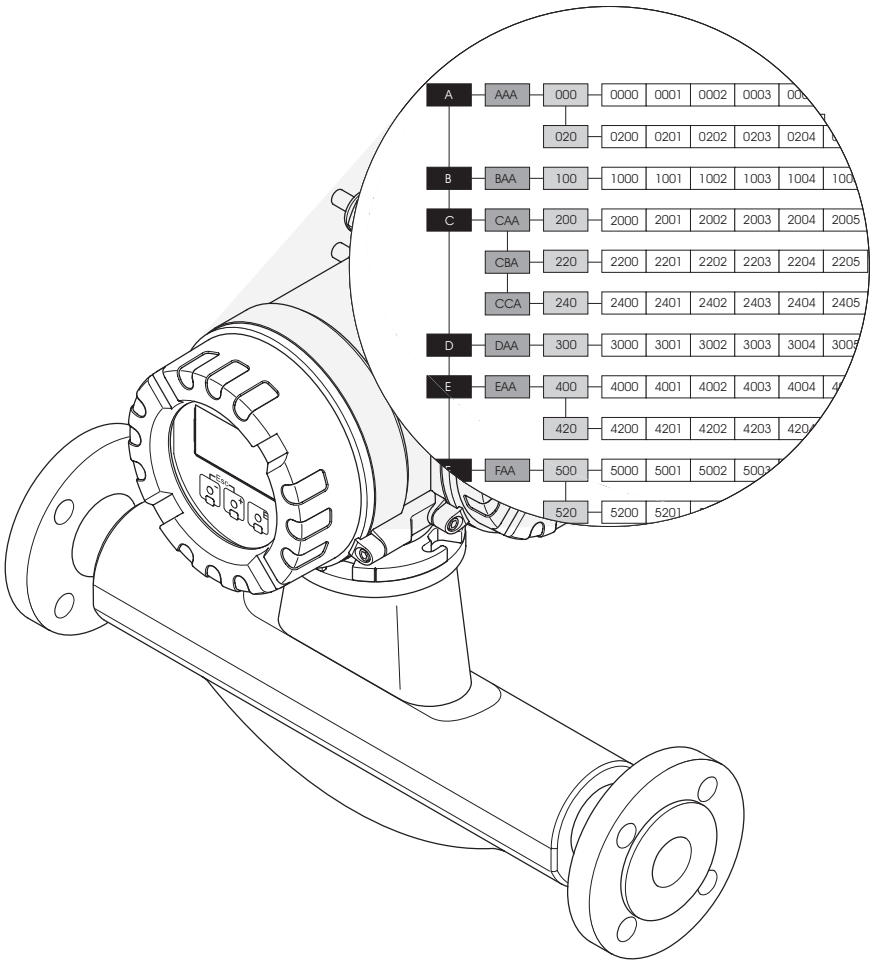
Level Pressure Flow Temperature Liquid Analysis Registration Systems Components Services Solutions

Description of Device Functions

Proline Promass 83 PROFIBUS DP/PA

Coriolis Mass Flow Measuring System



BA064D/06/en/11.08
71085225
Valid as of version
PROFIBUS DP: V 3.04.XX (device software)
PROFIBUS PA: V 3.05.XX (device software)

Endress+Hauser

People for Process Automation

Table of contents

1 Using this Manual

This manual must be used in conjunction with the Operating Instructions of the measuring device. A description of all the functions of the measuring device is provided here.

1.1 Finding a function description

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

1.1.1 Using the table of contents

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.

1.1.2 Using the graphic of the function matrix

This step-by-step, top-down approach starts with the blocks, the highest level, and works 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.

1.1.3 Using the index of the function matrix

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.

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.

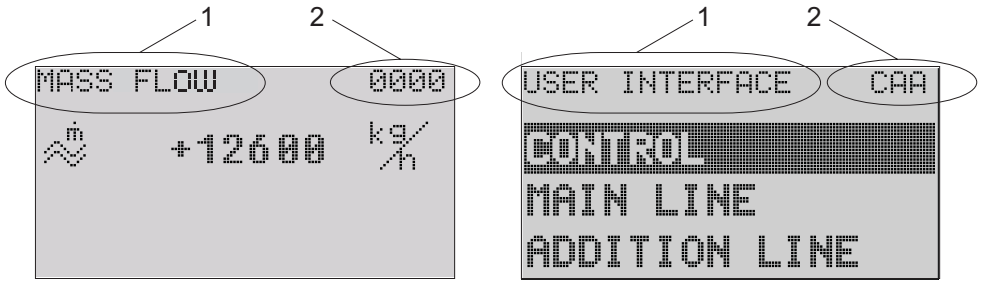


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Fig. 1 : Local display
1 Name of the function, e.g. mass flow, user interface
2 Function code, e.g. 0000, CAA

The index to the function matrix is on Page 171.

2 Function matrix

2.1 General layout of the function matrix

The function matrix consists of four levels:
Blocks -> Groups -> Function groups -> Functions

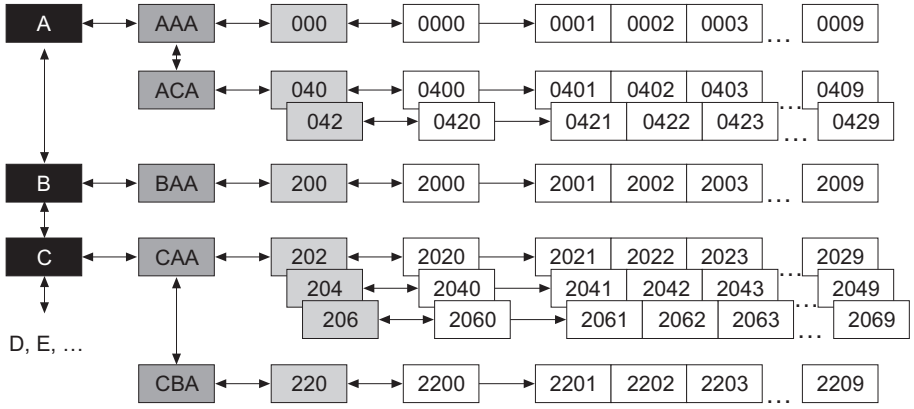


Fig. 2 : Layout of the function matrix

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, OUTPUTS, 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, ADDITION 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. The function groups in the “CONTROL” group, for example, include: BASIC CONFIGURATION, UN-/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

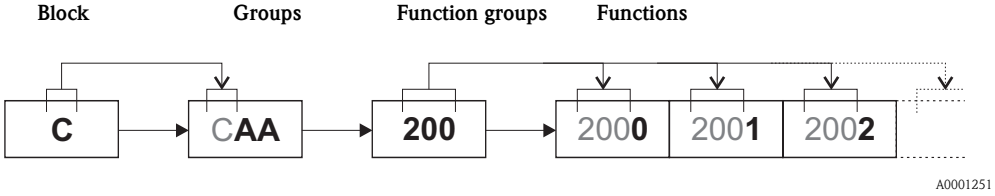
Each cell (block, group, function group and function) in the function matrix has an individual, unique code.

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).



2.2 Illustration of the function descriptions

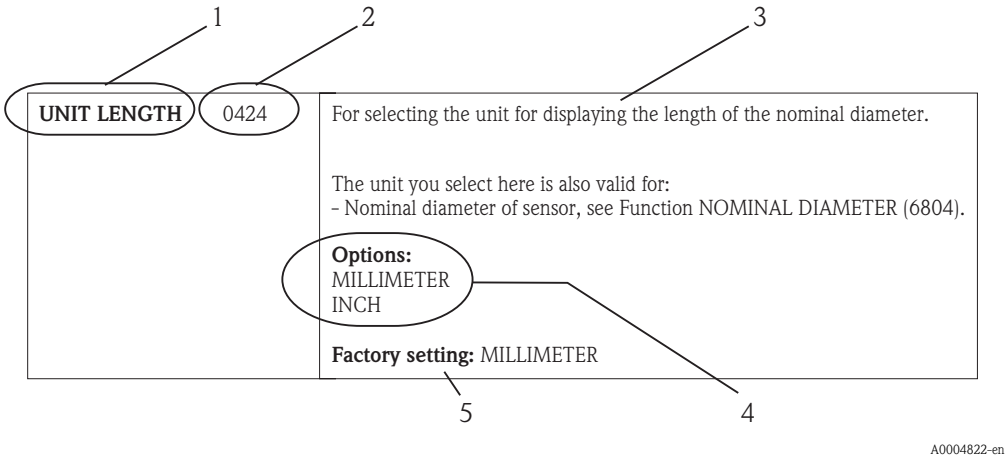


Fig. 3 : Example for the description of a function

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 Max. 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.

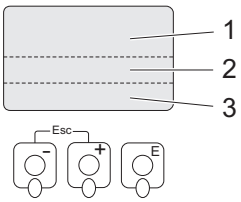


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Fig. 4 : Local display
1 Main line
2 Additional line
3 Information line

The values are assigned to the individual lines in the USER INTERFACE block, see Page 33.

2.5 Available Blocks, Groups, etc.

Type code of the measuring device	Available In-/Outputs							Available Blocks, Groups, etc.										
											OUTPUTS							
	PROFIBUS PA, Ex i	PROFIBUS DP	Current output 1	Pulse/freq. output 1	Relay output 1	Relay output 2	Status input	MEASURED VARIABLES	QUICK SETUP	USER INTERFACE	Current output 1	Pulse/freq. output 1	Relay output 1	Relay output 2	INPUTS	BASIC FUNCTION	SPECIAL FUNCTION	SUPERVISION
83***-**********F/H	X	–	–	–	–	–	–	X*	X	X	–	–	–	–	–	X	–	X
83***-**********J	–	X	–	–	–	–	–	X	X	X	–	–	–	–	–	X	X	X
83***-**********P	–	X	X	X	–	–	X	X	X	X	X	X	–	–	X	X	X	X
83***-**********V	–	X	–	–	X	X	X	X	X	X	–	–	X	X	X	X	X	X

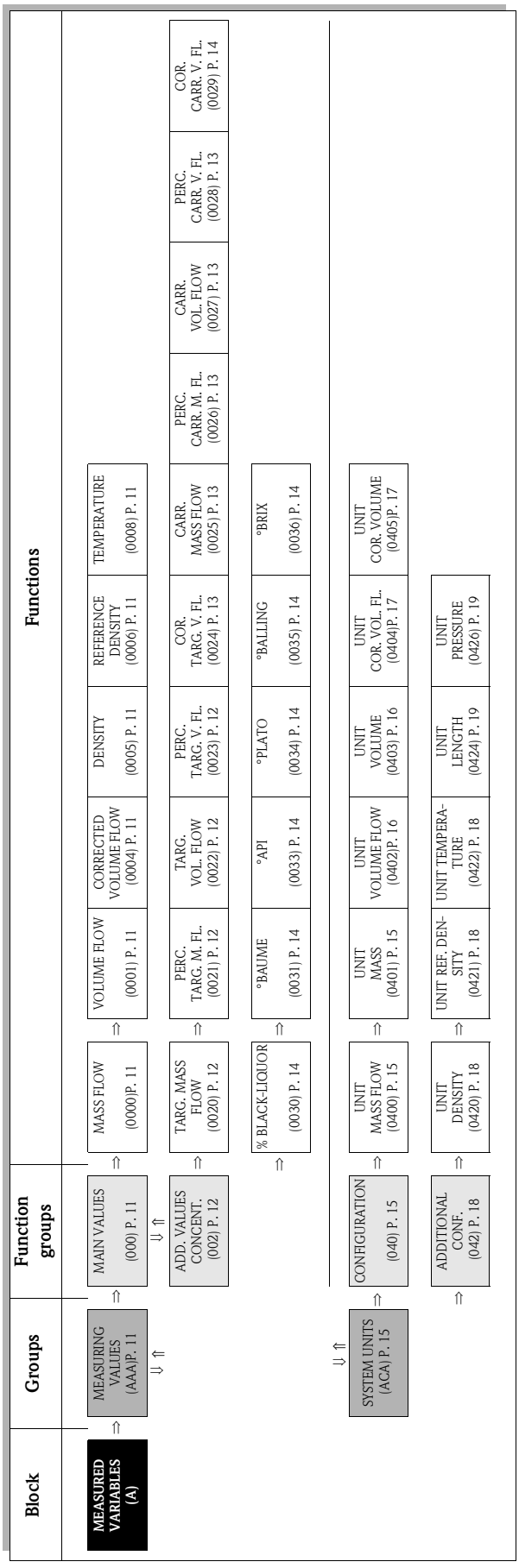
* For measuring devices with the type code 83***-**********F (PROFIBUS PA, Ex i) and 83***-**********H (PROFIBUS PA) the function group “ADD. VALUES CONCENT.”, in the “MEASURED VARIABLES” block, is **not** available.

2.6 Function matrix

Note!
The availability of the blocks, groups, function groups and functions depends on the input and output placement of the measuring devices → Page 8 (Available Blocks, Groups, etc.).

Blocks		Groups		Function groups
MEASURED VARIABLES (see P. 10)	**A**	MEASURING VALUES	AAA	see Page 11
		SYSTEM UNITS	ACA	see Page 15
QUICK SETUP (see P. 20)	**B**	Commissioning and application setups		see Page 20
USER INTERFACE (see P. 32)	**C**	CONTROL	CAA	see Page 33
		MAIN LINE	CCA	see Page 37
		ADDITION LINE	CEA	see Page 41
		INFORMATION LINE	CGA	see Page 47
OUTPUTS (see P. 53)	**E**	CURRENT OUTPUT 1	EAA	see Page 54
		PULSE/FREQ. OUTPUT 1 1	ECA	see Page 63
		RELAY OUTPUT 1	EGA	see Page 88
		RELAY OUTPUT 2	EGB	see Page 88
INPUTS (see P. 97)	**F**	STATUS INPUT	FAA	see Page 98
BASIC FUNCTION (see P. 101)	**G**	PROFIBUS DP, GBA / PROFIBUS PA, GCA		see Page 102
		PROCESS PARAMETER	GIA	see Page 111
		SYSTEM PARAMETER	GLA	see Page 120
		SENSOR DATA	GNA	see Page 121
SPECIAL FUNCTION (see P. 125)	**H**	DENSITY FUNCTION	HAA	see Page 127
		BATCH FUNCTION	HCA	see Page 132
		ADVANCED DIAGNOSTICS	HEA	see Page 148
SUPERVISION (see P. 160)	**J**	SYSTEM	JAA	see Page 161
		VERSION INFO	JCA	see Page 164

3 Block MEASURED VARIABLES



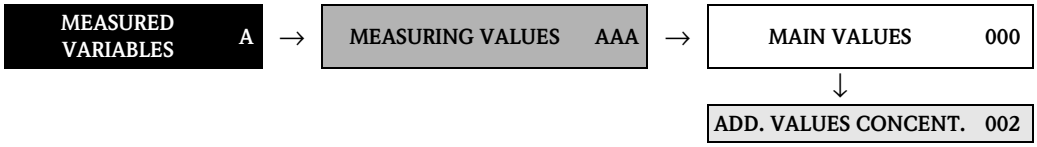
3.1 Group MEASURING VALUES

3.1.1 Function group MAIN VALUES

MEASURED VARIABLES A → MEASURING VALUES AAA → MAIN VALUES 000

Function description MEASURED VARIABLES → MEASURING VALUES → MAIN VALUES		
✎ 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.		
MASS FLOW	**0000**	The currently measured mass flow appears on the display. **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 calculated volume flow appears on the display. The volume flow is derived from the measured mass flow and the measured density of the fluid. **Display:** 5-digit floating-point number, including unit and sign (e.g. 5.5445 dm^3/min; 1.4359 m^3/h; –731.63 gal/d; etc.)
CORRECTED VOLUME FLOW	**0004**	The calculated corrected volume flow appears on the display. The calculated corrected volume flow is derived from the measured mass flow and the reference density of the fluid (density at reference temperature, measured or fixed entry). **Display:** 5-digit floating-point number, including unit and sign (e.g. 1.3549 Nm^3/h; 7.9846 scm/day; etc.)
DENSITY	**0005**	The currently measured density or its specific gravity appears on the display. **Display:** 5-digit floating point number, incl. unit, corresponding to 0.1000 to 6.0000 kg/dm^3 (e.g. 1.2345 kg/dm^3; 993.5 kg/m^3; 1.0015 SG_20 °C; etc.)
REFERENCE DENSITY	**0006**	The density of the fluid, at reference temperature, appears on the display. The reference density can be measured or also specified via the function FIXED REFERENCE DENSITY (6461), (see Page 115). **Display:** 5-digit floating point number, incl. unit, corresponding to 0.1000 to 6.0000 kg/dm^3 (e.g. 1.2345 kg/dm^3; 993.5 kg/m^3; 1.0015 SG_20 °C; etc.)
TEMPERATURE	**0008**	The currently measured temperature appears on the display. **Display:** max. 4-digit fixed-point number, including unit and sign (e.g. –23.4 °C; 160.0 °F; 295.4 K; etc.)

3.1.2 Function group ADDITIONAL VALUES CONCENT.



✎ Note!
This function group is not available for all measuring devices → Page 8 (Available Blocks, Groups, etc.).

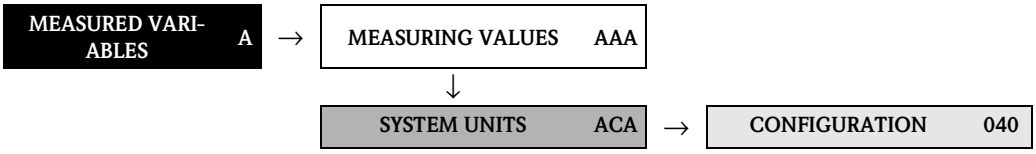
Function description MEASURED VARIABLES → MEASURING VALUES → ADD. VALUES CONCENT.	
TARGET MASS FLOW **0020**	✎ Note! Function is not available unless one of the following was selected: ■ in the function DENSITY FUNCTION (7000), see Page 127: – % MASS / % VOLUME – FLEXIBLE and in the function MODE (7021), see Page 129, the selection % MASS 2D or % MASS 3D The currently measured mass flow of the target fluid appears on the display. Target fluid = carried material (e.g. lime powder). **Display:** 5-digit floating-point number, including unit and sign
% TARGET MASS FLOW **0021**	✎ Note! Function is not available unless one of the following was selected: ■ in the function DENSITY FUNCTION (7000), see Page 127: – % MASS / % VOLUME – FLEXIBLE and in the function MODE (7021), see Page 129, the selection % MASS 2D or % MASS 3D The currently measured mass flow of the target fluid is displayed as a % (of the overall mass flow). Target fluid = carried material (e.g. lime powder). **Display:** 5-digit floating-point number, including unit and sign
TARGET VOLUME FLOW **0022**	✎ Note! Function is not available unless one of the following was selected: ■ in the function DENSITY FUNCTION (7000), see Page 127: – % MASS / % VOLUME – FLEXIBLE and in the function MODE (7021), see Page 129, the selection % VOLUME 2D or % VOLUME 3D The currently measured volume flow of the target fluid appears on the display. Target fluid = carried material (e.g. lime powder). **Display:** 5-digit floating-point number, including unit and sign
% TARGET VOLUME FLOW **0023**	✎ Note! Function is not available unless one of the following was selected: ■ in the function DENSITY FUNCTION (7000), see Page 127: – % MASS / % VOLUME – FLEXIBLE and in the function MODE (7021), see Page 129, the selection % VOLUME 2D or % VOLUME 3D The currently measured volume flow of the target fluid is displayed as a % (of the overall volume flow). Target fluid = carried material (e.g. lime powder). **Display:** 5-digit floating-point number, including unit and sign

Function description MEASURED VARIABLES → MEASURING VALUES → ADD. VALUES CONCENT.	
TARGET CORRECTED VOLUME FLOW **0024**	✎ Note! Function is not available unless % MASS / % VOLUME was selected in the DENSITY FUNCTION function (7000), (see Page 127). The currently measured corrected volume flow of the target fluid appears on the display. Target fluid = carried material (e.g. lime powder). **Display:** 5-digit floating-point number, including unit and sign
CARRIER MASS FLOW **0025**	✎ Note! Function is not available unless one of the following was selected: ■ in the function DENSITY FUNCTION (7000), see Page 127: – % MASS / % VOLUME – FLEXIBLE and in the function MODE (7021), see Page 129, the selection % MASS 2D or % MASS 3D The currently measured mass flow of the carrier fluid appears on the display. Carrier fluid = transporting liquid (e.g. water). **Display:** 5-digit floating-point number, including unit and sign
% CARRIER MASS FLOW **0026**	✎ Note! Function is not available unless one of the following was selected: ■ in the function DENSITY FUNCTION (7000), see Page 127: – % MASS / % VOLUME – FLEXIBLE and in the function MODE (7021), see Page 129, the selection % MASS 2D or % MASS 3D The currently measured mass flow of the carrier fluid is displayed as a % (of the overall mass flow). Carrier fluid = transporting liquid (e.g. water). **Display:** 5-digit floating-point number, including unit and sign
CARRIER VOLUME FLOW **0027**	✎ Note! Function is not available unless one of the following was selected: ■ in the function DENSITY FUNCTION (7000), see Page 127: – % MASS / % VOLUME – FLEXIBLE and in the function MODE (7021), see Page 129, the selection % VOLUME 2D or % VOLUME 3D The currently measured volume flow of the carrier fluid appears on the display. Carrier fluid = transporting liquid (e.g. water). **Display:** 5-digit floating-point number, including unit and sign
% CARRIER VOLUME FLOW **0028**	✎ Note! Function is not available unless % MASS / % VOLUME was selected in the DENSITY FUNCTION function (7000), (see Page 127). Use this function to display the currently measured corrected volume flow of the carrier fluid. Carrier fluid = transporting liquid (e.g. water). **Display:** 5-digit floating-point number, including unit and sign

Function description MEASURED VARIABLES → MEASURING VALUES → ADD. VALUES CONCENT.	
CARRIER CORRECTED VOLUME FLOW **0029**	✎ Note! Function is not available unless % MASS / % VOLUME was selected in the DENSITY FUNCTION function (7000), (see Page 127). The currently measured corrected volume flow of the carrier fluid appears on the display. Carrier fluid = transporting liquid (e.g. water). **Display:** 5-digit floating-point number, including unit and sign
% BLACK-LIQUOR **0030**	✎ Note! Function is not available unless %-BLACK LIQUOR was selected in the DENSITY FUNCTION function (7000), (see Page 127). The concentration in %-BLACK LIQUOR is displayed. **Display:** 5-digit floating-point number, including units
°BAUME **0031**	✎ Note! Function is not available unless °BAUME was selected in the DENSITY FUNCTION function (7000), (see Page 127). The concentration in °BAUME is displayed. **Display:** 5-digit floating-point number, including units
°API **0033**	✎ Note! Function is not available unless °API was selected in the DENSITY FUNCTION function (7000), (see Page 127). The concentration in °API is displayed. **Display:** 5-digit floating-point number, including units
°PLATO **0034**	✎ Note! Function is not available unless °PLATO was selected in the DENSITY FUNCTION function (7000), (see Page 127). The concentration in °PLATO is displayed. **Display:** 5-digit floating-point number, including units
°BALLING **0035**	✎ Note! Function is not available unless °BALLING was selected in the DENSITY FUNCTION function (7000), (see Page 127). The concentration in °BALLING is displayed. **Display:** 5-digit floating-point number, including units
°BRIX **0036**	✎ Note! Function is not available unless °BRIX was selected in the DENSITY FUNCTION function (7000), (see Page 127). The concentration in °BRIX is displayed. **Display:** 5-digit floating-point number, including units

3.2 Group SYSTEM UNITS

3.2.1 Function group CONFIGURATION

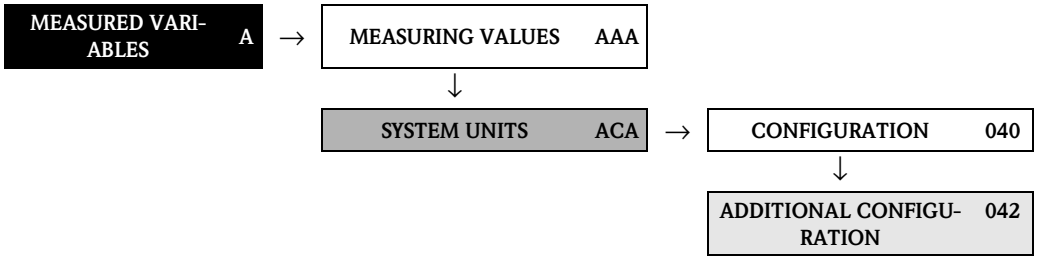


Function description MEASURED VARIABLES → SYSTEM UNITS → CONFIGURATION	
You can select the units for measured variables in this function group.	
UNIT MASS FLOW 0400	For selecting the unit for displaying the mass flow (mass/time). The unit you select here is also valid for: ■ Current output ■ Frequency 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 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:** Country-dependent (kg/h or US-lb/min)
UNIT MASS 0401	For selecting the unit for displaying the mass. The unit you select here is also valid for: ■ Pulse value (e.g. kg/p) ■ Batching functions **Options:** Metric: g kg t US: oz lb ton **Factory setting:** Country-dependent (kg or US-lb) ✎ 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**	For selecting the unit for displaying the volume flow (volume/time). The unit you select here is also valid for: ■ Current output ■ Frequency output ■ Relay switch points (limit value for volume flow, flow direction) ■ Low flow cut off **Options:** Metric: cubic centimeter → cm^3/s; cm^3/min; cm^3/h; cm^3/day cubic decimeter → dm^3/s; dm^3/min; dm^3/h; dm^3/day cubic meter → m^3/s; m^3/min; m^3/h; m^3/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 → ft^3/s; ft^3/min; ft^3/h; ft^3/day fluid ounce → oz f/s; oz f/min; oz f/h; oz f/day gallon → gal/s; gal/min; gal/h; gal/day kilogallon → 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:** Country-dependent (m^3/h or US-Mgal/day)
UNIT VOLUME	**0403**	For selecting the unit for displaying the volume. The unit you select here is also valid for: ■ Pulse value (e.g. m^3/p) ■ Batching functions **Options:** Metric → cm^3; dm^3; m^3; ml; l; hl; Ml Mega US → cc; af; ft^3; oz f; gal; Kgal; Mgal; bbl (normal fluids); bbl (beer); bbl (petrochemicals); bbl (filling tanks) Imperial → gal; Mgal; bbl (beer); bbl (petrochemicals) **Factory setting:** m^3 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 CORRECTED VOLUME FLOW **0404**	For selecting the unit for displaying the corrected volume flow (corrected volume/time). The unit you select here is also valid for: ■ Current output ■ Frequency output ■ Relay switch points (limit value for corrected volume flow, flow direction) ■ Low flow cut off **Options:** Metric: Nl/s Nl/min Nl/h Nl/day Nm³/s Nm³/min Nm³/h Nm³/day US: Sm³/s Sm³/min Sm³/h Sm³/day Scf/s Scf/min Scf/h Scf/day **Factory setting:** Nm³/h
UNIT CORRECTED VOLUME **0405**	For selecting the unit for displaying the corrected volume. The unit you select here is also valid for: ■ Pulse value (e.g. m³/p) ■ Batching functions **Options:** Metric: Nm³ Nl US: Sm³ Scf **Factory setting:** Nm³ ✎ 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.

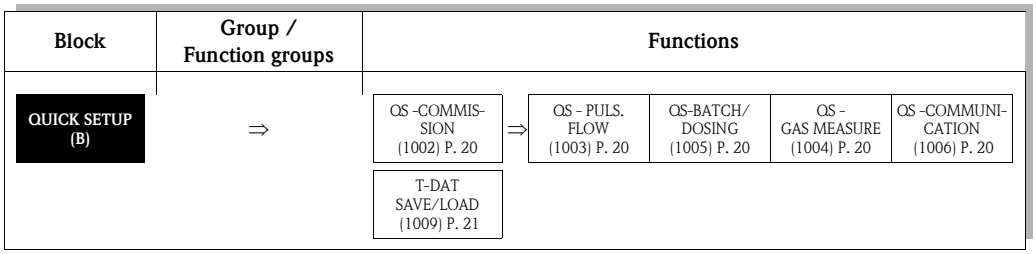
3.2.2 Function group ADDITIONAL CONFIGURATION



Function description MEASURED VARIABLES → SYSTEM UNITS → CONFIGURATION	
UNIT DENSITY **0420**	For selecting the unit for displaying the fluid density. The unit you select here is also valid for: ■ Current output ■ Frequency output ■ Relay switch points (limit value for density) ■ Density response value for EPD ■ Density adjustment value **Options:** Metric → g/cm³; g/cc; 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 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 REFERENCE DENSITY **0421**	For selecting the unit for displaying the reference density. The unit you select here is also valid for: ■ Current output ■ Frequency output ■ Relay switch points (limit value for density) ■ Fixed reference density (for calculation of corrected volume flow) **Options:** Metric: kg/Nl kg/Nm³ US: g/Scc kg/Sm³ lb/Scf **Factory setting:** kg/Nl
UNIT TEMPERATURE **0422**	For selecting the unit for displaying the temperature. The unit you select here is also valid for: ■ Current output ■ Frequency output ■ Relay switch points (limit value for temperature) ■ Reference temperature (for corrected vol. measurement with measured reference density) **Options:** °C (Celsius) K (Kelvin) °F (Fahrenheit) °R (Rankine) **Factory setting:** °C

Function description MEASURED VARIABLES → SYSTEM UNITS → CONFIGURATION		
UNIT LENGTH	**0424**	For selecting 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 121) **Options:** MILLIMETER INCH **Factory setting:** MILLIMETER
UNIT PRESSURE	**0426**	For selecting the unit for displaying the pressure. The unit you select here is also valid for: ■ Specified pressure (function PRESSURE (6501) on Page 119) **Options:** bara barg psia psig **Factory setting:** barg

4 Block QUICK SETUP

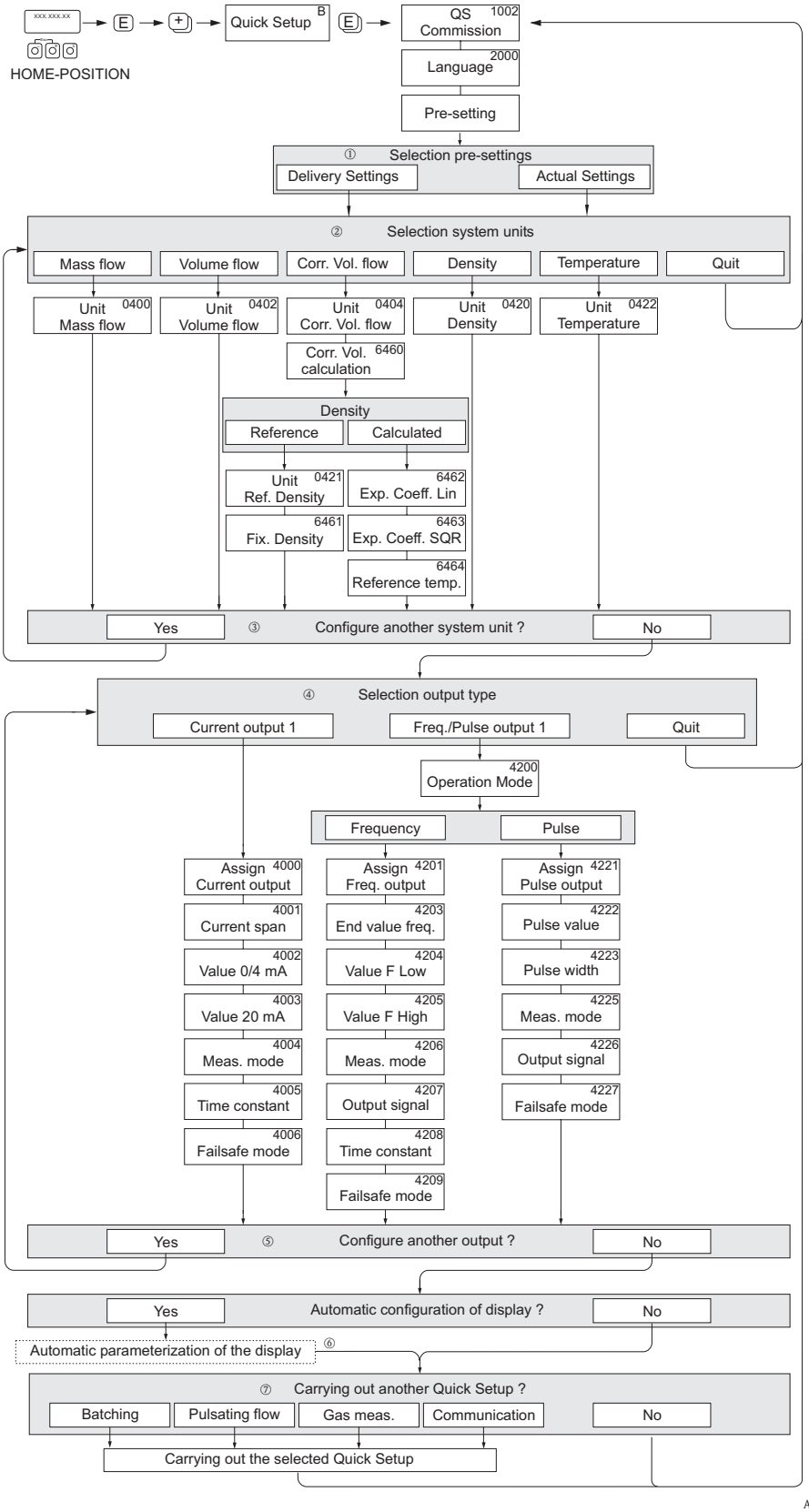


Function description QUICK SETUP	
✎ Note! ■ The Quick Setups are only available by means of the local display. ■ The flowcharts of the various Quick Setups are provided on the pages to follow. ■ For more information on the Setup menus, please refer to the Operating Instructions BA107D.	
QUICK SETUP COMMISSION **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 frequency output. For starting the Setup menu. **Options:** NO YES **Factory setting:** NO
QUICK SETUP BATCHING/ DOSING **1005**	✎ Note! Function only available for measuring devices with a relay output with and the optional software package BATCHING. For starting the Setup menu. **Options:** NO YES **Factory setting:** NO
SETUP GAS MEASUREMENT **1004**	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 safety 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 during startup. 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 Quick Setup "Commissioning"

In the case of devices without a local display, the individual parameters and functions have to be configured by means of the operating program, e.g. FieldCare.



✎ Note!

- The display returns to the cell QUICK SETUP COMMISSION (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 The "DELIVERY SETTINGS" option sets every selected unit to the factory setting.
The "ACTUAL SETTINGS" accepts the units you configured beforehand.

② Only units not yet configured in the current Setup are offered for selection in each cycle. The unit for mass, volume and corrected volume is derived from the corresponding flow unit.

③ The "YES" option remains visible until all the units have been configured.
"NO" is the only option displayed when no further units are available.

④ This prompt only appears if a current output and/or pulse/frequency output is available. Only the outputs not yet configured in the current Setup are offered for selection in each cycle.

⑤ The "YES" option remains visible until all the outputs have been configured.
"NO" is the only option displayed when no further outputs are available.

⑥ The "automatic parameterization of the display" option contains the following basic settings/factory settings

YES Main line = mass flow
Additional line = totalizer 1
Information line = operating/system condition

NO The existing (selected) settings remain.

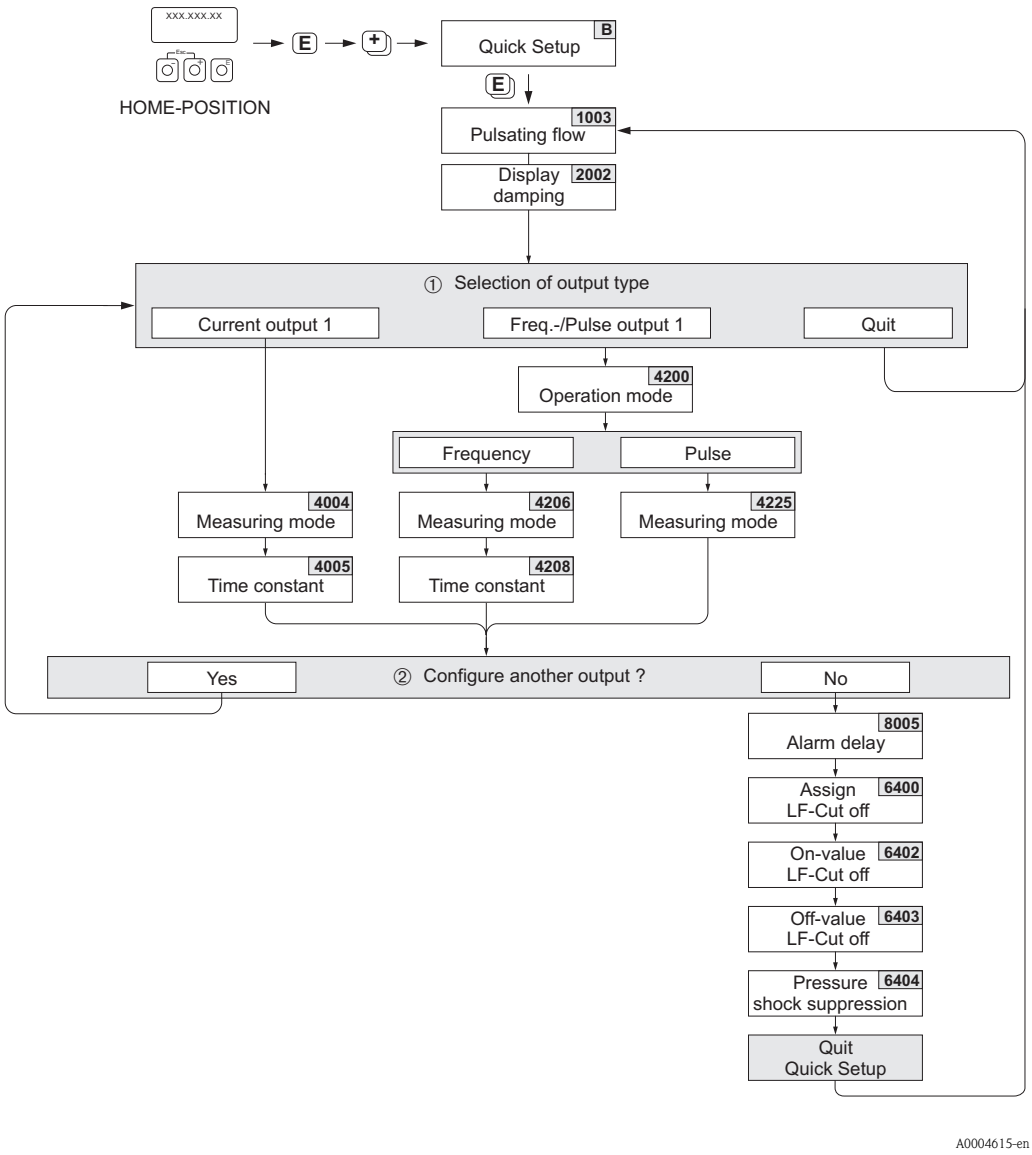
⑦ The execution of other Quick Setups is described in the following sections.

✎ Note!

- The QUICK SETUP BATCHING is only available when the optional software package BATCHING is installed and PROFIBUS DP is present.
- The PULS. FLOW QUICK SETUP is only available if a current and/or pulse/frequency output is available.

4.2 Quick Setup “Pulsating Flow”

Note!
The “Pulsating flow” Quick Setup is only available if the device has a current output or a pulse/frequency output.



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Note!

- The display returns to the cell QUICK SETUP PULSATING FLOW (1003) if you press the key combination during parameter interrogation.
- You can call up this Setup menu either directly from the “COMMISSIONING” Setup menu or manually by means of the function QUICK SETUP PULSATING FLOW (1003).

① Only the outputs not yet configured in the current Quick Setup are offered for selection in each cycle.

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

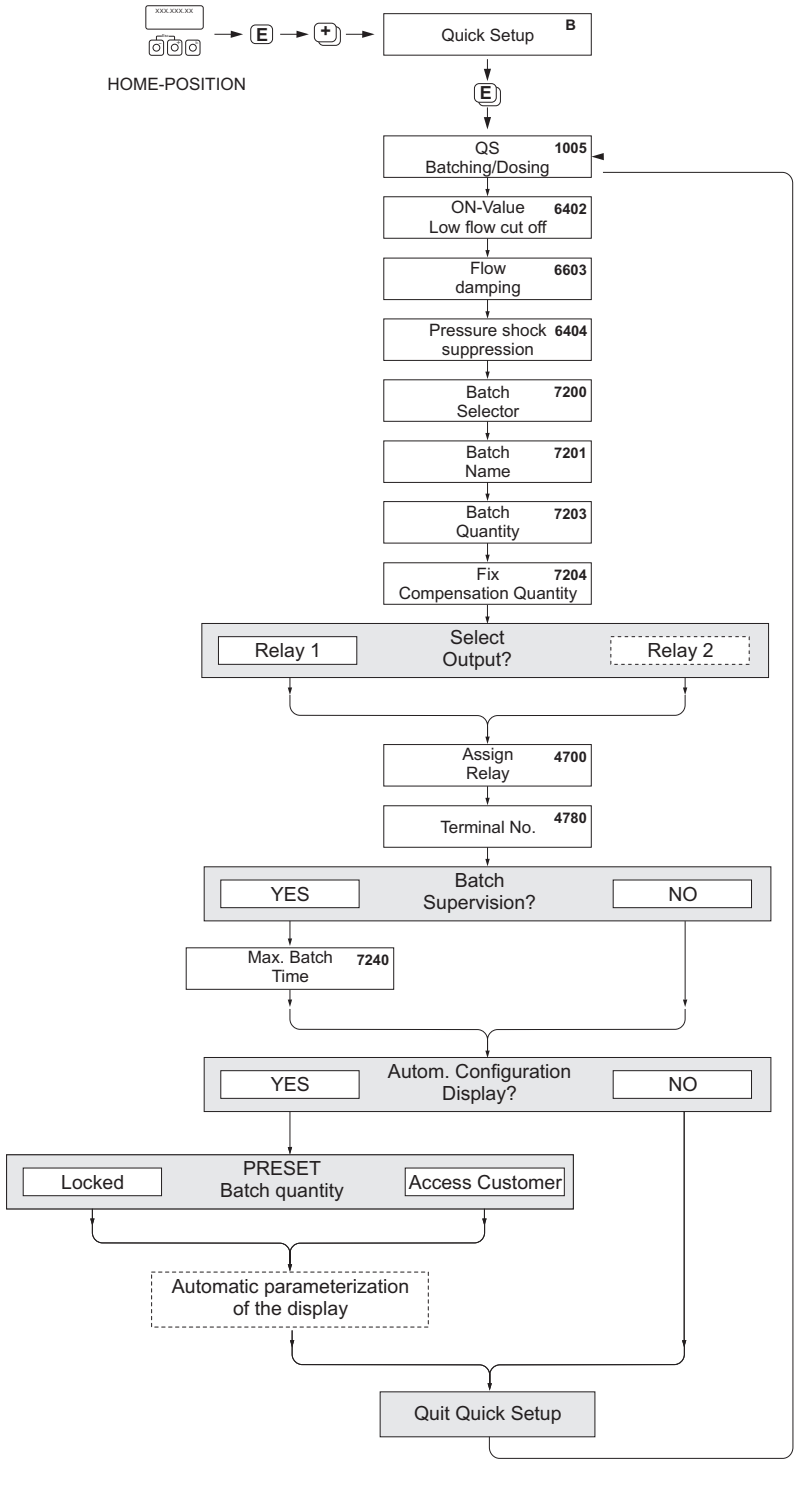
Settings for the Pulsating Flow Setup menu:

Fct. code	Function name	Suggested settings	Description
Call up through the function matrix:			
B	QUICK SETUP	QUICK SETUP PULSATING FLOW	see P. 20
1003	QUICK SETUP PULSATING	YES	see P. 20
Basic configuration:			
2002	DISPLAY DAMPING	1 second	see P. 34
Select the signal type: CURRENT OUTPUT 1			
4004	MEASURING MODE	PULSATING FLOW	see P. 57
4005	TIME CONSTANT	1 second	see P. 60
Select the signal type: FREQ./PULSE OUTPUT 1 / operating mode: FREQUENCY			
4206	MEASURING MODE	PULSATING FLOW	see P. 68
4208	TIME CONSTANT	0 seconds	see P. 73
Select the signal type: FREQ./PULSE OUTPUT 1 / operating mode: PULSE			
4225	MEASURING MODE	PULSATING FLOW	see P. 75
Other settings:			
8005	ALARM DELAY	0 seconds	see P. 161
6400	ASSIGN LF CUT OFF	MASS FLOW	see P. 111
6402	ON-VALUE LOW FLOW CUT OFF	Depends on diameter (DN [mm]): – DN 1 = 0.02 [kg/h] or [l/h] – DN 2 = 0.10 [kg/h] or [l/h] – DN 4 = 0.45 [kg/h] or [l/h] – DN 8 = 2.0 [kg/h] or [l/h] – DN 15 = 6.5 [kg/h] or [l/h] – DN 15 FB * = 18 [kg/h] or [l/h] – DN 25 = 18 [kg/h] or [l/h] – DN 25 FB * = 45 [kg/h] or [l/h] – DN 40 = 45 [kg/h] or [l/h] – DN 40 FB * = 70 [kg/h] or [l/h] – DN 50 = 70 [kg/h] or [l/h] – DN 50 FB * = 180 [kg/h] or [l/h] – DN 80 = 180 [kg/h] or [l/h] – DN 100 = 350 [kg/h] or [l/h] – DN 150 = 650 [kg/h] or [l/h] – DN 250 = 1800 [kg/h] or [l/h] *DN 15, 25, 40, 50 “FB” = Full bore versions Promass I	see P. 111
6403	OFF-VALUE LOW FLOW CUT OFF	50%	see P. 111
6404	PRESSURE SHOCK SUPPRESSION	0 s	see P. 112

4.3 Quick Setup “Batching”

Note!
This function is only available when the additional “batching” software is installed in the measuring device (order option). This software can also be ordered as an accessory from Endress+Hauser at a later stage (see Operating Instructions).

This Quick Setup menu guides the user systematically through all the device functions that have to be adjusted and configured for batching operation. These basic settings allow simple (one step) batching processes. Additional settings, e.g. for multi-stage batching processes, have to be made via the function matrix itself.



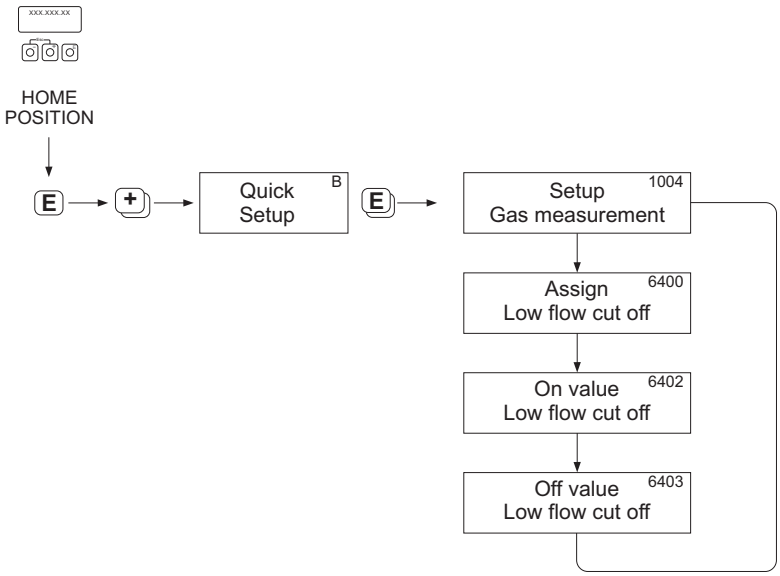
Caution!
By using the “Batching” Quick Setup, certain device parameters are optimally set for discontinuous operation. If the measuring device is used for continuous flow measurement at a later time, we recommend at you rerun the “Commissioning” and/or “Pulsating Flow” Quick Setup.

Note!
- The display returns to the function QUICK SETUP BATCHING/DOSING (1005) if you press the ESC key combination during parameter interrogation.
- At the start of the Setup, general device parameters are optimally configured for measuring signal processing and output response.
- Then you can enter the specific batching parameters, starting with the options list “Batching 1 to 6”. In this way, by running through the Setup menu a number of times, up to six different batching parameter sets (incl. special naming) can be created and called up as necessary.
- In order to enjoy full functionality, it is advisable to let the display parameters be set automatically. This means that the lowest display line is parameterized as the batching menu. Softkeys are displayed which can be used to start or stop the batching process in the HOME position. In this way, the measuring device can be fully deployed as a “batch controller”.
- The “PRESET batch quantity” prompt is used to specify the type of access to the batch quantity:
  – “Access customer” → The batch quantity can be modified via local operation (softkeys), **without** having to first enter the defined private code.
  – “Locked” → The current batch quantity can only be read but **cannot** be edited without first entering the defined private code.

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/ DOSING	see P. 20
1005	QUICK SETUP BATCHING/ DOSING	YES	see P. 20
Settings (functions with a gray background are set automatically):			
6400	ASSIGN LOW FLOW CUT OFF	Mass	see P. 111
6402	ON-VALUE LOW FLOW CUT OFF	Depends on diameter (DN [mm]): – DN 1 = 0.02 [kg/h] or [l/h] – DN 2 = 0.10 [kg/h] or [l/h] – DN 4 = 0.45 [kg/h] or [l/h] – DN 8 = 2.0 [kg/h] or [l/h] – DN 15 = 6.5 [kg/h] or [l/h] – DN 15 FB * = 18 [kg/h] or [l/h] – DN 25 = 18 [kg/h] or [l/h] – DN 25 FB * = 45 [kg/h] or [l/h] – DN 40 = 45 [kg/h] or [l/h] – DN 40 FB * = 70 [kg/h] or [l/h] – DN 50 = 70 [kg/h] or [l/h] – DN 50 FB * = 180 [kg/h] or [l/h] – DN 80 = 180 [kg/h] or [l/h] – DN 100 = 350 [kg/h] or [l/h] – DN 150 = 650 [kg/h] or [l/h] – DN 250 = 1800 [kg/h] or [l/h] *DN 15, 25, 40, 50 “FB” = Full bore versions Promass I	see P. 111
6403	OFF-VALUE LOW FLOW CUT OFF	50%	see P. 111
6603	FLOW DAMPING	0 seconds	see P. 120
6404	PRESSURE SHOCK SUPPRESSION	0 seconds	see P. 112
7200	BATCH SELECTOR	BATCH # 1	see P. 132
7201	BATCH NAME	BATCH # 1	see P. 132
7202	ASSIGN BATCH VARIABLE	Mass flow	see P. 133
7203	BATCH QUANTITY	0	see P. 133
7204	FIX COMPENSATION QUANTITY	0	see P. 133
7205	COMPENSATION MODE	OFF	see P. 134
7208	BATCH STAGES	1	see P. 136
7209	INPUT FORMAT	Value input	see P. 136
4700	ASSIGN RELAY	BATCHING VALVE 1	see P. 88
4780	TERMINAL NUMBER	Output (display only)	see P. 93
7220	OPEN VALVE 1	0% or 0 [unit]	see P. 137
7240	MAXIMUM BATCHING TIME	0 seconds (Off)	see P. 142
7241	MINIMUM BATCHING QUANTITY	0 seconds	see P. 142
7242	MAXIMUM BATCHING QUANTITY	0 seconds	see P. 143
2200	ASSIGN (Main line)	BATCH NAME	see P. 37
2220	ASSIGN (Multiplex main line)	Off	see P. 39
2400	ASSIGN (Additional line)	BATCH DOWNWARDS	see P. 41
2420	ASSIGN (Multiplex additional line)	Off	see P. 44
2600	ASSIGN (Info line)	BATCHING KEYS	see P. 47
2620	ASSIGN (Multiplex info line)	Off	see P. 50

4.4 Quick Setup "Gas Measurement"



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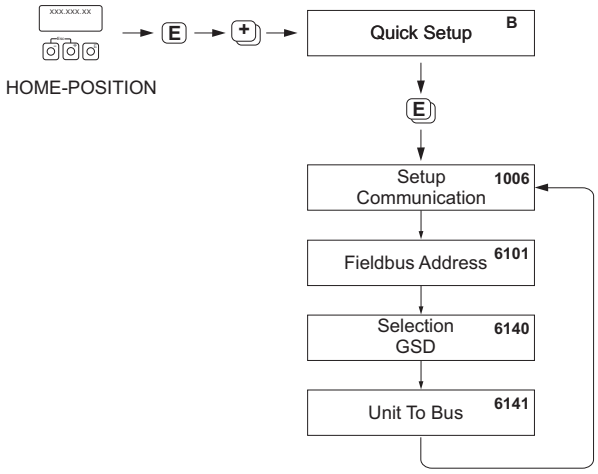
Settings for the Gas Measurement Setup menu:

Fct. code	Function name	Suggested settings	Description
Call up through the function matrix:			
B	QUICK SETUP	QUICK SETUP GAS MEASUR.	see P. 20
1004	QUICK SETUP GAS MEASUR.	YES	see P. 20
Basic configuration:			
6420	EMPTY PIPE DETECTION	No entry possible, the selection changes automatically to OFF.	see P. 113
6400	ASSIGN LOW FLOW CUT OFF	For gas measurement we recommend to switch off the low flow cut off. OFF	see P. 111
6402	ON-VALUE LOW FLOW CUT OFF	If you do not switch off the low flow cut off: 0.0000	see P. 111
6403	OFF-VALUE LOW FLOW CUT OFF	If you do not switch off the low flow cut off: 50%	see P. 111

4.5 Quick Setup “Communication”



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Settings for the Gas Measurement Setup menu:

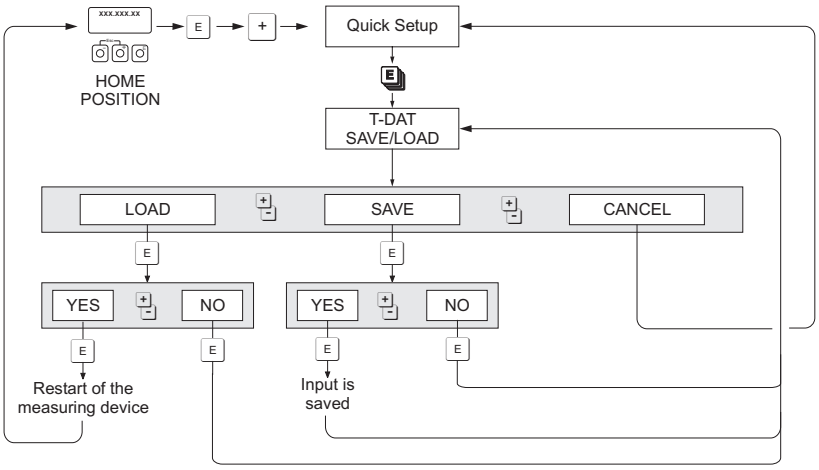
Fct. code	Function name	Suggested settings	Description
Call up through the function matrix:			
B	QUICK SETUP	QUICK SETUP COMMUNICATION	see P. 20
1006	QUICK SETUP COMMUNICATION	YES	see P. 20
Basic configuration:			
6101	FIELDBUS ADDRESS	Input device address	see P. 102
6140	SELECTION GSD	MANUFACT. SPEC	see P. 109
6141	UNIT TO BUS	SET UNITS	see P. 109

4.6 Data back-up/transfer

You can use the T-DAT SAVE/LOAD function to transfer data (device parameters and settings) between the T-DAT (removable memory) and the EEPROM (device memory).

This is required for the following applications:
- Creating a backup: current data are transmitted from an EEPROM to the T-DAT.
- Replacing a transmitter: current data are copied from an EEPROM to the T-DAT, then transmitted to the EEPROM of the new transmitter.
- Duplicating data: current data are copied from an EEPROM to the T-DAT, then transmitted to EEPROMs of identical measuring points.

✎ Note!
Installing and removing the T-DAT → Operating Instructions of the Promass 83 (BA063D)



Data storage/transmission with T-DAT SAVE/LOAD

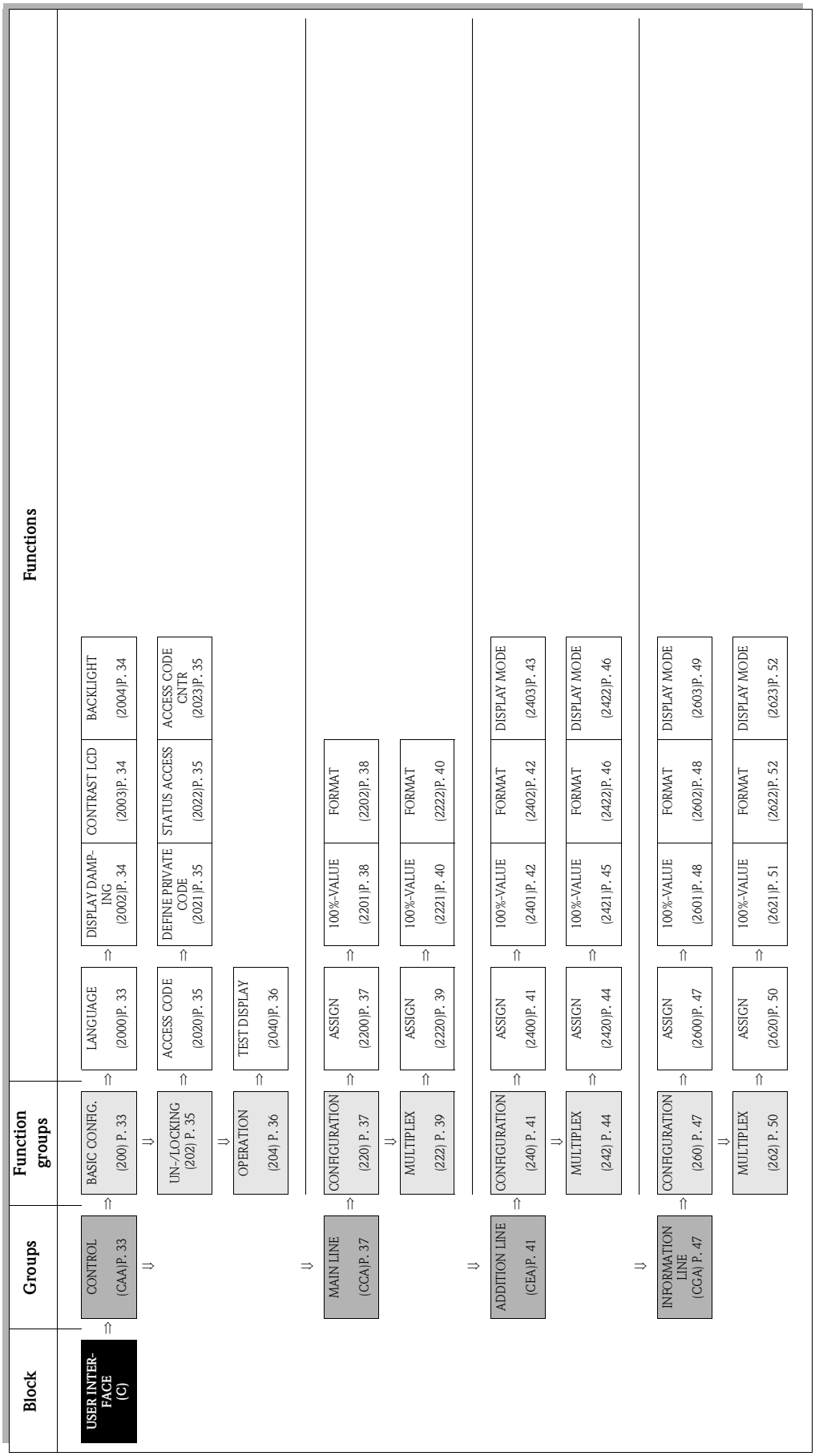
Notes on the LOAD and SAVE options:

LOAD:
Data are transmitted from the T-DAT to the EEPROM.

✎ Note!
- Previously saved settings on the EEPROM are deleted.
- This selection is available only if the T-DAT contains valid data.
- This selection can be made only 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 the restart and the LOAD function is subsequently no longer available.

SAVE:
Data are transmitted from the EEPROM to the T-DAT.

5 Block USER INTERFACE



5.1 Group CONTROL

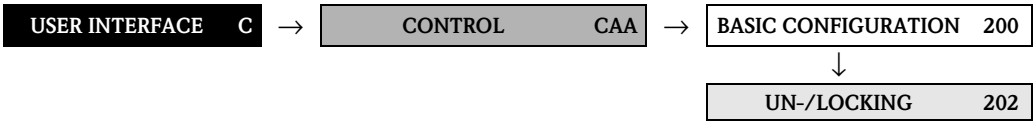
5.1.1 Function group BASIC CONFIGURATION

USER INTERFACE C → **CONTROL CAA** → **BASIC CONFIGURATION 200**

Function description USER INTERFACE → CONTROL → BASIC CONFIGURATION	
LANGUAGE **2000**	For selecting the language for all texts, parameters and messages shown on the local display. ✎ Note! The displayed options depend on the language group available. The language group that is supplied with the measuring device is displayed in the LANGUAGE GROUP (8226) function (see Page 165). **Options:** (for language group WEST EU / USA) ENGLISH DEUTSCH FRANCAIS ESPANOL ITALIANO NEDERLANDS PORTUGUESE **Options:** (for language group EAST EU / SCAND) ENGLISH NORSK SVENSKA SUOMI POLISH RUSSIAN CZECH **Options:** (for language group ASIA) ENGLISH BAHASA INDONESIA JAPANESE (syllabary) **Options:** (for language group CHINA) ENGLISH CHINESE **Factory setting:** Country-dependent (Page 169) ✎ Note! ■ If you press the ⊞/⊟ keys simultaneously at startup, the language defaults to "ENGLISH". ■ You can change the language group via the FieldCare operating program. Please do not hesitate to contact your Endress+Hauser sales office if you have any questions.

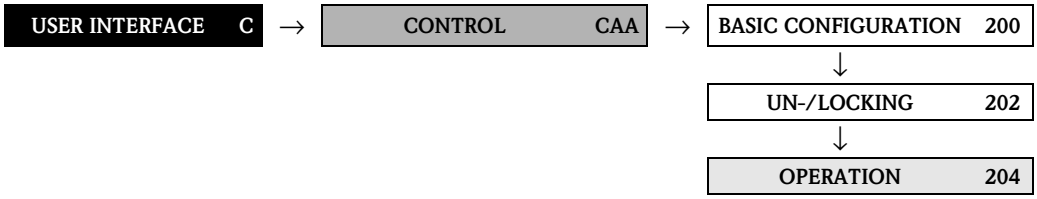
Function description USER INTERFACE → CONTROL → BASIC CONFIGURATION	
DISPLAY DAMPING **2002**	For entering a time constant which defines how the display reacts to severely fluctuating flow variables, either very quickly (enter a low time constant) or with damping (enter a high time constant). **User input:** 0 to 100 seconds **Factory setting:** 1 s ✎ Note! Entering the value "0" (seconds) means that the damping is switched off.
CONTRAST LCD **2003**	For adjusting the display contrast to suit local operating conditions. **User input:**10 to 100% **Factory setting:** 50%
BACKLIGHT **2004**	For adjusting the backlight to suit local operating conditions. **User input:** 0 to 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 UN-/LOCKING



Function description USER INTERFACE → CONTROL → UN-/LOCKING	
ACCESS CODE **2020**	✎ Note! This function is only relevant for local operation and accessing 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 = 83,** see function DEFINE PRIVATE CODE (2021)). **User input:** max. 4-digit number: 0 to 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**	For specifying a personal code for enabling programming in the function ACCESS CODE. **User input:** 0 to 9999 (max. 4-digit number) **Factory setting:** 83 ✎ 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**	Indicates whether access to the function matrix is currently possible (ACCESS CUSTOMER) or whether configuration is locked (LOCKED). **Display:** LOCKED (parameterization disabled) ACCESS CUSTOMER (parameterization possible)
ACCESS CODE COUNTER **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. **Display:** max. 7-digit number: 0 to 9999999 **Factory setting:** 0

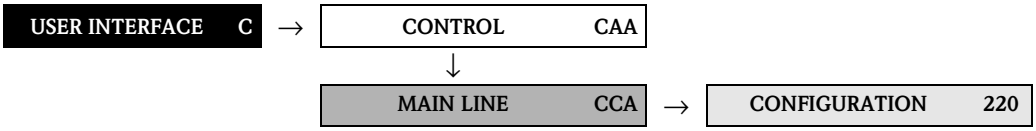
5.1.3 Function group OPERATION



Function description USER INTERFACE → CONTROL → OPERATION	
TEST DISPLAY 2040	For testing 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 second. 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 second. When the test is completed, the local display returns to its initial state and the setting changes to “OFF”.

5.2 Group MAIN LINE

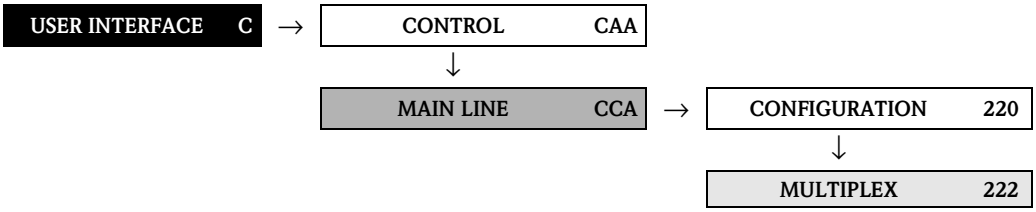
5.2.1 Function group CONFIGURATION



Function description USER INTERFACE → CONTROL → CONFIGURATION	
ASSIGN **2200**	For assigning a value to be displayed to the main line (top line in the local display). This value is displayed during normal operation. **Options:** (standard) OFF MASS FLOW MASS FLOW IN % VOLUME FLOW VOLUME FLOW IN % CORRECTED VOLUME FLOW CORRECTED VOLUME FLOW IN % DENSITY REFERENCE DENSITY TEMPERATURE ACTUAL CURRENT ACTUAL FREQUENCY AI1 - OUT VALUE AI2 - OUT VALUE AI3 - OUT VALUE AI4 - OUT VALUE AI5 - OUT VALUE AI6 - OUT VALUE AO - DISP. VALUE TOT. OUT VALUE 1 (totalizer 1) TOT. OUT VALUE 2 (totalizer 2) TOT. OUT VALUE 3 (totalizer 3) **Factory setting:** MASS FLOW **Advanced selection** (with the optional SW 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 in the function BATCH SELECTOR (“BATCH # 1”, “BATCH # 2”, etc.). Example: If BATCH # 1 was selected in the BATCH SELECTOR function (7200), then only the values from BATCH # 1 (batch name, batch quantity etc.) can be displayed. (continued on next page)

Function description USER INTERFACE → CONTROL → CONFIGURATION		
ASSIGN (continued)	**2200**	**Advanced selection** (with the optional SW package CONCENTRATION): TARGET MASS FLOW % TARGET MASS FLOW TARGET VOLUME FLOW % TARGET VOLUME FLOW TARGET CORRECTED VOLUME FLOW CARRIER MASS FLOW % CARRIER MASS FLOW CARRIER VOLUME FLOW % CARRIER VOLUME FLOW CARRIER CORRECTED VOLUME FLOW % BLACK LIQUOR ° BAUME ° API ° PLATO ° BALLING ° BRIX OTHER (_ _ _ _ flexible concentration) **Advanced selection** (with the optional SW package ADVANCED DIAGNOSTICS): MASS FLOW DEVIATION DENSITY DEVIATION REFERENCE DENSITY DEVIATION TEMPERATURE DEVIATION TUBE DAMPING DEVIATION ELECTRODYNAMIC SENSOR DEVIATION FREQU. FLUCTUATION DEVIATION TUBE DAMPING FLUCTUATION DEVIATION
100%-VALUE	**2201**	✎ Note! Function is not available unless one of the following was selected in the ASSIGN function (2200): ■ MASS FLOW IN % ■ VOLUME FLOW IN % ■ CORRECTED VOLUME FLOW IN % For specifying the flow value to be shown on the display as the 100% value. **User input:** 5-digit floating-point number **Factory setting:** 10 kg/s, 10 l/s or 10 Nl/s
FORMAT	**2202**	For selecting the maximum number of places after the decimal point to be displayed for the display value. **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

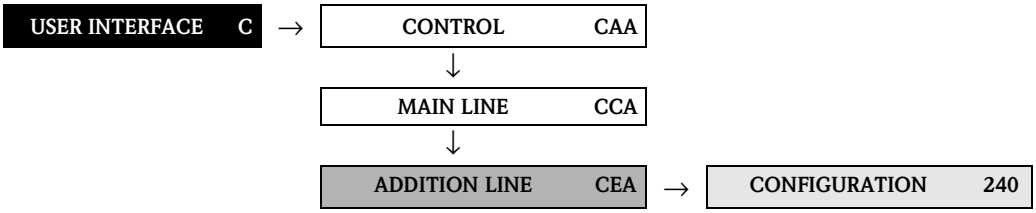


Function description USER INTERFACE → CONTROL → MULTIPLEX		
ASSIGN	**2220**	For assigning a second reading to be displayed in the main line alternately (every 10 seconds) with the value defined in the ASSIGN function (2200). **Options:** (standard) OFF MASS FLOW MASS FLOW IN % VOLUME FLOW VOLUME FLOW IN % CORRECTED VOLUME FLOW CORRECTED VOLUME FLOW IN % DENSITY REFERENCE DENSITY TEMPERATURE ACTUAL CURRENT ACTUAL FREQUENCY AI1 - OUT VALUE AI2 - OUT VALUE AI3 - OUT VALUE AI4 - OUT VALUE AI5 - OUT VALUE AI6 - OUT VALUE AO - DISP. VALUE TOT. OUT VALUE 1 (totalizer 1) TOT. OUT VALUE 2 (totalizer 2) TOT. OUT VALUE 3 (totalizer 3) **Factory setting:** OFF **Advanced selection** (with the optional SW 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 in the function BATCH SELECTOR (“BATCH # 1”, “BATCH # 2”, etc.). Example: If BATCH # 1 was selected in the BATCH SELECTOR function (7200), then only the values from BATCH # 1 (batch name, batch quantity etc.) can be displayed. (continued on next page)

Function description USER INTERFACE → CONTROL → MULTIPLEX		
ASSIGN (continued)	***2220***	**Advanced selection** (with the optional SW package CONCENTRATION): TARGET MASS FLOW % TARGET MASS FLOW TARGET VOLUME FLOW % TARGET VOLUME FLOW TARGET CORRECTED VOLUME FLOW CARRIER MASS FLOW % CARRIER MASS FLOW CARRIER VOLUME FLOW % CARRIER VOLUME FLOW CARRIER CORRECTED VOLUME FLOW % BLACK LIQUOR ° BAUME ° API ° PLATO ° BALLING ° BRIX OTHER (_ _ _ _ flexible concentration) **Advanced selection** (with the optional SW package ADV. DIAGNOSTICS): MASS FLOW DEVIATION DENSITY DEVIATION REFERENCE DENSITY DEVIATION TEMPERATURE DEVIATION TUBE DAMPING DEVIATION ELECTRODYNAMIC SENSOR DEVIATION FREQU. FLUCTUATION DEVIATION TUBE DAMPING FLUCTUATION DEVIATION
100%-VALUE	***2221***	✎ Note! Function is not available unless one of the following was selected in the ASSIGN function (2220): ■ MASS FLOW IN % ■ VOLUME FLOW IN % ■ CORRECTED VOLUME FLOW IN % For specifying the flow value to be shown on the display as the 100% value. **User input:** 5-digit floating-point number **Factory setting:** 10 kg/s, 10 l/s or 10 Nl/s
FORMAT	***2222***	For selecting the maximum number of places after the decimal point to be displayed for the display value. **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 ADDITION LINE

5.3.1 Function group CONFIGURATION

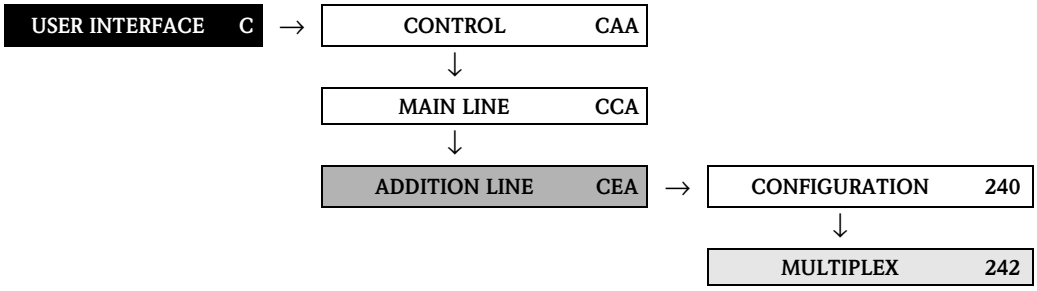


Function description USER INTERFACE → ADDITION LINE → CONFIGURATION		
ASSIGN	**2400**	For assigning a value to be displayed to the additional line (middle line in the local display). This value is displayed during normal operation. **Options:** standard OFF MASS FLOW MASS FLOW IN % VOLUME FLOW VOLUME FLOW IN % CORRECTED VOLUME FLOW CORRECTED VOLUME FLOW IN % DENSITY REFERENCE DENSITY TEMPERATURE MASS FLOW BARGRAPH IN % VOLUME FLOW BARGRAPH IN % CORRECTED VOLUME FLOW BARGRAPH IN % ACTUAL CURRENT ACTUAL FREQUENCY AI1 - OUT VALUE AI2 - OUT VALUE AI3 - OUT VALUE AI4 - OUT VALUE AI5 - OUT VALUE AI6 - OUT VALUE AO - DISP. VALUE TOT. OUT VALUE 1 (totalizer 1) TOT. OUT VALUE 2 (totalizer 2) TOT. OUT VALUE 3 (totalizer 3) TAG NAME **Factory setting:** TOT. OUT VALUE 1 (totalizer 1) **Advanced selection (**with the optional SW 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 in the function BATCH SELECTOR (“BATCH # 1”, “BATCH # 2”, etc.). Example: If BATCH # 1 was selected in the BATCH SELECTOR function (7200), then only the values from BATCH # 1 (batch name, batch quantity etc.) can be displayed. (continued on next page)

Function description USER INTERFACE → ADDITION LINE → CONFIGURATION		
ASSIGN (continued)	**2400**	**Advanced selection** (with the optional SW package CONCENTRATION): TARGET MASS FLOW % TARGET MASS FLOW TARGET VOLUME FLOW % TARGET VOLUME FLOW TARGET CORRECTED VOLUME FLOW CARRIER MASS FLOW % CARRIER MASS FLOW CARRIER VOLUME FLOW % CARRIER VOLUME FLOW CARRIER CORRECTED VOLUME FLOW % BLACK LIQUOR ° BAUME ° API ° PLATO ° BALLING ° BRIX **Advanced selection** (with the optional SW package ADVANCED DIAGNOSTICS): MASS FLOW DEVIATION DENSITY DEVIATION REFERENCE DENSITY DEVIATION TEMPERATURE DEVIATION TUBE DAMPING DEVIATION ELECTRODYNAMIC SENSOR DEVIATION FREQU. FLUCTUATION DEVIATION TUBE DAMPING FLUCTUATION DEVIATION
100%-VALUE	**2401**	✎ Note! Function is not available unless one of the following was selected in the ASSIGN function (2400): ■ MASS FLOW IN % ■ VOLUME FLOW IN % ■ CORRECTED VOLUME FLOW IN % ■ MASS FLOW BARGRAPH IN % ■ VOLUME FLOW BARGRAPH IN % ■ CORRECTED VOLUME FLOW BARGRAPH IN % For specifying the flow value to be shown on the display as the 100% value. **User input:** 5-digit floating-point number **Factory setting:** 10 kg/s, 10 l/s or 10 Nl/s
FORMAT	**2402**	For selecting the maximum number of places after the decimal point to be displayed for the display value. **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.

Function description USER INTERFACE → ADDITION LINE → CONFIGURATION	
DISPLAY MODE **2403**	✎ Note! Function is not available unless one of the following was selected in the ASSIGN function (2400): ■ MASS FLOW BARGRAPH IN % ■ VOLUME FLOW BARGRAPH IN % ■ CORRECTED VOLUME FLOW BARGRAPH IN % Use this function to define the format of the bar graph. **Options:** STANDARD SYMMETRY **Factory setting:** STANDARD **Illustration of bar graph**  A0001258 *Fig. 5 : Bar graph for STANDARD option Simple bar graph with 25 / 50 / 75% gradations and integrated sign.*  A0001259 *Fig. 6 : Bar graph for SYMMETRY option Symmetrical bar graph for positive and negative directions of flow, with –50 / 0 / +50% gradations and integrated sign.*

5.3.2 Function group MULTIPLEX



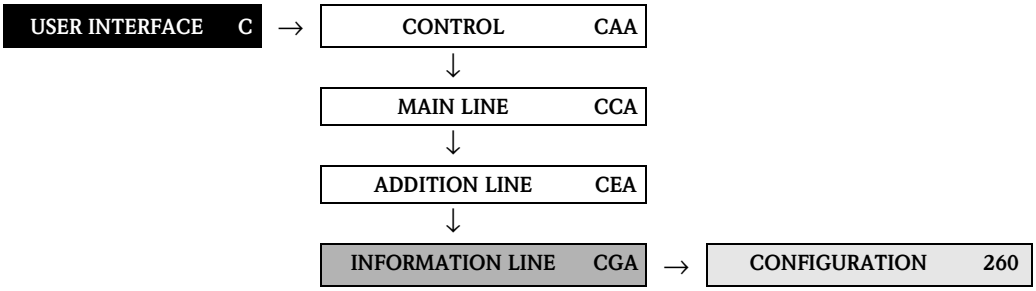
Function description USER INTERFACE → ADDITION LINE → MULTIPLEX	
ASSIGN **2420**	For assigning a second reading to be displayed in the main line alternately (every 10 seconds) with the value defined in the ASSIGN function (2400). **Options:** standard OFF MASS FLOW MASS FLOW IN % VOLUME FLOW VOLUME FLOW IN % CORRECTED VOLUME FLOW CORRECTED VOLUME FLOW IN % DENSITY REFERENCE DENSITY TEMPERATURE MASS FLOW BARGRAPH IN % VOLUME FLOW BARGRAPH IN % CORRECTED VOLUME FLOW BARGRAPH IN % ACTUAL CURRENT ACTUAL FREQUENCY AI1 - OUT VALUE AI2 - OUT VALUE AI3 - OUT VALUE AI4 - OUT VALUE AI5 - OUT VALUE AI6 - OUT VALUE AO - DISP. VALUE TOT. OUT VALUE 1 (totalizer 1) TOT. OUT VALUE 2 (totalizer 2) TOT. OUT VALUE 3 (totalizer 3) TAG NAME **Factory setting:** OFF **Advanced selection** (with the optional SW 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 in the function BATCH SELECTOR (“BATCH # 1”, “BATCH # 2”, etc.). Example: If BATCH # 1 was selected in the BATCH SELECTOR function (7200), then only the values from BATCH # 1 (batch name, batch quantity etc.) can be displayed. (continued on next page)

Function description USER INTERFACE → ADDITION LINE → MULTIPLEX		
ASSIGN (continued)	***2420***	**Advanced selection** (with the optional SW package CONCENTRATION): TARGET MASS FLOW % TARGET MASS FLOW TARGET VOLUME FLOW % TARGET VOLUME FLOW TARGET CORRECTED VOLUME FLOW CARRIER MASS FLOW % CARRIER MASS FLOW CARRIER VOLUME FLOW % CARRIER VOLUME FLOW CARRIER CORRECTED VOLUME FLOW % BLACK LIQUOR ° BAUME ° API ° PLATO ° BALLING ° BRIX **Advanced selection** (with the optional SW package ADVANCED DIAGNOSTICS): MASS FLOW DEVIATION DENSITY DEVIATION REFERENCE DENSITY DEVIATION TEMPERATURE DEVIATION TUBE DAMPING DEVIATION ELECTRODYNAMIC SENSOR DEVIATION FREQU. FLUCTUATION DEVIATION TUBE DAMPING FLUCTUATION DEVIATION ✎ 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.
100%-VALUE	***2421***	✎ Note! Function is not available unless one of the following was selected in the ASSIGN function (2420): ■ MASS FLOW IN % ■ VOLUME FLOW IN % ■ CORRECTED VOLUME FLOW IN % ■ MASS FLOW BARGRAPH IN % ■ VOLUME FLOW BARGRAPH IN % ■ CORRECTED VOLUME FLOW BARGRAPH IN % For specifying the flow value to be shown on the display as the 100% value. **User input:** 5-digit floating-point number **Factory setting:** 10 kg/s, 10 l/s or 10 Nl/s

Function description USER INTERFACE → ADDITION LINE → MULTIPLEX	
FORMAT **2422**	For selecting the maximum number of places after the decimal point to be displayed for the display value. **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 **2423**	✎ Note! Function is not available unless one of the following was selected in the ASSIGN function (2420): ■ MASS FLOW BARGRAPH IN % ■ VOLUME FLOW BARGRAPH IN % ■ CORRECTED VOLUME FLOW BARGRAPH IN % Use this function to define the format of the bar graph. **Options:** STANDARD SYMMETRY **Factory setting:** STANDARD **Illustration of bar graph**  A0001258 *Fig. 7 : Bar graph for STANDARD option Simple bar graph with 25 / 50 / 75% gradations and integrated sign.*  A0001259 *Fig. 8 : Bar graph for SYMMETRY option Symmetrical bar graph for positive and negative directions of flow, with –50 / 0 / +50% gradations and integrated sign.*

5.4 Group INFORMATION LINE

5.4.1 Function group CONFIGURATION

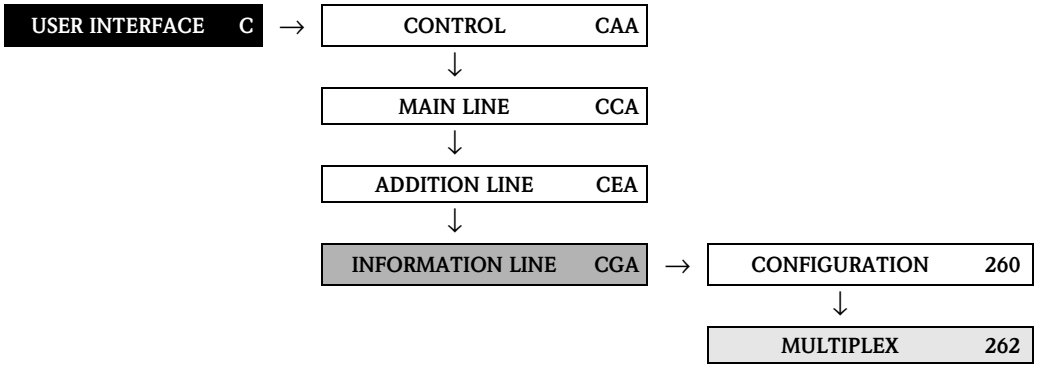


Function description USER INTERFACE → INFORMATION LINE → CONFIGURATION		
ASSIGN	**2600**	For assigning a value to be displayed to the information line (bottom line in the local display). This value is displayed during normal operation. **Options:** standard OFF MASS FLOW MASS FLOW IN % VOLUME FLOW VOLUME FLOW IN % CORRECTED VOLUME FLOW CORRECTED VOLUME FLOW IN % DENSITY REFERENCE DENSITY TEMPERATURE MASS FLOW BARGRAPH IN % VOLUME FLOW BARGRAPH IN % CORRECTED VOLUME FLOW BARGRAPH IN % ACTUAL CURRENT ACTUAL FREQUENCY OPERATING/SYSTEM CONDITIONS FLOW DIRECTION READING AI1 - OUT VALUE AI2 - OUT VALUE AI3 - OUT VALUE AI4 - OUT VALUE AI5 - OUT VALUE AI6 - OUT VALUE AO - DISP. VALUE TOT. OUT VALUE 1 (totalizer 1) TOT. OUT VALUE 2 (totalizer 2) TOT. OUT VALUE 3 (totalizer 3) TAG NAME **Factory setting:** OPERATING/SYSTEM CONDITIONS **Advanced selection** with the optional SW package BATCHING BATCHING KEYS (softkeys on the local display) ✎ Note! ■ If you select the BATCHING OPERATING KEYS, the multiplex display functionality is not available in the information line. ■ For the functionality and display examples of the Batching menu, see Operating Instructions BA0107D, “Operation” section. (continued on next page)

Function description USER INTERFACE → INFORMATION LINE → CONFIGURATION		
ASSIGN (continued)	**2600**	**Advanced selection** (with the optional SW package CONCENTRATION): TARGET MASS FLOW % TARGET MASS FLOW TARGET VOLUME FLOW % TARGET VOLUME FLOW TARGET CORRECTED VOLUME FLOW CARRIER MASS FLOW % CARRIER MASS FLOW CARRIER VOLUME FLOW % CARRIER VOLUME FLOW CARRIER CORRECTED VOLUME FLOW % BLACK LIQUOR ° BAUME ° API ° PLATO ° BALLING ° BRIX **Advanced selection** (with the optional SW package ADVANCED DIAGNOSTICS): MASS FLOW DEVIATION DENSITY DEVIATION REFERENCE DENSITY DEVIATION TEMPERATURE DEVIATION TUBE DAMPING DEVIATION ELECTRODYNAMIC SENSOR DEVIATION FREQU. FLUCTUATION DEVIATION TUBE DAMPING FLUCTUATION DEVIATION
100%-VALUE	**2601**	✎ Note! Function is not available unless one of the following was selected in the ASSIGN function (2600): ■ MASS FLOW IN % ■ VOLUME FLOW IN % ■ CORRECTED VOLUME FLOW IN % ■ MASS FLOW BARGRAPH IN % ■ VOLUME FLOW BARGRAPH IN % ■ CORRECTED VOLUME FLOW BARGRAPH IN % For specifying the flow value to be shown on the display as the 100% value. **User input:** 5-digit floating-point number **Factory setting:** 10 kg/s, 10 l/s or 10 Nl/s
FORMAT	**2602**	For selecting the maximum number of places after the decimal point to be displayed for the display value. **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.

Function description USER INTERFACE → INFORMATION LINE → CONFIGURATION	
DISPLAY MODE **2603**	✎ Note! Function is not available unless one of the following was selected in the ASSIGN function (2600): ■ MASS FLOW BARGRAPH IN % ■ VOLUME FLOW BARGRAPH IN % ■ CORRECTED VOLUME FLOW BARGRAPH IN % Use this function to define the format of the bar graph. **Options:** STANDARD SYMMETRY **Factory setting:** STANDARD **Illustration of bar graph**  A0001258 *Fig. 9 : Bar graph for STANDARD option Simple bar graph with 25 / 50 / 75% gradations and integrated sign.*  A0001259 *Fig. 10 : Bar graph for SYMMETRY option Symmetrical bar graph for positive and negative directions of flow, with –50 / 0 / +50% gradations and integrated sign.*

5.4.2 Function group MULTIPLEX



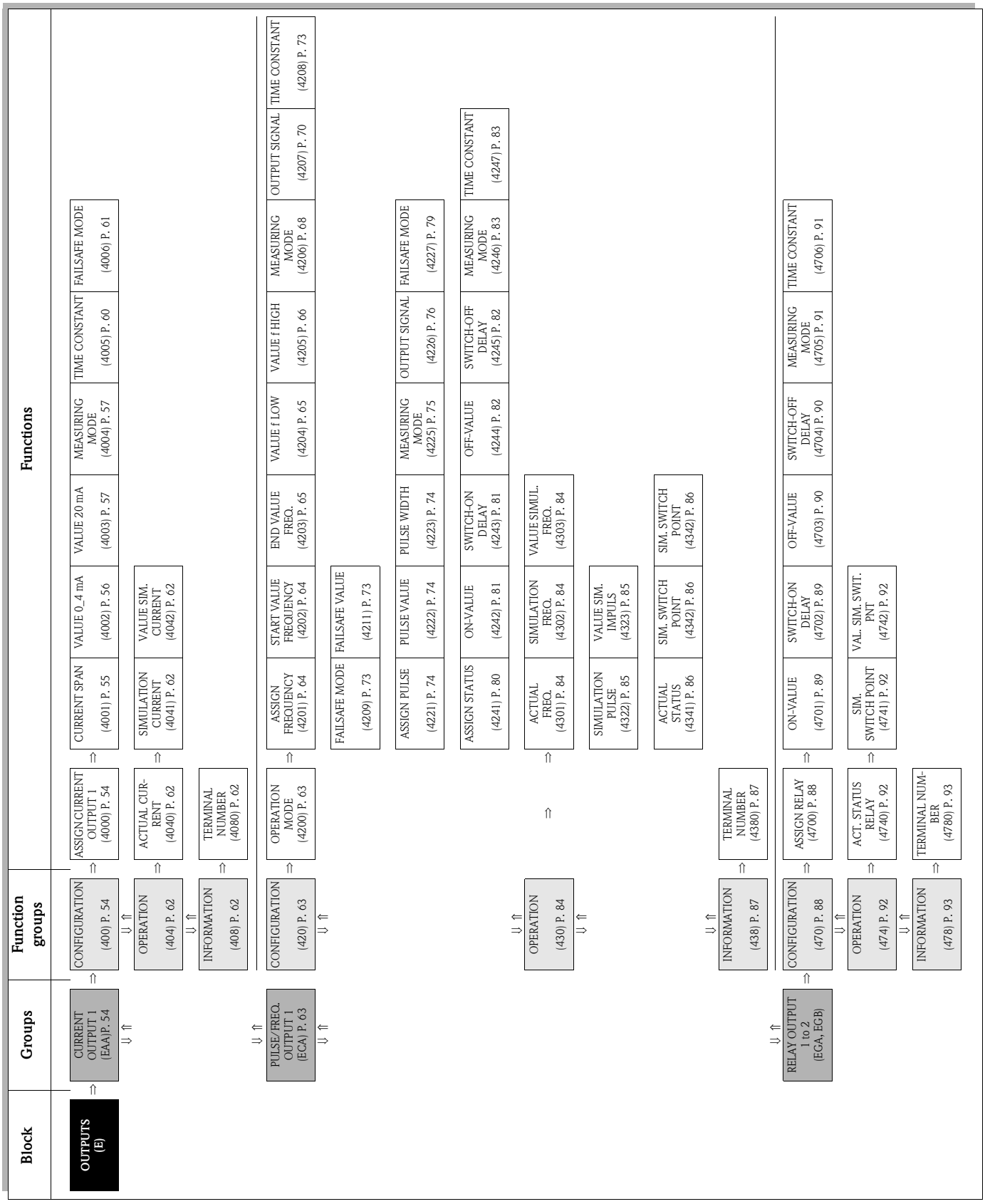
Function description USER INTERFACE → INFORMATION LINE → MULTIPLEX	
✎ Note! If you select the BATCHING OPERATING KEYS in the function ASSIGN (2600), the multiplex display functionality is not available in the information line.	
ASSIGN **2620**	For assigning a second reading to be displayed in the main line alternately (every 10 seconds) with the value defined in the ASSIGN function (2600). **Options:** standard OFF MASS FLOW MASS FLOW IN % VOLUME FLOW VOLUME FLOW IN % CORRECTED VOLUME FLOW CORRECTED VOLUME FLOW IN % DENSITY REFERENCE DENSITY TEMPERATURE MASS FLOW BARGRAPH IN % VOLUME FLOW BARGRAPH IN % CORRECTED VOLUME FLOW BARGRAPH IN % ACTUAL CURRENT ACTUAL FREQUENCY OPERATING/SYSTEM CONDITIONS FLOW DIRECTION READING AI1 - OUT VALUE AI2 - OUT VALUE AI3 - OUT VALUE AI4 - OUT VALUE AI5 - OUT VALUE AI6 - OUT VALUE AO - DISP. VALUE TOT. OUT VALUE 1 (totalizer 1) TOT. OUT VALUE 2 (totalizer 2) TOT. OUT VALUE 3 (totalizer 3) TAG NAME **Factory setting:** OFF (continued on next page)

Function description USER INTERFACE → INFORMATION LINE → MULTIPLEX		
ASSIGN (continued)	***2620***	**Advanced selection** (with the optional SW package CONCENTRATION): TARGET MASS FLOW % TARGET MASS FLOW TARGET VOLUME FLOW % TARGET VOLUME FLOW TARGET CORRECTED VOLUME FLOW CARRIER MASS FLOW % CARRIER MASS FLOW CARRIER VOLUME FLOW % CARRIER VOLUME FLOW CARRIER CORRECTED VOLUME FLOW % BLACK LIQUOR ° BAUME ° API ° PLATO ° BALLING ° BRIX **Advanced selection** (with the optional SW package ADV. DIAGNOSTICS): MASS FLOW DEVIATION DENSITY DEVIATION REFERENCE DENSITY DEVIATION TEMPERATURE DEVIATION TUBE DAMPING DEVIATION ELECTRODYNAMIC SENSOR DEVIATION FREQU. FLUCTUATION DEVIATION TUBE DAMPING FLUCTUATION DEVIATION ✎ 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.
100%-VALUE	***2621***	✎ Note! Function is not available unless one of the following was selected in the ASSIGN function (2620): ■ MASS FLOW IN % ■ VOLUME FLOW IN % ■ CORRECTED VOLUME FLOW IN % ■ MASS FLOW BARGRAPH IN % ■ VOLUME FLOW BARGRAPH IN % ■ CORRECTED VOLUME FLOW BARGRAPH IN % For specifying the flow value to be shown on the display as the 100% value. **User input:** 5-digit floating-point number **Factory setting:** 10 kg/s, 10 l/s or 10 Nl/s

Function description USER INTERFACE → INFORMATION LINE → MULTIPLEX	
FORMAT **2622**	For selecting the maximum number of places after the decimal point to be displayed for the display value. **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! Function is not available unless one of the following was selected in the ASSIGN function (2620): ■ MASS FLOW BARGRAPH IN % ■ VOLUME FLOW BARGRAPH IN % ■ CORRECTED VOLUME FLOW BARGRAPH IN % Use this function to define the format of the bar graph. **Options:** STANDARD SYMMETRY **Factory setting:** STANDARD **Illustration of bar graph**  A0001258 *Fig. 11 : Bar graph for STANDARD option Simple bar graph with 25 / 50 / 75% gradations and integrated sign.*  A0001259 *Fig. 12 : Bar graph for SYMMETRY option Symmetrical bar graph for positive and negative directions of flow, with –50 / 0 / +50% gradations and integrated sign.*

6 Block OUTPUTS

Note!
This block is not available for all measuring devices → Page 8 (Available Blocks, Groups, etc.).



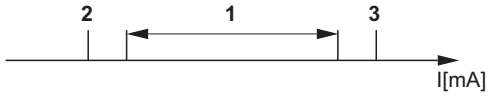
6.1 Group CURRENT OUTPUT 1

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 1 4000	For assigning a measured variable to the current output. **Options:** OFF MASS FLOW VOLUME FLOW CORRECTED VOLUME FLOW DENSITY REFERENCE DENSITY TEMPERATURE **Advanced selection** (with the optional SW package CONCENTRATION): TARGET MASS FLOW % TARGET MASS FLOW TARGET VOLUME FLOW % TARGET VOLUME FLOW TARGET CORRECTED VOLUME FLOW CARRIER MASS FLOW % CARRIER MASS FLOW CARRIER VOLUME FLOW % CARRIER VOLUME FLOW CARRIER CORRECTED VOLUME FLOW % BLACK LIQUOR ° BAUME ° API ° PLATO ° BALLING ° BRIX **Advanced selection** (with the optional SW package ADV. DIAGNOSTICS): MASS FLOW DEVIATION DENSITY DEVIATION REFERENCE DENSITY DEVIATION TEMPERATURE DEVIATION TUBE DAMPING DEVIATION ELECTRODYNAMIC SENSOR DEVIATION FREQU. FLUCTUATION DEVIATION TUBE DAMPING FLUCTUATION DEVIATION **Factory setting:** MASS FLOW ✎ Note! If you select OFF, the only function shown in the CONFIGURATION function group is this function, in other words ASSIGN CURRENT OUTPUT 1 (4000).

Function description OUTPUTS → CURRENT OUTPUT 1 → CONFIGURATION (only with PROFIBUS DP)	
CURRENT SPAN 4001	For selecting the current span. The selection specifies the operational range and the lower and upper signal on alarm. **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 BA063D).



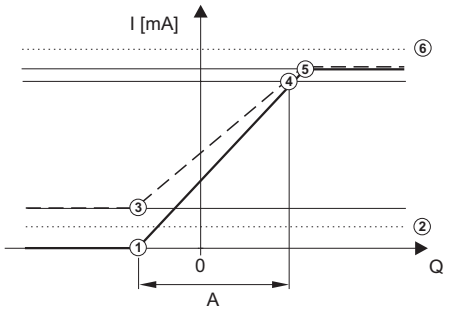
a	1	2	3
0-20 mA (25 mA)	0 - 24 mA	0	25
4-20 mA (25 mA)	4 - 24 mA	2	25
0-20 mA	0 - 20.5 mA	0	22
4-20 mA	4 - 20.5 mA	2	22
4-20 mA NAMUR	3.8 - 20.5 mA	3.5	22.6
4-20 mA US	3.9 - 20.8 mA	3.75	22.6

A0002959

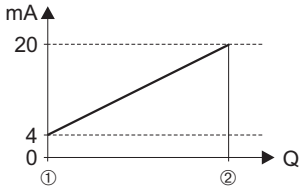
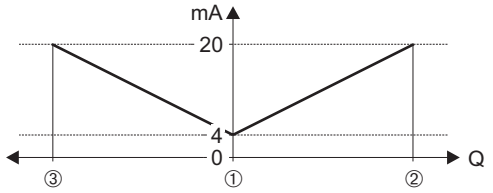
Fig. 13 : Overview of current span, operational range and signal on alarm level

a Current span
1 Operational range (measuring information)
2 Lower signal on alarm level
3 Upper signal on alarm level

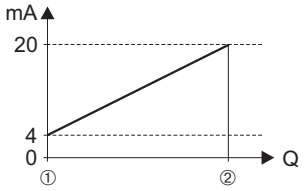
✎ Note!
- If the measured value exceeds the measuring range (as defined in the functions VALUE 0_4 mA (4002) and VALUE 20 mA (4003)) a notice message is generated (#351 to 354, current span).
- In case of a fault the behavior of the current output is according to the selected option in the function FAILSAFE MODE (4006).

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 (function VALUE 20 mA (4003), see Page 57). Positive and negative values are permissible, depending on the measured variable in question (e.g. mass flow). Example: 4 mA assigned value = - 250 kg/h 20 mA assigned value = +750 kg/h Calculated current value = 8 mA (at zero flow) ✎ Note! 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.  A0001223 *Fig. 14 : Example for the STANDARD measuring mode* *1 Initial value (0 to 20 mA)* *2 Lower signal on alarm level: depends on the setting in the function CURRENT SPAN* *3 Initial value (4 to 20 mA): depends on the setting in the function CURRENT SPAN* *4 Full scale value (0/4 to 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 and FAILSAFE MODE* *A Measuring range* **User input:** 5-digit floating-point number, with sign **Factory setting:** 0 [kg/h] or 0.5 [kg/l] or –50 [°C] ✎ Note! ■ The appropriate unit is taken from the following functions: – UNIT MASS FLOW (0400) – UNIT VOLUME FLOW (0402) – UNIT CORRECTED VOLUME FLOW (0404) – UNIT DENSITY (0420) – UNIT REFERENCE DENSITY (0421) – UNIT TEMPERATURE (0422) (see Page 15 to Page 18). ☞ 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.

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 (function VALUE 0_4 mA (4002), see Page 56). Positive and negative values are permissible, depending on the measured variable in question (e.g. mass flow). **Example:** 4 mA assigned value = – 250 kg/h 20 mA assigned value = +750 kg/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, if SYMMETRY is the setting selected in the function MEASURING MODE (4004). In this case, the message "INPUT RANGE EXCEEDED" appears. **User input:** 5-digit floating-point number, with sign **Factory setting:** Depends on nominal diameter [kg/h] or 2 [kg/l] or 200 [°C] ✎ Note! ■ The appropriate unit is taken from the following functions: – UNIT MASS FLOW (0400) – UNIT VOLUME FLOW (0402) – UNIT CORRECTED VOLUME FLOW (0404) – UNIT DENSITY (0420) – UNIT REFERENCE DENSITY (0421) – UNIT TEMPERATURE (0422) (see Page 15 to Page 18). ■ The appropriate unit is taken from the function UNIT MASS FLOW (0400), (see Page 15). ■ An example for selecting the STANDARD option in the function MEASURING MODE (4004) can be found on Page 58. ☝ 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 56.
MEASURING MODE **4004**	For selecting the measuring mode for the current output. **Options:** STANDARD SYMMETRY PULSATING FLOW **Factory setting:** STANDARD (continued on next page)

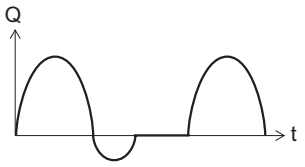
Function description OUTPUTS → CURRENT OUTPUT 1 → CONFIGURATION (only with PROFIBUS DP)	
MEASURING MODE **4004** (continued)	**Description of the individual options:** STANDARD The current output signal is proportional to the measured variable. The flow components outside the scaled measuring range (defined 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 (in example 4 mA). 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 settings in the function FAILSAFE MODE (4006).  A0001248 *Fig. 15 : Example for STANDARD measuring mode* 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 *Fig. 16 : Example for SYMMETRY measuring mode* ✎ 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. 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.

Function description OUTPUTS → CURRENT OUTPUT 1 → CONFIGURATION (only with PROFIBUS DP)	
Detailed explanations and information	**How the current output responds at a defined measuring range ①-② (s. Fig. 17) and flow behavior (s. Fig. 18):**



A0001248

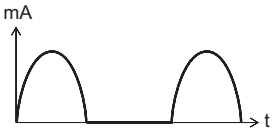
Fig. 17 : Defined measuring range: ① and ② with the same sign



A0001265

Fig. 18 : Flow behavior

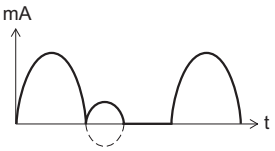
For STANDARD measuring mode
The current output signal is proportional to the measured variable.
The flow components outside the scaled measuring range are not taken into account for signal output.



A0001267

Fig. 19 : Behavior of current output for STANDARD measuring mode

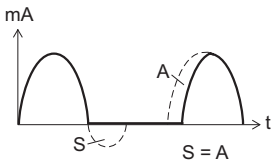
For SYMMETRY measuring mode
The current output signal is independent of the direction of flow.



A0001268

Fig. 20 : Behavior of current output for SYMMETRY measuring mode

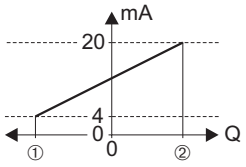
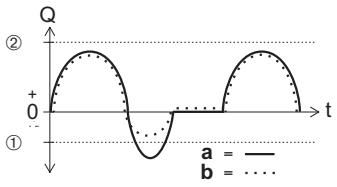
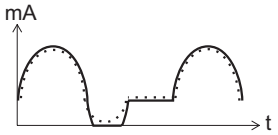
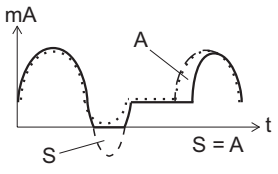
For PULSATING FLOW measuring mode
Flow components outside the measuring range are buffered, balanced and output after a maximum delay of 60 seconds.



A0001269

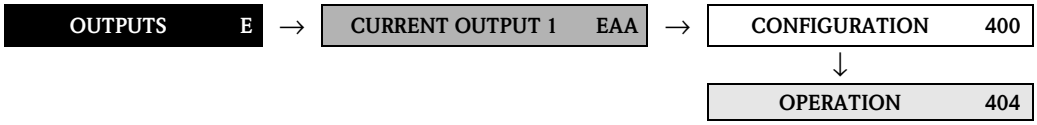
Fig. 21 : Behavior of current output for PULSATING FLOW measuring mode

(continued on next page)

Function description OUTPUTS → CURRENT OUTPUT 1 → CONFIGURATION (only with PROFIBUS DP)	
Detailed explanations and information (continued)	**How the current output responds at a defined measuring range ①-② (s. Fig. 22) and flow behavior (s. Fig. 23):**  A0001272 *Fig. 22 : Defined measuring range: ① and ② do not have the same sign*  A0001273 *Fig. 23 : Flow a (—) outside, b (- - -) within the measuring range* **For STANDARD measuring mode** a (—): The flow components outside the scaled measuring range cannot be taken into account for signal output. A fault message is generated (# 351 to 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 *Fig. 24 : Behavior of current output for STANDARD measuring mode* **For SYMMETRY measuring mode** This option is not available under these circumstance, because the 0_4 mA value and the 20 mA value have different signs. **For PULSATING FLOW measuring mode** Flow components outside the measuring range are buffered, balanced and output after a maximum delay of 60 seconds.  A0001275 *Fig. 25 : Behavior of current output for PULSATING FLOW measuring mode*
TIME CONSTANT 4005	Entering a time constant defines 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 to 100.00 s **Factory setting:** 1.00 s

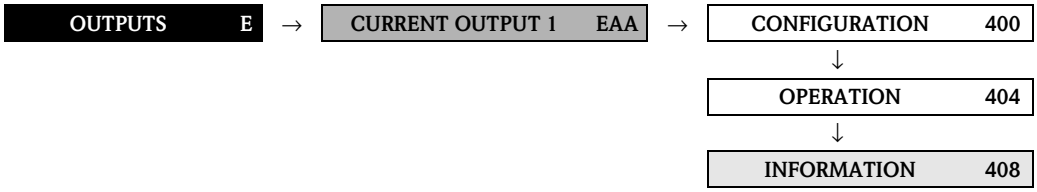
Function description OUTPUTS → CURRENT OUTPUT 1 → CONFIGURATION (only with PROFIBUS DP)	
FAILSAFE MODE **4006**	For safety reasons it is advisable to ensure that the current output assumes a predefined state in the event of a fault. The setting you select here affects only the current output. The failsafe mode of other outputs and the totalizers is defined in the related function group. **Options:** MIN. CURRENT The current output adopts the value of the lower signal on alarm level (as defined in the function CURRENT SPAN (4001), see Page 55). MAX. CURRENT The current output adopts the value of the upper signal on alarm level (as defined in the function CURRENT SPAN (4001), see Page 55). HOLD VALUE (**not recommended**) Measuring value output is based on the last measuring value saved before the error occurred. ACTUAL VALUE Measured 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 to 25.00 mA
SIMULATION CURRENT 4041	Activates simulation of the current output. **Options:** OFF ON **Factory setting:** OFF ✎ Note! ■ If simulation is active, the "SIMULATION CURRENT OUTPUT 1" message is displayed. ■ 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 function SIMULATION CURRENT (4041) is active. For defining 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 to 25.00 mA **Factory setting:** 0.00 mA ☝ Caution! The setting is not saved in the event of a power failure.

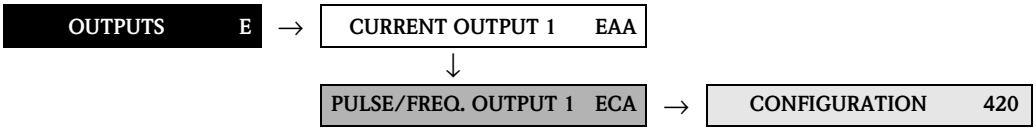
6.1.3 Function group INFORMATION



Function description OUTPUTS → CURRENT OUTPUT 1 → INFORMATION	
TERMINAL NUMBER 4080	Displays the: ■ Numbers of the terminals used by the current output (in the connection compartment) ■ Polarity **Display:** 20 (+) / 21 (–)

6.2 Group PULSE/FREQUENCY OUTPUT 1

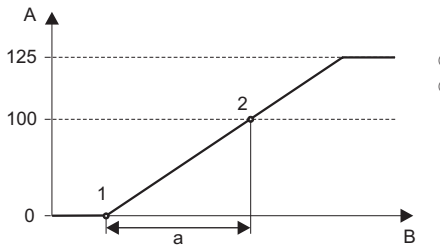
6.2.1 Function group CONFIGURATION

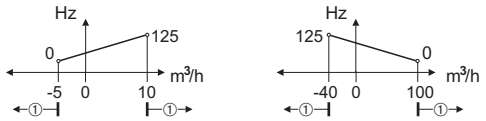
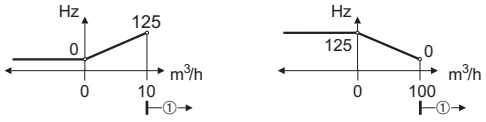
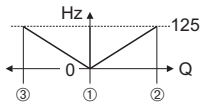


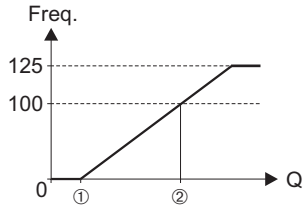
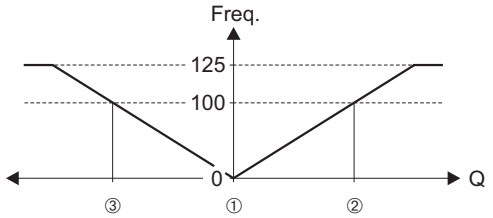
Function description OUTPUTS → PULSE/FREQUENCY OUTPUT 1 → CONFIGURATION (only with PROFIBUS DP)	
OPERATION MODE 4200	Configuration of the output as a pulse, frequency or status output. The functions available in this function group vary, depending on which option you select here. **Options:** PULSE FREQUENCY STATUS **Factory setting:** PULSE

Function description OUTPUTS → PULSE/FREQUENCY OUTPUT 1 → CONFIGURATION (FREQUENCY); (only with PROFIBUS DP)	
ASSIGN FREQUENCY **4201**	✎ Note! Function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function (4200). For assigning a measured variable to the frequency output. **Options:** OFF MASS FLOW VOLUME FLOW CORRECTED VOLUME FLOW DENSITY REFERENCE DENSITY TEMPERATURE **Advanced selection** (with the optional SW package CONCENTRATION): TARGET MASS FLOW % TARGET MASS FLOW TARGET VOLUME FLOW % TARGET VOLUME FLOW TARGET CORRECTED VOLUME FLOW CARRIER MASS FLOW % CARRIER MASS FLOW CARRIER VOLUME FLOW % CARRIER VOLUME FLOW CARRIER CORRECTED VOLUME FLOW % BLACK LIQUOR ° BAUME ° API ° PLATO ° BALLING ° BRIX OTHER (_ _ _ _ flexible concentration) **Advanced selection** (with the optional SW package ADVANCED DIAGNOSTICS): MASS FLOW DEVIATION DENSITY DEVIATION REFERENCE DENSITY DEVIATION TEMPERATURE DEVIATION TUBE DAMPING DEVIATION ELECTRODYNAMIC SENSOR DEVIATION FREQU. FLUCTUATION DEVIATION TUBE DAMPING FLUCTUATION DEVIATION **Factory setting:** MASS FLOW ✎ Note! If you select OFF, the only function shown in the CONFIGURATION function group is this function, in other words ASSIGN FREQUENCY (4201).
START VALUE FREQUENCY **4202**	✎ Note! Function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function (4200). For defining an initial frequency for the frequency output. You define the associated measured value of the measuring range in the VALUE f LOW function (4204) described on Page 65. **User input:** 5-digit fixed-point number: 0 to 10000 Hz **Factory setting:** 0 Hz Example: ■ VALUE F LOW = 0 kg/h, initial frequency = 0 Hz: i.e. a frequency of 0 Hz is output at a flow of 0 kg/h. ■ VALUE F LOW = 1 kg/h, initial frequency = 10 Hz: i.e. a frequency of 10 Hz is output at a flow of 1 kg/h.

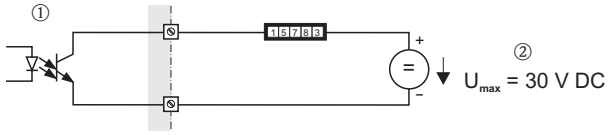
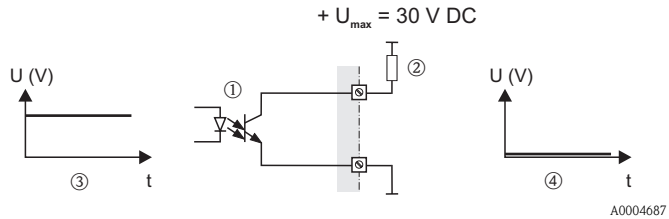
Function description OUTPUTS → PULSE/FREQUENCY OUTPUT 1 → CONFIGURATION (FREQUENCY); (only with PROFIBUS DP)	
END VALUE FREQUENCY **4203**	✎ Note! Function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function (4200). For defining a full scale frequency for the frequency output. You define the associated measured value of the measuring range in the VALUE f HIGH function (4205) described on Page 66. **User input:** 5-digit fixed-point number: 2 to 10000 Hz **Factory setting:** 10000 Hz Example: ■ VALUE F HIGH = 10000 kg/h, full scale frequency = 10000 Hz: i.e. a frequency of 10000 Hz is output at a flow of 10000 kg/h. ■ VALUE F HIGH = 3600 kg/h, full scale frequency = 10000 Hz: i.e. a frequency of 10000 Hz is output at a flow of 3600 kg/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.
VALUE f LOW **4204**	✎ Note! 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. mass 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 [kg/h] or 0 [kg/l] or –50 [°C] ✎ Note! ■ For a graphic illustration of the VALUE F LOW, see the VALUE f HIGH (4205) function. ■ 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. ■ The appropriate unit is taken from the following functions: – UNIT MASS FLOW (0400) – UNIT VOLUME FLOW (0402) – UNIT CORRECTED VOLUME FLOW (0404) – UNIT DENSITY (0420) – UNIT REFERENCE DENSITY (0421) – UNIT TEMPERATURE (0422) (see Page 15 to Page 18).

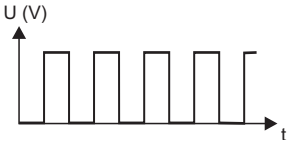
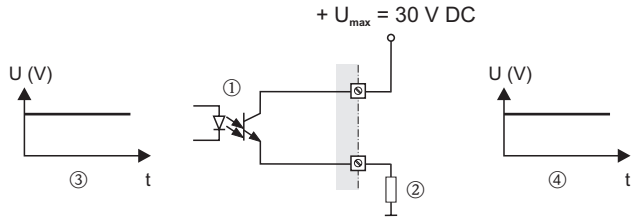
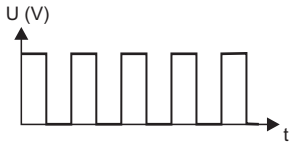
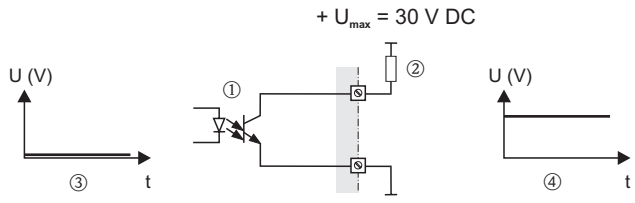
Function description OUTPUTS → PULSE/FREQUENCY OUTPUT 1 → CONFIGURATION (FREQUENCY); (only with PROFIBUS DP)	
VALUE f HIGH **4205**	✎ Note! Function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function (4200). Use this function to assign a variable to the END VALUE 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. mass 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 [kg/h] or 2 [kg/l] or 200 [°C] ✎ 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.  A0004823 *Fig. 26 : Behavior of frequency output* *a = Measuring range* *A = Frequency [%]* *B = Measured variable (amount)* *1 = Value F low* *2 = Value F high* ✎ Note! Parameter setting examples for the frequency output → see overleaf.

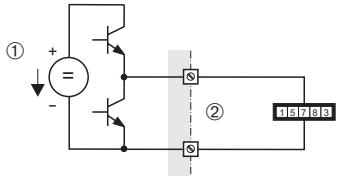
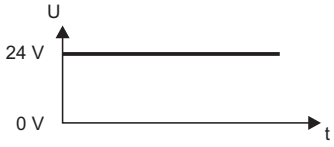
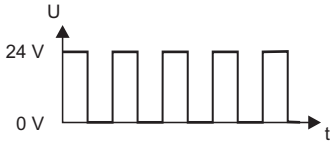
Function description OUTPUTS → PULSE/FREQUENCY OUTPUT 1 → CONFIGURATION (FREQUENCY); (only with PROFIBUS DP)	
Parameter setting examples for the frequency output	**Parameter setting example 1:** VALUE f LOW (4204) = not equal to zero flow (e.g. –5 m³/h, 10 m³/h) VALUE f HIGH (4205) = not equal to zero flow (e.g. 100 m³/h, –40 m³/h) MEASURING MODE (4206) = 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 Fig. ①), 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).  A0001276 **Parameter setting example 2:** VALUE f LOW (4204) = 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) = equal to zero flow (e.g. 0 m³/h) and MEASURING MODE (4206) = 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 Flow direction output via a switching contact. **Parameter setting example 4:** MEASURING MODE (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 delay. If the effective flow drops below or exceeds the defined working range, normally no fault message or notice message is generated.

Function description OUTPUTS → PULSE/FREQUENCY OUTPUT 1 → CONFIGURATION (FREQUENCY); (only with PROFIBUS DP)	
MEASURING MODE **4206**	✎ Note! 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 the 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 HIGH = 10 m³/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).  A0001279 *Fig. 27 : STANDARD measuring mode* 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).  A0001280 *Fig. 28 : SYMMETRY measuring mode* ✎ 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)

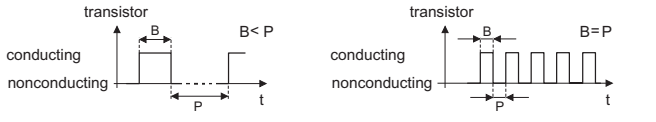
Function description OUTPUTS → PULSE/FREQUENCY OUTPUT 1 → CONFIGURATION (FREQUENCY); (only with PROFIBUS DP)		
MEASURING MODE (continued)	**4206**	PULSATING FLOW ■ If flow is characterized by severe fluctuations as is the case, for example, with reciprocating pumps, flow components outside the measuring 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 (4200) function. 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 mA / 20 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.  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)* (continued on next page)

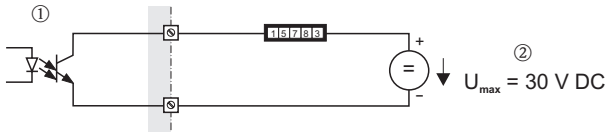
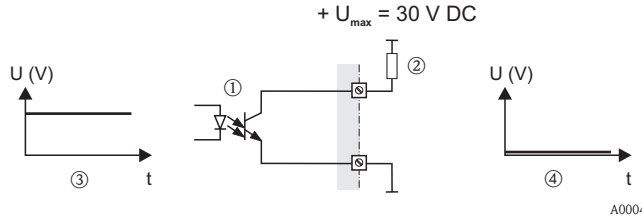
Function description OUTPUTS → PULSE/FREQUENCY OUTPUT 1 → CONFIGURATION (FREQUENCY); (only with PROFIBUS DP)	
OUTPUT SIGNAL **4207** (continued)	In the operating status (flow present), the output signal level changes from 0 V to a positive voltage level.  A0001975 **Example for output configuration PASSIVE-POSITIVE:** 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.  A0004689 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.  A0001981 **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.  A0004690 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.  A0001981 (continued on next page)

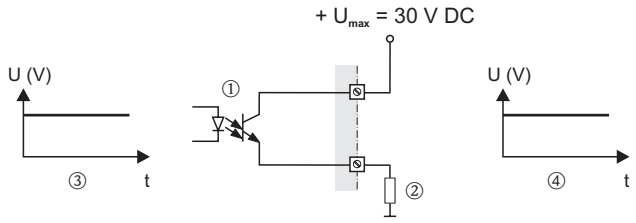
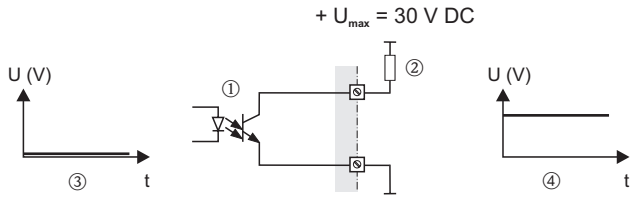
Function description OUTPUTS → PULSE/FREQUENCY OUTPUT 1 → CONFIGURATION (FREQUENCY); (only with PROFIBUS DP)	
OUTPUT SIGNAL **4207** (continued)	**Example for active output circuit (ACTIVE):** With an active circuit, the internal power supply is 24 V. The frequency output is short-circuit proof.  A0004691 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.  A0004693 In the operating status (flow present), the output signal level changes from a positive voltage level to 0 V.  A0004710

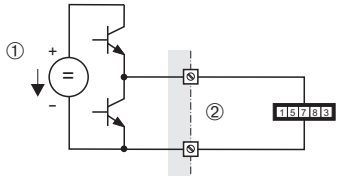
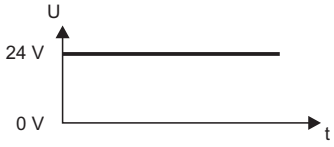
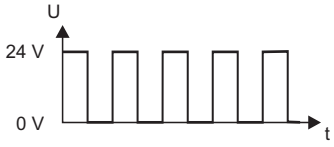
Function description OUTPUTS → PULSE/FREQUENCY OUTPUT 1 → CONFIGURATION (FREQUENCY); (only with PROFIBUS DP)	
TIME CONSTANT **4208**	✎ Note! Function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function (4200). Entering a time constant defines how the frequency output 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 to 100.00 s **Factory setting:** 0.00 s
FAILSAFE MODE **4209**	✎ Note! 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 Measured value output is based on the current flow measurement. The fault is ignored. **Factory setting:** FALLBACK VALUE
FAILSAFE VALUE **4211**	✎ Note! 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). For specifying the frequency that the measuring device outputs in the event of an error. **User input:** max. 5-digit number: 0 to 12500 Hz **Factory setting:** 12500 Hz

Function description OUTPUTS → PULSE/FREQUENCY OUTPUT 1 → CONFIGURATION (PULSE); (only with PROFIBUS DP)	
ASSIGN PULSE 4221	✎ Note! 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 CORRECTED VOLUME FLOW **Advanced selection** (with the optional SW package CONCENTRATION): TARGET MASS FLOW TARGET VOLUME FLOW TARGET CORRECTED VOLUME FLOW CARRIER MASS FLOW CARRIER VOLUME FLOW CARRIER CORRECTED VOLUME FLOW **Factory setting:** MASS 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! 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 totaled 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 ✎ Note! The appropriate unit is taken from the UNIT MASS FLOW (0400), UNIT VOLUME FLOW (0402) or UNIT CORRECTED VOLUME FLOW (0404) function (see Page 15 to Page 18).
PULSE WIDTH 4223	✎ Note! 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 to 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).  A0001233-EN *Fig. 29 : Pulse width* *B = Pulse width entered (the illustration applies to positive pulses)* *P = Pauses between the individual pulses* (continued on next page)

Function description OUTPUTS → PULSE/FREQUENCY OUTPUT 1 → CONFIGURATION (PULSE); (only with PROFIBUS DP)	
PULSE WIDTH **4223** (continued)	✎ 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 74) and from the current flow is too large to maintain the pulse width selected (the time interval P is smaller than the pulse width B entered), a system error message is generated (# 359 to 362, pulse buffer) after approx. 5 seconds buffer/balance time.
MEASURING MODE **4225**	✎ Note! 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 totaled. 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 totaled, 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 totaled. 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 mA / 20 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.  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)* (continued on next page)

Function description OUTPUTS → PULSE/FREQUENCY OUTPUT 1 → CONFIGURATION (PULSE); (only with PROFIBUS DP)	
OUTPUT SIGNAL **4226** (continued)	In the operating status (flow present), the output signal level changes from 0 V to a positive voltage level.  A0001975 **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.  A0004689 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.  A0001981 **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.  A0004690 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.  A0001981 (continued on next page)

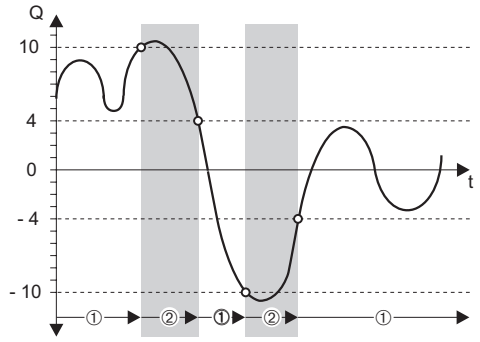
Function description OUTPUTS → PULSE/FREQUENCY OUTPUT 1 → CONFIGURATION (PULSE); (only with PROFIBUS DP)	
OUTPUT SIGNAL **4226** (continued)	**Example for active output circuit (ACTIVE):** With an active circuit, the internal power supply is 24 V. The pulse output is short-circuit proof.  A0004691 ① = *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.  A0004693 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 (PULSE); (only with PROFIBUS DP)	
FAILSAFE MODE 4227	✎ Note! 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 Measured value output is based on the current flow measurement. The fault is ignored. **Factory setting:** FALLBACK VALUE

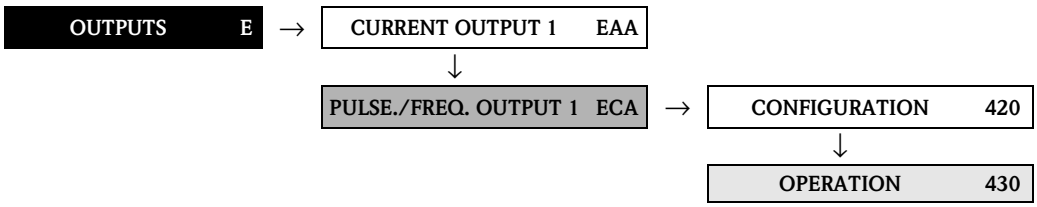
Function description OUTPUTS → PULSE/FREQUENCY OUTPUT 1 → CONFIGURATION (STATUS); (only with PROFIBUS DP)	
ASSIGN STATUS 4241	✎ Note! Function is not available unless the STATUS setting was selected in the OPERATION MODE function (4200). Use this function to assign a switching function to the status output. **Options:** OFF ON (operation) FAULT MESSAGE NOTICE MESSAGE FAULT MESSAGE or NOTICE MESSAGE EMPTY PIPE DETECTION (only with active function) FLOW DIRECTION MASS FLOW LIMIT VALUE VOLUME FLOW LIMIT VALUE CORRECTED VOLUME FLOW LIMIT VALUE DENSITY LIMIT VALUE REFERENCE DENSITY LIMIT VALUE TEMPERATURE LIMIT VALUE **Advanced selection** (with the optional SW package CONCENTRATION): LIMIT TARGET MASS FLOW LIMIT TARGET % MASS PROPORTION FLOW LIMIT TARGET VOLUME FLOW LIMIT TARGET % VOLUME PROPORTION FLOW LIMIT TARGET CORRECTED VOLUME FLOW LIMIT CARRIER MASS FLOW LIMIT CARRIER % MASS PROPORTION FLOW LIMIT CARRIER VOLUME FLOW LIMIT CARRIER % VOLUME PROPORTION FLOW LIMIT CARRIER CORRECTED VOLUME FLOW LIMIT % BLACK LIQUOR LIMIT °BAUME > 1 LIMIT °BAUME < 1 LIMIT °API LIMIT °PLATO LIMIT °BALLING LIMIT °BRIX **Advanced selection** (with the optional SW package ADV. DIAGNOSTICS): LIMIT MASS FLOW DEVIATION LIMIT DENSITY DEVIATION LIMIT REFERENCE DENSITY DEVIATION LIMIT TEMPERATURE DEVIATION LIMIT TUBE DAMPING DEVIATION LIMIT ELECTRODYNAMIC SENSOR DEVIATION LIMIT FREQU. FLUCTUATION DEVIATION LIMIT TUBE DAMPING FLUCTUATION DEVIATION **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. – “normal, error-free” operation: Flow direction = forwards; limit values = not exceeded; no empty or partially filled measuring tube (EPD/OED); no fault or notice message present. – Switching response like relay output, see Page 95 ■ If you select OFF, the only function shown in the CONFIGURATION function group is this function, in other words ASSIGN STATUS (4241). ■ Switching response like relay output, see Page 95.

Function description OUTPUTS → PULSE/FREQUENCY OUTPUT 1 → CONFIGURATION (STATUS); (only with PROFIBUS DP)	
ON-VALUE 4242	✎ Note! 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 higher or lower than the switch-off point. Positive or negative values are permissible, depending on the measured variable in question (e.g. mass flow, totalizer reading). **User input:** 5-digit floating-point number, [unit] **Factory setting:** 0 [kg/h] or 2 [kg/l] or 200 [°C] ✎ Note! ■ 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. ■ 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 switchover hysteresis.
SWITCH-ON DELAY 4243	✎ Note! 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 define a delay (0 to 100 seconds) for the switch-on (i.e. signal changes from “not conductive” to “conductive”) of the status output. 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 to 100.0 s **Factory setting:** 0.0 s

Function description OUTPUTS → PULSE/FREQUENCY OUTPUT 1 → CONFIGURATION (STATUS); (only with PROFIBUS DP)	
OFF-VALUE **4244**	✎ Note! Function is not available unless STATUS was selected in the OPERATION MODE function (4200) and a 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 higher or lower than the switch-on point. Positive and negative values are permissible, depending on the measured variable in question (e.g. mass flow, totalizer reading). **User input:** 5-digit floating-point number, [unit] **Factory setting:** 0 [kg/h] or 2 [kg/l] or 200 [°C] ✎ 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! Function is not available unless the STATUS setting was selected in the OPERATION MODE function (4200). Use this function to define a delay (0 to 100 seconds) for the switch-off (i.e. signal changes from “conductive” to “not conductive”) of the status output. The delay starts when the limit value is reached. The status output does switch when the delay has timed out and the switch off condition has been valid over the delay time. **User input:** fixed point number: 0.0 to 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! Function is not available unless STATUS was selected in the OPERATION MODE function (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  A0001247 *Fig. 30 : Example for the SYMMETRY measuring mode* *Switch-on point Q = 4* *Switch-off point Q = 10* ① = *Status output switched on (conductive)* ① = *Status output switched off (nonconductive)* ✎ 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! Function is not available unless the STATUS setting was selected in the OPERATION MODE function (4200). Entering a time constant defines 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 to 100.00 s **Factory setting:** 0.00 s

6.2.2 Function group OPERATION

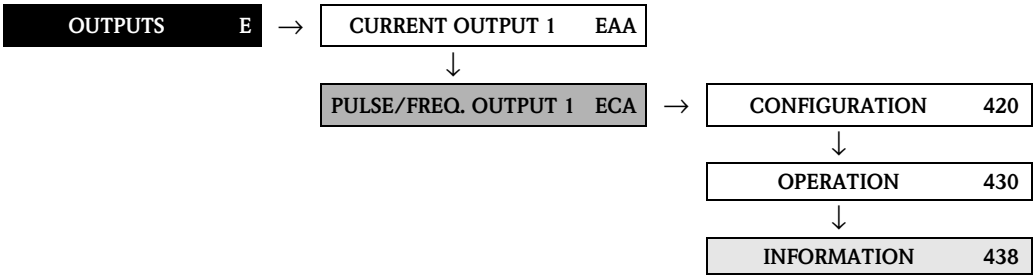


Function description OUTPUTS → PULSE/FREQUENCY OUTPUT 1 → OPERATION (FREQUENCY); (only with PROFIBUS DP)	
ACTUAL FREQUENCY **4301**	✎ Note! Function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function (4200). Use this function to view the computed actual value of the output frequency. **Display:** 0 to 12500 Hz
SIMULATION FREQUENCY **4302**	✎ Note! 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! 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 free selectable frequency value (e.g. 500 Hz) which should be output at the frequency output (with maximum pulse frequency or shortened minimum pulse width). This value is used to test downstream devices and the measuring device itself. **User input:** 0 to 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! Function is not available unless the PULSE setting was selected in the OPERATION MODE function (4200). 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 E key. ✎ Note! Simulation is started by confirming the CONTINUOUSLY option with the E 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! Function is not available unless the COUNTDOWN setting 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 E key. The display remains at 0 if the specified pulses have been output. **User input:** 0 to 10 000 **Factory setting:** 0 ✎ Note! Simulation is started by confirming the simulation value with the E 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 (STATUS); (only with PROFIBUS DP)	
ACTUAL STATUS **4341**	✎ Note! 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! 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! 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.

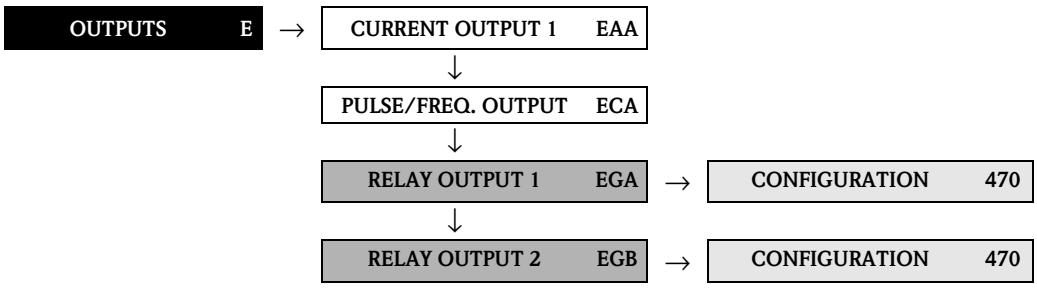
6.2.3 Function group INFORMATION



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

6.3 Group RELAY OUTPUT (1 to 2)

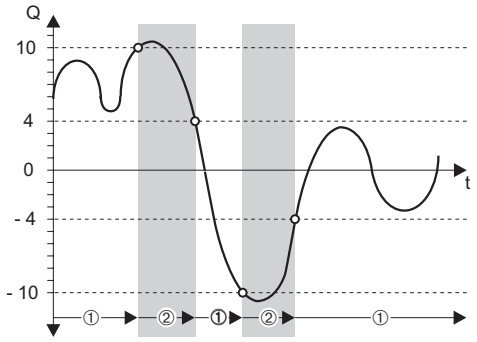
6.3.1 Function group CONFIGURATION



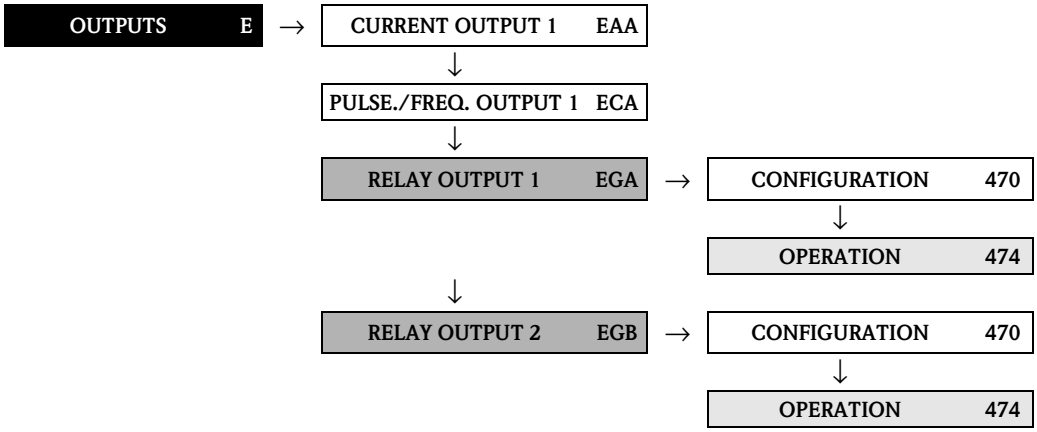
Function description OUTPUTS → RELAY OUTPUT (1 to 2) → CONFIGURATION (only with PROFIBUS DP)	
ASSIGN RELAY 4700	Use this function to assign a switching function to the relay output. **Options:** (standard) OFF ON (operation) FAULT MESSAGE NOTICE MESSAGE FAULT MESSAGE or NOTICE MESSAGE EPD (empty pipe detection, only if active) FLOW DIRECTION MASS FLOW LIMIT VALUE VOLUME FLOW LIMIT VALUE CORRECTED VOLUME FLOW LIMIT VALUE DENSITY LIMIT VALUE REFERENCE DENSITY LIMIT VALUE TEMPERATURE LIMIT VALUE **Advanced selection** (with the optional SW 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). ■ The only options available are the monitoring functions (7240 to 7243) which have a value not equal to zero (max. 2). **Advanced selection** (with the optional SW package CONCENTRATION) LIMIT TARGET MASS FLOW LIMIT TARGET % MASS PROPORTION FLOW LIMIT TARGET VOLUME FLOW LIMIT TARGET % VOLUME PROPORTION FLOW LIMIT TARGET CORRECTED VOLUME FLOW LIMIT CARRIER MASS FLOW LIMIT CARRIER % MASS PROPORTION FLOW LIMIT CARRIER VOLUME FLOW LIMIT CARRIER % VOLUME PROPORTION FLOW LIMIT CARRIER CORRECTED VOLUME FLOW LIMIT % BLACK LIQUOR LIMIT °BAUME > 1 LIMIT °BAUME < 1 LIMIT °API LIMIT °PLATO LIMIT °BALLING LIMIT °BRIX (continued on next page)

Function description OUTPUTS → RELAY OUTPUT (1 to 2) → CONFIGURATION (only with PROFIBUS DP)	
ASSIGN RELAY **4700** (continued)	**Advanced selection** (with the optional SW package ADV. DIAGNOSTICS): LIMIT MASS FLOW DEVIATION LIMIT DENSITY DEVIATION LIMIT REFERENCE DENSITY DEVIATION LIMIT TEMPERATURE DEVIATION LIMIT TUBE DAMPING DEVIATION LIMIT ELECTRODYNAMIC SENSOR DEVIATION LIMIT FREQU. FLUCTUATION DEVIATION LIMIT TUBE DAMPING FLUCTUATION DEVIATION **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 95). ■ It is advisable to configure at least one relay output as a fault output and define the outputs' response to error. ■ The relay output is configured as a normally open (NO or make) contact by default. It can be reconfigured as a normally closed (NC or break) contact by means of a jumper on the relay module (see Operating Instructions BA107D). ■ If you select OFF or ON, the only function shown in the CONFIGURATION function group is the function ASSIGN RELAY (4700).
ON-VALUE **4701**	✎ Note! Function is not available unless LIMIT VALUE or FLOW DIRECTION was selected in the ASSIGN RELAY function (4700). Use this function to assign a value to the switch-on point (relay output pulls up). The value can be higher or lower than the switch-off point. Positive or negative values are permissible, depending on the measured variable in question (e.g. mass flow, totalizer reading). **User input:** 5-digit floating-point number, [unit] **Factory setting:** 0 [kg/h] or 2 [kg/l] or 200 [°C] ✎ 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 switchover hysteresis.
SWITCH-ON DELAY **4702**	✎ Note! Function is not available unless LIMIT VALUE or FLOW DIRECTION was selected in the ASSIGN RELAY function (4700). Use this function to define a delay (0 to 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 on condition has been valid over the delay time. **User input:** fixed point number 0.0 to 100.0 s **Factory setting:** 0.0 s

Function description OUTPUTS → RELAY OUTPUT (1 to 2) → CONFIGURATION (only with PROFIBUS DP)	
OFF-VALUE **4703**	✎ Note! 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 higher or lower than the switch-on point. Positive or negative values are permissible, depending on the measured variable in question (e.g. mass flow, totalizer reading). **User input:** 5-digit floating-point number, [unit] **Factory setting:** 0 [kg/h] or 2 [kg/l] or 200 [°C] ✎ 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.
SWITCH-OFF DELAY **4704**	✎ Note! Function is not available unless LIMIT VALUE was selected in the ASSIGN RELAY function (4700). Use this function to define a delay (0 to 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 off condition has been valid over the delay time. **User input:** fixed point number 0.0 to 100.0 s **Factory setting:** 0.0 s

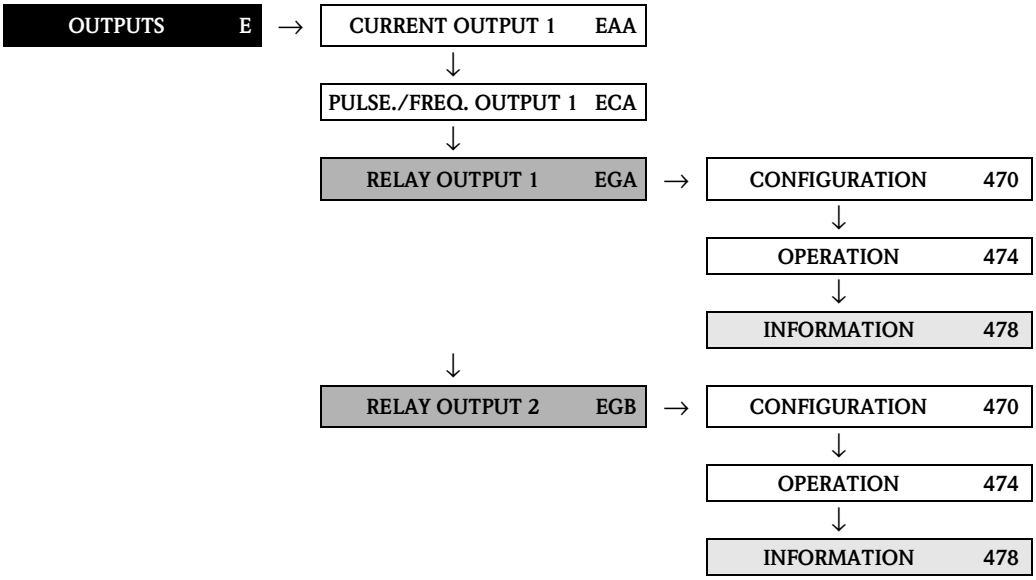
Function description OUTPUTS → RELAY OUTPUT (1 to 2) → CONFIGURATION (only with PROFIBUS DP)	
MEASURING MODE **4705**	✎ Note! This function is not visible unless a limit value was assigned to the relay output. Use this function to define the measuring mode for the relay output. **Options:** STANDARD The relay output signal switches at the defined switch points. SYMMETRY The relay output signal switches at the defined switch points, irrespective of the sign. If you define a switch point with a positive sign, the relay output switches as soon as the value is reached in the negative direction (negative sign), (see illustration). **Factory setting:** STANDARD  A0001247 *Fig. 31 : Example for the SYMMETRY measuring mode* *Switch-on point Q = 4* *Switch-off point Q = 10* *① = Relay energized* *② = Relay de-energized* ✎ Note! ■ SYMMETRY cannot be selected unless the values in the ON-VALUE (4701) and OFF-VALUE (4703) 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 **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 to 100.00 s **Factory setting:** 0.00 s

6.3.2 Function group OPERATION



Function description OUTPUTS → RELAY OUTPUT (1 to 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 Operating Instructions BA107D). **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. ■ If the "BATCH VALVE 1" option was selected in the ASSIGN RELAY function (4700), the functional test takes place by means of the BATCH PROCEDURE function (7260), see page 145. ☝ Caution! The setting is not saved in the event of a power failure.
VALUE SIMULATION SWITCH POINT **4742**	✎ Note! The function is not visible unless the function SIMULATION SWITCH POINT (4741) is active. 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 **Options:** 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 to 2) → INFORMATION (only with PROFIBUS DP)	
TERMINAL NUMBER **4780**	Use this function to view the numbers of the terminals (in the connection compartment) and the polarity 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 "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 m^3/h, the relay drops out at –1 m^3/h and pulls up at +1 m^3/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.

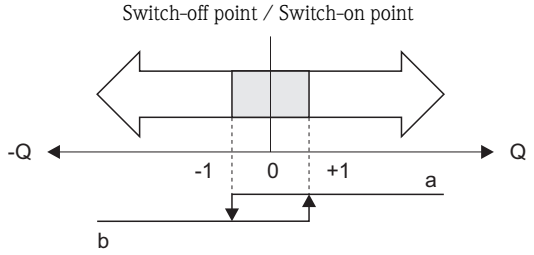


Fig. 32 : Relay output configured for "flow direction"
a Relay energized
b Relay de-energized

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.

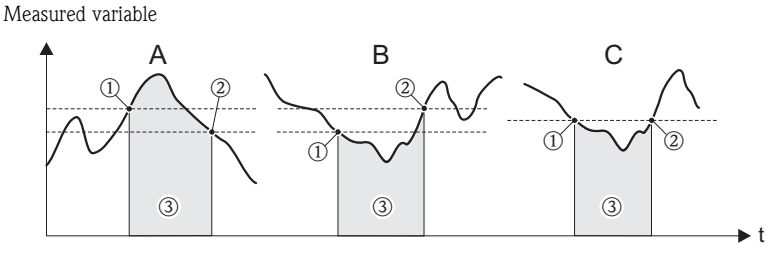
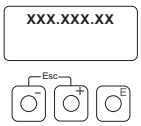
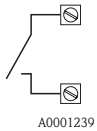
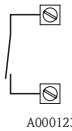
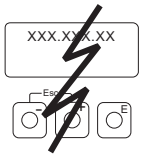
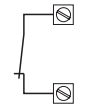
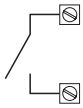
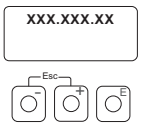
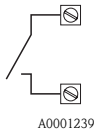
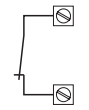
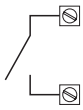
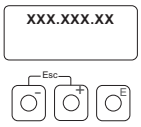
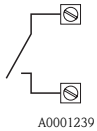
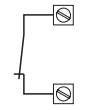
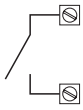
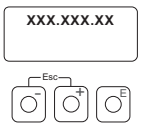
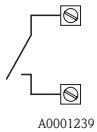
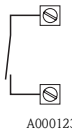
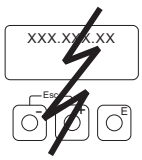
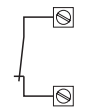
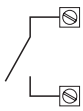
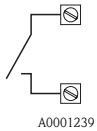
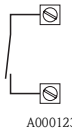
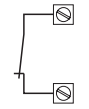
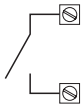
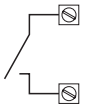
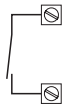
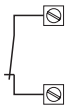
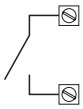
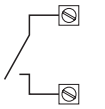
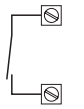
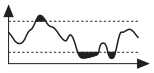
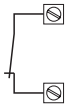
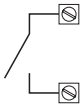


Fig. 33 : Relay output configured for "limit value"
① = Switch-off point, ② = Switch-on point, ③ = Relay de-energized

A = Maximum safety (SWITCH-OFF POINT > SWITCH-ON POINT)
B = Minimum safety (SWITCH-OFF POINT < SWITCH-ON POINT)
C = Minimum safety (SWITCH-OFF POINT = SWITCH-ON POINT, this configuration is to be avoided)

6.3.5 Switching response of the relay output

Function	State		Relay coil	Contact*	
				NC	NO
ON (operation)	System in measuring mode		energized	 A0001239	 A0001237
	System not in measuring mode (power supply failed)		de-energized	 A0001240	 A0001238
Fault message	System OK		energized	 A0001239	 A0001237
	(System or process error) Fault → Response to error Outputs/Inputs		de-energized	 A0001240	 A0001238
Notice message	System OK		energized	 A0001239	 A0001237
	(System or process error) Fault → Continuation of measuring		de-energized	 A0001240	 A0001238
Fault message or Notice message	System OK		energized	 A0001239	 A0001237
	(System or process error) Fault → Response to error or Note → Continuation of measuring		de-energized	 A0001240	 A0001238
Empty pipe detection (EPD)	Measuring tube full		energized	 A0001239	 A0001237
	Measuring tube partially filled /empty measuring tube		de-energized	 A0001240	 A0001238

Function	State		Relay coil	Contact*	
				NC	NO
Flow direction	forward	 A0001241	energized	 A0001239	 A0001237
	backward	 A0001242	de-energized	 A0001240	 A0001238
Limit value – Mass flow – Volume flow – Corrected volume flow – Density – Reference density – Temperature	Limit value **not** overshot or undershot	 A0001243	energized	 A0001239	 A0001237
	Limit value overshot or undershot	 A0001244	de-energized	 A0001240	 A0001238

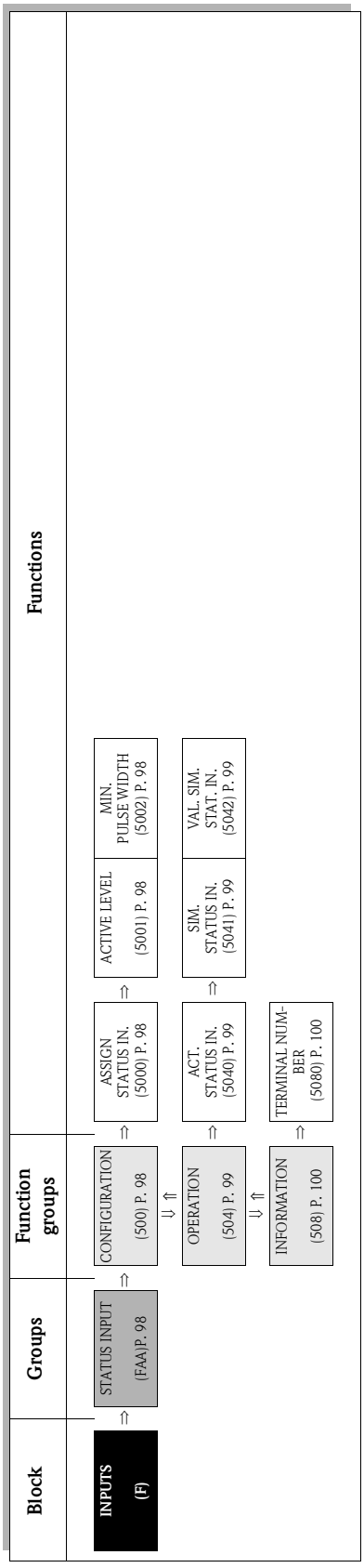
* Terminal numbers in accordance with the function TERMINAL NUMBER (4780) on Page 93.

✎ 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 measuring devices → Page 8 (Available Blocks, Groups, etc.).



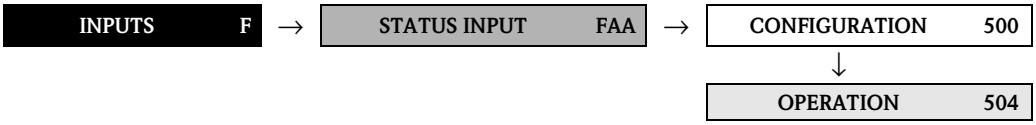
7.1 Group STATUS INPUT

7.1.1 Function group CONFIGURATION

INPUTS F → **STATUS INPUT FAA** → **CONFIGURATION 500**

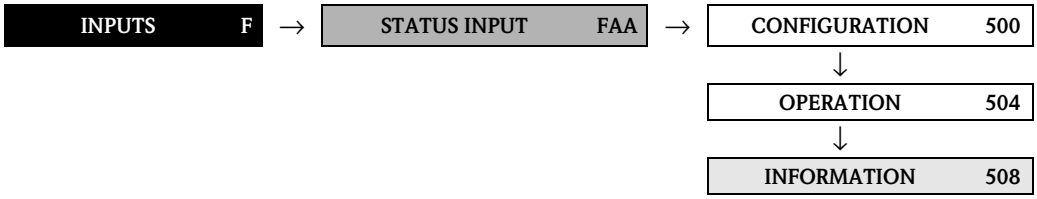
Function description INPUTS → STATUS INPUT → CONFIGURATION (only with PROFIBUS DP)	
ASSIGN STATUS INPUT 5000	Use this function to assign a switching function to the status input. **Options:** OFF POSITIVE ZERO RETURN RESET FAULT MESSAGE ZEROPOINT ADJUST ☝ Caution! POSITIVE ZERO RETURN is active as long 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. **Advanced selection** (with the optional SW package BATCHING): RUN BATCHING (start/stop) HOLD BATCHING (stop/continue) RESET BATCH SUM (resetting total quantity / total quantity totalizers) RESET TOTALIZER 3 & START BATCHING (reset totalizer 3, followed by batching start). ☝ Caution! If there is an input pulse during a running batching process, the batching process is aborted immediately. Totalizer 3 is not reset however. This makes it possible to read out partial filling correctly. **Advanced selection** (with the optional SW package ADVANCED DIAGNOSTICS): ACQUISITION ✎ Note! ACQUISITION is not available unless the SINGLE SHOT setting is selected in the ACQUISITION MODE function (7410). **Factory setting:** OFF
ACTIVE LEVEL 5001	Use this function to define whether the assigned function (see function ASSIGN STATUS INPUT (5000)) is released 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 function ASSIGN STATUS INPUT (5000)). **User input:** 20 to 100 ms **Factory setting:** 50 ms

7.1.2 Function group OPERATION



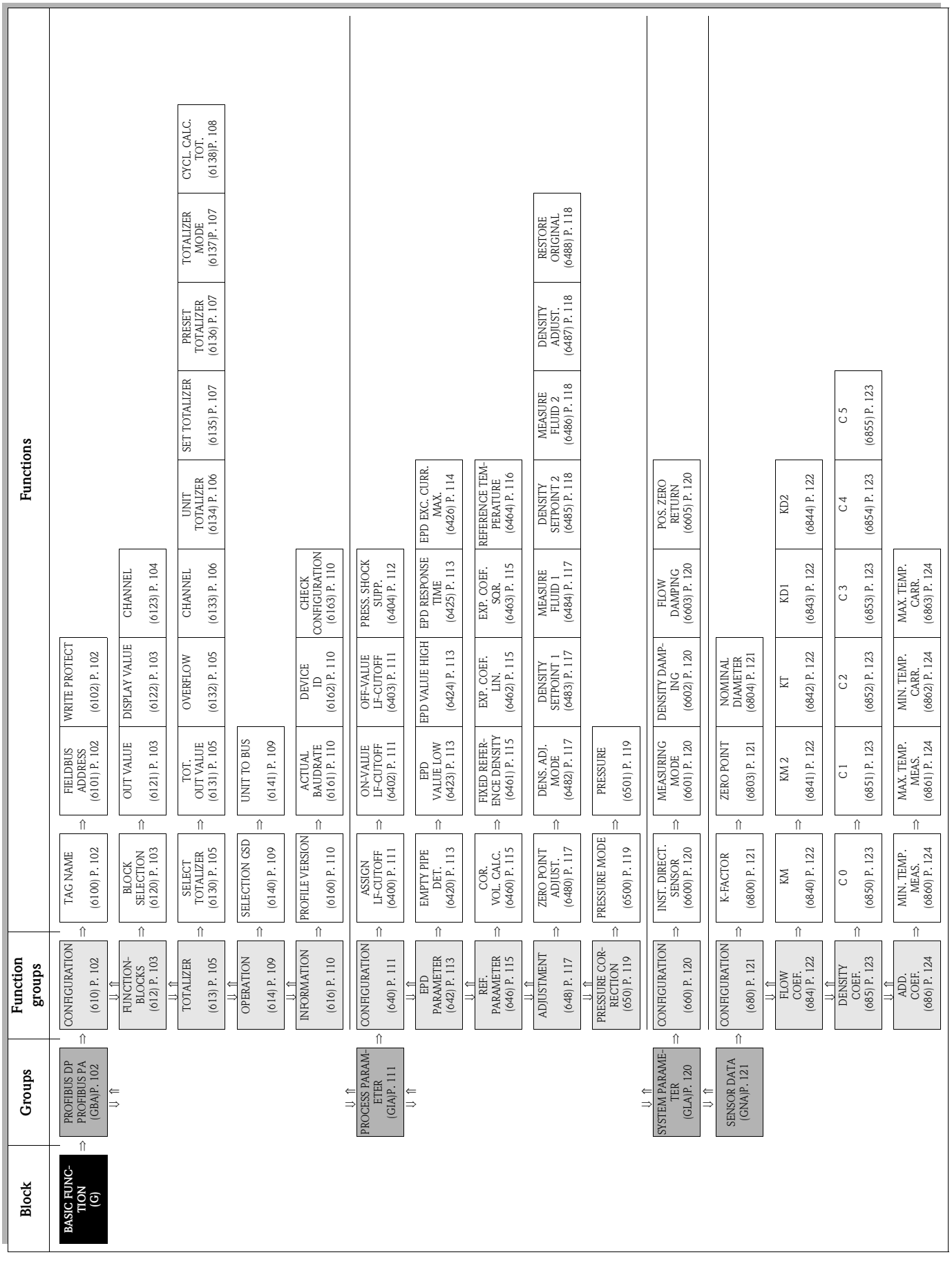
Function description INPUTS → STATUS INPUT → OPERATION (only with PROFIBUS DP)		
ACTUAL STATUS INPUT	**5040**	Use this function to view the current level of the status input. **Display:** LOW HIGH
SIMULATION STATUS INPUT	**5041**	Use this function to simulate the status input, in other words to trigger the function assigned to the status input (see the function ASSIGN STATUS INPUT (5000) on Page 98). **Display:** 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 function SIMULATION STATUS INPUT (5041) is active. 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:** LOW HIGH **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 view the numbers of the terminals (in the connection compartment) and the polarity used by the status input. **Display:** 24 (+) / 25 (–)

8 Block BASIC FUNCTION



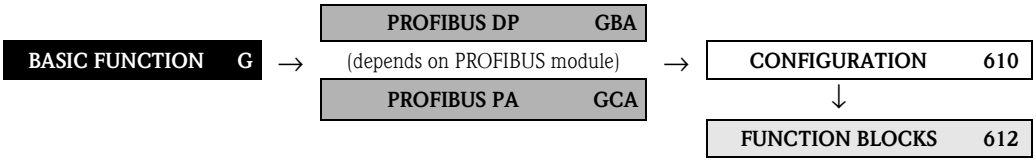
8.1 Group PROFIBUS DP/PA

8.1.1 Function group CONFIGURATION

BASIC FUNCTION G → **PROFIBUS DP GBA** / (depends on PROFIBUS module) / **PROFIBUS PA GCA** → **CONFIGURATION 610**

Function description BASIC FUNCTION → PROFIBUS DP/PROFIBUS PA → CONFIGURATION		
TAG NAME	**6100**	Use this function to assign a tag name to the measuring device. You can edit and read this tag name at the local display or by means of an operating program (e.g. FieldCare). **User input:** max. 16-character text, permissible: A-Z, 0-9, +,-, punctuation marks **Factory setting:** "_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _" (without text)
FIELDBUS ADDRESS	**6101**	For entering the device address. **User input:** 0 to 126 **Factory setting:** 126
WRITE PROTECT	**6102**	Indicates whether it is possible to write-access the device via PROFIBUS (acyclic data transmission, e.g. via the operating program "FieldCare"). **Display:** OFF → Write access via PROFIBUS (acyclic data transmission) possible ON → Write access via PROFIBUS (acyclic data transmission) disabled **Factory setting:** OFF ✎ Note! Write protection is activated and deactivated by means of a jumper on the I/O module (see Operating Instructions BA063D).

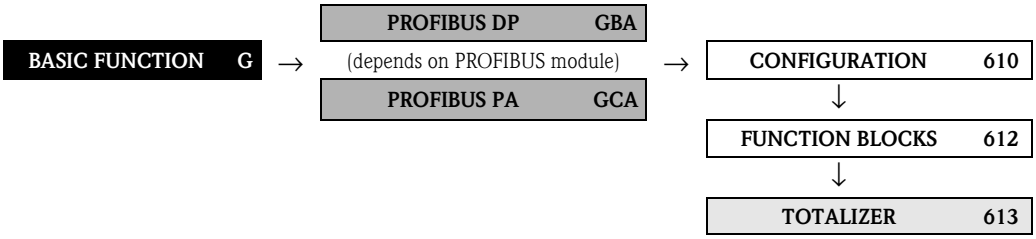
8.1.2 Function group FUNCTION BLOCKS



Function description BASIC FUNCTION → PROFIBUS DP/PROFIBUS PA → FUNCTION BLOCKS	
BLOCK SELECTION 6120	For selecting the PROFIBUS function block. If you select the Analog Input, the current value is displayed in the OUT VALUE (6121) function. If you select the Analog Output, the current value is displayed in the DISPLAY VALUE (6122) function. **Options:** ANALOG INPUT 1 ANALOG INPUT 2 ANALOG INPUT 3 ANALOG INPUT 4 ANALOG INPUT 5 ANALOG INPUT 6 ANALOG OUTPUT 1 **Factory setting:** ANALOG INPUT 1 ✎ Note! If the option PROFILE-GSD was selected in the SELECTION GSD (6140) function, the only options that appear in this function are: ■ ANALOG INPUT 1 ■ ANALOG INPUT 2 ■ ANALOG INPUT 3
OUT VALUE 6121	✎ Note! This function is not available unless one of the following was selected in the function BLOCK SELECTION (6120): ■ ANALOG INPUT 1 ■ ANALOG INPUT 2 ■ ANALOG INPUT 3 ■ ANALOG INPUT 4 ■ ANALOG INPUT 5 ■ ANALOG INPUT 6 This function shows the measured variable (AI module), incl. unit and status, cyclically transmitted **to** the PROFIBUS master (Class 1).
DISPLAY VALUE 6122	✎ Note! This function is not available unless ANALOG OUTPUT 1 was selected in the BLOCK SELECTION function (6120). This function shows the value (DISPLAY_VALUE module), incl. unit and status, cyclically transmitted **from** the PROFIBUS master (Class 1) to the measuring device, for displaying on the local display.

Function description BASIC FUNCTION → PROFIBUS DP/PROFIBUS PA → FUNCTION BLOCKS		
CHANNEL	**6123**	✎ Note! ■ This function is only available with PROFIBUS DP communication. ■ This function is not available unless one of the following options was selected in the BLOCK SELECTION function (6120): – ANALOG INPUT 1 – ANALOG INPUT 2 – ANALOG INPUT 3 – ANALOG INPUT 4 – ANALOG INPUT 5 – ANALOG INPUT 6 For assigning a measured variable (e.g. mass flow) to an ANALOG INPUT 1 to 6 (see BLOCK SELECTION function (6120)). **Options:** MASS FLOW VOLUME FLOW CORRECTED VOLUME FLOW DENSITY REFERENCE DENSITY TEMPERATURE **Extended options** (with the optional BATCHING software package): BATCH UPWARDS BATCH DOWNWARDS BATCH COUNTER BATCH SUM BATCH TIME **Extended options** (with the optional CONCENTRATION software package): ✎ Note! Depends on the selection in the DENSITY FUNCTION (7000) function. TARGET MASS FLOW % TARGET MASS FLOW TARGET VOLUME FLOW % TARGET VOLUME FLOW TARGET CORRECTED VOLUME FLOW CARRIER MASS FLOW % CARRIER MASS FLOW CARR. VOLUME FLOW % CARRIER VOLUME FLOW CARR. CORRECTED VOLUME FLOW %-BLACK LIQUOR DENSITY FUNCTION **Extended options** (with the optional ADVANCED DIAGNOSTICS software package): MASS FLOW DEVIATION DENSITY DEVIATION REFERENCE DENSITY DEVIATION TEMPERATURE DEVIATION TUBE DAMPING DEVIATION ELECTRODYNAMIC SENSOR DEVIATION FREQU. FLUCTUATION DEVIATION TUBE DAMPING FLUCTUATION DEVIATION **Factory setting:** Depends on the selection in the BLOCK SELECTION (6120) function: ■ ANALOG INPUT 1 → Factory setting= MASS FLOW ■ ANALOG INPUT 2 → Factory setting = VOLUME FLOW ■ ANALOG INPUT 3 → Factory setting = COR. VOLUME FLOW ■ ANALOG INPUT 4 → Factory setting = DENSITY ■ ANALOG INPUT 5 → Factory setting = REF. DENSITY ■ ANALOG INPUT 6 → Factory setting = TEMPERATURE

8.1.3 Function group TOTALIZER



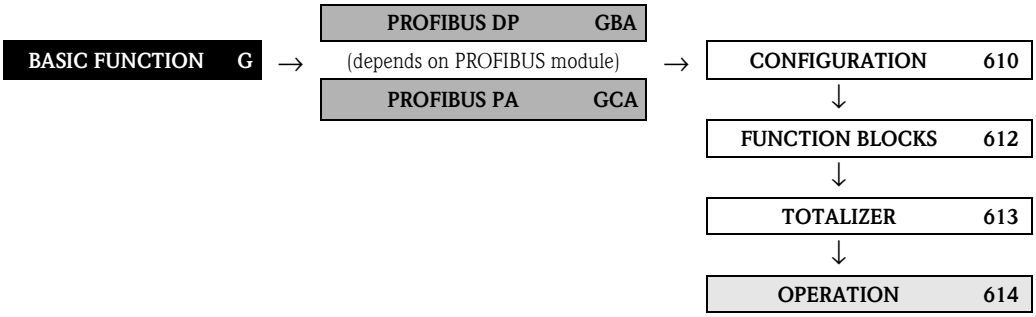
Function description BASIC FUNCTION → PROFIBUS DP/PROFIBUS PA → TOTALIZER		
SELECT TOTALIZER	**6130**	Use this function to select a totalizer. **Options:** TOTALIZER 1 TOTALIZER 2 TOTALIZER 3 **Factory setting:** TOTALIZER 1 ✎ Note! If the option PROFILE-GSD was selected in the SELECTION GSD (6140) function the only option available in this function is TOTALIZER 1.
✎ Note! The function descriptions below apply to totalizers 1 to 3; the totalizers are independently configurable.		
TOTALIZER OUT VALUE	**6131**	Use this function to display the current totalizer value incl. unit and status. **Display:** Max. 7-digit floating-point number, including sign and unit (e.g. 15467.04 m³; –4925.631 kg)
OVERFLOW	**6132**	Use this function to view the overflow for the totalizer aggregated since measuring commenced. 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 (>9999999) as overflows. The effective quantity is thus the total of overflow plus the value returned by the TOTALIZER OUT VALUE function (6131). Example: Reading for 2 overflows: 2 E7 (= 20000000). The value displayed in the TOTALIZER OUT VALUE (6131) function = 196845.7 kg Effective total quantity = 20196845.7 kg **Display:** integer with exponent, including sign, e.g. 2 E7

Function description BASIC FUNCTION → PROFIBUS DP/PROFIBUS PA → TOTALIZER		
CHANNEL	**6133**	Use this function to assign a measured variable to the totalizer in question. **Options:** OFF MASS FLOW VOLUME FLOW CORRECTED VOLUME FLOW **Extended options** (with the optional CONCENTRATION software package): ✎ Note! Depends on the selection in the DENSITY FUNCTION (7000) function. TARGET MASS FLOW TARGET VOLUME FLOW TARGET CORRECTED VOLUME FLOW CARRIER MASS FLOW CARR. VOLUME FLOW CARR. CORRECTED VOLUME FLOW **Factory setting:** MASS FLOW
UNIT TOTALIZER	**6134**	Use this function to define the unit for the totalizer. The options presented depend on the measured variable selected in the function CHANNEL (6133). **Options:** (for assigning MASS FLOW) Metric → g; kg; t US → oz; lb; ton **Factory setting:** kg **Options:** (for assigning VOLUME FLOW) Metric → cm^3; dm^3; m^3; ml; l; hl; Ml US → gal; Kgal; Mgal; bbl (beer); bbl (petrochemicals) Imperial → cc; af; ft3; oz f; gal; Mgal; bbl (normal fluids); bbl (beer); bbl (petrochemicals); bbl (filling tanks) **Factory setting:** m^3 **Options:** (for assigning CORRECTED VOLUME FLOW) Metric → Nm^3, Nl US → Sm^3, Scf **Factory setting:** Nm^3

Function description BASIC FUNCTION → PROFIBUS DP/PROFIBUS PA → TOTALIZER		
SET TOTALIZER	**6135**	Use this function to assign a status to the totalizer. **Options:** TOTALIZE Total the measured variable selected in the CHANNEL (6133) function. RESET Reset the totalizer to zero. PRESET Set the totalizer to the value defined in the PRESET TOTALIZER (6136) function. ✎ Note! Note that selecting RESET or PRESET resets the totalizer to 0 or sets it to the preset value respectively, but does not stop the totalizer. This means that it immediately recommences totaling from the new setting. If you want to stop the totalizer you must select HOLD in the TOTALIZER MODE (6137) function. **Factory setting:** TOTALIZE
PRESET TOTALIZER	**6136**	Use this function to define a start value for the totalizer. This value is not accepted by the totalizer unless the PRESET option is selected in the SET TOTALIZER (6135) function. **User input:** –9999999 to 9999999 **Factory setting:** 0
TOTALIZER MODE	**6137**	Use this function to define how the totalizer totals the flow components. **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 (reverse) Negative flow components only HOLD VALUE (HOLD) The totalizer stops. No further flow components are totaled. **Factory setting:** BALANCE ✎ Note! For the calculation of the positive and negative flow components (BALANCE) or the negative flow components only (NEGATIVE) to be carried out correctly, the BIDIRECTIONAL option must be selected in the MEASURING MODE function (6601) (s. Page 120).

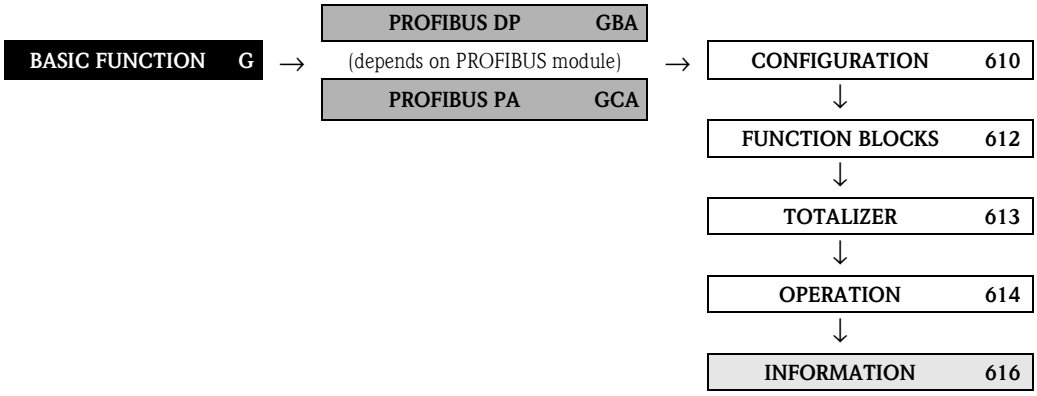
Function description BASIC FUNCTION → PROFIBUS DP/PROFIBUS PA → TOTALIZER		
CYCL. CALC. TOT.	**6138**	Use this function to define whether the totalizers 1 to 3 are updated on the local display and in the operating program (e.g. FieldCare). **Options:** ON Totalizers are always updated OFF Totalizers are only updated if the corresponding totalizer function block (TOTAL module or function) has been configured for cyclic data transmission. **Factory setting:** ON ✎ Note! Especially when conducting time-critical applications, optimization can be carried out for unnecessary totalizer function blocks. For this purpose, OFF must be selected in this function. When doing this, ensure that the totalizer is no longer updated on the local display and in the operating program (e.g. FieldCare) when selecting OFF.

8.1.4 Function group OPERATION



Function description BASIC FUNCTION → PROFIBUS DP/PROFIBUS PA → OPERATION		
SELECTION GSD	**6140**	For selecting the operating mode (GSD file) which is used for the cyclic communication with the PROFIBUS master (Class 1). **Options:** MANUFACT. SPEC. → the measuring device is operated with the complete device functionality. MANUFACT V2.0 → the measuring device is used as a replacement device for the predecessor device Promass 63 (compatibility mode). PROFILE-GSD → the measuring device is operated in the PROFIBUS profile mode. **Factory setting:** MANUFACT. SPEC. ✎ Note! Ensure, when configuring the PROFIBUS network, that the dedicated Device Master File (GSD file) of the measuring device is used for the selected operating mode (see Operating Instructions Promass 83 PROFIBUS DP/PA, BA063D).
UNIT TO BUS	**6141**	If this function is executed, the cyclically transmitted measured variables (AI module) are transmitted to the PROFIBUS master (Class 1) with the system units set in the measuring device. **Options:** OFF SET UNITS (pressing the E button starts transmission) ☝ Caution! Activating this function can cause the measured variables (AI module) transmitted to the PROFIBUS master (Class 1) to change suddenly; this, in turn, can affect subsequent control routines.

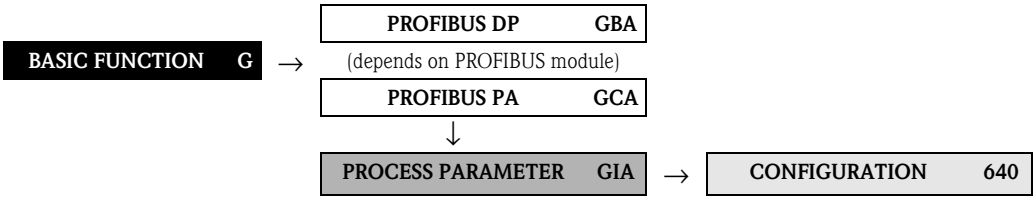
8.1.5 Function group INFORMATION

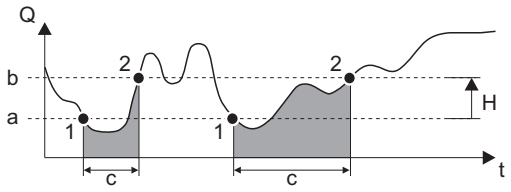


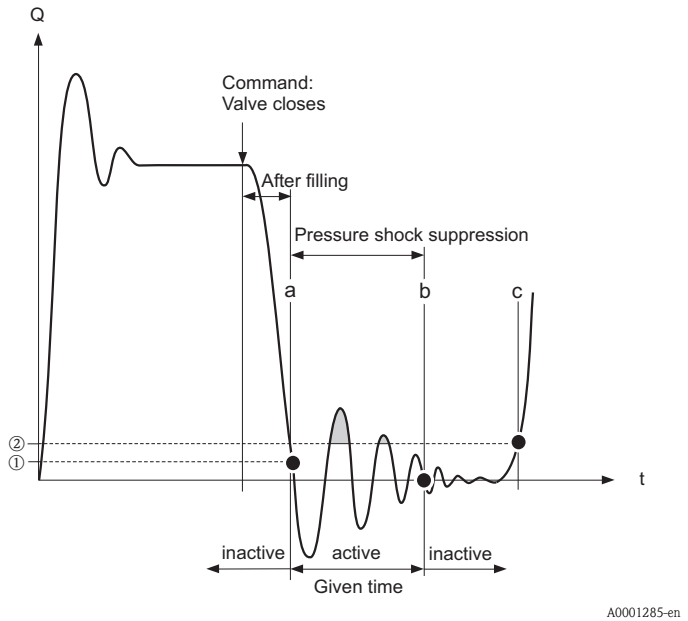
Function description BASIC FUNCTION → PROFIBUS DP/PROFIBUS PA → INFORMATION		
PROFILE VERSION	**6160**	Use this function to view the PROFIBUS profile version.
ACTUAL BAUDRATE	**6161**	Use this function to view the data transfer rate at which the device communicates.
DEVICE ID	**6162**	The PROFIBUS device ID appears on the display. The display depends on the options selected in the SELECTION GSD (6140) function. **Display:** If MANUFACTURER SPEC. is selected: ■ PROFIBUS DP communication output = 1529 Hex ■ PROFIBUS PA communication output = 152A Hex If MANUFACT V2.0 is selected: ■ PROFIBUS DP communication output = 1512 Hex ■ PROFIBUS PA communication output = 1506 Hex If PROFILE-GSD is selected: ■ PROFIBUS DP communication output = 9742 Hex ■ PROFIBUS PA communication output = 9742 Hex
CHECK CONFIGURATION	**6163**	Use this function to display whether the configuration for cyclic data transmission of the PROFIBUS master (Class 1) was accepted by the measuring device. **Display:** ACCEPTED (configuration accepted) NOT ACCEPTED (configuration not accepted)

8.2 Group PROCESS PARAMETER

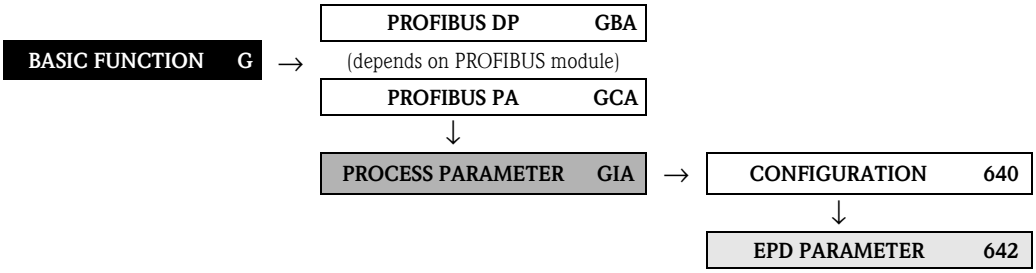
8.2.1 Function group CONFIGURATION



Function description BASIC FUNCTION → PROCESS PARAMETER → CONFIGURATION	
ASSIGN LOW FLOW CUT OFF **6400**	Use this function to assign the switch point for low flow cut off rate suppression. **Options:** OFF MASS FLOW VOLUME FLOW CORRECTED VOLUME FLOW **Factory setting:** MASS FLOW
ON-VALUE LOW FLOW CUT OFF **6402**	Use this function to assign a value to 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 ✎ Note! The appropriate unit is taken from the function group SYSTEM UNITS (see Page 15).
OFF-VALUE LOW FLOW CUT OFF **6403**	Use this function to enter the switch-off point for low flow cut off. Enter the switch-off point as a positive hysteresis from the switch-on point. **User input:** 0 to 100% **Factory setting:** 50%  A0001245 *Fig. 34 : Example for low flow cut off on-value and off-value* *Q = Flow [volume/time]* *t = Time* *a = ON-VALUE LOW FLOW CUT OFF (6402), e.g. 200 kg/h* *b = OFF-VALUE LOW FLOW CUT OFF (6403), e.g 10%* *c = Low flow cut off active* *1 = Low flow cut off is switched on, here e.g. at 200 kg/h* *2 = Low flow cut off is switched off, here e.g. at 220 kg/h*

Function description BASIC FUNCTION → PROCESS PARAMETER → 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 totaled 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 function ON-VALUE LOW FLOW CUT OFF (6402) on Page 111). Use this function to define the time span for active pressure shock suppression. Activation of the pressure shock suppression Pressure shock suppression is activated after 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 outputs → 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. 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 actual 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).  *Fig. 35 : Pressure shock suppression* *① = Off-value (low flow cut off)* *② = On-VALUE (low flow cut off)* *a Active when value falls below the on-value of the low flow cut off* *b Deactivated after specified time expires* *c Flow values are again used to calculate 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

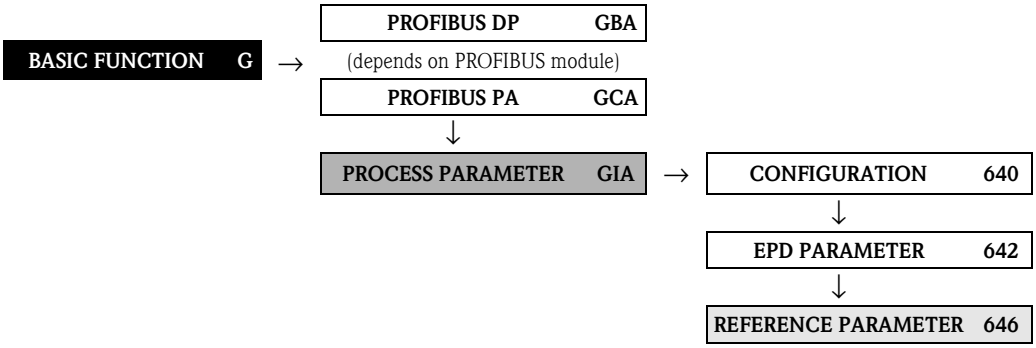
8.2.2 Function group EPD PARAMETER



Function description BASIC FUNCTION → PROCESS PARAMETER → EPD PARAMETER		
EMPTY PIPE DETECTION	**6420**	Use this function to activate the empty pipe detection (EPD). With empty measuring tubes the density of the fluid falls below the value specified in the function EPD VALUE LOW. **Options:** OFF ON **Factory setting:** Liquid: ON Gas: OFF ☞ Caution! ■ Select a correspondingly low EPD response value in the function EPD VALUE LOW, so that the difference to the effective density of the fluid is sufficiently large enough. This ensures that totally empty measuring tubes and not partially filled ones are detected. ■ For gas measurement we strongly recommend to switch off empty pipe detection.
EPD VALUE LOW	**6423**	✎ Note! Function is not available unless the ON selection was selected in the EMPTY PIPE DETECTION function. Use this function to set a lower threshold for the measured density value, in order to detect possible problems in the process indicated by too low density. **User input:** 5-digit floating-point number **Factory setting:** 0.2000 g/cc
EPD VALUE HIGH	**6424**	✎ Note! Function is not available unless the ON selection was selected in the EMPTY PIPE DETECTION function. Use this function to set an upper threshold for the measured density value. **User input:** 5-digit floating-point number **Factory setting:** 6.0000 g/cc
EPD RESPONSE TIME	**6425**	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. **User input:** fixed-point number: 1.0 to 60 s **Factory setting:** 1.0 s

Function description BASIC FUNCTION → PROCESS PARAMETER → EPD PARAMETER		
EPD EXCITING CURRENT MAX	**6426**	Empty pipe detection (EPD) can be switched on in this function. In the event of inhomogeneous fluids or air bubbles, the exciting current of the measuring pipes increases. If the exciting current specified in this function is overshot, error message #700 “EPD ACTIVE” is output similar to the EPD VALUE LOW (6423) function. **User input:** 5-digit floating-point number **Factory setting:** 100 mA (deactivated) ✎ Note! The function is not activated until a value under 100 mA is input. Entering the value 100 mA deactivates the function.

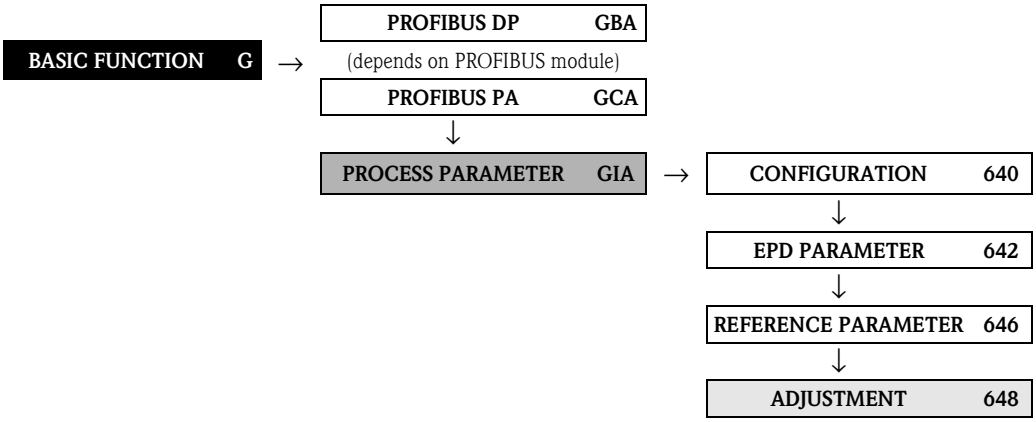
8.2.3 Function group REFERENCE PARAMETER



Function description BASIC FUNCTION → PROCESS PARAMETER → REFERENCE PARAMETER	
CORRECTED VOLUME CALCULATION **6460**	This function is used to set the reference density for calculating the corrected volume flow. **Options:** CALCULATED REFERENCE DENSITY FIXED REFERENCE DENSITY **Factory setting:** CALCULATED REFERENCE DENSITY
FIXED REFERENCE DENSITY **6461**	✎ Note! Function is not available unless the FIXED REFERENCE DENSITY setting was selected in the CORRECTED VOLUME CALCULATION function (6460). In this function, a fixed value for the reference density can be entered, with which the corrected volume flow or corrected volume is calculated. **User input:** 5-digit floating-point number **Factory setting:** 1 kg/Nl
EXPANSION COEFFICIENT **6462**	✎ Note! Function is not available unless the CALCULATED REFERENCE DENSITY setting was selected in the CORRECTED VOLUME CALCULATION function (6460). For temperature-compensated calculations of the reference density an expansion coefficient specific to the fluid is required and can be entered in this function (see REFERENCE TEMPERATURE (6464) function on Page 116). **User input:** 5-digit floating-point number **Factory setting:** 0.5000 e–3 [1/K]
EXPANSION COEFFICIENT SQUARE **6463**	Use this function to enter a square expansion coefficient, if the temperature compensation follows a nonlinear behavior (see REFERENCE TEMPERATURE (6464) function on Page 116). **User input:** 5-digit floating-point number **Factory setting:** 0 e–6 [1/K²]

Function description BASIC FUNCTION → PROCESS PARAMETER → REFERENCE PARAMETER		
REFERENCE TEMPERATURE	**6464**	✎ Note! Function is not available unless the CALCULATED REFERENCE DENSITY setting was selected in the CORRECTED VOLUME CALCULATION function (6460). For entering the reference temperature for calculating the corrected volume flow, the corrected volume and the reference density. **User input:**: 5-digit floating-point number **Factory setting:** 20.000 °C The reference density is calculated as follows: $\rho_N = \rho \cdot (1 + \alpha \Delta t + \beta \Delta t^2)$; where $\Delta t = t - t_N$ ρ_N = Reference density ρ = Currently measured fluid density (measuring value Promass) t = Actual measured temperature of fluid (measuring value Promass) t_N = Reference temperature for calculating the reference density (e.g. 20 °C) α = Vol. expansion coefficient of the fluid, unit [1/K] (K = Kelvin) β = Square vol. expansion coefficient of the fluid, unit [1/K²]

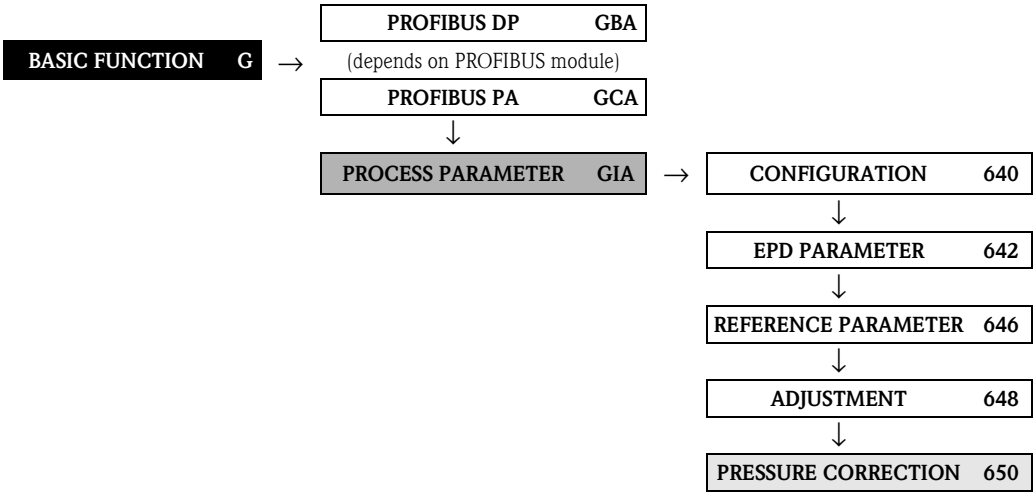
8.2.4 Function group ADJUSTMENT



Function description BASIC FUNCTION → PROCESS PARAMETER → ADJUSTMENT	
ZEROPOINT ADJUSTMENT **6480**	This function enables a zero point adjustment to be automatically carried out. The new zero point determined by the measuring system is adopted by the function ZERO POINT. **Options:** CANCEL START **Factory setting:** CANCEL Caution! Before carrying this out, please refer to the Operating Instructions BA107D for a detailed description of the procedure for zero point adjustment. Note! ■ Programming is locked during zero point adjustment. The message“ZERO ADJUST RUNNING” appears on the display. ■ If the zero point adjustment is not possible (e.g. if v > 0.1 m/s) or has been canceled, the alarm message “ZERO ADJUST NOT POSSIBLE” appears on the display. ■ If the Promass 83 measuring electronics are fitted with a status input, then the zero point can also be activated by using this input.
DENSITY ADJUST MODE **6482**	Use this function to select whether a 1-point or a 2-point density adjustment should be carried out. **Options:** CANCEL 1-POINT 2-POINT
DENSITY SETPOINT 1 **6483**	Use this function to enter the density setpoint value for the first fluid for which you want to carry out field density adjustment. **User input:** 5-digit floating-point number, including units Note! ■ The preset density entered here should not vary from the actual fluid density by a more than ±10%. ■ The appropriate unit is taken from the function group SYSTEM UNITS (see Page 15).
MEASURE FLUID 1 **6484**	In this function the actual density of the first fluid is measured for density adjustment. **Options:** CANCEL START

Function description BASIC FUNCTION → PROCESS PARAMETER → ADJUSTMENT		
DENSITY SETPOINT 2	**6485**	Use this function to enter the density setpoint value for the second fluid for which you want to carry out field density adjustment. **User input:** 5-digit floating-point number, including units ✎ Note! ■ The preset density entered here should not vary from the actual fluid density by a more than ±10%. ■ The difference between the density setpoint values must be at least 0.2 kg/l. ■ The appropriate unit is taken from the function group SYSTEM UNITS (see Page 15).
MEASURE FLUID 2	**6486**	In this function the current density of the second fluid is measured for density adjustment. **Options:** CANCEL START
DENSITY ADJUSTMENT	**6487**	With this function a density adjustment can be carried out on site. The density adjustment values will thus be recalculated and stored. This ensures that the values dependent on density calculations (e.g. volume flow) are as accurate as possible. ✎ Note! Before carrying this out, please refer to the Operating Instructions BA107D for a detailed description of the procedure for density adjustment. Two types of adjustment are possible: **1-point density adjustment (with one fluid)** This type of density adjustment is necessary under the following conditions: ■ The sensor does not accurately measure the density which the operator expects based on laboratory trials. ■ The characteristics of the fluid are outside the measuring points set at the factory or reference conditions under which the flowmeter has been calibrated. ■ The plant is used solely for measuring a fluid whose density is to be determined very accurately under constant conditions. **2-point density adjustment (with two fluids)** This type of adjustment must always be carried out when the measuring tubes are changed mechanically, e.g. due to deposits, abrasion or corrosion: In such instances, the measuring tube resonance frequency is influenced in such a way that it is no longer compatible with the calibration data determined at the factory. The 2-point density adjustment takes these mechanically-based changes into account and calculates new, adjusted calibration data. **Options:** CANCEL MEASURE FLUID 1 MEASURE FLUID 2 DENSITY ADJUSTMENT **Factory setting:** CANCEL
RESTORE ORIGINAL	**6488**	With this function the original density coefficient determined at the factory are restored. **Options:** NO YES **Factory setting:** NO

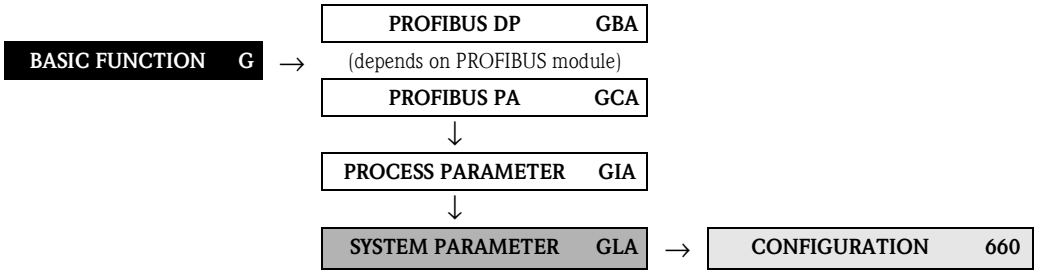
8.2.5 Function group PRESSURE CORRECTION



Function description BASIC FUNCTION → PROCESS PARAMETER → PRESSURE CORRECTION	
PRESSURE MODE 6500	Use this function to configure an automatic pressure correction. In this way, the effect of a pressure deviation between the calibration and process pressures on the measured error for mass flow is compensated for, (see also Operating Instructions BA107D, "Measuring accuracy" Chapter). **Options:** OFF FIX (a fixed process pressure for pressure correction is specified). **Factory setting:** OFF
PRESSURE 6501	✎ Note! Function is not available unless the FIX setting was selected in the PRESSURE MODE function (6500). Use this function to enter the value for the process pressure which should be used during pressure correction. **User input:** 7-digit floating-point number **Factory setting:** 0 bar g ✎ Note! The appropriate unit is taken from the function group SYSTEM UNITS (see Page 15).

8.3 Group SYSTEM PARAMETER

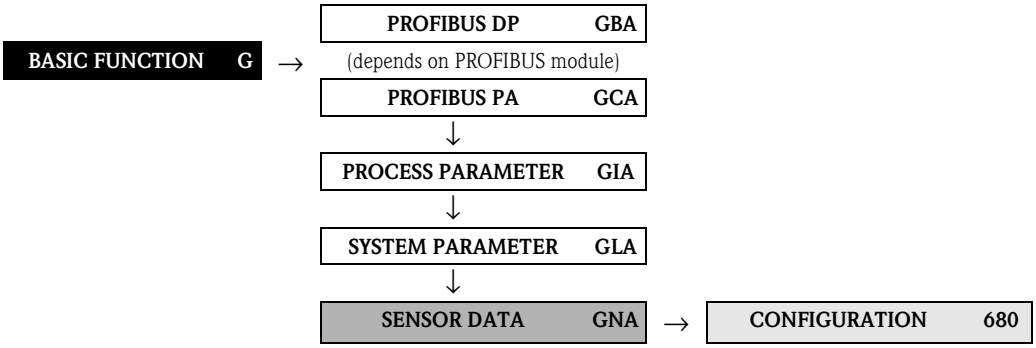
8.3.1 Function group CONFIGURATION



Function description BASIC FUNCTION → SYSTEM PARAMETER → CONFIGURATION		
INSTALLATION DIRECTION SENSOR	**6600**	Use this function to reverse the sign of the flow direction, if necessary. ✎ Note! Ascertain the actual direction of fluid flow with reference to the direction indicated by the arrow on the sensor (nameplate). **Options:** NORMAL (flow as indicated by the arrow) INVERSE (flow opposite to direction indicated by the arrow) **Factory setting:** NORMAL
MEASURING MODE	**6601**	Select how flow components should be recorded by the measuring device. **Options:** UNIDIRECTIONAL (only the positive flow components) BIDIRECTIONAL (the positive and negative flow components) **Factory setting:** UNIDIRECTIONAL
DENSITY DAMPING	**6602**	The density filter allows the sensitivity of the density measuring signal to be lowered with respect to variations in the density of the fluid, e.g. with inhomogeneous liquids. The damping acts on all functions and outputs of the measuring device. **User input:** max. 5-digit number, incl. unit: 0.00 to 100.00 s **Factory setting:** 0.00 s
FLOW DAMPING	**6603**	Setting 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 reaction time of the measuring device increases with every increase in the filter setting. The damping acts on all functions and outputs of the measuring device. **User input:** 0 to 100 s **Factory setting:** Liquid: 0.00 s Gas: 0.25 s
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, temperature and density are still output) **Factory setting:** OFF

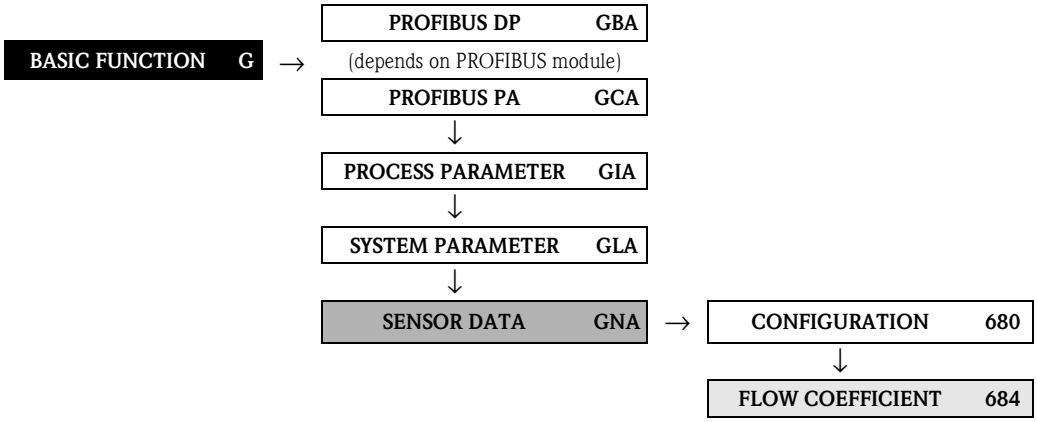
8.4 Group SENSOR DATA

8.4.1 Function group CONFIGURATION



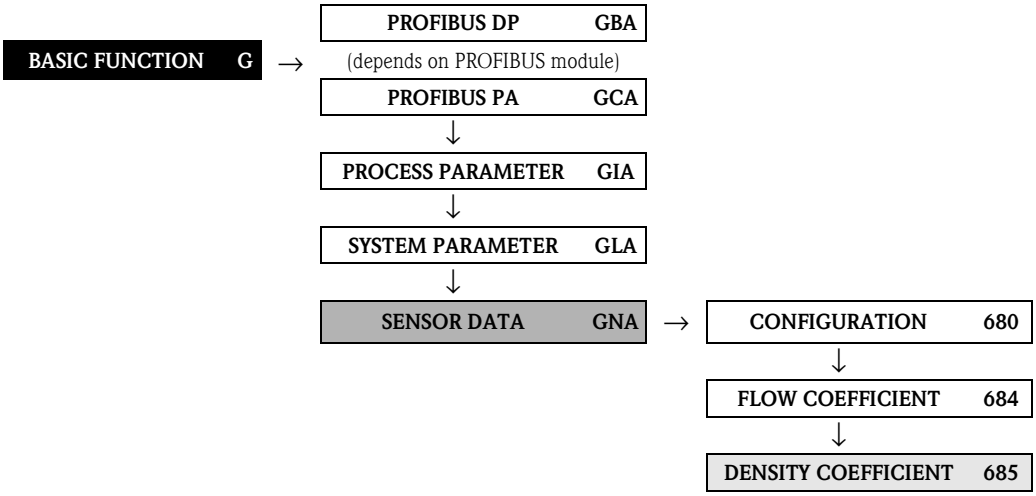
Function description BASIC FUNCTION → SENSOR DATA → CONFIGURATION		
All sensor data (calibration factor, zero point and nominal diameter) are set at the factory and saved on the S-DAT sensor memory chip. ☝ Caution! Under normal circumstances you should not change the following parameter settings, because 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.		
K-FACTOR	**6800**	This function shows the current calibration factor for the sensor. **Factory setting:** Depends on nominal diameter and calibration
ZERO POINT	**6803**	This function shows the current zero point correction value for the sensor. **Display:** max. 5-digit number: –99999 to +99999 **Factory setting:** Depends on calibration
NOMINAL DIAMETER	**6804**	**Display:** Nominal diameter for the sensor DN 1 or 1/24" 1 = DN 2 or 1/12" 2 = DN 3 or 1/8" 3 = DN 3.5 or 9/64" 4 = DN 4 or 5/32" 5 = DN 6 or 1/4" 6 = DN 8 or 5/16" 7 = DN 10 or 3/8" 8 = DN 15 or 1/2" 9 = DN 15 FB or 1/2" FB (full bore) 10 = DN 20 or 3/4" 11 = DN 25 or 1" 12 = DN 25 FB or 1" FB 13 = DN 32 or 1 1/4" 14 = DN 40 or 1 1/2" 15 = DN 40 FB or 1 1/2" FB 16 = DN 50 or 2" 17 = DN 50 FB or 2" FB 18 = DN 65 or 2 1/2" 19 = DN 80 or 3" 20 = DN 100 or 4" 21 = DN 125 or 5" 22 = DN 150 or 6" 23 = DN 200 or 8" 24 = DN 250 or 10"

8.4.2 Function group FLOW COEFFICIENT



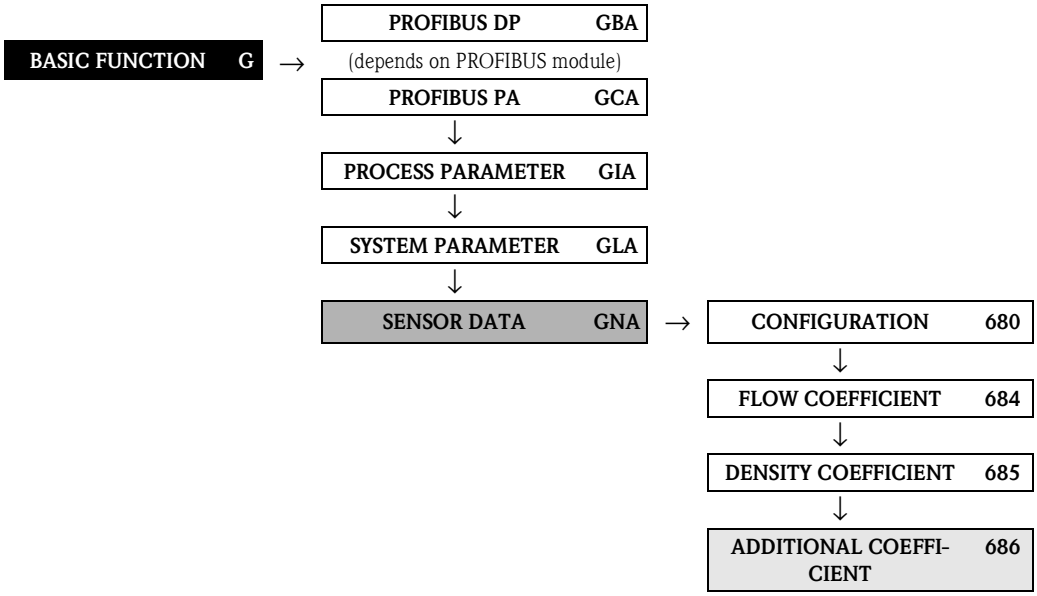
Function description BASIC FUNCTION → SENSOR DATA → FLOW COEFFICIENT	
All flow coefficients are set at the factory. All the sensor's parameter settings are saved on the S-DAT memory chip. Contact the Endress+Hauser service organization if you have any questions about these functions.	
TEMPERATURE COEFFICIENT KM **6840**	This function shows the temperature coefficient KM.
TEMPERATURE COEFFICIENT KM2 **6841**	This function shows the temperature coefficient KM2.
TEMPERATURE COEFFICIENT KT **6842**	This function shows the temperature coefficient KT.
CALIBRATION COEFFICIENT KD 1 **6843**	This function shows the calibration coefficient KD 1.
CALIBRATION COEFFICIENT KD 2 **6844**	This function shows the calibration coefficient KD 2.

8.4.3 Function group DENSITY COEFFICIENT



Function description BASIC FUNCTION → SENSOR DATA → DENSITY COEFFICIENT	
All density coefficients are set at the factory. All the sensor's parameter settings are saved on the S-DAT memory chip. Contact the Endress+Hauser service organization if you have any questions about these functions.	
DENSITY COEFF. C 0 **6850**	This function shows the actual density coefficient C 0. Caution! A density adjustment can alter the calibration value of this coefficient.
DENSITY COEFF. C 1 **6851**	This function shows the actual density coefficient C 1. Caution! A density adjustment can alter the calibration value of this coefficient.
DENSITY COEFF. C 2 **6852**	This function shows the actual density coefficient C 2. Caution! A density adjustment can alter the calibration value of this coefficient.
DENSITY COEFF. C 3 **6853**	This function shows the actual density coefficient C 3. Caution! A density adjustment can alter the calibration value of this coefficient.
DENSITY COEFF. C 4 **6854**	This function shows the actual density coefficient C 4. Caution! A density adjustment can alter the calibration value of this coefficient.
DENSITY COEFF. C 5 **6855**	This function shows the actual density coefficient C 5. Caution! A density adjustment can alter the calibration value of this coefficient.

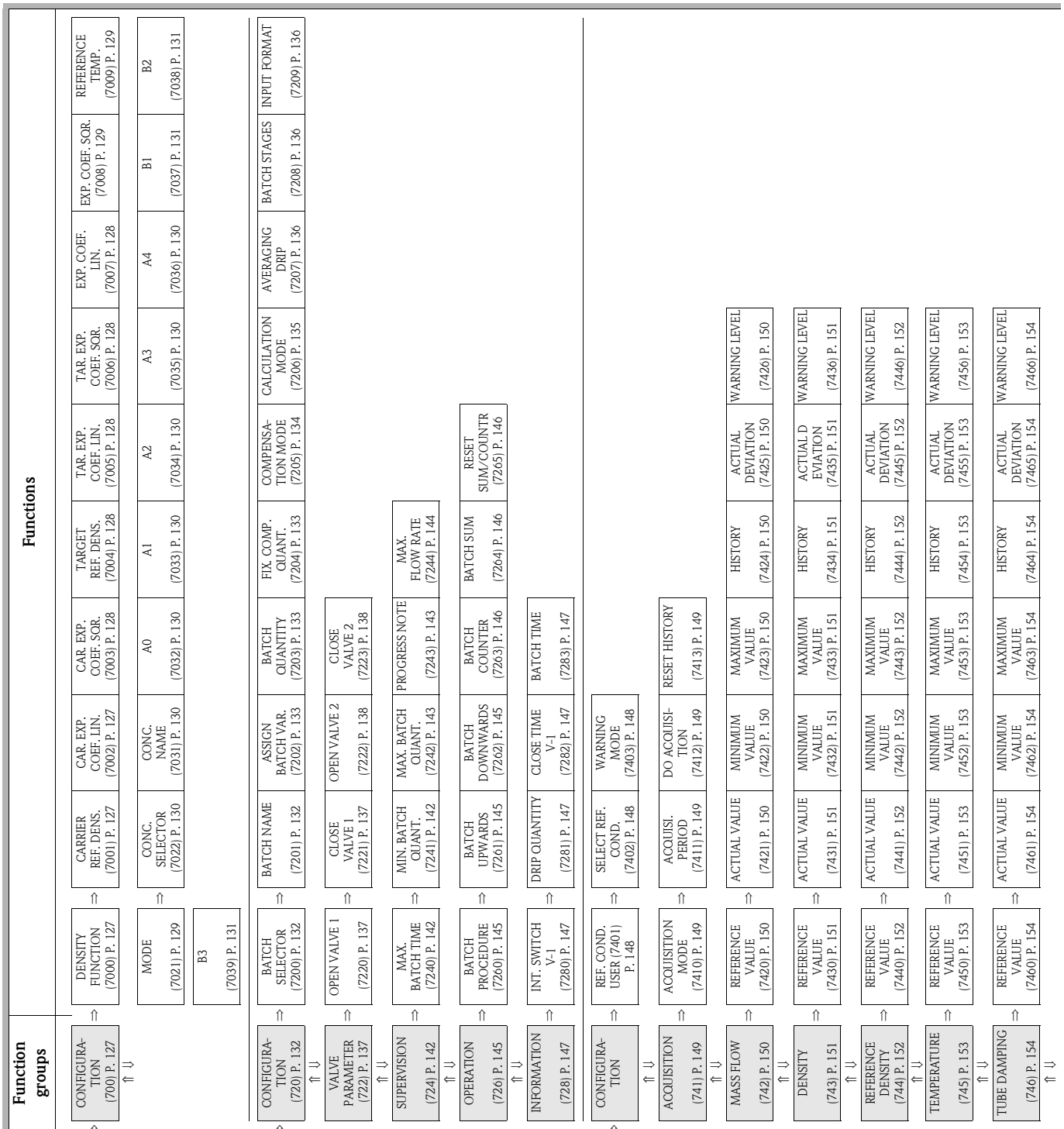
8.4.4 Function group ADDITIONAL COEFFICIENT



Function description BASIC FUNCTION → SENSOR DATA → ADDITIONAL COEFFICIENT	
All sensor data are set at the factory. All the sensor's parameter settings are saved on the S-DAT memory chip. ☝ Caution! These functions are used for displaying device parameters only and consequently cannot be accessed. Contact the Endress+Hauser service organization if you have any questions about these functions.	
MINIMAL TEMPERATURE MEASURED 6860	The lowest fluid temperature measured appears on the display.
MAXIMAL TEMPERATURE MEASURED 6861	The highest fluid temperature measured appears on the display.
MINIMAL TEMPERATURE CARRIER TUBE 6862	✎ Note! This function is not available for the Promass E measuring device. The lowest carrier tube temperature measured appears on the display.
MAXIMAL TEMPERATURE CARRIER TUBE 6863	✎ Note! This function is not available for the Promass E measuring device. The highest carrier tube temperature measured appears on the display.

9 Block SPECIAL FUNCTION

Note!
This block is not available for all measuring devices → Page 8 (Available Blocks, Groups, etc.).



Block
Groups
Function groups
Functions
EL. DYN. SENS. (747) P. 155
FREQU. FLUCTUATION (748) P. 156
TUBE DAMPING FLUCTUATION (749) P. 158
REFERENCE VALUE (7470) P. 155
REFERENCE VALUE (7480) P. 156
REFERENCE VALUE (7490) P. 158
ACTUAL VALUE (7471) P. 155
ACTUAL VALUE (7481) P. 156
ACTUAL VALUE (7491) P. 158
MINIMUM VALUE (7472) P. 155
MINIMUM VALUE (7482) P. 156
MINIMUM VALUE (7492) P. 158
MAXIMUM VALUE (7473) P. 155
MAXIMUM VALUE (7483) P. 156
MAXIMUM VALUE (7493) P. 158
HISTORY (7474) P. 155
HISTORY (7484) P. 156
HISTORY (7494) P. 158
ACTUAL DEVIATION (7475) P. 155
ACTUAL DEVIATION (7485) P. 156
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WARNING LEVEL (7476) P. 155
WARNING LEVEL (7486) P. 157
WARNING LEVEL (7496) P. 159

9.1 Group DENSITY FUNCTION

9.1.1 Functiongroup CONFIGURATION

SPECIAL FUNCTION H → **DENSITY FUNCTION HAA** → **CONFIGURATION 700**

Function description SPECIAL FUNCTION → DENSITY FUNCTION → CONFIGURATION	
DENSITY FUNCTION **7000**	For selecting the density function which is used to calculate special density values or the percentage proportion of components in two-phase fluids. **User input:** OFF % MASS / % VOLUME %-BLACK LIQUOR °BAUME > 1 SG °BAUME < 1 SG ° API ° PLATO ° BALLING ° BRIX FLEXIBLE **Factory setting:** OFF
REFERENCE DENSITY CARRIER FLUID **7001**	✎ Note! Function is not available unless % MASS / % VOLUME or % BLACK-LIQUOR was selected in the DENSITY FUNCTION function (7000). Use this function to enter the reference density (density at reference temp.) of the carrier fluid. This value is required for temperature-compensated calculation of the target fluid content in a two-phase fluid. **User input:** 5-digit floating-point number, including units **Factory setting:** 1.0000 kg/l ✎ Note! ■ Carrier fluid = transporting liquid, (e.g. water) Target fluid = material transported (e.g. lime powder) ■ The appropriate unit is taken from the function UNIT REFERENCE DENSITY (0421) (see Page 18).
EXPANSION COEFFICIENT LINEAR CARRIER FLUID **7002**	✎ Note! Function is not available unless % MASS / % VOLUME or % BLACK-LIQUOR was selected in the DENSITY FUNCTION function (7000). For entering the fluid-specific expansion coefficient for the carrier fluid for linear temperature curves. This value is required for temperature-compensated calculation of the target fluid content in a two-phase fluid. **User input:** 5-digit floating-point number, including unit and sign **Factory setting:** 0.5000 e–3 [1/K]

Function description SPECIAL FUNCTION → DENSITY FUNCTION → CONFIGURATION		
EXPANSION COEFFICIENT SQUARE CARRIER FLUID	**7003**	✎ Note! Function is not available unless % MASS / % VOLUME or % BLACK-LIQUOR was selected in the DENSITY FUNCTION function (7000). For entering the fluid-specific expansion coefficient for the carrier fluid for nonlinear temperature curves. This value is required for temperature-compensated calculation of the target fluid content in a two-phase fluid. **User input:** 5-digit floating-point number, including unit and sign **Factory setting:** 0.0000 e–6 [1/K²]
REFERENCE DENSITY TARGET FLUID	**7004**	✎ Note! Function is not available unless % MASS / % VOLUME or % BLACK-LIQUOR was selected in the DENSITY FUNCTION function (7000). Use this function to enter the reference density (density at reference temp.) of the target fluid. This value is required for temperature-compensated calculation of the target fluid content in a two-phase fluid. **User input:** 5-digit floating-point number, including units **Factory setting:** 1.0000 kg/l ✎ Note! ▪ Carrier fluid = transporting liquid, (e.g. water) Target fluid = material transported (e.g. lime powder) ▪ The appropriate unit is taken from the function UNIT REFERENCE DENSITY (0421) (see Page 18).
EXPANSION COEFFICIENT LINEAR TARGET FLUID	**7005**	✎ Note! Function is not available unless % MASS / % VOLUME or % BLACK-LIQUOR was selected in the DENSITY FUNCTION function (7000). For entering the fluid-specific expansion coefficient for the target fluid for linear temperature curves. This value is required for temperature-compensated calculation of the target fluid content in a two-phase fluid. **User input:** 5-digit floating-point number, including unit and sign **Factory setting:** 0.5000 e–3 [1/K]
EXPANSION COEFFICIENT SQUARE TARGET FLUID	**7006**	✎ Note! Function is not available unless % MASS / % VOLUME or % BLACK-LIQUOR was selected in the DENSITY FUNCTION function (7000). For entering the fluid-specific expansion coefficient for the target fluid for nonlinear temperature curves. This value is required for temperature-compensated calculation of the target fluid content in a two-phase fluid. **User input:** 5-digit floating-point number, including unit and sign **Factory setting:** 0.0000 e–6 [1/K²]
LINEAR EXPANSION COEFFICIENT	**7007**	✎ Note! Function is not available unless °BAUME < 1SG, °BAUME >1SG, °API, °PLATO, °BALLING or °BRIX was selected in the DENSITY FUNCTION function (7000). For entering the fluid-specific expansion coefficient (for linear temperature curves), to calculate the temperature-compensated density functions. **User input:** 5-digit floating-point number, including unit and sign **Factory setting:** 0.5000 e–3 [1/K]

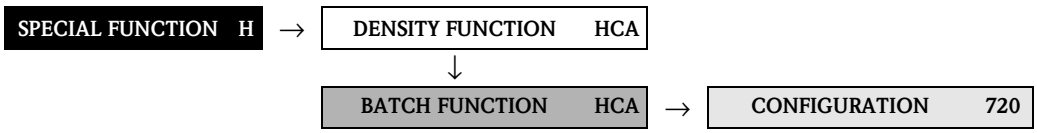
Function description SPECIAL FUNCTION → DENSITY FUNCTION → CONFIGURATION		
SQUARE EXPANSION COEFFICIENT	**7008**	✎ Note! Function is not available unless °BAUME < 1SG, °BAUME >1SG, °API, °PLATO, °BALLING or °BRIX was selected in the DENSITY FUNCTION function (7000). For entering the fluid-specific expansion coefficient (for nonlinear temperature curves), to calculate the temperature-compensated density functions. **User input:** 5-digit floating-point number, including unit and sign **Factory setting:** 0.0000 e–6 [1/K²]
REFERENCE TEMPERATURE	**7009**	✎ Note! Function only available if OFF, °BRIX or FLEXIBLE was **not** selected in the function DENSITY FUNCTION (7000). For entering the reference temperature for the density functions. **User input:** 4-digit fixed-point number, including unit and sign **Factory setting:** 20 °C
MODE	**7021**	✎ Note! Function is not available unless the FLEXIBLE setting was selected in the DENSITY FUNCTION function (7000). Use this function to select a user-specific method of calculating the concentration of the density and temperature measured. In order to use this function, the following values are required: ■ Concentration (see formula) ■ Currently measured density ■ Currently measured temperature The concentration is calculated from the density and temperature as follows: $K = A0 + A1 \cdot \rho + A2 \cdot \rho^2 + A3 \cdot \rho^3 + A4 \cdot \rho^4 + B1 \cdot T + B2 \cdot T^2 + B3 \cdot T^3$ K = Concentration ρ = Currently measured density A0 = Value from function COEFFICIENT A0 (7032) A1 = Value from function COEFFICIENT A1 (7033) A2 = Value from function COEFFICIENT A2 (7034) A3 = Value from function COEFFICIENT A3 (7035) A4 = Value from function COEFFICIENT A4 (7036) B1 = Value from function COEFFICIENT B1 (7037) B2 = Value from function COEFFICIENT B2 (7038) B3 = Value from function COEFFICIENT B3 (7039) T = Currently measured temperature in °C **User input:** % MASS 3D % VOLUME 3D % MASS 2D % VOLUME 2D **Factory setting:** % MASS 3D ✎ Note! If the relation between concentration density and temperature is given as table, the equation coefficients can be determined by Endress+Hauser e.g. via a coefficient calculation program and transmitted to the measuring device.

Function description SPECIAL FUNCTION → DENSITY FUNCTION → CONFIGURATION		
CONCENTRATION SELECTOR	**7022**	For selecting the concentration specification. There are four different specifications available, via which various concentrations can be defined. **Options:** CONC. # 1 CONC. # 2 CONC. # 3 CONC. # 4 **Factory setting:** CONC. # 1 ✎ Note! ■ A specific name can be given to the batching specification (CONC. # 1 to 4) in the CONCENTRATION NAME function (7031). ■ By selecting a concentration specification and the (subsequent) relevant settings, up to 4 different concentrations can be preconfigured and selected when needed. ■ All settings in the subsequent functions of this function group are each only valid for the concentration specification selected in the function CONCENTRATION SELECTOR (7022). In other words, the entry or option is assigned to the concentration specification currently selected (e.g. in the factory setting CONC. # 1).
CONCENTRATION NAME	**7031**	For entering a specific name for the concentration specification selected. **User input:** max. 8-character text, permissible: A-Z, 0-9 **Factory setting:** Name of concentration specification (depends on selection in the function CONCENTRATION SELECTOR (7022), e.g. “CONC. # 1”).
COEFFICIENT A0	**7032**	Coefficient A0 entry. **User input:** 5-digit floating-point number **Factory setting:** 0
COEFFICIENT A1	**7033**	Coefficient A1 entry. **User input:** 5-digit floating-point number **Factory setting:** 0
COEFFICIENT A2	**7034**	Coefficient A2 entry. **User input:** 5-digit floating-point number **Factory setting:** 0
COEFFICIENT A3	**7035**	Coefficient A3 entry. **User input:** 5-digit floating-point number **Factory setting:** 0
COEFFICIENT A4	**7036**	Coefficient A4 entry. **User input:** 5-digit floating-point number **Factory setting:** 0

Function description SPECIAL FUNCTION → DENSITY FUNCTION → CONFIGURATION	
COEFFICIENT B1 **7037**	✎ Note! This function does only appear if the option % MASS 3D, % VOLUME 3D or OTHER 3D was selected in the function MODE (7021). Coefficient B1 entry. **User input:** 5-digit floating-point number **Factory setting:** 0
COEFFICIENT B2 **7038**	✎ Note! This function does only appear if the option % MASS 3D, % VOLUME 3D or OTHER 3D was selected in the function MODE (7021). Coefficient B2 entry. **User input:** 5-digit floating-point number **Factory setting:** 0
COEFFICIENT B3 **7039**	✎ Note! This function does only appear if the option % MASS 3D, % VOLUME 3D or OTHER 3D was selected in the function MODE (7021). Coefficient B3 entry. **User input:** 5-digit floating-point number **Factory setting:** 0

9.2 Group BATCH FUNCTION

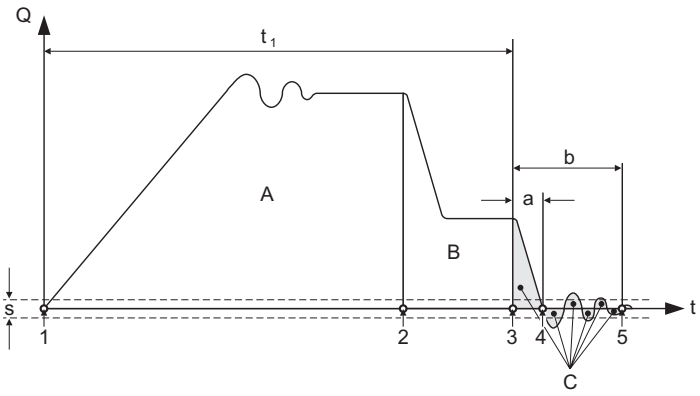
9.2.1 Function group CONFIGURATION



Function description SPECIAL FUNCTION → BATCH FUNCTION → CONFIGURATION (only with PROFIBUS DP)	
BATCH SELECTOR 7200	For selecting the batching specification. There are six different batching specifications available by means of which different batchings can be defined. **Options:** BATCH # 1 BATCH # 2 BATCH # 3 BATCH # 4 BATCH # 5 BATCH # 6 **Factory setting:** BATCH #1 ✎ Note! ■ A specific name can be given to the batching process (BATCH # 1 to 6) in the BATCH NAME function (7201). ■ 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 settings in the subsequent functions of this function group are each only valid for the batching specification selected in the BATCH SELECTOR function (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 BATCH SELECTOR function (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.

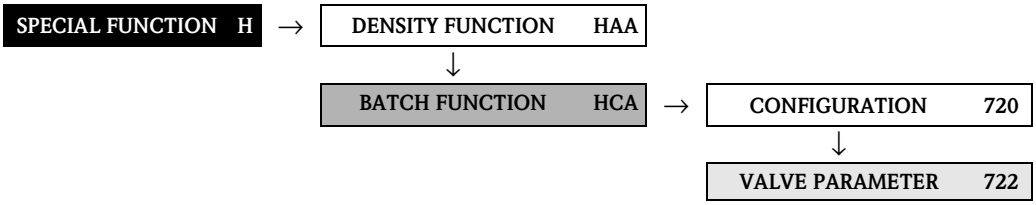
Function description SPECIAL FUNCTION → BATCH FUNCTION → CONFIGURATION (only with PROFIBUS DP)	
ASSIGN BATCH VARIABLE **7202**	Use this function to assign a batching variable to the batching specification. **Options:** OFF MASS FLOW VOLUME FLOW CORRECTED VOLUME FLOW **Advanced selection** (with the optional SW package CONCENTRATION): TARGET MASS FLOW TARGET VOLUME FLOW TARGET CORRECTED VOLUME FLOW CARRIER MASS FLOW CARRIER VOLUME FLOW CARRIER CORRECTED VOLUME 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 **Factory setting:** 0 [unit] ✎ Note! ■ The appropriate unit is taken from the function group SYSTEM UNITS (see Page 15). ■ When the batching quantity entered here is achieved, valve 1 closes (see function CLOSE VALVE 1 (7221) on Page 137).
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 overrunning 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:** ±10% of the batch quantity **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 (see Page 15).

Function description SPECIAL FUNCTION → BATCH FUNCTION → CONFIGURATION (only with PROFIBUS DP)	
COMPENSATION MODE **7205**	Use this function to determine whether the after run quantity or a fixed compensation quantity should be taken into account at the next batching. **Options:** OFF MODE 1 MODE 2 **Factory setting:** OFF ✎ Note! The pressure shock suppression must be switched off if MODE 1 or MODE 2 is selected in this function (see Function PRESSURE SHOCK SUPPRESSION on Page 112). **Detailed explanations and information** When batching using the optional software package BATCHING, process-related variable after run quantities or incorrect quantities can be determined and balanced out (by computer) by means of various functions. This ensures a high level of accuracy throughout the entire batching range. ■ Response when OFF is selected: The batching ends as soon as the quantity specified in the function BATCH QUANTITY (7203) has been achieved. If after running occurs, this is not recorded and is not taken into consideration during the next batching. In this way, in the event of process-related after running, the effective batched quantity is generally larger than the batching quantity specified. ■ Response when MODE 1 is selected: For short batchings and for batching cycles that follow on quickly from one other. Batching ends before the quantity specified in the function BATCH QUANTITY (7203) is achieved and the after run quantity is recorded. The exact batching switch-off time is calculated based on the previous after run quantities. The number of after run quantities which are to influence the calculation can be specified in the functions AVERAGING DRIP (7207) and CALCULATION MODE (7206). The after run quantity in MODE 1 is determined between the switch-off point and the **first** undershooting of the low flow cut off. Any subsequent fluid movements are not taken into account. ■ Response when MODE 2 is selected: For batchings where batching accuracy is vital and where process-related fluctuations in flow occur during after running. Batching ends before the quantity specified in the function BATCH QUANTITY (7203) is achieved and the after run quantity is recorded. The exact batching switch-off time is calculated based on the previous after run quantities. The number of after run quantities which are to influence the calculation can be specified in the functions AVERAGING DRIP (7207) and CALCULATION MODE (7206). The after run quantity in MODE 2 is determined between the switch-off point and the **constant** undershooting of the low-flow cut off. This means that the lower the setting is for the low-flow cut off, the longer the after run quantity is recorded. The batching is very accurate. (continued on next page)

Function description SPECIAL FUNCTION → BATCH FUNCTION → CONFIGURATION (only with PROFIBUS DP)	
COMPENSATION MODE **7205** (continued)	 *Fig. 36 : Example diagram of a batching sequence and the respective response in MODE 1 and MODE 2* *Q = Flow* *t = Time* *t_1 = Time period shorter than or equal to the maximum batching time* *A = Coarse batching quantity* *B = Fine batching quantity* *C = After run quantity* *(Effective batching quantity = A + B + C)* *1 = Coarse batching starts and valve 2 opens (two-stage batching)* *2 = Coarse batching ends / fine batching starts, valve 2 closes, valve 1 opens* *3 = Fine batching ends, valve 1 closes (automatically when the specified batching quantity is achieved)* *4 = After run quantity recording in MODE 1 ends* *5 = After run quantity recording in MODE 2 ends* *a = After run quantity recorded in MODE 1* *b = After run quantity recorded in MODE 2* *s = Low flow cut off*
CALCULATION MODE **7206**	✎ Note! Function is only available if MODE 1 or MODE 2 is selected in the function COMPENSATION MODE (7205). For selecting the method for calculating the recorded after run quantities. **Options:** ALL All after run quantities are used in the calculation. SELECTION The after run quantities recorded are filtered. The smallest and largest after run quantity are not taken into account in the calculation (extreme value filter). **Factory setting:** ALL ✎ Note! Machine-related (larger) “extreme values”, occurring especially at startup, delay correction and distort real reproducibility. By selecting “SELECT”, these “extreme values” are not taken into account. **Example:** Function CALCULATION MODE (7206) = SELECTION Function AVERAGING DRIP (7207) = 5 From five after run quantities recorded, the largest and smallest are not used. From the remaining three after run quantities, an average after run quantity is calculated which is taken into account at the next batching.

Function description SPECIAL FUNCTION → BATCH FUNCTION → CONFIGURATION (only with PROFIBUS DP)	
AVERAGING DRIP 7207	✎ Note! Function is only available if MODE 1 or MODE 2 is selected in the function COMPENSATION MODE (7205). For specifying the number of after run quantities (cycles) which are included in calculating the batching compensation mode, MODE 1 or MODE 2. ✎ Note! The value entered in this function influences the measuring system reaction time. If you specify: ■ a small calculation depth (low value entered) = measuring system reacts quickly to differing amount of after run quantities. ■ a large calculation depth (high value entered) = measuring system reacts slowly to changing after run quantities. **User input:** 0 to 100 **Factory setting:**: 0 [cycles]
BATCH STAGES 7208	For selecting 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 137) 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 137) and SUPERVISION (Page 142).

9.2.2 Function group VALVE PARAMETER



Function description SPECIAL FUNCTION → BATCH 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 batching specification has been selected in the BATCH SELECTOR function (7200).	
OPEN VALVE 1 7220	For specifying 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 in the function INPUT FORMAT (7209). **User input:** 0 to max. value or 0 to 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 kg for a batching quantity of 10 kg). 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	Displays 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 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 133). In this way, function CLOSE VALVE 1 (7221) is also the basis for calculating the after run quantity.

Function description SPECIAL FUNCTION → BATCH FUNCTION → VALVE PARAMETER (only with PROFIBUS DP)	
OPEN VALVE 2 **7222**	For specifying 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 in the function INPUT FORMAT (7209). **User input:** 0 to max. value or 0 to 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 the batching quantity of 10 kg = 7 kg). If the BATCH QUANTITY (7203) is adjusted (reduced/increased), the effective quantity switch point is automatically and dynamically adjusted (e.g. at 70% and a new batching quantity changing from 10 to 20 kg, the quantity switch point is adjusted from 7 kg to 14 kg). ■ 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 kg for a batching quantity of 10 kg). If the BATCH 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**	For specifying 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 in the function INPUT FORMAT (7209). **Display:** Value or 100% (corresponds 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 kg for a batching quantity of 10 kg). If the BATCH 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.

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

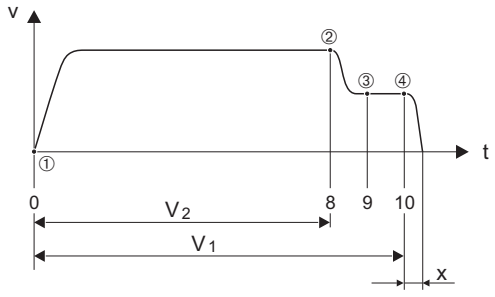


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Fig. 37 : Example 1
v = Flow velocity [m/s]
t = Time
V_1 = Valve 1 open
V_2 = Valve 2 open
① = Start batching/coarse batching, valves 1 (7220) and 2 (7222) open
② = Valve 2 (7223) closes, coarse batching quantity achieved
③ = Batching progress message (7243)
④= Valve 1 closes (7221), batching ends
x = After run quantity

The following parameter settings must be made:

– Select the unit for batching: Function UNIT MASS (0401) Page 15 = kg (kilogram)
– Select the measured variable for batching:
Function ASSIGN BATCH VARIABLE (7202) Page 133 = MASS FLOW
– Enter the batching quantity:
Function BATCH QUANTITY (7203) Page 133 = 10 [kg]
– Select the entry format:
Function BATCH STAGES (7208) Page 136 = 2-stage
– Select the entry format:
Function INPUT FORMAT (7209) Page 136 = VALUE-INPUT
– Quantity data for when the first valve should open:
Function OPEN VALVE 1 (7220) Page 137 = 0 [kg]
(valve 1 closes automatically when the batching quantity is achieved = 10 [kg], display in function CLOSE VALVE 1 (7221) Page 137)
– Quantity data for when the second valve should open:
Function OPEN VALVE 2 (7222) Page 138 = 0 [kg]
– Quantity data for when the second valve should close:
Function CLOSE VALVE 2 (7223) Page 138 = 8 [kg]
– Quantity data for when the message should be generated:
Function PROGRESS NOTE (7243) Page 143 = 9 [kg]

Example 1 a

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

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

– Enter the new batching quantity:
  Function BATCH QUANTITY (7203) Page 133 = 20 [kg]
– New quantity data for when the message should be generated:
  Function PROGRESS NOTE (7243) Page 143 = 18 [kg]

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

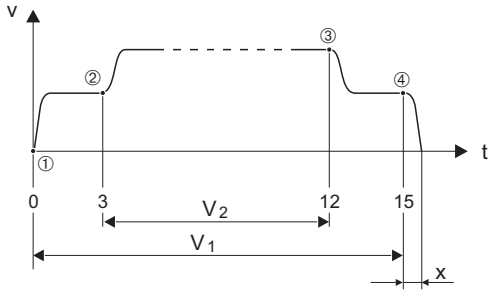
– Function OPEN VALVE 1 (7220) Page 137 = 0 [kg]
– Function OPEN VALVE 2 (7222) Page 138 = 0 [kg]
– Function CLOSE VALVE 2 (7223) Page 138 = 16 [kg]

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



A0004684

Fig. 38 : Example 2
v = Flow velocity [m/s]
t = Time
V_1 = Valve 1 open
V_2 = 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

The following parameter settings must be made:

– Select the unit for batching: Function UNIT MASS (0401) Page 15 = kg (kilogram)
– Select the measured variable for batching:
  Function ASSIGN BATCH VARIABLE (7202) Page 133 = MASS FLOW
– Enter the batching quantity: Function BATCH QUANTITY (7203) Page 133 = 15 [kg]
– Select the entry format: Function BATCH STAGES (7208) Page 136 = 2-stage
– Select the entry format:
  Function INPUT FORMAT (7209) Page 136 = %-INPUT
– Percentage data for when the first valve should open:
  Function OPEN VALVE 1 (7220) Page 137 = 0 [%]
  (Valve 1 closes automatically when the batching quantity is achieved = 15 [kg], display in function CLOSE VALVE 1 (7221) Page 137)
– Percentage data for when the second valve should open:
  Function OPEN VALVE 2 (7222) Page 138 = 20 [%] corresponds to 3 kg
– Percentage data for when the second valve should close:
  Function CLOSE VALVE 2 (7223) Page 138 = 80 [%] corresponds to 12 kg

Example 2 a

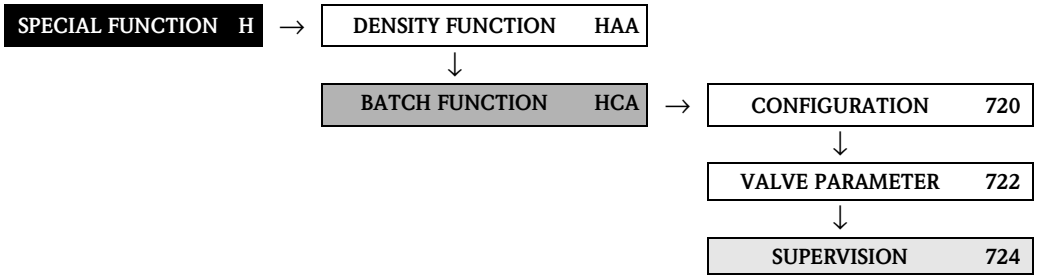
Batching specifications identical to those in example 1, however the new batching quantity is 45 kg.
The following parameters must be set **manually**:

Enter the new batching quantity:
Function BATCH QUANTITY (7203) Page 133 = 45 [kg]

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

- Function OPEN VALVE 1 (7220) Page 137 = 0 [%]
- Function OPEN VALVE 2 (7222) Page 138 = 20 [%] corresponds to 9 kg.
- Function CLOSE VALVE 2 (7223) Page 138 = 80 [%] corresponds to 36 kg.

9.2.4 Function group SUPERVISION

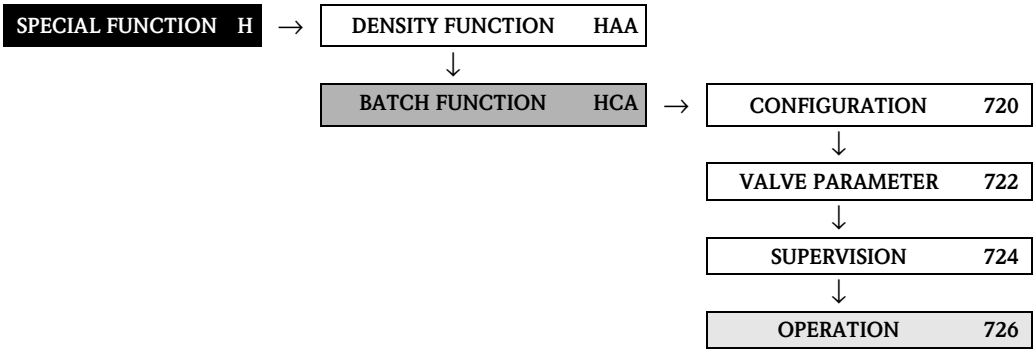


Function description SPECIAL FUNCTION → BATCH FUNCTION → SUPERVISION (only with PROFIBUS DP)	
MAXIMUM BATCHING TIME **7240**	For specifying a maximum batching time. All valves close once the specified batching time elapses, (see function CLOSE VALVE 1 (7221), Page 137 and CLOSE VALVE 2 (7223), Page 138). 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 to 30000 s **Factory setting:** 0 s (= deactivated) ☝ Caution! ■ When the batching quantity is adjusted (reduced/increased), (see function BATCH QUANTITY (7203) on Page 133) there is no automatic adjustment, i.e. this value must be determined again and reentered, (see also fault message # 471 in the Operating Instructions BA107D). ■ 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.
MINIMUM BATCHING QUANTITY **7241**	For specifying 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 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 to max. value or 0 to 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 133) there is no automatic adjustment, i.e. this value must be determined again and reentered, (see also fault message # 472 in the Operating Instructions BA107D). ■ Batching (START) is not possible when the fault message is active! ■ The function is not active if you enter 0 (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 → BATCH FUNCTION → SUPERVISION (only with PROFIBUS DP)	
MAXIMUM BATCHING QUANTITY **7242**	For specifying 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 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 to 2 x max. value or 0 to 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 133) there is no automatic adjustment, i.e. this value must be determined again and reentered, (see also fault message # 472 in the Operating Instructions BA107D). ■ Batching (START) is not possible when the fault message is active! ✎ Note! ■ The function is not active if you enter 0 (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**	For specifying the batching quantity at which a message should be generated. When the specified batching quantity is achieved, the message is generated and signaled via the output. The quantity value is entered as a % or as an absolute value, depending on the option 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 to max. value or 0 to 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 133), there is no automatic adjustment, i.e. this value must be determined again and reentered, (see also notice message # 473 in the Operating Instructions BA107D). ✎ 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 → BATCH FUNCTION → SUPERVISION (only with PROFIBUS DP)	
MAX. FLOW RATE 7244	For specifying a maximum flow value. The batching process is aborted and all the valves are closed if the specified flow value is overshot. **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 parameter ASSIGN BATCH VARIABLE (7202) and the unit configured in the group SYSTEM UNITS. ■ The function is not active if you enter 0 (factory setting). ■ If the batching process is aborted because the specified flow value was overshot, the parameter BATCH COUNTER (7263) is not incremented. ■ The error message #474 > MAX. FLOW is output if the maximum flow is overshot. This fault message can be acknowledged prematurely: – By modifying a batching function. – By selecting RESET in the “BATCH PROCEDURE” parameter – via PROFIBUS communication

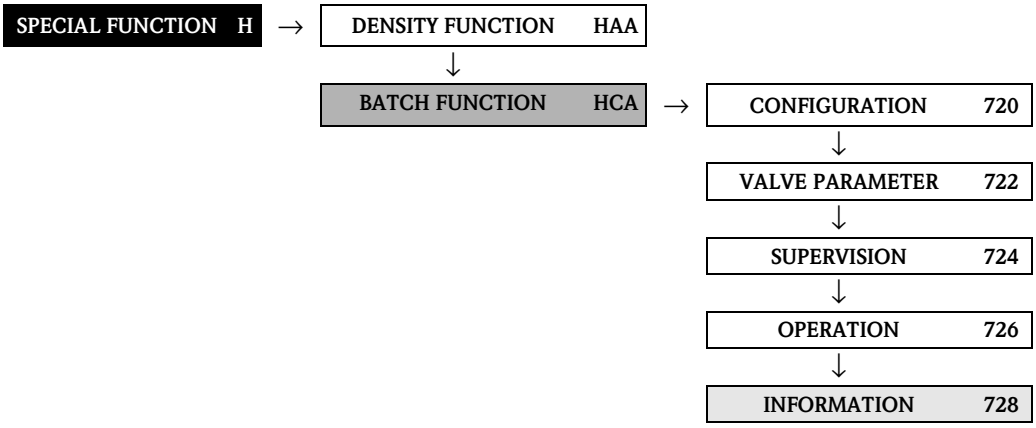
9.2.5 Function group OPERATION



Function description SPECIAL FUNCTION → BATCH FUNCTION → OPERATION (only with PROFIBUS DP)	
BATCH PROCEDURE **7260**	For controlling the 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) RESET (Reset error message # 471, # 472, # 473, # 474) **Factory setting:** STOP ✎ Note! ■ This function can also be controlled via the status input, (see function ASSIGN STATUS INPUT (5000) on Page 98) or PROFIBUS communication. ■ If the information line has been assigned to BATCHING MENU (see Page 47), 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 canceled (STOP) and the local display alternates between displaying the batching menu and the fault message. ■ If the positive zero return is activated: – during the batching process, the batching is canceled (STOP). – during a pause in the batching (option HOLD), the batching cannot be restarted, (see also notice messages # 571 and # 572 in the Operating Instructions BA107D, “Troubleshooting” section).
BATCH UPWARDS **7261**	In this function the batching progress can be read upwards, i.e. **starting at 0** the quantity displayed increases until the batching process is complete or until the quantity specified in the BATCH QUANTITY function (7203) is achieved. **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 → BATCH FUNCTION → OPERATION (only with PROFIBUS DP)	
BATCH COUNTER **7263**	Displays 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**	Displays the effective overall total of all the batchings carried out. **Display:** max. 7-digit floating-point number [unit] **Factory setting:** 0 [unit] ✎ Note! ■ E.g. in 2-stage batching the effective overall total is calculated from the coarse batching quantity, fine batching quantity and after run 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**	Resets the batching quantity counter and the total batching quantity to 0. **Options:** 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 PROFIBUS communication.

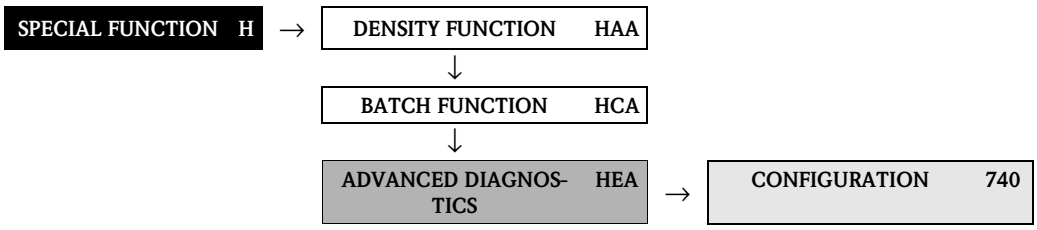
9.2.6 Function group INFORMATION



Function description SPECIAL FUNCTION → BATCH FUNCTION → INFORMATION (only with PROFIBUS DP)	
VALVE 1 INTERNAL SWITCH POINT **7280**	Displays the **internal** switch point of valve 1 (see Function CLOSE VALVE 1 on Page 137). The value displayed takes the fixed correction quantity and / or the calculated after run quantity into account. **Display:** max. 7-digit floating-point number [unit] ✎ Note! The appropriate unit is taken from the function group SYSTEM UNITS (see Page 15).
DRIP QUANTITY **7281**	Displays the after run calculated (averaged) **internally**. The value displayed can be overwritten in this function and the after run can thus be adjusted. The after run quantity is used to optimize the internal switch point of valve 1. **User input:** max. 7-digit floating-point number [unit] ✎ Note! ■ The after run, entered in this function, is only used for the first batching process. For the second and following batching processes, the internally calculated after run will be used again. ■ The appropriate unit is taken from the function group SYSTEM UNITS (ACA), (see Page 15).
VALVE 1 CLOSING TIME **7282**	Displays the valve closing time calculated **internally**. **Display:** max. 7-digit floating-point number [unit] ✎ 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.
BATCH 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 function BATCH SUM for the current or last batch process. **Display:** max. 7-digit floating-point number [s] ✎ 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

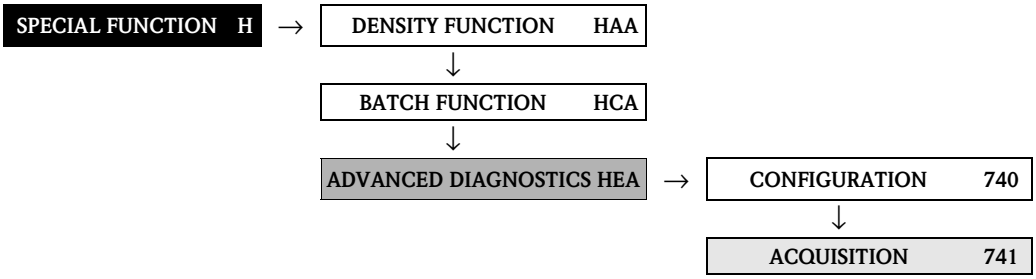
9.3 Group ADVANCED DIAGNOSTICS

9.3.1 Function group CONFIGURATION



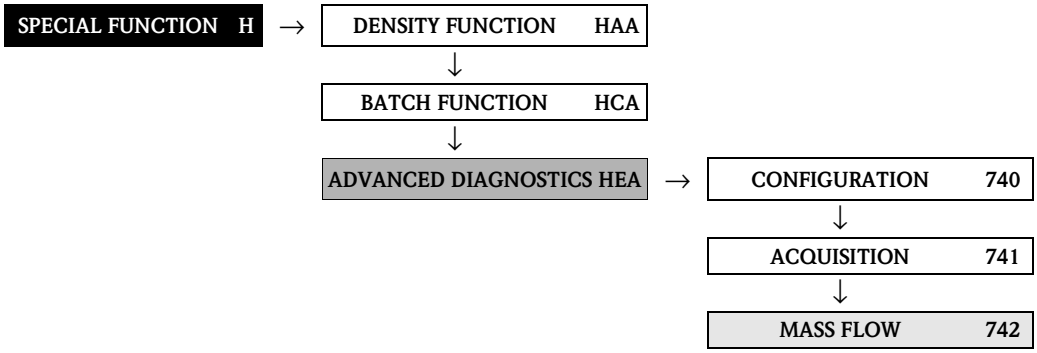
Function description SPECIAL FUNCTION → ADVANCED DIAGNOSTICS → CONFIGURATION	
REFERENCE CONDITION USER **7401**	Use this function to start determining the user reference status. The following values are determined: ■ MASS FLOW ■ DENSITY ■ REFERENCE DENSITY ■ TEMPERATURE ■ TUBE DAMPING ■ ELECTRODYNAMIC SENSORS ■ FREQU. FLUCTUATION ■ TUBE DAMPING FLUCTUATION **Options:** CANCEL START **Factory setting:** CANCEL
SELECT REFERENCE CONDITION **7402**	Use this function to select the reference status which should be used to compare the advanced diagnostics parameters (see function ACQUISITION MODE (7410) on Page 149). **Options:** FACTORY USER **Factory setting:** FACTORY
WARNING MODE **7403**	Use this function to determine whether a warning should be generated when there is a deviation between the reference status (FACTORY or USER, see function SELECT REFERENCE CONDITION, 7402) and the current measuring values. The values of the following functions are compared to the reference status: ■ Mass flow, function ACTUAL VALUE (7421) ■ Density, function ACTUAL VALUE (7431) ■ Reference density, function ACTUAL VALUE (7441) ■ Temperature, function ACTUAL VALUE (7451) ■ Tube damping, function ACTUAL VALUE (7461) ■ Electrodynamic sensor, function ACTUAL VALUE (7471) ■ Operating frequency fluctuation, ACTUAL VALUE function (7481) ■ Tube damping fluctuation, ACTUAL VALUE function (7491) **Options:** OFF ON **Factory setting:** OFF

9.3.2 Function group ACQUISITION



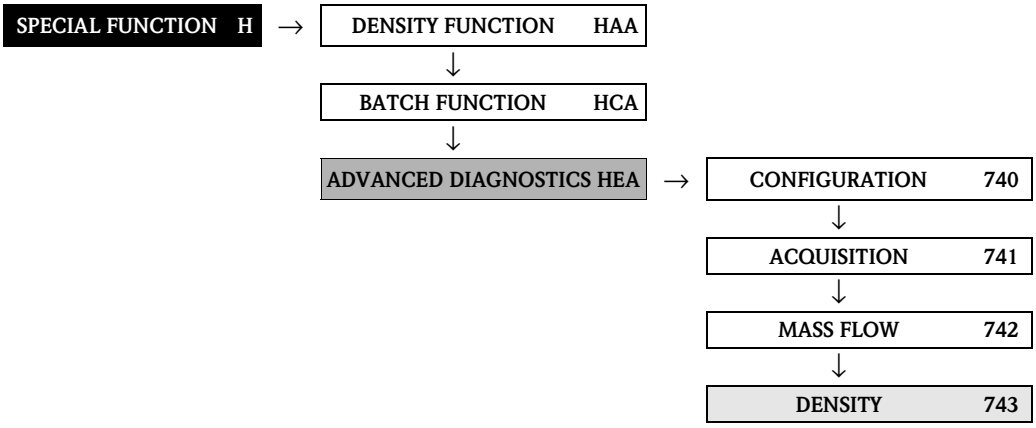
Function description SPECIAL FUNCTION → ADVANCED DIAGNOSTICS → ACQUISITION	
ACQUISITION MODE **7410**	Use this function to specify whether the advanced diagnostics parameters should be determined on a periodical or single-shot basis. **Options:** OFF PERIODICAL SINGLE SHOT **Factory setting:** OFF ✎ Note! See the Chapter on "Commissioning" in the Operating Instructions BA107D for more information on advanced diagnostics.
ACQUISITION PERIOD **7411**	✎ Note! Function is not available unless PERIODICAL was selected in the ACQUISITION MODE function (7410). Use this function to specify the time interval after which the advanced diagnostics parameters should be taken. The time interval starts with the confirmation of the input. **User input:** 0 to 99999 s **Factory setting:** 3600 s ✎ Note! A reference status must be defined prior to determining the diagnostics parameters, see function SELECT REFERENCE CONDITION (7402).
DO ACQUISITION **7412**	✎ Note! Function is not available unless SINGLE SHOT was selected in the ACQUISITION MODE function (7410). Use this function to start determining the advanced diagnostics parameters on a single-shot basis. **User input:** CANCEL START **Factory setting:** CANCEL ✎ Note! A reference status must be defined prior to determining the diagnostics parameters, see function SELECT REFERENCE CONDITION (7402).
RESET HISTORY **7413**	Use this function to delete all history values. **User input:** NO YES **Factory setting:** NO

9.3.3 Function group MASS FLOW



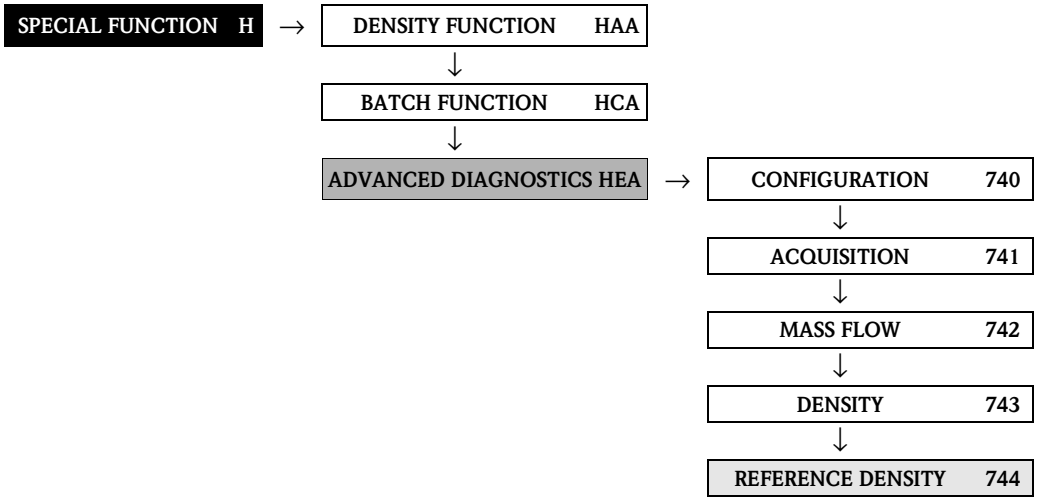
Function description SPECIAL FUNCTION → ADVANCED DIAGNOSTICS → MASS FLOW	
✎ Note! The appropriate unit is taken from the function UNIT MASS FLOW (0400), (see Page 15).	
REFERENCE VALUE 7420	The reference value for the mass flow appears on the display. **Display:** 5-digit floating-point number, including unit and sign
ACTUAL VALUE 7421	The measured mass flow appears on the display. **Display:** 5-digit floating-point number, including unit and sign
MINIMUM VALUE 7422	The lowest mass flow value since the saved values were last reset appears on the display. **Display:** 5-digit floating-point number, including unit and sign
MAXIMUM VALUE 7423	The highest mass flow value since the saved values were last reset appears on the display. **Display:** 5-digit floating-point number, including unit and sign
HISTORY 7424	The last ten mass flow values since the saved values were last reset appear on the display. **Display:** 5-digit floating-point number, including unit and sign
ACTUAL DEVIATION 7425	This function displays deviation between the measured mass flow and the reference values (FACTORY or USER), see Page 148, selected in the function SELECT REFERENCE CONDITION (7402). **Display:** 5-digit floating-point number, including unit and sign
WARNING LEVEL 7426	✎ Note! Function is not available unless ON was selected in the WARNING MODE function (7403). Use this function to specify a limit value for the mass flow. A notice message is generated if the limit value is exceeded. **User input:** 0 to 99999 [Mass flow unit] **Factory setting:** 90000 kg/h

9.3.4 Function group DENSITY



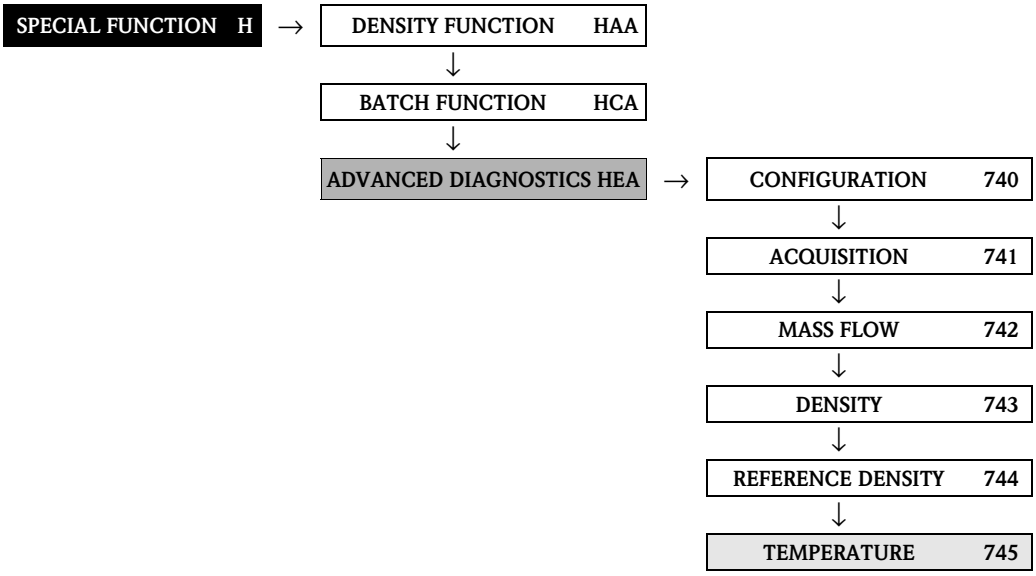
Function description SPECIAL FUNCTION → ADVANCED DIAGNOSTICS → DENSITY	
✎ Note! The appropriate unit is taken from the function UNIT DENSITY (0420), (see Page 18).	
REFERENCE VALUE **7430**	The reference value for the density appears on the display. **Display:** 5-digit floating-point number, including units
ACTUAL VALUE **7431**	The measured density appears on the display. **Display:** 5-digit floating-point number, including units
MINIMUM VALUE **7432**	The lowest density value since the saved values were last reset appears on the display. **Display:** 5-digit floating-point number, including units
MAXIMUM VALUE **7433**	The highest density value since the saved values were last reset appears on the display. **Display:** 5-digit floating-point number, including units
HISTORY **7434**	The last ten density values since the saved values were last reset appear on the display. **Display:** 5-digit floating-point number, including units
ACTUAL DEVIATION **7435**	This function displays the deviation between the measured density and the reference values (FACTORY or USER), see Page 148, selected in the function SELECT REFERENCE CONDITION (7402). **Display:** 5-digit floating-point number, including units
WARNING LEVEL **7436**	✎ Note! Function is not available unless ON was selected in the WARNING MODE function (7403). Use this function to specify a limit value for the density. A notice message is generated if the limit value is exceeded. **User input:** 0 to 99999 [%] **Factory setting:** 100%

9.3.5 Function group REFERENCE DENSITY



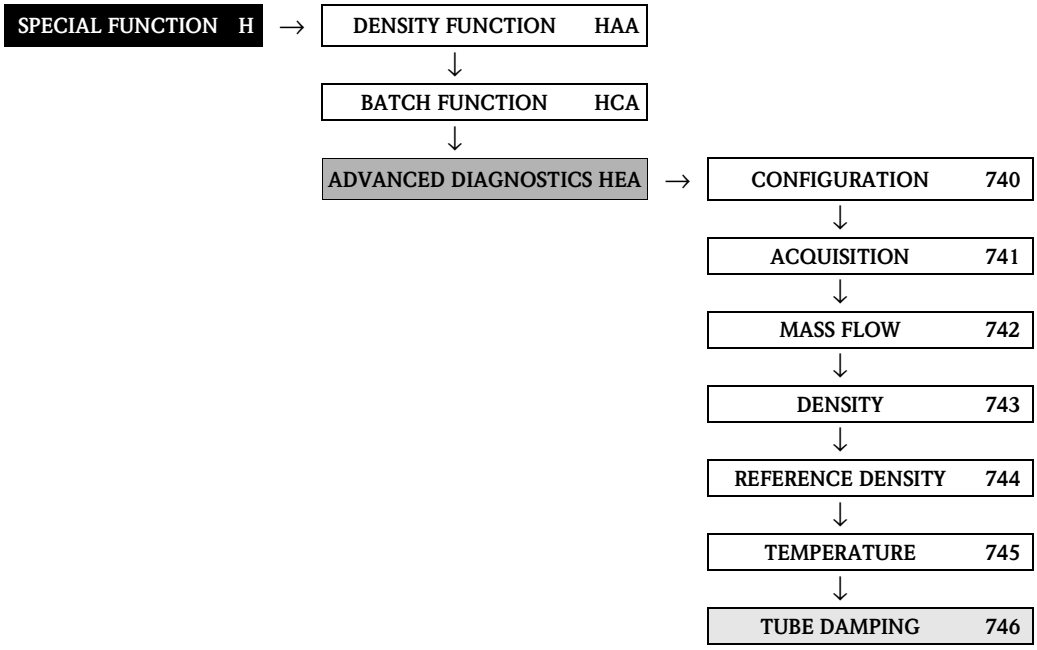
Function description SPECIAL FUNCTION → ADVANCED DIAGNOSTICS → REFERENCE DENSITY	
✎ Note! The appropriate unit is taken from the function UNIT REFERENCE DENSITY (0421) (Page 18).	
REFERENCE VALUE 7440	The reference value for the reference density appears on the display. **Display:** 5-digit floating-point number, including units
ACTUAL VALUE 7441	The measured reference density appears on the display. **Display:** 5-digit floating-point number, including units
MINIMUM VALUE 7442	The lowest reference density value since the saved values were last reset appears on the display. **Display:** 5-digit floating-point number, including units
MAXIMUM VALUE 7443	The highest reference density value since the saved values were last reset appears on the display. **Display:** 5-digit floating-point number, including units
HISTORY 7444	The last ten reference density values since the saved values were last reset appear on the display. **Display:** 5-digit floating-point number, including units
ACTUAL DEVIATION 7445	This function displays the deviation between the measured reference density and the reference values (FACTORY or USER), seePage 148, selected in the function SELECT REFERENCE CONDITION (7402). **Display:** 5-digit floating-point number, including units
WARNING LEVEL 7446	✎ Note! Function is not available unless ON was selected in the WARNING MODE function (7403). Use this function to specify a limit value for the reference density. A notice message is generated if the limit value is exceeded. **User input:** 0 to 99999 [%] **Factory setting:** 100%

9.3.6 Function group TEMPERATURE



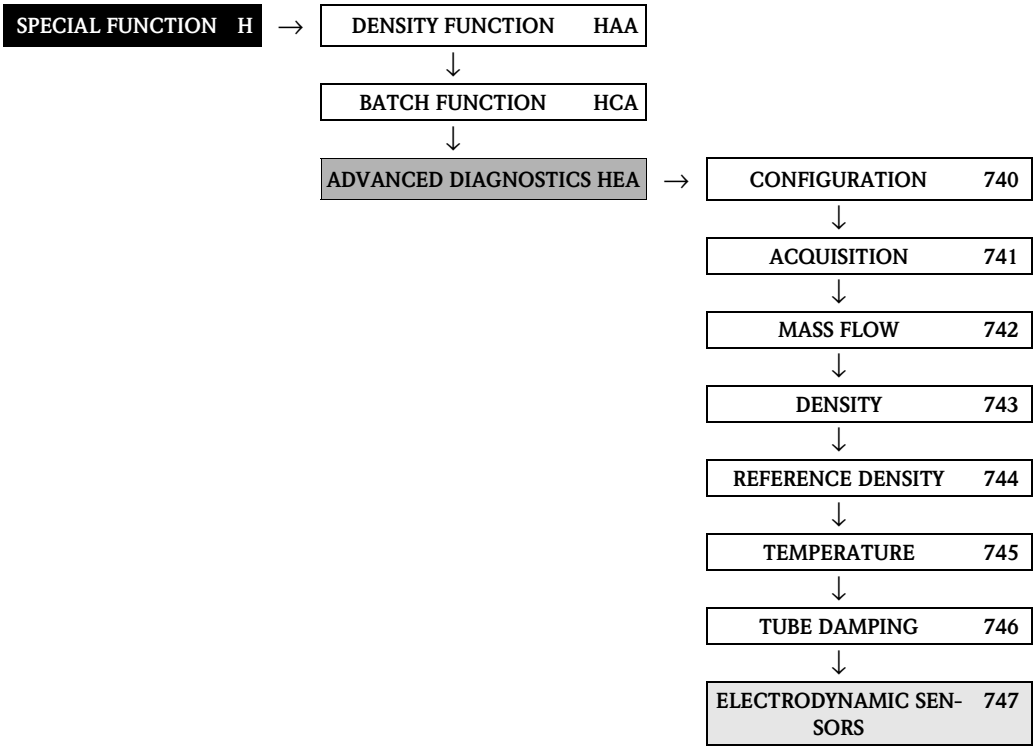
Function description SPECIAL FUNCTION → ADVANCED DIAGNOSTICS → TEMPERATURE	
✎ Note! The appropriate unit is taken from the function UNIT TEMPERATURE (0422), (see Page 18).	
REFERENCE VALUE **7450**	The reference value for the temperature appears on the display. **Display:** 5-digit floating-point number, including units
ACTUAL VALUE **7451**	The currently measured temperature appears on the display. **Display:** 5-digit floating-point number, including units
MINIMUM VALUE **7452**	The lowest temperature value since the saved values were last reset appears on the display. **Display:** 5-digit floating-point number, including units
MAXIMUM VALUE **7453**	The highest temperature value since the saved values were last reset appears on the display. **Display:** 5-digit floating-point number, including units
HISTORY **7454**	The last ten temperature values since the saved values were last reset appear on the display. **Display:** 5-digit floating-point number, including units
ACTUAL DEVIATION **7455**	This function displays the deviation between the currently measured temperature and the reference values (FACTORY or USER), see Page 148, selected in the function SELECT REFERENCE CONDITION (7402). **Display:** 5-digit floating-point number, including units
WARNING LEVEL **7456**	✎ Note! Function is not available unless ON was selected in the WARNING MODE function (7403). Use this function to specify a limit value for the temperature. A notice message is generated if the limit value is exceeded. **User input:** 0 to 99999 [°C] **Factory setting:** 100 °C

9.3.7 Function group TUBE DAMPING



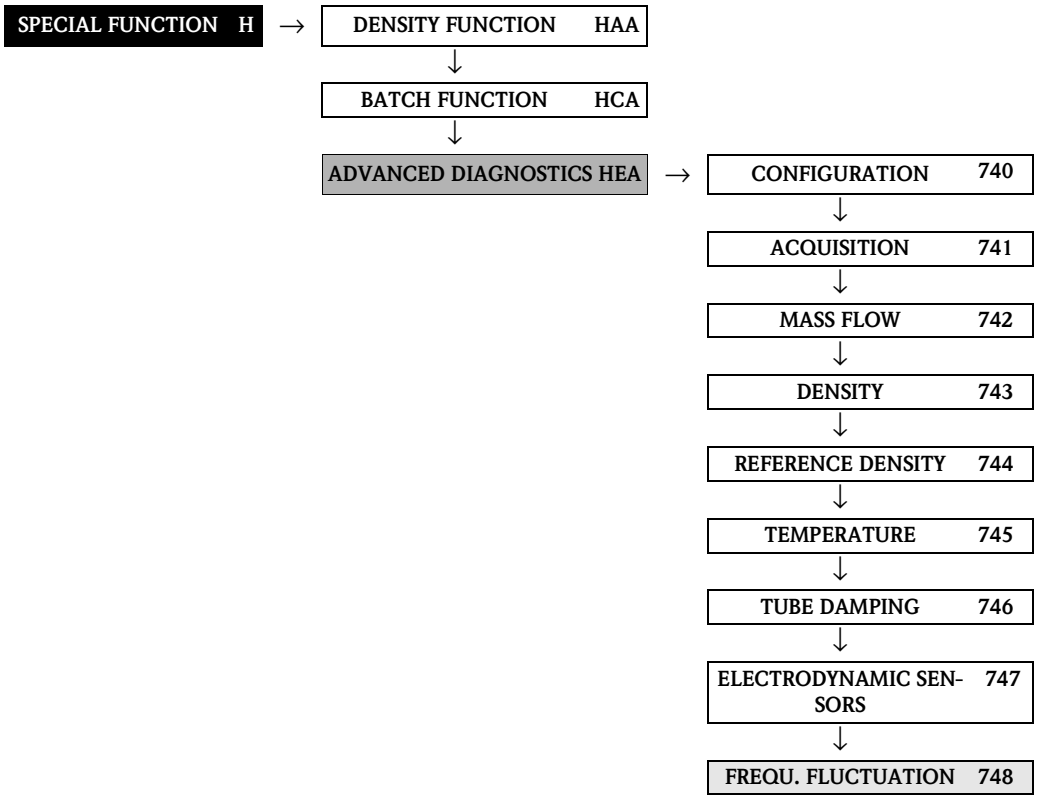
Function description SPECIAL FUNCTION → ADVANCED DIAGNOSTICS → TUBE DAMPING	
REFERENCE VALUE 7460	The reference value for tube damping appears on the display. **Display:** 5-digit floating-point number
ACTUAL VALUE 7461	The measured tube damping appears on the display. **Display:** 5-digit floating-point number
MINIMUM VALUE 7462	The lowest tube damping value since the saved values were last reset appears on the display. **Display:** 5-digit floating-point number
MAXIMUM VALUE 7463	The highest tube damping value since the saved values were last reset appears on the display. **Display:** 5-digit floating-point number
HISTORY 7464	The last ten tube damping values since the saved values were last reset appears on the display. **Display:** 5-digit floating-point number
ACTUAL DEVIATION 7465	This function displays the deviation between the measured tube damping and the reference values (FACTORY or USER), see Page 148, selected in the function SELECT REFERENCE CONDITION (7402). **Display:** 5-digit floating-point number
WARNING LEVEL 7466	✎ Note! Function is not available unless ON was selected in the WARNING MODE function (7403). Use this function to specify a limit value for tube damping. A notice message is generated if the limit value is exceeded. **User input:** 0 to 99999 [%] **Factory setting:** 1000%

9.3.8 Function group ELECTRODYNAMIC SENSORS



Function description SPECIAL FUNCTION → ADVANCED DIAGNOSTICS → ELECTRODYNAMIC SENSORS	
REFERENCE VALUE 7470	The reference value for the electrodynamic sensors appears on the display. **Display:** 5-digit floating-point number
ACTUAL VALUE 7471	The measuring values for the electrodynamic sensors appear on the display. **Display:** 5-digit floating-point number
MINIMUM VALUE 7472	The lowest value of the electrodynamic sensors since the saved values were last reset appears on the display. **Display:** 5-digit floating-point number
MAXIMUM VALUE 7473	The highest value of the electrodynamic sensors since the saved values were last reset appears on the display. **Display:** 5-digit floating-point number
HISTORY 7474	The last ten values of the electrodynamic sensors since the saved values were last reset appear on the display. **Display:** 5-digit floating-point number
ACTUAL DEVIATION 7475	This function displays the deviation between the measuring values for the electrodynamic sensors and the reference values (FACTORY or USER), see Page 148, selected in the function SELECT REFERENCE CONDITION (7402) is displayed. **Display:** 5-digit floating-point number
WARNING LEVEL 7476	✎ Note! Function is not available unless ON was selected in the WARNING MODE function (7403). Use this function to specify a limit value for the electrodynamic sensors. A notice message is generated if the limit value is exceeded. **User input:** 0 to 99999 [%] **Factory setting:** 100%

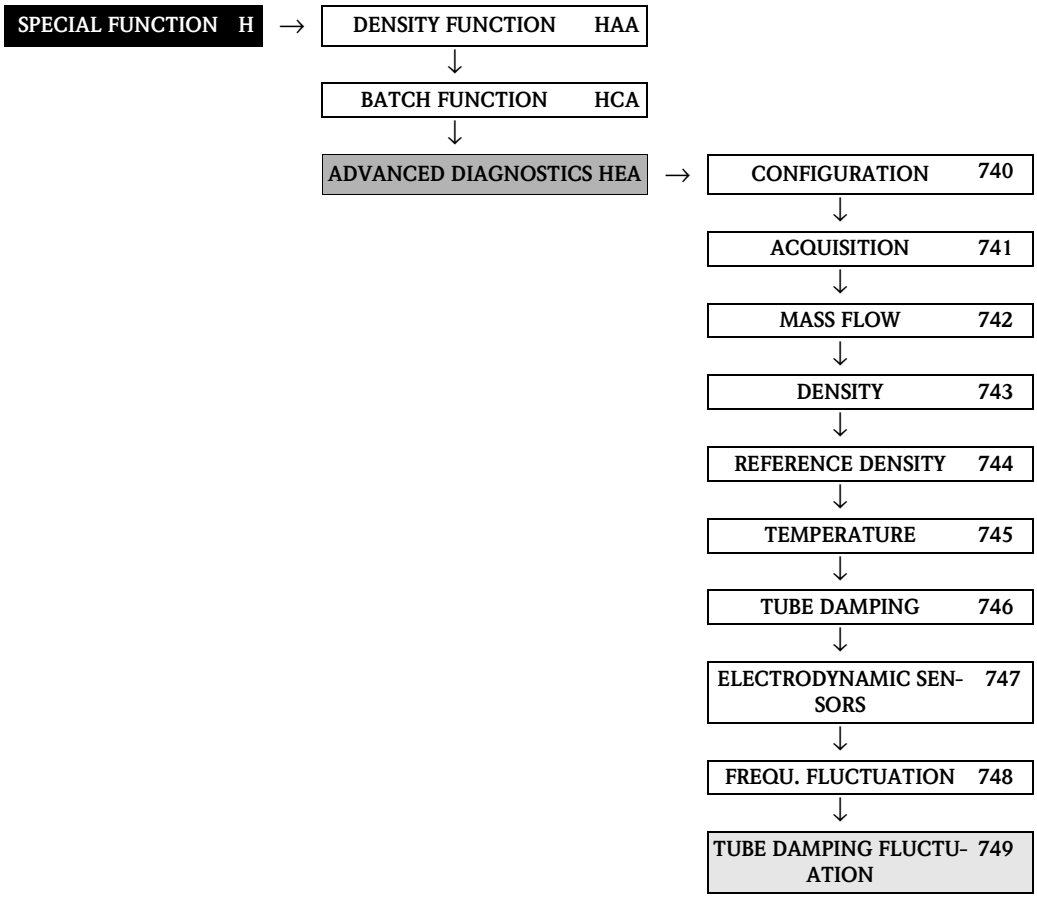
9.3.9 Function group FREQUENCY FLUCTUATION



Function description SPECIAL FUNCTION → ADVANCED DIAGNOSTICS → FREQU. FLUCTUATION	
REFERENCE VALUE FREQU. FLUCTUATION 7480	The reference value for the fluctuation of the operating frequency appears on the display. **Display:** 5-digit floating-point number, Hz
FREQU. FLUCTUATION 7481	The measured fluctuation in the operating frequency appears on the display. **Display:** 5-digit floating-point number, Hz
MINIMUM FREQU. FLUCTUATION 7482	The lowest value of the operating frequency fluctuation since the saved values were last reset appears on the display. **Display:** 5-digit floating-point number, Hz
MAXIMUM FREQU. FLUCTUATION 7483	The highest value of the operating frequency fluctuation since the saved values were last reset appears on the display. **Display:** 5-digit floating-point number, Hz
HISTORY FREQU. FLUCTUATION 7484	The last ten values of the operating frequency fluctuation since the saved values were last reset appear on the display. **Display:** 5-digit floating-point number, Hz
FREQU. FLUCTUATION DEVIATION 7485	This function displays the deviation between the measured fluctuation in operating frequency and the reference values (FACTORY or USER) selected in the SELECT REFERENCE CONDITION (7402) function, see Page 148. **Display:** 5-digit floating-point number, Hz

Function description SPECIAL FUNCTION → ADVANCED DIAGNOSTICS → FREQU. FLUCTUATION	
WARNING LEVEL 7486	✎ Note! This function is not available unless ON was selected in the WARNING MODE (7403) function. Use this function to specify a limit value for the operating frequency fluctuation. A notice message is generated if the limit value is exceeded. **Input:** 0 to 99999 Hz **Factory setting:** 1000 Hz

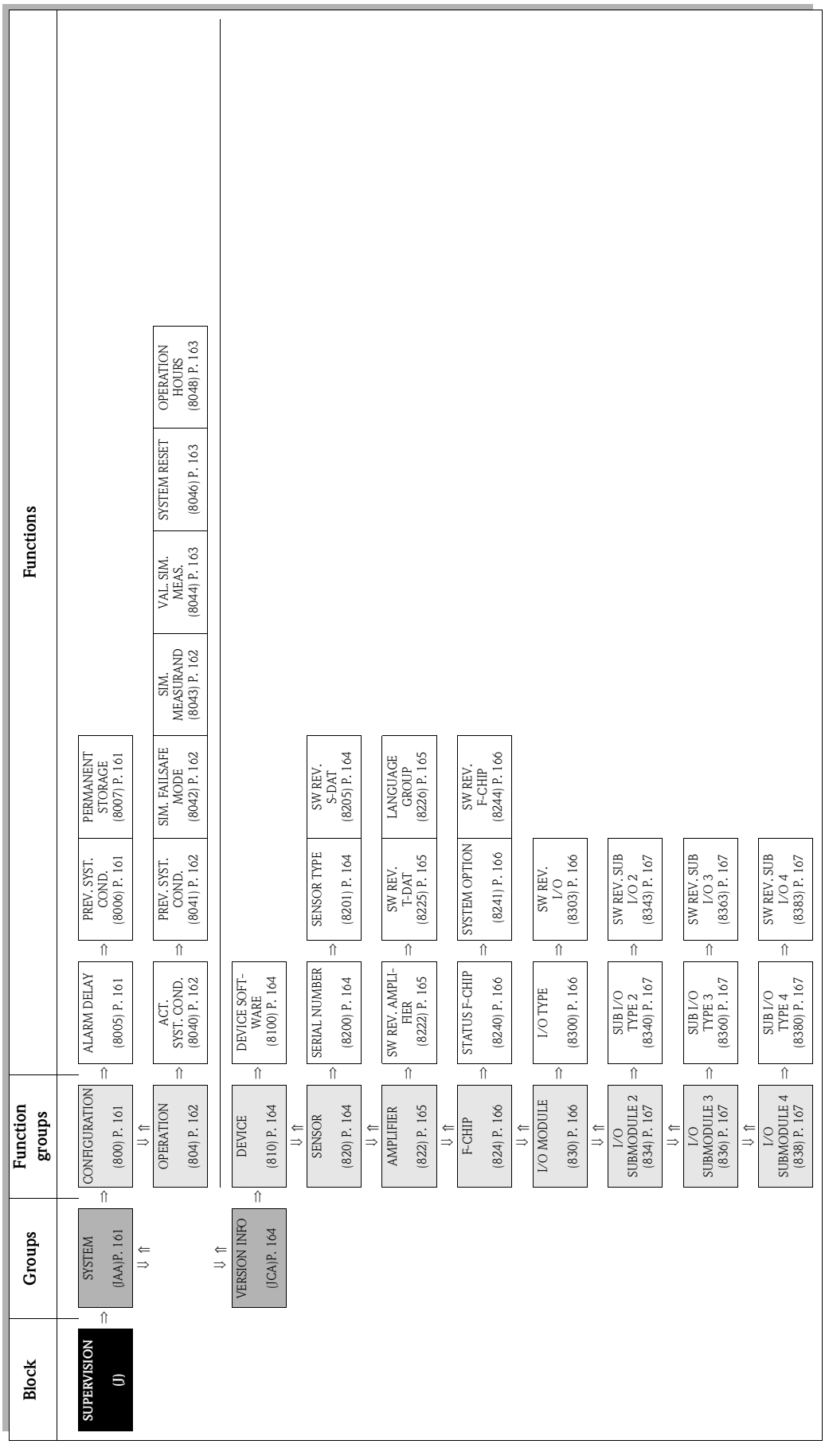
9.3.10 Function group TUBE DAMPING FLUCTUATION



Function description SPECIAL FUNCTION → ADVANCED DIAGNOSTICS → TUBE DAMPING FLUCTUATION	
REFERENCE VALUE TUBE DAMPING FLUCTUATION 7490	The reference value for the fluctuation of the tube damping appears on the display. **Display:** 5-digit floating-point number
TUBE DAMPING FLUCTUATION 7491	The measured fluctuation of the tube damping appears on the display. **Display:** 5-digit floating-point number
MINIMUM TUBE DAMPING FLUCTUATION 7492	The lowest value of the tube damping fluctuation since the saved values were last reset appears on the display. **Display:** 5-digit floating-point number
MAXIMUM TUBE DAMPING FLUCTUATION 7493	The highest value of the tube damping fluctuation since the saved values were last reset appears on the display. **Display:** 5-digit floating-point number
HISTORY TUBE DAMPING FLUCTUATION 7494	The last ten values of the tube damping fluctuation since the saved values were last reset appear on the display. **Display:** 5-digit floating-point number
TUBE DAMPING FLUCTUATION DEVIATION 7495	This function displays the deviation between the measured tube damping fluctuation and the reference values (FACTORY or USER), see Page 148, selected in the function SELECT REFERENCE CONDITION (7402). **Display:** 5-digit floating-point number

Function description SPECIAL FUNCTION → ADVANCED DIAGNOSTICS → TUBE DAMPING FLUCTUATION	
WARNING LEVEL 7496	✎ Note! This function is not available unless ON was selected in the WARNING MODE (7403) function. Use this function to specify a limit value for tube damping fluctuation. A notice message is generated if the limit value is exceeded. **Input:** 0 to 99999 **Factory setting:** 100

10 Block SUPERVISION



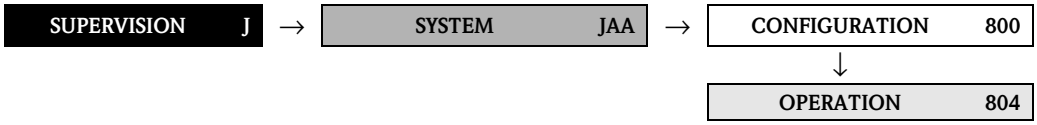
10.1 Group SYSTEM

10.1.1 Function group CONFIGURATION

SUPERVISION J → SYSTEM JAA → CONFIGURATION 800

Function description SUPERVISION → SYSTEM → CONFIGURATION	
ALARM DELAY **8005**	For entering a time span for which the criteria for an error have to be satisfied without interruption before a fault or notice message is generated. This suppression acts on: ■ Display ■ Current output ■ Frequency output ■ Relay output ■ PROFIBUS DP/PA **User input:** 0 to 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, density functions, 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. If reconfiguration does not take place, the local display and the totalizer are set to the factory setting and the outputs are set to OFF.
PERMANENT STORAGE **8007**	Displays whether permanent storage of all the parameters in the EEPROM is switched on or off. **Display:** OFF ON **Factory setting:** ON

10.1.2 Function group OPERATION

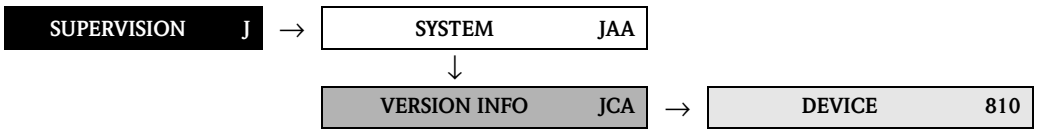


Function description SUPERVISION → SYSTEM → OPERATION	
ACTUAL SYSTEM CONDITION **8040**	Displays the present system condition. **Display:** SYSTEM OK or The fault / notice message with the highest priority. ✎ Note! More information can be found in Operating Instructions BA107D under the keyword "System or process error messages."
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. ✎ Note! More information can be found in Operating Instructions BA107D under the keyword "System or process error messages."
SIMULATION FAILSAFE MODE **8042**	Use this function to set all inputs, outputs and totalizers 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:** OFF ON **Factory setting:** OFF ✎ Note! The failsafe mode of the PROFIBUS function blocks must be defined in the relevant 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 CORRECTED VOLUME FLOW DENSITY REFERENCE DENSITY TEMPERATURE **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 function SIMULATION MEASURAND (8043) is active. For entering a freely selectable value (e.g. 12 m³/s) to check 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 15).
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 to 10,000 hours → display format = 0000:00 (hr:min) ■ Hours of operation > 10,000 hours → display format = 000000 (hr)

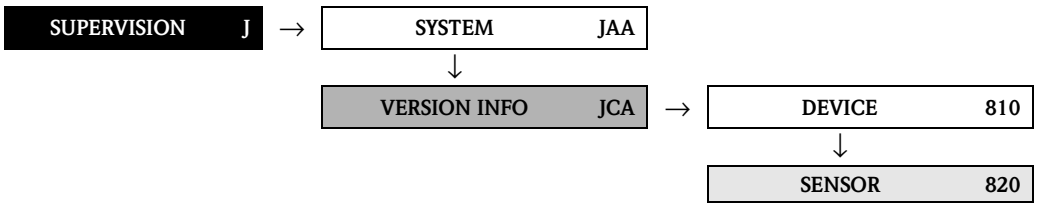
10.2 Group VERSION INFO

10.2.1 Function group DEVICE



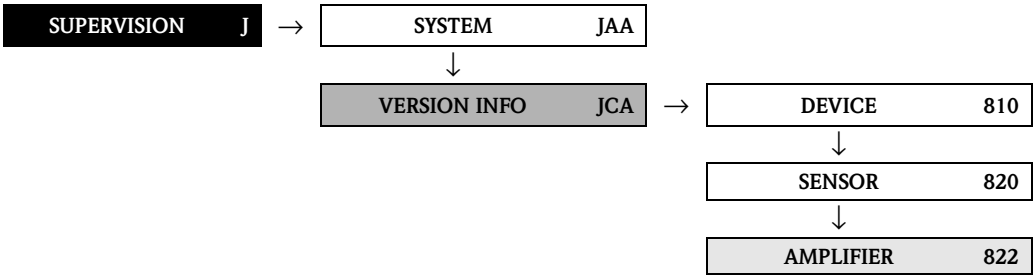
Function description SUPERVISION → VERSION INFO → DEVICE		
DEVICE SOFTWARE	**8100**	Displays the current device software version.

10.2.2 Function group SENSOR



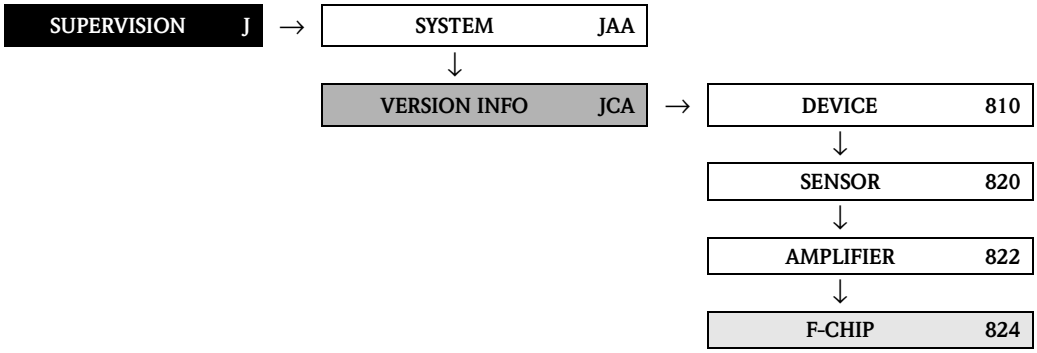
Function description SUPERVISION → VERSION INFO → SENSOR		
SERIAL NUMBER	**8200**	Use this function to view the serial number of the sensor.
SENSOR TYPE	**8201**	Use this function to view the sensor type (e.g. Promass F).
SOFTWARE REVISION S-DAT	**8205**	Use this function to view the software revision number of the software used to create the content of the S-DAT.

10.2.3 Function group AMPLIFIER



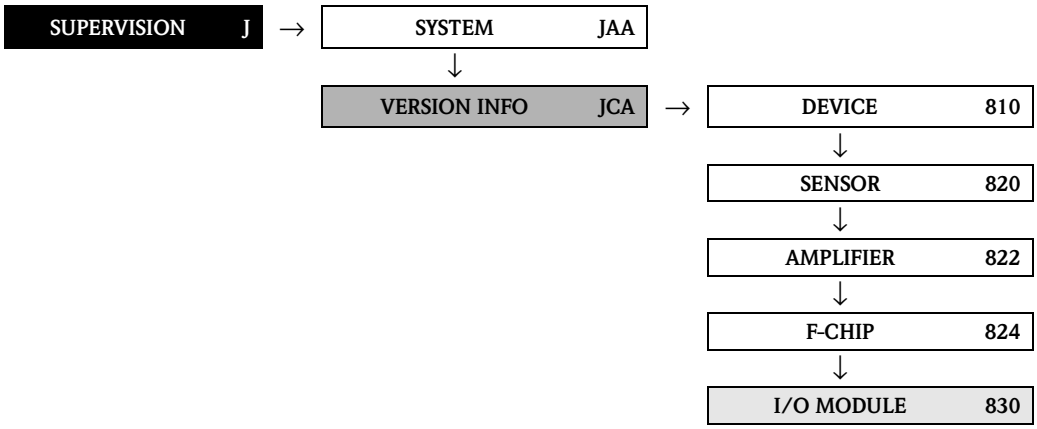
Function description SUPERVISION → VERSION INFO → AMPLIFIER		
SOFTWARE REVISION AMPLIFIER	**8222**	Use this function to view the software revision number of the amplifier.
SOFTWARE REVISION T-DAT	**8225**	✎ Note! Function is not available unless the measuring device is equipped with a T-DAT. Use this 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. ■ You can change the language group via the configuration software FieldTool. Please do not hesitate to contact your Endress+Hauser sales office if you have any questions.

10.2.4 Function group F-CHIP



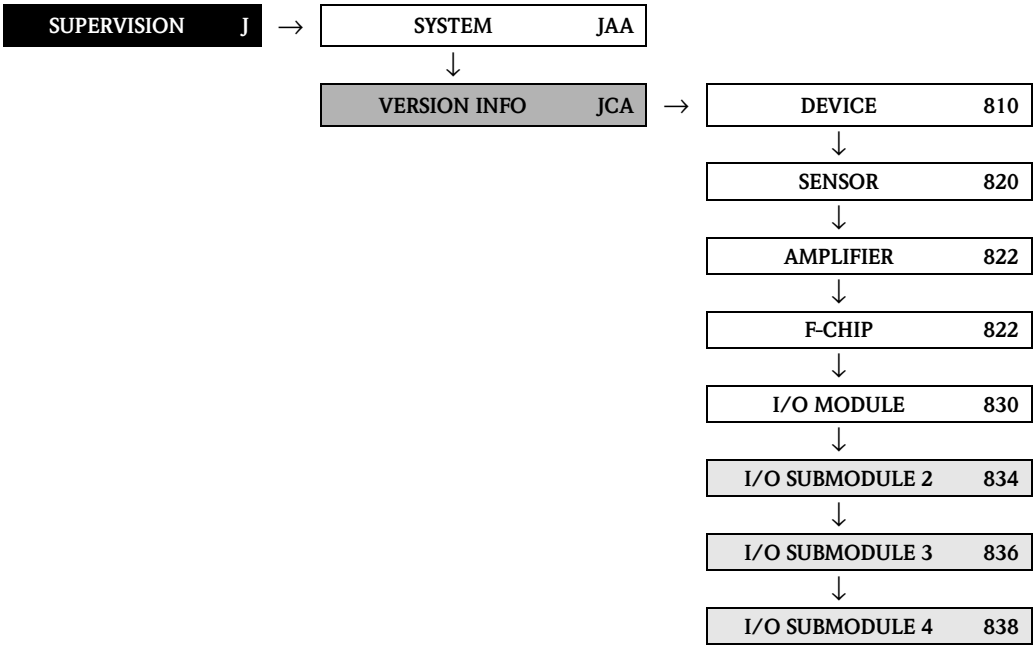
Function description SUPERVISION → VERSION INFO → F-CHIP		
STATUS F-CHIP	**8240**	Use this function to check whether an F-CHIP is installed and which software options are available.
SYSTEM OPTION	**8241**	✎ Note! Function is not available unless the measuring device is equipped with an F-CHIP. The software options available in the measuring device appear on the display. **Display:** NO ENTRY (= no SW-Options available) ADVANCED DIAGNOSTICS BATCH FUNCTION DENSITY FUNCTION
SOFTWARE REVISION F-CHIP	**8244**	✎ Note! The F-CHIP must be available in order to access this function. 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 TYPE	**8300**	Displays the configuration of the I/O module.
SOFTWARE REVISION I/O	**8303**	Use this function to view the software revision number of the I/O module.

10.2.6 Function group I/O SUBMODULE 2 to 4



Function description SUPERVISION → VERSION INFO → I/O SUBMODULE 2 to 4		
SUB-I/O TYPE 2	**8340**	Displays the configuration of the I/O submodule.
SW REV. SUB I/O TYPE 2	**8343**	Use this function to view the software revision umber of the corresponding submodule.
SUB I/O TYPE 3	**8360**	Displays the configuration of the I/O submodule.
SW REV. SUB I/O TYPE 3	**8363**	Use this function to view the software revision umber of the corresponding submodule.
SUB I/O TYPE 4	**8380**	Displays the configuration of the I/O submodule.
SW REV. SUB I/O TYPE 4	**8383**	Use this function to view the software revision umber of the corresponding submodule.

11 Factory settings

11.1 SI units (not for USA and Canada)

11.1.1 Low flow cut off, full scale value, pulse value – Liquid

Nominal diam. [mm]	Low flow cut off (approx. v = 0.04 m/s)		Full scale value (approx. v = 2.0 m/s)		Pulse value (approx. 2 pulse/s at 2.0 m/s)	
1	0.08	kg/h	4	kg/h	0.001	kg/p
2	0.40	kg/h	20	kg/h	0.010	kg/p
4	1.80	kg/h	90	kg/h	0.010	kg/p
8	8.00	kg/h	400	kg/h	0.100	kg/p
15	26.00	kg/h	1300	kg/h	0.100	kg/p
15 FB	72.00	kg/h	3600	kg/h	1.000	kg/p
25	72.00	kg/h	3600	kg/h	1.000	kg/p
25 FB	180.00	kg/h	9000	kg/h	1.000	kg/p
40	180.00	kg/h	9000	kg/h	1.000	kg/p
40 FB	300.00	kg/h	15000	kg/h	10.000	kg/p
50	300.00	kg/h	15000	kg/h	10.000	kg/p
50 FB	720.00	kg/h	36000	kg/h	10.000	kg/h
80	720.00	kg/h	36000	kg/h	10.000	kg/p
100	1200.00	kg/h	60000	kg/h	10.000	kg/p
150	2600.00	kg/h	130000	kg/h	100.000	kg/p
250	7200.00	kg/h	360000	kg/h	100.000	kg/p
DN 15, 25, 40, 50 “FB” = Full bore versions of Promass I						

11.1.2 Low flow cut off, full scale value, pulse value – Gas

Nom. diameter [mm]	Low flow cut off (approx. v = 0.01 m/s)		Full scale value (approx. v = 2 m/s)		Pulse value (approx. 2 pulse/s at 2 m/s)	
1	0.02	kg/h	4	kg/h	0.001	kg/p
2	0.10	kg/h	20	kg/h	0.010	kg/p
4	0.45	kg/h	90	kg/h	0.010	kg/p
8	2.00	kg/h	400	kg/h	0.100	kg/p
15	6.50	kg/h	1300	kg/h	0.100	kg/p
15 FB	18.00	kg/h	3600	kg/h	1.000	kg/p
25	18.00	kg/h	3600	kg/h	1.000	kg/p
25 FB	45.00	kg/h	9000	kg/h	1.000	kg/p
40	45.00	kg/h	9000	kg/h	1.000	kg/p
40 FB	75.00	kg/h	15000	kg/h	10.000	kg/p
50	75.00	kg/h	15000	kg/h	10.000	kg/p
50 FB	180.00	kg/h	36000	kg/h	10.000	kg/p
80	180.00	kg/h	36000	kg/h	10.000	kg/p
100	300.00	kg/h	60000	kg/h	10.000	kg/p
150	650.00	kg/h	130000	kg/h	100.000	kg/p
250	1800.00	kg/h	360000	kg/h	100.000	kg/p
DN 15, 25, 40, 50 “FB” = Full bore versions Promass I						

11.1.3 Language

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

11.1.4 Density, length, temperature

	Unit
Density	kg/l
Length	mm
Temperature	°C

11.2 US units (only for USA and Canada)

11.2.1 Low flow cut off, full scale value, pulse value – Liquid

Nominal diam. [mm]	Low flow cut off (approx. v = 0.04 m/s)		Full scale value (approx. v = 2.0 m/s)		Pulse value (approx. 2 pulse/s at 2.0 m/s)	
1	0.003	lb/min	0.15	lb/min	0.002	lb/p
2	0.015	lb/min	0.75	lb/min	0.020	lb/p
4	0.066	lb/min	3.30	lb/min	0.020	lb/p
8	0.300	lb/min	15.00	lb/min	0.200	lb/p
15	1.000	lb/min	50.00	lb/min	0.200	lb/p
15 FB	2.600	lb/min	130.00	lb/min	2.000	lb/p
25	2.600	lb/min	130.00	lb/min	2.000	lb/p
25 FB	6.600	lb/min	330.00	lb/min	2.000	lb/p
40	6.600	lb/min	330.00	lb/min	2.000	lb/p
40 FB	11.000	lb/min	550.00	lb/min	20.000	lb/p
50	11.000	lb/min	550.00	lb/min	20.000	lb/p
50 FB	26.000	lb/min	1300.00	lb/min	20.000	lb/min
80	26.000	lb/min	1300.00	lb/min	20.000	lb/p
100	44.000	lb/min	2200.00	lb/min	20.000	lb/p
150	95.000	lb/min	4800.00	lb/min	200.000	lb/p
250	260.000	lb/min	13000.00	lb/min	200.000	lb/p
DN 15, 25, 40, 50 “FB” = Full bore versions of Promass I						

11.2.2 Low flow cut off, full scale value, pulse value – Gas

Nominal diameter [mm]	Low flow cut off (approx. v = 0.01 m/s)		Full scale value (approx. v = 2 m/s)		Pulse value (approx. 2 pulse/s at 2 m/s)	
1	0.001	lb/min	0.15	lb/min	0.002	lb/p
2	0.004	lb/min	0.75	lb/min	0.020	lb/p
4	0.046	lb/min	3.30	lb/min	0.020	lb/p
8	0.075	lb/min	15.00	lb/min	0.200	lb/p
15	0.250	lb/min	50.00	lb/min	0.200	lb/p
15 FB	0.650	lb/min	130.00	lb/min	2.000	lb/p
25	0.650	lb/min	130.00	lb/min	2.000	lb/p
25 FB	1.650	lb/min	330.00	lb/min	2.000	lb/p
40	1.650	lb/min	330.00	lb/min	2.000	lb/p
40 FB	2.750	lb/min	550.00	lb/min	20.000	lb/p
50	2.750	lb/min	550.00	lb/min	20.000	lb/p
50 FB	6.500	lb/min	1300.00	lb/min	20.000	lb/p
80	6.500	lb/min	1300.00	lb/min	20.000	lb/p
100	11.000	lb/min	2200.00	lb/min	20.000	lb/p
150	23.750	lb/min	4800.00	lb/min	200.000	lb/p
250	65.000	lb/min	13000.00	lb/min	200.000	lb/p
DN 15, 25, 40, 50 “FB” = Full bore versions Promass I						

11.2.3 Language, density, length, temperature

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

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Symbols

Numerics

www.endress.com/worldwide

Endress+Hauser

People for Process Automation

BA060D/06/en/11.08
71085225