factory code request	Each key pressed is shown as a field.

## 2 The parameter level

This chapter describes the setting options in the parameter level.

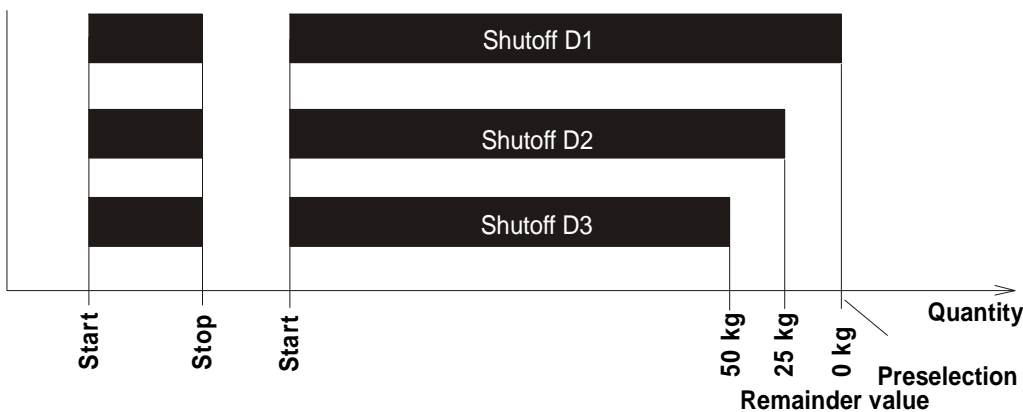
### 2.1 Setting the digital shut-off steps

There are three digital outputs for switching a on/off- valves or pumps during the batch process. Shut-off steps D1 to D3 are assigned to digital outputs DA1 to DA3 in the factory setting. These three digital outputs are switched off (opened) when the OFF switch is actuated.

These digital outputs switch on when batching is started. They switch off when the preselected quantity is reached. The digital outputs are also switched off if batching is interrupted through a stop or OFF.

Remainder values can be set to prevent over-batching. The digital outputs then switch off before the end of batching. Setting the remainder values for the shutoff steps is carried out in function 1.1.x of the Parameter Level.

If, for instance, you set the D3 shutoff to 50 kg, D2 to 25 kg and D1 to 0 kg, the digital outputs switch as shown in the drawing.



All three digital outputs switch on when batching is started. Shutoff step D3 switches off 50 kg before the end of batching. Shutoff step D2 switches off 25 kg before the end of batching. When the preselected quantity is reached (remainder value = 0), shutoff step D1 switches off.

The digital shutoff steps are assigned to the digital outputs in function 2.3.x of the Structure Level.

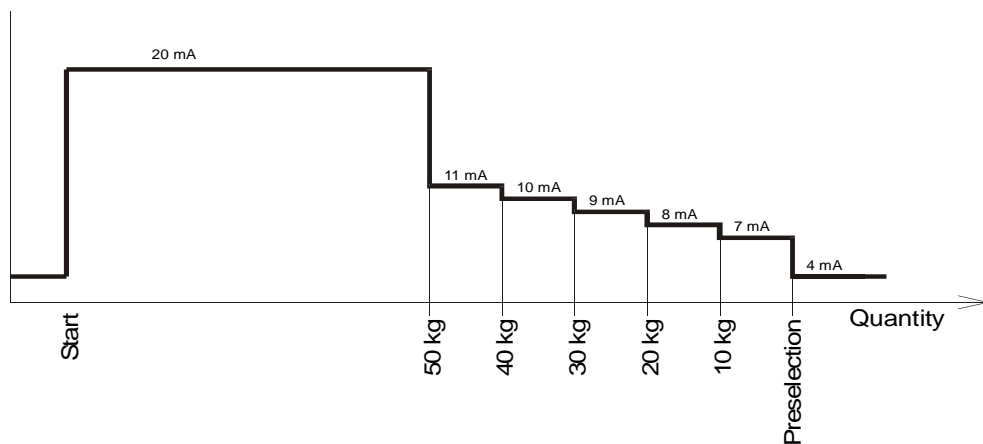
The direction of action of the digital outputs can be set in function 2.3.x. Please note that digital outputs DA1 to DA3 always open when an OFF is initiated.

The LEDs in keys F1 to F3 can be assigned to the digital shutoff steps in function 2.7 of the Structure Level.

## 2.2 Setting the analogue shut-off steps

To achieve a more accurate shut-off at the end of batching, the analogue output can be ramped down to 4 mA in six steps. The point at which a step should be activated before the end of batching is entered in function 1.2.x. A current figure is assigned to this value in the next sub-menu. If a flow controller is active, the flow setpoint can be entered. To do this, shut-off by flow must be set in function 1.2.1.

The diagram below shows how the preselected values (factory setting) act during batching.

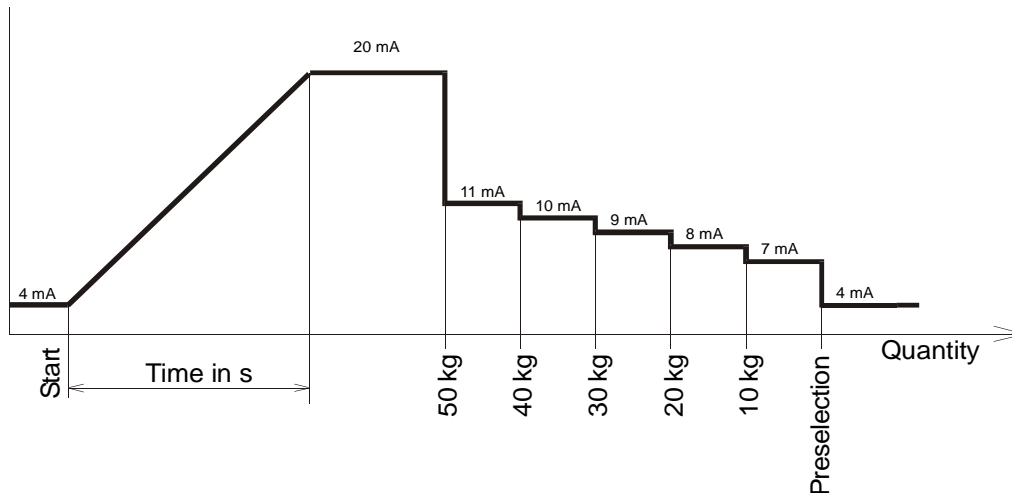


If batching is stopped using Stop, the output supplies 4 mA immediately. If OFF is operated, the output supplies no current.

If the preselected quantity is less than the remainder value of a shut-down step, the shut-down step becomes active immediately.

### 2.3 Setting a start-up ramp of the analogue output

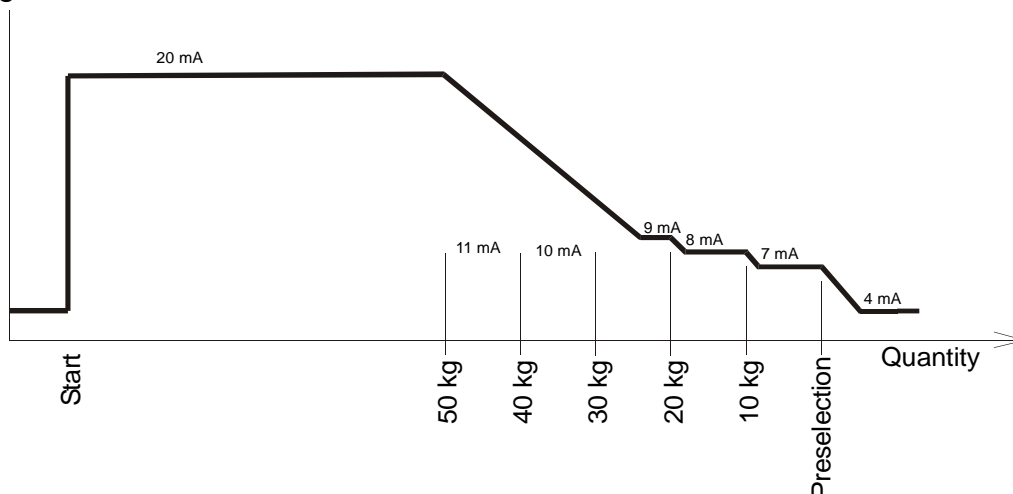
To prevent pressure hammers in the pipework, the current output to the valve is ramped up at the batch start from 4 to 20 mA. The time for the ramp can be programmed in function 1.3. A value up to 9999 seconds can be specified.



### 2.4 Setting the shut-down ramp of the analogue output

To prevent pressure hammers in the pipework, the current output to the valve can be ramped down from 20 to 4 mA if the shut-down steps are working at the end of the batch or if the batch will be interrupted by the stop key. The ramp doesn't work when the OFF is activated.

The time for the ramp can be programmed in function 1.4. A value up to 9999 seconds can be specified. The time must be specified so short that there is no over-dosage.



### 2.5 Monitoring maximum flow

A maximum permissible flow can be specified in function 1.5. This function can be assigned to a digital output (function 2.3.x). This digital output switches when the specified flow is exceeded. Entering a value of 0 will disable flow monitoring.

## 2.6 Batching indication

Function 1.6 enables a digital output to be used for batching indication. A digital output has to be assigned to the batching indication in function 2.3.x.

There are two types of batching indication (continuous or pulse).

In the first type, the digital output is switched from the start to the end of batching. Batching must be fully terminated. If batching is interrupted with [Stop] (preselected quantity not reached), the batching indication remains on. The batching indication only switches off when an interrupted batching process is terminated with [Reset].

In the second version, the batching indication is not on all the time. A pulse is output at the end of batching. The pulse length is written in seconds to menu 1.6.2

## 2.7 Monitoring the overflow quantity

A value for the maximum permissible overflow quantity can be entered in function 1.7.1. If this value is exceeded, a fault message appears on the display. The digital output assigned to the fault message in function 2.3.x is switched.

In function 1.7.2, a time indicating how long the overflow quantity is to be monitored after batching is terminated can be entered. This is necessary if, for example, the mass measuring device runs empty after a time and issues pulses even though no medium is flowing.

## 2.8 Monitoring of sensor break contact inputs

If a Batching Master has been configured for pulse or double pulse input, the namur contact sensor break can be monitored. The contact inputs used are monitored for open circuit or short-circuit when sensor break is switched on in function 1.8.1 or 1.8.2. If a fault occurs, an active batching process is stopped and the fault message is issued.

## 2.9 Monitoring of sensor break current inputs

If the Batching Master has been configured as a current input or a limiting or tracking controller, the mA sensor break can be monitored. The current inputs used are monitored for currents less than 3.2 mA when sensor break is activated in functions 1.8.3 to 1.8.5. If a fault occurs, an active batching process is stopped and the fault message is output.

## 2.10 Monitoring measuring range violation for current inputs

If your Batching Master has been configured as a current input or a limiting or tracking controller, mA measuring range violation can be monitored. The current inputs used are monitored for currents exceeding 20.4 mA when monitoring is switched on in functions 1.8.6 to 1.8.8. If a violation occurs, an active batching process is stopped and the fault message is output.

## 2.11 Specify fixed values

You can order a special function that enables you to specify three fixed pre-selection values or controller setpoints. These pre-selections are then selected via digital inputs (see functions 2.2.0) or function keys.

The three fixed pre-selection values can be specified in function 1.9.x or 3.1.11-13.

## 2.12 Self optimising overrun compensation

If a batch is controlled via digital outputs with attached on/off valves or pumps, it can due to different product properties or plant conditions (e. g. pump pressure) to the over or under batch.

To correct this, you can turn on the automatic tracking corrections function in 1.10.0. Both correction functions contribute to the shut off values of the digital outputs, which are referred as digital shutoff 1 to 3 in menu 1.1.0. The analogue shut-off steps are not changed.

Note:

- Only batches, which are done without stops and error messages are used for the compensation calculation. The third shut off point is used for calculation reference.
- Don't forget to activate the flow monitoring in function 4.8.0. A value for the allowed under-batching must be set. The minimum allowed flow (4.8.1) with the times (4.8.2 and 4.8.3) and a allowed under-batching (4.8.4) must be set.
- To detect a over-batching, the print out waiting time in function 4.11.2 must be set. The correction of the shut up steps is calculated after this waiting time. During this waiting time no new start is possible.



Note!

### 2.12.1 End value for correction

The over-batching or under-batching value is determined. All three shut off points are moved accordingly for the next batch.

In function 1.10.1 you set the factor for over-batching compensation. The input value is in percent. The function is off if 0 % is set. You can see the actual shut-off values in the function 1.1.0.

Example:

The over-batch is 10 kg. If function 1.10.1 is set to 10 % as correction factor, the digital shut off points are set back 1 kg, so that the next batch is shut off 1 kg earlier.

### 2.12.2 Absolute value for maximum deviation

You set the maximum batch deviation that is used for calculation in function 1.10.2. All batches with greater deviations are not used for calculation the correction. The function is off if it is set to 0.

### **2.12.3 Flow rate addicted correction from the shut off steps**

You set in function 1.10.3 the flow rate addicted correction factor. At the third shut off the actual flow rate is compared with the flow rate from the last batch. If the actual flow rate is less than the last flow rate, the shut off points are set near to the batch end. If the flow rate is greater, the shut off points are set away from the batch end. The new shut off point 3 can work first at the next batch. The function 1.10.3 is disabled if set to 0. The set value of shut off correction is set for a ten percent change from the maximum flow rate.

Example:

In function 1.10.3 (flow corr.) 10 kg is set. At the last batch the flow rate was 50000 kg/h (measuring range 100000 kg/h). At the actual batch the flow rate is 40000 kg/h. So the flow rate is 10% less (from maximum flow rate) as in the last batch. The first and the second shut off steps will be activated 10 kg later as in the last batch.

### **2.13 Checksum for certification data**

In function 1.11, a checksum of all certification data is generated and is displayed on the LCD.

### **2.14 Checksum for parameter assignment data**

In function 1.12, a checksum of all data unrelated to certification is generated and displayed on the LCD.

### **2.15 Software version custody transfer part**

The software version from the custody transfer software part is displayed.

## **3 The structure level**

### **3.1 Setting the language**

The language in which the menus are displayed is selected in function 2.1.

### **3.2 Setting the function of the digital inputs**

Functions 2.2.1, 2.2.4, 2.2.7, 2.2.10 and 2.2.13 are used to set the functions of the digital inputs.

#### **3.2.1 Set**

If a digital input is set to “Set” the input behaves in the same way as the [Set] key.

#### **3.2.2 Start**

If a digital input is set to “Start” the input behaves in the same way as the [Start] key.

#### **3.2.3 Set-Start**

If a digital input is set to “Set-Start” the input behaves as if the Set key has been pressed followed by the Start key.

#### **3.2.4 Stop**

If a digital input is set to “Stop” the input behaves in the same way as the [Stop] key.

#### **3.2.5 Reset**

If a digital input is set to “Reset” the input behaves in the same way as the [Reset] key.

#### **3.2.6 Failure of the flow sensor**

It is possible to connect a digital status output of a flow meter to a digital input of the Batching Master. The setting is “ext. error”. If the input switches during an active batch the batch will be stopped with the failure message “ERR Sensor”.

#### **3.2.7 Reset totaliser**

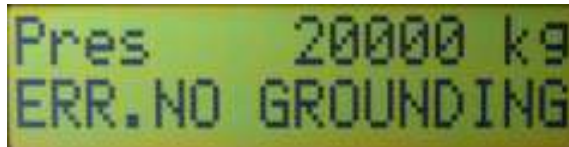
If the digital input is set to “Tot. reset”, the totaliser will be reset if the input is activated.

### 3.2.8 Two custom specific release signals

If a digital input is programmed to “Release 1” or “Release 2”, batching process can only be started if the digital input is activated. Otherwise a failure message will be shown in the second display line. This can be cancelled with the reset key. The release signal is controlled during the batch.

These two failure texts can be entered via the Modbus interface from Holding Register address 1151. The maximum length is 16 characters.

Example:



### 3.2.9 Enabling the Modbus interface

If the digital input is set to “Interface enable”, it is possible to read and write to the registers if the input is activated. The LED RC lightened.

### 3.2.10 Disabling keypad operating

You disable the keypad operation if the digital input is activated. Single keys could be enabled with function 2.6.x.

### 3.2.11 Activate purge function

If the digital input is set to “purge”, the positioner output ramps up to 20 mA when the input is activated. The lower display shows “purge”. You can't purge during the batch. The function is described in more detail on page 31.

### 3.2.12 Switching off controller function

This switches off the controller function for as long as the digital input is activated.

### 3.2.13 Valve opened contact

The valve opened contact is monitored (see function 2.11.1).

### 3.2.14 Valve closed contact

The valve closed contact is monitored (see function 2.11.2).

### 3.2.15 Enabling input for special function

If the digital input is set to “SF enable”, function 4.9 is enabled when the input is activated (see special rinsing function page 31).

### 3.2.16 Selecting the fixed preselection values

Digital input 4 can be assigned to “Preselection 1” and digital input 3 to “Preselection 2”. These digital inputs can then be used to select one of three fixed values. If only one fixed value is required, it is sufficient to set digital input 4 to “Preselection 1”. If up to three fixed preselection values are required, digital input 3 must be set to “Preselection 2”.

Selection of the preselection values is performed according to the table below:

	Value 1	Value 2	Value 3
Selection 1 Digital input 4	1	0	1
Selection 2 Digital input 3	0	1	1

The fixed preselection values can also be selected using function keys F1 to F3. To enable this, set the function keys to fixed preselection in function 2.7.3. The corresponding preselection comes into force as soon as the function key is pressed. The LED in the key you pressed lights up.

### 3.3 Setting the direction of action of the digital inputs

Functions 2.2.2, 2.2.5, 2.2.8, 2.2.12 and 2.2.14 are used to set the direction of action of a digital input. The “normally open” setting means that a contact must be closed to activate the function. The direction of action is reversed in the “normally closed” setting.

### 3.4 Setting the type of activation of the digital inputs

Functions 2.2.3, 2.2.6, 2.2.9, 2.2.13 and 2.2.15 are used to specify whether the function of the digital input is to be triggered by a level or an edge.

If, for example, a digital input is set to “Stop” with the action “Fixed level”, batching cannot be started until the Stop is deactivated. If, however, the “Stop” function is set to “Edge”, batching is interrupted by the digital input but can be restarted. The activation of the stop input does not need to be interrupted for a restart to take place. Another stop will only be initiated by activating the stop input again (edge).

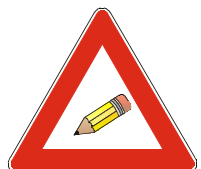
### 3.5 Setting the functions of the digital outputs

A number of functions can be assigned to the five digital outputs. Note that digital outputs 1 to 3 are switched off when the OFF is operated.

The factory setting of the digital outputs is as follows:

Digital output 1	Digital shut off point 1
Digital output 2	Digital shut off point 2
Digital output 3	Digital shut off point 3
Digital output 4	Batching indication
Digital output 5	Fault indication

If menu 2.9 valve control is set to “two-steps”, digital output 1 is used as NC contact and digital output 2 is used as NO contact. The menu for setting digital output 1 and 2 are not available.



Note!

### **3.5.1 Assigning shut off points to the digital outputs**

The shut off points entered in functions 1.1.1 to 1.1.3 can be assigned to the digital outputs. In the factory setting, the three shut off points are assigned to digital outputs 1 to 3. When the OFF is operated, digital outputs 1 to 3 are switched off immediately via the hardware. In addition, switch off takes place via the micro-controller. "ERR OFF active" appears in the lower display line.

### **3.5.2 Setting a digital output to pulse output**

The current flow rate can be give out on the digital outputs in the form of pulses. The maximum frequency is 150 Hz.

Setting the pulse increment is carried out in function 4.4.

### **3.5.3 Setting a digital output as batching indication**

You can assign the batching indication (function 1.6) to the digital output. This permits termination of batching to be transmitted to a higher-level system.

### **3.5.4 Setting a digital output as a flow alarm**

The flow alarm (function 1.5) can be shown on the digital outputs.

### **3.5.5 Setting a digital output as a fault indication**

A fault indication can be assigned to a digital output so that faults which cause batching to be interrupted can be passed on to a higher-level system. This output switches immediately a fault occurs.

### **3.5.6 Switch off 1 reverse**

The contact *switch off 1* switched not before ending batch. It switched after starting the batch. Exceeding the quantity set in menu 1.1.1, the contact switch.

### **3.5.7 Setting a digital output as purge indication**

The output switched if the purge function is active.

### **3.5.8 Setting a digital output for additive dosing**

The digital output is used for additive dosing control.

## **3.6 Setting the direction of action of the digital outputs**

Functions 2.3.2, 2.3.4, 2.3.8 and 2.3.10 are used to set the direction of action of a digital output. The "normally open" setting means that the contact closes when the function is triggered. The direction of action is reversed in the "normally closed" setting.

### 3.7 Interface settings

The Batching Master has two serial data interface. The settings are performed in the sub menu 2.4.0.

The interface can be controlled by a watchdog. Within a specified time a modbus flag must be reset, otherwise a communication error is displayed. The settings are done over the interface and described in the manual “MODBUS-Register Batching Master”.

#### 3.7.1 Setting the operating mode for interface 1

In function 2.4.1 it is possible to select between the following operation modes:

The setting “read only” only allows the read out of the data from the Batching Master. At the setting “read/write” it is also allowed to write data to the Batching Master. The LED inside the RC key is lightning if the mode is “read/write”.

#### 3.7.2 Setting the protocol type of interface 1

In function 2.4.2, you can choose between Modbus RTU and Modbus ASCII and DIN 66348. If DIN 66348 is selected, a MEW is emulated.

The Batching Master interface works with the following parameters (settings):

<i>Modbus RTU:</i>	<i>Modbus ASCII:</i>
- Data bits: 8	- Data bits: 7
- Stop bits: 1	- Stop bits: 1
- Parity: Even	- Parity: Even

#### 3.7.3 Specifying the unit address of interface 1

In function 2.4.3 it is possible to enter the unit address between 1 and 255.

#### 3.7.4 Specifying transmission speed of interface 1

The baud rate is specified in function 2.4.4. The maximum baud rate is 19200 bps for intrinsically safe units and 115200 bps for non-ex equipment.

#### 3.7.5 Specifying the function of interface 2

In function 2.4.5 it is possible to select between Modbus slave and Modbus master. If the interface 2 works as a slave the Batching Master communicates with a top system. If the interface 2 is set to E&H Promass, Krohne MFC010 or Emerson Micromotion the Batching Master is a Modbus master and able to read out the process data (flow rate, density and temperature) from a flow meter via the interface.

#### 3.7.6 Setting the protocol type of interface 2

If Modbus Slave is selected, you can choose between Modbus RTU and Modbus ASCII in function 2.4.6.

The parity setting on the interfaces is even parity and cannot be modified.

### **3.7.7 Specifying the unit address of interface 2**

In function 2.4.7. it is possible to enter the unit address for the second interface between 1 and 255.

### **3.7.8 Specifying transmission speed of interface 2**

The baud rate for the second interface is specified in function 2.4.8. The maximum baud rate is 19200 bps for intrinsically safe units and 115200 bps for non-ex equipment.

## **3.8 Code entry**

Access to all levels can be code protected. The code is entered in functions 2.5.1 to 2.5.7.

Function 2.5.4, setpoint, prevents the controller setpoint from being modified (only if the controller is active).

If the programming switch is ON, the install level, calibration and test level and linearisation level are blocked with code. If function 8.4 custody transfer is ON the levels are blocked always. If the programming switch is OFF, this levels are not blocked.

## **3.9 Locking the keypad**

The keypad can be enabled and locked using function 2.6.1.

Function 2.6.2 has two settings: The Reset key can be enabled complete or only for the failure reset, even if the keypad is locked.

Function 2.6.3 enables the SET key, even if the keypad is locked.

Function 2.6.4 enables the START key, even if the keypad is locked.

Function 2.6.5 enables the STOP key, even if the keypad is locked.

Function 2.6.6 enables the function keys, even if the keypad is locked.

Function 2.6.7 enables the numeric keys, even if the keypad is locked.

## **3.10 Function key assignment**

You can assign various functions to the function keys using function 2.7.

### **3.10.1 Shut-off steps on LED**

The digital shut-off steps can be assigned to the LEDs in keys F1 to F3. The LEDs indicate the status of the digital outputs that are set to digital shut-off. The function keys have no function.

### 3.10.2 Fixed select values

The fixed select values are assigned to function keys F1 to F3. When a function key is pressed, the associated LED lights. If the function preselect values is enable, the preselection appears in the display. Batching is started with [Set][Start]. If the user is not allowed to enter a preselection other than the fixed pre-selections, the keypad must be locked. The Set, Start, Stop, Reset and function keys can then be enabled individually (see description in chapter 3.9).

### 3.10.3 Purge via F1

This purge function can be used to open the batching valve when no batching process is activated. Then the pipe can be emptied, cleaned or filled. This purging function can be assigned to the F1 key. By pressing the F1 key the output signal to the batching valve opens to 20 mA. Then the LED in the F1 key lights and the LCD shows purge in the lower display.

This purge function can be switched off by pressing the F1 key again. It is also possible to program a digital output so that he switches during the time when this purge process is activated.

### 3.10.4 Product selection

A product can be selected using the function keys F1- F3 (F1 is assigned to the digital shut off step 1, F2 to digital shut-off step 2 and F3 to digital shut-off step 3).

After the confirmation of the pre-set input value with [Set], the first display line shows the question text. When a function key is pressed, the LED in the key lights and in the second display line the product text is shown which is associated to the selected product way.



SELECT PRODUCT!  
F1 = METHANOL

The selected product has to be confirmed by pressing [Set]. Then the batch can be started. When batching is started, only the selected digital shut-off step switches and the 4- 20 mA output signal to the batching valve opens.

The question text and the 3 product texts can have maximal 16 characters. These texts can be programmed via the Modbus interface.

### 3.11 Text entry

The texts for releases, station name etc. could be edited in menu 2.8. If no text is specified, a standard text is used.

<i>function</i>	<i>description</i>
2.8.1	Release 1
2.8.2	Release 2
2.8.3	Station name
2.8.4	Product select
2.8.5	Product 1
2.8.6	Product 2
2.8.7	Product 3
2.8.8	Wait for release
2.8.9	Text for delay

### 3.12 Valve control

In menu 2.9 is set the type of valve, either a analogue valve or a two step control valve. The controller function (flowrate control) from Batching Master is used for controlling the two-step-control-valve.

If the two-step-control-valve is selected, in the controller level the additional points “3.1.15 valve set time” and “3.1.16. minimum pulse length” are listed.

For controlling the two-step-control-valve the digital output 1 is connected to the N. C. control valve (normally closed) and the digital output 2 is connected to the N. O. control valve (normally open).

The current output shows the setpoint from the two step valve controller.

<i>status</i>	<i>control valve (N. C) at digital output 1</i>	<i>control valve (N. O.) at digital output 2</i>	<i>remarks</i>
close valve	not energised (control valve closed)	not energised (control valve open)	valve closed
open valve	energised, open (control valve open)	energised (control valve closed)	valve opened
to continue in position	not energised, closed (control valve closed)	energised, (control valve closed)	valve position not changed

The five shut up steps must be set to “flowrate” in menu 1.2.1. The shut up steps and the controller set-points are configured in menu 1.2.2, 1.2.3, ff.

### 3.13 Indication of different values from the flow conversion

With the arrow up and down keys you can switch to different values from the flow conversion (option). The normal batching display is shown after 10 seconds without pressing the arrow up or down keys. You can also press SET or arrow left to leave this display.

In 2.10 you enable the indication from the different values of the flow conversion. More information about flow conversion you will find in the optional manual flow conversion. Following settings are available:

<i>function</i>	<i>description</i>
2.10.1	Batched mass
2.10.2	Batched volume
2.10.3	Batched standard-volume
2.10.4	mass flow
2.10.5	volume flow
2.10.6	standard-volume flow
2.10.7	actual temperature
2.10.8	actual pressure
2.10.9	actual density
2.10.10	average temperature (only after batch end)
2.10.11	average density
2.10.12	calculated density
2.10.13	mass totaliser
2.10.14	volume totaliser
2.10.15	standard volume totaliser

### 3.14 Valve position feedback

The Batching Master can monitor the valve position. After batch start, the valve open contact must be active within the specified time in function 2.11.1. If not, the batch will stop and the error message appears. In function 2.11.2 is set the time for the valve closed contact to monitor closing the valve. If these times are set to 0s the functions are OFF.

## 4 Controller settings

A controller function can be ordered as an option. This function allows a physical quantity to be controlled during batching. The controller type is set in function 3. You can use the flow controller and the limiting controller simultaneously.

The setpoint can be set even during batching. Press the [#] key ([RC] key for limiting controller). The upper display shows the setpoint, the lower display the actual value. The setpoint can be changed by pressing [Reset], entering a new setpoint using keys [0] to [9] and then pressing [Set]. The controller display remains active for approx. 4 seconds. After this, the batching data (preset quantity, batched quantity) is displayed. If the setpoint was not changed, the Batching Master returns to the operating mode after 10 seconds if no key is pressed.

### 4.1 Flow controller

The flow is controlled during batching. In function 1.2.1 you can select between Flow values or mA values are set as shut off steps. These are shown as a setpoint when the controller is displayed. If batching is interrupted, the last manipulated variable is saved. If no start-up ramp is set, the setpoint is reached quickly.

The flow controller setpoint can also be specified externally on analogue input 3. To do this, function 3.1.1 must be switched to FLOW tracking controller.

### 4.2 Limiting controller

A second physical quantity (e.g. temperature) can be controlled by the limiting controller during batching. Analogue input 2 is used for the controlled variable. The calculated manipulated variable limits the upper value of the analogue output. The shut off steps or ramps remain unchanged as long as the limiting function does not intervene.

The limiting controller setpoint can also be specified externally on analogue input 3. To do this, function 3.2.1 must be switched to "Remote Control".

#### 4.2.1 Measuring range of limiting controller

The unit for the limiting controller is specified in function 3.2.2. You can choose no unit, %, °C, bar or pH.

The position of the decimal point is set in function 3.2.3. Up to three decimal places can be displayed.

Finally, the measuring range is specified. Function 3.2.4 sets the start of the measuring range i.e. the value corresponding to 4 mA. Function 3.2.5 sets the end of the measuring range i.e. the value corresponding to 20 mA. A value between -9999 and +9999 can be entered. The decimal point is shown in a fixed position.

### 4.3 Control parameter

All the usual control parameters for the flow controller can be set in functions 3.1.2 to 3.1.13 respectively for the limiting controller in functions 3.2.6 to 3.2.17.

#### 4.3.1 Proportional coefficient $K_p$

The proportional coefficient  $K_p$  in function 3.1.2 either 3.2.6 is set in the factory to 1.0. A negative proportional coefficient inverts the direction of action of the controller.

#### 4.3.2 Working point setting $OP$

With a P controller, the working point  $Y_0$  is set in function 3.1.3 either 3.2.7. The factory setting is 0.0%.

#### 4.3.3 Derivative action gain $K_d$

The derivative action gain  $K_d$  (or  $V_v$ ) in function 3.1.4 either 3.2.8 is set in the factory to 1.00.

#### 4.3.4 Integral action time $T_n$

The integral action time in function 3.1.5 either 3.2.9 is set in the factory to "Off". This is displayed when 5000 is entered.

#### 4.3.5 Derivative action time $T_v$

The derivative action time in function 3.1.6 either 3.2.10 is set in the factory to 0 sec.

#### 4.3.6 Setpoint start $SPS$

Use function 3.1.7 either 3.2.11 to enter the lowest setpoint that the user can set.

#### 4.3.7 Setpoint end $SPE$

Use function 3.1.8 either 3.2.12 to enter the highest setpoint that the user can set.

#### 4.3.8 Set setpoint enable

Use function 3.1.9 or 3.1.13 to enable the changing of setpoint.

#### 4.3.9 Setpoints

Use function 3.1.10 to 3.1.13 or 3.2.14 to 3.2.17 for setting the setpoints. The first setpoint is the actual setpoint, which is active either selected. The following three setpoints are fixed setpoints, which can be set.

### **4.3.10 Ramp difference**

During the start ramp the flow controller is not active. The flow rate reaches fast within the ramp time the maximum flow. As soon as the control deviation is within the set parameter in function 3.1.14, the flow controller is activated.

### **4.3.11 Valve time**

For controlling a two-step-valve the valve set time is preset in function 3.1.15.

### **4.3.12 Minimal pulse time**

Please set the minimal pulse time for the two-step-valve in function 3.1.16.

## 5 Settings in the install level

All important settings that affect the sensor and measuring range are set in the install level (Function 4.0). In certified custody transfer instruments, this level can only be enabled via the programming switch.

### 5.1 Specifying the type of sensor

The type of sensor for flow rate, temperature, density and pressure to be connected is specified in function 4.1. There is a choice of current, pulse and double pulse input. Different mass flow meter could be readout direct from the Batching Master using the second serial interface.

Additional the measuring values could be transmit by interface. You can use this for checking the quantity transformer function.

A sensor with current output must be connected to analogue input 1. A sensor with pulse output is connected to pulse input 1. In the case of certified custody transfer sensors that have a second pulse output, connect the second output to pulse input 2. Namur type sensor outputs are also connected to the pulse input. Sensor break monitoring is switched on in function 1.8.x.

Mass flow meters which should be readout over Modbus-interface, connect please to the second serial interface.

### 5.2 Setting the measuring range of the flow

The measuring range is specified in function 4.2.x.

#### 5.2.1 Measuring range unit

The measuring range unit is set in function 4.2.1. You can choose between kg, g, mg, l, ml, t, m<sup>3</sup> and "no unit".

#### 5.2.2 Decimal places

The number of decimal places are specified in function 4.2.2. All measured values are displayed to this level of precision.

#### 5.2.3 End of scale value

The end of scale value is then set in function 4.2.3.

#### 5.2.4 Incoming pulses per unit

For sensors with pulse output, the increment per pulse is entered in function 4.2.4. The number of pulses must be entered to the last decimal place on the display.

Example:

You have set a measuring range of 10000 kg/h. This is to be displayed to one decimal place. The sensor supplies 10 pulses/kg. An increment per pulse of 1 pulse / 0.1 kg must therefore be entered.

### **5.2.5 Allowed error pulses**

For sensors with double pulse input, in function 4.2.5 is set the ratio from one error pulse to x pulses where the batch is stopped.

### **5.3 Linearisation of an input signal**

You can linearise an input of the Batching Master in the case of a non-linear sensor. The input to be linearised is selected in function 4.3. The linearisation takes place in the characteristic level described on page 36.

### **5.4 Pulse output, pulse rate or frequency**

You can select the pulse output between count pulses or frequency according to the flow rate.

#### **5.4.1 Pulse output, pulse rate**

It is possible to specify how many pulses are output per last displayed decimal place. The maximum frequency is 150 Hz.

#### **5.4.2 Pulse output, frequency**

It is possible to specify frequency from pulse output at maximum flow rate. The maximum frequency is 150 Hz.

### **5.5 Limit pre-selection value**

For limiting the pre-selected value for users you can specify the setting range.

#### **5.5.1 Minimum pre-selection value**

The minimum permissible pre-selection can be set in menu 4.5. This setting is required in particular for certified custody transfer instruments.

#### **5.5.2 Maximum pre-selection value**

The maximum permissible pre-selection can be set in function 4.6.

### **5.6 Entering the overrun quantity**

If the Batching Master shows a constant quantity less than actually delivered for every batch, an overrun quantity (the quantity not measured by the sensor) can be entered in function 4.7. To ensure the preselected quantity is batched, the cut-off stages start earlier by this amount. At the end of batching, the overrun quantity is added by the Batching Master and the actual quantity should then agree with the preselected quantity. The overrun quantity can not be set by units with flow conversion function.

## 5.7 Monitoring the minimum permissible flow

In menu 4.8 it is possible to program the values for the minimum flow rate monitoring. This important security function take care that a batch will be stopped at a too less flow rate. The reason could be a failure of the flow meter or a failure in the batch system. The failure message in case of this failure is “Err Min-Flow”

The minimum flow rate that must be present during batching is entered in function 4.8.1.

How long the flow rate may remain below the value set in function 4.8.1 after starting is specified in function 4.8.2. If the flow rate has not reached the minimum permissible value within this time, batching is interrupted and a fault message is output.

How long the flow rate may remain below the value set in function 4.8.1 during the batch is specified in function 4.8.3

### 5.7.1 Permissible under-batching quantity

In menu 4.8.4 it is possible to program maximal allowed under-batching quantity. If the batch will be stopped with “Err-Min Flow” and the batched quantity is very close to the pre-set value then the batch will be finished and not interrupted with the failure message.

## 5.8 Special function for filling and emptying the pipe system

A rinsing function is implemented in function 4.9. his can be ordered as an option and is enabled at the factory.

The following applications can be implemented with this rinsing function:

- Filling the batching line before batching
  1. for a fixed time
  2. until a liquid detector detects product after the flow sensor
- Closing a circulating line before the start of batching

The three digital outputs D1 to D3 are assigned to digital shut-off steps D1 to D3. A digital input is set to SF enable.

For all functions that need an enable signal, the enable is via a pulse. Whenever a filter time greater than 0 sec (Off) is entered in function 4.9.1, the enable input must always be activated. The signal must not be interrupted for longer than the specified time. If the enable signal is interrupted for longer than this, batching is stopped. Batching can be re-started.

If batching has not been started, rinsing can be initiated via the digital input assigned to the rinsing function. The current output supplies 20 mA for as long as the contact is operated. The digital shut-off points D1 to D3 do not switch.

The rinse function cannot be started during batching and batching cannot be started during rinsing.

### 5.8.1 Application 1

Once the Start signal has been given, the digital output assigned to digital shut-off step D3 is active. A text, which is stored from holding register 1209, is shown. The configuration is done by the serial interface.

After enabling via the SF enable digital input, digital shut-off steps D2 and D1 switch. The positioner output ramps up. Batching indication is active. The Batching Master meters the flow.

If digital shut-off step D3 has to drop out before D2 and D1 are activated, the delay must be set in function 4.9.4. Once enable is given, shut-off step 3 drops out. D2 and D1 switch after expiry of the time (4.9.4).

### 5.8.2 Application 2

Once the Start signal has been given, the digital output assigned to digital shut-off step D3 is active. A text is shown (holding register 1209).

After the time in function 4.9.2 "t to batch" has expired, D2 and D1 are also active. The positioner output ramps up. Batching indication is active. The Batching Master meters the flow.

### 5.8.3 Application 3

Once the Start signal has been given, the digital output set to digital shut-off step D3 is active. A text is shown (holding register 1209).

If the SF enable is issued via the digital input within the wait time set in function 4.9.3, D2 and D1 are also active. The positioner output ramps up. Batching indication is active. The Batching Master meters the flow. If enable is not issued within this time, D3 drops out. A error message appears (from holding register address 1151). This procedure can be started again with Start.

### 5.8.4 Application 4

A delay time is entered in function 4.9.4.

Once the Start signal has been given, the digital output set to digital shut-off step D3 is active.

After expiry of the time "t to batch" (Function 4.9.2, see Application 2) or after enabling via the SF enable digital input (see Application 2), D3 becomes inactive. D2 and D1 are active after the delay time set here. During this time the text from holding register 1217 is shown. The positioner output ramps up. Batching indication is active. The Batching Master meters the flow.

## 5.9 Suppressing the flow counting

When the input signal is to be evaluated is specified in function 4.10 'Metering'. The factory setting is for the input signal always to be evaluated.

With the rinsing function, it is logical to evaluate the input signal only during active batching (during DOS). The input signal is to be evaluated from start to end of the batch. The evaluation occurs further on even if temporary stopped.

There are also some applications in which it is desirable that the input signal is only evaluated during a started batch (during Start). The input signal is to be evaluated only if the batch is started. If temporary stopped, the input signal is not to be evaluated.

### **5.10 Printer settings**

In function 4.11.1, a print instruction can be sent to a higher-level system.

The delay before printing, because medium flow continued for a short time after stopped batch and must be evaluated, should be entered in function 4.11.2.

The stop conditions of a batch if no printer is connected or active are specified in function 4.11.3. If “no stop” is selected, batching can continue even though the printer is inactive. If “no restart” is set, a new batch can only be started if the printer is active.

### **5.11 Reset totaliser**

To reset the totaliser, set function 4.12 to reset.

### **5.12 Confirm end of batch**

Function 4.13 “conf. batch” specifies whether the end of a batch must be confirmed from a higher-level system.

The associated flag reg. no 18 is set after the end of batching. A new batch can only be started when this flag is reset by the higher level system.

In the case of certified custody transfer instruments, this function can only be changed by activating the programming enable switch.

### **5.13 Software function pipeline measuring**

The Batching Master could be used as Pipeline-Master. In this case no batch function is available.

The measuring variables from the mass flow meter are read out with the second serial interface from Batching Master and printed to the printer periodically or on request. The measuring and count values are indicated at the display. More information are available in a separate manual.

### **5.14 Additive dosing control**

For additive dosing controls a digital output controls a valve or a dosing pump. All settings are done in function 4.15.0.

In addition to the batch a defined pulse issued. The pulse length is set in function 4.15.1. The batch quantity, after that a pulse issued, is set in function 4.15.2.

## 6 Settings in the calibration and test level



This level can only be accessed with the programming switch in the case of certified custody transfer instruments. The seal must be broken to do this.

Please note that, in this level, all outputs may switch and up to 22 mA may flow from the current output. You must ensure that the switching of digital outputs or setting an output current poses no danger to personnel and plant .

### 6.1 Calibrating current inputs

To calibrate the current inputs, connect a current source to the current input that is to be calibrated.

The three current inputs are calibrated in functions 5.1.1 to 5.1.6.

Example: calibrating current input 2.

Connect a current source to current input 2 and apply 4 mA. In function 5.1.3, enter the programming level with [➤] (display flashes). Returning by pressing [◀] or [Set] saves the present current as the 0% value.

Now apply a current of 20 mA from the current source. Change to function 5.1.4 with [▲]. Enter the programming level with [➤] (display flashes) and exit this again immediately with [◀]. The 100% value is now saved. The other current inputs are programmed in the same way.

### 6.2 Calibrating current outputs

To calibrate the current outputs, connect an ammeter to the current output that is to be calibrated.

Enter function 5.1.7 and change to the programming level with the [➤] key. Set the current using the [▲▼] keys. When the 0% value of 4 mA is reached, exit the programming level using the [◀] key. Setting of the 100% value setting is performed in function 5.1.8.

### 6.3 Testing inputs and outputs

To enable the function of the batching Master to be checked quickly, a test level is included in functions 5.2.1 to 5.2.12. All the inputs and outputs of the Batching Master can be tested.

Function 5.2.1 tests the digital inputs. Each input is shown on the LCD when activated.

Function 5.2.2 tests the digital outputs. Use number keys 1 to 5 to switch the associated digital output and the LED in the front while the key is held down. Note that this can also take place on site and may consequently initiate undesired actions.

Function 5.2.3 and 5.2.4 can be used to display the present input frequency on the pulse inputs.

Function 5.2.5 checks the pulse inputs for sensor break.

Functions 5.2.6 to 5.2.8 enable the present output current on the three analogue outputs to be displayed.

Functions 5.2.9 to 5.2.11 cause a test current of 4, 12 or 20 mA respectively to be output by the current output. Note that this can also take place on site and may consequently initiate undesired actions.

Function 5.2.12 is used to read the keypad. Each key pressed is shown on the display. This level is exited with the [↵] key.

Function 5.2.13 carries out an LCD test.

## 7 Error correction of an input signal

To correct non-linear input signals, use the function “6.0 Linearisation”.

Assignment of the input for error correction is carried out in Function 4.3. Only one input can be linearised.

There are 25 nodes available at 5% intervals from -10% to +110%. The nodes in Functions 6.1 to 6.25 specifies the correction at this node.

Example:

A flow meter is connected to analogue input 1.

You have determined that, at an output current of 5.6 mA (corresponding to 10% from the maximum flow rate), the sensor does not have a flow rate of 10000 kg/h as expected but only 9000 kg/h. This is a error of -10%.

For error correction select analogue input 1 at function 4.3.

To correct this error, switch to Function 6.5 (node 10%) and change the value from 00,00% to -10% with the keys [#] (for -) and [0 to 9].

This change has the result that a current of 5.6 mA is evaluated as a value of 9000 kg/h (real flow rate) at the Batching Master. All nodes set to 00,00% are not corrected.

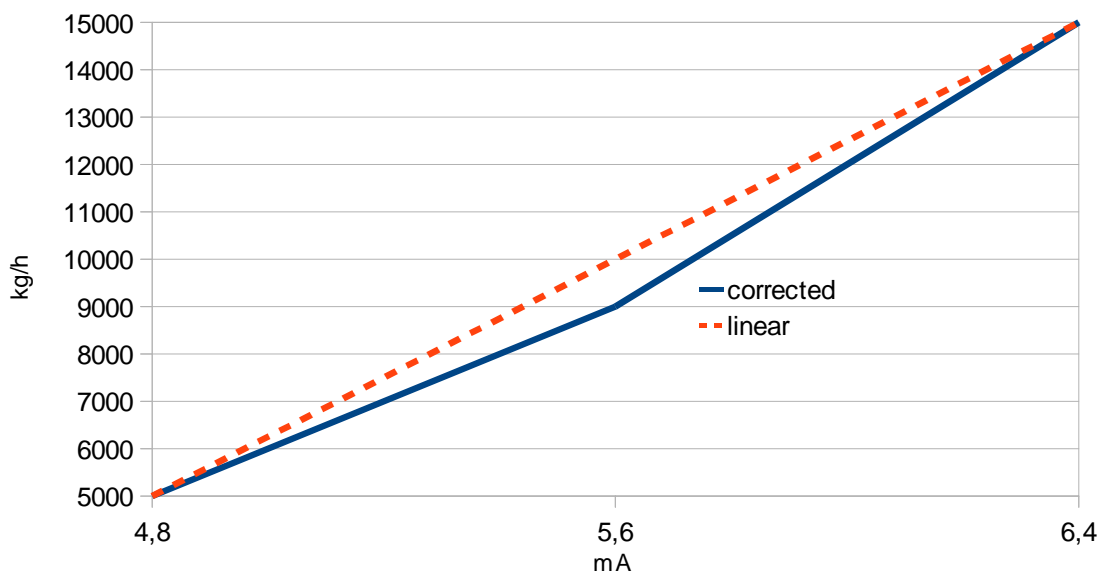


Figure 1: Detail of the corrected input signal

## 8 Flow conversion menu

The setting for the flow conversion functions have to be done in menu 7.0

Flow rate input can be the mass flow or volume flow. These input can be converted to standard volume based at standard temperature (mostly 15°C). It is also possible to convert from mass to volume or from volume to mass.

As pre-set value, batched quantity and actual flow rate at the display of the Batching Master always the under 7.1 selected batch dimensions will be used. The other flow values can be read out via the Modbus interface or can be printed out via a printer multiplexer PCC 300/400.

This conversions can be done with the temperature signal, the density signal and / or the pressure signal.

### 8.1 Possibilities for the flow conversion:

Flow input signal	Conversing to:	Conversion method:
volume	mass or standard volume	Method 1, linear
mass	volume or standard volume	Method 1, linear
volume	mass or standard volume	Method 2, API tables
mass	volume or standard volume	Method 2, API tables
volume	mass or standard volume	FAME DIN EN 14214
mass	volume or standard volume	FAME DIN EN 14214

The flow conversion is described in a separate document.

## 9 Factory menu

Various software options can be ordered. These options can be enabled in the factory menu. The code is not accessible to users. You can see which functions are available.

This software functions are only present if they was ordered as an option.

### 9.1 Specify fixed preselection values, setpoints or products

Three fixed preselection values, three setpoints for the flow controller, three setpoints for the override-controller or three products can be specified. The selection is done by using the digital inputs or the function keys F1 to F3.

### 9.2 Controller

In addition to metering the quantity, a controller can be activated.

This allows the flowrate to be held more constant (flow controller).

It is also possible to monitor the pressure or temperature and control the batching appropriately (limiting controller).

Both controller could be active simultaneously.

The controller setpoint can also be specified externally (4 - 20 mA).

### 9.3 Purge function and other special functions

This function has been added so the pipework can be purged.

To make the function more flexible, several times have been added that can be used to specify how the digital outputs are to be switched.

One digital input can be used as an enable input.

You will find a complete description in Paragraph 8.8 et sqq..

### 9.4 Custody transfer approved instrument

If the Batching Master is specified with certification for custody transfer, all the parameters that contain certification data can only be accessed by switching on the programming enable. The seal must be broken to do this.

### 9.5 Terminal mode

You can switch the batching master to terminal mode by the interface. The terminal mode is only usable by stopped batching.

Via interface you can write to the LC-Display and poll the keys. A communication to a priority systems can be build in this way.

The function is described in Paragraph 12.1.

## **9.6 Device number**

Every Batching Master has a unique device number that is set at the factory and cannot be changed by the customer.

By pressing the menu key, the device number and the software version is shown for approximately one second.

## **9.7 Flow conversion with temperature and density**

The measuring value could be corrected with the current inputs with temperature and / or density signals. Additionally a pressure correction is possible.

With this function it is possible to make a flow conversion to mass flow, volume flow or standard volume flow.

Corrections can be done based on the API tables, by a linear formula or with a special linear formula for biodiesel.

The parametrization occurs in level 7.0.

## **9.8 Continuous pipeline measuring**

In this application the Batching Master receive the data process signals and counter values from a connected flow meter. These information are shown in the Batching Master. The printer multiplexer PCC 300B prints these data out in a programmed time circle. These data are also shown at the Modbus interface for the transfer to a supervisory system.

## 10 Overview parameter settings

<b>Fct.</b>	<b>description</b>	<b>setting range</b>	<b>set value</b>	<b>P.</b>
1.0	parameter main menu			11
1.1.0	sub menu digital shutoff			11
1.1.1	digital shutoff 1	unit: as measuring range 4.2.1, decimal point 4.2.2 setting range: 0 to 9999999 factory setting: 0		11
1.1.2	digital shutoff 2	unit: as measuring range 4.2.1, decimal point 4.2.2 setting range: 0 to 9999999 factory setting: 0		11
1.1.3	digital shutoff 3	unit: as measuring range 4.2.1, decimal point 4.2.2 setting range: 0 to 9999999 factory setting: 0		11
1.2.0	sub menu analogue shutoff			12
1.2.1	shutoff	setting range: current flow factory setting: current		12
1.2.2.	analogue shutoff1	unit: as measuring range 4.2.1, decimal point 4.2.2 setting range: 0 to 9999999 factory setting: 50		12
1.2.3	analogue out 1	unit: mA setting range: 4.00 - 20,00 mA factory setting: 11 mA or: 0 to 9999999 unit as measuring range 4.2.1, decimal point 4.2.2 factory setting: 5000		12
1.2.4	analogue shutoff 2	see 1.2.1 factory setting: 40		12
1.2.5	analogue out 2	see 1.2.2 factory setting: 10 mA or 4000		12
1.2.6	analogue shutoff 3	see 1.2.1 factory setting: 30		12
1.2.7	analogue out 3	see 1.2.2 factory setting: 9 mA or 3000		12
1.2.8	analogue shutoff 4	see 1.2.1 factory setting: 20		12

Overview parameter settings

<b>Fct.</b>	<b>description</b>	<b>setting range</b>	<b>set value</b>	<b>P.</b>
1.2.9	analogue out 4	see 1.2.2 factory setting: 8 mA or 2000		12
1.2.10	analogue shutoff 5	see 1.2.1 factory setting: 10		12
1.2.11	analogue out 5	see 1.2.2 factory setting: 7 mA or 1000		12
1.3	Start up ramp	unit: s setting range: 0 to 9999 factory setting: 0		13
1.4	Shut down ramp	unit: s setting range: 0 to 9999 factory setting: 0		13
1.5	Flow alarm	unit: as measuring range 4.2.1, decimal point 4.2.2 setting range: 0 to 9999999, (0 shown as OFF) factory setting: OFF		13
1.6.0	sub menu batch indication			14
1.6.1	batch-indication	unit: no setting range: on, pulses, (after ending batch a pulse about 2s is set) factory setting: ON		14
1.6.2	pulse length	unit: s setting range: 0 to 99.9s factory setting: 2s		14
1.7.0	sub menu overflow quantity			14
1.7.1	Overflow quantity	unit: as measuring range 4.2.1, decimal point 4.2.2 setting range: 0 to 9999999 factory setting: 9999999		14
1.7.2	time overflow quantity	only displayed if 1.7.1 < 9999999 unit: s setting range: 0 to 9999, (0 displayed as continual) factory setting: continual		14
1.8.0	sub menu sensor break / measuring range overflow			14

## Overview parameter settings

<b>Fct.</b>	<b>description</b>	<b>setting range</b>	<b>set value</b>	<b>P.</b>
1.8.1	sensor break / short circuit namur contact 1	unit: no setting range: sensor break OFF, sensor break ON factory setting: sensor break OFF		14
1.8.2	sensor break / short circuit namur contact 2	unit: no setting range: sensor break OFF, sensor break ON factory setting: sensor break OFF		14
1.8.3	sensor break current input 1	unit: no setting range: sensor break OFF, sensor break ON factory setting: sensor break OFF		14
1.8.4	sensor break current input 2	unit: no setting range: sensor break OFF, sensor break ON factory setting: sensor break OFF		14
1.8.5	sensor break current input 3	unit: no setting range: sensor break OFF, sensor break ON factory setting: sensor break OFF		14
1.8.6	measuring range overflow current input 1	unit: no setting range: sensor break OFF, sensor break ON factory setting: sensor break OFF		14
1.8.7	measuring range overflow current input 2	unit: no setting range: sensor break OFF, sensor break ON factory setting: sensor break OFF		14
1.8.8	measuring range overflow current input 3	unit: no setting range: sensor break OFF, sensor break ON factory setting: sensor break OFF		14

Overview parameter settings

<b>Fct.</b>	<b>description</b>	<b>setting range</b>	<b>set value</b>	<b>P.</b>
1.9.0	sub menu fixed preselection	(not for controller setpoints see controller settings)		15
1.9.1	fixed preselection 1	unit: as measuring range 4.2.1, decimal point 4.2.2 setting range: 0 to 9999999 factory setting: 0		15
1.9.2	fixed preselection 2	unit: as measuring range 4.2.1, decimal point 4.2.2 setting range: 0 to 9999999 factory setting: 0		15
1.9.3	fixed preselection 3	unit: as measuring range 4.2.1, decimal point 4.2.2 setting range: 0 to 9999999 factory setting: 0		15
1.10.0	Selfoptimising overrun quantity			15
1.10.1	Final value for correction	unit: % setting range: 0 to 100% factory setting: 0%		15
1.10.2	maximum deviation	unit: as measuring range 4.2.1, decimal point 4.2.2 setting range: 0 to 9999 factory setting: 9999		15
1.10.3	flow correction	unit: as measuring range 4.2.1, decimal point 4.2.2 setting range: 0 to 9999 factory setting: 0 (OFF)		15
1.11	checksum part custody transfer			16
1.12	checksum part parameter settings			16
1.13	Software version custody transfer			16

## 11 Overview structure level

<i>Fct.</i>	<i>description</i>	<i>setting range</i>	<i>set value</i>	<i>P.</i>
2.0	structure main menu			17
2.1	Select language	unit: no setting range: Deutsch, English, Französisch, Spanisch, Italienisch factory setting: Deutsch		17
2.2.0	sub menu settings digital inputs			17
2.2.1	function digital input 1	setting range: no function, SET, START, SET-START, STOP, RESET, external failure, totaliser reset, release 1, release 2, interface on, Keypad enable, purge, controller off, Valve open, valve closed, special function release, factory setting: no function n/a at two step valve		17
2.2.2	direction of action digital input 1	setting range: normally open, normally closed factory setting: normally open		17
2.2.3	type of action digital input 1	setting range: level, flank factory setting: level		17
2.2.4	function digital input 2	setting range: no function, SET, START, SET-START, STOP, RESET, external failure, totaliser reset, release 1, release 2, interface on, Keypad enable, purge, controller off, Valve open, valve closed, special function release, factory setting: no function n/a at two step valve		17
2.2.5	direction of action digital input 2	setting range: normally open, normally closed factory setting: normally open		17
2.2.6	type of action digital input 2	setting range: level, flank factory setting: level		17
2.2.7	function digital input 3	setting range: no function, SET, START, SET-START, STOP, RESET, external failure, totaliser reset, release 1, release 2, interface on, Keypad enable, purge,		17

<b>Fct.</b>	<b>description</b>	<b>setting range</b>	<b>set value</b>	<b>P.</b>
		controller off, Valve open, valve closed, special function release, fixed selection switch 2 factory setting: no function		
2.2.8	direction of action digital input 3	setting range: normally open, normally closed factory setting: normally open		17
2.2.9	type of action digital input 3	setting range: level, flank factory setting: level		17
2.2.10	function digital input 4	setting range: no function, SET, START, SET-START, STOP, RESET, external failure, totaliser reset, release 1, release 2, interface on, Keypad enable, purge, controller off, Valve open, valve closed, special function release, fixed selection switch 1 factory setting: no function		17
2.2.11	direction of action digital input 4	setting range: normally open, normally closed factory setting: normally open		17
2.2.12	type of action digital input 4	setting range: level, flank factory setting: level		17
2.2.13	function digital input 5	setting range: no function, SET, START, SET-START, STOP, RESET, external failure, totaliser reset, release 1, release 2, interface on, Keypad enable, purge, controller off, Valve open, valve closed, special function release factory setting: no function		17
2.2.14	direction of action digital input 5	setting range: normally open, normally closed factory setting: normally open		17
2.2.15	type of action digital input 5	setting range: level, flank factory setting: level		17
2.3.0	sub menu settings digital outputs			19
2.3.1	function digital output 1	setting range: no function, shut off 1, shut off 2, shut off 3, pulse output, batch indication, flow alarm, error message, shut off 1 reverse, purge, additive batching factory setting: shut off 1		19

Overview structure level

<b>Fct.</b>	<b>description</b>	<b>setting range</b>	<b>set value</b>	<b>P.</b>
2.3.2	direction of action digital output 1	setting range: normally open, normally closed factory setting: normally open		19
2.3.3	function digital output 2	setting range: no function, shut off 1, shut off 2, shut off 3, pulse output, batch indication, flow alarm, error message, shut off 1 reverse, purge, additive batching factory setting: shut off 2		19
2.3.4	direction of action digital output 2	setting range: normally open, normally closed factory setting: normally open		19
2.3.5	function digital output 3	setting range: no function, shut off 1, shut off 2, shut off 3, pulse output, batch indication, flow alarm, error message, shut off 1 reverse, purge, additive batching factory setting: shut off 3		19
2.3.6	direction of action digital output 3	setting range: normally open, normally closed factory setting: normally open		19
2.3.7	function digital output 4	setting range: no function, shut off 1, shut off 2, shut off 3, pulse output, batch indication, flow alarm, error message, shut off 1 reverse, purge, additive batching factory setting: batch indication		19
2.3.8	direction of action digital output 4	setting range: normally open, normally closed factory setting: normally open		19
2.3.9	function digital output 5	setting range: no function, shut off 1, shut off 2, shut off 3, pulse output, batch indication, flow alarm, error message, shut off 1 reverse, purge, additive batching factory setting: error message		19
2.3.10	direction of action digital output 5	setting range: normally open, normally closed factory setting: normally open		19
2.4.0	sub menu interface settings			21

<b>Fct.</b>	<b>description</b>	<b>setting range</b>	<b>set value</b>	<b>P.</b>
2.4.1	function	setting range: read / write, read only factory setting: read / write		21
2.4.2	Protocol 1	setting range: MODBUS RTU, MODBUS ASCII DIN66348 factory setting: RTU		21
2.4.3	Address 1	setting range: 1 to 255 factory setting: 1		21
2.4.4	Baud rate 1	setting range: 2400, 4800, 9600, 19200, 38400, 76800, 115200 factory setting: 9600		21
2.4.5	Function 2	setting range: Master. Slave factory setting: Slave		21
2.4.6	Protocol 2	setting range: MODBUS RTU, MODBUS ASCII DIN 66348 factory setting: RTU		21
2.4.7	Address 2	setting range: 1 to 255 factory setting: 1		22
2.4.8	Baudrate 2	setting range: 2400, 4800, 9600, 19200 38400, 76800, 115200 factory setting: 9600		22
2.5.0	sub menu code input			22
2.5.1	Code parameter menu	setting range: 0 to 9999999 factory setting: 0		22
2.5.2	Code structure menu	setting range: 0 to 9999999 factory setting: 0		22
2.5.3	Code controller menu	setting range: 0 to 9999999 factory setting: 0		22
2.5.4	Code setpoint setting controller	setting range: 0 to 9999999 factory setting: 0		22
2.5.5	Code install menu	setting range: 0 to 9999999 factory setting: 0		22
2.5.6	Code calibration and test menu	setting range: 0 to 9999999 factory setting: 0		22
2.5.7	Code linearisation	setting range: 0 to 9999999 factory setting: 0		22
2.6.0	sub menu key operation disable / enable			22

## Overview structure level

<b>Fct.</b>	<b>description</b>	<b>setting range</b>	<b>set value</b>	<b>P.</b>
2.6.1	key operation disable / enable	setting range: enable, locked factory setting: enable		22
2.6.2	key operation RESET enable	setting range: RESET enable, RESET disable factory setting: disable		22
2.6.3	key operation SET enable	setting range: SET enable, SET disable factory setting: disable		22
2.6.4	key operation START enable	setting range: START enable, START disable factory setting: disable		22
2.6.5	key operation STOP enable	setting range: STOP enable, STOP disable factory setting: disable		22
2.6.6	key operation function keys enable	setting range: F1-F3 enable, F1-F3 disable factory setting: disable		22
2.6.7	key operation numeric keys enable	setting range: 0 .. 9 enable, 0 .. 9 disable factory setting: 0 .. 9 disable		22
2.7	sub menu function keys	setting range: no function, LED digital shut off fixed pre-selection, F1 Purge, product selection factory setting: no function		22
2.8	Texts			24
2.8.1	Release 1			24
2.8.2	Release 2			24
2.8.3	Station			24
2.8.4	Product selection			24
2.8.5	Product 1			24
2.8.6	Product 2			24
2.8.7	Product 3			24
2.8.8	Wait for release			24
2.8.9	Delay			24
2.9	Valve control	Setting range: analogue two step valve factory setting: analogue		24
2.10	Indication flow conversion			25

<b>Fct.</b>	<b>description</b>	<b>setting range</b>	<b>set value</b>	<b>P.</b>
2.10.1	Batched mass	setting range: ON, OFF factory setting: OFF		25
2.10.2	Batched volume	setting range: ON, OFF factory setting: OFF		25
2.10.3	Batched standard-volume	setting range: ON, OFF factory setting: OFF		25
2.10.4	mass flow	setting range: ON, OFF factory setting: OFF		25
2.10.5	volume flow	setting range: ON, OFF factory setting: OFF		25
2.10.6	standard-volume flow	setting range: ON, OFF factory setting: OFF		25
2.10.7	actual temperature	setting range: ON, OFF factory setting: OFF		25
2.10.8	actual pressure	setting range: ON, OFF factory setting: OFF		25
2.10.9	actual density	setting range: ON, OFF factory setting: OFF		25
2.10.10	average temperature	setting range: ON, OFF factory setting: OFF		25
2.10.11	average density	setting range: ON, OFF factory setting: OFF		25
2.10.12	calculated density	setting range: ON, OFF factory setting: OFF		25
2.10.13	mass totaliser	setting range: ON, OFF factory setting: OFF		25
2.10.14	volume totaliser	setting range: ON, OFF factory setting: OFF		25
2.10.15	standard volume totaliser	setting range: ON, OFF factory setting: OFF		25
2.11.0	Position feedback from the valve			25
2.11.1	Time at start	setting range: 0 (OFF) to 9999 s		25
2.11.2	Time at end	setting range: 0 (OFF) to 9999 s		25

## 12 Overview controller settings

<i>Fct.</i>	<i>description</i>	<i>setting range</i>	<i>set value</i>	<i>P.</i>
3.0	Controller main menu			26
3.1.0	Flow controller			26
3.1.1	Controller type	Setting range: no function flow controller tracking flow controller Factory setting: No function		26
3.1.2	Proportional coefficient Kp	Setting range: -100.0 to 100.0 Unit: none Decimal point: 0,0 Factory setting: 1.0		27
3.1.3	P controller operating point OP	Setting range: -10% to 110% Unit: none Decimal point: 0.0 Factory setting: 0		27
3.1.4	Derivative action gain Kd or Vv	Setting range: 1.00 to 10.00 Unit: none Decimal point: 0,00 Factory setting: 1.00		27
3.1.5	Integral action time	Setting range: 1 to 4999 Unit: s Decimal point: 0 Factory setting: 5000 corresponding to off		27
3.1.6	Derivative action time Tv	Setting range: 0 to 1000 Unit: s Decimal point: 0 Factory setting: 0		27
3.1.7	Setpoint start SPS	Setting range: -9999 to 9999999 Unit: from 3.2.1 or 4.2.0 Decimal point: see above Factory setting: 0		27
3.1.8	Setpoint end SPE	Setting range: -9999 to 9999999 Unit: from 3.2.1 or 4.2.0 Decimal point: see above Factory setting: 100%		27
3.1.9	Setpoint adjustment	Setting range: fixed, variable Factory setting: fixed		27
3.1.10	Setpoint SP	Actual Setpoint		27
3.1.11	Setpoint SP1	Setpoint 1		27
3.1.12	Setpoint SP2	Setpoint 2		27

<b>Fct.</b>	<b>description</b>	<b>setting range</b>	<b>set value</b>	<b>P.</b>
3.1.13	Setpoint SP3	Setpoint 3		27
3.1.14	ramp difference	setting range: 0 to 100 % factory setting: 0 %		28
3.1.15	Valve set time	setting range: 0 to 500s factory setting: 0s		28
3.1.16	minimal pulse time	setting range: 0 to 500s factory setting: 0s		28
3.2.0	Limiting controller			26
3.2.1	Controller type	Setting range: no function limiting controller tracking limiting controller Factory setting: No function		26
3.2.2	Physical unit controller	Setting range: no physical unit, %, °C, bar, pH Factory setting: %		26
3.2.3	Decimal point (not applicable for flow controllers)	Setting range: 0000 000.0 00.00 0.000 Factory setting: 0000		26
3.2.4	Start of scale	Setting range: -9999 to 9999 Unit from 3.2.1 Decimal point from 3.2.2 Factory setting: 0%		26
3.2.5	End of scale	Setting range: -9999 to 9999 Unit from 3.2.1 Decimal point from 3.2.2 Factory setting: 100%		26
3.2.6	Proportional coefficient Kp	Setting range: -100.0 to 100.0 Unit: none Decimal point: 0,0 Factory setting: 1.0		27
3.2.7	P controller operating point OP	Setting range: -10% to 110% Unit: none Decimal point: 0.0 Factory setting: 0		27
3.2.8	Derivative action gain Kd or VV	Setting range: 1.00 to 10.00 Unit: none Decimal point: 0.00 Factory setting: 1.00		27
3.2.9	Integral action time	Setting range: 1 to 4999 Unit: s Decimal point: 0 Factory setting: 5000 corresponding to off		27

## Overview controller settings

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<b><i>Fct.</i></b>	<b><i>description</i></b>	<b><i>setting range</i></b>	<b><i>set value</i></b>	<b><i>P.</i></b>
3.2.10	Derivative action time Tv	Setting range: 0 to 1000 Unit: s Decimal point: 0 Factory setting: 0		27
3.2.11	Setpoint start SPS	Setting range: -9999 to 9999999 Unit: from 3.2.1 or 4.2.0 Decimal point: see above Factory setting: 0		27
3.2.12	Setpoint end SPE	Setting range: -9999 to 9999999 Unit: from 3.2.1 or 4.2.0 Decimal point: see above Factory setting: 100%		27
3.2.13	Setpoint adjustment	Setting range: fixed, variable Factory setting: fixed		27
3.2.14	Setpoint SP	Actual Setpoint		27
3.2.15	Setpoint SP1	Setpoint 1		27
3.2.16	Setpoint SP2	Setpoint 2		27
3.2.17	Setpoint SP3	Setpoint 3		27

## 13 Overview install settings

<i>Fct.</i>	<i>description</i>	<i>setting range</i>	<i>set value</i>	<i>P.</i>
4.0	main menu install			29
4.1	Sub menu Selection of Measuring inputs			29
4.1.1	Flow	setting range: factory setting:	4 – 20mA input 1 pulse input 1, double pulse Modbus interface pulse input 1	29
4.1.2	Temperature	setting range: factory setting:	No input 4 – 20mA input 1 4 – 20mA input 2 4 – 20mA input 3 Modbus interface No input	29
4.1.3	Density	setting range: factory setting:	No input 4 – 20mA input 1 4 – 20mA input 2 4 – 20mA input 3 Modbus interface Pulse input 2 No input	29
4.1.4	Preassure	setting range: factory setting:	No input 4 – 20mA input 1 4 – 20mA input 2 4 – 20mA input 3 Modbus interface No input	29
4.2.0	sub menu measuring range			29
4.2.1	flow unit	setting range: factory setting:	kg, g, mg, l, ml, t, m <sup>3</sup> , no unit kg/h	29
4.2.2	decimal point	setting range: factory setting:	0000 000.0 00.00 0.000 0000	29
4.2.3	end of scale value	setting range: unit: factory setting:	1 to 9999999 from 4.2.1 100000	29
4.2.4	increment per pulse	setting range: factory setting:	1 to 9999,999 10,000	29

## Overview install settings

<b>Fct.</b>	<b>description</b>	<b>setting range</b>	<b>set value</b>	<b>P.</b>
		The setting range is for the last digit		
4.2.5	error pulse / x pulses	setting range: factory setting:	1 to 9999999 1	30
4.3	select input to linearisation	setting range:  factory setting:	pulse input current input 1 current input 2 current input 3 OFF (no input) OFF	30
4.4	sup menu pulse ration or frequency of pulse output			30
4.4.1	count pulses or frequency	setting range: factory setting:	count pulse, frequency count pulse	30
4.4.2	increment per pulse of pulse output	setting range: factory setting:	1, 10, 100, 1000 1	30
4.4.3	frequency at maximum flow	setting range: factory setting:	1.00 to 100.00Hz 100 Hz	30
4.5	minimum preselection	setting range: factory setting:	1 to 9999999 1	30
4.6	maximum preselection	setting range: factory setting:	1 to 9999999 9999999	30
4.7	overrun quantity	setting range: factory setting:	0 to 9999999 AUS (0)	30
4.8.0	sub menu monitoring the flow			31
4.8.1	minimum permissible flow	setting range: factory setting:	0 to 9999999 0	31
4.8.2	maximum time for minimum flow after start	setting range: unit: factory setting:	0 to 9999999 s 0 = OFF.	31
4.8.3	maximum time for minimum flow during the batch	setting range: unit: factory setting:	0 to 9999999 s 0 = OFF.	31
4.8.4	allowed under batching quantity	setting range:  factory setting:	0 to 9999999 The unit and the decimal point are shown 0 = OFF.	31
4.9.0	sub menu special function purge			31

<b>Fct.</b>	<b>description</b>	<b>setting range</b>	<b>set value</b>	<b>P.</b>
4.9.1	Filter time for enabling contact	setting range: 0,0 to 999,9 unit: s factory setting: 0,0 = OFF.		31
4.9.2	waiting time before batching	setting range: 0,0 to 999,9 unit: s factory setting: 0,0 = OFF		31
4.9.3	waiting time within the enabling contact must switch	setting range: 0,0 to 999,9 unit: s factory setting: 0,0 = OFF, see description of function 4.9.0		31
4.9.4	delay after enable contact for batching	setting range: 0 to 99.9 unit: s factory setting: 0 = OFF		31
4.10	suppressing the flow metering	setting range: continual at batch at start factory setting: continual		32
4.11.0	sub menu printer settings			33
4.11.1	printout	setting range: yes, no factory setting: no		33
4.11.2	printout delay	setting range: 0 to 999 unit: s factory setting: 0		33
4.11.3	stop conditions at printer error	setting range: no stop no new start factory setting: no stop		33
4.12	reset totaliser	setting range: do not delete, delete factory setting: delete		33
4.13	confirm end of batch	setting range: no, yes factory setting: no		33
4.14.0	sub menu pipeline measuring			33
4.14.1	Function	setting range: Batch controller, Conti-Pipeline factory setting: Batch controller		33
4.14.2	Counter 1	setting range: active, not active factory setting: not active		33
4.14.3	Counter 2	setting range: active, not active factory setting: not active		33
4.14.4	Counter 3	setting range: active, not active factory setting: not active		33
4.14.5	Mass-flow	setting range: active, not active factory setting: not active		33

## Overview install settings

<b>Fct.</b>	<b>description</b>	<b>setting range</b>		<b>set value</b>	<b>P.</b>
4.14.6	Vol-flow	setting range: factory setting:	active, not active not active		33
4.14.7	St.Vol-flow	setting range: factory setting:	active, not active not active		33
4.14.8	Temperat.	setting range: factory setting:	active, not active not active		33
4.14.9	Density	setting range: factory setting:	active, not active not active		33
4.14.10	St.Dens.	setting range: factory setting:	active, not active not active		33
4.14.11	Pressure	setting range: factory setting:	active, not active not active		33
4.14.12	Printout	setting range:          factory setting:	every hour every 2 hours every 4 hours every 8 hours every 12 hours at 0 a.m. at 0 p.m. 1 x every week 1 x every month only digital inp. only keyboard every hour		33
4.15.0	Additive Batching				33
4.15.1	T-Pulse (pulse time)	setting range: factory setting:	0,0 s to 99,9 s 0,0 s		33
4.15.2	Batched Quantity	setting range: factory setting:	0 to 9999999 x 0		33

## 14 Overview calibration and test settings

<i>Fct.</i>	<i>description</i>	<i>setting range</i>	<i>set value</i>	<i>P.</i>
5.0	main menu calibr. / test	Main menu calibration / test After pressing $\blacktriangleright$ for entering this menu, there is displayed a warning about 2 seconds in the display. After this you can enter with $\blacktriangleright$ the next level. For custody transfer units, changes are only possible with the custody transfer switch.		34
5.1.0	sub menu calibration current inputs and outputs	Sub menu calibration current inputs and output		34
5.1.1	calibration current input 1 4 mA	Connect 4 mA to current input 1. Enter the programming level by pressing $\blacktriangleright$ . The display flashed. To confirm the current press $\blacktriangleleft$ or [Set]. To calibrate the next selection press $\blacktriangleup$ or $\blacktriangledown$ .		34
5.1.2	calibration current input 1 20 mA	Connect 20 mA to current input 1. Enter the programming level by pressing $\blacktriangleright$ . The display flashed. To confirm the current press $\blacktriangleleft$ or [Set]. To calibrate the next selection press $\blacktriangleup$ or $\blacktriangledown$ .		34
5.1.3	calibration current input 2 4 mA	Connect 4 mA to current input 2. Enter the programming level by pressing $\blacktriangleright$ . The display flashed. To confirm the current press $\blacktriangleleft$ or [Set]. To calibrate the next selection press $\blacktriangleup$ or $\blacktriangledown$ .		34
5.1.4	calibration current input 2 20 mA	Connect 20 mA to current input 2. Enter the programming level by pressing $\blacktriangleright$ . The display flashed. To confirm the current press $\blacktriangleleft$ or [Set]. To calibrate the next selection press $\blacktriangleup$ or $\blacktriangledown$ .		34
5.1.5	calibration current input 3 4 mA	Connect 4 mA to current input 3. Enter the programming level by pressing $\blacktriangleright$ . The display flashed. To confirm the current press $\blacktriangleleft$ or [Set]. To calibrate the next selection press $\blacktriangleup$ or $\blacktriangledown$ .		34
5.1.6	Calibration current input 3 20 mA	Connect 20 mA to current input 3. Enter the programming level by pressing $\blacktriangleright$ . The display flashed. To confirm the current press $\blacktriangleleft$ or [Set]. To calibrate the next selection press $\blacktriangleup$ or $\blacktriangledown$ .		34
5.1.7	calibration current output 4 mA	A multimeter is connect to the analog output. Enter the programming level by pressing $\blacktriangleright$ . The display flashed. Set the current with $\blacktriangleup$ / $\blacktriangledown$ to 4 mA. To confirm the current press $\blacktriangleleft$ or [Set]. To calibrate the next selection press $\blacktriangleup$ or $\blacktriangledown$ .		34

## Overview calibration and test settings

<b>Fct.</b>	<b>description</b>	<b>setting range</b>	<b>set value</b>	<b>P.</b>
5.1.8	calibration current output 20 mA	A multimeter is connect to the anlog output. Enter the programming level by pressing $\blacktriangleright$ . The display flashed. Set the current with $\blacktriangle\blacktriangledown$ to 20 mA. To confirm the current press $\blacktriangleleft$ or [Set]. To choose the next selection press $\blacktriangle$ or $\blacktriangledown$ .		34
5.2.0	sub menu test	sub menu 5.2.0 test		34
5.2.1	digital inputs	Every digital input is shown in the upper display as value.		34
5.2.2	digital outputs	By pressing the keys 1 to 5 the digital outputs 1 to 5 switches and the LED's are illuminated.		34
5.2.3	pulse input 1	The actual input frequency at pulse input 1 is shown.		34
5.2.4	Pulse input 2	The actual input frequency at pulse input 1 is shown.		34
5.2.5	Sensor break	A sensor break at pulse input 1 or 2 is shown.		34
5.2.6	current input 1	The actual current at analogue input 1 is shown.		34
5.2.7	current input 2	The actual current at analogue input 2 is shown.		34
5.2.8	current input 3	The actual current at analogue input 3 is shown.		34
5.2.9	current 4 mA	There are 4 mA at the current output.		34
5.2.10	current 12 mA	There are 12 mA at the current output.		34
5.2.11	current 20 mA	There are 20 mA at the current output.		34
5.2.12	keyboard test	To enter the test level press $\blacktriangleright$ . Every pressed key is shown in the display. To quit this level press $\blacktriangleleft$ . Select the next level by pressing $\blacktriangle$ or $\blacktriangledown$ .		34
5.2.12	LCD test	To enter the test level press $\blacktriangleright$ . To quit this level press $\blacktriangleleft$ .		34

## 15 Overview linearisation

<i>Fct.</i>	<i>description</i>	<i>setting range</i>	<i>set value</i>	<i>P.</i>
6.0	main menu linearisation			36
6.1	support point -10%	setting range: -99,99% to +99,99% factory setting: 00,00%		36
6.2	support point -5%	as 6.1		36
6.3	support point 0%	as 6.1		36
6.4	support point 5%	as 6.1		36
6.5	support point 10%	as 6.1		36
6.6	support point 15%	as 6.1		36
6.7	support point 20%	as 6.1		36
6.8	support point 25%	as 6.1		36
6.9	support point 30%	as 6.1		36
6.10	support point 35%	as 6.1		36
6.11	support point 40%	as 6.1		36
6.12	support point 45%	as 6.1		36
6.13	support point 50%	as 6.1		36
6.14	support point 55%	as 6.1		36
6.15	support point 60%	as 6.1		36
6.16	support point 65%	as 6.1		36
6.17	support point 70%	as 6.1		36
6.18	support point 75%	as 6.1		36
6.19	support point 80%	as 6.1		36
6.20	support point 85%	as 6.1		36
6.21	support point 90%	as 6.1		36
6.22	support point 95%	as 6.1		36
6.23	support point 100%	as 6.1		36
6.24	support point 105%	as 6.1		36
6.25	support point 110%	as 6.1		36

## 16 Overview Flow Conversion

<i>Fct.</i>	<i>description</i>	<i>setting range</i>	<i>set value</i>	<i>P.</i>
7.0	main menu Flow Conversion			37
7.1.0	Batch Dimension			
7.1.1	Batch Dimension	setting range: Mass, Volume, Standard Volume, manual selection factory setting: Mass		
7.1.2	Deactivated dimension	setting range: Mass, Volume, Standard Volume, No factory setting: No		
7.1.3	Totaliser dimension	setting range: Mass, Volume, Standard Volume, No factory setting: Mass		
7.2.0	Sub menu Temperature			
7.2.1	Calculation	setting range: Linear Correction API Correction DIN EN 14214 factory setting: Linear Correction		
7.2.2	Temp. 0 % (Start value temperature input signal)	setting range: -200,0 °C – 600,0 °C factory setting: 0,0 °C		
7.2.3	Temp. 100 % (End value temperature input signal)	setting range: -200,0 °C – 600,0 °C factory setting: 100,0 °C		
7.2.4	Aver. Corr. (Average correction)	setting range: 0,000 – 2,000 factory setting: 0,723		
7.2.5	Sensor break	setting range: no new start start with fixed value start value input		
7.2.6	Error value	setting range: -200,0 °C – 600,0 °C factory setting: 0,0 °C		
7.3	Sub menu Density			

<b>Fct.</b>	<b>description</b>	<b>setting range</b>	<b>set value</b>	<b>P.</b>
7.3.1	Calculation	setting range: from analogue input calculate dens. Fix Value factory setting:from analogue input		
7.3.2	Density 0 %	setting range: 0,00 – 2000,00 kg/m <sup>3</sup> factory setting: 1000,00 kg/m <sup>3</sup>		
7.3.3	Density 100 %	setting range: 0,00 – 2000,00 kg/m <sup>3</sup> factory setting: 1000,00 kg/m <sup>3</sup>		
7.3.4	Std.Dens.	setting range: 0,00 – 2000,00 kg/m <sup>3</sup> factory setting: 1000,00 kg/m <sup>3</sup>		
7.3.5	Std. Temp.	setting range: 0,0 °C – 100,0 °C factory setting: 15 °C		
7.3.6	$\alpha_0$	0.00000 * 10 <sup>-3</sup> /K If $\alpha_0 = 0$ then calculation with $K_0, K_1, K_2$		
7.3.7	$K_0$	0000,0000		
7.3.8	$K_1$	0,0000		
7.3.9	$K_2$	-0,00000000		
7.3.10	Fix density	Setting range: 0,00 – 2000,00 kg/m <sup>3</sup> factory setting: 1000,00		
7.3.11	Sensor break	setting range: no new start start with fixed value start value input		
7.3.12	Error value	setting range: 0,00 – 2000,00 kg/m <sup>3</sup> factory setting: 1000,00 kg/m <sup>3</sup>		
7.4	Sub menu Pressure	(Only for indication, not used for the flow conversion)		
7.4.1	Calculation	Setting range: OFF, man. compensation, method 1 linear, method 2 API, method 2 API spezial factory setting: OFF		
7.4.2	Press. 0%	Setting range: -1,00 to + 100,00 bar factory setting: 0,00 bar		
7.4.3	Press. 100%	Setting range: -1,00 to + 100,00 bar factory setting: 100,00 bar		
7.4.4	Cplm man.	Setting range: 0,000001 to 2,000000 factory setting: 1,000000		
7.4.5	Compress. b	Setting range: 0,000001 to 2,000000 factory setting: 1,000000		

## Overview Flow Conversion

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<b><i>Fct.</i></b>	<b><i>description</i></b>	<b><i>setting range</i></b>	<b><i>set value</i></b>	<b><i>P.</i></b>
7.4.6	Base pressure	factory setting: 1,01325 bar		
7.4.7	Sensor break	setting range: no new start start with fixed value start value input		
7.4.8	Error value	Setting range: -1,00 to + 100,00 bar factory setting: 0,00 bar		

## 17 Factory Settings

<i>Fct.</i>	<i>description</i>	<i>setting range</i>	<i>set value</i>	<i>P.</i>
8.0	main menu Factory Setting			
8.1	Selection function key	setting range: off, preselection, setpoint flow, setpoint override, product factory setting: as ordered		
8.2	Controller	setting range: active, not active factory setting: as ordered		
8.3	Purge function	setting range: active, not active factory setting: as ordered		
8.4	Custody transfer	setting range: no, yes factory setting: as ordered		
8.5	Terminal mode	setting range: active, not active factory setting: as ordered		
8.6	Instrument number	set in the factory		
8.7	Flow conversion	setting range: active, not active factory setting: as ordered		
8.9	Pipelinemaster	setting range: active, not active factory setting: as ordered		