



Level



Pressure



Flow



Temperature



Liquid
Analysis



Registration



Systems
Components



Services

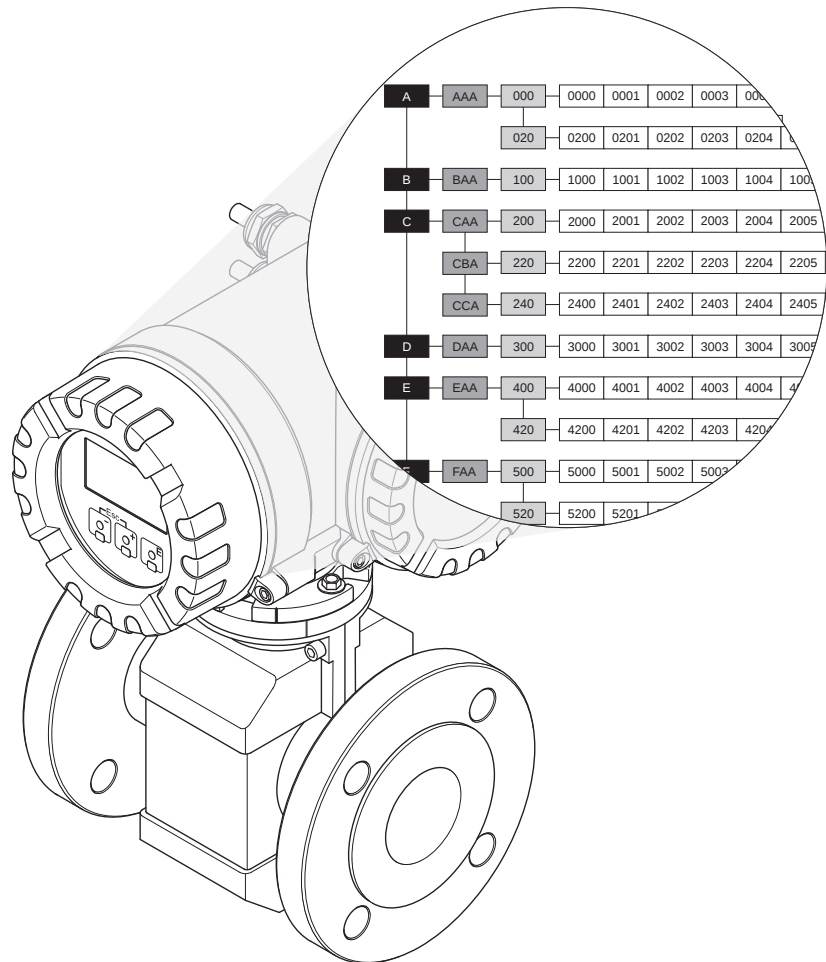


Solutions

Description of Device Functions

Proline Promag 53 PROFIBUS DP/PA

Electromagnetic Flow Measuring System



BA054D/06/en/06.10
71116504

Valid as of version
PROFIBUS DP: V 3.06.XX (Device software)
PROFIBUS PA: V 3.06.XX (Device software)

Endress+Hauser

People for Process Automation

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1 Using this Manual

There are various ways of locating the description of a function of your choice in the manual:

1.1 Using the table of contents to locate a function description

The designations of all the cells in the function matrix are listed in the table of contents. You can use these unambiguous designations (such as USER INTERFACE, INPUTS, OUTPUTS, etc.) to choose whichever functions are applicable to a particular set of conditions. The page references show you exactly where to find the detailed descriptions of the functions in question. The table of contents is on page 3.

1.2 Using the graphic of the function matrix to locate a function description

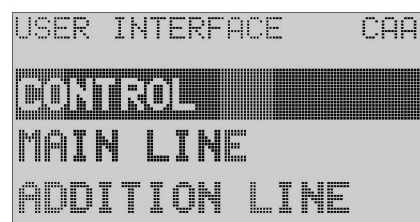
This step-by-step, top-down approach starts with the blocks, the highest level, and factory down through the matrix to the description of the function you need:

1. All blocks available, and their related groups, are illustrated on page 9. Select the block (or the group within the block) which you need for your application and use the page reference to locate the information corresponding to the next level.
2. The page in question contains a graphic showing of the block with all its subordinate groups, function groups and functions. Select the function which you need for your application and use the page reference to locate the detailed function description.

1.3 Using the index of the function matrix to locate a function description

Each “cell” in the function matrix (blocks, groups, function groups, functions) has a unique identifier in the form of a code consisting of one or three letters or a three- or four-digit number. The code identifying a selected “cell” appears at the top right on the local display.

Example:



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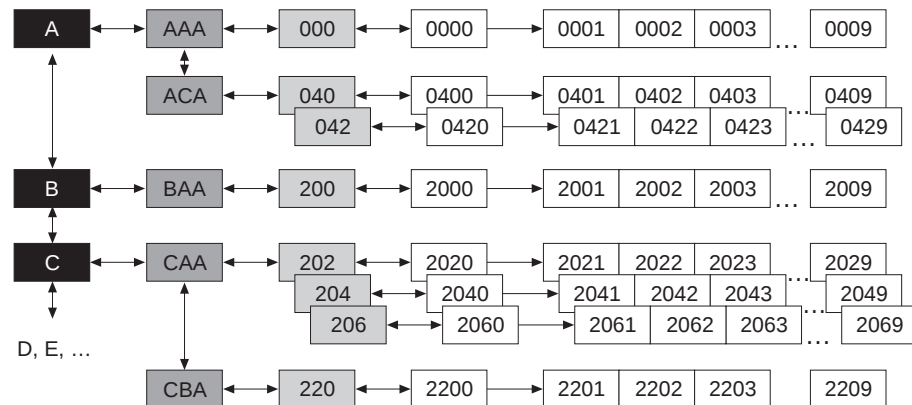
The function matrix index lists the codes for all the available “cells” in alphabetic and consecutive order, complete with the page references for the corresponding functions. The index to the function matrix is on page 145.

2 Function Matrix

2.1 General layout of the function matrix

The function matrix consists of four levels:

Blocks -> Groups -> Function groups -> Functions



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2.1.1 Blocks (A, B, C, etc.)

The blocks are the highest-level grouping of the operation options for the device.

The blocks include, for example: MEASURED VARIABLES, QUICK SETUP, USER INTERFACE, TOTALIZER, etc.

2.1.2 Groups (AAA, AEA, CAA, etc.)

A block consists of one or more groups. Each group represents a more detailed selection of the operation options in the higher-order block. The groups in the “USER INTERFACE” block, for example, include: CONTROL, MAIN LINE, ADDITIONAL LINE, etc.

2.1.3 Function groups (000, 020, 060, etc.)

A group consists of one or more function groups. Each function group represents a more detailed selection of the operation options in the higher-order group. Function groups available of group “CONTROL” are for example: BASIC CONFIGURATION, UNLOCKING/LOCKING, OPERATION, etc.

2.1.4 Functions (0000, 0001, 0002, etc.)

Each function group consists of one or more functions. The functions are used to operate and parameterize the device. Numerical values can be entered or parameters selected and saved. The functions in the “BASIC CONFIGURATION” function group include LANGUAGE, DISPLAY DAMPING, CONTRAST LCD, etc. The procedure for changing the language of the user interface, for example, is as follows:

1. Select the block “USER INTERFACE”.
2. Select the group “CONTROL”.
3. Select the function group “BASIC CONFIGURATION”.
4. Select the function “LANGUAGE” (here you can set the language required).

2.1.5 Codes identifying cells

Each cell (block, group, function group and function) in the function matrix has an individual, unique code.

Blocks:

The code is a letter (A, B, C, etc.)

Groups:

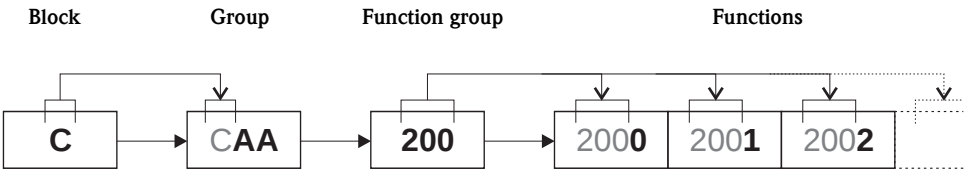
The code consists of three letters (AAA, ABA, BAA, etc.).
The first letter matches the block code (i.e. each group in block A has a code starting with an A _ _; the codes of the groups in block B start with a B _ _, etc.). The other two letters are for identifying the group within the respective block.

Function groups:

The code consists of three digits (000, 001, 100, etc.).

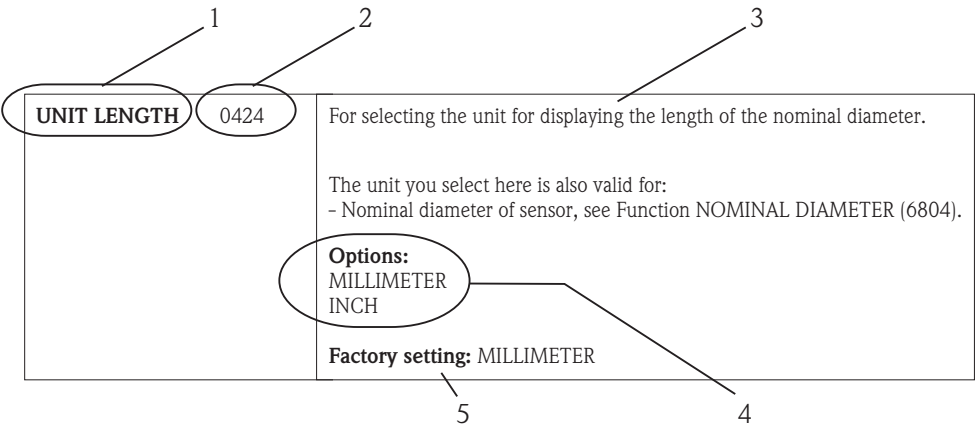
Functions:

The code consists of four digits (0000, 0001, 0201, etc.).
The first three digits are the same as the code for the function group.
The last digit in the code is a counter for the functions in the function group, incrementing from 0 to 9 (e.g. function 0005 is the sixth function in group 000).



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2.2 Illustration of the function descriptions



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Fig. 1 : Example for the description of a function

- 1 Name of the function
- 2 Number of the function (appears on the local display)
- 3 Description of the function
- 4 Selection or entry options or display
- 5 Factory setting (the measuring device is delivered with this setting/selected option)

2.3
Maximum number of writes

The number of writes to the EEPROM is technically restricted to a maximum of 1 million. Attention must be paid to this limit since, if exceeded, it results in data loss and measuring device failure. For this reason, avoid constantly writing nonvolatile device parameters via the PROFIBUS!

2.4
Display lines on the local display

The local display is split into various display lines.

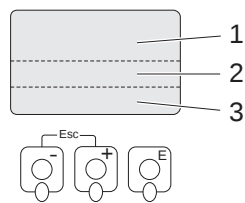


Fig. 2 : Local display

- 1 Main line
- 2 Additional line
- 3 Information line

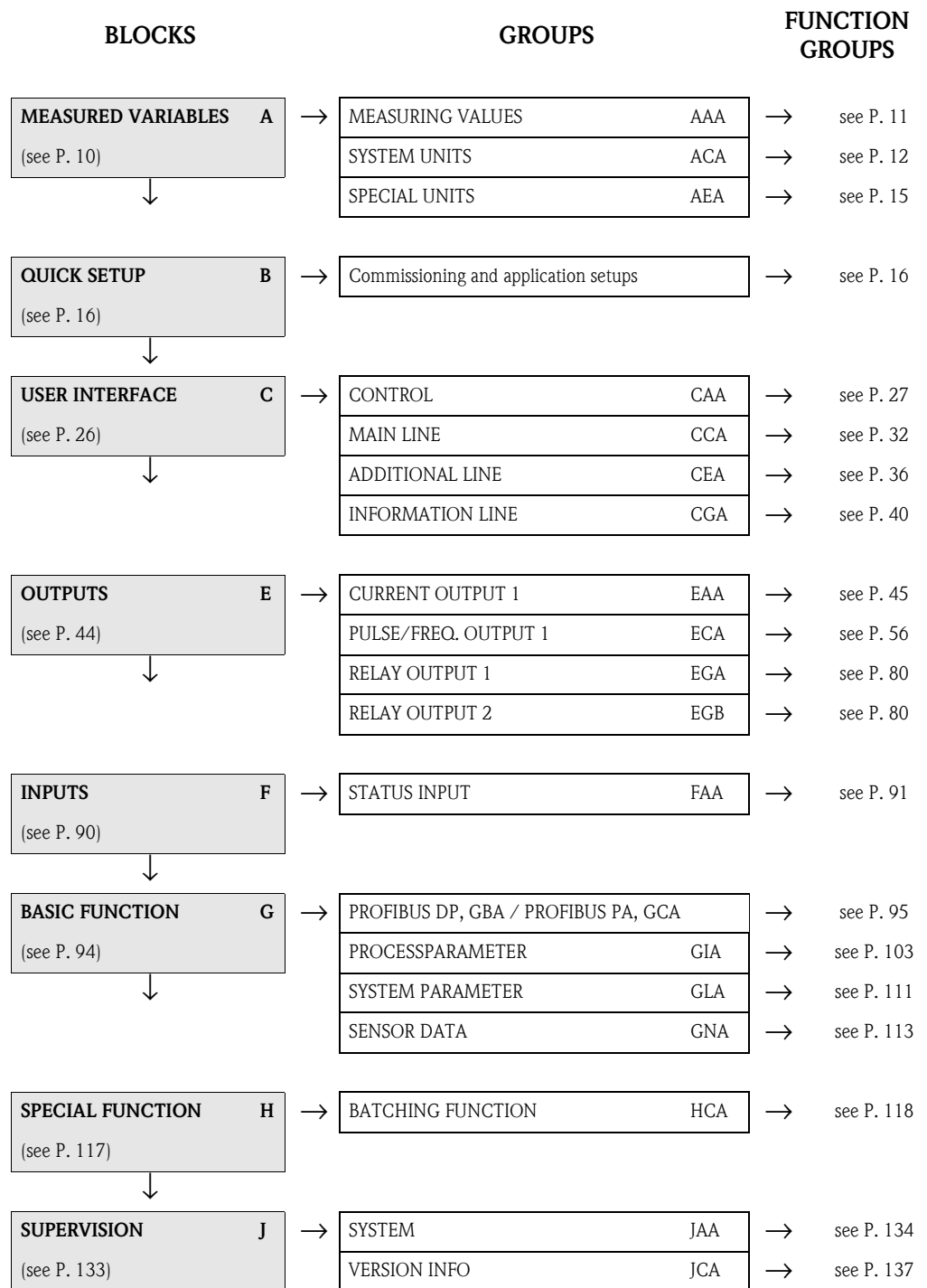
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The values are assigned to the individual lines in the USER INTERFACE block, see page 27.

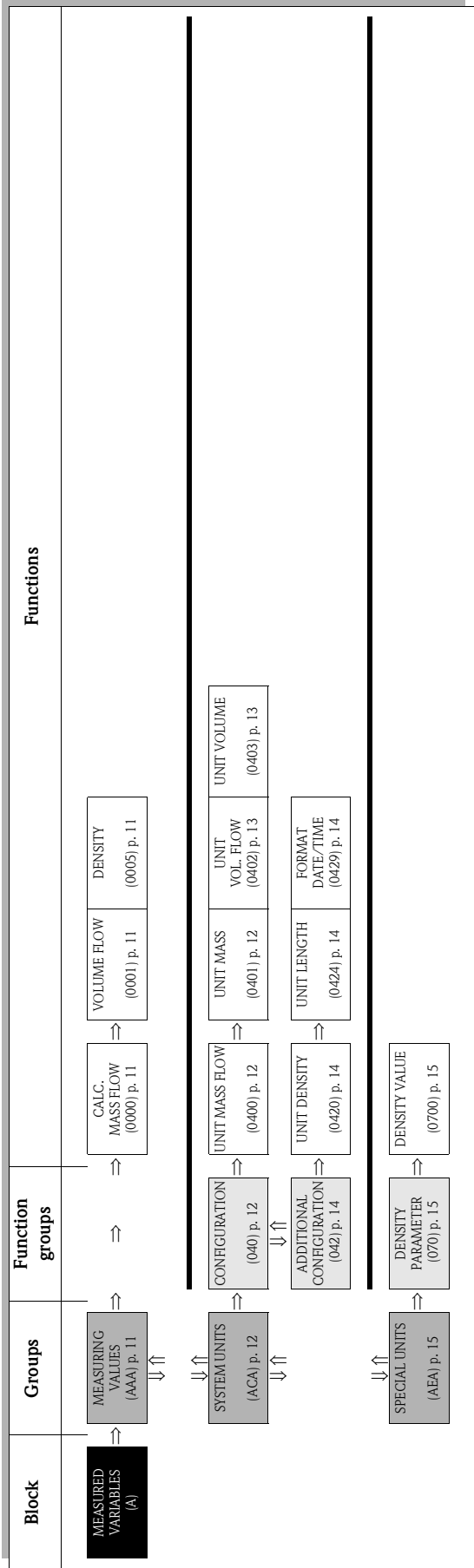
2.5
Available blocks, groups, etc.

Type code of device	Available inputs and outputs							Available blocks, groups, etc.										
	PROFIBUS PA, Ex i	PROFIBUS DP	Current output	Pulse/Frequency output	Relay output 1	Relay output 2	Status input	MEASURED VARIABLES	QUICK SETUP	USER INTERFACE	Current output	Pulse/Frequency output	Relay output 1	Relay output 2	INPUTS	BASIC FUNCTION	SPECIAL FUNCTION	SUPERVISION
53***_*****F/H	X	–	–	–	–	–	–	X	X	X	–	–	–	–	–	X	–	X
53***_*****J	–	X	–	–	–	–	–	X	X	X	–	–	–	–	–	X	–	X
53***_*****P	–	X	X	X	–	–	X	X	X	X	X	X	–	–	X	X	–	X
53***_*****V	–	X	–	–	X	X	X	X	X	X	–	–	X	X	X	X	X	X

2.6 Function Matrix



3 Block MEASURED VARIABLES



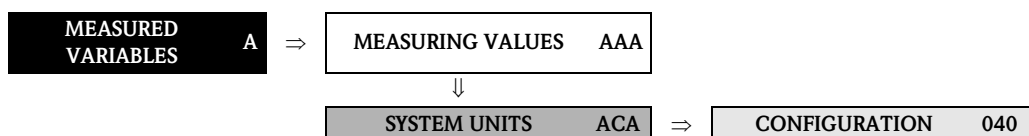
3.1 Group MEASURING VALUES



Function description		
MEASURED VARIABLES → MEASURING VALUES → Measuring value functions		
 Note! ■ The engineering units of all the measured variables shown here can be set in the “SYSTEM UNITS” group. ■ If the fluid in the pipe flows backwards, a negative sign prefixes the flow reading on the display.		
CALCULATED MASS FLOW	0000	The calculated mass flow appears on the display. The mass flow is derived from the measured volume flow and the fixed density. Display: 5-digit floating-point number, including unit and sign (e.g. 462.87 kg/h; −731.63 lb/min; etc.)
VOLUME FLOW	0001	The volume flow currently measured appears on the display. Display: 5-digit floating-point number, including unit and sign (e.g. 5.5445 dm³/min; 1.4359 m³/h; −731.63 gal/d; etc.)
DENSITY	0005	The fixed density appears on the display. Display: 5-digit floating-point number, including unit (corresponding to 0.10000...6.0000 kg/dm³) e.g. 1.2345 kg/dm³; 993.5 kg/m³; 1.0015 SG_20 °C; etc.

3.2 Group SYSTEM UNITS

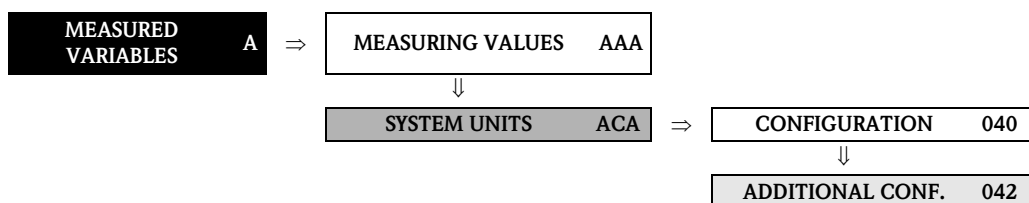
3.2.1 Function group CONFIGURATION



Function description	
MEASURED VARIABLES → SYSTEM UNITS → CONFIGURATION	
You can select the unit for the measured variable in this function group.  Note! The factory settings for the system units which are described here apply to the local display and may differ from the units which are used to transfer the measured variables to the automation system. However, the UNIT TO BUS function (→ page 101) can be used to set these units to the units currently selected on the local display.	
UNIT MASS FLOW 0400	Use this function to select the unit for displaying the calculated mass flow (mass/time). The mass flow is derived from the fixed (compensated) specific fluid density and the measured volume flow. The unit you select here is also valid for: ■ Current output ■ Pulse/frequency output ■ Relay switch points (limit value for mass flow, flow direction) ■ Low flow cut off Options: Metric: gram → g/s; g/min; g/h; g/day Kilogram → kg/s; kg/min; kg/h; kg/day Metric ton → t/s; t/min; t/h; t/day US: ounce → oz/s; oz/min; oz/h; oz/day pound → lb/s; lb/min; lb/h; lb/day ton → ton/s; ton/min; ton/h; ton/day Factory setting: Depends on nominal diameter and country (s. page 141 ff.).
UNIT MASS 0401	Use this function to select the unit for displaying the calculated mass. The mass is derived from the preset (compensated) specific fluid density and the measured volume. The unit you select here is also valid for: ■ Pulse value (e.g. kg/p) Options: Metric → g; kg; t US → oz; lb; ton Factory setting: Depends on nominal diameter and country (s. page 141 ff.).  Note! The unit of the totalizers is independent of your choice here. The unit for each totalizer is selected separately for the totalizer in question.

Function description		
MEASURED VARIABLES → SYSTEM UNITS → CONFIGURATION		
UNIT VOLUME FLOW	0402	Use this function to select the unit for displaying the volume flow (volume/time). The unit you select here is also valid for: ■ Current output ■ Pulse/frequency output ■ Relay switch points (limit value for volume flow, flow direction) ■ Low flow cut off Options: Metric: Cubic centimeter → cm³/s; cm³/min; cm³/h; cm³/day Cubic decimeter → dm³/s; dm³/min; dm³/h; dm³/day Cubic meter → m³/s; m³/min; m³/h; m³/day Milliliter → ml/s; ml/min; ML/h; ml/day Liter → l/s; l/min; l/h; l/day Hectoliter → hl/s; hl/min; hl/h; hl/day Megaliter → ML/s; ml/min; ML/h; ml/day US: Cubic centimeter → cc/s; cc/min; cc/h; cc/day Acre foot → af/s; af/min; af/h; af/day Cubic foot → ft³/s; ft³/min; ft³/h; ft³/day Fluid ounce → oz f/s; oz f/min; oz f/h; oz f/day Gallon → gal/s; gal/min; gal/h; gal/day Kilo gallon → Kgal/s; Kgal/min; Kgal/h; Kgal/day Million gallon → Mgal/s; Mgal/min; Mgal/h; Mgal/day Barrel (normal fluids: 31.5 gal/bbl) → bbl/s; bbl/min; bbl/h; bbl/day Barrel (beer: 31.0 gal/bbl) → bbl/s; bbl/min; bbl/h; bbl/day Barrel (petrochemicals: 42.0 gal/bbl) → bbl/s; bbl/min; bbl/h; bbl/day Barrel (filling tanks: 55.0 gal/bbl) → bbl/s; bbl/min; bbl/h; bbl/day Imperial: Gallon → gal/s; gal/min; gal/h; gal/day Mega gallon → Mgal/s; Mgal/min; Mgal/h; Mgal/day Barrel (beer: 36.0 gal/bbl) → bbl/s; bbl/min; bbl/h; bbl/day Barrel (petrochemicals: 34.97 gal/bbl) → bbl/s; bbl/min; bbl/h; bbl/day Factory setting: Depends on nominal diameter and country (s. page 141 ff.).
UNIT VOLUME	0403	Use this function to select the unit for displaying the volume. The unit you select here is also valid for: ■ Pulse weighting (e.g. m³/p) Options: Metric → cm³; dm³; m³; ml; l; hl; Ml Mega US → cc; af; ft³; oz f; gal; Kgal; Mgal; bbl (normal fluids); bbl (beer); bbl (petrochemicals); * bbl (filling tanks) Imperial → gal; Mgal; bbl (beer); bbl (petrochemicals) Factory setting: Depends on nominal diameter and country (s. page 141 ff.).  Note! The unit of the totalizers is independent of your choice here. The unit for each totalizer is selected separately for the totalizer in question.

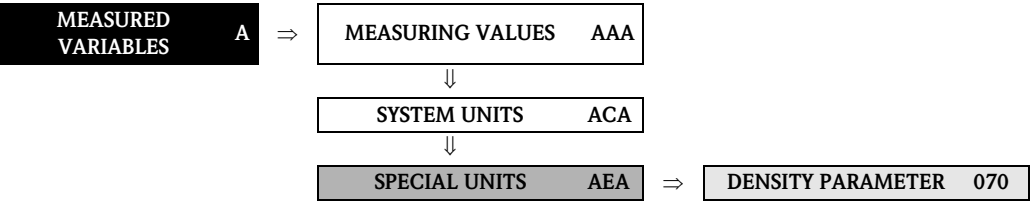
3.2.2 Function group ADDITIONAL CONFIGURATION



Function description		
MEASURED VARIABLES → SYSTEM UNITS → ADDITIONAL CONFIGURATION		
UNIT DENSITY	0420	Use this function to select the unit for displaying the fluid density. The unit you select here is also valid for: Fluid density entry Options: Metric → g/cm³; g/cc; g/l; kg/dm³; kg/l kg/m³; SD 4 °C, SD 15 °C, SD 20 °C; SG 4 °C, SG 15 °C, SG 20 °C US → lb/ft³; lb/gal; lb/bbl (normal fluids); lb/bbl (beer); lb/bbl (petrochemicals); lb/bbl (filling tanks) Imperial → lb/gal; lb/bbl (beer); lb/bbl (petrochemicals) Factory setting: kg/l (SI units: not for USA and Canada) g/cc (US units: only for USA and Canada) SD = Specific Density, SG = Specific Gravity The specific density is the ratio of fluid density to water density (at water temperature = 4, 15, 20 °C).
UNIT LENGTH	0424	Use this function to select the unit for displaying the length of the nominal diameter. The unit you select here is also valid for: Nominal diameter of sensor (function NOMINAL DIAMETER (6804) on page 114) Options: MILLIMETER INCH Factory setting: MILLIMETER (SI units: not for USA and Canada) INCH (US units: only for USA and Canada)
FORMAT DATE/TIME	0429	Use this function to select the format for the date and the time. The unit you select here is also valid for: Displaying the current calibration date (function CALIBRATION DATE (6800) on page 113) Options: DD.MM.YY 24H MM/DD/YY 12H A/P DD.MM.YY 12H A/P MM/DD/YY 24H Factory setting: DD.MM.YY 24H (SI units) MM/DD/YY 12H A/P (US units)

3.3 Group SPECIAL UNITS

3.3.1 Function group DENSITY PARAMETER



Function description		
MEASURED VARIABLES → SPECIAL UNITS → DENSITY PARAMETER		
DENSITY VALUE	0700	Use this function to enter a density value preferably at process temperature (or at reference temperature). This density value is used to convert the volume flow to a mass flow. User input: 5-digit floating-point number Factory setting: 1 [unit] Note! The appropriate unit is taken from the function UNIT DENSITY (0420), (see page 14).

4 Block QUICK SETUP

Block	Group / function groups	Functions					
QUICK SETUP (B)	⇒	QUICK SETUP COMMISSION (1002) p. 16	⇒	QUICK SETUP PULSATING (1003) p. 16	QUICK SETUP BATCHING (1005) p. 16	QUICK SETUP COMMUNICATION (1006) p. 16	T-DAT SAVE/LOAD (1009) p. 17

Function description QUICK SETUP

 Note!

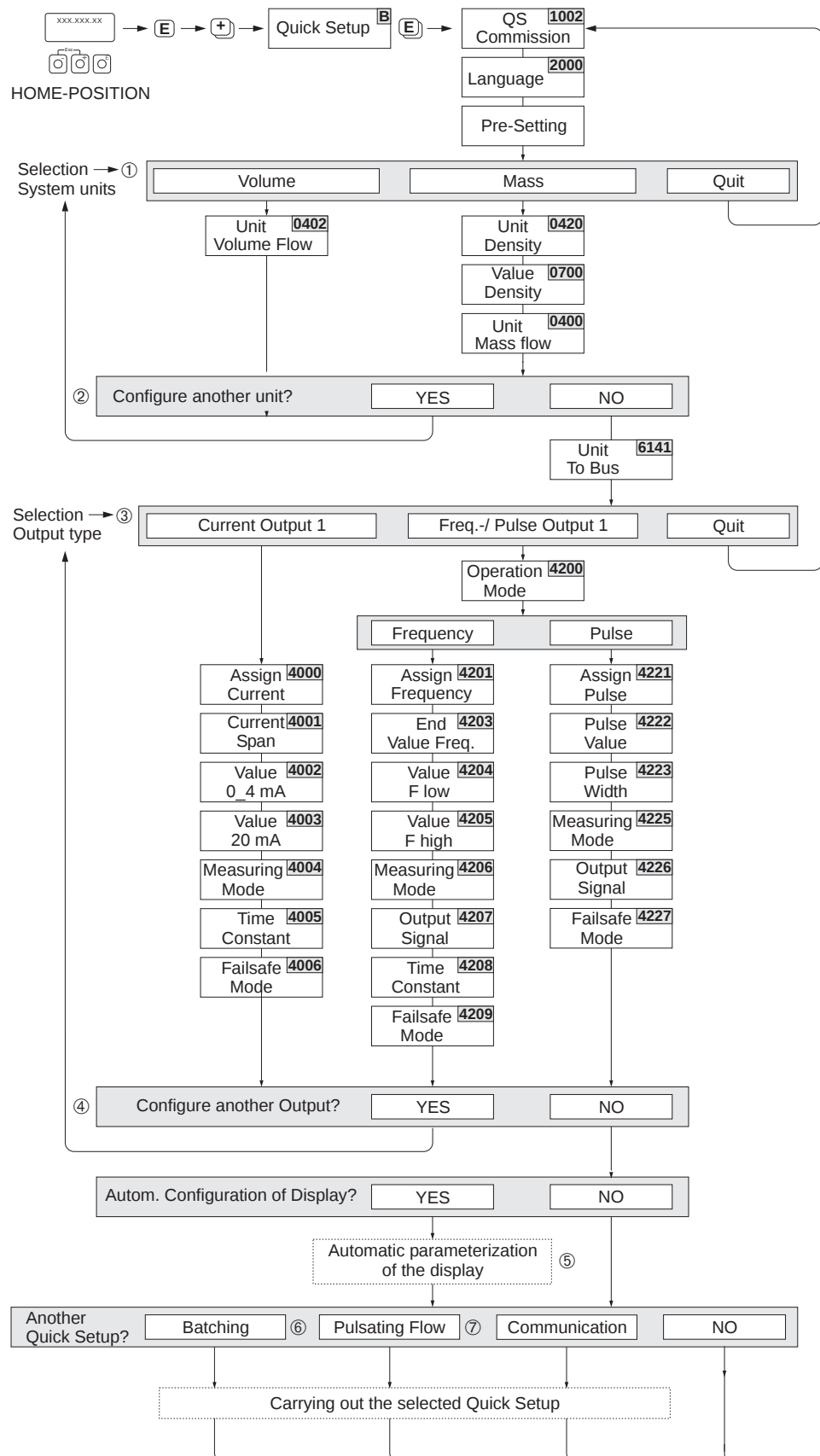
- The Quick Setups are only available by means of the local display.
- The flowcharts of the various Quick Setups are provided on the pages to follow.
- For more information on the Setup menus, please refer to the Operating Instructions BA053D.

QUICK SETUP COMMISSIONING	1002	For starting the Setup menu. Options: NO YES Factory setting: NO
QUICK SETUP PULSATING FLOW	1003	 Note! Function only available for measuring devices with a current or pulse/frequency output. For starting the Setup menu. Options: NO YES Factory setting: NO
QUICK SETUP BATCHING	1005	 Note! Function is only available with the optional software package BATCHING. For starting the Setup menu. Options: NO YES Factory setting: NO
QUICK SETUP COMMUNICATION	1006	For starting the Setup menu. Options: NO YES Factory setting: NO

Function description QUICK SETUP	
T-DAT SAVE/LOAD 1009	Use this function to save the parameter settings / configuration of the transmitter in a transmitter DAT (T-DAT), or to load the parameter settings from the T-DAT into the EEPROM (manual security function). Application examples: ■ After commissioning, the current measuring point parameters can be saved to the T-DAT as a backup. ■ If the transmitter is replaced for some reason, the data from the T-DAT can be loaded into the new transmitter (EEPROM). Options: CANCEL SAVE (from EEPROM to T-DAT) LOAD (from the T-DAT into EEPROM) Factory setting: CANCEL  Note! ■ If the target device has an older software version, the message “TRANSM. SW-DAT” is displayed. Then only the “SAVE” function is available. ■ LOAD This function is only possible if the target device has the same software version as, or a more recent software version than, the source device. ■ SAVE This function is always available.

4.1 Setup Commissioning

In the case of measuring devices without a local display, the individual parameters and functions must be configured by means of a configuration program, such as FieldCare from Endress+Hauser.



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- The display returns to the cell SETUP COMMISSIONING (1002) if you press the ESC key combination during parameter interrogation. The stored parameters remain valid.
 - The “Commissioning” Quick Setup must be carried out before one of the Quick Setups explained below is run.
- ① Only units not yet configured in the current Setup are offered for selection in each cycle. The unit for mass and volume is derived from the corresponding flow unit.
 - ② The “YES” option remains visible until all the units have been configured.
“NO” is the only option displayed when no further units are available.
 - ③ The prompt only appears if a current output and/or a pulse/frequency output is available. Only the outputs not yet configured in the current Setup are offered for selection in each cycle.
 - ④ The “YES” option remains visible until all the outputs have been parameterized.
“NO” is the only option displayed when no further outputs are available.
 - ⑤ The “automatic parameterization of the display” option contains the following basic settings/factory settings:
YES: Main line = Volume flow;
 Additional line = Totalizer 1;
 Information line = Operating/system conditions
NO: The existing (selected) settings remain.
 - ⑥ The QUICK SETUP BATCHING is only available when the optional software package BATCHING is installed.
 - ⑦ The QUICK SETUP PULSATING FLOW is only available when the device has a current or pulse/frequency output.

4.2 Quick Setup “Pulsating Flow”



Note!

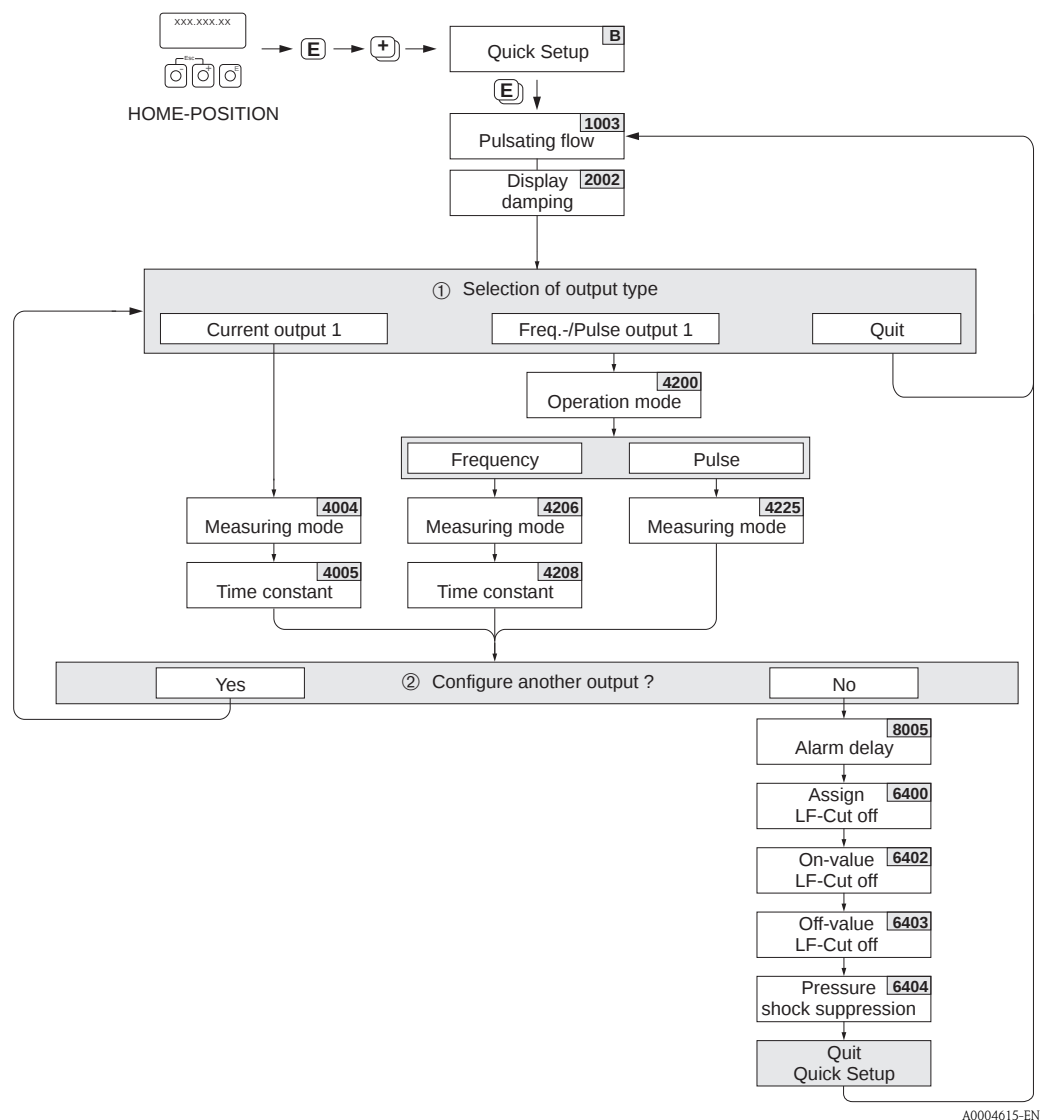
The Quick Setup “Pulsating Flow” is only available when the device has a current or pulse/frequency output.

A temporally fluctuating flow rate occurs when using pumps of a construction which necessitates a pulsating pumping action, such as piston, hose, eccentric pumps, etc. Also in the case of these pumps, negative flow rates resulting from the closing volume may occur, or there may be leakage from valves.



Note!

Run the Quick Setup “Commissioning” (s. page 18) before running the Quick Setup “Pulsating flow”.



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① Only the output not yet configured in the current Setup is offered for selection in the second cycle.

② The “YES” option remains visible until both outputs have been parameterized.
“NO” is the only option displayed when no further outputs are available.

Settings for the Pulsating flow Setup menu:

Fct. code	Function name	Suggested settings	Description
Call up through the function matrix:			
B	QUICK SETUP	QUICK SETUP PULSATING FLOW	see P. 16
1003	QUICK SETUP PULSATING FLOW	YES	see P. 16
Basic configuration:			
2002	DISPLAY DAMPING	3 s	see P. 27
Select the signal type: CURRENT OUTPUT 1			
4004	MEASURING MODE	PULSATING FLOW	see P. 50
4005	TIME CONSTANT	3 s	see P. 52
Select the signal type: FREQ./PULSE OUTPUT 1 / operating mode: FREQUENCY			
4206	MEASURING MODE	PULSATING FLOW	see P. 60
4208	TIME CONSTANT	0 s	see P. 65
Select the signal type: FREQ./PULSE OUTPUT 1 / operating mode: PULSE			
4225	MEASURING MODE	PULSATING FLOW	see P. 68
Other settings:			
8005	ALARM DELAY	0 s	see P. 134
6400	ASSIGN LOW FLOW CUTOFF	VOLUME FLOW	see P. 103
6402	ON-VALUE LOW FLOW CUTOFF	see table below	see P. 103
6403	OFF-VALUE LOW FLOW CUTOFF	50%	see P. 103
6404	PRESSURE SHOCK SUPPRESSION	0 s	see P. 104

Recommended settings for the function ON-VALUE LOW FLOW CUTOFF (6402):

DN [mm]	dm ³ /min		US-gal/min
2	0.002	or	0.001
4	0.007	or	0.002
8	0.03	or	0.008
15	0.1	or	0.03
25	0.3	or	0.08
32	0.5	or	0.15
40	0.7	or	0.2
50	1.1	or	0.3
65	2.0	or	0.5
80	3.0	or	0.8
100	4.7	or	1.3

The recommended values correspond to the max. full scale value per DN divided by 1000
(see see Operating Instructions Promag 53 PROFIBUS DP/PA, BA053D/06/en, Chapter "Installation" → nominal diameters and flow rates).

4.3 Quick Setup “Batching”

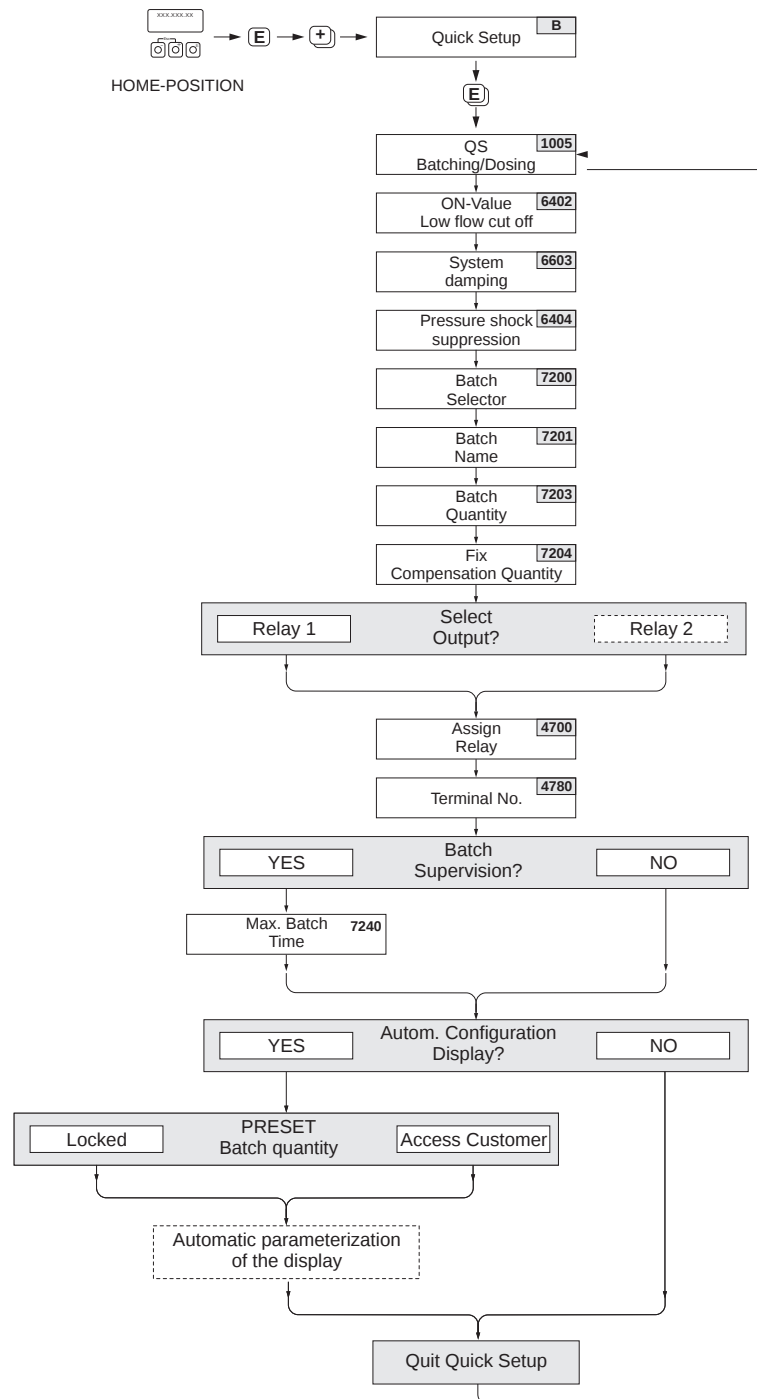


Note!

This function is available only if the “Batching” add-on is installed in the measuring device (order option). This software can be ordered at a later date as an accessory from Endress+Hauser at a later date (see Operating Instructions).

This Quick Setup guides the user systematically through all the device functions that have to be adjusted and configured for batching operation. These basic settings allow for simple (one-stage) batching processes.

Additional settings, e.g. for multistage batching processes, must be made using the function matrix.



A0004433-EN

**Caution!**

Using the Quick Setup “Batching”, certain device parameters are optimally set for discontinuous measurement.

If the measuring device is used again for continuous flow measurement at a later time, we recommend you to rerun the Quick Setup “Commissioning” and/or “Pulsating flow”.

**Note!**

- Run the Quick Setup “Commissioning” (s. page 18) before running the Quick Setup “Batching”.
- For detailed information on the batching functions see page 117 ff.
- Batching processes may also be controlled directly via the local display. During the Quick Setup a prompt appears for the automatic configuration of the display. This prompt is acknowledged by selecting “YES”.

This results in the bottom line of the display being allocated special batching functions (START, PRESET, etc.), which can be run locally using the three operating keys ($\square$ / $\square$ / $\square$). In this way, the measuring device can be fully deployed in the field as a “batch controller”.

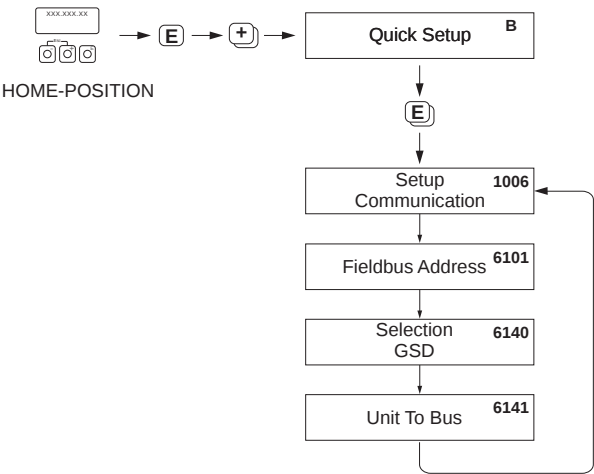
- Batching processes may also be controlled directly using the field bus.

Settings for the Batching Setup menu:

Fct. code	Function name	Suggested settings	Description
Call up through the function matrix:			
B	QUICK SETUP	QUICK SETUP BATCHING	see P. 16
1005	QUICK SETUP BATCHING	YES	see P. 16
Settings (functions with a gray background are set automatically):			
6400	ASSIGN LOW FLOW CUTOFF	Volume	see P. 103
6402	ON-VALUE LOW FLOW CUTOFF	Table value	see P. 103
6403	OFF-VALUE LOW FLOW CUTOFF	50%	see P. 103
6603	SYSTEM DAMPING	9 Note! For highly accurate and short batching processes, the “system damping” must be optimized accordingly: Set this to “0”.	see P. 111
6404	PRESSURE SHOCK SUPPRESSION	0 seconds	see P. 104
7200	BATCH SELECTOR	BATCH #1	see P. 118
7202	BATCH NAME	BATCH #1	see P. 118
7201	ASSIGN BATCH VARIABLE	Volume	see P. 119
7203	BATCH QUANTITY	0	see P. 119
7204	FIX COMPENSATION QUANTITY	0	see P. 119
7208	BATCH STAGES	1	see P. 120
7209	INPUT FORMAT	Value input	see P. 120
4700	ASSIGN RELAY	BATCHING VALVE 1	see P. 80
4780	TERMINAL NUMBER	Output (display only)	see P. 86
7220	OPEN VALVE 1	0% or 0 [unit]	see P. 121
7240	MAXIMUM BATCH TIME	0 seconds	see P. 126
7241	MINIMUM BATCH QUANTITY	0 seconds	see P. 127
7242	MAXIMUM BATCH QUANTITY	0 seconds	see P. 128
2200	ASSIGN (Main line)	BATCH NAME	see P. 32
2220	ASSIGN (Multiplex main line)	Off	see P. 34
2400	ASSIGN (Additional line)	BATCH DOWNWARDS	see P. 36
2420	ASSIGN (Multiplex additional line)	Off	see P. 38
2600	ASSIGN (Information line)	BATCHING KEYS	see P. 40
2620	ASSIGN (Multiplex information line)	Off	see P. 42

4.4 Quick Setup “Communication”

To set up the cyclical data transfer, various arrangements must be made between the PROFIBUS master and the device (slave). These arrangements must be taken into account when configuring different functions. Using the Quick Setup “Communication”, these functions can be configured quickly and easily. The different possible parameter settings are explained in greater detail in the following table.



A0002600-EN

Settings for the Communication Setup menu:			
Fct. code	Function name	Suggested settings	Description
Call up through the function matrix:			
B	QUICK SETUP	QUICK SETUP COMMUNICATION	see P. 16
1006	QS-COMMUNICATION	YES	see P. 16
Basic configuration:			
6101	FIELDBUS ADDRESS	Enter device address	see P. 95
6140	SELECTION GSD	MANUFACT. SPEC.	see P. 101
6141	UNIT TO BUS	SET UNITS	see P. 101

4.5 Data backup/transmission

Using the T-DAT SAVE/LOAD function, you can transfer data (device parameters and settings) between the T-DAT (exchangeable memory) and the EEPROM (device storage unit).

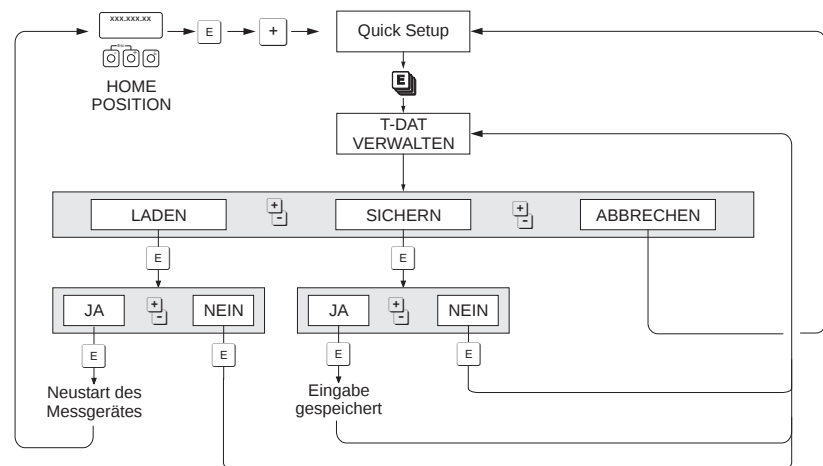
This is required in the following instances:

- Creating a backup: current data are transferred from an EEPROM to the T-DAT.
- Replacing a transmitter: current data are copied from an EEPROM to the T-DAT and then transferred to the EEPROM of the new transmitter.
- Duplicating data: current data are copied from an EEPROM to the T-DAT and then transferred to EEPROMs of identical measuring points.



Note!

For information on installing and removing the T-DAT → Operating Manual Proline Promag 53 PROFIBUS PA/DP



Data backup/transmission with T-DAT SAVE/LOAD function

a0001221-en

Information on the LOAD and SAVE options available:

LOAD:

Data are transferred from the T-DAT to the EEPROM.



Note!

- Any settings already saved on the EEPROM are deleted.
- This option is only available, if the T-DAT contains valid data.
- This option can only be executed if the software version of the T-DAT is the same or newer than that of the EEPROM. Otherwise, the error message "TRANSM. SW-DAT" appears after restarting and the LOAD function is then no longer available.

SAVE:

Data are transferred from the EEPROM to the T-DAT.

5 Block USER INTERFACE

Block	Groups	Function groups	Functions
USER INTERFACE (C)	CONTROL (CAA) p. 27	⇕⇕	⇕⇕
			BASIC CONFIGURATION (200) p. 27
		⇕⇕	⇕⇕
			LANGUAGE (2000) p. 27
	MAIN LINE (CCA) p. 32	⇕⇕	⇕⇕
			DISPLAY DAMPING (2002) p. 27
		⇕⇕	⇕⇕
			CONTRAST LCD (2003) p. 28
	ADDITIONAL LINE (CEA) p. 36	⇕⇕	⇕⇕
			BACKLIGHT (2004) p. 28
		⇕⇕	⇕⇕
			DEFINE PRIVATE CODE (2021) p. 29
	INFORMATION LINE (CGA) p. 40	⇕⇕	⇕⇕
			STATUS ACCESS (2022) p. 29
		⇕⇕	⇕⇕
			ACCESS CODE COUNTER (2023) p. 30
	TEST DISPLAY (2040) p. 31	⇕⇕	⇕⇕
			ACCESS CODE (2020) p. 29
		⇕⇕	⇕⇕
			OPERATION (204) p. 31
	CONFIGURATION (220) p. 32	⇕⇕	⇕⇕
			ASSIGN (2200) p. 32
	MULTIPLY (222) p. 34	⇕⇕	⇕⇕
			100% VALUE (2201) p. 33
		⇕⇕	⇕⇕
			FORMAT (2202) p. 33
	ADDITIONAL LINE (CEA) p. 36	⇕⇕	⇕⇕
			ASSIGN (2220) p. 34
		⇕⇕	⇕⇕
			100% VALUE (2221) p. 34
	INFORMATION LINE (CGA) p. 40	⇕⇕	⇕⇕
			FORMAT (2222) p. 35
		⇕⇕	⇕⇕
			100% VALUE (2401) p. 37
	MULTIPLY (242) p. 38	⇕⇕	⇕⇕
			ASSIGN (2400) p. 36
		⇕⇕	⇕⇕
			FORMAT (2402) p. 37
	ADDITIONAL LINE (CEA) p. 36	⇕⇕	⇕⇕
			100% VALUE (2403) p. 37
		⇕⇕	⇕⇕
			DISPLAY MODE (2403) p. 37
	INFORMATION LINE (CGA) p. 40	⇕⇕	⇕⇕
			ASSIGN (2420) p. 38
		⇕⇕	⇕⇕
			FORMAT (2422) p. 39
	MULTIPLY (262) p. 42	⇕⇕	⇕⇕
			100% VALUE (2421) p. 39
		⇕⇕	⇕⇕
			DISPLAY MODE (2423) p. 39
	INFORMATION LINE (CGA) p. 40	⇕⇕	⇕⇕
			ASSIGN (2600) p. 40
		⇕⇕	⇕⇕
			FORMAT (2602) p. 41
	MULTIPLY (262) p. 42	⇕⇕	⇕⇕
			100% VALUE (2601) p. 41
		⇕⇕	⇕⇕
			DISPLAY MODE (2603) p. 41
	INFORMATION LINE (CGA) p. 40	⇕⇕	⇕⇕
			ASSIGN (2620) p. 42
		⇕⇕	⇕⇕
			FORMAT (2622) p. 43
	MULTIPLY (262) p. 42	⇕⇕	⇕⇕
			100% VALUE (2621) p. 43
		⇕⇕	⇕⇕
			DISPLAY MODE (2623) p. 43

5.1 Group CONTROL

5.1.1 Function group BASIC CONFIGURATION

USER INTERFACE C



CONTROL

CAA

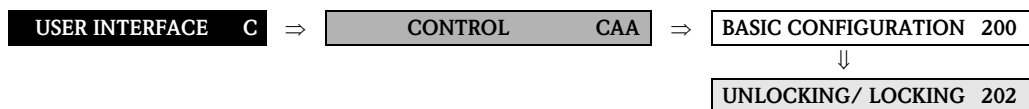


BASIC CONFIGURATION 200

Function description		
USER INTERFACE → CONTROL → BASIC CONFIGURATION		
LANGUAGE	2000	Use this function to select the language for all texts, parameters and messages shown on the local display.  Note! The displayed options depend on the available language group shown in the LANGUAGE GROUP (8226) function. OPTIONS: Language group WEST EU / USA: ENGLISH DEUTSCH FRANCAIS ESPANOL ITALIANO NEDERLANDS PORTUGUESE Language group EAST EU / SCAND: ENGLISH NORSK SVENSKA SUOMI POLISH RUSSIAN CZECH Language group ASIA: ENGLISH BAHASA INDONESIA JAPANESE (Silbenschrift) Language group CHINA: ENGLISH CHINESE Factory setting: Country-dependent (s. page 142)  Note! ■ If you press the  /  keys at startup, the language defaults to "ENGLISH". ■ The language group can be changed using the configuration program FieldCare. Please do not hesitate to contact your Endress+Hauser sales office if you have any questions.
DISPLAY DAMPING	2002	Use this function to enter a time constant defining how the display reacts to severely fluctuating flow variables, either very quickly (enter a low time constant) or with damping (enter a high time constant). User input: 0...100 seconds Factory setting: 3 s  Note! Setting the time constant to zero seconds switches off damping.

Function description		
USER INTERFACE → CONTROL → BASIC CONFIGURATION		
CONTRAST LCD	2003	Use this function to optimize display contrast to suit local operating conditions. User input: 10...100% Factory setting: 50%
BACKLIGHT	2004	Use this function to optimize the backlight to suit local operating conditions. User input: 0...100%  Note! Entering the value “0” means that the backlight is “switched off”. The display then no longer emits any light, i.e. the display texts can no longer be read in the dark. Factory setting: 50%

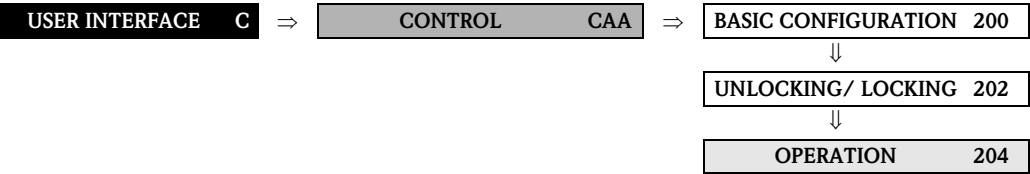
5.1.2 Function group UNLOCKING/ LOCKING



Function description	
USER INTERFACE → CONTROL → UNLOCKING/ LOCKING	
ACCESS CODE 2020	 Note! This function is only relevant for onsite operation and access via an operating program (e.g. FieldCare) and does not affect cyclic data transmission via the PROFIBUS master (Class 1). All data of the measuring system are protected against inadvertent change. Programming is disabled and the settings cannot be changed until a code is entered in this function. If you press the  /  keys in any function, the measuring system automatically goes to this function and the prompt to enter the code appears on the display (when programming is disabled). You can enable programming by entering your personal code (factory setting = 53, see function). User input: max. 4-digit number: 0...9999  Note! ■ Programming is disabled if you do not press a key within 60 seconds following automatic return to the HOME position. ■ You can also disable programming in this function by entering any number (other than the defined private code). ■ The Endress+Hauser service organization can be of assistance if you mislay your personal code.
DEFINE PRIVATE CODE 2021	Use this function to specify a personal code for enabling programming in the function ACCESS CODE. User input: 0...9999 (max. 4-digit number) Factory setting: 53  Note! ■ Programming is always enabled with the code "0". ■ Programming has to be enabled before this code can be changed. When programming is disabled this function is not available, thus preventing others from accessing your personal code.
STATUS ACCESS 2022	Use this function to check the access status for the function matrix. Display: ACCESS CUSTOMER (parameterization possible) LOCKED (parameterization disabled)

Function description		
USER INTERFACE → CONTROL → UNLOCKING/ LOCKING		
ACCESS CODE	2023	Displays how often the customer code, service code or the digit “0” (code-free) has been entered to gain access to the function matrix.
COUNTER		Display: max. 7-digit number: 0...9999999 Factory setting: 0

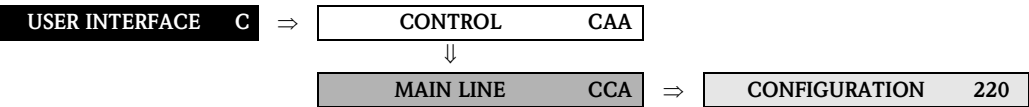
5.1.3 **Function group OPERATION**



Function description		
USER INTERFACE → CONTROL → OPERATION		
TEST DISPLAY	2040	Use this function to test the operability of the local display and its pixels. Options: OFF ON Factory setting: OFF Test sequence: 1. Start the test by selecting ON. 2. All pixels of the main line, additional line and information line are darkened for minimum 0.75 seconds. 3. Main line, additional line and information line show an “8” in each field for minimum 0.75 seconds. 4. Main line, additional line and information line show a “0” in each field for minimum 0.75 seconds. 5. Main line, additional line and information line show nothing (blank display) for minimum 0.75 seconds. When the test completes the local display returns to its initial state and the setting changes to OFF.

5.2 Group MAIN LINE

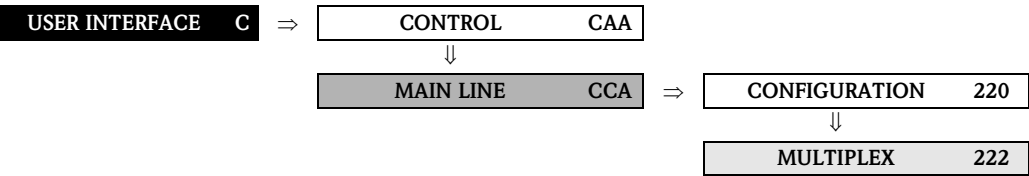
5.2.1 Function group CONFIGURATION



Function description		
USER INTERFACE → MAIN LINE → CONFIGURATION		
1 2 3 Esc 1 = main line, 2 = additional line, 3 = information line A0001253		
ASSIGN	2200	In this function, a value to be displayed is assigned to the main line (top line in the local display). This value is displayed during normal operation. Options: OFF VOLUME FLOW MASS FLOW VOLUME FLOW IN % MASS FLOW IN % ACTUAL CURRENT 1 ACTUAL FREQUENCY 1 AI1 - OUT VALUE AI2 - OUT VALUE AO - DISP. VALUE TOT. 1 OUT VALUE (totalizer 1) TOT. 2 OUT VALUE (totalizer 2) TOT. 3 OUT VALUE (totalizer 3) Advanced options with optional software package BATCHING: BATCH NAME ("BATCH # 1" or "BEER 330", etc.) BATCH QUANTITY (overall quantity to be batched) BATCH COUNTER (batching processes carried out) BATCH SUM (effective total batching quantity) Note! The options given in the BATCHING software package always refer to the batching selected ("BATCH # 1", "BATCH # 2", etc.) in the function BATCH SELECTOR (page 118). Example: If the option BATCH # 1 was selected in the function BATCH SELECTOR (7200), only the values of BATCH # 1 (batch name, batch quantity, etc.) can be displayed. Factory setting: VOLUME FLOW

Function description	
USER INTERFACE → MAIN LINE → CONFIGURATION	
100% VALUE	2201
	 Note! This function is only available if VOLUME FLOW IN % or MASS FLOW IN % was selected in the function ASSIGN (2200). Use this function to define the flow value to be shown on the display as the 100% value. User input: 5-digit floating-point number Factory setting: Depends on nominal diameter and country (s. page 141 ff.).
FORMAT	2202
	Use this function to define the maximum number of places after the decimal point displayed for the reading in the main line. Options: XXXXX. – XXXX.X – XXX.XX – XX.XXX – X.XXXX Factory setting: X.XXXX  Note! ■ Note that this setting only affects the reading as it appears on the display, it has no influence on the accuracy of the system's calculations. ■ The places after the decimal point as computed by the measuring device cannot always be displayed, depending on this setting and the engineering unit. In such instances an arrow appears on the display between the measuring value and the engineering unit (e.g. 1.2 → kg/h), indicating that the measuring system is computing with more decimal places than can be shown on the display.

5.2.2 Function group MULTIPLEX

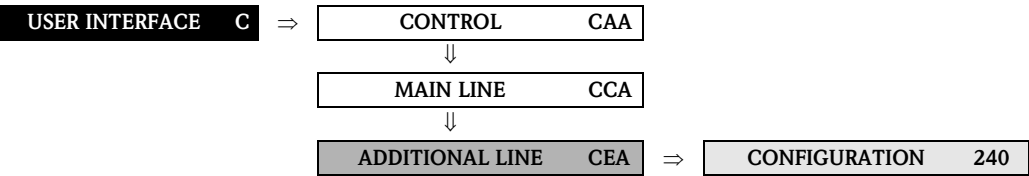


Function description		
USER INTERFACE → MAIN LINE → MULTIPLEX		
ASSIGN	2220	Use this function to define the second reading to be displayed in the main line alternately (every 10 seconds) with the value defined in the ASSIGN function (2200). Options: OFF VOLUME FLOW MASS FLOW VOLUME FLOW IN % MASS FLOW IN % ACTUAL CURRENT 1 ACTUAL FREQUENCY 1 AI1 - OUT VALUE AI2 - OUT VALUE AO - DISP. VALUE TOT. 1 OUT VALUE (totalizer 1) TOT. 2 OUT VALUE (totalizer 2) TOT. 3 OUT VALUE (totalizer 3) Advanced options with optional software package BATCHING: BATCH NAME ("BATCH # 1" or "BEER 330", etc.) BATCH QUANTITY (overall quantity to be batched) BATCH COUNTER (batching processes carried out) BATCH SUM (effective total batching quantity) Note! The options given in the BATCHING software package always refer to the batching selected ("BATCH # 1", "BATCH # 2", etc.) in the function BATCH SELECTOR (page 118). Example: If the option BATCH # 1 was selected in the function BATCH SELECTOR (7200), only the values of BATCH # 1 (batch name, batch quantity, etc.) can be displayed. Factory setting: OFF
100% VALUE	2221	Note! This function is only available if VOLUME FLOW IN % or MASS FLOW IN % was selected in the function ASSIGN (2220). Use this function to define the flow value to be shown on the display as the 100% value. User input: 5-digit floating-point number Factory setting: Depends on nominal diameter and country (s. page 141 ff.).

Function description		
USER INTERFACE → MAIN LINE → MULTIPLEX		
FORMAT	2222	Use this function to define the maximum number of places after the decimal point for the second value displayed in the main line. Options: XXXXX. – XXXX.X – XXX.XX – XX.XXX – X.XXXX Factory setting: X.XXXX  Note! ■ Note that this setting only affects the reading as it appears on the display, it has no influence on the accuracy of the system's calculations. ■ The places after the decimal point as computed by the measuring device cannot always be displayed, depending on this setting and the engineering unit. In such instances an arrow appears on the display between the measuring value and the engineering unit (e.g. 1.2 → kg/h), indicating that the measuring system is computing with more decimal places than can be shown on the display.

5.3 Group ADDITIONAL LINE

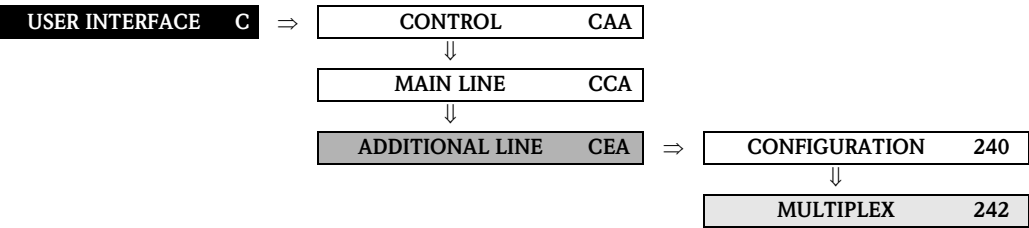
5.3.1 Function group CONFIGURATION



Function description		
USER INTERFACE → ADDITIONAL LINE → CONFIGURATION		
		1 2 3 Esc 1= main line, 2 = additional line, 3 = information line A0001253
ASSIGN	2400	In this function, a value to be displayed is assigned to the additional line (middle line in the local display). This value is displayed during normal operation. Options: OFF VOLUME FLOW MASS FLOW VOLUME FLOW IN % MASS FLOW IN % VOLUME FLOW BARGRAPH IN % MASS FLOW BARGRAPH IN % FLOW VELOCITY ACTUAL CURRENT 1 ACTUAL FREQUENCY 1 AI1 - OUT VALUE AI2 - OUT VALUE AO - DISP. VALUE TOT. 1 OUT VALUE (totalizer 1) TOT. 2 OUT VALUE (totalizer 2) TOT. 3 OUT VALUE (totalizer 3) TAG NAME Advanced options with optional software package BATCHING: BATCH NAME ("BATCH # 1" or "BEER 330", etc.) BATCH QUANTITY (overall quantity to be batched) BATCH COUNTER (batching processes carried out) BATCH SUM (effective total batching quantity) BATCH UPWARDS (batching progress upwards) BATCH DOWNWARDS (batching progress downwards) Note! The options given in the BATCHING software package always refer to the batching selected ("BATCH # 1", "BATCH # 2", etc.) in the function BATCH SELECTOR (page 118). Example: If the option BATCH # 1 was selected in the function BATCH SELECTOR (7200), only the values of BATCH # 1 (batch name, batch quantity, etc.) can be displayed. Factory setting: TOT. 1 OUT VALUE (totalizer 1)

Function description	
USER INTERFACE → ADDITIONAL LINE → CONFIGURATION	
100% VALUE2401	Note! This function is not available unless one of the following was selected in the function ASSIGN (2400): ■ VOLUME FLOW IN % ■ MASS FLOW IN % ■ VOLUME FLOW BARGRAPH IN % ■ MASS FLOW BARGRAPH IN % Use this function to define the flow value to be shown on the display as the 100% value. User input: 5-digit floating-point number Factory setting: Depends on nominal diameter and country (s. page 141 ff.).
FORMAT2402	Note! This function is not available unless a number was selected in the function ASSIGN (2400). Use this function to define the maximum number of places after the decimal point displayed for the reading in the additional line. Options: XXXXX. – XXXX.X – XXX.XX – XX.XXX – X.XXXX Factory setting: X.XXXX Note! ■ Note that this setting only affects the reading as it appears on the display, it has no influence on the accuracy of the system's calculations. ■ The places after the decimal point as computed by the measuring device cannot always be displayed, depending on this setting and the engineering unit. In such instances an arrow appears on the display between the measuring value and the engineering unit (e.g. 1.2 → kg/h), indicating that the measuring system is computing with more decimal places than can be shown on the display.
DISPLAY MODE2403	Note! This function is only available if VOLUME FLOW BARGRAPH IN % or MASS FLOW BARGRAPH IN % was selected in the function ASSIGN (2400). Use this function to define the format of the bar graph. Options: STANDARD (Simple bar graph with 25 / 50 / 75% gradations and integrated sign). +25+50+75% A0001258 SYMMETRY (Symmetrical bar graph for positive and negative directions of flow, with –50 / 0 / +50% gradations and integrated sign). -50-+50% A0001259 Factory setting: STANDARD

5.3.2 Function group MULTIPLEX

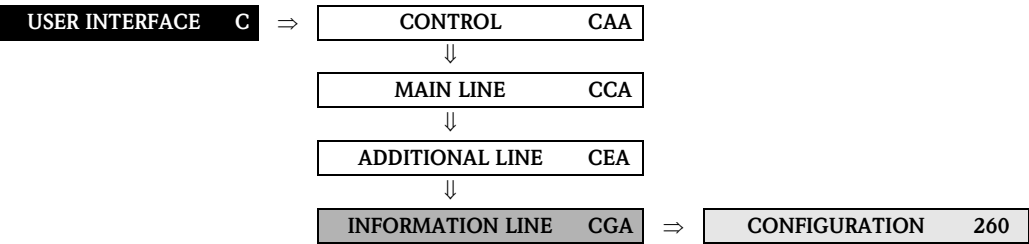


Function description		
USER INTERFACE → ADDITIONAL LINE → MULTIPLEX		
ASSIGN	2420	Use this function to define the second reading to be displayed in the additional line alternately (every 10 seconds) with the value defined in the function ASSIGN (2400). Options: OFF VOLUME FLOW MASS FLOW VOLUME FLOW IN % MASS FLOW IN % VOLUME FLOW BARGRAPH IN % MASS FLOW BARGRAPH IN % FLOW VELOCITY ACTUAL CURRENT 1 ACTUAL FREQUENCY 1 AI1 - OUT VALUE AI2 - OUT VALUE AO - DISP. VALUE TOT. 1 OUT VALUE (totalizer 1) TOT. 2 OUT VALUE (totalizer 2) TOT. 3 OUT VALUE (totalizer 3) TAG NAME Advanced options with optional software package BATCHING: BATCH NAME ("BATCH # 1" or "BEER 330", etc.) BATCH QUANTITY (overall quantity to be batched) BATCH COUNTER (batching processes carried out) BATCH SUM (effective total batching quantity) BATCH UPWARDS (batching progress upwards) BATCH DOWNWARDS (batching progress downwards) Note! The options given in the BATCHING software package always refer to the batching selected ("BATCH # 1", "BATCH # 2", etc.) in the function BATCH SELECTOR (page 118). Example: If the option BATCH # 1 was selected in the function BATCH SELECTOR (7200), only the values of BATCH # 1 (batch name, batch quantity, etc.) can be displayed. Factory setting: OFF Note! Multiplex mode is suspended as soon as a fault / notice message is generated. The message in question appears on the display. Once the fault is eliminated, the measuring device resumes operation in Multiplex mode and the error message is no longer displayed on the local display.

Function description	
USER INTERFACE → ADDITIONAL LINE → MULTIPLEX	
100% VALUE2421	Note! This function is not available unless one of the following was selected in the function ASSIGN (2420): ■ VOLUME FLOW IN % ■ MASS FLOW IN % ■ VOLUME FLOW BARGRAPH IN % ■ MASS FLOW BARGRAPH IN % Use this function to define the flow value to be shown on the display as the 100% value. User input: 5-digit floating-point number Factory setting: Depends on nominal diameter and country (s. page 141 ff.).
FORMAT2422	Note! This function is not available unless a number was selected in the function ASSIGN (2420). Use this function to define the maximum number of places after the decimal point for the second value displayed in the additional line. Options: XXXXX. – XXXX.X – XXX.XX – XX.XXX – X.XXXX Factory setting: X.XXXX Note! ■ Note that this setting only affects the reading as it appears on the display, it has no influence on the accuracy of the system's calculations. ■ The places after the decimal point as computed by the measuring device cannot always be displayed, depending on this setting and the engineering unit. In such instances an arrow appears on the display between the measuring value and the engineering unit (e.g. 1.2 → kg/h), indicating that the measuring system is computing with more decimal places than can be shown on the display.
DISPLAY MODE2423	Note! This function is only available if VOLUME FLOW BARGRAPH IN % or MASS FLOW BARGRAPH IN % was selected in the function ASSIGN (2420). Use this function to define the format of the bar graph. Options: STANDARD (Simple bar graph with 25 / 50 / 75% gradations and integrated sign). +25+50+75% A0001258 SYMMETRY (Symmetrical bar graph for positive and negative directions of flow, with –50 / 0 / +50% gradations and integrated sign). -50+50% A0001259 Factory setting: STANDARD

5.4 Group INFORMATION LINE

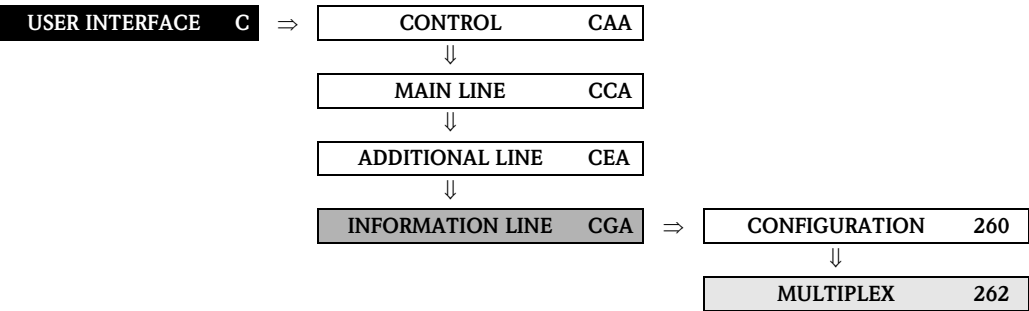
5.4.1 Function group CONFIGURATION



Function description		
USER INTERFACE → INFORMATION LINE → CONFIGURATION		
1 2 3 Esc 1 = main line, 2 = additional line, 3 = information line A0001253		
ASSIGN	2600	In this function, a value to be displayed is assigned to the information line (bottom line in the local display). This value is displayed during normal operation. Options: OFF VOLUME FLOW IN % MASS FLOW IN % VOLUME FLOW BARGRAPH IN % MASS FLOW BARGRAPH IN % FLOW VELOCITY ACTUAL CURRENT 1 ACTUAL FREQUENCY 1 AI1 - OUT VALUE AI2 - OUT VALUE AO - DISP. VALUE TOT. 1 OUT VALUE (totalizer 1) TOT. 2 OUT VALUE (totalizer 2) TOT. 3 OUT VALUE (totalizer 3) TAG NAME OPERATING/SYSTEM CONDITIONS DISPLAY FLOW DIRECTION Advanced options with optional software package BATCHING: BATCHING KEYS (softkeys on the local display) Note! ■ If you select the BATCHING OPERATING KEYS, the multiplex display functionality (function ASSIGN (2620), etc.) is not available in the information line. ■ For information on the functional concept of the batching menu, see chapter “Operation” in the see Operating Instructions Promag 53 PROFIBUS DP/PA, BA053D/06/en. Factory setting: OPERATING/SYSTEM CONDITIONS

Function description	
USER INTERFACE → INFORMATION LINE → CONFIGURATION	
100% VALUE2601	 Note! This function is not available unless one of the following was selected in the function ASSIGN (2600): ■ VOLUME FLOW IN % ■ MASS FLOW IN % ■ VOLUME FLOW BARGRAPH IN % ■ MASS FLOW BARGRAPH IN % Use this function to define the flow value to be shown on the display as the 100% value. User input: 5-digit floating-point number Factory setting: Depends on nominal diameter and country (s. page 141 ff.).
FORMAT2602	 Note! This function is not available unless a number was selected in the function ASSIGN (2600). Use this function to define the maximum number of places after the decimal point displayed for the reading in the information line. Options: XXXXX. – XXXX.X – XXX.XX – XX.XXX – X.XXXX Factory setting: X.XXXX  Note! ■ Note that this setting only affects the reading as it appears on the display, it has no influence on the accuracy of the system's calculations. ■ The places after the decimal point as computed by the measuring device cannot always be displayed, depending on this setting and the engineering unit. In such instances an arrow appears on the display between the measuring value and the engineering unit (e.g. 1.2 → kg/h), indicating that the measuring system is computing with more decimal places than can be shown on the display.
DISPLAY MODE2603	 Note! This function is only available if VOLUME FLOW BARGRAPH IN % or MASS FLOW BARGRAPH IN % was selected in the function ASSIGN (2600). Use this function to define the format of the bar graph. Options: STANDARD (Simple bar graph with 25 / 50 / 75% gradations and integrated sign).  SYMMETRY (Symmetrical bar graph for positive and negative directions of flow, with –50 / 0 / +50% gradations and integrated sign).  Factory setting: STANDARD

5.4.2 Function group MULTIPLEX



Function description		
USER INTERFACE → INFORMATION LINE → MULTIPLEX		
 Note! If you select BATCHING OPERATING KEYS in the function ASSIGN (2600), the multiplex display functionality is not available in the information line.		
ASSIGN	2620	Use this function to define the second reading to be displayed in the information line alternately (every 10 seconds) with the value defined in the function ASSIGN (2600). Options: OFF VOLUME FLOW IN % MASS FLOW IN % VOLUME FLOW BARGRAPH IN % MASS FLOW BARGRAPH IN % FLOW VELOCITY ACTUAL CURRENT 1 ACTUAL FREQUENCY 1 AI1 - OUT VALUE AI2 - OUT VALUE AO - DISP. VALUE TOT. 1 OUT VALUE (totalizer 1) TOT. 2 OUT VALUE (totalizer 2) TOT. 3 OUT VALUE (totalizer 3) TAG NAME OPERATING/SYSTEM CONDITIONS DISPLAY FLOW DIRECTION Factory setting: OFF  Note! Multiplex mode is suspended as soon as a fault / notice message is generated. The message in question appears on the display. Once the fault is eliminated, the measuring device resumes operation in Multiplex mode and the error message is no longer displayed on the local display.

Function description	
USER INTERFACE → INFORMATION LINE → MULTIPLEX	
100% VALUE 2621	 Note! This function is not available unless one of the following was selected in the function ASSIGN (2620): ■ VOLUME FLOW IN % ■ MASS FLOW IN % ■ VOLUME FLOW BARGRAPH IN % ■ MASS FLOW BARGRAPH IN % Use this function to define the flow value to be shown on the display as the 100% value. User input: 5-digit floating-point number Factory setting: Depends on nominal diameter and country (s. page 141 ff.).
FORMAT 2622	 Note! This function is not available unless a number was selected in the function ASSIGN (2600). Use this function to define the maximum number of places after the decimal point for the second value displayed in the information line. Options: XXXXX. – XXXX.X – XXX.XX – XX.XXX – X.XXXX Factory setting: X.XXXX  Note! ■ Note that this setting only affects the reading as it appears on the display, it has no influence on the accuracy of the system's calculations. ■ The places after the decimal point as computed by the measuring device cannot always be displayed, depending on this setting and the engineering unit. In such instances an arrow appears on the display between the measuring value and the engineering unit (e.g. 1.2 → kg/h), indicating that the measuring system is computing with more decimal places than can be shown on the display.
DISPLAY MODE 2623	 Note! This function is only available if VOLUME FLOW BARGRAPH IN % or MASS FLOW BARGRAPH IN % was selected in the function ASSIGN (2620). Use this function to define the format of the bar graph. Options: STANDARD (Simple bar graph with 25 / 50 / 75% gradations and integrated sign). SYMMETRY (Symmetrical bar graph for positive and negative directions of flow, with –50 / 0 / +50% gradations and integrated sign). Factory setting: STANDARD

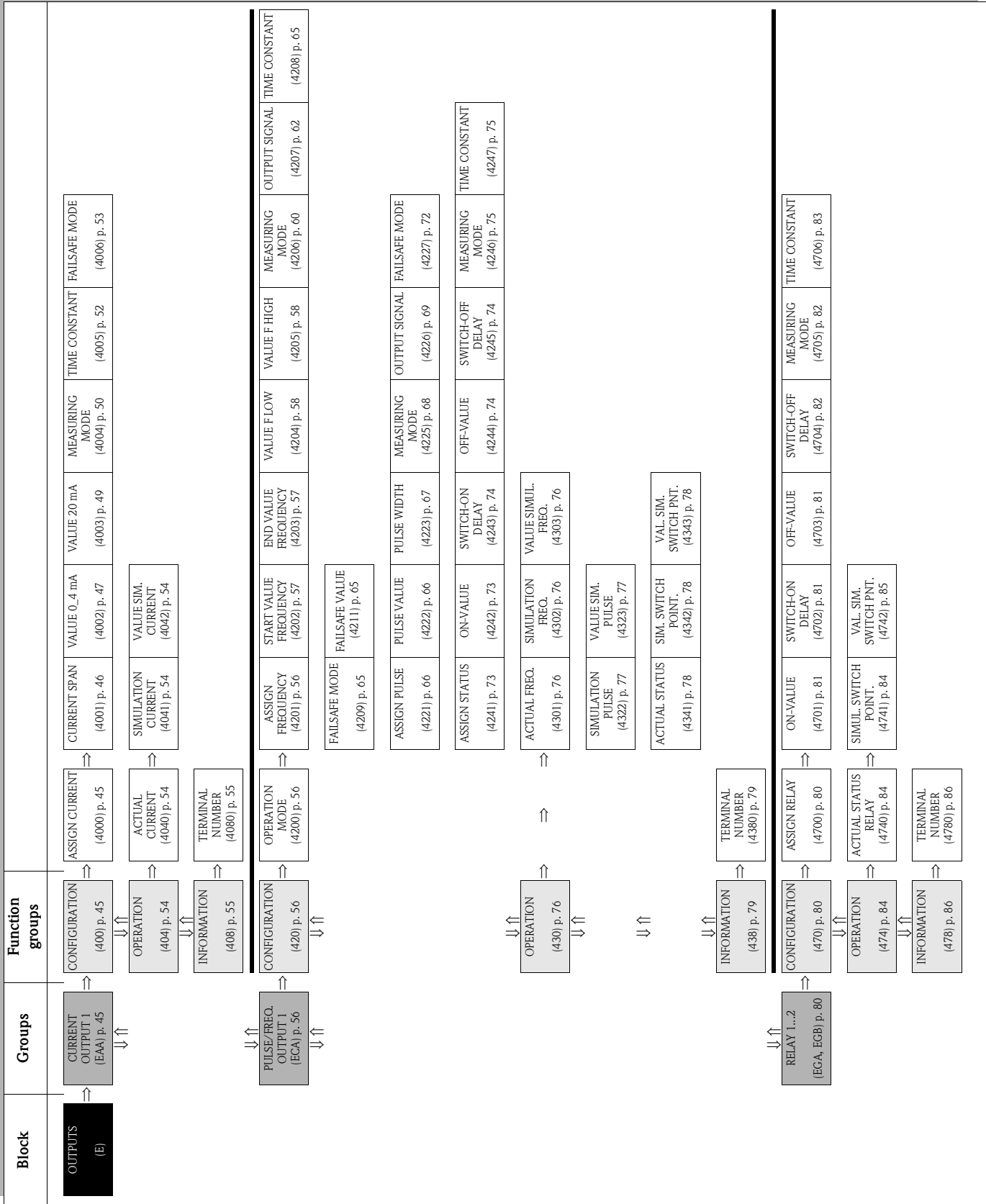
A0001258

A0001258

6 Block OUTPUTS



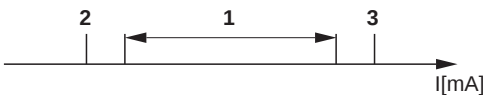
Note!
This block is not available for all devices → page 8 (Available blocks, groups, etc.).

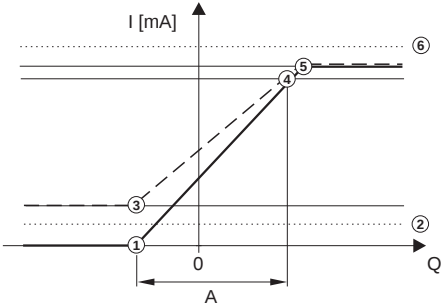


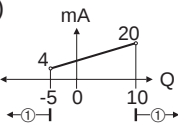
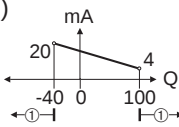
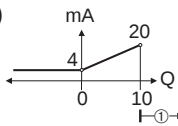
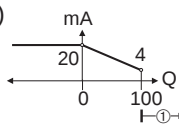
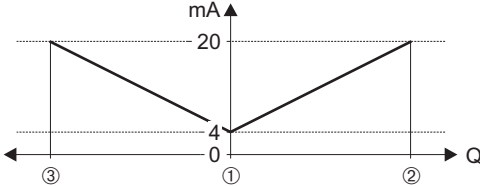
6.1 Group CURRENT OUTPUT 1

6.1.1 Function group CONFIGURATION

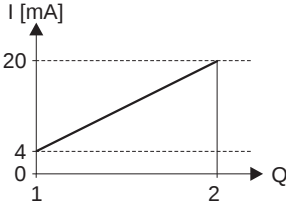
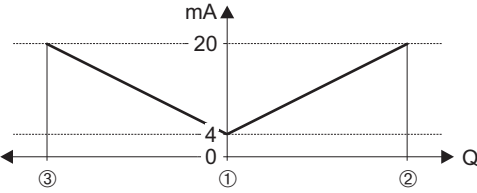
OUTPUTS	E	⇒	CURRENT OUTPUT 1	EAA	⇒	CONFIGURATION	400
Function description OUTPUTS → CURRENT OUTPUT 1 → CONFIGURATION (only with PROFIBUS DP)							
ASSIGN CURRENT OUTPUT		4000	Use this function to assign a measured variable to the current output. Options: OFF MASS FLOW VOLUME FLOW Factory setting: VOLUME FLOW  Note! If you select OFF, the only function shown in the function group CONFIGURATION (400) is this function, in other words, ASSIGN CURRENT OUTPUT (4000).				

Function description																													
OUTPUTS → CURRENT OUTPUT 1 → CONFIGURATION (only with PROFIBUS DP)																													
CURRENT SPAN 4001	Use this function to define the current span. This selection defines the operational range and the upper and lower signal on alarm. For the current output 1 the option HART can be defined additionally. Options: 0–20 mA (25 mA) 4–20 mA (25 mA) 0–20 mA 4–20 mA 4–20 mA NAMUR 4–20 mA US Factory setting: 4–20 mA NAMUR  Note! When switching the hardware from an active (factory setting) to a passive output signal, select a current span of 4–20 mA (please refer to the Operating Instructions BA053D/06/en). Current span, operational range and signal on alarm level  <table><tr><th>a</th><th>1</th><th>2</th><th>3</th></tr><tr><td>0-20 mA (25 mA)</td><td>0 - 24 mA</td><td>0</td><td>25</td></tr><tr><td>4-20 mA (25 mA)</td><td>4 - 24 mA</td><td>2</td><td>25</td></tr><tr><td>0-20 mA</td><td>0 - 20.5 mA</td><td>0</td><td>22</td></tr><tr><td>4-20 mA</td><td>4 - 20.5 mA</td><td>2</td><td>22</td></tr><tr><td>4-20 mA NAMUR</td><td>3.8 - 20.5 mA</td><td>3.5</td><td>22.6</td></tr><tr><td>4-20 mA US</td><td>3.9 - 20.8 mA</td><td>3.75</td><td>22.6</td></tr></table> A0002959 a <i>Current span</i> 1 <i>Operational range (measuring information)</i> 2 <i>Lower signal on alarm level</i> 3 <i>Upper signal on alarm level</i>  Note! ■ If the measured value is outside the measuring range (as defined in the functions VALUE 0_4 mA (4002) and VALUE 20 mA (4003), a notice message is generated (#351...354, current span). ■ In case of a fault the behavior of the current output is according to the selected option in the function FAILSAFE MODE (4006).	a	1	2	3	0-20 mA (25 mA)	0 - 24 mA	0	25	4-20 mA (25 mA)	4 - 24 mA	2	25	0-20 mA	0 - 20.5 mA	0	22	4-20 mA	4 - 20.5 mA	2	22	4-20 mA NAMUR	3.8 - 20.5 mA	3.5	22.6	4-20 mA US	3.9 - 20.8 mA	3.75	22.6
a	1	2	3																										
0-20 mA (25 mA)	0 - 24 mA	0	25																										
4-20 mA (25 mA)	4 - 24 mA	2	25																										
0-20 mA	0 - 20.5 mA	0	22																										
4-20 mA	4 - 20.5 mA	2	22																										
4-20 mA NAMUR	3.8 - 20.5 mA	3.5	22.6																										
4-20 mA US	3.9 - 20.8 mA	3.75	22.6																										

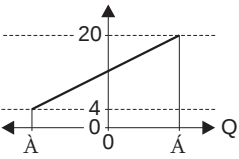
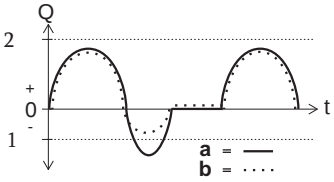
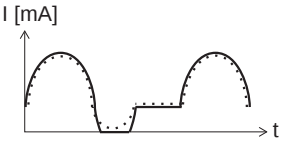
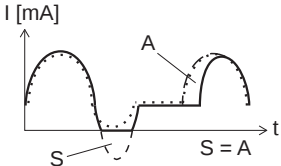
Function description		
OUTPUTS → CURRENT OUTPUT 1 → CONFIGURATION (only with PROFIBUS DP)		
VALUE 0_4 mA	4002	Use this function to assign the 0/4 mA current a value. The value can be higher or lower than the value assigned to 20 mA (function VALUE 20 mA (4003)). Positive and negative values are permissible, depending on the measured variable in question (e.g. volume flow). Example: 4 mA assigned value = -250 l/h 20 mA assigned value = +750 l/h Calculated current value = 8 mA (at zero flow) Note that values with different signs cannot be entered for 0/4 mA and 20 mA (function 4003) if SYMMETRY is the setting selected for the MEASURING MODE function (4004). In this case, the message "INPUT RANGE EXCEEDED" appears on the display. Example for STANDARD measuring mode:  ① = Initial value (0...20 mA) ② = Lower signal on alarm level: depends on the setting in the function CURRENT SPAN ③ = Initial value (4...20 mA): depends on the setting in the function CURRENT SPAN ④ = Full scale value (0/4...20 mA): depends on the setting in the function CURRENT SPAN ⑤ = Maximum current value: depends on the setting in the function CURRENT SPAN ⑥ = Failsafe mode (upper signal on alarm level): depends on the setting in the functions CURRENT SPAN (s. page 46) and FAILSAFE MODE, (s. page 53) A = Measuring range (the minimum measuring range has to exceed the value that correlates with a flow velocity of 0.3 m/s) User input: 5-digit floating-point number, with sign Factory setting: 0 [unit]  Note! ■ The appropriate unit is taken from the function UNIT VOLUME FLOW (0402) or UNIT MASS FLOW (0400), (see page 13 or page 12).  Caution! The current output responds differently, depending on the parameters set in the various functions. Some examples of parameter settings and their effect on the current output are given in the following section. (continued on next page)

Function description	
OUTPUTS → CURRENT OUTPUT 1 → CONFIGURATION (only with PROFIBUS DP)	
VALUE 0_4 mA 4002 (continued)	Parameter setting example A: 1. VALUE 0_4 mA (4002) = not equal to zero flow (e.g. -5 m³/h) VALUE 20 mA (4003) = not equal to zero flow (e.g. 10 m³/h) or 2. VALUE 0_4 mA (4002) = not equal to zero flow (e.g. 100 m³/h) VALUE 20 mA (4003) = not equal to zero flow (e.g. -40 m³/h) and MEASURING MODE (4004) = STANDARD When you enter the values for 0/4 mA and 20 mA, the working range of the measuring device is defined. If the effective flow drops below or exceeds this working range (see ①), a fault/notice message is generated (#351-354, current range) and the current output responds in accordance with the parameter settings in the function FAILSAFE MODE (4006). 1) 2) A0001262 Parameter setting example B: 1. VALUE 0_4 mA (4002) = equal to zero flow (e.g. 0 m³/h) VALUE 20 mA (4003) = not equal to zero flow (e.g. 10 m³/h) or 2. VALUE 0_4 mA (4002) = not equal to zero flow (e.g. 100 m³/h) VALUE 20 mA (4003) = equal to zero flow (e.g. 0 m³/h) and MEASURING MODE (4004) = STANDARD When you enter the values for 0/4 mA and 20 mA, the working range of the measuring device is defined. One of the two values here is configured as zero flow (e.g. 0 m³/h). If the effective flow drops below or exceeds the value parameterized as the zero flow, no fault/notice message is generated and the current output retains its value. If the effective flow drops below or exceeds the other value, a fault/notice message is generated (#351-354, current range) and the current output responds in accordance with the parameter settings in the function FAILSAFE MODE (4006). 1) 2) A0001264 Deliberately only one flow direction is output with this setting and flow values in the other flow direction are suppressed. Parameter setting example C: MEASURING MODE (4004) = SYMMETRY The current output signal is independent of the direction of flow (absolute amount of the measured variable). The 0_4 mA VALUE ① and the 20 mA VALUE ② must have the same sign (+ or -). The "20 mA VALUE" ③ (e.g. backflow) corresponds to the mirrored 20 mA VALUE ② (e.g. flow).  A0001249 ASSIGN RELAY (4700) = FLOW DIRECTION With this setting e.g. the flow direction output via a switching contact can be made. Parameter setting example D: MEASURING MODE (4004) = PULSATING FLOW → page 50 ff.

Function description		
OUTPUTS → CURRENT OUTPUT 1 → CONFIGURATION (only with PROFIBUS DP)		
VALUE 20 mA	4003	Use this function to assign the 20 mA current a value. The value can be higher or lower than the value assigned to 0/4 mA (function VALUE 0_4 mA (4002), see page 47). Positive and negative values are permissible, depending on the measured variable in question (e.g. volume flow). Example: 4 mA assigned value = -250 l/h 20 mA assigned value = +750 l/h Calculated current value = 8 mA (at zero flow) Note that values with different signs cannot be entered for 0/4 mA (function 4002) and 20 mA, if SYMMETRY is the setting selected in the function MEASURING MODE (4004). In this case, the message "INPUT RANGE EXCEEDED" appears. Example for STANDARD measuring mode → page 47 User input: 5-digit floating-point number, with sign Factory setting: Depends on nominal diameter and country (s. page 141 ff.).  Note! ■ The appropriate unit is taken from the function UNIT VOLUME FLOW (0402) or UNIT MASS FLOW (0400).  Caution! It is very important to read and comply with the information in the function VALUE 0_4 mA (under "⚠ Caution"; Examples of parameter settings) on page 47.

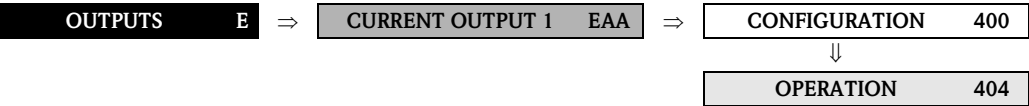
Function description		
OUTPUTS → CURRENT OUTPUT 1 → CONFIGURATION (only with PROFIBUS DP)		
MEASURING MODE	4004	Use this function to define the measuring mode for the current output. Options: STANDARD SYMMETRY PULSATING FLOW Factory setting: STANDARD Description of the individual options: ■ STANDARD The current output signal is proportional to the measured variable. The flow components outside the scaled measuring range (defined by the 0_4 mA VALUE ① and the 20 mA VALUE ②) are taken into account as follows for signal output. – If one of the values is defined as equal to the zero flow (e.g. VALUE 0_4 mA = 0 m³/h), no message is given if this value is exceeded or not achieved and the current output retains its value (4 mA in the example). If the other value is exceeded or not achieved, the message “CURRENT OUTPUT AT FULL SCALE VALUE” appears and the current output responds in accordance with the parameter setting in the function FAILSAFE MODE (4006). – If both values defined are not equal to the zero flow (for example VALUE 0_4 mA = -5 m³/h; VALUE 20 mA = 10m³/h), the message “CURRENT OUTPUT AT FULL SCALE VALUE” appears if the measuring range is exceeded or not achieved and the current output responds in accordance with the parameter setting in the function FAILSAFE MODE (4006).  A0001248 ■ SYMMETRY The current output signal is independent of the direction of flow (absolute amount of the measured variable). The 0_4 mA VALUE ① and the 20 mA VALUE ② must have the same sign (+ or -). The “20 mA VALUE” ③ (e.g. backflow) corresponds to the mirrored 20 mA VALUE ② (e.g. flow).  A0001249  Note! ■ The direction of flow can be output via the configurable relay or status outputs. ■ SYMMETRY cannot be selected unless the values in the VALUE 0_4 mA (4002) and VALUE 20 mA (4003) functions have the same sign or one of the values is zero. If the values have different signs, SYMMETRY cannot be selected and an “ASSIGNMENT NOT POSSIBLE” message is displayed. (continued on next page)

Function description	
OUTPUTS → CURRENT OUTPUT 1 → CONFIGURATION (only with PROFIBUS DP)	
MEASURING MODE (continued)	4004 ■ PULSATING FLOW If flow is characterized by severe fluctuations as is the case, for example, with reciprocating pumps, flow components outside the measuring range are buffered, balanced and output after a maximum delay of 60 seconds. If the buffered data cannot be processed within approx. 60 seconds, a fault/notice message appears. Under certain plant conditions, flow values can aggregate in the buffer, for example in the case of prolonged and unwanted fluid backflow. However, this buffer is reset in all relevant programming adjustments which affect the current output.
Detailed explanations and information	How the current output responds under the following postulated conditions: 1. Defined measuring range (①–②): ① and ② have the same sign I [mA] 20 4 0 1 2 Q and the following flow behavior: Q t ■ STANDARD The current output signal is proportional to the measured variable. The flow components outside the scaled measuring range are not taken into account for signal output. I [mA] t ■ SYMMETRY The current output signal is independent of the direction of flow. I [mA] t ■ PULSATING FLOW Flow components outside the measuring range are buffered, balanced and output after a maximum delay of 60 seconds. I [mA] t S = A

Function description	
OUTPUTS → CURRENT OUTPUT 1 → CONFIGURATION (only with PROFIBUS DP)	
Detailed explanations and information (continued)	2. Defined measuring range (①–②): ① and ② do not have the same sign.  A0001272 Flow a (—) outside, b (---) within the measuring range.  A0001273 ■ STANDARD a (—): The flow components outside the scaled measuring range cannot be taken into account for signal output. A fault message is generated (# 351...354, current range) and the current output responds in accordance with the parameter settings in the function FAILSAFE MODE (4006). b (---): The current output signal is proportional to the measured variable assigned.  A0001274 ■ SYMMETRY This option is not available under these circumstances because the 0_4 mA value and the 20 mA value have different signs. ■ PULSATING FLOW Flow components outside the measuring range are buffered, balanced and output after a maximum delay of 60 seconds.  A0001275
TIME CONSTANT 4005	Use this function to enter a time constant defining how the current output signal reacts to severely fluctuating measured variables, either very quickly (enter a low time constant) or with damping (enter a high time constant). User input: fixed-point number 0.01...100.00 s Factory setting: 3.00 s

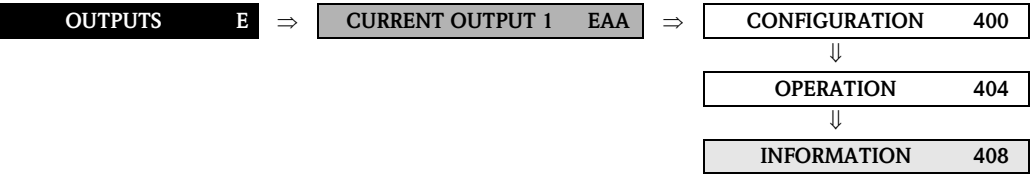
Function description	
OUTPUTS → CURRENT OUTPUT 1 → CONFIGURATION (only with PROFIBUS DP)	
FAILSAFE MODE 4006	For safety reasons it is advisable to ensure that the current output assumes a predefined state in the event of a fault. The setting you select here affects only the current output. It has no effect on other outputs and the display (e.g. totalizers). Options: MIN. CURRENT The current output adopts the value of the lower signal on alarm level (as defined in the function CURRENT SPAN (4001, page 46). MAX. CURRENT The current output adopts the value of the upper signal on alarm level (as defined in the function CURRENT SPAN (4001, page 46). HOLD VALUE (not recommended) Measuring value output is based on the last measuring value saved before the error occurred . ACTUAL VALUE Measuring value output is based on the current flow measurement. The fault is ignored. Factory setting: MIN. CURRENT

6.1.2 Function group OPERATION



Function description	
OUTPUTS → CURRENT OUTPUT 1 → OPERATION (only with PROFIBUS DP)	
ACTUAL CURRENT 4040	Use this function to view the computed actual value of the output current. Display: 0.00...25.00 mA
SIMULATION CURRENT 4041	Use this function to activate simulation of the current output. Options: OFF ON Factory setting: OFF  Note! ■ The “SIMULATION CURRENT OUTPUT” message indicates that simulation is active. ■ The measuring device continues to measure while simulation is in progress, i.e. the current measured values are output correctly via the other outputs.  Caution! The setting is not saved in the event of a power failure.
VALUE SIMULATION CURRENT 4042	 Note! The function is not visible unless the SIMULATION CURRENT function (4041) is active (= ON). Use this function to define a freely selectable value (e.g. 12 mA) to be output at the current output. This value is used to test downstream devices and the measuring device itself. User input: 0.00...25.00 mA Factory setting: 0.00 mA  Caution! The setting is not saved in the event of a power failure.

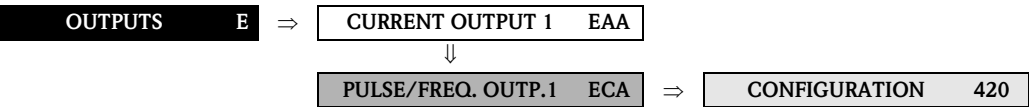
6.1.3 **Function group INFORMATION**



Function description		
OUTPUTS → CURRENT OUTPUT 1 → INFORMATION (only with PROFIBUS DP)		
TERMINAL NUMBER	4080	Use this function to display the numbers of the terminals (in the connection compartment) which are used by the current output. Display: 20 (+) / 21 (-)

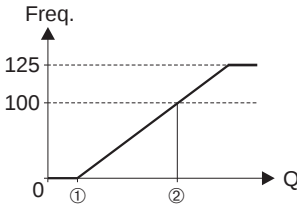
6.2 Group PULSE-/FREQUENCY OUTPUT 1

6.2.1 Function group CONFIGURATION

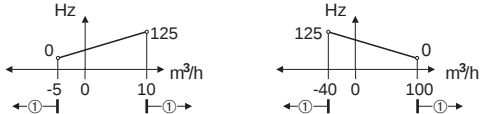
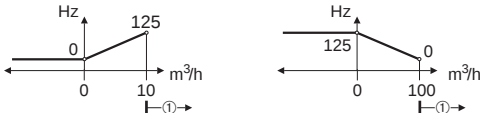
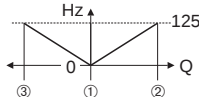


Function description	
OUTPUTS → PULSE-/FREQUENCY OUTPUT 1 → CONFIGURATION (GENERAL / FREQUENCY) (only with PROFIBUS DP)	
OPERATION MODE 4200	Use this function to configure the output as a pulse output, frequency output or status output. The functions available in this function group vary, depending on which option you select here. Options: PULSE FREQUENCY STATUS Factory setting: PULSE
ASSIGN FREQUENCY 4201	 Note! This function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function (4200). Use this function to assign a measured variable to the frequency output. Options: OFF MASS FLOW VOLUME FLOW Factory setting: VOLUME FLOW  Note! If you select OFF, the only function shown in the CONFIGURATION function group is this function, in other words ASSIGN FREQUENCY (4201).

Function description	
OUTPUTS → PULSE-/FREQUENCY OUTPUT 1 → CONFIGURATION (FREQUENCY) (only with PROFIBUS DP)	
START VALUE FREQUENCY 4202	 Note! This function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function (4200). Use this function to define an initial frequency for the frequency output. You define the associated measuring value of the measuring range in the VALUE F LOW function (4204) described on page 58. User input: 5-digit fixed-point number: 0...10000 Hz Factory setting: 0 Hz Example: ■ VALUE F LOW = 0 l/h, initial frequency = 0 Hz: i.e. a frequency of 0 Hz is output at a flow of 0 l/h. ■ VALUE F LOW = 1 l/h, initial frequency = 10 Hz: i.e. a frequency of 10 Hz is output at a flow of 1 l/h.
END VALUE FREQUENCY 4203	 Note! This function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function (4200). Use this function to define a full scale frequency for the frequency output. You define the associated measuring value of the measuring range in the VALUE F HIGH function (4205) described on page 58. User input: 5-digit fixed-point number 2...10000 Hz Factory setting: 10000 Hz Example: ■ VALUE F HIGH = 1000 l/h, full scale value frequency = 1000 Hz: i.e. a frequency of 1000 Hz is output at a flow of 1000 l/h. ■ VALUE F HIGH = 3600 l/h, full scale value frequency = 1000 Hz: i.e. a frequency of 1000 Hz is output at a flow of 3600 l/h.  Note! In the FREQUENCY operating mode the output signal is symmetrical (on/off ratio = 1:1). At low frequencies the pulse duration is limited to a maximum of 2 seconds, i.e. the on/off ratio is no longer symmetrical.

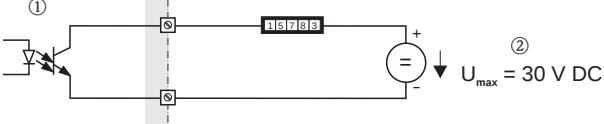
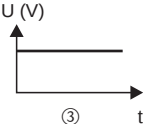
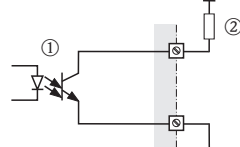
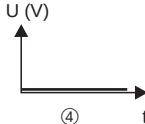
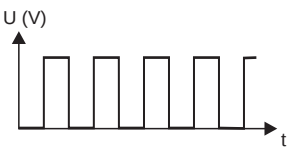
Function description	
OUTPUTS → PULSE-/FREQUENCY OUTPUT 1 → CONFIGURATION (FREQUENCY) (only with PROFIBUS DP)	
VALUE F LOW 4204	 Note! This function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function (4200). Use this function to assign a variable to the start value frequency (4202). The value can be higher or lower than the value assigned to the VALUE F HIGH. Positive and negative values are permissible, depending on the measured variable in question (e.g. volume flow). You define a measuring range by defining the VALUE F LOW and VALUE F HIGH values. User input: 5-digit floating-point number Factory setting: 0 [unit]  Note! ■ For graphic illustration of VALUE F LOW see function VALUE F HIGH. ■ The appropriate unit is taken from the function UNIT VOLUME FLOW (0402) or UNIT MASS FLOW (0400), (see page 13 or page 12).
VALUE F HIGH 4205	 Note! This function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function (4200). Use this function to assign a variable to the end value frequency (4203). The value can be higher or lower than the value assigned to the VALUE F LOW. Positive and negative values are permissible, depending on the measured variable in question (e.g. volume flow). You define a measuring range by defining the VALUE F LOW and VALUE F HIGH values. User input: 5-digit floating-point number Factory setting: Depends on nominal diameter and country (s. page 141 ff.).  Note! Note that values with different signs cannot be entered for VALUE F LOW and VALUE F HIGH, if SYMMETRY is the setting selected for the MEASURING MODE function (4206). In this case, the message “INPUT RANGE EXCEEDED” appears on the display.  ① = Value-f min. ② = Value-f high (continued on next page)

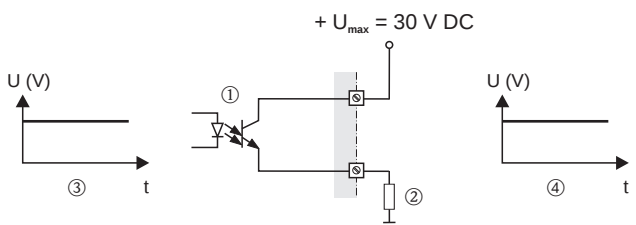
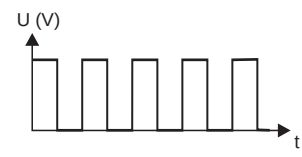
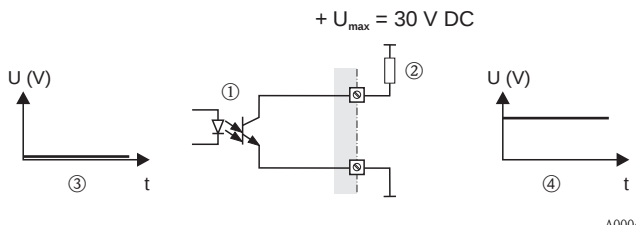
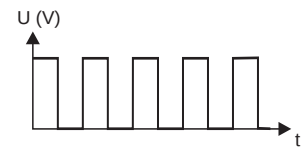
A0001279

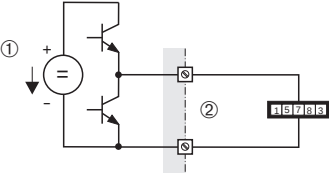
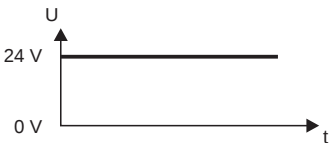
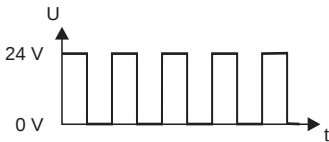
Function description	
OUTPUTS → PULSE-/FREQUENCY OUTPUT 1 → CONFIGURATION (FREQUENCY) (only with PROFIBUS DP)	
VALUE F HIGH 4205 (continued)	Parameter setting example 1: - VALUE F LOW (4204) = not equal to zero flow (e.g. -5 m³/h) VALUE F HIGH (4205) = not equal to zero flow (e.g. 10 m³/h) or - VALUE F LOW (4204) = not equal to zero flow (e.g. 100 m³/h) VALUE F HIGH (4205) = not equal to zero flow (e.g. 40 m³/h) and MEASURING MODE (4004) = STANDARD When you enter the values for VALUE F LOW and VALUE F HIGH the working range of the measuring device is defined. If the effective flow drops below or exceeds this working range (see ①), a fault or notice message is generated (#355–358, frequency area) and the frequency output responds in accordance with the parameter settings in the function FAILSAFE MODE (4209).  a0001276 Parameter setting example 2: - VALUE F LOW (4204) = not equal to zero flow (e.g. 0 m³/h) VALUE F HIGH (4205) = not equal to zero flow (e.g. 10 m³/h) or - VALUE F LOW (4204) = not equal to zero flow (e.g. 100 m³/h) VALUE F HIGH (4205) = not equal to zero flow (e.g. 0 m³/h) and MEASURING MODE (4004) = STANDARD When you enter the values for VALUE F LOW and VALUE F HIGH the working range of the measuring device is defined. In doing so, one of the two values is parameterized as zero flow (e.g. 0 m³/h). If the effective flow drops below or exceeds the value parameterized as the zero flow, no fault/notice message is generated and the frequency output retains its value. If the effective flow drops below or exceeds the other value, a fault/notice message is generated (#355–358, frequency area) and the frequency output responds in accordance with the parameters set in the function FAILSAFE MODE (4209).  A0001277 Deliberately only one flow direction is output with this setting and flow values in the other flow direction are suppressed. Parameter setting example 3: MEASURING MODE (4206) = SYMMETRY The frequency output signal is independent of the direction of flow (absolute amount of the measured variable). The VALUE F LOW ① and VALUE F HIGH ② must have the same sign (+ or -). The “VALUE F HIGH” ③ (e.g. backflow) corresponds to the mirrored VALUE F HIGH ② (e.g. flow).  A0001278 ASSIGN RELAY (4700) = FLOW DIRECTION With this setting e.g. the flow direction output via a switching contact can be made. Parameter setting example 4: MEASURING MODE (4004) = PULSATING FLOW → page 50 ff.

Function description	
OUTPUTS → PULSE-/FREQUENCY OUTPUT 1 → CONFIGURATION (FREQUENCY) (only with PROFIBUS DP)	
MEASURING MODE	4206
Note! This function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function (4200). Use this function to define the measuring mode for the frequency output. Options: STANDARD SYMMETRY PULSATING FLOW Factory setting: STANDARD Description of the individual options: ■ STANDARD The frequency output signal is proportional to the measured variable. The flow components outside the scaled measuring range (defined by the VALUE F LOW. ① and VALUE F HIGH. ②) are not taken into account for signal output. – If one of the values is defined as equal to the zero flow (e.g. VALUE F LOW = 0 m³/h), no message is given if this value is exceeded or not achieved and the frequency output retains its value (0 Hz in the example). If the other value is exceeded or not achieved, the message “FREQUENCY OUTPUT AT FULL SCALE VALUE” appears and the frequency output responds in accordance with the parameter setting in the function FAILSAFE MODE (4209). – If both values defined are not equal to the zero flow (for example VALUE F LOW= −5 m³/h; VALUE F HIGH10m³/h), the message “FREQUENCY OUTPUT AT FULL SCALE VALUE” appears if the measuring range is exceeded or not achieved and the frequency output responds in accordance with the parameter settings in the function FAILSAFE MODE (4209). Freq. 125 100 0 ① ② Q A0001279 ■ SYMMETRY The frequency output signal is independent of the direction of flow (absolute amount of the measured variable). The VALUE F LOW ① and VALUE F HIGH ② must have the same sign (+ or −). The VALUE F HIGH ③ (e.g. backflow) corresponds to the mirrored VALUE F HIGH ② (e.g. forward flow). Freq. 125 100 0 ③ ① ② Q A0001280 Note! ■ The direction of flow can be output via the configurable relay or status outputs. ■ SYMMETRY cannot be selected unless the values in the VALUE F LOW (4204) and VALUE F HIGH (4205) functions have the same sign or one of the values is zero. If the values have different signs, SYMMETRY cannot be selected and an “ASSIGNMENT NOT POSSIBLE” message is displayed. (continued on next page)	

Function description		
OUTPUTS → PULSE-/FREQUENCY OUTPUT 1 → CONFIGURATION (FREQUENCY) (only with PROFIBUS DP)		
MEASURING MODE (continued)	4206	■ PULSATING FLOW If flow is characterized by severe fluctuations as is the case, for example, with reciprocating pumps, flow components outside the measuring range are buffered, balanced and output after a maximum delay of 60 seconds. If the buffered data cannot be processed within approx. 60 seconds, a fault/notice message appears. Under certain plant conditions, flow values can aggregate in the buffer, for example in the case of prolonged and unwanted fluid backflow. However, this buffer is reset in all relevant programming adjustments which affect the frequency output.

Function description	
OUTPUTS → PULSE-/FREQUENCY OUTPUT 1 → CONFIGURATION (FREQUENCY) (only with PROFIBUS DP)	
OUTPUT SIGNAL 4207	 Note! Function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function (4200). For selecting the output configuration of the frequency output. Options: PASSIVE - POSITIVE PASSIVE - NEGATIVE ACTIVE - POSITIVE ACTIVE - NEGATIVE Factory setting: PASSIVE - POSITIVE Explanation ■ PASSIVE = power is supplied to the frequency output by means of an external power supply. ■ ACTIVE = power is supplied to the frequency output by means of the device-internal power supply. Configuring the output signal level (POSITIVE or NEGATIVE) determines the quiescent behavior (at zero flow) of the frequency output. The internal transistor is activated as follows: ■ If POSITIVE is selected, the internal transistor is activated with a positive signal level. ■ If NEGATIVE is selected, the internal transistor is activated with a negative signal level (0 V).  Note! With the passive output configuration, the output signal levels of the frequency output depend on the external circuit (see examples). Example for passive output circuit (PASSIVE) If PASSIVE is selected, the frequency output is configured as an open collector.  A0001225 ① = Open Collector ② = External power supply  Note! For continuous currents up to 25 mA ($I_{max} = 250 \text{ mA} / 20 \text{ ms}$). Example for output configuration PASSIVE-POSITIVE: Output configuration with an external pull-up resistance. In the quiescent state (at zero flow), the output signal level at the terminals is 0 V. + $U_{max} = 30 \text{ V DC}$  ③   ④ A0004687 ① = Open Collector ② = Pull-Up-Resistance ③ = Transistor activation in "POSITIVE" quiescent state (at zero flow) ④ = Output signal level in quiescent state (at zero flow) In the operating status (flow present), the output signal level changes from 0 V to a positive voltage level.  A0001975 (continued on next page)

Function description	
OUTPUTS → PULSE-/FREQUENCY OUTPUT 1 → CONFIGURATION (FREQUENCY) (only with PROFIBUS DP)	
OUTPUT SIGNAL 4207 (continued)	Example for output configuration PASSIVE-POSITIVE: Output configuration with an external pull-down resistance. In the quiescent state (at zero flow), a positive voltage level is measured via the pull-down resistance.  ① = Open Collector ② = Pull-Down-Resistance ③ = Transistor activation in “POSITIVE” quiescent state (at zero flow) ④ = Output signal level in quiescent state (at zero flow) In the operating status (flow present), the output signal level changes from a positive voltage level to 0 V.  Example for output configuration PASSIVE-NEGATIVE: Output configuration with an external pull-up resistance. In the quiescent state (at zero flow), the output signal level at the terminals is at a positive voltage level.  ① = Open Collector ② = Pull-Up-Resistance ③ = Transistor activation in “NEGATIVE” quiescent state (at zero flow) ④ = Output signal level in quiescent state (at zero flow) In the operating status (flow present), the output signal level changes from a positive voltage level to 0 V.  (continued on next page)

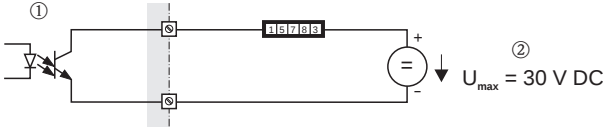
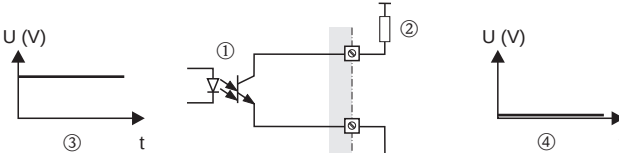
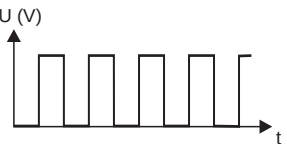
Function description	
OUTPUTS → PULSE-/FREQUENCY OUTPUT 1 → CONFIGURATION (FREQUENCY) (only with PROFIBUS DP)	
OUTPUT SIGNAL 4207 (continued)	Example for active output circuit (ACTIVE): With an active circuit, the internal power supply is 24 V. The frequency output is short-circuit proof.  A0004691 ① = 24 V DC internal power supply ② = Short-circuit proof output The signal levels are to be seen as analogous to the passive circuit. The following applies for the output configuration ACTIVE-POSITIVE: In the quiescent state (at zero flow), the output signal level at the terminals is 0 V.  A0004694 In the operating status (flow present), the output signal level changes from 0 V to a positive voltage level.  A0004692 The following applies for the output configuration ACTIVE-NEGATIVE: In the quiescent state (at zero flow), the output signal level at the terminals is at a positive voltage level.  A0006493 In the operating status (flow present), the output signal level changes from a positive voltage level to 0 V.  A0004710

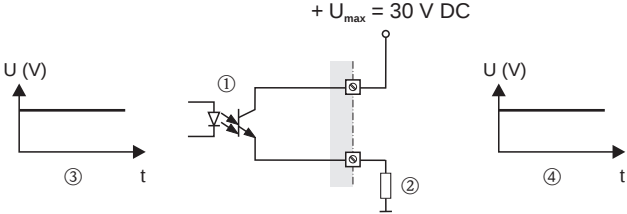
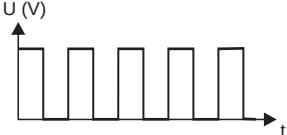
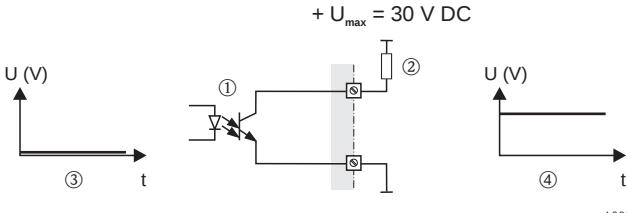
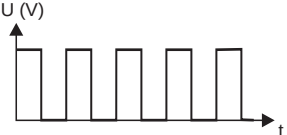
Function description OUTPUTS → PULSE-/FREQUENCY OUTPUT 1 → CONFIGURATION (FREQUENCY) (only with PROFIBUS DP)	
TIME CONSTANT 4208	 Note! This function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function (4200). Use this function to enter a time constant defining how the frequency output signal reacts to severely fluctuating measured variables, either very quickly (enter a low time constant) or with damping (enter a high time constant). User input: fixed-point number 0.00...100.00 s Factory setting: 0.00 s
FAILSAFE MODE 4209	 Note! This function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function (4200). For safety reasons it is advisable to ensure that the frequency output assumes a predefined state in the event of a fault. The setting you select here affects only the frequency output. It has no effect on other outputs and the display (e.g. totalizers). Options: FALLBACK VALUE Output is 0 Hz. FAILSAFE VALUE Output is the frequency specified in the FAILSAFE VALUE function (4211). HOLD VALUE Measuring value output is based on the last measuring value saved before the error occurred . ACTUAL VALUE Measuring value output is based on the current flow measurement. The fault is ignored. Factory setting: FALLBACK VALUE
FAILSAFE VALUE 4211	 Note! This function is not available unless FREQUENCY was selected in the OPERATION MODE function (4200) and FAILSAFE VALUE was selected in the FAILSAFE MODE function (4209). Use this function to define the frequency that the measuring device outputs in the event of an error. User input: max. 5-digit number: 0...12500 Hz Factory setting: 12500 Hz

Function description	
OUTPUTS → PULSE-/FREQUENCY OUTPUT 1 → CONFIGURATION (PULSE) (only with PROFIBUS DP)	
ASSIGN PULSE 4221	 Note! This function is not available unless the PULSE setting was selected in the OPERATION MODE function (4200). Use this function to assign a measured variable to the pulse output. Options: OFF MASS FLOW VOLUME FLOW Factory setting: VOLUME FLOW  Note! If you select OFF, the only function shown in the CONFIGURATION function group is this function, in other words ASSIGN PULSE (4221).
PULSE VALUE 4222	 Note! This function is not available unless the PULSE setting was selected in the OPERATION MODE function (4200). Use this function to define the flow at which a pulse is triggered. These pulses can be totalled by an external totalizer, and the total flow quantity since measuring started can be registered in this way. User input: 5-digit floating-point number [unit] Factory setting: Depends on nominal diameter and country (s. page 141 ff.).  Note! The appropriate unit is taken from the function UNIT VOLUME (0403) or UNIT MASS (0401), (see page 13 or page 12).

Function description	
OUTPUTS → PULSE-/FREQUENCY OUTPUT 1 → CONFIGURATION (PULSE) (only with PROFIBUS DP)	
PULSE WIDTH 4223	Note! This function is not available unless the PULSE setting was selected in the OPERATION MODE function (4200). Use this function to enter the pulse width of the output pulse. User input: 0.05...2000 ms Factory setting: 100 ms Pulse output is always with the pulse width (B) entered in this function. The pauses (P) between the individual pulses are automatically configured. However, they must at least correspond to the pulse width (B = P). transistor conducting nonconducting B P B < P t transistor conducting nonconducting B P B = P t A0001233 B = Pulse width entered (the illustration applies to positive pulses) P= Intervals between the individual pulses Note! When entering the pulse width, select a value that can still be processed by an external totalizer (e.g. mechanical totalizer, PLC, etc.). Caution! If the pulse number or frequency resulting from the pulse value entered, (see function PULSE VALUE (4222) on page 66) and from the current flow is too large to maintain the pulse width selected (the interval P is smaller than the pulse width B entered), a system error message (# 359...362, pulse memory) is generated after buffering/balancing has occurred.

Function description	
OUTPUTS → PULSE-/FREQUENCY OUTPUT 1 → CONFIGURATION (PULSE) (only with PROFIBUS DP)	
MEASURING MODE	4225  Note! This function is not available unless the PULSE setting was selected in the OPERATION MODE function (4200). Use this function to define the measuring mode for the pulse output. Options: STANDARD Only positive flow components are totalled. Negative components are not taken into account. SYMMETRY Positive and negative flow components are taken into account.  Note! The direction of flow can be output via the relay output. PULSATING FLOW If flow is characterized by severe fluctuations as is the case, for example, with reciprocating pumps, the positive and negative flow components are totalled, with the signs taken into account (e.g. -10 l and +25 l = 15 l). Flow components outside the maximum pulse number per second (value/width) are buffered, balanced and output after a maximum delay of 60 seconds. If the buffered data cannot be processed within approx. 60 seconds, a fault/notice message appears. Under certain plant conditions, flow values can aggregate in the buffer, for example in the case of prolonged and unwanted fluid backflow. However, this buffer is reset in all relevant programming adjustments which affect the pulse output. STANDARD REVERSE Only negative flow components are totalled. Positive components are not taken into account. Factory setting: STANDARD

Function description	
OUTPUTS → PULSE-/FREQUENCY OUTPUT 1 → CONFIGURATION (PULSE) (only with PROFIBUS DP)	
OUTPUT SIGNAL 4226	Note! Function is not available unless the PULSE setting was selected in the OPERATION MODE (4200) function. For selecting the output configuration of the pulse output. Options: PASSIVE – POSITIVE PASSIVE – NEGATIVE ACTIVE – POSITIVE ACTIVE – NEGATIVE Factory setting: PASSIVE – POSITIVE Explanation ■ PASSIVE = power is supplied to the pulse output by means of an external power supply. ■ ACTIVE = power is supplied to the pulse output by means of the device-internal power supply. Configuring the output signal level (POSITIVE or NEGATIVE) determines the quiescent behavior (at zero flow) of the pulse output. The internal transistor is activated as follows: ■ If POSITIVE is selected, the internal transistor is activated with a positive signal level. ■ If NEGATIVE is selected, the internal transistor is activated with a negative signal level (0 V). Note! With the passive output configuration, the output signal levels of the pulse output depend on the external circuit (see examples). Example for passive output circuit (PASSIVE) If PASSIVE is selected, the pulse output is configured as an open collector.  A0001225 ① = Open Collector ② = External power supply Note! For continuous currents up to 25 mA ($I_{\max} = 250 \text{ mA} / 20 \text{ ms}$). Example for output configuration PASSIVE-POSITIVE: Output configuration with an external pull-up resistance. In the quiescent state (at zero flow), the output signal level at the terminals is 0 V. + $U_{\max} = 30 \text{ V DC}$  A0004687 ① = Open Collector ② = Pull-Up-Resistance ③ = Transistor activation in “POSITIVE” quiescent state (at zero flow) ④ = Output signal level in quiescent state (at zero flow) In the operating status (flow present), the output signal level changes from 0 V to a positive voltage level.  A0001975 (continued on next page)

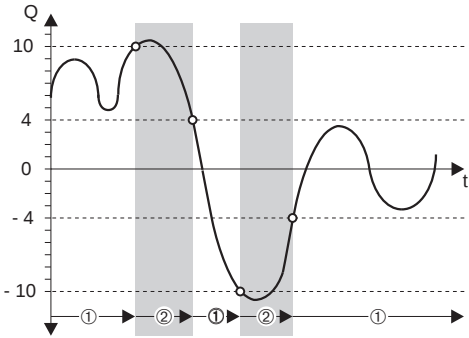
Function description	
OUTPUTS → PULSE-/FREQUENCY OUTPUT 1 → CONFIGURATION (PULSE) (only with PROFIBUS DP)	
OUTPUT SIGNAL 4226 (continued)	Example for output configuration PASSIVE-POSITIVE: Output configuration with an external pull-down resistance. In the quiescent state (at zero flow), a positive voltage level is measured via the pull-down resistance.  ① = Open Collector ② = Pull-Down-Resistance ③ = Transistor activation in "POSITIVE" quiescent state (at zero flow) ④ = Output signal level in quiescent state (at zero flow) In the operating status (flow present), the output signal level changes from a positive voltage level to 0 V.  Example for output configuration PASSIVE-NEGATIVE: Output configuration with an external pull-up resistance. In the quiescent state (at zero flow), the output signal level at the terminals is at a positive voltage level.  ① = Open Collector ② = Pull-Up-Resistance ③ = Transistor activation in "NEGATIVE" quiescent state (at zero flow) ④ = Output signal level in quiescent state (at zero flow) In the operating status (flow present), the output signal level changes from a positive voltage level to 0 V.  (continued on next page)

Function description	
OUTPUTS → PULSE-/FREQUENCY OUTPUT 1 → CONFIGURATION (PULSE) (only with PROFIBUS DP)	
OUTPUT SIGNAL 4226 (continued)	Example for active output circuit (ACTIVE): With an active circuit, the internal power supply is 24 V. The pulse output is short-circuit proof. ① = 24 V DC internal power supply ② = Short-circuit proof output The signal levels are to be seen as analogous to the passive circuit. The following applies for the output configuration ACTIVE-POSITIVE: In the quiescent state (at zero flow), the output signal level at the terminals is 0 V. In the operating status (flow present), the output signal level changes from 0 V to a positive voltage level. The following applies for the output configuration ACTIVE-NEGATIVE: In the quiescent state (at zero flow), the output signal level at the terminals is at a positive voltage level. In the operating status (flow present), the output signal level changes from a positive voltage level to 0 V.

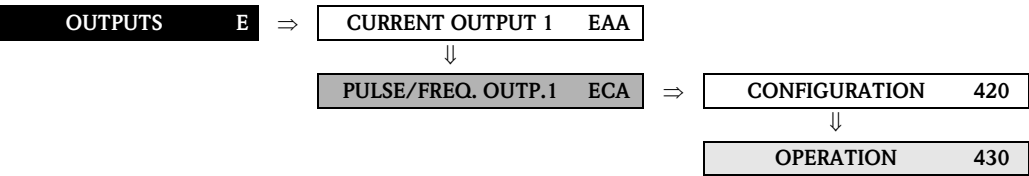
Function description	
OUTPUTS → PULSE-/FREQUENCY OUTPUT 1 → CONFIGURATION (PULSE) (only with PROFIBUS DP)	
FAILSAFE MODE 4227	 Note! This function is not available unless the PULSE setting was selected in the OPERATION MODE function (4200). For safety reasons it is advisable to ensure that the pulse output assumes a predefined state in the event of a fault. The setting you select here affects only the pulse output. It has no effect on other outputs and the display (e.g. totalizers). Options: FALLBACK VALUE Output is 0 pulse. ACTUAL VALUE Measuring value output is based on the current flow measurement. The fault is ignored. Factory setting: FALL BACK VALUE

Function description	
OUTPUTS → PULSE-/FREQUENCY OUTPUT 1 → CONFIGURATION (STATUS) (only with PROFIBUS DP)	
ASSIGN STATUS 4241	 Note! This function is not available unless the STATUS setting was selected in the OPERATION MODE function (4200). Use this function to assign a switching function to the status output. Options: OFF ON (operation) FAULT MESSAGE NOTICE MESSAGE FAULT MESSAGE or NOTICE MESSAGE EPD or OED (Empty Pipe Detection / Open Electrode Detection, only if active) FLOW DIRECTION MASS FLOW LIMIT VALUE VOLUME FLOW LIMIT VALUE Factory setting: FAULT MESSAGE  Note! ■ The behavior of the status output is a normally closed behavior, in other words the output is closed (transistor conductive) when normal, error-free measuring is in progress. – The following apply as “normal, error-free” measurements: Flow direction = forward; limit values = not exceeded; no empty or partially filled measuring tube (EPD/OED); no fault or notice message present. – For switching behavior such as relay output, s. page 87 ■ If you select OFF, the only function shown in the CONFIGURATION function group is this function, in other words ASSIGN STATUS (4241).
ON-VALUE 4242	 Note! This function is not available unless STATUS was selected in the OPERATION MODE function (4200) and LIMIT VALUE or FLOW DIRECTION was selected in the ASSIGN STATUS function (4241). Use this function to assign a value to the switch-on point (activation of the status output). The value can be equal to, higher than or lower than the switch-off point. Positive or negative values are permissible, depending on the measured variable in question (e.g. volume flow). User input: 5-digit floating-point number [unit] Factory setting: 0 [unit]  Note! ■ The appropriate unit is taken from the function UNIT VOLUME FLOW (0402) or UNIT MASS FLOW (0400). ■ Only the switch-on point is available for flow direction output (no switch-off point). If you enter a value not equal to the zero flow (e.g. 5), the difference between the zero flow and the value entered corresponds to half the switching hysteresis.

Function description	
OUTPUTS → PULSE-/FREQUENCY OUTPUT 1 → CONFIGURATION (STATUS) (only with PROFIBUS DP)	
SWITCH-ON DELAY 4243	 Note! This function is not available unless STATUS was selected in the OPERATION MODE function (4200) and LIMIT VALUE or FLOW DIRECTION was selected in the ASSIGN STATUS function (4241). Use this function to specify a delay (0...100 seconds) for switching on the status output (i.e. signal changes from 0 to 1). The delay starts when the limit value is reached. The status output does switch when the delay has timed out and the switch-on condition has been valid over the delay time. User input: fixed-point number: 0.0...100.0 s Factory setting: 0.0 s
OFF-VALUE 4244	 Note! This function is not available unless STATUS was selected in the OPERATION MODE function (4200) and LIMIT VALUE was selected in the ASSIGN STATUS function (4241). Use this function to assign a value to the switch-off point (deactivation of the status output). The value can be equal to, higher than or lower than the switch-on point. Positive and negative values are permissible, depending on the measured variable in question (e.g. volume flow). User input: 5-digit floating-point number [unit] Factory setting: 0 [unit]  Note! ■ The appropriate unit is taken from the function UNIT VOLUME FLOW (0402) or UNIT MASS FLOW (0400). ■ If SYMMETRY is selected in the function MEASURING MODE (4246) and values with different signs are entered for the switch-on and switch-off points, the notice message "INPUT RANGE EXCEEDED" appears.
SWITCH-OFF DELAY 4245	 Note! This function is not available unless the STATUS setting was selected in the OPERATION MODE function (4200). Use this function to define a delay (0...100 seconds) for switching off the status output (i.e. signal changes from 1 to 0). The delay starts when the limit value is reached. The status output does switch when the delay has timed out and the switch condition has been valid over the delay time. User input: fixed-point number 0.0...100.0 s Factory setting: 0.0 s

Function description	
OUTPUTS → PULSE-/FREQUENCY OUTPUT 1 → CONFIGURATION (STATUS) (only with PROFIBUS DP)	
MEASURING MODE 4246	 Note! This function is not available unless STATUS was selected in the function OPERATION MODE (4200) and the status output was assigned a limit value. Use this function to define the measuring mode for the status output. Options: STANDARD The status output signal switches at the defined switch points. SYMMETRY The status output signal switches at the defined switch points, irrespective of the sign. If you define a switch point with a positive sign, the status output signal switches as soon as the value is reached in the negative direction (negative sign), (see illustration). Factory setting: STANDARD Example for the SYMMETRY measuring mode: Switch-on point Q = 4, switch-off point: Q = 10 ① = Status output switched on (conductive) ② = Status output switched off (nonconductive)  A0001247  Note! ■ SYMMETRY cannot be selected unless the values in the ON-VALUE (4242) and OFF-VALUE (4244) functions have the same sign or one of the values is zero. ■ If the values have different signs, SYMMETRY cannot be selected and an “ASSIGNMENT NOT POSSIBLE” message is displayed.
TIME CONSTANT 4247	 Note! This function is not available unless the STATUS setting was selected in the OPERATION MODE function (4200). Use this function to enter a time constant defining how the measuring signal reacts to severely fluctuating measured variables, either very quickly (enter a low time constant) or with damping (enter a high time constant). Damping acts on the measuring signal before the switch status changes, and consequently before switch-on or switch-off delay is activated. The purpose of damping, therefore, is to prevent the status output changing state continuously in response to fluctuations in flow. User input: fixed-point number 0.00...100.00 s Factory setting: 0.00 s

6.2.2 Function group OPERATION

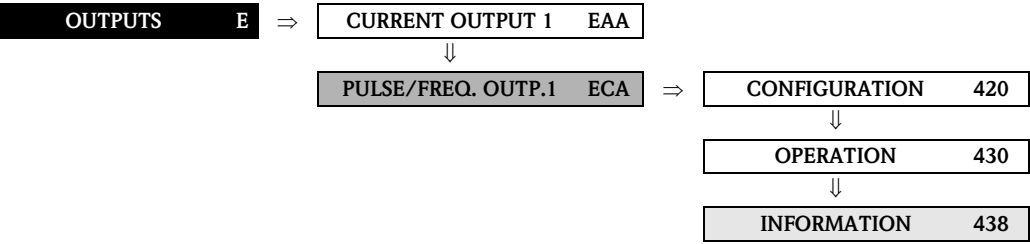


Function description	
OUTPUTS → PULSE-/FREQUENCY OUTPUT 1 → OPERATION (FREQUENCY) (only with PROFIBUS DP)	
ACTUAL FREQUENCY 4301	 Note! This function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function (4200). Use this function to view the computed value of the output frequency. Display: 0...12500 Hz
SIMULATION FREQUENCY 4302	 Note! This function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function (4200). Use this function to activate simulation of the frequency output. Options: OFF ON Factory setting: OFF  Note! ■ The “SIMULATION FREQUENCY OUTPUT” message indicates that simulation is active. ■ The measuring device continues to measure while simulation is in progress, i.e. the current measured values are output correctly via the other outputs.  Caution! The setting is not saved in the event of a power failure.
VALUE SIMULATION FREQUENCY 4303	 Note! This function is not available unless FREQUENCY was selected in the OPERATION MODE function (4200) and the SIMULATION FREQUENCY function (4302) is active (= ON). Use this function to define a selectable frequency value (e.g. 500 Hz) to be output at the frequency output. This value is used to test downstream devices and the measuring device itself. User input: 0...12500 Hz Factory setting: 0 Hz  Caution! The setting is not saved in the event of a power failure.

Function description	
OUTPUTS → PULSE-/FREQUENCY OUTPUT 1 → OPERATION (PULSE) (only with PROFIBUS DP)	
SIMULATION PULSE	4322  Note! This function is not available unless the PULSE option was selected in the OPERATION MODE function. Use this function to activate simulation of the pulse output. Options: OFF COUNTDOWN The pulses specified in the VALUE SIMULATION PULSE function are output. CONTINUOUSLY Pulses are continuously output with the pulse width specified in the PULSE WIDTH function. Simulation is started once the CONTINUOUSLY option is confirmed with the  key.  Note! Simulation is started by confirming the CONTINUOUSLY option with the  key. The simulation can be switched off again via the SIMULATION PULSE function. Factory setting: OFF  Note! ■ The notice message #631 "SIM. PULSE" indicates that simulation is active. ■ The on/off ratio is 1:1 for both types of simulation. ■ The measuring device continues to measure while simulation is in progress, i.e. the current measured values are output correctly via the other outputs.  Caution! The setting is not saved in the event of a power failure.
VALUE SIMULATION PULSE	4323  Note! This function is not available unless the COUNTDOWN option was selected in the SIMULATION PULSE function. Use this function to specify the number of pulses (e.g. 50) which are output during the simulation. This value is used to test downstream devices and the measuring device itself. The pulses are output with the pulse width specified in the PULSE WIDTH function. The on/off ratio is 1:1. Simulation is started once the specified value is confirmed with the  key. The display remains at 0 if the specified pulses have been output. User input: 0...10'000 Factory setting: 0  Note! Simulation is started by confirming the simulation value with the  key. The simulation can be switched off again via the SIMULATION PULSE function.  Caution! The setting is not saved in the event of a power failure.

Function description	
OUTPUTS → PULSE-/FREQUENCY OUTPUT 1 → OPERATION (PULSE) (only with PROFIBUS DP)	
ACTUAL STATUS 4341	 Note! This function is not available unless the STATUS setting was selected in the OPERATION MODE function (4200). Use this function to check the current status of the status output. Display: NOT CONDUCTIVE CONDUCTIVE
SIMULATION SWITCH POINT 4342	 Note! This function is not available unless the STATUS setting was selected in the OPERATION MODE function (4200). Use this function to activate simulation of the status output. Options: OFF ON Factory setting: OFF  Note! ■ The “SIMULATION STATUS OUTPUT” message indicates that simulation is active. ■ The measuring device continues to measure while simulation is in progress, i.e. the current measured values are output correctly via the other outputs.  Caution! The setting is not saved in the event of a power failure.
VALUE SIMULATION SWITCH POINT 4343	 Note! This function is not available unless STATUS was selected in the OPERATION MODE function (4200) and the SIMULATION SWITCH POINT function (4342) is active (= ON). Use this function to define the switching response of the status output during the simulation. This value is used to test downstream devices and the measuring device itself. Options: NOT CONDUCTIVE CONDUCTIVE Factory setting: NOT CONDUCTIVE  Caution! The setting is not saved in the event of a power failure.

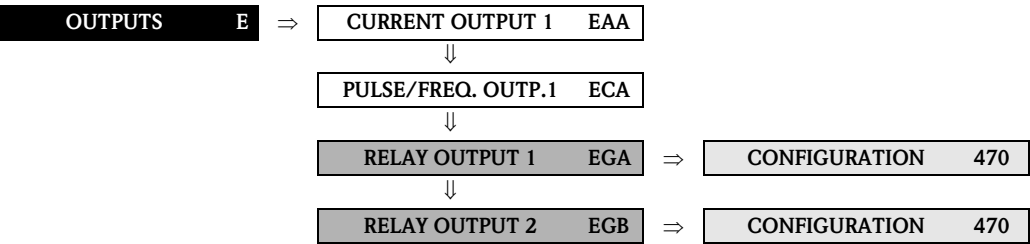
6.2.3 **Function group INFORMATION**



Function description		
OUTPUTS → PULSE-/FREQUENCY OUTPUT 1 → INFORMATION (only with PROFIBUS DP)		
TERMINAL NUMBER	4380	Use this function to display the numbers of the terminals (in the connection compartment) which are used by the pulse/frequency output. Display: 22 (+) / 23 (–)

6.3 Group RELAY OUTPUT (1...2)

6.3.1 Function group CONFIGURATION



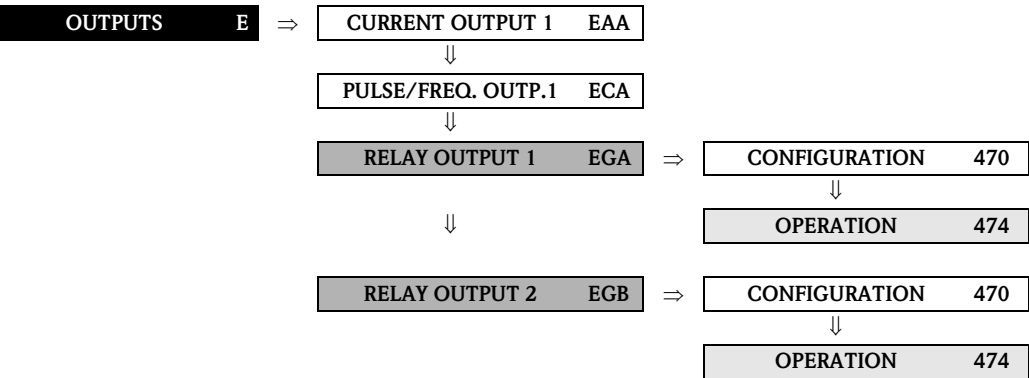
Function description		
OUTPUTS → RELAY OUTPUT (1...2) → CONFIGURATION (only with PROFIBUS DP)		
ASSIGN RELAY	4700	Use this function to assign a switching function to the relay output. Options: OFF ON (operation) FAULT MESSAGE NOTICE MESSAGE FAULT MESSAGE or NOTICE MESSAGE EPD or OED (Empty Pipe Detection / Open Electrode Detection, only if active) FLOW DIRECTION MASS FLOW LIMIT VALUE VOLUME FLOW LIMIT VALUE Advanced options with optional software package BATCHING: BATCH VALVE 1 (e.g. to control valve 1) BATCH VALVE 2 (e.g. to control valve 2) BATCH RUNNING > BATCH TIME >< BATCH QUANTITIES (< min. / > max. batching quantity) PROGRESS NOTE (batching end approaching)  Note! ■ The batching valves defined in the function BATCH STAGES (7208) are the only available selection (max. 2). ■ Only the monitoring functions (7240...7243), which have a value not equal to zero, are available for selection. Factory setting: FAULT MESSAGE  Note! ■ It is very important to read and comply with the information on the switching characteristics of the relay output (see page 87). ■ It is advisable to configure at least one relay output as a fault output and define the outputs' response to error. ■ Relay output 1 is configured as a normally open (NO or make) contact and relay output 2 as a normally closed (NC or break) contact by default. It can be reconfigured by means of a jumper on the relay module (see Operating Instructions Promag 53 PROFIBUS DP/PA, BA053D/06/en). ■ If you select OFF, the only function shown in the CONFIGURATION function group is this function (4700).

Function description	
OUTPUTS → RELAY OUTPUT (1...2) → CONFIGURATION (only with PROFIBUS DP)	
ON-VALUE 4701	 Note! This function is not available unless LIMIT VALUE or FLOW DIRECTION was selected in the function ASSIGN RELAY (4700). Use this function to assign a value to the switch-on point (relay output pulls up). The value can be equal to, higher than or lower than the switch-off point. Positive or negative values are permissible, depending on the measured variable in question (e.g. volume flow). User input: 5-digit floating-point number [unit] Factory setting: 0 [unit]  Note! ■ The appropriate unit is taken from the function UNIT VOLUME FLOW (0402) or UNIT MASS FLOW (0400). ■ Only the switch-on point is available for flow direction output (no switch-off point). If you enter a value not equal to the zero flow (e.g. 5), the difference between the zero flow and the value entered corresponds to half the switching hysteresis.
SWITCH-ON DELAY 4702	 Note! This function is not available unless LIMIT VALUE or FLOW DIRECTION was selected in the function ASSIGN RELAY (4700). Use this function to define a delay (0 ... 100 seconds) for pull-up (i.e. signal changes from 0 to 1) of the relay output. The delay starts when the limit value is reached. The relay output does switch when the delay has timed out and the switch condition has been valid throughout the delay time. User input: fixed-point number 0.0...100.0 s Factory setting: 0.0 s
OFF-VALUE 4703	 Note! This function is not available unless LIMIT VALUE was selected in the ASSIGN RELAY function (4700). Use this function to assign a value to the switch-off point (relay drops out). The value can be equal to, higher than or lower than the switch-on point. Positive or negative values are permissible, depending on the measured variable in question (e.g. volume flow). User input: 5-digit floating-point number [unit] Factory setting: 0 [unit]  Note! ■ The appropriate unit is taken from the function UNIT VOLUME FLOW (0402) or UNIT MASS FLOW (0400). ■ If SYMMETRY is selected in the function MEASURING MODE (4705) and values with different signs are entered for the switch-on and switch-off points, the notice message "INPUT RANGE EXCEEDED" appears.

Function description	
OUTPUTS → RELAY OUTPUT (1...2) → CONFIGURATION (only with PROFIBUS DP)	
SWITCH-OFF DELAY 4704	Note! This function is not available unless LIMIT VALUE was selected in the ASSIGN RELAY function (4700). Use this function to define a delay (0 ... 100 seconds) for dropout (i.e. signal changes from 1 to 0) of the relay output. The delay starts when the limit value is reached. The relay output does switch when the delay has timed out and the switch condition has been valid throughout the delay time. User input: fixed-point number 0.0...100.0 s Factory setting: 0.0 s

Function description	
OUTPUTS → RELAY OUTPUT (1...2) → CONFIGURATION (only with PROFIBUS DP)	
TIME CONSTANT 4706	Use this function to enter a time constant defining how the measuring signal reacts to severely fluctuating measured variables, either very quickly (enter a low time constant) or with damping (enter a high time constant). Damping acts on the measuring signal before the switch status changes, and consequently before switch-on or switch-off delay is activated. The purpose of damping, therefore, is to prevent the relay output changing state continuously in response to fluctuations in flow. User input: fixed-point number 0.00...100.00 s Factory setting: 0.00 s

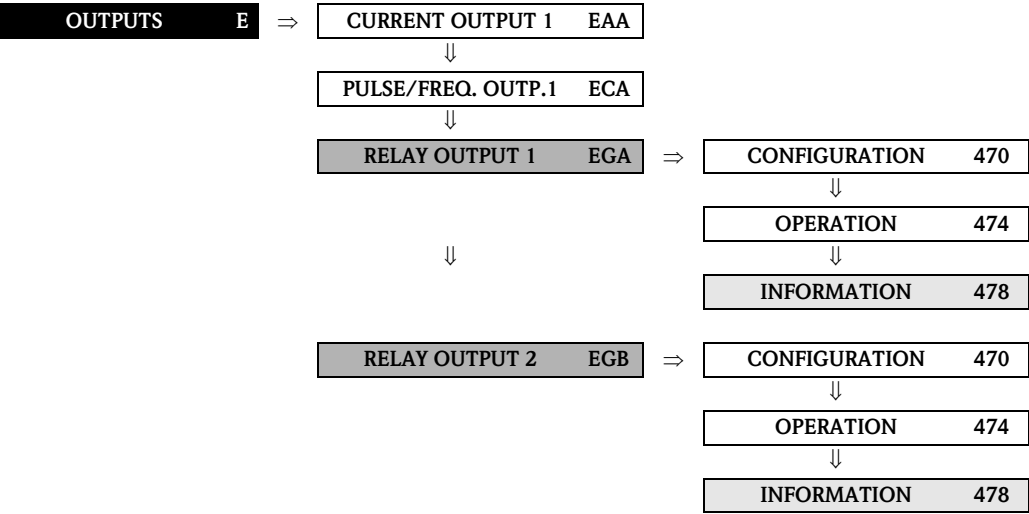
6.3.2 Function group OPERATION



Function description		
OUTPUTS → RELAY OUTPUT (1...2) → OPERATION (only with PROFIBUS DP)		
ACTUAL STATUS RELAY	4740	Use this function to check the current status of the relay output. A jumper on the contact side defines the relay output as a normally open (NO or make) or normally closed (NC or break) contact (see see Operating Instructions Promag 53 PROFIBUS DP/PA, BA053D/06/en). Display: BREAK CONTACT OPEN BREAK CONTACT CLOSED MAKE CONTACT OPEN MAKE CONTACT CLOSED
SIMULATION SWITCH POINT	4741	Use this function to activate simulation of the relay output. Options: OFF ON Factory setting: OFF Note! ■ The “SIMULATION RELAY” message indicates that simulation is active. ■ The measuring device continues to measure while simulation is in progress, i.e. the current measured values are output correctly via the other outputs. Caution! The setting is not saved in the event of a power failure.

Function description	
OUTPUTS → RELAY OUTPUT (1...2) → OPERATION (only with PROFIBUS DP)	
VALUE SIMULATION SWITCH POINT	4742  Note! The function is not visible unless the SIMULATION SWITCH POINT function (4741) is active (= ON). Use this function to define the status of the relay output during the simulation. This value is used to test downstream devices and the measuring device itself. Depending on the relay configuration (as make or break contact) the following selections are available. Options: Relay output configured as normally open (make) contact: BREAK CONTACT OPEN BREAK CONTACT CLOSED Relay output configured as normally closed (break) contact: MAKE CONTACT OPEN MAKE CONTACT CLOSED  Caution! The setting is not saved in the event of a power failure.

6.3.3 Function group INFORMATION



Function description		
OUTPUTS → RELAY OUTPUT (1...2) → INFORMATION (only with PROFIBUS DP)		
TERMINAL NUMBER	4780	Use this function to display the numbers of the terminals (in the connection compartment) which are used by the relay output. Display: 22 (+) / 23 (-) → RELAY OUTPUT 1 20 (+) / 21 (-) → RELAY OUTPUT 2

6.3.4 Information on the response of the relay output

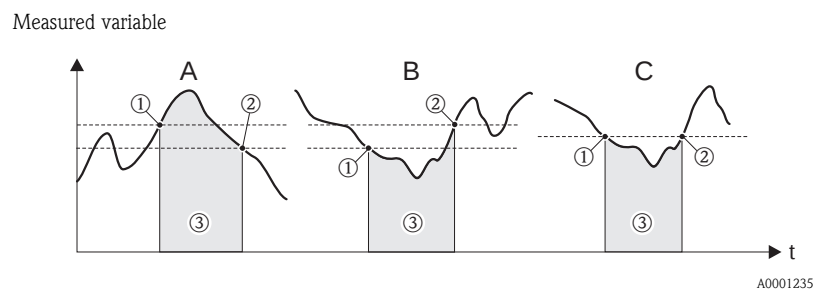
General

If you have configured the relay output signal for “LIMIT VALUE” or “FLOW DIRECTION”, you can define the requisite switch points in the ON-VALUE and OFF-VALUE functions. When the measured variable in question reaches one of these predefined values, the relay output switches as shown in the illustrations below.

Relay output configured for “limit value”

The relay output signal switches as soon as the measured variable undershoots or overshoots a defined switch point.

Application: Monitoring flow or process-related boundary conditions.



A = Maximum safety → ① SWITCH-OFF POINT > ② SWITCH-ON POINT

B = Minimum safety → ① SWITCH-OFF POINT < ② SWITCH-ON POINT

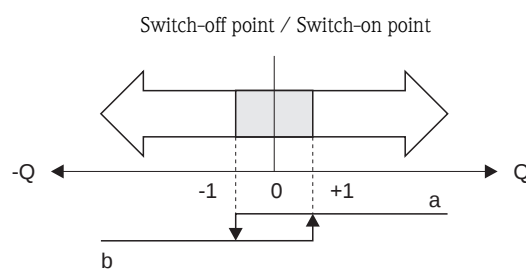
C = Minimum safety → ① SWITCH-OFF POINT = ② SWITCH-ON POINT (this configuration is to avoid)

③ = Relay de-energized

Relay output configured for “flow direction”

The value you entered in the function ON-VALUE defines the switch point for the positive and negative directions of flow.

If, for example, the switch point you define is $1 \text{ m}^3/\text{h}$, the relay drops out at $-1 \text{ m}^3/\text{h}$ and pulls up at $+1 \text{ m}^3/\text{h}$. Set the switch point to 0 if your process calls for direct switchover (no switching hysteresis). If low flow cut off is used, it is advisable to set hysteresis to a value higher than or equal to the low flow cut off rate.

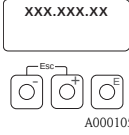
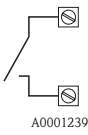
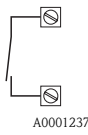
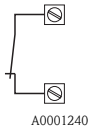
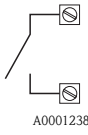
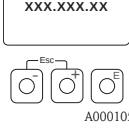
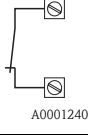
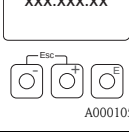
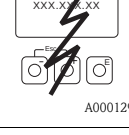
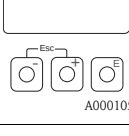
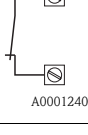


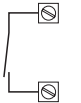
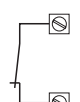
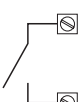
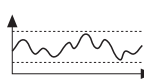
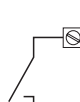
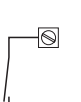
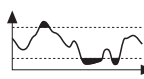
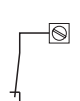
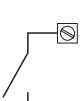
a = Relay energized

b = Relay de-energized

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6.3.5 Switching response of the relay output

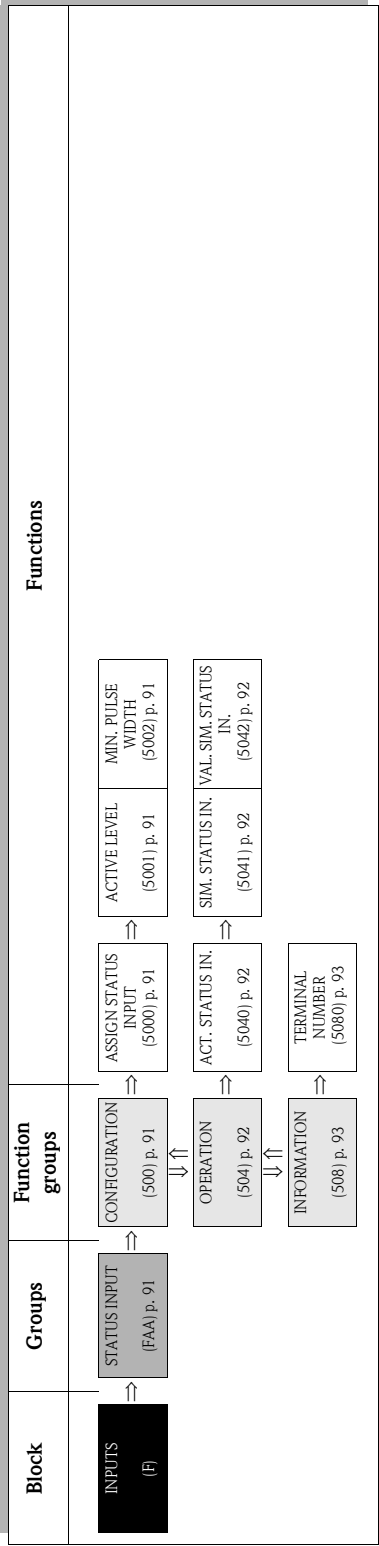
Function	State		Relay coil	Contact*	
				NC	NO
ON (operation)	System in measuring mode		energized		
	System not in measuring mode (power supply failed)		de-energized		
Fault message	System OK		energized		
	(System or process error) Fault → Response to error Outputs /INPUTS		de-energized		
Notice message	System OK		energized		
	(System or process error) Fault → Continuation of measuring		de-energized		
Fault message or Notice message	System OK		energized		
	(System or process error) Fault → Response to error or Note → Continuation of measuring		de-energized		

Function	State	Relay coil	Contact*		
			NC	NO	
Empty pipe detection (EPD) / Open electrode detection (OED)	Measuring tube full	 A0001292	energized	 A0001239  A0001237	
	Measuring tube partially filled /empty measuring tube	 A0001293	de-energized	 A0001240  A0001238	
Flow direction	forward	 A0001241	energized	 A0001239  A0001237	
	reverse	 A0001242	de-energized	 A0001240  A0001238	
Limit value – Volume flow	Limit value not overshoot or undershot	 A0001243	energized	 A0001239  A0001237	
	Limit value overshoot or undershot	 A0001244	de-energized	 A0001240  A0001238	
* Terminal numbers in accordance with the TERMINAL NUMBER function (4780) on page 86.  Note! If the measuring device has two relays, the factory setting is: ■ Relay 1 → normally open contact (NO) ■ Relay 2 → normally closed contact (NC)  Caution! When using the optional software package BATCHING, it is advisable for the contacts (either normally open or normally closed contacts) to have the same switching response for all relay outputs used.					

7 Block INPUTS



Note!
This block is not available for all devices → page 8 (Available blocks, groups, etc.).

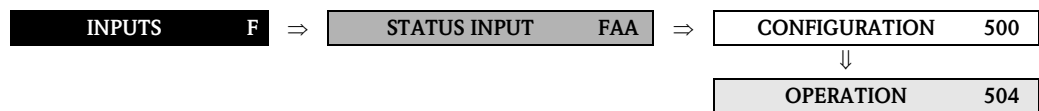


7.1 Group STATUS INPUT

7.1.1 Function group CONFIGURATION

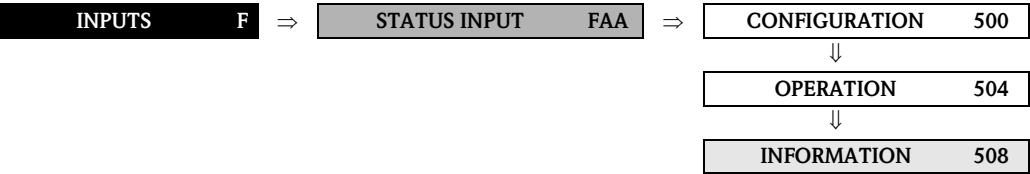
INPUTS	F	⇒	STATUS INPUT	FAA	⇒	CONFIGURATION	500
Function description							
INPUTS → STATUS INPUT → CONFIGURATION (only with PROFIBUS DP)							
ASSIGN STATUS INPUT	5000	Use this function to assign a switching function to the status input. Options: OFF POSITIVE ZERO RETURN Advanced options with optional software package BATCHING: RUN BATCHING (start/stop) HOLD BATCHING (stop/continue) RESET BATCH SUM (resetting total quantity / total quantity totalizers) Factory setting: OFF  Caution! Positive zero return is active as long as the level is available at the status input (continuous signal). All other assignments react to a change in level (pulse) at the status input.					
ACTIVE LEVEL	5001	Use this function to define whether the assigned switch function is released or sustained when the signal level is present (HIGH) or not present (LOW). Options: HIGH LOW Factory setting: HIGH					
MINIMUM PULSE WIDTH	5002	Use this function to define a minimum pulse width which the input pulse must achieve in order to trigger the selected switching function (see ASSIGN STATUS INPUT function (5000)). User input: 20...100 ms Factory setting: 50 ms					

7.1.2 Function group OPERATION



Function description		
INPUTS → STATUS INPUT → OPERATION (only with PROFIBUS DP)		
ACTUAL STATUS INPUT	5040	Use this function to view the current level of the status input. Display: HIGH LOW
SIMULATION STATUS INPUT	5041	Use this function to simulate the status input, i.e. to trigger the function (see function ASSIGN STATUS INPUT on page 91) assigned to the status input. Options: OFF ON Factory setting: OFF  Note! ■ The “SIMULATION STATUS INPUT” message indicates that simulation is active. ■ The measuring device continues to measure while simulation is in progress, i.e. the current measured values are output correctly via the other outputs.  Caution! The setting is not saved in the event of a power failure.
VALUE SIMULATION STATUS INPUT	5042	 Note! The function is not visible unless the SIMULATION STATUS INPUT function (5041) is active (= ON). Use this function to define the level to be assumed at the status output during the simulation. This value is used to test downstream devices and the measuring device itself. Options: HIGH LOW Factory setting: LOW  Caution! The setting is not saved in the event of a power failure.

7.1.3 Function group INFORMATION



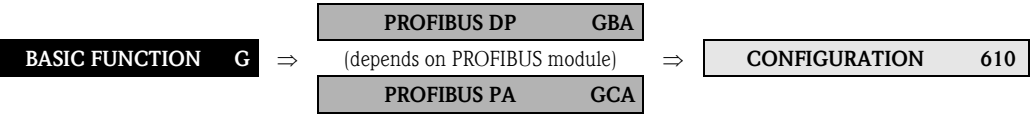
Function description		
INPUTS → STATUS INPUT → INFORMATION (only with PROFIBUS DP)		
TERMINAL NUMBER	5080	Use this function to display the numbers of the terminals (in the connection compartment) which are used by the status input. Display: 24 (+) / 25 (-)

8 Block BASIC FUNCTION

Block	Groups	Function groups	Functions																			
BASIC FUNCTION (G)	PROFIBUS DP PROFIBUS PA (GBA) p. 95	⇕⇕	⇕	CONFIGURATION (610) p. 95	⇕	TAG NAME (6100) p. 95	⇕	FIELDBUS ADDRESS (6101) p. 95	⇕	WRITE PROTECT (6102) p. 95												
			⇕⇕	FUNCTION BLOCKS (612) p. 96	⇕	BLOCK SELECTION (6120) p. 96	⇕	OUT VALUE (6121) p. 96	⇕	DISPLAY VALUE (6122) p. 96	⇕	CHANNEL (6123) p. 97										
			⇕⇕	TOTALIZER (613) p. 98	⇕	SELECT TOTALIZER (6130) p. 98	⇕	TOT OUT VALUE (6131) p. 98	⇕	OVERFLOW (6132) p. 98	⇕	CHANNEL (6133) p. 98	⇕	UNIT TOTALIZER (6134) p. 99	⇕	SET TOTALIZER (6135) p. 99	⇕	PRESET TOTALIZER (6136) p. 99	⇕	TOTALIZER MODE (6137) p. 100	⇕	CYCL. CALC. TOT. (6138) p. 100
				OPERATION (614) p. 101	⇕	SELECTION GSD (6140) p. 101	⇕	UNIT TO BUS (6141) p. 101														
			⇕⇕	INFORMATION (616) p. 102	⇕	PROFILE VERSION (6160) p. 102	⇕	ACTUAL BAUDRATE (6161) p. 102	⇕	DEVICE ID (6162) p. 102	⇕	CHECK CONFIG. (6163) p. 102										
				CONFIGURATION (640) p. 103	⇕	ASSIGN LF CUT OFF (6400) p. 103	⇕	ON-VALUE LF CUT OFF (6402) p. 103	⇕	OFF-VALUE LF CUT OFF (6403) p. 103	⇕	PRESSURE SHOCK SUPPR. (6404) p. 104										
			⇕⇕	EPD PARAMETER (642) p. 105	⇕	EPD (6420) p. 105	⇕	EPD/OED RESP. TIME (6425) p. 107														
				ECC PARAMETER (644) p. 108	⇕	ECC (6440) p. 108	⇕	ECC DURATION (6441) p. 108	⇕	ECC RECOVERY TIME (6442) p. 109	⇕	ECC CLEAN. CYCLE (6443) p. 109										
			⇕⇕	ADJUSTMENT (648) p. 110	⇕	ADJUSTMENT (6480) p. 110																
				CONFIGURATION (660) p. 111	⇕	INST. DIR. SENSOR (6600) p. 111	⇕	SYSTEM DAMPING (6603) p. 111	⇕	INTEGRATION TIME (6604) p. 112	⇕	POSITIVE ZERO RETURN (6605) p. 112										
		⇕⇕	SENSOR DATA (GNA) p. 113	⇕	CONFIGURATION (680) p. 113	⇕	CALIBRATION DATE (6800) p. 113	⇕	K-FACTOR (6801) p. 113	⇕	ZERO POINT (6803) p. 113	⇕	NOMINAL DIAMETER (6804) p. 114									
			OPERATION (682) p. 115	⇕	MEASURING PERIOD (6820) p. 115	⇕	OVERVOLT. TIME (6821) p. 115	⇕	EPD ELECTRODE (6822) p. 116	⇕	POLARITY ECC (6823) p. 116											

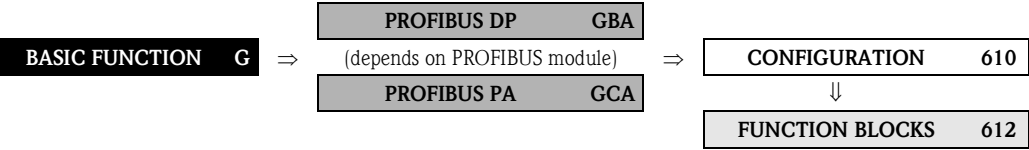
8.1 PROFIBUS DP/PA Group

8.1.1 CONFIGURATION function group



Function description		
BASIC FUNCTION → PROFIBUS DP/PROFIBUS PA → CONFIGURATION		
TAG NAME	6100	For entering a tag name for the measuring device. You can edit and read this tag name via the local display or an operating program (e.g. FieldCare). User input: max. 16-character text, permissible: A–Z, 0–9, +, –, punctuation marks Factory setting: “-----” (No text)
BUS ADDRESS	6101	For entering the device address. User input: 0...126 Factory setting: 126
WRITE PROTECT	6102	Indicates whether write access to the device via PROFIBUS (acyclical data transfer, e.g. via FieldCare) is possible. Display: OFF → Write access via PROFIBUS (acyclical data transfer) possible ON → Write access via PROFIBUS (acyclical data transfer) blocked Factory setting: OFF  Note! Hardware write protection is activated and deactivated by means of a jumper on the I/O module (see Operating Instructions BA053D).

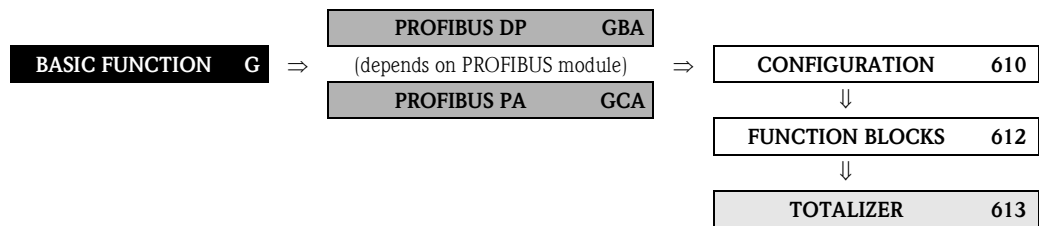
8.1.2 FUNCTION BLOCKS function group



Function description	
BASIC FUNCTION → PROFIBUS DP/PROFIBUS PA → FUNCTION BLOCKS	
BLOCK SELECTION 6120	Select a PROFIBUS function block. If analog input is selected, the current measured value is displayed in the OUT VALUE function (6121). If the analog output is selected, the current measured value is displayed in the DISPLAY VALUE function (6122). Options: ANALOG INPUT 1 ANALOG INPUT 2 ANALOG OUTPUT 1 Factory setting: ANALOG INPUT 1  Note! If PROFILE-GSD was selected in the SELECTION GSD (6140) function, only the selection appears in this function: ■ ANALOG INPUT 1
OUT VALUE 6121	 Note! This function is not available unless one of the following was selected in the BLOCK SELECTION (6120) function: ■ ANALOG INPUT 1 ■ ANALOG INPUT 2 Display of the measured variable (module AI) which is cyclically transferred to the PROFIBUS master (Class 1), incl. unit and status.
DISPLAY VALUE 6122	 Note! This function is not available unless the ANALOG OUTPUT 1 option was selected in the BLOCK SELECTION 6120 function. Display of the measured variable (DISPLAY_VALUE module) which is cyclically transferred from the PROFIBUS master (Class 1) to the measuring device, incl. unit and status.

Function description	
BASIC FUNCTION → PROFIBUS DP/PROFIBUS PA → FUNCTION BLOCKS	
CHANNEL	6123
	 Note! ■ This function is not available unless one of the following was selected in the BLOCK SELECTION (6120) function: – ANALOG INPUT 1 – ANALOG INPUT 2 Assigning a measured variable for the analog input selected in the BLOCK SELECTION (6120) function. Options: MASS FLOW VOLUME FLOW Advanced options with optional software package BATCHING: BATCH UPWARDS BATCH DOWNWARDS BATCH COUNTER BATCH SUM BATCHING TIME Factory setting: Dependent on the option selected in the BLOCK SELECTION (6120) function. For: ■ ANALOG INPUT 1 → Factory setting = VOLUME FLOW ■ ANALOG INPUT 2 → Factory setting = MASS FLOW

8.1.3 TOTALIZERfunction group

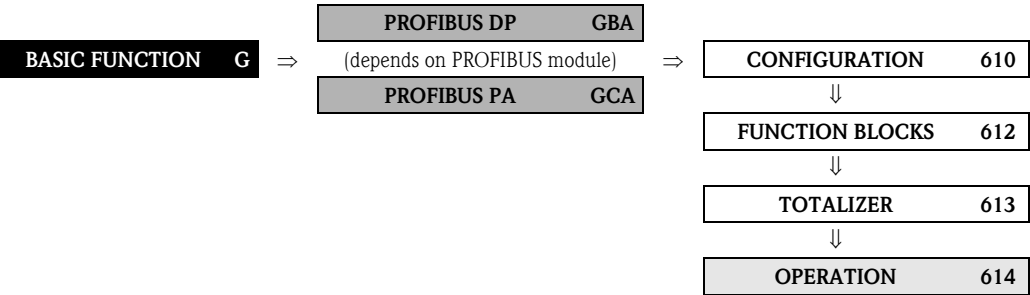


Function description		
BASIC FUNCTION → PROFIBUS DP/PROFIBUS PA → TOTALIZER		
SELECT TOTALIZER	6130	This function is used to select a totalizer. Options: TOTALIZER 1 TOTALIZER 2 TOTALIZER 3 Factory setting: TOTALIZER 1 Note! If PROFILE-GSD was selected in the SELECTION GSD (6140) function, only the TOTALIZER 1 selection appears in this function.
Note! The function descriptions below apply to totalizers 1...3; the totalizers are independently configurable.		
TOTALIZER OUT VALUE	6131	The current totalizer value, incl. unit and status, appears in this function. Display: max. 7-digit floating-point number, including sign and unit (e.g. 15467.04 m³; -4925.631 kg)
OVERFLOW	6132	This function shows the totalizer's overflow aggregated since measuring began. Total flow quantity is represented by a floating-point number consisting of max. 7 digits. You can use this function to view higher numerical values (>9,999,999) as overflows. The effective quantity is thus the total of OVERFLOW plus the value returned by the TOTALIZER OUT VALUE (6131) function. Example: Reading for 2 overflows: 2 E7 (= 20,000,000). The value displayed in the TOTALIZER OUT VALUE (6131) function = 196,845.7 m³ Effective total quantity = 20,196,845.7 m³ Display: integer with exponent, including sign and unit, e.g. 2 E7
CHANNEL	6133	Use this function to assign a measured variable to the totalizer in question. Options: OFF MASS FLOW VOLUME FLOW Factory setting: VOLUME FLOW

		Function description
		BASIC FUNCTION → PROFIBUS DP/PROFIBUS PA → TOTALIZER
UNIT TOTALIZER	6134	This function is used to determine the unit of the totalizer. The selection is dependent on the measured variable selected in the CHANNEL (6133) function. Options: (for VOLUME FLOW assignment): Metric → cm³; dm³; m³; ml; l; hl; Ml Mega US → ccc; af; ft³; oz f; gal; Kgal; Mgal; bbl (normal fluids); bbl (beer); bbl (petrochemicals); bbl (filling tanks) Imperial → gal; Mgal; bbl (beer); bbl (petrochemicals) Factory setting: m³ Options: (for MASS FLOW assignment): Metric → g; kg; t US → oz; lb; ton Factory setting: kg
SET TOTALIZER	6135	This function is used to assign different statuses to the totalizer. Options: TOTALIZE The measured variable selected in the CHANNEL (6133) function is totalled. RESET Resets the totalizer to zero. PRESET The totalizer is reset to the value defined in the PRESET TOTALIZER (6136) function.  Note! If RESET or PRESET is selected, the totalizer is reset to zero or to the preset value. However, it is not stopped. In other words, it immediately continues to total from the value in question. To stop the totalizer, the HOLD VALUE option must be selected in the TOTALIZER MODE (6137) function. Factory setting: TOTALIZE
PRESET TOTALIZER	6136	This function is used to define a (start) value for the totalizer. This value is taken from the totalizer only if the PRESET option has been selected in the SET TOTALIZER (6135) function. User input: -9999999...9999999 Factory setting: 0

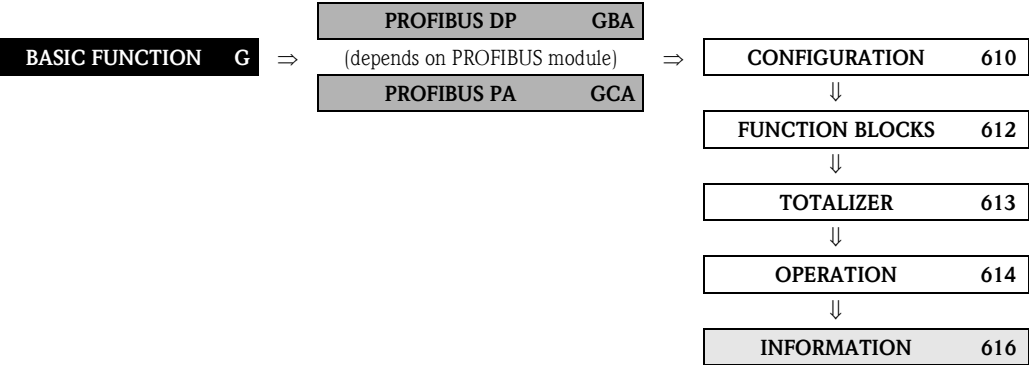
Function description	
BASIC FUNCTION → PROFIBUS DP/PROFIBUS PA → TOTALIZER	
TOTALIZER MODE 6137	Use this function to define how the flow components are to be totalled by the totalizer. Options: BALANCE Positive and negative flow components. The positive and negative flow components are balanced. In other words, net flow in the flow direction is registered. POSITIVE (forward) Positive flow components only NEGATIVE (backwards) Negative flow components only HOLD VALUE The totalizer stops at the last value. No more flow components are totalled. Factory setting: BALANCE  Note! To ensure that the positive and negative flow components (BALANCE) or only the negative flow components (NEGATIVE) are balanced correctly, the BIDIRECTIONAL option must be selected in the MEASURING MODE function (6601) (s. page 111).
CYCL. CALC. TOT. 6138	This function is used to determine if the totalizers 1...3 on the local display and in the operating program (e.g. FieldCare) are updated. Options: ON Totalizers are always updated. OFF Totalizers are updated only if the relevant totalizer function block (TOTAL module or function) is configured for cyclical data transfer. Factory setting: ON  Note! Particularly in the case of time-critical applications, optimization can be carried out on totalizer function blocks which are not needed. To do this, the "OFF" option must be selected in this function. It is very important when selecting the "OFF" option that the totalizers on the local display and in the operating program (e.g. FieldCare) are no longer updated.

8.1.4 OPERATION function group



Function description		
BASIC FUNCTION → PROFIBUS DP/PROFIBUS PA → OPERATION		
SELECTION GSD	6140	Selection of operating mode (GSD file), which is used for cyclical communication with the PROFIBUS Master (Class 1). Options: MANUFACT. SPEC. → the device is operated with the complete range of device functionality. MANUFACT V2.0 → the device is used as a replacement device for the previous model Promag 33 (compatibility mode). PROFILE-GSD → the device is operated in PROFIBUS Profile mode. Factory setting: MANUFACT. SPEC.  Note! When configuring PROFIBUS in a network, ensure that the correct device data base file (GSD file) for the selected mode of operation is used (see Operating Instructions Promag 53 (PROFIBUS DP/PA), BA053D).
UNIT TO BUS	6141	If this function is run, the cyclically transferred measured variables (module AI) are transferred to the PROFIBUS master (Class 1) with the system units configured in the device. Options: OFF SET UNITS (the transfer is started by activating the  key)  Caution! Activating this function may result in a sudden change in the measured variables (module AI) transferred to the PROFIBUS master (Class 1), which may in turn effect subsequent adjustments.

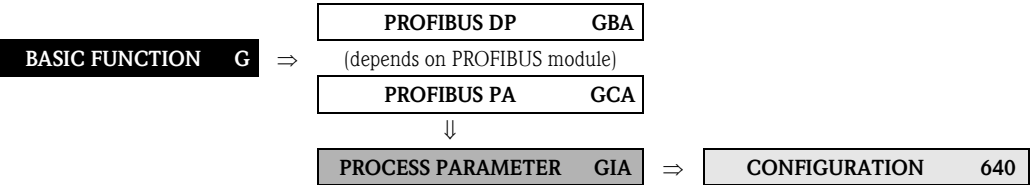
8.1.5 INFORMATION function group

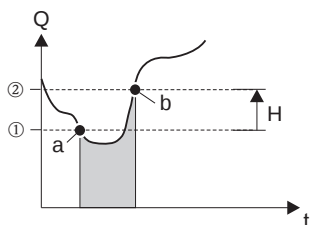


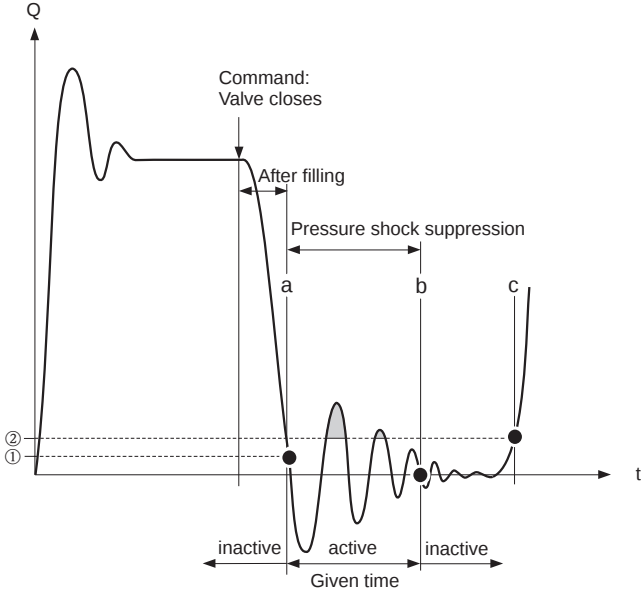
Function description		
BASIC FUNCTION → PROFIBUS DP/PROFIBUS PA → INFORMATION		
PROFILE VERSION	6160	This function is used to display the PROFIBUS profile version.
ACTUAL BAUDRATE	6161	This function is used to display the data transmission rate at which the device communicates.
DEVICE ID	6162	Displays PROFIBUS device ID. The display is dependent on the option selected in the SELECTION GSD (6140) function. Display: If MANUFACT. SPEC. is selected: ■ for a PROFIBUS DP communication output = 1526 Hex ■ for a PROFIBUS PA communication output = 1527 Hex If the MANUFACT V2.0 option is selected: ■ for a PROFIBUS DP communication output = 1511 Hex ■ for a PROFIBUS PA communication output = 1505 Hex If PROFILE-GSD is selected: ■ for a PROFIBUS DP communication output = 9741 Hex ■ for a PROFIBUS PA communication output = 9741 Hex
CHECK CONFIGURATION	6163	Indicates if the configuration for the PROFIBUS master (Class 1) cyclical data transfer was accepted by the device. Display: ACCEPTED (configuration accepted) NOT ACCEPTED (configuration not accepted)

8.2 Group PROCESSPARAMETER

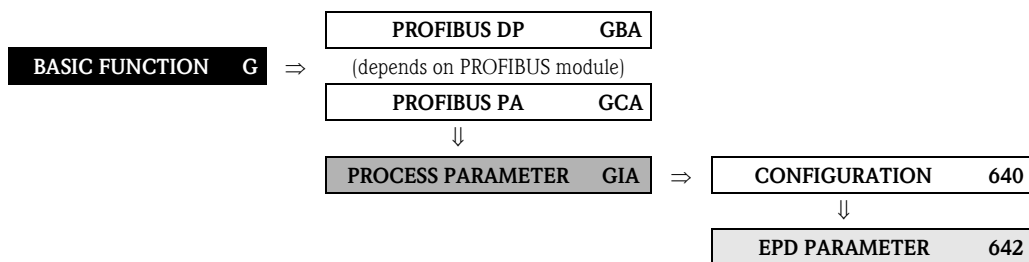
8.2.1 Function group CONFIGURATION



Function description		
BASIC FUNCTION → PROCESSPARAMETER → CONFIGURATION		
ASSIGN LOW FLOW CUTOFF	6400	Use this function to assign the switch point for the low flow cut off. Options: OFF MASS FLOW VOLUME FLOW Factory setting: VOLUME FLOW
ON-VALUE LOW FLOW CUTOFF	6402	Use this function to enter the switch-on point for low flow cut off. Low flow cut off is active if the value entered is not equal to 0. The sign of the flow value is highlighted on the display to indicate that low flow cut off is active. User input: 5-digit floating-point number [unit] Factory setting: Depends on nominal diameter and country (s. page 141 ff.).  Note! The appropriate unit is taken from the function UNIT VOLUME FLOW (0402) or UNIT MASS FLOW (0400) (see page 13 or page 12).
OFF-VALUE LOW FLOW CUTOFF	6403	Use this function to enter the switch-off (b) point for low flow cut off. Enter the switch-off point as a positive hysteresis (H) from the switch-on point (a). User input: Integer 0...100% Factory setting: 50%  ① = switch-on point, ② = switch-off point a low flow cutoff is switched on b low flow cutoff is switched off (a + a · H) H Hysteresis value: 0...100% ■ low flow cutoff active Q Flow

Function description	
BASIC FUNCTION → PROCESSPARAMETER → CONFIGURATION	
PRESSURE SHOCK SUPPRESSION 6404	The closure of a valve can cause brief but severe movements of the fluid in the piping system, movements which the measuring system registers. The pulses totalled in this way result in a totalizer reading error, particularly in the case of batching processes. For this reason, the measuring device is equipped with pressure shock suppression (= short-term signal suppression) which can eliminate system-related “disruptions”.  Note! Note that pressure shock suppression cannot be used unless the low flow cut off is active (see ON-VALUE LOW FLOW CUTOFF function on page 103). Use this function to define the time span for active pressure shock suppression. Activation of the pressure shock suppression Pressure shock suppression is activated once the flow falls below the switch-on point of the low flow cut off (see point a in graphic). While pressure shock suppression is active, the following conditions apply: ■ Current output → outputs the current corresponding to zero flow. ■ Pulse-/Freq.-output → outputs the frequency corresponding to zero flow. ■ Flow reading on display 0. ■ Totalizer reading → the totalizers are pegged at the last correct value. ■ Transfer of measured value PROFIBUS → 0. Deactivation of the pressure shock suppression The pressure shock suppression is deactivated after the time interval, set in this function, has passed (see point b in graphic).  Note! The current flow value is displayed and output, when the time interval for the pressure shock suppression has passed and the flow exceeds the switch-off point of the low flow cut off (see point c in graphic).  ① = switsch-off point (low flow) , ② = switch-on point (low flow) a Activated if on-value of low flow is not reached b Deactivated once the predefined time period has elapsed c Flow values are taken into account when calculating the pulses  Suppressed values Q Flow User input: max. 4-digit number, incl. unit: 0.00 to 100.0 s Factory setting: 0.00 s

8.2.2 Function group EPD PARAMETER

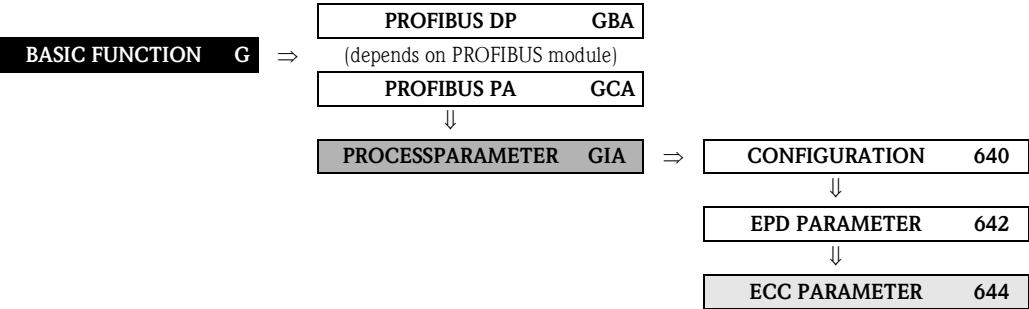


Function description		
BASIC FUNCTION → PROCESSPARAMETER → EPD PARAMETER		
EPD	6420	Flow cannot be measured correctly unless the measuring pipe is completely full. This status can be monitored at all times with the Empty Pipe Detection function. Use this function to activate Empty Pipe Detection (EPD) or Open Electrode Detection (OED). ■ EPD = Empty Pipe Detection (with the help of an EPD electrode) ■ OED = Open Electrode Detection (empty pipe detection with the help of the measuring electrodes, if the sensor is not equipped with an EPD electrode or the orientation is not suitable for using EPD). Options: OFF – ON SPECIAL – OED – ON STANDARD OFF (neither EPD nor OED are active) ON SPECIAL (for DN <400 only): Switching on the Empty Pipe Detection (EPD) for devices in remote version (transmitter and sensor are installed separately). OED: Switching on the Open Electrode Detection (OED). ON STANDARD: Switching on the Empty Pipe Detection (EPD) for: – Devices in compact version (transmitter and sensor form a single mechanical unit). – Applications where a facing and coating of the fluid on the measuring tube line and measuring electrode accrues. Factory setting: OFF  Note! ■ The options ON STANDARD and ON SPECIAL are not available unless the sensor is equipped with an EPD electrode. ■ The default setting for the EPD/OED functions when the device is delivered is OFF. The functions must be activated as required. ■ The devices are calibrated at the factory with water (approx. 500 µS/cm). If the conductivity of certain fluids deviates from this reference, empty pipe/full pipe adjustment must be performed again on site (see function EPD ADJUSTMENT on page 110). ■ The adjustment coefficients must be valid before you can switch on the EPD or OED. If these coefficients are not available, the function EPD ADJUSTMENT is displayed (s. page 110). ■ If there are problems with the adjustment, the following error messages appear on the screen: – ADJUSTMENT FULL = EMPTY: The adjustment values for empty pipe and full pipe are identical. In such instances, empty pipe adjustment/full pipe adjustment must be carried out again. – ADJUSTMENT NOT OK: Adjustment is not possible as the fluid conductivity values are outside the permitted range. (continued on next page)

Function description		
BASIC FUNCTION → PROCESSPARAMETER → EPD PARAMETER		
EPD (continued)	6420	Notes on empty pipe detection (EPD and OED) ■ Flow cannot be measured correctly unless the measuring pipe is completely full. This status can be monitored at all times by means of the EPD/OED. ■ An empty or partially filled pipe is a process error. A default factory setting defines that a fault message is issued and that this process error has an effect on the outputs. ■ The EPD/OED process error can be output via the configurable relay or status outputs. ■ A plausibility check of the adjustment values will only be executed by activating the empty pipe detection. If an empty or full pipe adjustment is performed during the empty pipe detection is active, the empty pipe detection has to be de- and again activated, after finishing the adjustment, to start the plausibility check. Response to partially filled pipes If the EPD/OED is switched on and responds to a partially filled or empty pipe, the notice message "EMPTY PIPE" appears on the display. If the pipe is partially empty and the EPD/OED is not switched on, the response can vary in identically configured systems: ■ Flow reading fluctuates ■ Zero flow ■ Excessively high flow values Notes on open electrode detection (OED) Open Electrode Detection (OED) functions like the Empty Pipe Detection (EPD). In contrast to the EPD where the measuring device must be equipped with a separate (optional) electrode, the OED detects partial filling by means of the two measuring electrodes which are present as standard (fluid no longer covers the measuring electrodes). Open electrode detection can also be used if: ■ the sensor is not installed in the optimal position for using EPD (optimal = installed horizontally). ■ the sensor is not equipped with an additional (optional) EPD electrode.  Note! ■ Cable connection length: When mounting a remote version, please observe the maximum permissible cable length of 15 metres in order to keep the OED function. ■ OED empty pipe adjustment: To achieve the best results for the open electrode detection, it is important to have the electrodes surface as dry as possible (no liquid film) while the empty-pipe adjustment is being made. Even during normal operation, the OED function is only secured if there is no longer any liquid film present on the electrodes when the measuring pipe is empty.

Function description	
BASIC FUNCTION → PROCESSPARAMETER → EPD PARAMETER	
EPD RESPONSE TIME	6425  Note! This function is not available unless ON STANDARD, ON SPECIAL or OED was selected in the EPD function (6420). Use this function to enter the time span for which the criteria for an “empty” pipe have to be satisfied without interruption before a notice message or fault message is generated. The setting defined here is used by the active empty pipe detection (EPD) or open electrode detection (OED). User input: fixed-point number: 1.0...100 s Factory setting: 1.0 s  Note! OED detection time: The recognition of open electrodes is, in contrast to the empty pipe detection (EPD), very slow reacting (delay at least 25 seconds) and is only activated after an additional delay from the programmed response time! We recommend in most applications to use the empty pipe detection (EPD) which is an optimal solution for detecting partly filled measuring tubes.

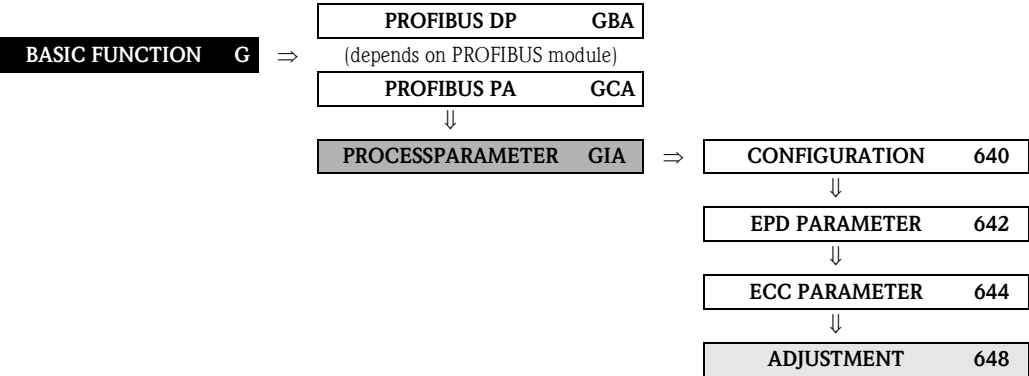
8.2.3 Function group ECC PARAMETER



Function description		
BASIC FUNCTION → PROCESSPARAMETER → ECC PARAMETER		
ECC	6440	 Note! This function is not available unless the measuring device is equipped with an (optional) electrode cleaning function. Use this function to activate cyclical electrode cleaning (ECC). Options: ON (only with the optional electrode cleaning function ECC) OFF Factory setting: ON (only if the optional electrode cleaning function ECC is available) Notes on electrode cleaning (ECC) Conductive deposits on the electrodes and on the walls of the measuring tube (e.g. magnetite) can falsify measurement values. The Electrode Cleaning Circuitry (ECC) was developed to prevent such conductive deposits accreting in the vicinity of the electrodes. ECC functions as described above for all available electrode materials except tantalum. If tantalum is used as the electrode material, the ECC protects the electrode surface only against oxidation.  Caution! If the ECC is switched off for a prolonged period in applications with conductive deposits, a layer forms inside the measuring tube and this can falsify measurement values. If the layer is allowed to accrete beyond a certain level, it might no longer be possible to remove it by switching on the ECC. If this happens the measuring tube must be cleaned and the layer removed.
ECC DURATION	6441	 Note! This function is not available unless the measuring device is equipped with the optional electrode cleaning function (ECC). Use this function to specify the electrode cleaning duration. User input: fixed-point number: 0.01 ...30.0 s Factory setting: 2.0 s

Function description	
BASIC FUNCTION → PROCESSPARAMETER → ECC PARAMETER	
ECC RECOVERY TIME 6442	 Note! This function is not available unless the measuring device is equipped with the optional electrode cleaning function (ECC). Use this function to specify the recovery time for which the last flow value measured prior to cleaning is retained. A recovery time is necessary as the signal outputs can fluctuate after electrode cleaning on account of electrochemical interference voltages. User input: max. 3-digit number: 1...600 s Factory setting: 5 s  Caution! The last value measured prior to cleaning is output for the duration of the recovery time (max. 600 s). This in turn means that the measuring system does not register changes in flow, e.g. stoppage, during this time span.
ECC CLEANING CYCLE 6443	 Note! This function is not available unless the measuring device is equipped with the optional electrode cleaning function (ECC). Use this function to specify the cleaning cycle for electrode cleaning. User input: Integer: 30...10080 min Factory setting: 40 min

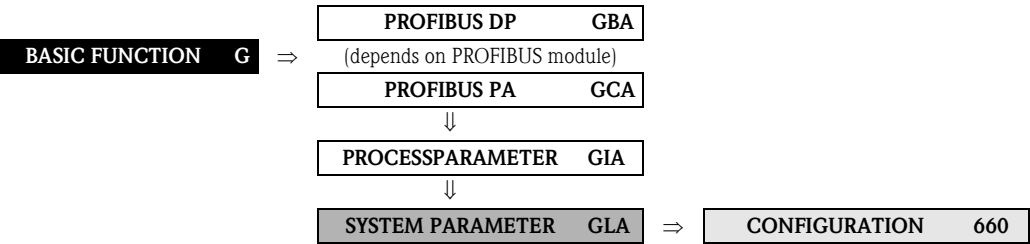
8.2.4 Function group ADJUSTMENT



Function description	
BASIC FUNCTION → PROCESSPARAMETER → ADJUSTMENT	
EPD ADJUSTMENT 6480	Use this function to activate the EPD/OED adjustment for an empty or full measuring tube.  Note! A detailed description and other helpful hints for the empty-pipe/full-pipe adjustment procedure can be found on page 105. Options: OFF FULL PIPE ADJUST EMPTY PIPE ADJUST OED FULL ADJUST OED EMPTY ADJUST Factory setting: OFF Procedure for EPD or OED empty-pipe / full-pipe adjustment - Empty the piping. In case of an EPD adjustment, the wall of the measuring tube should be wetted with fluid for the adjustment procedure but this is not the case with an OED adjustment! - Start empty-pipe adjustment: Select “EMPTY PIPE ADJUST” or “OED EMPTY ADJUST” and press  to confirm. - After empty-pipe adjustment, fill the piping with fluid. - Start full-pipe adjustment: Select “FULL PIPE ADJUST” or “OED FULL ADJUST” and press  to confirm. - Having completed the adjustment, select the setting “OFF” and exit the function by pressing . - Now select the EPD function (s. page 105). Switch on Empty Pipe Detection by selecting the following settings: - EPD → Select ON STANDARD or ON SPECIAL and press  to confirm. - OED → Select OED and confirm with .  Caution! The adjustment coefficients must be valid before you can activate the EPD/OED function. If adjustment is incorrect the following messages might appear on the display: - FULL = EMPTY The adjustment values for empty pipe and full pipe are identical. In cases of this nature you must repeat empty-pipe or full-pipe adjustment again! - ADJUSTMENT NOT OK Adjustment is not possible because the fluid’s conductivity is out of range.

8.3 Group SYSTEM PARAMETER

8.3.1 Function group CONFIGURATION

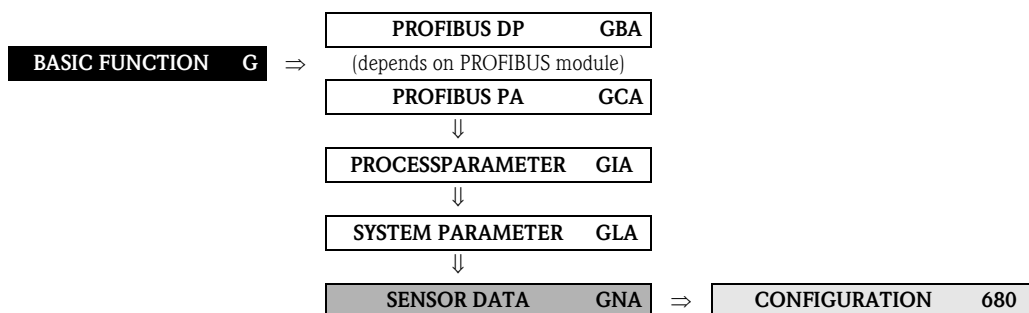


Function description		
BASIC FUNCTION → SYSTEM PARAMETER → CONFIGURATION		
INSTALLATION DIRECTION SENSOR	6600	Use this function to reverse the sign of the flow direction, if necessary. Options: NORMAL (flow as indicated by the arrow) INVERSE (flow opposite to direction indicated by the arrow) Factory setting: NORMAL  Note! Ascertain the actual direction of fluid flow with reference to the direction indicated by the arrow on the sensor (nameplate).
MEASURING MODE	6601	Determines how the flow components are recorded by the device. Options: UNIDIRECTIONAL (only positive flow components) BIDIRECTIONAL (positive and negative flow components) Factory setting: UNIDIRECTIONAL
SYSTEM DAMPING	6603	Use this function to set the filter depth of the digital filter. The sensitivity of the flow measurement signal can be reduced with respect to interference peaks (e.g. in the event of a high solid content, gas bubbles in the fluid etc.). The system reaction time decreases with an increasing filter setting. User input: 0...15 Factory setting: 9  Note! The system damping acts on all functions and outputs of the measuring device.

Function description		
BASIC FUNCTION → SYSTEM PARAMETER → CONFIGURATION		
INTEGRATION TIME	6604	Use this function to set the integration time. Under normal circumstances it is not necessary to change the factory settings. User input: 3.3...65 ms Factory setting: 20 ms at 50 Hz → power supply frequency (e.g. Europe) 16.7 ms at 60 Hz → power supply frequency (e.g. USA)  Caution! The integration time must not be selected with a greater value than the measuring period (6820).  Note! The integration time defines the duration of internal totalling of the induced voltage in the fluid (measured by the measuring electrode), i.e. the time in which the measuring device records the true flow (afterwards the magnetic field for the next integration is created from the opposite pole).
POSITIVE ZERO RETURN	6605	Use this function to interrupt evaluation of measured variables. This is necessary when a piping system is being cleaned, for example. This setting acts on all function and outputs of the measuring device. Options: OFF ON → Signal output is set to the “ZERO FLOW” value. Factory setting: OFF  Note! Positive zero return may not be activated for batching processes with the optional software package BATCHING.

8.4 Group SENSOR DATA

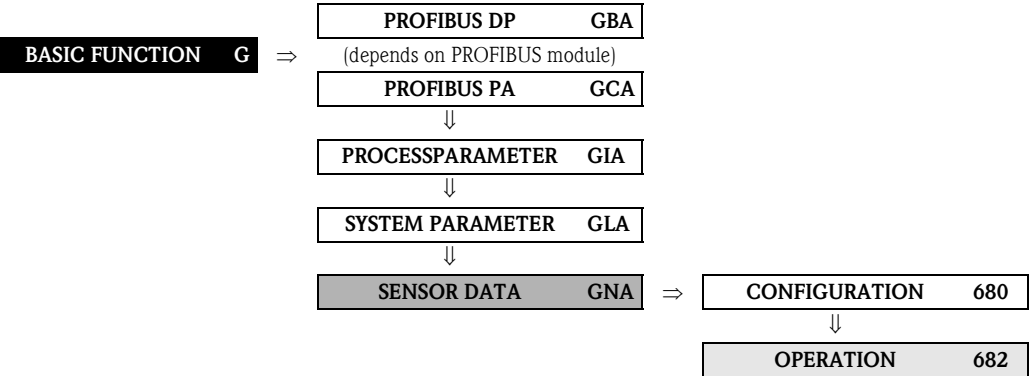
8.4.1 Function group CONFIGURATION



Function description		
BASIC FUNCTION → SENSOR DATA → CONFIGURATION		
All sensor data (calibration factors, zero (point) and nominal diameter) are set at the factory and saved on the S-DAT sensor memory chip.  Caution! Under normal circumstances you should not change the following parameter settings, because changes affect numerous functions of the entire measuring facility in general and the accuracy of the measuring system in particular. For this reason, the functions described below cannot be changed even when you enter your personal code. Contact the Endress+Hauser service organization if you have any questions about these functions.  Note! The individual values of the functions are also provided on the sensor nameplate.		
CALIBRATION DATE	6800	Use this function to view the current calibration date and time for the sensor. User interface: Calibration date and time Factory setting: Calibration date and time of the current calibration.  Note! The calibration date and time format is defined in the FORMAT DATE/TIME function, → Seite 14.
K-FACTOR	6801	Use this function to display the current calibration factor (positive flow direction) for the sensor. The calibration factor is determined and set at the factory. Display: 5-digit fixed-point number: 0.5000...2.0000 Factory setting: Depends on nominal diameter and calibration
ZERO POINT	6803	This function shows the current zero-point correction value for the sensor. Zero-point correction is determined and set at the factory. Display: max. 4-digit number: -1000...+1000 Factory setting: Depends on nominal diameter and calibration

Function description		
BASIC FUNCTION → SENSOR DATA → CONFIGURATION		
NOMINAL DIAMETER	6804	This function shows the nominal diameter for the sensor. The nominal diameter depends on the size of the sensor and is set at the factory. Display: 2...2000 mm or 1/12...78" Factory setting: Depends on the size of the sensor

8.4.2 Function group OPERATION



Function description		
BASIC FUNCTION → SENSOR DATA → OPERATION		
All sensor data (measuring period, overvoltage time etc.) are set at the factory and saved on the S-DAT sensor memory chip.		
MEASURING PERIOD	6820	Use this function to set the time for a full measuring period. The duration of the measuring period is calculated from the rise time of the magnetic field, the brief recovery time, the integration time (which can be set) and the empty pipe detection time. User input: 0.0...1000 ms Factory setting: Depends on nominal diameter Note! The system checks the time entered and sets the measuring period which is actually used internally to a plausible value. If you enter 0 ms, the system automatically computes the shortest time.
Caution! Under normal circumstances you should not change the following parameter settings, because changes affect numerous functions of the entire measuring facility in general and the accuracy of the measuring system in particular. For this reason, the functions described below cannot be changed even when you enter your personal code. Contact the Endress+Hauser service organization if you have any questions about these functions.		
OVERVOLTAGE TIME	6821	Use this function to specify the time in which overvoltage is applied to the coil circuit in order to build up the magnetic field as fast as possible. The overvoltage time is adjusted automatically while measuring is in progress. The overvoltage time depends on the sensor type and the nominal diameter and is set at the factory. Display: 4-digit floating-point number 0.0...100.0 ms Factory setting: Depends on nominal diameter

Function description		
BASIC FUNCTION → SENSOR DATA → OPERATION		
EPD ELECTRODE	6822	Use this function to check whether the sensor is equipped with an EPD electrode. Display: YES NO Factory setting: YES → Electrode fitted as standard
POLARITY ECC	6823	 Note! This function is not available unless the measuring device is equipped with an (optional) electrode cleaning function. Use this function to display the actual current polarity for optional electrode cleaning (ECC). Electrode cleaning uses either a positive or negative current, depending on the electrode material. The measuring device automatically selects the correct polarity on the basis of the electrode-material data stored in the S-DAT. Display: POSITIVE → for electrodes made of: 1.4435, alloy C-22, platinum, titanium NEGATIVE → for electrodes made of: tantalum  Caution! If the incorrect current is applied to the electrodes, the electrode material is destroyed.

9 Block SPECIAL FUNCTION



Note!

This block is not available for all devices → page 8 (Available blocks, groups, etc.).

Block	Groups	Function groups	Functions							
SPECIAL FUNCTION (H)	BATCHING FUNCTION (HCA) p. 118	CONFIGURATION (720) p. 118	BATCH SELECTOR (7200) p. 118	BATCH NAME (7201) p. 118	ASSIGN BATCH VAR. (7202) p. 119	BATCH QUANTITY (7203) p. 119	FIX COMPENSATION QUANTITY	BATCH STAGES (7208) p. 120	INPUT FORMAT (7209) p. 120	
				CLOSE VALVE 1 (7221) p. 121	OPEN VALVE 2 (7222) p. 122	CLOSE VALVE 2 (7223) p. 122				
		VALVE PARAMETER (722) p. 121	OPEN VALVE 1 (7220) p. 121							
		SUPERVISION (724) p. 126	MAXIMUM BATCH TIME (7240) p. 126	MIN. BATCH QUANTITY (7241) p. 127	MAX. BATCH QUANTITY (7242) p. 128	PROGRESS NOTE (7243) p. 128	MAX. FLOW VALUE (7244) p. 129			
		OPERATION (726) p. 130	BATCH PROCEDURE (7260) p. 130	BATCH UPWARDS (7261) p. 130	BATCH DOWNWARDS (7262) p. 130	BATCH COUNTER (7263) p. 131	BATCH SUM (7264) p. 131	RESET SUM/COUNTER (7265) p. 131		
		INFORMATION (728) p. 132	INT. SWITCH V-1 (7280) p. 132	VALVE 1 CLOSING TIME (7282) p. 132	BATCHING TIME (7283) p. 132					

9.1 Group BATCHING FUNCTION

9.1.1 Function group CONFIGURATION

SPECIAL FUNCTION H	⇒	BATCHING FUNCTION HCA	⇒	CONFIGURATION 720
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Function description	
SPECIAL FUNCTION → BATCHING FUNCTION → CONFIGURATION (only with PROFIBUS DP)	
BATCH SELECTOR 7200	Use this function to select a batching specification. There are six different batching specifications available by means of which different batchings can be defined. Options: BATCH # 1 (or the name which was defined for batching specification 1 in the function BATCH NAME (7201). BATCH # 2 (or the name which was defined for batching specification 2 in the function BATCH NAME (7201). BATCH # 3 (or the name which was defined for batching specification 3 in the function BATCH NAME (7201). BATCH # 4 (or the name which was defined for batching specification 4 in the function BATCH NAME (7201). BATCH # 5 (or the name which was defined for batching specification 5 in the function BATCH NAME (7201). BATCH # 6 (or the name which was defined for batching specification 6 in the function BATCH NAME (7201). Factory setting: BATCH #1  Note! ■ By selecting a batching specification and its related settings (explained below), up to 6 different batchings can be preconfigured and selected as necessary. ■ All the following functions in this function group, as well as the functions in the function groups VALVE PARAMETER (722) and SUPERVISION (724) are assigned to the batching specification selected here. ■ All the settings in the following functions of this function group are valid only for the batching specification selected in the function BATCH SELECTOR (7200). In other words, the entry or option is assigned to the batching specification currently selected (e.g. in the factory setting BATCH # 1).
BATCH NAME 7201	Use this function to assign a specific name to the batching specification. User input: max. 8-character text, permissible: A–Z, 0–9 Factory setting: Name of batching specification (depends on selection in the function BATCH SELECTOR (7200), e.g. "BATCH # 1").  Note! Once an entry has been made (e.g. "BEER 33"), the batch name (BEER 33) appears in the home position when selecting the quantity, and the name of the batching specification ("e.g. BATCH # 1") no longer appears.

Function description		
SPECIAL FUNCTION → BATCHING FUNCTION → CONFIGURATION (only with PROFIBUS DP)		
ASSIGN BATCH VARIABLE	7202	Use this function to assign a batching variable to the batching specification. Options: OFF VOLUME FLOW MASS FLOW Factory setting: OFF  Note! ■ The possible assignments of the display functions are automatically extended. Once a batching variable has been selected (MASS or VOLUME), you can locally define the application-specific function of the minus key (start-stop-continue) and the plus key (stop-batching name/quantity) in the information line by means of the “batching menu” assignment. In this way, a direct batching control station is made available locally at the measuring device by means of the user interface and the controls. ■ Select OFF if the BATCHING functionality is no longer to be used. All settings related to the function (e.g. switching contact assigned to the relay output) must be assigned to another functionality.
BATCH QUANTITY	7203	Use this function to define the quantity to be batched. User input: 5-digit floating-point number: 0...max. value (depends on nominal diameter) [unit] Factory setting: 0 [unit]  Note! ■ The appropriate unit is taken from the function group SYSTEM UNITS (ACA), (see page 12). ■ When the batching quantity entered here is achieved, valve 1 closes (see function CLOSE VALVE 1 (7221) on page 121).
FIX COMPENSATION QUANTITY	7204	Use this function to specify a positive or negative compensation quantity. The compensation quantity balances out a constant, system-related incorrect quantity. This can be caused, for example, by a pump over-running or by the closing time of a valve. The compensation quantity is determined by the system operator. A negative compensation quantity must be specified for overbatching and a positive compensation quantity for underbatching.  Note! The compensation quantity affects batching quantity only and does not affect the after run compensation. User input: Floating-point number with sign (depends on nominal diameter) Factory setting: 0 [unit]  Note! ■ If the entry range is not sufficient for the compensation quantity, the batching quantity may have to be adjusted. ■ The appropriate unit is taken from the function group SYSTEM UNITS (ACA), (see page 12).

Function description		
SPECIAL FUNCTION → BATCHING FUNCTION → CONFIGURATION (only with PROFIBUS DP)		
BATCH STAGES	7208	Use this function to define the number of batching stages. Batching can be carried out in several stages, e.g. 2-stage batching with fast and precise batching. Options: 1-stage (1 valve or 1-stage batching) 2-stage (2 valves or 2-stage batching) Factory setting: 1-stage (1 valve or 1-stage batching)  Note! ■ The batching stage selection (number of valves) is directly dependent on the configuration of the outputs. For 2-stage batching two relay outputs must be available in the measuring device. ■ The functions available in the function group VALVE PARAMETER (page 121) are dependent on the number of batching stages (number of valves) selected in this function.
INPUT FORMAT	7209	Use this function to define the entry format of the quantities for the switch points of the valves. Options: VALUE-INPUT (e.g. 10 [unit]) %-INPUT (e.g. 80 [%]) Factory setting: VALUE-INPUT  Note! The entry format selected in this function is also used in the function groups VALVE PARAMETER (page 121) and SUPERVISION (page 126).

9.1.2 Function group VALVE PARAMETER

SPECIAL FUNCTION H ⇒

BATCHING FUNCTION HCA ⇒

CONFIGURATION 720



VALVE PARAMETER 722

Function description		
SPECIAL FUNCTION → BATCHING FUNCTION → VALVE PARAMETER (only with PROFIBUS DP)		
The parameters for the switching contacts of up to 2 valves can be set in the following functions. The number of switching contacts (valves) available, and thus their settings in this group, is defined in the function BATCH STAGES (7208). Note! The following functions are only available if at least one batch stage has been selected in the function BATCH SELECTOR (7200).		
OPEN VALVE 1	7220	Use this function to specify the quantity value at which contact 1 opens. This is used as a switch point for valve 1 to output via an assigned output. The quantity value is entered as a % or as an absolute value, depending on the option selected in the function INPUT FORMAT (7209). User input: 0...max. value or 0...100% (related to the batching quantity) Factory setting: 0 [unit] or 0 [%] Note! - Dynamic tracking for %-data: If the value is entered as a %, this %-value always refers to the batching quantity (e.g. 70% of a batching quantity of 10 liters = 7 liters). If the BATCH QUANTITY (7203) is adjusted (reduced/increased), the effective quantity switch point is automatically and dynamically adjusted (e.g. taking 70% and changing the batching quantity from 10 to 20 liters, the quantity switch point is adjusted from 7 liters to 14 liters). - Dynamic tracking for value-data: If you enter value-input, this value is “absolute” for batching quantities that do not change (e.g. always 7 liters for a batching quantity of 10 liters). If the batching quantity (7203) is adjusted (reduced/increased), the quantity switch point is automatically and dynamically adjusted/tracked (e.g. with a new batching quantity changing from 10 to 20 liters, the quantity switch point is adjusted from 7 liters to 14 liters). In other words, the existing value data is tracked as a percentage of the altered batching quantity.
CLOSE VALVE 1	7221	Use this function to display the quantity value at which contact 1 (valve 1) closes. The quantity value is displayed either as a % or as an absolute value, depending on the option selected in the function INPUT FORMAT (7209). Display: Value or 100% (corresponds to the batching quantity) Factory setting: 0 [unit] or 0 [%] Note! The switching contact for valve 1 is the “main contact”, i.e. the closing function of valve 1 is firmly assigned to the batching quantity entered (see function BATCH QUANTITY (7203) on page 119). In this way, function CLOSE VALVE 1 is also the basis for calculating the after run quantity.

Function description	
SPECIAL FUNCTION → BATCHING FUNCTION → VALVE PARAMETER (only with PROFIBUS DP)	
OPEN VALVE 2 7222	Use this function to specify the quantity value at which contact 2 opens. This is used as a switch point for valve 2 to output via an assigned output. The quantity value is entered as a % or as an absolute value, depending on the option selected in the function INPUT FORMAT (7209). User input: 0...max. value or 0...100% (related to the batching quantity) Factory setting: 0 [unit] or 0 [%]  Note! ■ Dynamic tracking for %-data: If the value is entered as a %, this %-value always refers to the batching quantity (e.g. 70% of a batching quantity of 10 liters = 7 liters). If the BATCH QUANTITY (7203) is adjusted (reduced/increased), the effective quantity switch point is automatically and dynamically adjusted (e.g. taking 70% and changing the batching quantity from 10 to 20 liters, the quantity switch point is adjusted from 7 liters to 14 liters). ■ Dynamic tracking for value-data: If you enter value-input, this value is “absolute” for batching quantities that do not change (e.g. always 7 liters for a batching quantity of 10 liters). If the batching quantity (7203) is adjusted (reduced/increased), the quantity switch point is automatically and dynamically adjusted/tracked (e.g. with a new batching quantity changing from 10 to 20 liters, the quantity switch point is adjusted from 7 liters to 14 liters). In other words, the existing value data is tracked as a percentage of the altered batching quantity.
CLOSE VALVE 2 7223	Use this function to specify the quantity value at which contact 2 closes. This is used as a switch point for valve 2 to output via an assigned output. The quantity value is entered as a % or as an absolute value, depending on the option selected in the function INPUT FORMAT (7209). User input: 0...max. value or 0...100% (related to the batching quantity) Factory setting: 0 [unit] or 0 [%]  Note! ■ Dynamic tracking for %-data: If the value is entered as a %, this %-value always refers to the batching quantity (e.g. 70% of a batching quantity of 10 liters = 7 liters). If the BATCH QUANTITY (7203) is adjusted (reduced/increased), the effective quantity switch point is automatically and dynamically adjusted (e.g. taking 70% and changing the batching quantity from 10 to 20 liters, the quantity switch point is adjusted from 7 liters to 14 liters). ■ Dynamic tracking for value-data: If you enter value-input, this value is “absolute” for batching quantities that do not change (e.g. always 7 liters for a batching quantity of 10 liters). If the batching quantity (7203) is adjusted (reduced/increased), the quantity switch point is automatically and dynamically adjusted/tracked (e.g. with a new batching quantity changing from 10 to 20 liters, the quantity switch point is adjusted from 7 liters to 14 liters). In other words, the existing value data is tracked as a percentage of the altered batching quantity.

9.1.3 Examples of setting parameters for batching processes

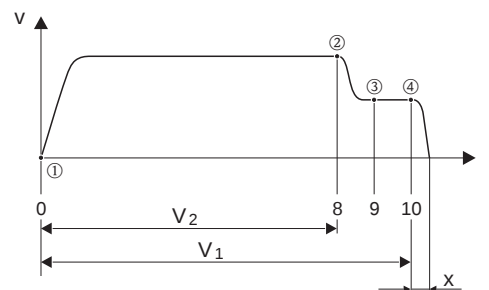
The two examples in the next section clearly show the effect of different entries and options in the function group.

Example 1

The first example explains the parameter setting of various functions for carrying out batching and illustrates how functions are affected when the batching quantity is changed.

The following batching is to take place:

- 2-stage batching with a batching quantity of 10 liters in total.
- Coarse batching quantity of 8 liters. Valve 2 opens at the start of the batching and closes when 8 liters is achieved.
- Fine batching of 2 liters. Valve 1 opens at the start of the batching and closes (automatically) when the batching quantity (10 liters) is achieved.
- Once 9 liters have been batched a batching progress message should be generated.
- Value-input should be entered.



v = Flow velocity [m/s]

t = Time

V_1 = Valve 1 open

V_2 = Valve 2 open

① = Start batching/coarse batching, valves 1 (7220) and 2 (7222) open

② = Valve 2 (7223) closes, coarse batching quantity achieved

③ = Batching progress message (7243)

④ = Valve 1 closes (7221), end of batching

x = After run quantity

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The following parameter settings must be made:

- Select the unit for batching:
Function UNIT VOLUME (0403) page 13 = 1 (liter)
- Select the measured variable for batching:
Function ASSIGN BATCH VARIABLE (7202) page 119 = VOLUME FLOW
- Enter the batching quantity:
Function BATCH QUANTITY (7203) page 119 = 10 [liters]
- Select the entry format:
Function BATCH STAGES (7208) page 120 = 2-stage
- Select the entry format:
Function INPUT FORMAT (7209) page 120 = VALUE-INPUT
- Quantity data for when the first valve should open:
Function OPEN VALVE 1 (7220) page 121 = 0 [liters]
(valve 1 closes automatically when the batching quantity is achieved = 10 [liters], display in function CLOSE VALVE 1 (7221) page 121)
- Quantity data for when the second valve should open:
Function OPEN VALVE 2 (7224) page 122 = 0 [liters]

- Quantity data for when the second valve should close:
Function CLOSE VALVE 2 (7223) page 122 = 8 [liters]
- Quantity data for when the message should be generated:
Function PROGRESS NOTE (7243) page 128 = 9 [liters]

Example 1 a

Batching specifications identical to those in example 1, however the new batching quantity is 20 liters and the message should be generated once 18 liters are batched.

The following parameters must be set **manually** :

- Enter the new batching quantity:
Function BATCH QUANTITY (7203) page 119 = 20 [liters]
- New quantity data for when the message should be generated:
Function PROGRESS NOTE (7243) page 128 = 18 [liters]

The following functions are **automatically** adjusted to suit the new batching quantity:

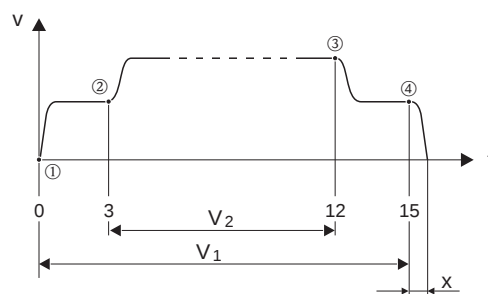
- Function OPEN VALVE 1 = 0 [liters]
- Function OPEN VALVE 2 = 0 [liters]
- Function CLOSE VALVE 2 = 16 [liters]

Example 2

The second example explains the parameter settings of the various functions for batching with the entry format in % for the switch points of the valves.

The following batching is to take place:

- 2-stage batching with a batching quantity of 15 liters in total.
- Coarse batching quantity from 3 to 12 liters. Valve 2 opens when 20% (3 liters) of the batching quantity is achieved and closes once 80% (12 liters) is achieved.
- Valve 1 opens at the start of the batching and closes (automatically) when the batching quantity (15 liters) is achieved.
- %-data should be entered.



v = Flow velocity [m/s]

t = Time

V₁ = Valve 1 open

V₂ = Valve 2 open

① = Start batching, valve 1 (7220) opens

② = Valve 2 (7222) opens, coarse batching quantity starts

③ = Valve 2 (7223) closes, coarse batching quantity achieved

④ = Valve 1 (7221) closes, end of batching

x = After run quantity

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The following parameter settings must be made:

- Select the unit for batching:
Function UNIT VOLUME (0403) page 13 = 1 (liter)
- Select the measured variable for batching:
Function ASSIGN BATCH VARIABLE (7202) page 119 = VOLUME FLOW
- Enter the batching quantity:
Function BATCH QUANTITY (7203) page 119 = 15 [liters]
- Select the entry format:
Function BATCH STAGES (7208) page 120 = 2-stage
- Select the entry format:
Function INPUT FORMAT (7209) page 120 = %-DATA
- Percentage data for when the first valve should open:
Function OPEN VALVE 1 (7220) page 121 = 0 [%]
(valve 1 closes automatically when the batching quantity is achieved = 15 [liters],
display in function CLOSE VALVE 1 (7221) page 121)
- Percentage data for when the second valve should open:
Function OPEN VALVE 2 (7224) page 122 = 20 [%], corresponds to 3 liters
- Percentage data for when the second valve should close:
Function CLOSE VALVE 2 (7223) page 122 = 80 [%], corresponds to 12 liters

Example 2 a

Batching specifications identical to those in example 1, however the new batching quantity is 45 liters.

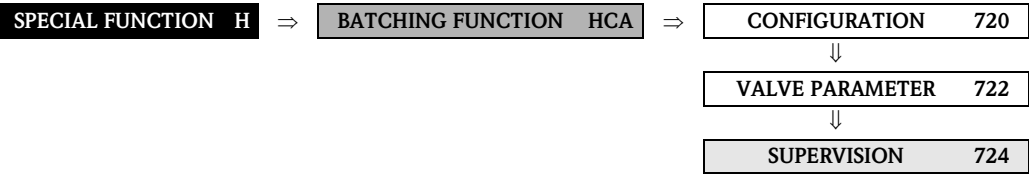
The following parameters must be set **manually**:

- Enter the new batching quantity:
Function BATCH QUANTITY (7203) page 119 = 45 [liters]

The following functions are **automatically** adjusted to suit the new batching quantity:

- Function OPEN VALVE 1 = 0 [%]
- Function OPEN VALVE 2 = 20 [%] corresponds to 9 liters
- Function CLOSE VALVE 2 = 80 [%] corresponds to 36 liters

9.1.4 Function group SUPERVISION



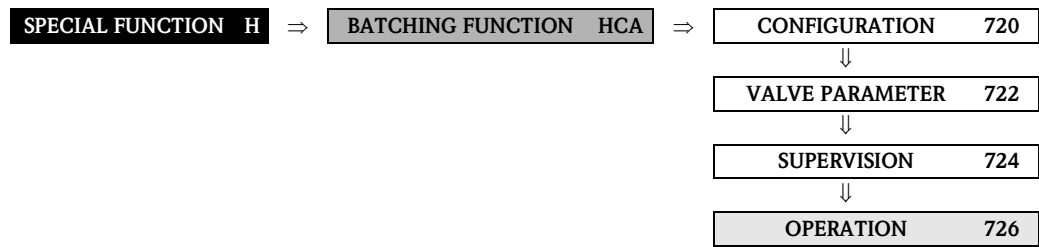
Function description	
SPECIAL FUNCTION → BATCHING FUNCTION → SUPERVISION (only with PROFIBUS DP)	
MAXIMUM BATCH TIME7240	Use this function to specify a maximum batching time. All valves close once the specified batching time elapses (see functions CLOSE VALVE 1...2, see page 121 ff.). This function can be used for safety reasons, for example, to ensure all batching valves close in the event of a system fault. User input: 0...30000 s Factory setting: 0 s (= deactivated)  Caution! ■ When the batching quantity is adjusted (reduced/increased), (see function BATCH QUANTITY (7203) on page 119), automatic adjustment does not take place i.e. this value must be determined again and reentered (see also fault message # 471 in the Operating Instructions Promag 53, PROFIBUS DP/PA, BA053D/06/en/, Troubleshooting Chapter). ■ Batching (START) is not possible when the fault message is active!  Note! ■ The function is not active if you enter 0 s (factory setting). This means that the batching valves are not closed by means of this function. ■ A fault message is assigned to the function. This fault message can be acknowledged prematurely: – By modifying a batching function. – By selecting RESET in the “BATCH PROCEDURE” parameter – Via PROFIBUS communication ■ This function can be output via the switch output.

Function description	
SPECIAL FUNCTION → BATCHING FUNCTION → SUPERVISION (only with PROFIBUS DP)	
MINIMUM BATCH QUANTITY 7241	Use this function to specify a minimum batching quantity. A message is generated if the minimum batching quantity was not achieved by the time batching ends (e.g. if after run mode is active). The quantity value is entered as a % or as an absolute value, depending on the option selected in the function INPUT FORMAT (7209). Application: Message stating that underbatching is present (e.g. the contents of the containers does not correspond to the quantity declared). User input: 0...max. value or 0...100% (related to the batching quantity) Factory setting: 0 [unit] (= deactivated)  Caution! ■ When the batching quantity is adjusted (reduced/increased), (see function BATCH QUANTITY (7203) on page 119) automatic adjustment does not take place, i.e. this value must be determined again and reentered (see also fault message # 472 in the Operating Instructions Promag 53, PROFIBUS DP/PA, BA053D/06/en/, Troubleshooting Chapter). ■ Batching (START) is not possible when the fault message is active!  Note! ■ The function is not active if you enter 0 s (factory setting). ■ A fault message is assigned to the function. This fault message can be acknowledged prematurely: – By modifying a batching function. – By selecting RESET in the “BATCH PROCEDURE” parameter – Via PROFIBUS communication ■ This function can be output via the switch output.

Function description	
SPECIAL FUNCTION → BATCHING FUNCTION → SUPERVISION (only with PROFIBUS DP)	
MAXIMUM BATCH QUANTITY 7242	Use this function to specify a maximum batching quantity. If the maximum batching quantity is exceeded during batching, all valves are closed, batching is stopped and a message is generated. The quantity value is entered as a % or as an absolute value, depending on the option selected in the function INPUT FORMAT (7209). Application: To avoid overbatching and thus prevent critical situations caused by fluid overflow arising in the plant, (e.g. plant standstill caused by safety level switches being triggered, contamination, product loss, etc.). User input: 0...2 x max. value or 0...200% (related to the batching quantity) Factory setting: 0 [unit] (= deactivated)  Caution! - When the batching quantity is adjusted (reduced/increased), (see function BATCH QUANTITY (7203) on page 119) automatic adjustment does not take place, i.e. this value must be determined again and reentered (see also fault message # 472 in the Operating Instructions Promag 53, PROFIBUS DP/PA, BA053D/06/en/, Troubleshooting Chapter). - Batching (START) is not possible when the fault message is active!  Note! - The function is not active if you enter 0 s (factory setting). - A fault message is assigned to the function. This fault message can be acknowledged prematurely: - By modifying a batching function. - By selecting RESET in the “BATCH PROCEDURE” parameter - Via PROFIBUS communication - This function can be output via the switch output.
PROGRESS NOTE 7243	Use this function to define a batching quantity at which a message should be generated. When the specified batching quantity is achieved, the message is generated and signalled via the output. The quantity value is entered as a % or as an absolute value, depending on the option selected in the function INPUT FORMAT (7209). Application: For longer batching processes when preparing or taking measures related to production (e.g. preparing to replace container, etc.). User input: 0...max. value or 0...100% (related to the batching quantity) Factory setting: 0 [unit] (= deactivated)  Caution! When the batching quantity is adjusted (reduced/increased), (see function BATCH QUANTITY (7203) on page 119) there is no automatic adjustment, i.e. this value must be determined again and reentered, (see also notice message # 473 in the Operating Instructions Promag 53, PROFIBUS DP/PA, BA053D/06/en/, Troubleshooting Chapter).  Note! - The function is not active if you enter 0 (factory setting). - This function can be output via the switch output. - The batching progress message remains active until batching ends.

Function description		
SPECIAL FUNCTION → BATCHING FUNCTION → SUPERVISION (only with PROFIBUS DP)		
MAX. FLOW VALUE	7244	A maximum flow value can be specified in this function. The batching process is aborted and all the valves are closed if the specified flow value is overshoot. Application: This function can be used for safety reasons, for example, to ensure all batching valves close in the event of a system fault. User input: 5-digit floating-point number Factory setting: 0 [unit] (= deactivated)  Note! ■ The appropriate unit is taken depending on the process variable selected in the ASSIGN BATCH VARIABLE (7202) parameter and the unit configured in the SYSTEM UNITS group. ■ The function is not active if you enter 0 (factory setting). ■ If the batching process is aborted because the specified flow value was overshoot, the BATCH COUNTER parameter (7263) is not incremented. ■ The error message #474 > MAX. FLOW is output if the maximum flow is overshoot. This fault message can be acknowledged prematurely: – By modifying a batching function. – By selecting RESET in the “BATCH PROCEDURE” parameter – Via PROFIBUS communication

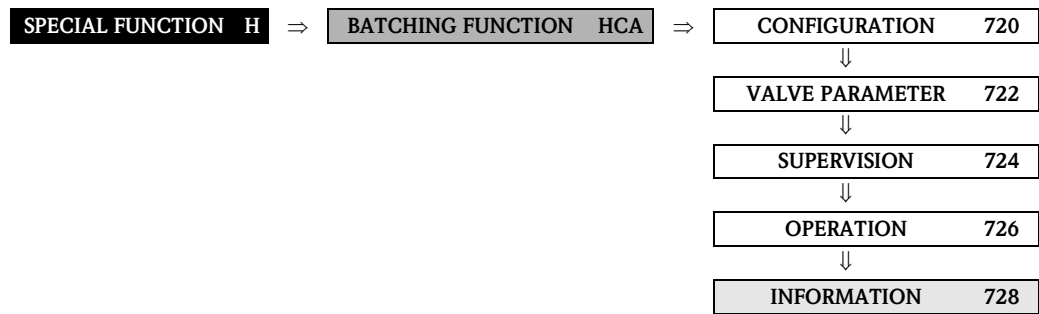
9.1.5 Function group OPERATION



Function description		
SPECIAL FUNCTION → BATCHING FUNCTION → OPERATION (only with PROFIBUS DP)		
BATCH PROCEDURE	7260	Use this function to control a batching process. The batching can be started manually or a batching already running can be interrupted or stopped at any time. Options: STOP (Stop batching) START (Start batching) HOLD (Interrupt batching) GO ON (Continue batching) Factory setting: STOP  Note! ■ This function can also be controlled using the status input (see ASSIGN STATUS INPUT function (5000) on page 91) or using PROFIBUS communication. ■ If the information line has been assigned to BATCHING MENU (see page 40), the application-specific functions of the minus key (START-STOP) and the plus key (HOLD-GO ON / PRESET) are defined locally. In this way, a direct batching control station is available locally at the measuring device by means of the user interface (not access-protected). ■ In the event of a fault: – during the batching process, the batching is cancelled (STOP) and the local display alternates between displaying the batching menu and the fault message. ■ If the positive zero return is activated (see page 112): – during the batching process, the batching is cancelled (STOP). – during a pause in the batching (option PAUSE), the batching cannot be restarted (see also notice messages # 571 and # 572 in the Operating Instructions Promag 53, PROFIBUS DP/PA, BA053D/06/en/, Troubleshooting Chapter).
BATCH UPWARDS	7261	In this function the batching progress can be read upwards, i.e. starting from 0 the quantity displayed increases until the batching process is complete or the amount specified in the BATCH QUANTITY (7203) function is reached. Display: Floating-point number incl. unit
BATCH DOWNWARDS	7262	In this function the batching progress can be read downwards, i.e. starting from the batching quantity (BATCH QUANTITY (7203)) the quantity displayed decreases until the batching process is complete. Display: Floating-point number incl. unit

Function description	
SPECIAL FUNCTION → BATCHING FUNCTION → OPERATION (only with PROFIBUS DP)	
BATCH COUNTER 7263	Use this function to display the number of batchings carried out. Display: max. 7-digit floating-point number Factory setting: 0  Note! ■ The batching quantity totalizer can be reset to 0 via the function RESET SUM/COUNTER (7265). ■ This function is reset to 0 (zero) if a different batching specification is selected in the function BATCH SELECTOR (7200).
BATCH SUM 7264	Use this function to display the effective overall total of all the batchings carried out. Display: max. 7-digit floating-point number [unit] Factory setting: 0 [unit]  Note! ■ For example, in 2-stage batching the effective overall total is calculated from the coarse batching quantity and fine batching quantity. ■ The total batching quantity can be reset to 0 via the function RESET SUM/COUNTER (7265). ■ This function is reset to 0 (zero) if a different batching specification is selected in the function BATCH SELECTOR (7200).
RESET SUM/COUNTER 7265	Use this function to reset the batch counter and the batch sum to zero. User input: NO YES Factory setting: NO  Note! The batch counter and the batch sum can also be reset via the batching menu (information line on the local display) or using PROFIBUS communication.

9.1.6 Function group INFORMATION



Function description	
SPECIAL FUNCTION → BATCHING FUNCTION → INFORMATION (only with PROFIBUS DP)	
VALVE 1 INTERNAL SWITCH POINT 7280	Use this function to display the internal switch point of valve 1 (see function CLOSE VALVE 1 on page 121). The displayed value takes into account the fix compensation quantity. Display: max. 7-digit floating-point number [unit]  Note! The appropriate unit is taken from the function group SYSTEM UNITS (ACA), (see page 12).
VALVE 1 CLOSING TIME 7282	Use this function to display the valve closing time calculated internally. Display: max. 7-digit floating-point number [ms]  Note! ■ The valve closing time is the period between the switch point of valve 1 and the first undershooting of the low flow cut off. ■ The data can only be taken as a general trend as the accuracy of the time value is directly dependent on the measuring period.
BATCHING TIME 7283	Displays the batching time for the current or completed batch process. Starting at 0 seconds, the time displayed increases until the batch process is completed. Application: The batching time refers to the batch quantity determined in the BATCH SUM function for the current or last batch process. Display: max. 7-digit floating-point number  Note! ■ Behavior when controlling the batching process by means of the BATCH PROCEDURE function: – STOP → BATCHING TIME is not reset and remains at the current value. – START → BATCHING TIME is reset and starts at 0. – HOLD → BATCHING TIME is not reset and remains at the current value. – GO ON → BATCHING TIME is not reset and continues updating based on the last time value. ■ The BATCHING TIME is also updated during the batching process

10 Block SUPERVISION

Block	Groups	Function groups	Functions							
SUPERVISION (I)	SYSTEM (JAA) p. 134	⇕⇕	CONFIGURATION (800) p. 134	⇕	ALARM DELAY (8005) p. 134	⇕	REMOVE SW-OPTION (8006) p. 134	PERMANENT STORAGE (8007) p. 134		
			⇕⇕	OPERATION (804) p. 135	⇕	ACT. SYST. CONDITION (8040) p. 135	⇕	PREV. SYST. CONDITION (8041) p. 135	SIM. FAILSAFE MODE (8042) p. 135	
	⇕⇕	⇕⇕	SENSOR (810) p. 137	⇕	DEVICE SOFTWARE (8100) p. 137	⇕	SIM. MEASURAND (8043) p. 135	VAL. SIM. MEASURAND (8044) p. 136	SYSTEM RESET (8046) p. 136	OPERATION HOURS (8048) p. 136
			SENSOR (820) p. 137	⇕	SERIAL NUMBER (8200) p. 137	⇕	SENSOR TYPE (8201) p. 137	SW REV.-NO. S-DAT (8205) p. 137		
			AMPLIFIER (822) p. 138	⇕	SW REV.-NO. AMPLIFIER (8222) p. 138	⇕	SW REV.-NO. T-DAT (8225) p. 138	LANGUAGE GROUP (8226) p. 138		
			⇕⇕	F-CHIP (824) p. 139	⇕	STATUS F-CHIP (8240) p. 139	⇕	SYSTEM OPTIONS (8241) p. 139	SW REV.-NO F-CHIP (8244) p. 139	
			⇕⇕	I/O MODULE (830) p. 139	⇕	I/O MODULE TYPE (8300) p. 139	⇕	SW REV. I/O-MODULE (8303) p. 139		
			⇕⇕	I/O SUBMODULE 2 (834) p. 140	⇕	SUB IN-/OUTPUT TYPE 2 (8340) p. 140	⇕	SW REV. SUB I/O TYPE 2 (8343) p. 140		
			⇕⇕	I/O SUBMODULE 3 (836) p. 140	⇕	SUB IN-/OUTPUT TYPE 3 (8360) p. 140	⇕	SW REV. SUB I/O TYPE 3 (8363) p. 140		
			⇕⇕	I/O SUBMODULE 4 (838) p. 140	⇕	SUB IN-/OUTPUT TYPE 4 (8380) p. 140	⇕	SW REV. SUB I/O TYPE 4 (8383) p. 140		

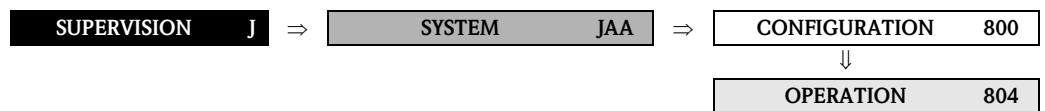
10.1 Group SYSTEM

10.1.1 Function group CONFIGURATION

SUPERVISION	J	⇒	SYSTEM	JAA	⇒	CONFIGURATION	800
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Function description		SUPERVISION → SYSTEM → CONFIGURATION
ALARM DELAY	8005	Use this function to define a time span in which the criteria for a fault have to be satisfied without interruption before a fault or notice message is generated. Depending on the setting and the type of fault, this suppression acts on: ■ Display ■ Relay output ■ Current output ■ Pulse/frequency output ■ PROFIBUS DP/PA User input: 0...100 s (in steps of one second) Factory setting: 0 s  Caution! If this function is activated fault and notice messages are delayed by the time corresponding to the setting before being transmitted to the higher-order controller (process controller, etc.). It is therefore imperative to check in advance in order to make sure whether a delay of this nature could affect the safety requirements of the process. If fault and notice messages may not be suppressed, a value of 0 seconds must be entered here.
REMOVE SW-OPTION	8006	 Note! This function is only available if: ■ The F-CHIP software options were saved beforehand ■ The F-CHIP is not located on the I/O board of the measuring device Deletes all F-CHIP software options, such as batching, etc. The measuring device is restarted after the software options have been deleted. Options: NO YES Factory setting: NO  Caution! If process variables which are only available via the F-CHIP software options are assigned to the local display or the outputs, these have to be reconfigured.
PERMANENT STORAGE	8007	This function indicates whether permanent storage of all parameters in the EEPROM has been switched on or off. Display: 0 = OFF 1 = ON Factory setting: ON

10.1.2 Function group OPERATION

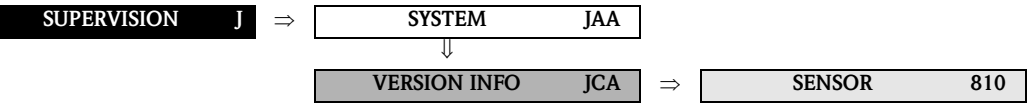


Function description		SUPERVISION → SYSTEM → OPERATION
ACTUAL SYSTEM CONDITION	8040	Use this function to check the present system condition. Display: “SYSTEM OK” or the fault / notice message with the highest priority.
PREVIOUS SYSTEM CONDITION	8041	Use this function to view the fifteen most recent fault and notice messages since measuring last started. Display: The 15 most recent fault or notice messages.
SIMULATION FAILSAFE MODE	8042	Use this function to set all inputs and outputs to their defined failsafe modes, in order to check whether they respond correctly. During this time, the message “SIMULATION FAILSAFE MODE” appears on the display. Options: ON OFF Factory setting: OFF  Note! The failsafe mode of the PROFIBUS function blocks must be defined in the appropriate Analog Input function block or Totalizer function block.
SIMULATION MEASURAND	8043	Use this function to set all inputs, outputs and totalizers to their defined flow-response modes, in order to check whether they respond correctly. During this time, the message “SIMULATION MEASURAND” appears on the display. Options: OFF MASS FLOW VOLUME FLOW Factory setting: OFF  Caution! ■ The measuring device cannot be used for measuring while this simulation is in progress. ■ The setting is not saved in the event of a power failure.

Function description		
SUPERVISION → SYSTEM → OPERATION		
VALUE SIMULATION MEASURAND	8044	 Note! The function is not visible unless the SIMULATION MEASURAND function (8043) is active. Use this function to specify a selectable value (e.g. 12 m³/s). This is used to test the associated functions in the device itself and downstream signal loops. User input: 5-digit floating-point number [unit] Factory setting: 0 [unit]  Caution! ■ The setting is not saved in the event of a power failure. ■ The appropriate unit is taken from the function group SYSTEM UNITS (ACA), (see page 12).
SYSTEM RESET	8046	Use this function to perform a reset of the measuring system. Options: NO RESTART SYSTEM (restart without interrupting power supply) Factory setting: NO
OPERATION HOURS	8048	The hours of operation of the device appear on the display. Display: Depends on the number of hours of operation elapsed: Hours of operation < 10 hours → display format = 0:00:00 (hr:min:sec) Hours of operation 10...10,000 hours → display format = 0000:00 (hr:min) Hours of operation > 10,000 hours → display format = 000000 (hr)

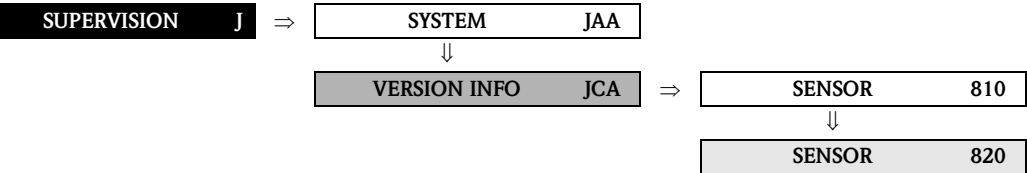
10.2 Group VERSION INFO

10.2.1 Function group SENSOR



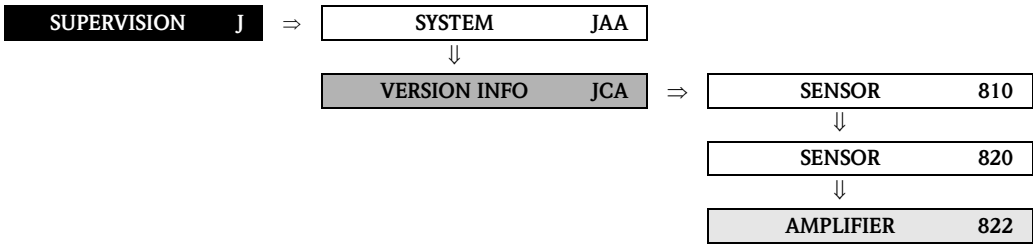
Function description		
SUPERVISION → VERSION INFO → SENSOR		
DEVICE SOFTWARE	8100	Displays the current device software version.

10.2.2 Function group SENSOR



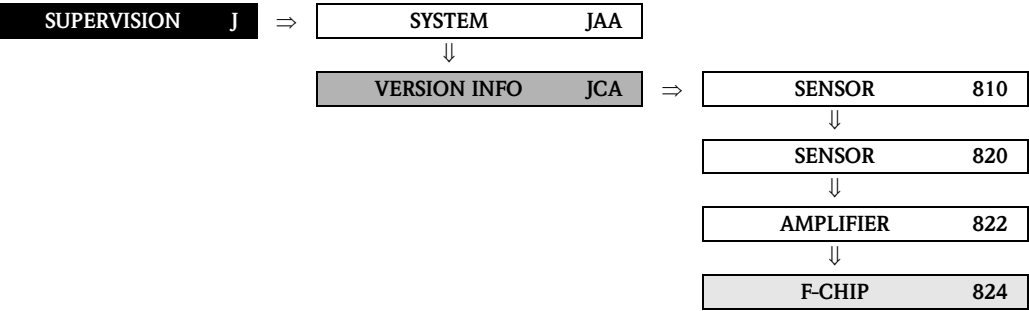
Function description		
SUPERVISION → VERSION INFO → SENSOR		
SERIAL NUMBER	8200	Use this function to view the serial number of the sensor.
SENSOR TYPE	8201	Use this function to view the sensor type.
SW REV.-NO. S-DAT	8205	Use this function to view the software revision number of the software used to create the content of the S-DAT.

10.2.3 Function group AMPLIFIER



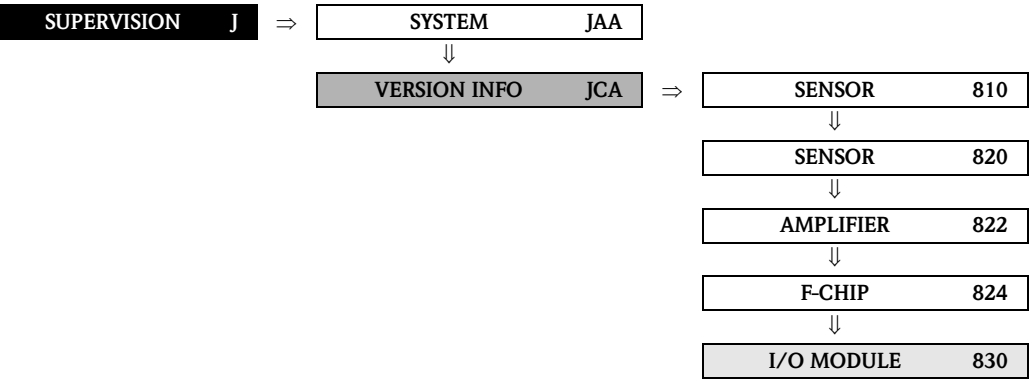
Function description		
SUPERVISION → VERSION INFO → AMPLIFIER		
SW REV.-NO. AMPLIFIER	8222	Use this function to view the software revision number of the amplifier.
SW REV.-NO. T-DAT	8225	Use this function to view the software revision number of the software used to create the content of the T-DAT.
LANGUAGE GROUP	8226	Displays the installed language group. Display: TYPE UNKNOWN WEST EU / USA EAST EU / SCAND. ASIA CHINA Note! ■ The language options of the available language group are displayed in the LANGUAGE (2000) function. ■ The language group can be changed using the configuration program FieldCare. Please do not hesitate to contact your Endress+Hauser sales office if you have any questions.

10.2.4 Function group F-CHIP



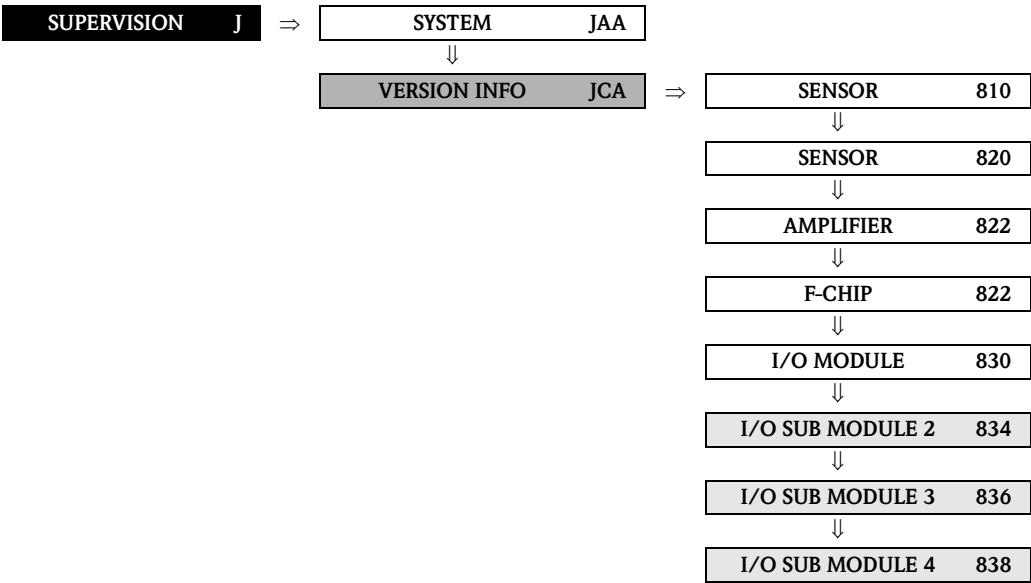
Function description		
SUPERVISION → VERSION INFO → F-CHIP		
STATUS F-CHIP	8240	Use this function to check whether an F-CHIP is installed and which software options are available.
SYSTEM OPTIONS	8241	Note! This function is not available unless the measuring device is equipped an F-CHIP. The software options available in the measuring device appear on the display.
SW REV.-NO F-CHIP	8244	Note! This function is not available unless the measuring device is equipped an F-CHIP. Use this function to view the software revision number of the F-CHIP.

10.2.5 Function group I/O MODULE



Function description		
SUPERVISION → VERSION INFO → I/O MODULE		
I/O MODULE TYPE	8300	Displays the configuration of the I/O module.
SW REV. I/O-MODULE	8303	Use this function to view the software revision number of the I/O module.

10.2.6 Function groups INPUT /OUTPUT 2...4



Function description		
SUPERVISION → VERSION INFO → IN-/OUTPUT 2...4		
SUB IN-/OUTPUT TYPE	2 = 8340 3 = 8360 4 = 8380	Use this function to view the configuration complete with terminal numbers.
SW REV. NO. SUB IN-/OUTPUT TYPE	2 = 8343 3 = 8363 4 = 8383	Use this function to view the software revision number of the corresponding submodule.

11 Factory settings

11.1 SI units (not for USA and Canada)

Low flow cut off, full scale value, pulse value

Nominal diameter		Low flow cut off (approx. v = 0.04 m/s)		Full scale value (approx. v = 2.5 m/s)		Pulse value (approx. 2 pulse/s at 2.5 m/s)	
[mm]	[inch]		Volume		Volume		Vol.
2	1/12"	0.01	dm ³ /min	0..5	dm ³ /min	0.005	dm ³
4	5/32"	0.05	dm ³ /min	2	dm ³ /min	0.025	dm ³
8	5/16"	0.1	dm ³ /min	8	dm ³ /min	0.10	dm ³
15	1/2"	0.5	dm ³ /min	25	dm ³ /min	0.20	dm ³
25	1"	1	dm ³ /min	75	dm ³ /min	0.50	dm ³
32	1 1/4"	2	dm ³ /min	125	dm ³ /min	1.00	dm ³
40	1 1/2"	3	dm ³ /min	200	dm ³ /min	1.50	dm ³
50	2"	5	dm ³ /min	300	dm ³ /min	2.50	dm ³
65	2 1/2"	8	dm ³ /min	500	dm ³ /min	5.00	dm ³
80	3"	12	dm ³ /min	750	dm ³ /min	5.00	dm ³
100	4"	20	dm ³ /min	1200	dm ³ /min	10.00	dm ³
125	5"	30	dm ³ /min	1850	dm ³ /min	15.00	dm ³
150	6"	2.5	m ³ /h	150	m ³ /h	0.025	m ³
200	8"	5.0	m ³ /h	300	m ³ /h	0.05	m ³
250	10"	7.5	m ³ /h	500	m ³ /h	0.05	m ³
300	12"	10	m ³ /h	750	m ³ /h	0.10	m ³
350	14"	15	m ³ /h	1000	m ³ /h	0.10	m ³
375	15"	20	m ³ /h	1200	m ³ /h	0.15	m ³
400	16"	20	m ³ /h	1200	m ³ /h	0.15	m ³
450	18"	25	m ³ /h	1500	m ³ /h	0.25	m ³
500	20"	30	m ³ /h	2000	m ³ /h	0.25	m ³
600	24"	40	m ³ /h	2500	m ³ /h	0.30	m ³
700	28"	50	m ³ /h	3500	m ³ /h	0.50	m ³
–	30"	60	m ³ /h	4000	m ³ /h	0.50	m ³
800	32"	75	m ³ /h	4500	m ³ /h	0.75	m ³
900	36"	100	m ³ /h	6000	m ³ /h	0.75	m ³
1000	40"	125	m ³ /h	7000	m ³ /h	1.00	m ³
–	42"	125	m ³ /h	8000	m ³ /h	1.00	m ³
1200	48"	150	m ³ /h	10000	m ³ /h	1.50	m ³
–	54"	200	m ³ /h	13000	m ³ /h	1.50	m ³
1400	–	225	m ³ /h	14000	m ³ /h	2.00	m ³
–	60"	250	m ³ /h	16000	m ³ /h	2.00	m ³
1600	–	300	m ³ /h	18000	m ³ /h	2.50	m ³
–	66"	325	m ³ /h	20500	m ³ /h	2.50	m ³
1800	72"	350	m ³ /h	23000	m ³ /h	3.00	m ³
–	78"	450	m ³ /h	28500	m ³ /h	3.50	m ³
2000	–	450	m ³ /h	28500	m ³ /h	3.50	m ³

Language

Country	Language
Australia	English
Belgium	English
China	Chinese
Denmark	English
Germany	Deutsch
England	English
Finland	Suomi
France	Francais
Netherlands	Nederlands
Hong Kong	English
India	English
Indonesia	Bahasa Indonesia
Instruments International	English
Italy	Italiano
Japan	Japanese
Malaysia	English
Norway	Norsk
Poland	Polish
Portugal	Portuguese
Austria	Deutsch
Russia	Russian
Sweden	Svenska
Switzerland	Deutsch
Singapore	English
Spain	Espanol
South Africa	English
Thailand	English
Czech Republic	Czech
Hungary	English

Density, length, temperature

	Unit
Density	kg/l
Length	mm
Temperature	°C

11.2 US units (only for USA and Canada)

Low flow cut off, full scale value, pulse value

Nominal diameter		Low flow cut off (approx. v = 0.04 m/s)		Full scale value (approx. v = 2.5 m/s)		Pulse value (approx. 2 pulse/s at 2.5 m/s)	
[inch]	[mm]		Volumen		Volumen		Vol.
1/12"	2	0.002	gal/min	0.1	gal/min	0.001	gal
5/32"	4	0.008	gal/min	0.5	gal/min	0.005	gal
5/16"	8	0.025	gal/min	2	gal/min	0.02	gal
1/2"	15	0.10	gal/min	6	gal/min	0.05	gal
1"	25	0.25	gal/min	18	gal/min	0.20	gal
1 1/4"	32	0.50	gal/min	30	gal/min	0.20	gal
1 1/2"	40	0.75	gal/min	50	gal/min	0.50	gal
2"	50	1.25	gal/min	75	gal/min	0.50	gal
2 1/2"	65	2.0	gal/min	130	gal/min	1	gal
3"	80	2.5	gal/min	200	gal/min	2	gal
4"	100	4.0	gal/min	300	gal/min	2	gal
5"	125	7.0	gal/min	450	gal/min	5	gal
6"	150	12	gal/min	600	gal/min	5	gal
8"	200	15	gal/min	1200	gal/min	10	gal
10"	250	30	gal/min	1500	gal/min	15	gal
12"	300	45	gal/min	2400	gal/min	25	gal
14"	350	60	gal/min	3600	gal/min	30	gal
15"	375	60	gal/min	4800	gal/min	50	gal
16"	400	60	gal/min	4800	gal/min	50	gal
18"	450	90	gal/min	6000	gal/min	50	gal
20"	500	120	gal/min	7500	gal/min	75	gal
24"	600	180	gal/min	10500	gal/min	100	gal
28"	700	210	gal/min	13500	gal/min	125	gal
30"	–	270	gal/min	16500	gal/min	150	gal
32"	800	300	gal/min	19500	gal/min	200	gal
36"	900	360	gal/min	24000	gal/min	225	gal
40"	1000	480	gal/min	30000	gal/min	250	gal
42"	–	600	gal/min	33000	gal/min	250	gal
48"	1200	600	gal/min	42000	gal/min	400	gal
54"	–	1.3	Mgal/d	75	Mgal/d	0.0005	Mgal
–	1400	1.3	Mgal/d	85	Mgal/d	0.0005	Mgal
60"	–	1.3	Mgal/d	95	Mgal/d	0.0005	Mgal
–	1600	1.7	Mgal/d	110	Mgal/d	0.0008	Mgal
66"	–	2.2	Mgal/d	120	Mgal/d	0.0008	Mgal
72"	1800	2.6	Mgal/d	140	Mgal/d	0.0008	Mgal
78"	–	3.0	Mgal/d	175	Mgal/d	0.001	Mgal
–	2000	3.0	Mgal/d	175	Mgal/d	0.001	Mgal

Language, density, length, temperature

	Unit
Language	English
Density	g/cc
Length	inch
Temperature	°F

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