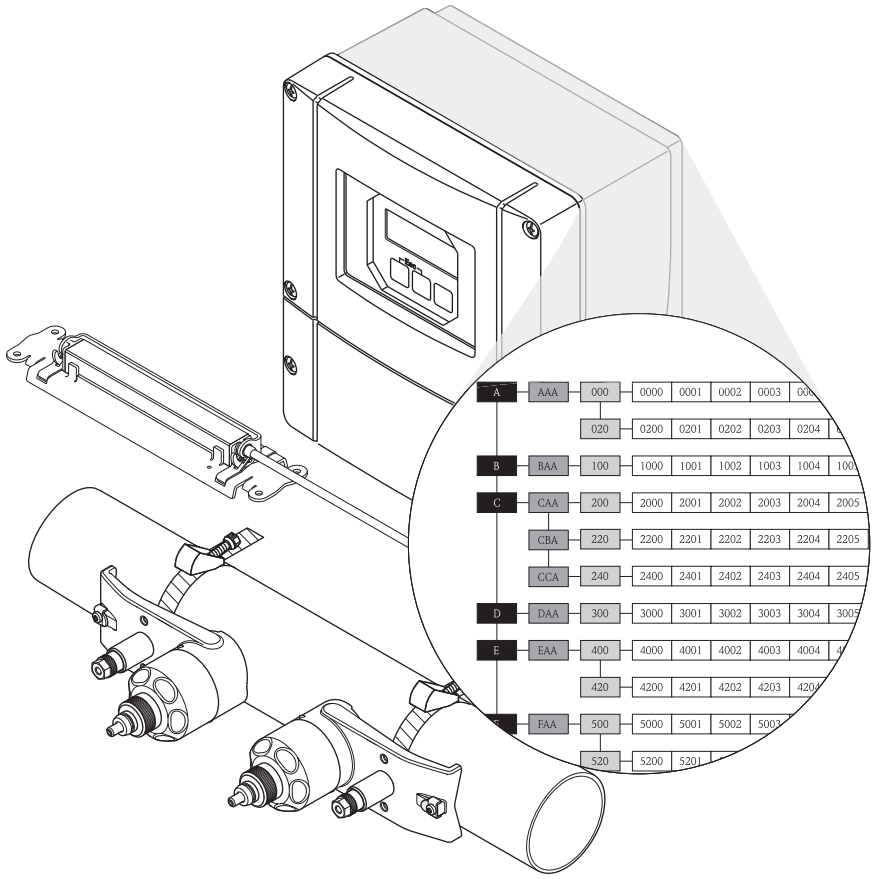
Level Pressure Flow Temperature Liquid Analysis Registration Systems Components Services Solutions

Description of Device Functions

Proline Prosonic Flow 93 PROFIBUS DP/PA

Ultrasonic flow measuring system



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

Endress+Hauser
People for Process Automation

Contents

1 Using this Manual

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

1.1 Using the table of contents to locate a function description

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

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

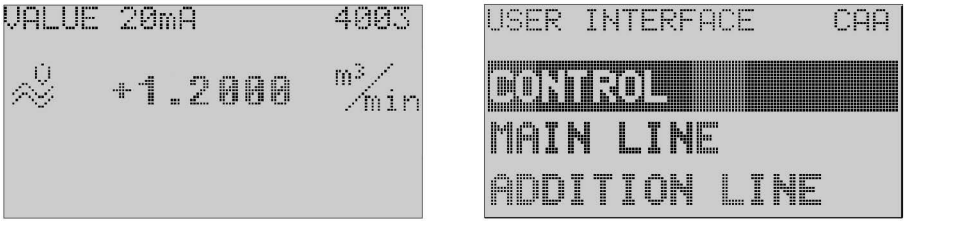
This step-by-step, top-down approach starts with the blocks, the highest level, and works down through the matrix to the description of the function you need:

1. All blocks available, and their related groups, are illustrated on Page 6. Select the block (or the group within the block) which you need for your application and use the page reference to locate the information corresponding to the next level.
2. The page in question contains a graphic showing of the block with all its subordinate groups, function groups and functions. Select the function which you need for your application and use the page reference to locate the detailed function description.

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

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

Example:



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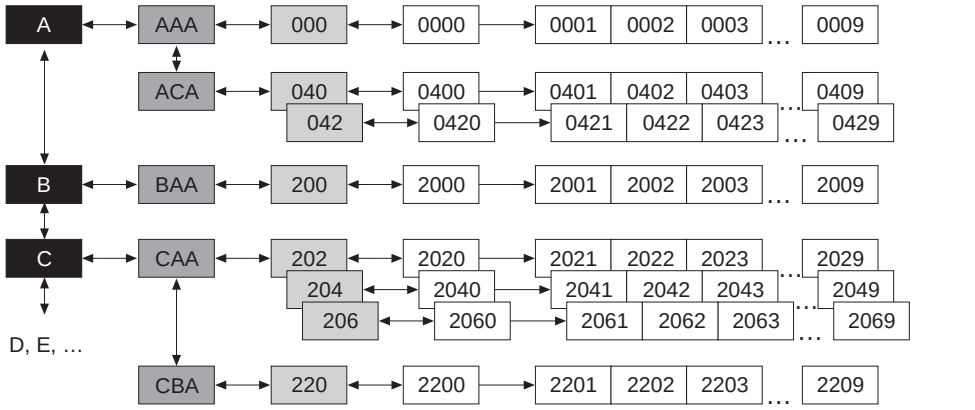
The function-matrix index lists the codes for all the available "cells" in alphabetic and consecutive order, complete with the page references for the corresponding functions.
The index to the function matrix is on Page 127.

2 Function matrix

2.1 General layout of the function matrix

The function matrix consists of four levels:

Blocks -> Groups -> Function groups -> Functions



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

The blocks are the "highest-level grouping" of the operation options for the device.
Examples of blocks available are MEASURED VARIABLES, QUICK SETUP, USER INTERFACE, TOTALIZERS, 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

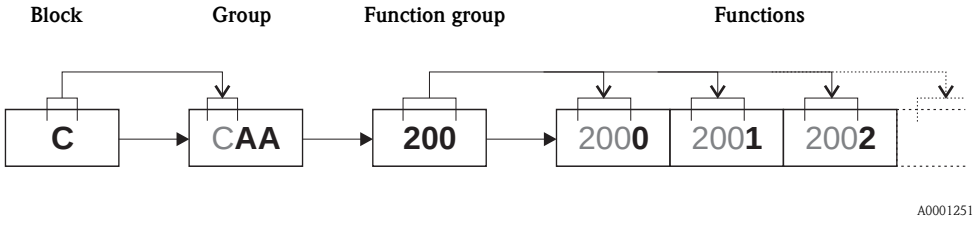
Each cell (block, group, function group and function) in the function matrix has an individual, unique code.

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 _ _, and so on). 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

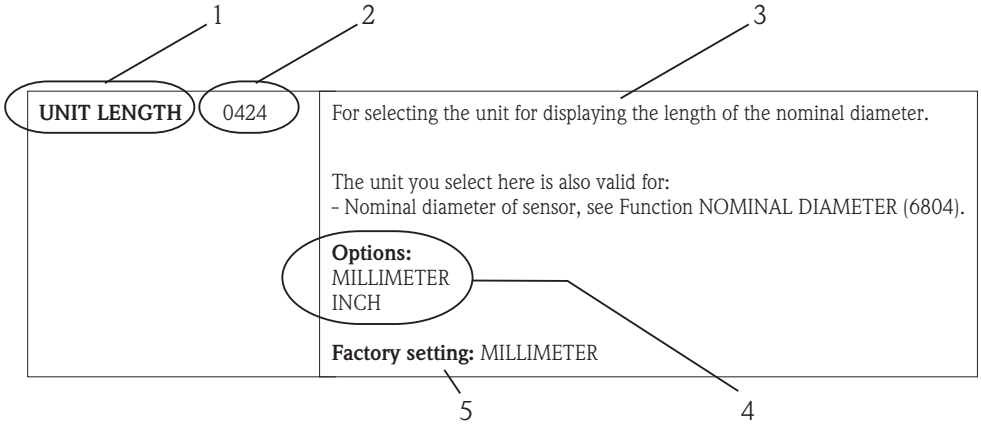


Fig. 1 : Example for the description of a function

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

2.3 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.

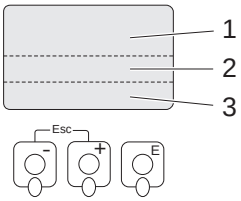


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Fig. 2 : Local display
1 Main line
2 Additional line
3 Information line

The values are assigned to the individual lines in the USER INTERFACE block, → Page 23.

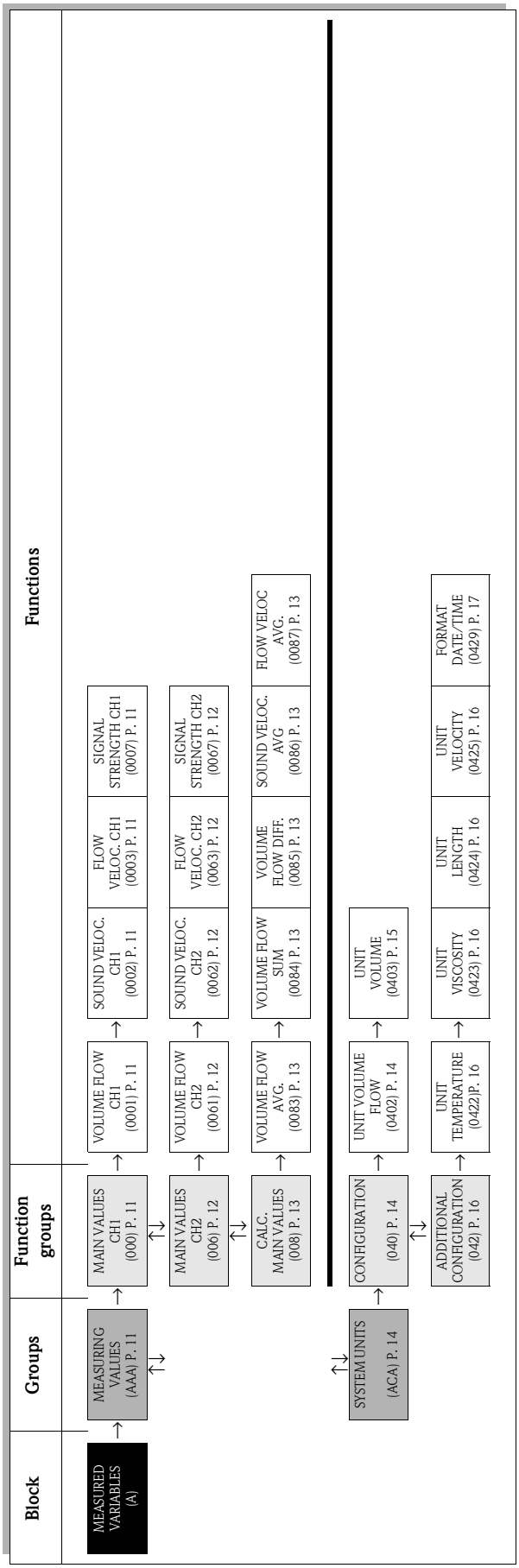
2.5 Available Blocks, Groups, etc.

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

2.6 Function matrix Prosonic Flow 93 PROFIBUS

BLOCKS		GROUPS			FUNCTION GROUPS
MEASURED VARIABLES (s. Page 10)	**A**	MEASURING VALUES	AAA	→	Page 11
		SYSTEM UNITS	ACA	→	Page 14
QUICK-SETUP (s. Page 18)	**B**	Commissioning and application setups		→	Page 18
USER INTERFACE (s. Page 23)	**C**	CONTROL	CAA	→	Page 24
		MAIN LINE	CCA	→	Page 28
		ADDITION LINE	CEA	→	Page 32
		INFORMATION LINE	CGA	→	Page 36
OUTPUTS (see P. 40)	**E**	CURRENT OUTPUT (1 to 3)	EAA,B,C	→	Page 41
		PULSE/FREQ. OUTPUT (1 to 2)	ECA,B	→	Page 52
		RELAY OUTPUT (1 to 2)	EGA,B	→	Page 77
INPUTS (see P. 86)	**F**	STATUS INPUT	FAA	→	Page 87
BASIC FUNCTION (s. Page 90)	**G**	PROFIBUS DP or PROFIBUS PA	GBA/GCA	→	Page 91
		PROCESS PARAMETER (CH1 to CH2)	GIA, GIB	→	Page 98
		SYSTEM PARAMETER (CH1 to CH2)	GLA, GLB	→	Page 110
		SENSOR DATA (CH1 to CH2)	GNA, GNB	→	Page 112
SUPERVISION (s. Page 120)	**J**	SYSTEM	JAA	→	Page 121
		SYSTEM CH2	JAB	→	Page 121
		VERSION INFO	JCA	→	Page 124

3 Block MEASURED VARIABLES



3.1 Group MEASURING VALUES

3.1.1 Function group MAIN VALUES CH1

MEASURED VARIABLES A → MEASURING VALUES AAA → MAIN VALUES CH1 000

Functional description MEASURED VARIABLES → MEASURING VALUES → MAIN VALUES CH1	
The measuring values of channel 1 currently being measured are displayed in this function group. ✎ Note! ■ The units of measure 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.	
VOLUME FLOW CH1 (0001)	The volume flow currently measured appears on the display (channel 1). **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.)
SOUND VELOCITY CH1 (0002)	The sound velocity currently measured in the liquid appears on the display (channel 1). **Display:** 5-digit fixed-point number, incl. units (e.g. 1400.0 m/s, 5249.3 ft/s)
FLOW VELOCITY CH1 (0003)	The flow velocity currently measured appears on the display (channel 1). **Display:** 5-digit floating-point number, including unit and sign (e.g. 8.0000 m/s, 26.247 ft/s)
SIGNAL STRENGTH CH1 (0007)	The signal strength appears on the display (channel 1). **Display:** 4-digit fixed point number (e.g. 80.0) ✎ Note! To ensure reliable measurement takes place, Prosonic Flow requires a signal strength of > 30.

3.1.2 Function group MAIN VALUES CH2

MEASURED VARIABLES A → MEASURING VALUES AAA → MAIN VALUES CH2 006

Functional description MEASURED VARIABLES → MEASURING VALUES → MAIN VALUES CH2	
The measuring values of channel 2 currently being measured are displayed in this function group. ✎ Note! ■ The units of measure 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.	
VOLUME FLOW CH2 (0061)	The volume flow currently measured appears on the display (channel 2). **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.)
SOUND VELOCITY CH2 (0062)	The sound velocity currently measured in the liquid appears on the display (channel 2). **Display:** 5-digit fixed-point number, incl. units (e.g. 1400.0 m/s, 5249.3 ft/s)
FLOW VELOCITY CH2 (0063)	The flow velocity currently measured appears on the display (channel 2). **Display:** 5-digit floating-point number, including unit and sign (e.g. 8.0000 m/s, 26.247 ft/s)
SIGNAL STRENGTH CH2 (0067)	The signal strength appears on the display (channel 2). **Display:** 4-digit fixed-point number (e.g. 80.0) ✎ Note! To ensure reliable measurement takes place, Prosonic Flow requires a signal strength of > 30.

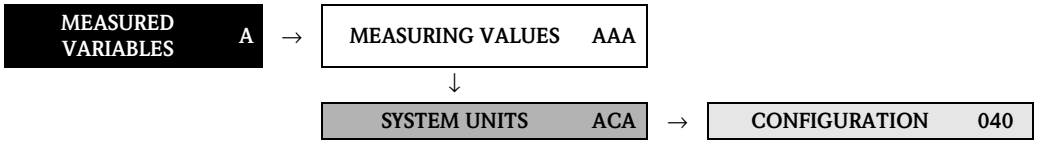
3.1.3 Function group CALCULATED MAIN VALUES

MEASURED VARIABLES A → MEASURING VALUES AAA → CALC. MAIN VALUES 008

Functional description MEASURED VARIABLES → MEASURING VALUES → CALC. MAIN VALUES	
The calculated measured values appear on the display. The measured values of both channels are used when calculating the values. ✎ Note! ■ The units of measure 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.	
VOLUME FLOW AVG (0083)	The average volume flow appears on the display. Calculated from the measured values: (VOLUME FLOW CH1 + VOLUME FLOW CH2) · 1/2 **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.)
VOLUME FLOW SUM (0084)	The total volume flow appears on the display. Calculated from the measured values: VOLUME FLOW CH1 + VOLUME FLOW CH2 **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.)
VOLUME FLOW DIFFERENCE (0085)	The difference between the volume flows appears on the display. Calculated from the measured values: VOLUME FLOW CH1 – VOLUME FLOW CH2 **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.)
SOUND VELOCITY AVERAGE (0086)	The average sound velocity appears on the display. Calculated from the measured values: (SOUND VELOCITY CH1 + SOUND VELOCITY CH2) · 1/2 **Display:** 5-digit fixed-point number, incl. units (e.g. 1400.0 m/s, 5249.3 ft/s)
FLOW VELOCITY AVERAGE (0087)	The average flow velocity appears on the display. Calculated from the measured values: (FLOW VEL. CH1 + FLOW VEL. CH2) · 1/2 **Display:** 5-digit floating-point number, including unit and sign (e.g. 8.0000 m/s, 26.247 ft/s)

3.2 Group SYSTEM UNITS

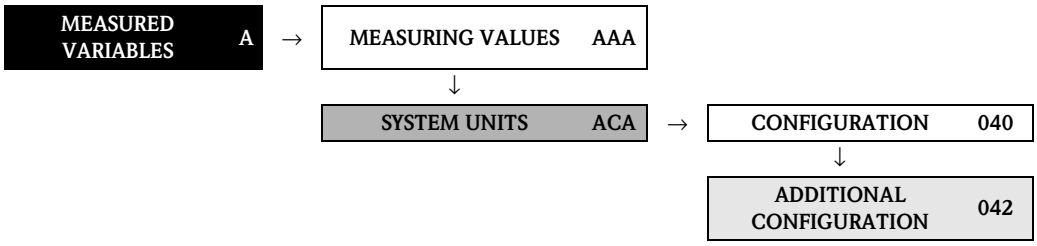
3.2.1 Function group CONFIGURATION



Functional description MEASURED VARIABLES → SYSTEM UNITS → CONFIGURATION	
You can select the units for measured variables in this function group.	
UNIT VOLUME FLOW (0402)	Use this function to select the unit for displaying the volume flow. The unit you select here is also valid for: ▪ PROFIBUS DP/PA output ▪ Low flow cut off **Options:** ✎ Note! The following units of time (…) can be selected: s = second, m = minute, h = hour, d = day *Metric:* Cubic centimeter → cm^3/… Cubic decimeter → dm^3/… Cubic meter → m^3/… Milliliter → ml/… Liter → l/… Hectoliter → hl/… Megaliter → Ml/… MEGA *US:* Cubic centimeter → cc/… Acre foot → af/… Cubic foot → ft^3/… Fluid ounce → oz f/… Gallon → US gal/… Million gallon → US Mgal/… Barrel (normal fluids: 31.5 gal/bbl) → US bbl/… NORM. Barrel (beer: 31.0 gal/bbl) → US bbl/… BEER Barrel (petrochemicals: 42.0 gal/bbl) → US bbl/… PETR. Barrel (filling tanks: 55.0 gal/bbl) → US bbl/… TANK *Imperial:* Gallon → imp. gal/… Mega gallon → imp. Mgal/… Barrel (beer: 36.0 gal/bbl) → imp. bbl/… BEER Barrel (petrochemicals: 34.97 gal/bbl) → imp. bbl/… PETR. **Factory setting:** l/s

Functional description MEASURED VARIABLES → SYSTEM UNITS → CONFIGURATION	
UNIT VOLUME (0403)	Use this function to select the unit for displaying the volume. **Options:** *Metric:* Cubic centimeter → cm^3 Cubic decimeter → dm^3 Cubic meter → m^3 Milliliter → ml Liter → l Hectoliter → hl Megaliter → Ml MEGA *US:* Cubic centimeter → cc Acre foot → af Cubic foot → ft^3 Fluid ounce → oz f Gallon → US gal Million gallon → US Mgal Barrel (normal fluids: 31.5 gal/bbl) → US bbl NORM.FL. Barrel (beer: 31.0 gal/bbl) → US bbl BEER Barrel (petrochemicals: 42.0 gal/bbl) → US bbl PETROCH. Barrel (filling tanks: 55.0 gal/bbl) → US bbl TANK *Imperial:* Gallon → imp. gal Mega gallon → imp. Mgal Barrel (beer: 36.0 gal/bbl) → imp. bbl BEER Barrel (petrochemicals: 34.97 gal/bbl) → imp. bbl PETROCH. **Factory setting:** l (liter) ✎ 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. ■ The unit selected in this function is only for showing the values on the local display, i.e. the measuring system does not use it for further processing of the measured variables.

3.2.2 Function group ADDITIONAL CONFIGURATION



Functional description MEASURED VARIABLES → SYSTEM UNITS → ADDITIONAL CONFIGURATION	
UNIT TEMPERATURE (0422)	Use this function to select the unit for displaying the fluid temperature. ✎ Note! The fluid temperature is entered in the TEMPERATURE function (s. Page 107). **Options:** °C (Celsius) K (Kelvin) °F (Fahrenheit) R (Rankine) **Factory setting:** °C
UNIT VISCOSITY (0423)	Use this function to select the unit for fluid viscosity. **Options:** mm^2/s cSt St **Factory setting:** mm^2/s
UNIT LENGTH (0424)	Use this function to select the unit for the measure of length. The unit you select here is valid for: ■ Nominal diameter ■ Diameter ■ Wall thickness ■ Liner thickness ■ Path length ■ Wire length ■ Sensor spacing **Options:** MILLIMETER INCH **Factory setting:** MILLIMETER
UNIT VELOCITY (0425)	Use this function to select the unit for displaying the velocity. The unit you select here is also valid for: ■ Sound velocity ■ Flow velocity **Options:** m/s ft/s **Factory setting:** m/s

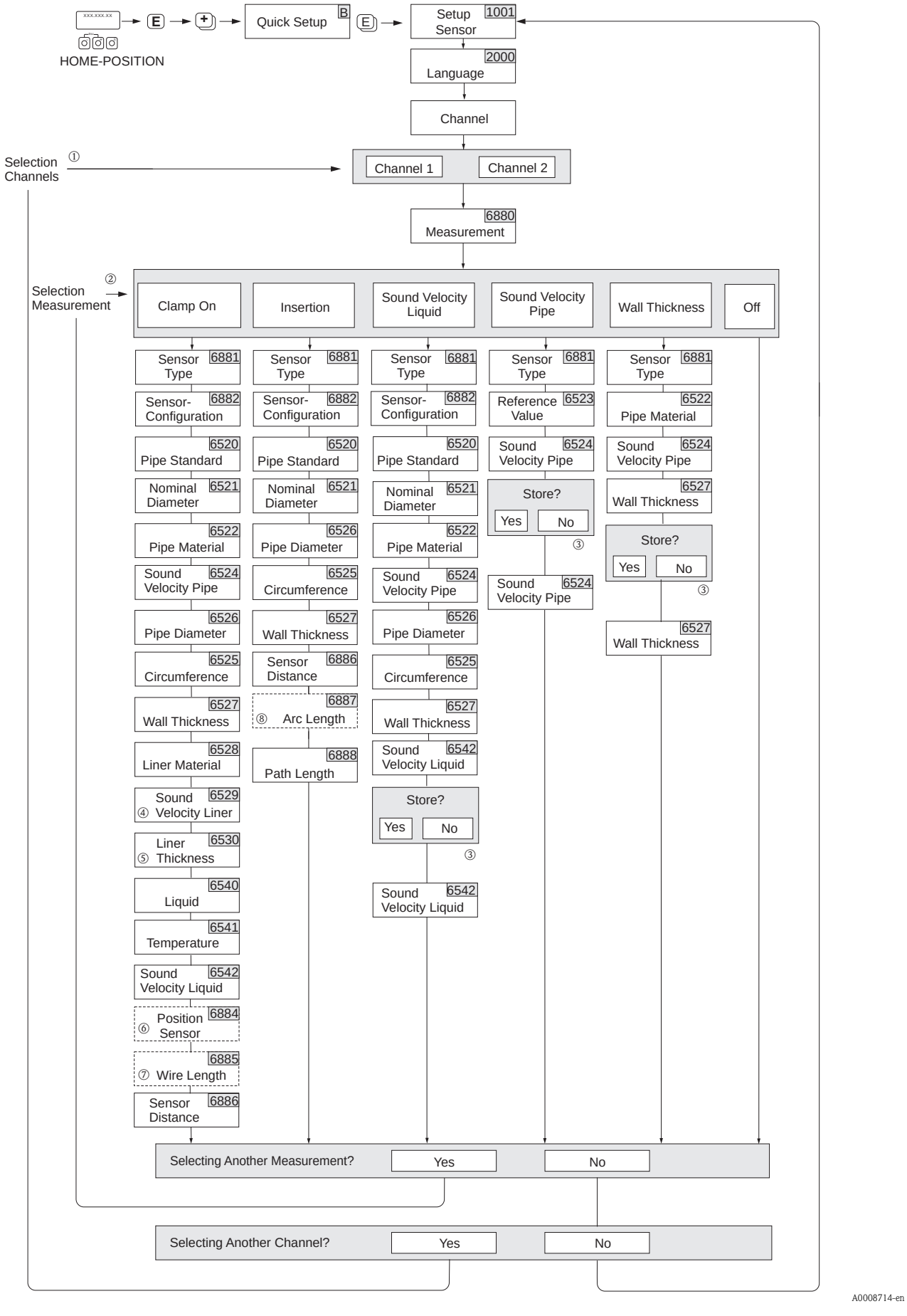
Functional description MEASURED VARIABLES → SYSTEM UNITS → ADDITIONAL CONFIGURATION	
FORMAT DATE/TIME (0429)	Use this function to select the date and time format of the calibration history. **Options:** DD.MM.YY 24 H MM/DD/YY 12 H A/P DD.MM.YY 12 H A/P MM/DD/YY 24 H **Factory setting:** DD.MM.YY 24 H

4 Block QUICK-SETUP

Block	Group	Function groups	Functions		
QUICK-SETUP (B)	→	→	SETUP SENSOR (1001) P. 18	→	QS-COMMISSION. (1002) P. 18 / T-DAT SAVE/LOAD (1009) P. 18

Functional description QUICK-SETUP	
QUICK SETUP SENSOR (1001)	Use this function to start the Quick Setup menu for assembling the ultrasonic sensors. **Options:** YES NO **Factory setting:** NO ✎ Note! You will find a flowchart of the "Sensor installation" Quick Setup menu on Page 19. Please refer to the Operating Instructions for Prosonic Flow 93 PROFIBUS DP/PA, BA 076D, for more information on Quick Setup menus.
SETUP COMMISSIONING (1002)	Use this function to start the Quick Setup menu for commissioning. **Options:** YES NO **Factory setting:** NO ✎ Note! You will find a flowchart of the "COMMISSIONING" Quick Setup menu on Page 21. Please refer to the Operating Instructions for Prosonic Flow 93 PROFIBUS DP/PA, BA 076D, for more information on Quick Setup menus.
T-DAT SAVE/LOAD (1009)	Use this function to save the parameter settings / configuration of the **transmitter** in a transmitter DAT (T-DAT), or to load the parameter settings from the T-DAT into the EEPROM (**manual** security function). Application examples: ▪ After commissioning, the current measuring point parameters can be saved to the T-DAT as a backup. ▪ If the transmitter is replaced for some reason, the data from the T-DAT can be loaded into the new transmitter (EEPROM). **Options:** CANCEL SAVE (from EEPROM to T-DAT) LOAD (from the T-DAT into EEPROM) **Factory setting:** CANCEL ✎ Note! ▪ If the power supply fails, the totalizer readings are automatically saved to the EEPROM. ▪ The option "LOAD" cannot be executed if the T-DAT is empty or faulty. ▪ The option "LOAD" and "SAVE" cannot be executed if no T-DAT is present.

4.1 Quick Setup "Sensor Installation"



Note!
The display returns to the cell SETUP SENSOR (1001) if you press the ESC key combination during interrogation.

① If a channel is selected for which a Quick Setup has already been executed, the previous values are overwritten.

② During each run, all the options can be selected. If settings were made during a previous run, these are overwritten.

③ "Save?" prompt for pipe sound velocity:
- YES = The value measured during Quick Setup is accepted in the appropriate function.
- NO = The measurement is discarded and the original value remains.

④ The SOUND VELOCITY LINER (6529) only appears if:
- The LINER MATERIAL is selected to something ohter than NONE (6528)

⑤ The LINER THICKNESS (6530) only appears if:
- The LINER MATERIAL is selected to something ohter than NONE (6528).

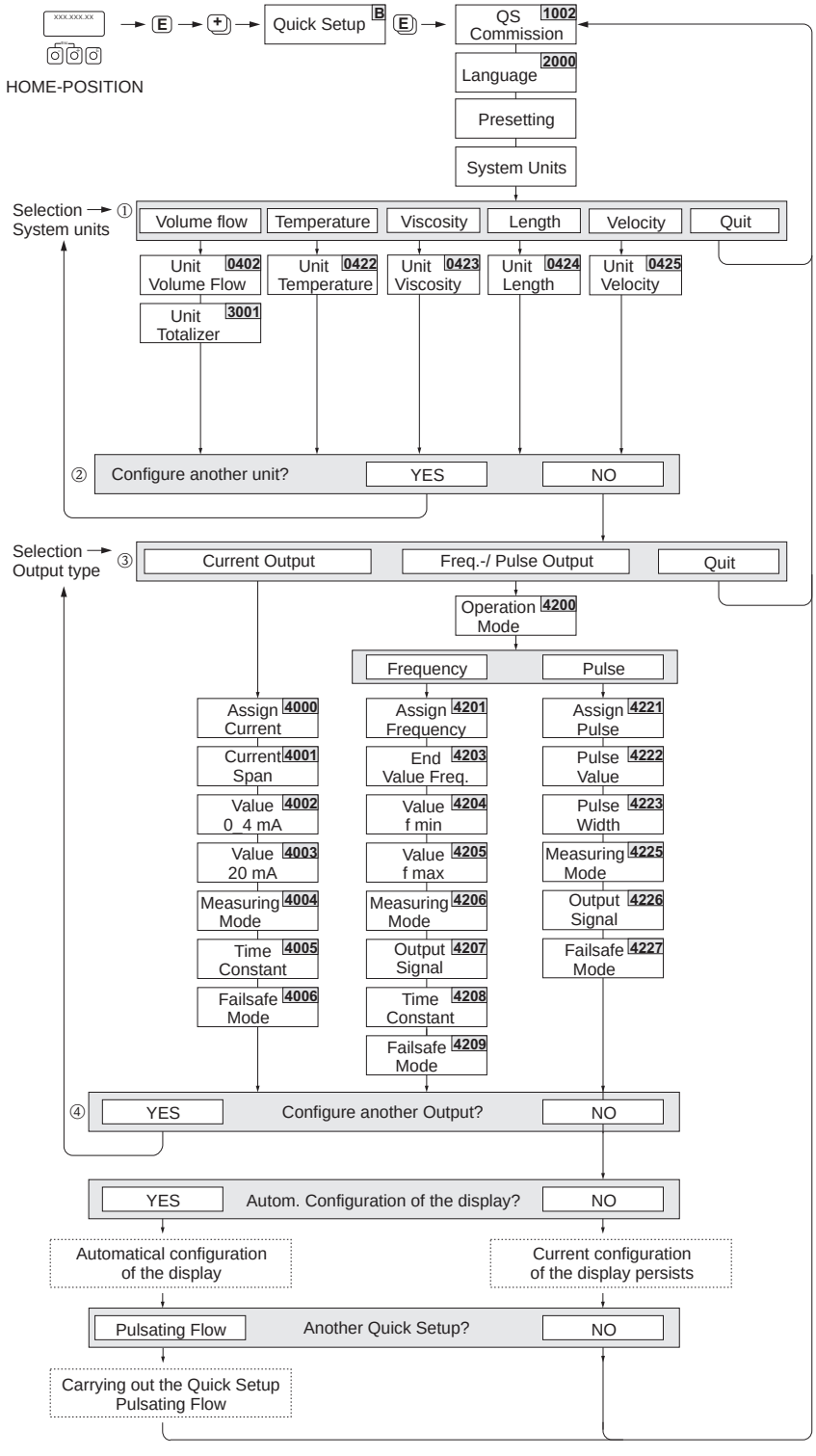
⑥ The POSITION SENSOR function (6884) only appears if:
- The CLAMP ON option is selected in the MEASUREMENT function (6880)
  and
- Two traverses are selected in the SENSOR CONFIGURATION function (6882)

⑦ The WIRE LENGTH function (6885) only appears if:
- The CLAMP ON option is selected in the MEASUREMENT function (6880)
  and
- One traverse is selected in the SENSOR CONFIGURATION function (6882)

⑧ The ARC LENGTH function (6887) only appears if:
- The INSERTION option is selected in the MEASUREMENT function (6880)
  and
- The DUAL-PATH option is selected in the SENSOR CONFIGURATION function (6882)

4.2 Quick Setup "Commissioning"

In the case of measuring devices without a local display, the individual parameters and functions must be configured via the operating program, e.g. FieldCare.
If the measuring device is equipped with a local display, all the important device parameters for standard operation, as well as additional functions, can be configured quickly and easily by means of the following Quick Setup menus.



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Note!

- The display returns to the function SETUP COMMISSIONING (1002) if you press the ESC key combination during parameter interrogation.
- If you answer YES to the question regarding the "Automatic configuration of the display", the display lines are assigned as follows:
  Main line = volume flow
  Additional line = totalizer 1
  Information line = operating/system condition

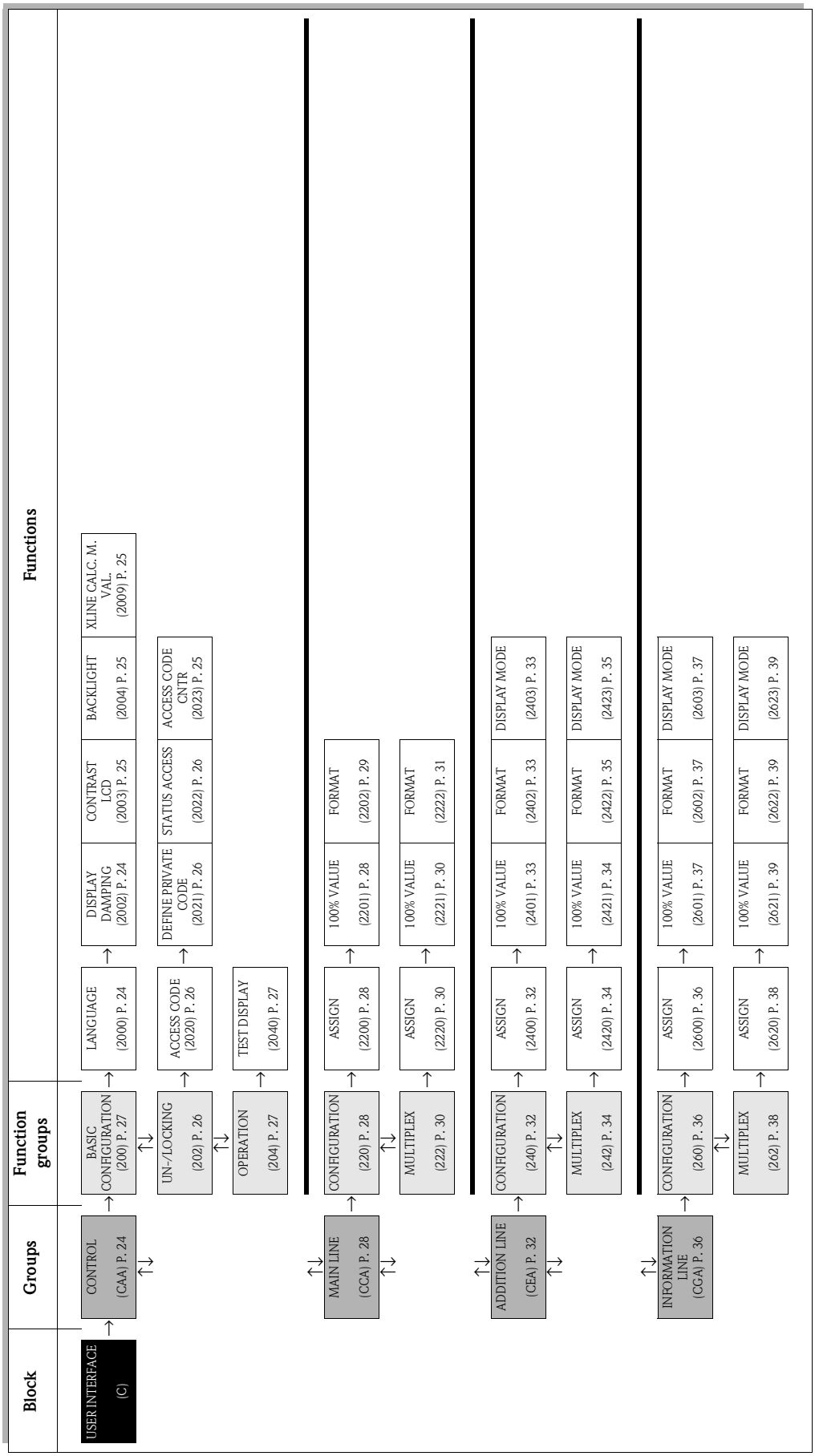
① Only units not yet configured in the current Quick Setup are offered for selection in each cycle. The volume unit is derived from the volume flow unit.

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

③ Only outputs not yet configured in the current Quick Setup are offered for selection in each cycle.

④ The "YES" option appears as long as a free output is still available.
"NO" is the only option displayed when no further outputs are available.

5 Block USER INTERFACE



5.1 Group CONTROL

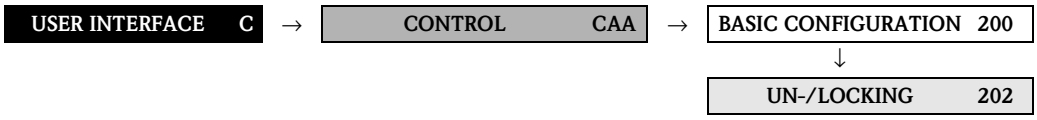
5.1.1 Function group BASIC CONFIGURATION

USER INTERFACE C → CONTROL CAA → BASIC CONFIGURATION 200

Functional description USER INTERFACE → CONTROL → BASIC CONFIGURATION	
LANGUAGE (2000)	Use this function to select the language for all texts, parameters and messages shown on the local display. ✎ Note! The displayed options depend on the available language group shown in the LANGUAGE GROUP function (8226). **Options:** Language group WEST EU / USA: ENGLISH, DEUTSCH, FRANCAIS, ESPANOL, ITALIANO, NEDERLANDS, PORTUGUESE Language group EAST EU / SCAND.: ENGLISH, NORSK, SVENSKA, SUOMI, POLISH, CZECH, RUSSIAN Language group ASIA: ENGLISH, BAHASA INDONESIA, JAPANESE (syllabary) Language group CHINESE: CHINESE, ENGLISH **Factory setting:** Country-dependent (s. Page 126) ✎ Note! ▪ If you press the ⊞ keys simultaneously during startup, the language defaults to "ENGLISH". ▪ You can change the language group via the configuration software FieldCare. Please do not hesitate to contact your Endress+Hauser sales office if you have any questions.
DISPLAY DAMPING (2002)	Use this function to enter a time constant defining how the display reacts to severely fluctuating flow variables, either very quickly (enter a low time constant) or with damping (enter a high time constant). **User input:** 0 to 100 seconds **Factory setting:** 1 s ✎ Note! Setting the time constant to zero seconds switches off damping.

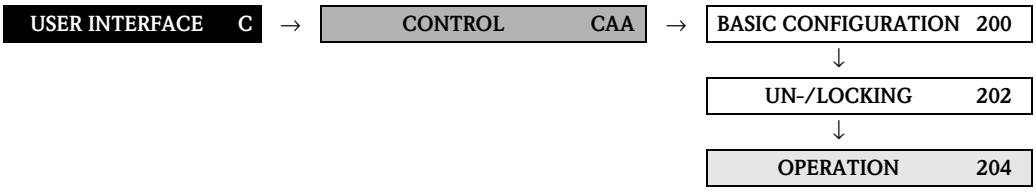
Functional description USER INTERFACE → CONTROL → BASIC CONFIGURATION	
CONTRAST LCD (2003)	Use this function to optimize display contrast to suit local operating conditions. **User input:** 10…100% **Factory setting:** 50%
BACKLIGHT **(2004)**	Use this function to optimize the backlight to suit local operating conditions. **User input:** 10…100% **Factory setting:** 50%
X-LINE CALCULATED MAIN VALUES (2009)	Use this function to indicate which "calculated main value" from the measured values of both channels is displayed. The option CALCULATED VOLUME FLOW must be selected in the ASSIGN function (2200, main line), (2400, additional line), (2600, information line) so that the value appears in the line desired. ✎ Note! This function does **not** appear if OFF was selected on at least one channel in the MEASUREMENT function (6880). **Options:** (CH1 + CH2)/2 CH1 + CH2 CH1 - CH2 **Factory setting:** (CH1 + CH2)/2

5.1.2 Function group UN-/LOCKING



Functional description USER INTERFACE → CONTROL → UN-/LOCKING	
ACCESS CODE (2020)	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 = 93**, see DEF.PRIVATE CODE (2021)) . **User input:** max. 4-digit number: 0 to 9999 ✎ Note! ■ The programming levels are 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.
DEF. PRIVATE CODE (2021)	Use this function to specify a personal code number for enabling programming in the ACCESS CODE function. **User input:** 0 to 9999 (max. 4-digit number) **Factory setting:** 93 ✎ Note! ■ Programming is always enabled with the code "0". ■ Programming has to be enabled before this code can be changed. When programming is disabled this function is not available, thus preventing others from accessing your personal code.
STATUS ACCESS (2022)	Use this function to check the access status for the function matrix. **Display:** ACCESS CUSTOMER (parameterization possible) LOCKED (parameterization disabled)
ACCESS CODE COUNTER (2023)	The number of times the private or service code was entered to access the device appears on the display. **Display:** Integer (delivery status: 0)

5.1.3 Function group OPERATION

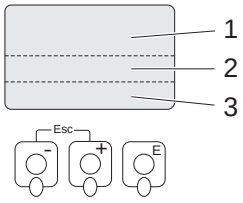


Functional description USER INTERFACE → CONTROL → OPERATION	
TEST DISPLAY (2040)	Use this function to test the operability of the local display and its pixels. **Options:** OFF ON **Factory setting:** OFF Test sequence: 1. Start the test by selecting ON. 2. All pixels of the main line, additional line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

5.2 Group MAIN LINE

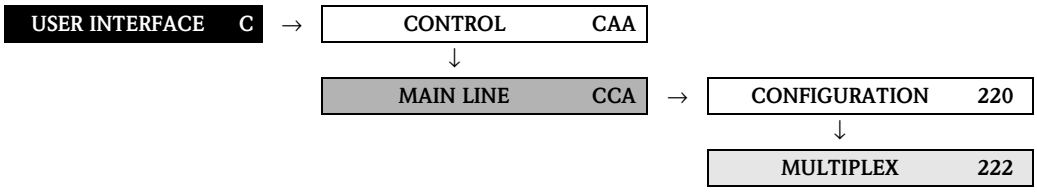
5.2.1 Function group CONFIGURATION

USER INTERFACE C → CONTROL CAA
↓
MAIN LINE CCA → CONFIGURATION 220

Functional description USER INTERFACE → MAIN LINE → CONFIGURATION	
1 = Main line 2 = Additional line 3 = Information line  A0001253	
ASSIGN **(2200)**	Use this function to define the display value assigned to the main line (the top line of the local display) during normal measuring operation. **Options:** OFF VOLUME FLOW (CH1 to CH2) CALCULATED VOLUME FLOW VOLUME FLOW % (CH1 to CH2) CALCULATED VOLUME FLOW IN % SOUND VELOCITY (CH1 to CH2) SOUND VELOCITY AVERAGE SIGNAL STRENGTH (CH1 to CH2) FLOW VELOCITY (CH1 to CH2) FLOW VELOCITY AVERAGE AI1 to AI8 - OUT VALUE A0 - DISP. VALUE TOT. OUT VALUE 1 to 3 ✎ Note! ■ If a channel is not visible, it does not appear in the options. Channels can be displayed or hidden by means of the MEASUREMENT function (6880). ■ If the option PROFILE-GSD was selected in the SELECTION GSD function (6140), the following options are not available in this function: AI 3 to AI 8 - OUT VALUE, AO - DISP. VALUE, TOT 2 and TOT 3 - OUT VALUE **Factory setting:** VOLUME FLOW CH1
100% VALUE **(2201)**	✎ Note! This function is only available if VOLUME FLOW % or CALCULATED VOLUME FLOW % is selected in the ASSIGN function (2200). Use this function to define the flow value to be shown on the display as the 100% value. **User input:** 5-digit floating-point number **Factory setting:** Depends on nominal diameter and country, [value] / [dm3 to m3 or US-gal to US-Mgal]. Corresponds to the factory setting for the full scale value (s. Page 126).

Functional description USER INTERFACE → MAIN LINE → CONFIGURATION	
FORMAT **(2202)**	Use this function to define the maximum number of places after the decimal point displayed for the reading in the main line. **Options:** XXXXX. – XXXX.X – XXX.XX – XX.XXX – X.XXXX **Factory setting:** X.XXXX ✎ Note! ■ Note that this setting only affects the reading as it appears on the display, it has no influence on the accuracy of the system's calculations. ■ The places after the decimal point as computed by the measuring device cannot always be displayed, depending on this setting and the engineering unit. In such instances an arrow appears on the display between the measuring value and the engineering unit (e.g. 1.2 → m^3/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

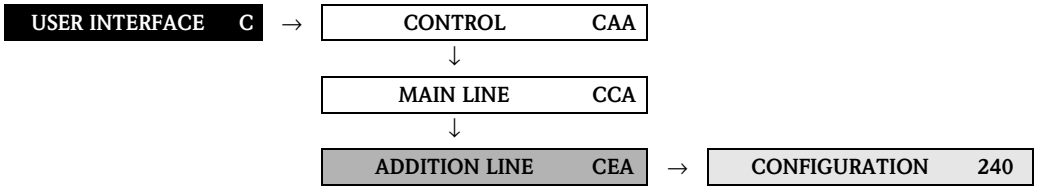


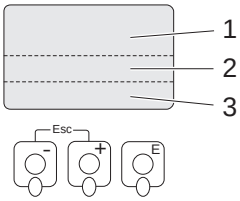
Functional description USER INTERFACE → MAIN LINE → MULTIPLEX	
ASSIGN **(2220)**	Use this function to define a second reading to be displayed in the main line alternatively (every 10 seconds) with the reading defined in the ASSIGN function (2200). **Options:** OFF VOLUME FLOW (CH1 to CH2) CALCULATED VOLUME FLOW VOLUME FLOW % (CH1 to CH2) CALCULATED VOLUME FLOW IN % SOUND VELOCITY (CH1 to CH2) SOUND VELOCITY AVERAGE SIGNAL STRENGTH (CH1 to CH2) FLOW VELOCITY (CH1 to CH2) FLOW VELOCITY AVERAGE AI1 to AI8 - OUT VALUE A0 - DISP. VALUE TOT. OUT VALUE 1 to 3 ✎ Note! ■ If a channel is not visible, it does not appear in the options. Channels can be displayed or hidden by means of the MEASUREMENT function (6880). ■ If the option PROFILE-GSD was selected in the SELECTION GSD function (6140), the following options are not available in this function: AI 3 to AI 8 - OUT VALUE, AO - DISP. VALUE, TOT 2 and TOT 3 - OUT VALUE **Factory setting:** OFF
100% VALUE **(2221)**	✎ Note! This function is only available if VOLUME FLOW % or CALCULATED VOLUME FLOW % is selected in the ASSIGN function (2200). Use this function to define the flow value to be shown on the display as the 100% value. **User input:** 5-digit floating-point number **Factory setting:** Depends on nominal diameter and country, [value] / [dm3 to m3 or US-gal to US-Mgal]. Corresponds to the factory setting for the full scale value (s. Page 126).

Functional description USER INTERFACE → MAIN LINE → MULTIPLEX	
FORMAT **(2222)**	Use this function to define the maximum number of places after the decimal point for the second value displayed in the main line. **Options:** XXXXX. – XXXX.X – XXX.XX – XX.XXX – X.XXXX **Factory setting:** X.XXXX ✎ Note! ■ Note that this setting only affects the reading as it appears on the display, it has no influence on the accuracy of the system's calculations. ■ The places after the decimal point as computed by the measuring device cannot always be displayed, depending on this setting and the engineering unit. In such instances an arrow appears on the display between the measuring value and the engineering unit (e.g. 1.2 → m^3/h), indicating that the measuring system is computing with more decimal places than can be shown on the display.

5.3 Group ADDITION LINE

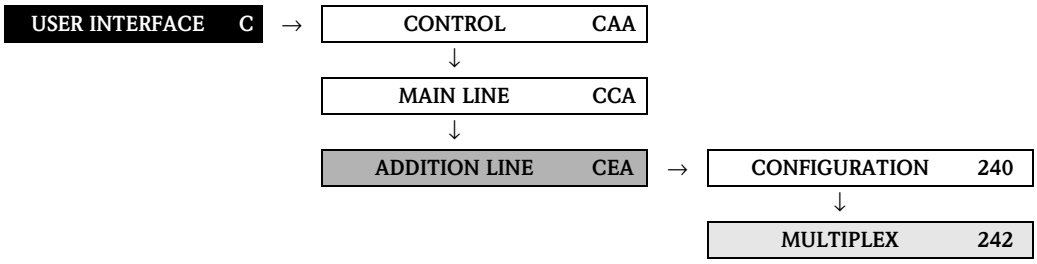
5.3.1 Function group CONFIGURATION



Functional description USER INTERFACE → ADDITION LINE → CONFIGURATION	
1 = Main line 2 = Additional line 3 = Information line  A0001253	
ASSIGN **(2400)**	Use this function to define the display value assigned to the additional line (the middle line of the local display) during normal measuring operation. **Options:** OFF VOLUME FLOW (CH1 to CH2) CALCULATED VOLUME FLOW VOLUME FLOW % (CH1 to CH2) CALCULATED VOLUME FLOW IN % SOUND VELOCITY (CH1 to CH2) SOUND VELOCITY AVERAGE SIGNAL STRENGTH (CH1 to CH2) FLOW VELOCITY (CH1 to CH2) FLOW VELOCITY AVERAGE VOLUME FLOW BARGRAPH IN % (CH1 to CH2) CALCULATED VOLUME FLOW BARGRAPH % SIGNAL STRENGTH BARGRAPH % (CH1 to CH2) TAG NAME FLOW DIRECTION (CH1 to CH2) CALCULATED FLOW DIRECTION AI1 to AI8 - OUT VALUE A0 - DISP. VALUE TOT. OUT VALUE 1 to 3 **Factory setting:** TOT. OUT VALUE 1 ✎ Note! ■ If a channel is not visible, it does not appear in the options. Channels can be displayed or hidden by means of the MEASUREMENT function (6880). ■ If the option PROFILE-GSD was selected in the SELECTION GSD function (6140), the following options are not available in this function: AI 3 to AI 8 - OUT VALUE, AO - DISP. VALUE, TOT 2 and TOT 3 - OUT VALUE

Functional description USER INTERFACE → ADDITION LINE → CONFIGURATION	
100% VALUE (2401)	✎ Note! This function is not available unless one of the following was selected in the ASSIGN function (2400): ■ VOLUME FLOW % ■ VOLUME FLOW BARGRAPH % ■ CALCULATED VOLUME FLOW IN % ■ CALCULATED VOLUME FLOW BARGRAPH % Use this function to define the flow value to be shown on the display as the 100% value. **User input:** 5-digit floating-point number **Factory setting:** Depends on nominal diameter and country, [value] / [dm3 to m3 or US-gal to US-Mgal]. Corresponds to the factory setting for the full scale value (s. Page 126).
FORMAT (2402)	✎ Note! This function is not available unless a number was selected in the ASSIGN function (2400). Use this function to define the maximum number of places after the decimal point displayed for the reading in the additional line. **Options:** XXXXX. – XXXX.X – XXX.XX – XX.XXX – X.XXXX **Factory setting:** X.XXXX ✎ Note! ■ Note that this setting only affects the reading as it appears on the display, it has no influence on the accuracy of the system's calculations. ■ The places after the decimal point as computed by the measuring device cannot always be displayed, depending on this setting and the engineering unit. In such instances an arrow appears on the display between the measuring value and the engineering unit (e.g. 1.2 → m^3/h), indicating that the measuring system is computing with more decimal places than can be shown on the display.
DISPLAY MODE (2403)	✎ Note! This function is only available if VOLUME FLOW BARGRAPH IN % or CALCULATED VOLUME FLOW BARGRAPH IN % was selected in the ASSIGN function (2420). Use this function to define the format of the bar graph. **Options:** STANDARD (Simple bar graph with 25 / 50 / 75% gradations and integrated sign).  A0001258 SYMMETRY (Symmetrical bar graph for positive and negative directions of flow, with –50 / 0 / +50% gradations and integrated sign).  A0001259 **Factory setting:** STANDARD

5.3.2 Function group MULTIPLEX

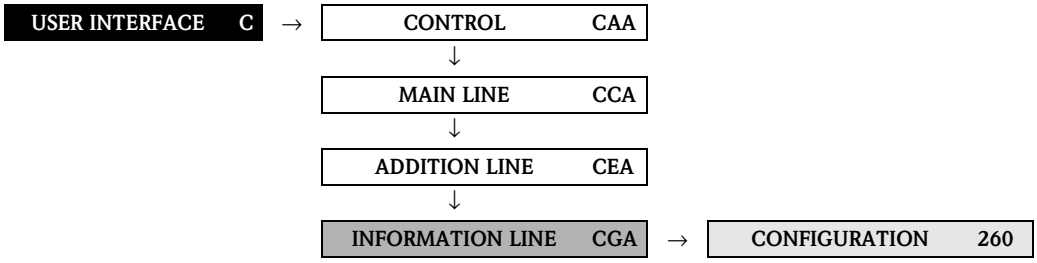


Functional description USER INTERFACE → ADDITION LINE → MULTIPLEX	
ASSIGN (2420)	Use this function to define a second reading to be displayed in the additional line alternatively (every 10 seconds) with the reading defined in the ASSIGN function (2400). **Options:** OFF VOLUME FLOW (CH1 to CH2) CALCULATED VOLUME FLOW VOLUME FLOW % (CH1 to CH2) CALCULATED VOLUME FLOW IN % SOUND VELOCITY (CH1 to CH2) SOUND VELOCITY AVERAGE SIGNAL STRENGTH (CH1 to CH2) FLOW VELOCITY (CH1 to CH2) FLOW VELOCITY AVERAGE VOLUME FLOW BARGRAPH IN % (CH1 to CH2) CALCULATED VOLUME FLOW BARGRAPH % SIGNAL STRENGTH BARGRAPH % (CH1 to CH2) TAG NAME FLOW DIRECTION (CH1 to CH2) CALCULATED FLOW DIRECTION AI1 to AI8 - OUT VALUE A0 - DISP. VALUE TOT. OUT VALUE 1 to 3 **Factory setting:** OFF ✎ Note! ■ Multiplex mode is suspended as soon as a fault / notice message is generated. ■ If a channel is not visible, it does not appear in the options. Channels can be displayed or hidden by means of the MEASUREMENT function (6880). ■ If the option PROFILE-GSD was selected in the SELECTION GSD function (6140), the following options are not available in this function: AI 3 to AI 8 - OUT VALUE, AO - DISP. VALUE, TOT 2 and TOT 3 - OUT VALUE
100% VALUE (2421)	✎ Note! This function is not available unless one of the following was selected in the ASSIGN function (2420): ■ VOLUME FLOW % ■ VOLUME FLOW BARGRAPH % ■ CALCULATED VOLUME FLOW IN % ■ CALCULATED VOLUME FLOW BARGRAPH % Use this function to define the flow value to be shown on the display as the 100% value. **User input:** 5-digit floating-point number **Factory setting** Depends on nominal diameter and country, [value] / [dm3 to m3 or US-gal to US-Mgal]. Corresponds to the factory setting for the full scale value (s. Page 126).

Functional description USER INTERFACE → ADDITION LINE → MULTIPLEX	
FORMAT **(2422)**	✎ Note! This function is not available unless a number was selected in the ASSIGN function (2420). Use this function to define the maximum number of places after the decimal point for the second value displayed in the additional line. **Options:** XXXXX. – XXXX.X – XXX.XX – XX.XXX – X.XXXX **Factory setting:** X.XXXX ✎ Note! ▪ Note that this setting only affects the reading as it appears on the display, it has no influence on the accuracy of the system's calculations. ▪ The places after the decimal point as computed by the measuring device cannot always be displayed, depending on this setting and the engineering unit. In such instances an arrow appears on the display between the measuring value and the engineering unit (e.g. 1.2 m^3/h), indicating that the measuring system is computing with more decimal places than can be shown on the display.
DISPLAY MODE **(2423)**	✎ Note! This function is only available if VOLUME FLOW BARGRAPH IN % or CALCULATED VOLUME FLOW BARGRAPH IN % was selected in the ASSIGN function (2420). Use this function to define the format of the bar graph. **Options:** STANDARD (Simple bar graph with 25 / 50 / 75% gradations and integrated sign).  A0001258 SYMMETRY (Symmetrical bar graph for positive and negative directions of flow, with –50 / 0 / +50% gradations and integrated sign).  A0001259 **Factory setting:** STANDARD

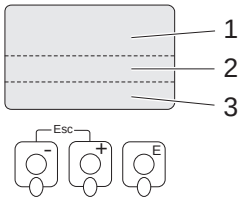
5.4 Group INFORMATION LINE

5.4.1 Function group CONFIGURATION



Functional description
USER INTERFACE → INFORMATION LINE → CONFIGURATION

1 = Main line
2 = Additional line
3 = Information line



A0001253

ASSIGN (2600)

Use this function to define the display value assigned to the information line (the bottom line of the local display) during normal measuring operation.

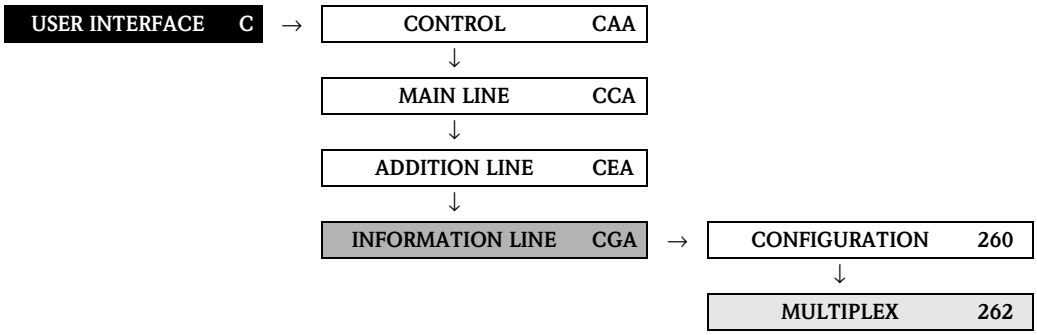
Options:
OFF
VOLUME FLOW (CH1 to CH2)
CALCULATED VOLUME FLOW
VOLUME FLOW % (CH1 to CH2)
CALCULATED VOLUME FLOW IN %
SOUND VELOCITY (CH1 to CH2)
SOUND VELOCITY AVERAGE
SIGNAL STRENGTH (CH1 to CH2)
FLOW VELOCITY (CH1 to CH2)
FLOW VELOCITY AVERAGE
VOLUME FLOW BARGRAPH IN % (CH1 to CH2)
CALCULATED VOLUME FLOW BARGRAPH %
SIGNAL STRENGTH BARGRAPH % (CH1 to CH2)
TAG NAME
OPERATING/SYSTEM CONDITIONS
FLOW DIRECTION (CH1 to CH2)
CALCULATED FLOW DIRECTION
AI1 to AI8 - OUT VALUE
A0 - DISP. VALUE
TOT. OUT VALUE 1 to 3 (totalizer 1 to 3)

Factory setting:
OPERATING/SYSTEM CONDITIONS

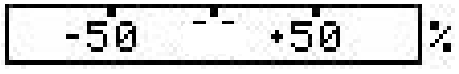
✎ Note!
- If a channel is not visible, it does not appear in the options. Channels can be displayed or hidden by means of the MEASUREMENT function (6880).
- If the option PROFILE-GSD was selected in the SELECTION GSD function (6140), the following options are not available in this function:
  AI 3 to AI 8 - OUT VALUE, AO - DISP. VALUE, TOT 2 and TOT 3 - OUT VALUE

Functional description USER INTERFACE → INFORMATION LINE → CONFIGURATION	
100% VALUE (2601)	✎ Note! This function is not available unless one of the following was selected in the ASSIGN function (2400): ■ VOLUME FLOW % ■ VOLUME FLOW BARGRAPH % ■ CALCULATED VOLUME FLOW IN % ■ CALCULATED VOLUME FLOW BARGRAPH % Use this function to define the flow value to be shown on the display as the 100% value. **User input:** 5-digit floating-point number **Factory setting:** Depends on nominal diameter and country, [value] / [dm3 to m3 or US-gal to US-Mgal]. Corresponds to the factory setting for the full scale value (s. Page 126).
FORMAT (2602)	✎ Note! This function is not available unless a number was selected in the ASSIGN function (2600). Use this function to define the maximum number of places after the decimal point displayed for the reading in the information line. **Options:** XXXXX. – XXXX.X – XXX.XX – XX.XXX – X.XXXX **Factory setting:** X.XXXX ✎ Note! ■ Note that this setting only affects the reading as it appears on the display, it has no influence on the accuracy of the system's calculations. ■ The places after the decimal point as computed by the measuring device cannot always be displayed, depending on this setting and the engineering unit. In such instances an arrow appears on the display between the measuring value and the engineering unit (e.g. 1.2 → m^3/h), indicating that the measuring system is computing with more decimal places than can be shown on the display.
DISPLAY MODE (2603)	✎ Note! This function is only available if VOLUME FLOW BARGRAPH IN % or CALCULATED VOLUME FLOW BARGRAPH IN % was selected in the ASSIGN function (2600). Use this function to define the format of the bar graph. **Options:** STANDARD (Simple bar graph with 25 / 50 / 75% gradations and integrated sign).  A0001258 SYMMETRY (Symmetrical bar graph for positive and negative directions of flow, with –50 / 0 / +50% gradations and integrated sign).  A0001259 **Factory setting:** STANDARD

5.4.2 Function group MULTIPLEX

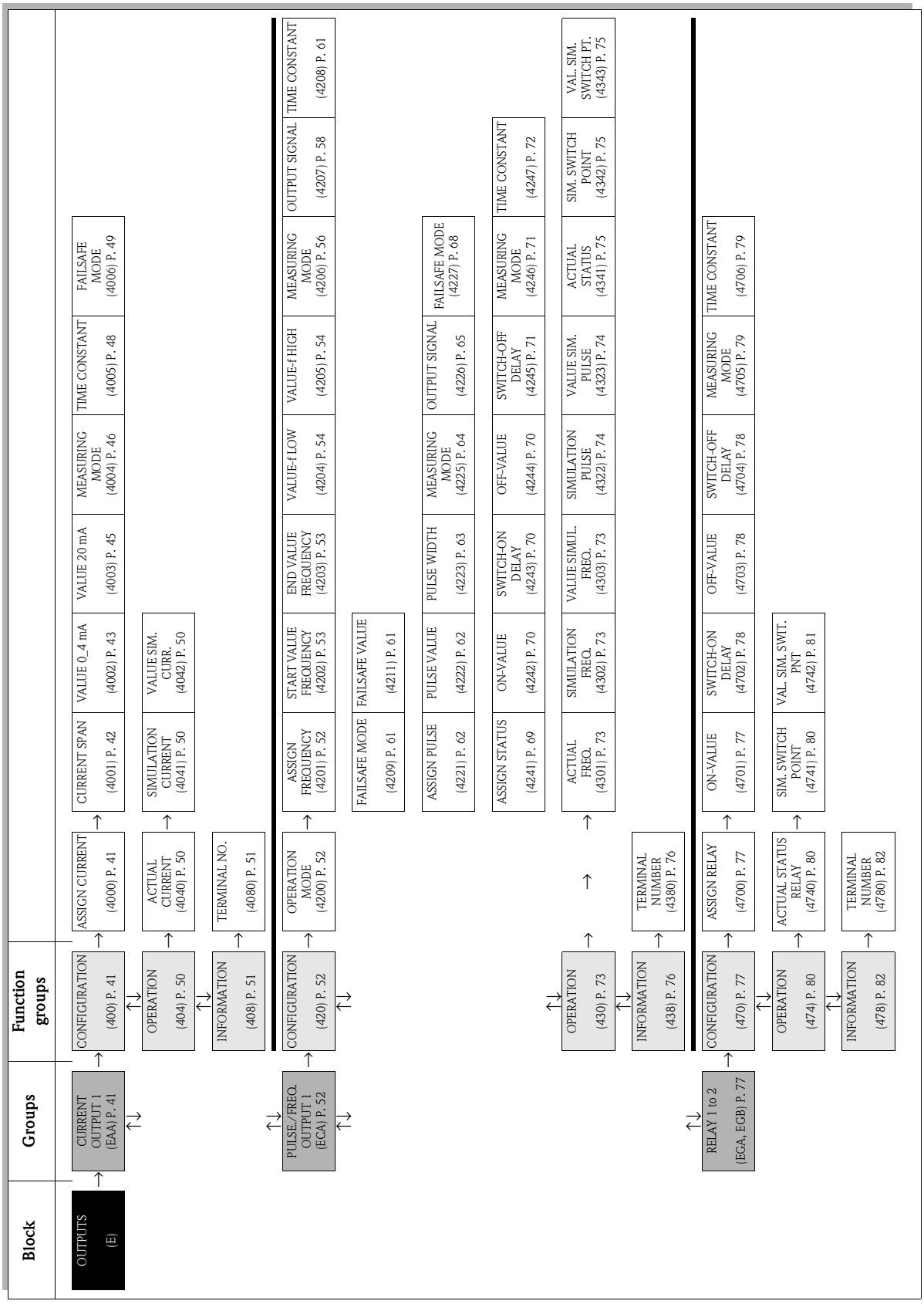


Functional description USER INTERFACE → INFORMATION LINE → MULTIPLEX	
ASSIGN **(2620)**	Use this function to define a second reading to be displayed in the information line alternatively (every 10 seconds) with the reading defined in the ASSIGN function (2600). **Options:** OFF VOLUME FLOW (CH1 to CH2) CALCULATED VOLUME FLOW VOLUME FLOW % (CH1 to CH2) CALCULATED VOLUME FLOW IN % SOUND VELOCITY (CH1 to CH2) SOUND VELOCITY AVERAGE SIGNAL STRENGTH (CH1 to CH2) FLOW VELOCITY (CH1 to CH2) FLOW VELOCITY AVERAGE VOLUME FLOW BARGRAPH IN % (CH1 to CH2) CALCULATED VOLUME FLOW BARGRAPH % (CH1 to CH2) SIGNAL STRENGTH BARGRAPH % (CH1 to CH2) TAG NAME OPERATING/SYSTEM CONDITIONS FLOW DIRECTION (CH1 to CH2) CALCULATED FLOW DIRECTION AI1 to AI8 - OUT VALUE A0 - DISP. VALUE TOT. OUT VALUE 1 to 3 **Factory setting:** OFF ✎ Note! ▪ Multiplex mode is suspended as soon as a fault / notice message is generated. ▪ If a channel is not visible, it does not appear in the options. Channels can be displayed or hidden by means of the MEASUREMENT function (6880). ▪ If the option PROFILE-GSD was selected in the SELECTION GSD function (6140), the following options are not available in this function: AI 3 to AI 8 - OUT VALUE, AO - DISP. VALUE, TOT 2 and TOT 3 - OUT VALUE

Functional description USER INTERFACE → INFORMATION LINE → MULTIPLEX	
100% VALUE (2621)	✎ Note! This function is not available unless one of the following was selected in the ASSIGN function (2400): ■ VOLUME FLOW % ■ VOLUME FLOW BARGRAPH % ■ CALCULATED VOLUME FLOW IN % ■ CALCULATED VOLUME FLOW BARGRAPH % Use this function to define the flow value to be shown on the display as the 100% value. **User input:** 5-digit floating-point number **Factory setting:** Depends on nominal diameter and country, [value] / [dm3 to m3 or US-gal to US-Mgal]. Corresponds to the factory setting for the full scale value (s. Page 126).
FORMAT (2622)	✎ Note! This function is not available unless a number was selected in the ASSIGN function (2600). Use this function to define the maximum number of places after the decimal point for the second value displayed in the information line. **Options:** XXXXX. – XXXX.X – XXX.XX – XX.XXX – X.XXXX **Factory setting:** X.XXXX ✎ Note! ■ Note that this setting only affects the reading as it appears on the display, it has no influence on the accuracy of the system's calculations. ■ The places after the decimal point as computed by the measuring device cannot always be displayed, depending on this setting and the engineering unit. In such instances an arrow appears on the display between the measuring value and the engineering unit (e.g. 1.2 → m^3/h), indicating that the measuring system is computing with more decimal places than can be shown on the display.
DISPLAY MODE (2623)	✎ Note! This function is only available if VOLUME FLOW BARGRAPH IN % or CALCULATED VOLUME FLOW BARGRAPH IN % was selected in the ASSIGN function (2620). Use this function to define the format of the bar graph. **Options:** STANDARD (Simple bar graph with 25 / 50 / 75% gradations and integrated sign).  A0001258 SYMMETRY (Symmetrical bar graph for positive and negative directions of flow, with –50 / 0 / +50% gradations and integrated sign).  A0001259 **Factory setting:** STANDARD

6 Block OUTPUTS

Note!
Block 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**

Functional description OUTPUTS → CURRENT OUTPUT 1 → CONFIGURATION (only with PROFIBUS DP)	
ASSIGN CURRENT OUTPUT (4000)	Use this function to assign a measured variable to the current output. **Options:** OFF VOLUME FLOW (CH1 to CH2) VOLUME FLOW AVERAGE VOLUME FLOW SUM (CH1+CH2) VOLUME FLOW DIFFERENCE (CH1-CH2) SOUND VELOCITY (CH1 to CH2) SOUND VELOC. AVG SIGNAL STRENGTH (CH1 to CH2) FLOW VELOCITY (CH1 to CH2) FLOW VELOCITY AVERAGE **Factory setting:** VOLUME FLOW CH1 ✎ Note! If you select OFF, the only function shown in the CONFIGURATION function group (400) is the function ASSIGN CURRENT OUTPUT (4000).

Functional description

OUTPUTS → CURRENT OUTPUT 1 → CONFIGURATION
(only with PROFIBUS DP)

CURRENT SPAN (4001)

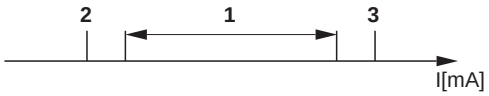
Use this function to define the current span. The selection specifies the operational range and the lower and upper signal on alarm.

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, (see Operating Instructions)

Current span, operational range and signal on alarm level

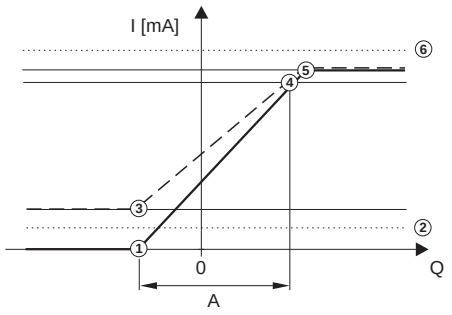


a	1	2	3
0-20 mA (25 mA)	0 - 24 mA	0	25
4-20 mA (25 mA)	4 - 24 mA	2	25
0-20 mA	0 - 20.5 mA	0	22
4-20 mA	4 - 20.5 mA	2	22
4-20 mA NAMUR	3.8 - 20.5 mA	3.5	22.6
4-20 mA US	3.9 - 20.8 mA	3.75	22.6

A0002959

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 (#351–354, current range).
- In case of a fault the behavior of the current output is according to the selected option in the FAILSAFE MODE function (4006).

Functional 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 greater or less than the value assigned to 20 mA, (function VALUE 20 mA (4003)). Positive and negative values are permissible, depending on the measured variable in question (e.g. volume flow). Example: 4 mA assigned value = – 250 l/h 20 mA assigned value = +750 l/h Calculated current value = 8 mA (at zero flow) Note that values with different signs cannot be entered for 0/4 mA and 20 mA (function 4003) if SYMMETRY is the setting selected for the MEASURING MODE function (4004). In this case the message "INPUT RANGE EXCEEDED" appears on the display. Example for STANDARD measuring mode:  A0001223 *① = Initial value (0 to 20 mA)* *② = Lower signal on alarm level: depends on the setting in the CURRENT SPAN function* *③ = Initial value (4 to 20 mA): depends on the setting in the CURRENT SPAN function* *④ = Full scale value (0/4 to 20 mA): depends on the setting in the CURRENT SPAN function* *⑤ = Maximum current value: depends on the setting in the CURRENT SPAN function* *⑥ = Failsafe mode (upper signal on alarm level): depends on the setting in the functions CURRENT SPAN → Page 42 and FAILSAFE MODE → Page 49* *A = Measuring range (the minimum measuring range has to exceed the value that correlates with a flow velocity of 0.3 m/s)* **User input:** 5-digit floating-point number, with sign **Factory setting:** 0 [unit] Note! ■ The appropriate unit is taken from the UNIT VOLUME FLOW function (0402) → Page 14. Caution! The current output responds differently, depending on the parameters set in the various functions. Some examples of parameter settings and their effect on the current output are given in the following section. (continued on next page)

Functional description

OUTPUTS → CURRENT OUTPUT 1 → CONFIGURATION
(only with PROFIBUS DP)

VALUE 0_4 mA
(Continued)

Parameter setting example A:

1. VALUE 0_4 mA (4002) = not equal to zero flow (e.g. –5 m^3/h)
   VALUE 20 mA (4003) = not equal to zero flow (e.g. 10 m^3/h) or
2. VALUE 0_4 mA (4002) = not equal to zero flow (e.g. 100 m^3/h)
   VALUE 20 mA (4003) = not equal to zero flow (e.g. –40 m^3/h)

and
MEASURING MODE (4004) = STANDARD

When you enter the values for 0/4 mA and 20 mA, the working range of the measuring device is defined. If the effective flow drops below or exceeds this working range (see Fig.), a fault/notice message is generated (#351-354, current range) and the current output responds in accordance with the parameter settings in the FAILSAFE MODE function (4006)).

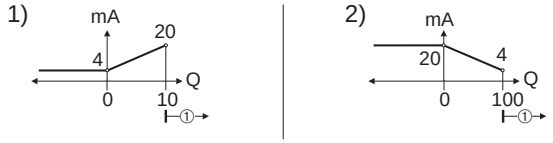
A0001262

Parameter setting example B:

1. VALUE 0_4 mA (4002) = equal to zero flow (e.g. 0 m^3/h)
   VALUE 20 mA (4003) = not equal to zero flow (e.g. 10 m^3/h) or
2. VALUE 0_4 mA (4002) = not equal to zero flow (e.g. 100 m^3/h)
   VALUE 20 mA (4003) = equal to zero flow (e.g. 0 m^3/h)

and
MEASURING MODE (4004) = STANDARD

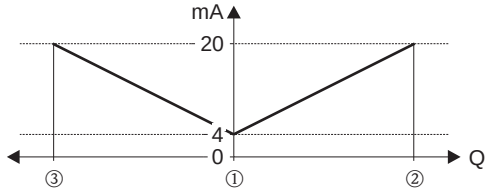
When you enter the values for 0/4 mA and 20 mA, the working range of the measuring device is defined. In doing so, one of the two values is parameterized as zero flow (e.g. 0 m^3/h).
If the effective flow drops below or exceeds the value parameterized as the zero flow, no fault/notice message is generated and the current output retains its value.
If the effective flow drops below or exceeds the other value, a fault/notice message is generated (#351-354, current range) and the current output responds in accordance with the parameter settings in the FAILSAFE MODE function (4006).



A0001264

Deliberately only one flow direction is output with this setting and flow values in the other flow direction are suppressed.

Parameter setting example C:
MEASURING MODE (4004) = SYMMETRY
The current output signal is independent of the direction of flow (absolute amount of the measured variable). The 0_4 mA VALUE ① and the 20 mA VALUE n must have the same sign (+ or -). The "20 mA VALUE" ③ (e.g. backflow) corresponds to the mirrored 20 mA VALUE ② (e.g. flow).

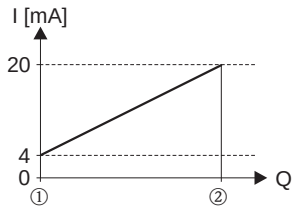
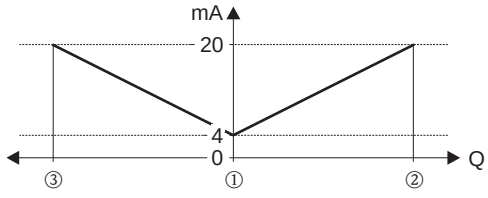


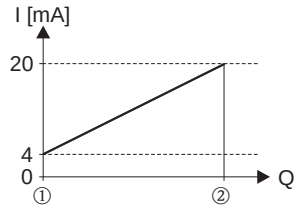
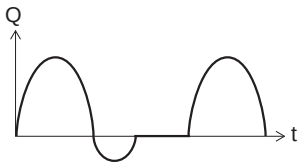
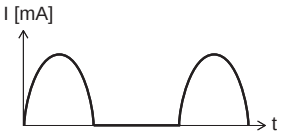
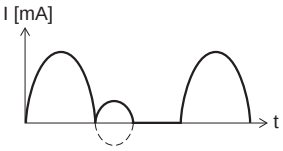
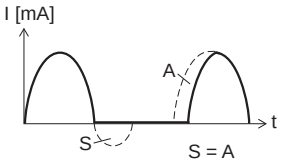
A0001249

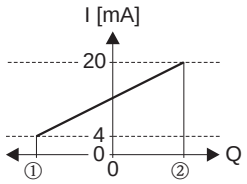
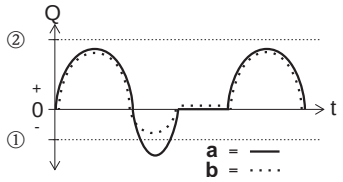
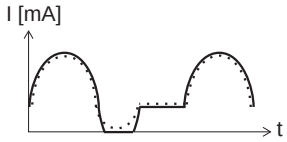
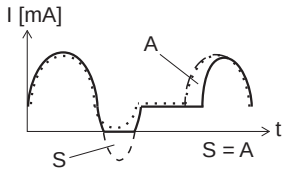
ASSIGN RELAY (4700) = FLOW DIRECTION
With this setting e.g. the flow direction output via a switching contact can be made.

Parameter setting example D:
MEASURING MODE (4004) = PULSATING FLOW → Page 46

Functional 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 greater or less than the value assigned to 0/4 mA, (function VALUE 0_4 mA (4002) → Page 43). Positive and negative values are permissible, depending on the measured variable in question (e.g. volume flow). Example: 4 mA assigned value = – 250 l/h 20 mA assigned value = +750 l/h Calculated current value = 8 mA (at zero flow) Note that values with different signs cannot be entered for 0/4 mA and 20 mA (function 4002) if SYMMETRY is the setting selected for the MEASURING MODE function (4004). In this case the message "INPUT AREA EXCEEDED" appears. Example for STANDARD measuring mode → Page 43. **User input:** 5-digit floating-point number, with sign **Factory setting:** Depends on the setting in the ASSIGN CURRENT OUTPUT function (4000): volume flow: 10 l/s sound velocity: 1800 m/s flow velocity: 10 m/s corresponds to the factory setting for the final value. ✎ Note! The appropriate unit is taken from the UNIT VOLUME FLOW function (0402) . ☝ Caution! It is very important to read and comply with the information in the VALUE 0_4 mA function (under "☝ Caution"; Examples of parameter settings) on Page 43.

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

Functional description OUTPUTS → CURRENT OUTPUT 1 → CONFIGURATION (only with PROFIBUS DP)	
MEASURING MODE (Continued)	■ 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 data cannot be buffered within approx. 60 seconds, a fault or notice message appears. Under certain plant conditions, flow values can aggregate in the buffer, for example in the case of prolonged and unwanted fluid backflow. However, this buffer is reset in all relevant programming adjustments which affect the current output.
Detailed explanations and information	**How the current output responds under the following postulated conditions:** 1. Defined measuring range (① – ②): ① and ② have the **same** sign  A0001248 and the following flow behavior:  A0001265 ■ STANDARD The current output signal is proportional to the measured variable. The flow components outside the scaled measuring range are not taken into account for signal output.  A0001267 ■ SYMMETRY The current output signal is independent of the direction of flow.  A0001268 ■ PULSATING FLOW Flow components outside the measuring range are buffered, balanced and output after a maximum delay of 60 seconds.  A0001269 (continued on next page)

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

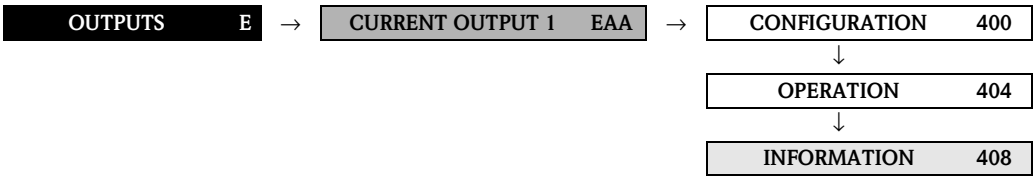
Functional description OUTPUTS → CURRENT OUTPUT 1 → CONFIGURATION (only with PROFIBUS DP)	
FAILSAFE MODE (4006)	For safety reasons it is advisable to ensure that the current output assumes a predefined state in the event of a fault. The setting you select here affects only the current output. It has no effect on other outputs and the display (e.g. totalizers). **Options:** MIN. CURRENT The current output adopts the value of the lower signal on alarm level (as defined in the CURRENT SPAN function (4001) on Page 42). MAX. CURRENT The current output adopts the value of the upper signal on alarm level (as defined in the CURRENT SPAN function (4001) on Page 42). 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

OUTPUTS E → CURRENT OUTPUT 1 EAA → CONFIGURATION 400
↓
OPERATION 404

Functional 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 CURR. (4041)	Use this function to activate simulation of the current output. **Options:** OFF ON **Factory setting:** OFF ✎ Note! ■ The "SIMULATION CURRENT OUTPUT" message indicates that simulation is active. ■ The measuring device continues to measure while simulation is in progress, i.e. the current measured values are output correctly via the other outputs. ☝ Caution! The setting is not saved in the event of a power failure.
VAL. SIM. CURR. (4042)	✎ Note! The function is not visible unless the SIMULATION CURR. function (4041) is active (= ON). Use this function to define a freely selectable value (e.g. 12 mA) to be output at the current output. This value is used to test downstream devices and the measuring device itself. **User input:** 0.00 to 25.00 mA **Factory setting:** 0.00 mA ☝ Caution! The setting is not saved in the event of a power failure.

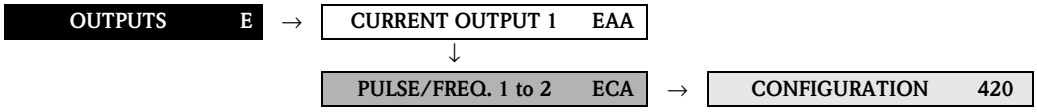
6.1.3 Function group INFORMATION



Functional description OUTPUTS → CURRENT OUTPUT 1 → INFORMATION (only with PROFIBUS DP)	
TERMINAL NO. **(4080)**	Use this function to display the numbers of the terminals (in the connection compartment) which are used by the current output. **Display:** 20 (+) / 21 (–)

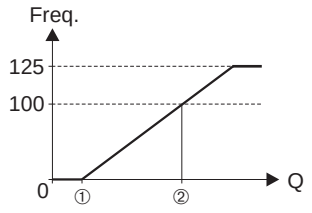
6.2 Group PULSE/FREQUENCY OUTPUT 1

6.2.1 Function group CONFIGURATION



Functional description OUTPUTS → PULSE/FREQUENCY OUTPUT 1 → CONFIGURATION (GENERAL/ FREQUENCY) (only with PROFIBUS DP)	
OPERATION MODE (4200)	Use this function to configure the output as a pulse output, frequency output or status output. The functions available in this function group vary, depending on which option you select here. **Options:** PULSE FREQUENCY STATUS **Factory setting:** PULSE
ASSIGN FREQUENCY (4201)	✎ Note! This function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function (4200). Use this function to assign a measured variable to the frequency output. **Options:** OFF VOLUME FLOW (CH1 to CH2) VOLUME FLOW AVERAGE VOLUME FLOW SUM (CH1+CH2) VOLUME FLOW DIFFERENCE (CH1-CH2) SOUND VELOCITY (CH1 to CH2) SOUND VELOC. AVG SIGNAL STRENGTH (CH1 to CH2) FLOW VELOCITY (CH1 to CH2) FLOW VELOCITY AVERAGE **Factory setting:** VOLUME FLOW CH1 ✎ Note! If you select OFF, the only function shown in the CONFIGURATION function group (420) is the function ASSIGN FREQUENCY (4201).

Functional description OUTPUTS → PULSE/FREQUENCY OUTPUT 1 → CONFIGURATION (FREQUENCY) (only with PROFIBUS DP)	
START VALUE FREQ. (4202)	✎ Note! This function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function (4200). Use this function to define an initial frequency for the frequency output. You define the associated measuring value of the measuring range in the VALUE-f LOW function (4204) on Page 54. **User input:** 5-digit fixed-point number: 0 to 10000 Hz **Factory setting:** 0 Hz Example: ■ VALUE- f LOW = 0 l/h, initial frequency = 0 Hz: i.e. a frequency of 0 Hz is output at a flow of 0 l/h. ■ VALUE-f LOW = 1 l/h, initial frequency = 10 Hz: i.e. a frequency of 10 Hz is output at a flow of 1 l/h.
END VALUE FREQ. (4203)	✎ Note! This function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function (4200). Use this function to define an end frequency for the frequency output. You define the associated measuring value of the measuring range in the VALUE-f HIGH function (4205) on Page 54. **User input:** 5-digit fixed point number 2 to 10000 Hz **Factory setting:** 10000 Hz Example: ■ VALUE-f HIGH = 1000 l/h, full scale frequency = 1000 Hz: i.e. at a flow of 1000 l/h, a frequency of 1000 Hz is output. ■ VALUE-f HIGH = 3600 l/h, full scale frequency = 1000 Hz: i.e. at a flow of 3600 l/h, a frequency of 1000 Hz is output. ✎ 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.

Functional description OUTPUTS → PULSE/FREQUENCY OUTPUT 1 → CONFIGURATION (FREQUENCY) (only with PROFIBUS DP)	
VALUE-f LOW (4204)	✎ Note! This function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function (4200). Use this function to assign a value to the start value frequency (4202). The value can be higher or lower than the value assigned to the VALUE-f HIGH. Positive and negative values are permissible, depending on the measured variable in question (e.g. volume flow). You define a measuring range by defining the VALUE F LOW and VALUE-f HIGH values. **User input:** 5-digit floating-point number **Factory setting:** 0 [unit] ✎ Note! ▪ For a graphic illustration of the VALUE-f LOW (see the VALUE-f HIGH function). ▪ The appropriate unit is taken from the UNIT VOLUME FLOW function (0402) → Page 14.
VALUE-f HIGH (4205)	✎ Note! This function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function (4200). Use this function to assign a value to the end value frequency (4203). The value can be higher or lower than the value assigned to the VALUE-f LOW. Positive and negative values are permissible, depending on the measured variable in question (e.g. volume flow). You define a measuring range by defining the VALUE-f LOW and VALUE-f HIGH values. **User input:** 5-digit floating-point number **Factory setting:** Depends on the setting in the ASSIGN FREQUENCY function (4201): volume flow: 10 l/s sound velocity: 1800 m/s flow velocity: 10 m/s corresponds to the factory setting for the final value. ✎ 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.  A0001279 ① = Value-f low ② = Value-f high (continued on next page)

Functional description

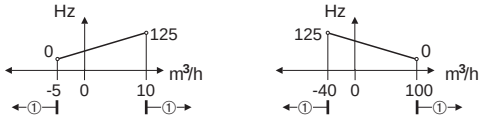
OUTPUTS → PULSE/FREQUENCY OUTPUT 1 → CONFIGURATION (FREQUENCY)
(only with PROFIBUS DP)

VALUE-f HIGH
(Continued)

Parameter setting example 1:
1. VALUE-f LOW (4204) = not equal to zero flow (e.g. –5 m^3/h)
   VALUE-f HIGH (4205) = not equal to zero flow (e.g. 10 m^3/h) or
2. VALUE-f LOW (4204) = not equal to zero flow (e.g. 100 m^3/h)
   VALUE-f HIGH (4205) = not equal to zero flow (e.g. –40 m^3/h)

and MEASURING MODE (4004) = STANDARD

When you enter the values for VALUE-f LOW and VALUE-f HIGH the working range of the measuring device is defined. If the effective flow drops below or exceeds this working range (see Fig.), a fault or notice message is generated (#355-358, frequency range) and the frequency output responds in accordance with the parameter settings in the FAILSAFE MODE function (4209)..

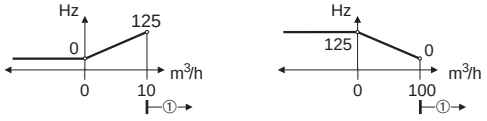


a0001276

Parameter setting example 2:
1. VALUE-f LOW (4204) = not equal to zero flow (e.g. 0 m^3/h)
   VALUE-f HIGH (4205) = not equal to zero flow (e.g. 10 m^3/h) or
2. VALUE-f LOW (4204) = not equal to zero flow (e.g. 100 m^3/h)
   VALUE-f HIGH (4205) = not equal to zero flow (e.g. 0 m^3/h)

and MEASURING MODE (4004) = STANDARD

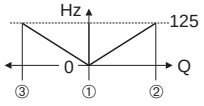
When you enter the values for VALUE-f LOW and VALUE-f HIGH the working range of the measuring device is defined. In doing so, one of the two values is parameterized as zero flow (e.g. 0 m^3/h).
If the effective flow drops below or exceeds the value parameterized as the zero flow, no fault/notice message 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 range) and the frequency output responds in accordance with the parameters set in the FAILSAFE MODE function (4209).



A0001277

Deliberately only one flow direction is output with this setting and flow values in the other flow direction are suppressed.

Parameter setting example 3:
MEASURING MODE (4206) = SYMMETRY
The frequency output signal is independent of the direction of flow (absolute amount of the measured variable). The VALUE-f LOW ① and VALUE-f HIGH ② must have the same sign (+ or -). The "VALUE-f HIGH" ③ (e.g. backflow) corresponds to the mirrored VALUE-f HIGH ② (e.g. flow).



A0001278

ASSIGN RELAY (4700) = FLOW DIRECTION
With this setting e.g. the flow direction output via a switching contact can be made.

Parameter setting example 4:
MEASURING MODE (4004) = PULSATING FLOW → Page 46 ff.

Functional description

OUTPUTS → PULSE/FREQUENCY OUTPUT 1 → CONFIGURATION (FREQUENCY)
(only with PROFIBUS DP)

MEASURING MODE (4206)

✎ Note!
This function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function (4200).

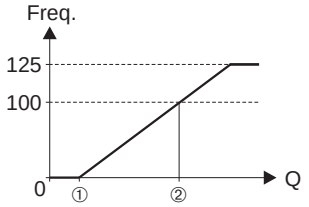
Use this function to define the measuring mode for the frequency output.

Options:
STANDARD
SYMMETRY
PULSATING FLOW

Factory setting
STANDARD

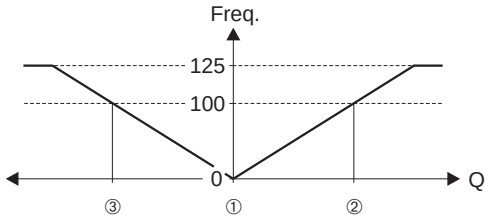
Description of the individual options:

- STANDARD
  The frequency output signal is proportional to the measured variable. The flow components outside the scaled measuring range (defined by the VALUE-f LOW ① and 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 m^3/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 FAILSAFE MODE function (4209).
  – If both values are defined as not equal to the zero flow (for example VALUE-f LOW = –5 m^3/h; VALUE-f HIGH = 10 m^3/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 setting in the FAILSAFE MODE function (4209).



A0001279

- SYMMETRY
  The frequency output signal is independent of the direction of flow (absolute amount of the measured variable). The VALUE-f LOW ① and VALUE-f HIGH ② must have the same sign (+ or -). The VALUE-f HIGH ③ (e.g. backflow) corresponds to the mirrored VALUE-f HIGH ② (e.g. flow).



A0001280

✎ Note!

- The direction of flow can be output via the configurable relay or status outputs.
- SYMMETRY cannot be selected unless the values in the VALUE-f LOW (4204) and VALUE-f HIGH (4205) functions have the same sign or one of the values is zero. If the signs of the two values differ, SYMMETRY cannot be selected and an "ASSIGNMENT NOT POSSIBLE" message is issued.

(continued on next page)

Functional description OUTPUTS → PULSE/FREQUENCY OUTPUT 1 → CONFIGURATION (FREQUENCY) (only with PROFIBUS DP)	
MEASURING MODE (Continued)	■ 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 data cannot be buffered within approx. 60 seconds, a fault or 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.

Functional description

OUTPUTS → PULSE/FREQUENCY OUTPUT 1 → CONFIGURATION (FREQUENCY)
(only with PROFIBUS DP)

OUTPUT SIGNAL (4207)

✎ Note!
Function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function (4200).

For selecting the output configuration of the frequency output.

Options:
PASSIVE - POSITIVE
PASSIVE - NEGATIVE
ACTIVE - POSITIVE
ACTIVE - NEGATIVE

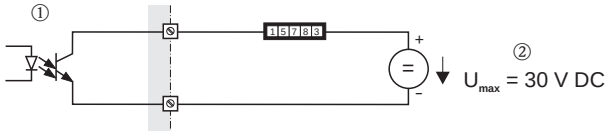
Factory setting: PASSIVE - POSITIVE

Explanation
- PASSIVE = power is supplied to the frequency output by means of an external power supply.
- ACTIVE = power is supplied to the frequency output by means of the device-internal power supply.

Configuring the output signal level (POSITIVE or NEGATIVE) determines the quiescent behavior (at zero flow) of the frequency output.
The internal transistor is activated as follows:
- If POSITIVE is selected, the internal transistor is activated with a **positive** signal level.
- If NEGATIVE is selected, the internal transistor is activated with a **negative** signal level (0 V).

✎ Note!
With the passive output configuration, the output signal levels of the frequency output depend on the external circuit (see examples).

Example for passive output circuit (PASSIVE)
If PASSIVE is selected, the frequency output is configured as an open collector.

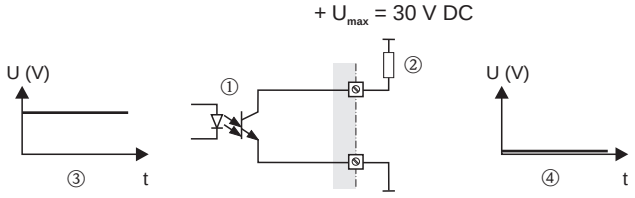


A0001225

m = Open Collector
n = External power supply

✎ Note!
For continuous currents up to 25 mA (I_{max} = 250 mA / 20 ms).

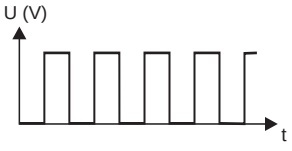
Example for output configuration PASSIVE-POSITIVE:
Output configuration with an external pull-up resistance.
In the quiescent state (at zero flow), the output signal level at the terminals is 0 V.



A0004687

m = Open Collector
n = Pull-Up-Resistance
③ = Transistor activation in "POSITIVE" quiescent state (at zero flow)
④ = Output signal level in quiescent state (at zero flow)

In the operating status (flow present), the output signal level changes from 0 V to a positive voltage level.



A0001975

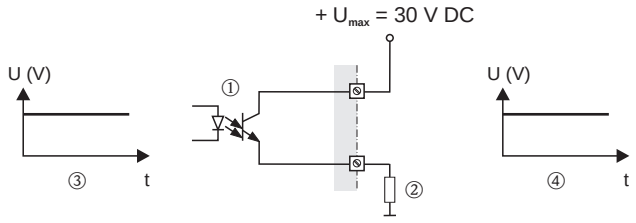
(continued on next page)

Functional description

OUTPUTS → PULSE/FREQUENCY OUTPUT 1 → CONFIGURATION (FREQUENCY)
(only with PROFIBUS DP)

OUTPUT SIGNAL
(Continued)

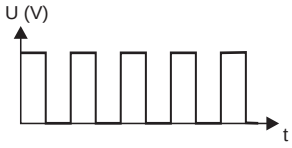
Example for output configuration PASSIVE-POSITIVE:
Output configuration with an external pull-down resistance.
In the quiescent state (at zero flow), a positive voltage level is measured via the pull-down resistance.



A0004689

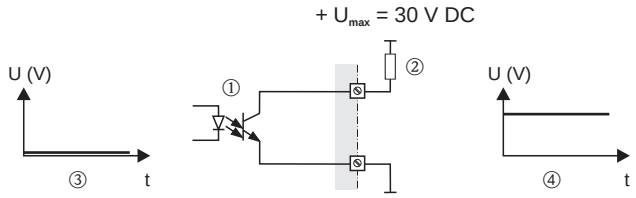
m = Open Collector
n = Pull-Down-Resistance
③ = Transistor activation in "POSITIVE" quiescent state (at zero flow)
④ = Output signal level in quiescent state (at zero flow)

In the operating status (flow present), the output signal level changes from a positive voltage level to 0 V.



A0001981

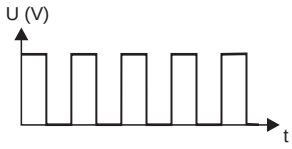
Example for output configuration PASSIVE-NEGATIVE:
Output configuration with an external pull-up resistance.
In the quiescent state (at zero flow), the output signal level at the terminals is at a positive voltage level.



A0004690

m = Open Collector
n = 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

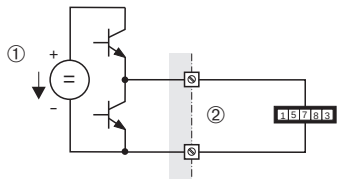
(continued on next page)

Functional description

OUTPUTS → PULSE/FREQUENCY OUTPUT 1 → CONFIGURATION (FREQUENCY)
(only with PROFIBUS DP)

OUTPUT SIGNAL
(Continued)

Example for active output circuit (ACTIVE):
With an active circuit, the internal power supply is 24 V.
The frequency output is short-circuit proof.



A0004691

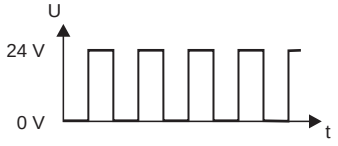
① = *24 V DC internal power supply*
② = *Short-circuit proof output*

The signal levels are to be seen as analogous to the passive circuit.

The following applies for the output configuration **ACTIVE-POSITIVE**:
In the quiescent state (at zero flow), the output signal level at the terminals is 0 V.

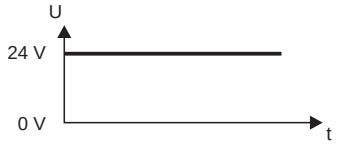
A0004694

In the operating status (flow present), the output signal level changes from 0 V to a positive voltage level.



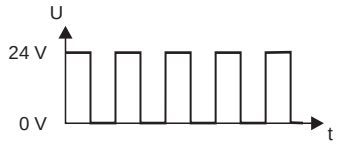
A0004692

The following applies for the output configuration **ACTIVE-NEGATIVE**:
In the quiescent state (at zero flow), the output signal level at the terminals is at a positive voltage level.



A0006493

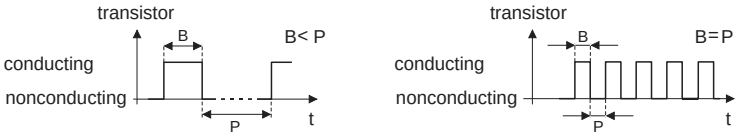
In the operating status (flow present), the output signal level changes from a positive voltage level to 0 V.



A0004710

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

Functional description OUTPUTS → PULSE/FREQUENCY OUTPUT 1 → CONFIGURATION (PULSE) (only with PROFIBUS DP)	
ASSIGN PULSE (4221)	✎ Note! This function is not available unless the PULSE setting was selected in the OPERATION MODE function (4200). Use this function to assign a measured variable to the pulse output. **Options:** OFF VOLUME FLOW (CH1 to CH2) VOLUME FLOW AVERAGE VOLUME FLOW SUM (CH1+CH2) VOLUME FLOW DIFFERENCE (CH1-CH2) **Factory setting:** VOLUME FLOW CH1 ✎ Note! If you select OFF, the only function shown in the CONFIGURATION function group is the ASSIGN PULSE function (4221).
PULSE VALUE (4222)	✎ Note! This function is not available unless the PULSE setting was selected in the OPERATION MODE function (4200). Use this function to define the flow at which a pulse is triggered. These pulses can be totaled by an external totalizer and in this way the total flow since measuring commenced can be registered. **User input:** 5-digit floating-point number, [unit] **Factory setting:** 1 l/pulse ✎ Note! The appropriate unit is taken from the UNIT VOLUME function (0403) → Page 15.

Functional description OUTPUTS → PULSE/FREQUENCY OUTPUT 1 → CONFIGURATION (PULSE) (only with PROFIBUS DP)	
PULSE WIDTH (4223)	✎ Note! This function is not available unless the PULSE setting was selected in the OPERATION MODE function (4200). Use this function to enter the pulse width of the output pulse. **User input:** 0.05 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 B = Pulse width entered (the illustration applies to positive pulses) P= Intervals between the individual pulses ✎ Note! When entering the pulse width, select a value that can still be processed by an external totalizer (e.g. mechanical totalizer, PLC, etc.) . ☞ Caution! If the pulse number or frequency resulting from the pulse value entered, (see the PULSE VALUE function (4222) on Page 62) and from the current flow is too large to maintain the pulse width selected (the interval P is smaller than the pulse width B entered), a system error message (# 359-362, pulse memory) is generated after buffering/balancing has occurred.

Functional description OUTPUTS → PULSE/FREQUENCY OUTPUT 1 → CONFIGURATION (PULSE) (only with PROFIBUS DP)	
MEASURING MODE (4225)	✎ Note! This function is not available unless the PULSE setting was selected in the OPERATION MODE function (4200). Use this function to define the measuring mode for the pulse output. **Options:** STANDARD Only positive flow components are 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 data cannot be buffered within approx. 60 seconds, a fault or 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

Functional 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 function (4200).

For selecting the output configuration of the pulse output.

Options:
PASSIVE - POSITIVE
PASSIVE - NEGATIVE
ACTIVE - POSITIVE
ACTIVE - NEGATIVE

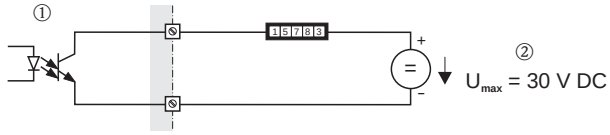
Factory setting: PASSIVE - POSITIVE

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.

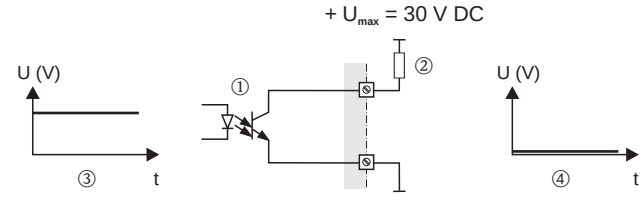


A0001225

m = Open Collector
n = 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

m = Open Collector
n = Pull-Up-Resistance
③ = Transistor activation in "POSITIVE" quiescent state (at zero flow)
④ = Output signal level in quiescent state (at zero flow)

In the operating status (flow present), the output signal level changes from 0 V to a positive voltage level.

A0001975

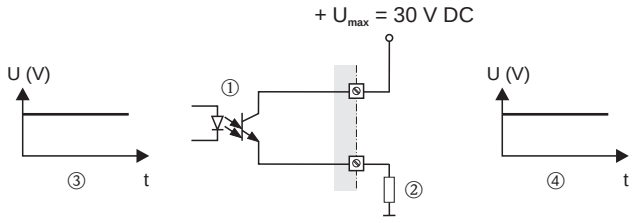
(continued on next page)

Functional description

OUTPUTS → PULSE/FREQUENCY OUTPUT 1 → CONFIGURATION (PULSE)
(only with PROFIBUS DP)

OUTPUT SIGNAL
(Continued)

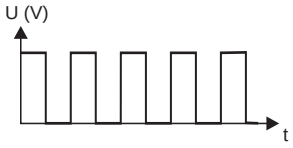
Example for output configuration PASSIVE-POSITIVE:
Output configuration with an external pull-down resistance.
In the quiescent state (at zero flow), a positive voltage level is measured via the pull-down resistance.



A0004689

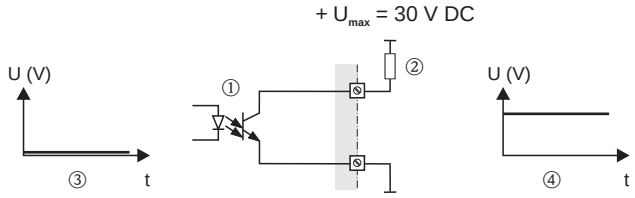
m = Open Collector
n = Pull-Down-Resistance
③ = Transistor activation in "POSITIVE" quiescent state (at zero flow)
④ = Output signal level in quiescent state (at zero flow)

In the operating status (flow present), the output signal level changes from a positive voltage level to 0 V.



A0001981

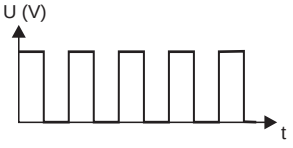
Example for output configuration PASSIVE-NEGATIVE:
Output configuration with an external pull-up resistance.
In the quiescent state (at zero flow), the output signal level at the terminals is at a positive voltage level.



A0004690

m = Open Collector
n = 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

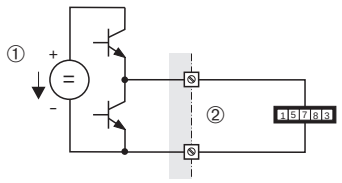
(continued on next page)

Functional description

OUTPUTS → PULSE/FREQUENCY OUTPUT 1 → CONFIGURATION (PULSE)
(only with PROFIBUS DP)

OUTPUT SIGNAL
(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.

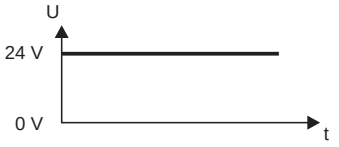
The following applies for the output configuration **ACTIVE-POSITIVE**:
In the quiescent state (at zero flow), the output signal level at the terminals is 0 V.

A0004694

In the operating status (flow present), the output signal level changes from 0 V to a positive voltage level.

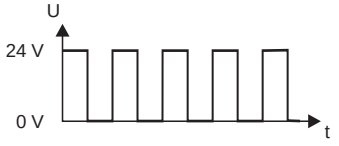
A0004692

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.

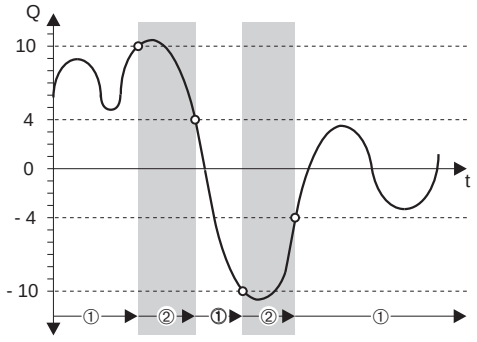


A0004710

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

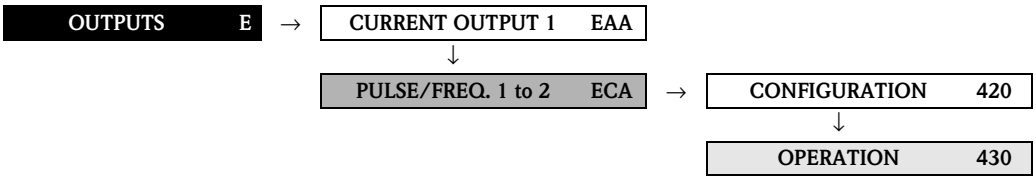
Functional description OUTPUTS→ PULSE/FREQUENCY OUTPUT 1 → CONFIGURATION (STATUS) (only with PROFIBUS DP)	
ASSIGN STATUS (4241)	✎ Note! This function is not available unless the STATUS setting was selected in the OPERATION MODE function (4200). Use this function to assign a switching function to the status output. **Options:** OFF ON (operation) FAULT MESSAGE FAILURE (CH1 to CH2) NOTICE MESSAGE FAULT MESSAGE & NOTICE MESSAGE LIMIT TOTALIZER (1 to 3) FLOW DIRECTION (CH1 to CH2) FLOW DIRECTION AVERAGE FLOW DIRECTION SUM FLOW DIRECTION DIFFERENCE LIMIT VOLUME FLOW (CH1 to CH2) LIMIT VOLUME FLOW AVERAGE LIMIT VOLUME FLOW SUM LIMIT VOLUME FLOW DIFFERENCE LIMIT SOUND VELOCITY (CH1 to CH2) LIMIT SOUND VELOCITY AVERAGE LIMIT SIGNAL STRENGTH (CH1 to CH2) LIMIT FLOW VELOCITY (CH1 to CH2) LIMIT AVERAGE FLOW VELOCITY ✎ Note! ■ The following settings/entries must be made to ensure correct and immediate signal output: – Function SWITCH-ON DELAY (4243) = 0 ms → Page 70 – Function SWITCH-OFF DELAY (4245) = 0 ms → Page 71 – Function TIME CONSTANT (4247) = 0 ms → Page 72 ■ The ASSIGN operating mode contains a channel-specific option for the fault messages: – FAULT MESSAGE – all faults are displayed (gen. faults, channel-specific faults for CH1 and channel-specific faults for CH2) – FAULT CH1 – faults affecting channel 2 are not displayed (only gen. faults and channel-specifics faults for CH1) – FAULT CH2 – faults affecting channel 1 are not displayed (only gen. faults and channel-specifics faults for CH2) **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. ■ If you select OFF, the only function shown in the CONFIGURATION function group is the ASSIGN STATUS function (4241).

Functional description OUTPUTS→ PULSE/FREQUENCY OUTPUT 1 → CONFIGURATION (STATUS) (only with PROFIBUS DP)	
ON-VALUE (4242)	✎ Note! This function is not available unless STATUS was selected in the OPERATION MODE function (4200) and LIMIT VALUE or FLOW DIRECTION was selected in the ASSIGN STATUS function (4241). Use this function to assign a value to the switch-on point (activation of the status output). The value can be equal to, greater than or less than the switch-off point. Positive or negative values are permissible, depending on the measured variable in question (e.g. volume flow). **User input:** 5-digit floating-point number, [unit] **Factory setting:** 0 [unit] ✎ Note! ■ The appropriate unit is taken from the UNIT VOL. FLOW function (0402). ■ 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! This function is not available unless STATUS was selected in the OPERATION MODE function (4200) and LIMIT VALUE or FLOW DIRECTION was selected in the ASSIGN STATUS function (4241). Use this function to specify a delay (0 to 100 seconds) for switching on the status output (i.e. signal changes from 0 to 1). The delay starts when the limit value is reached. The status output does switch when the delay has timed out and the switch-on condition has been valid over the delay time. **User input:** fixed point number: 0.0 to 100.0 s **Factory setting:** 0.0 s
OFF-VALUE (4244)	✎ Note! This function is not available unless STATUS was selected in the OPERATION MODE function (4200) and LIMIT VALUE was selected in the ASSIGN STATUS function (4241). Use this function to assign a value to the switch-off point (deactivation of the status output). The value can be equal to, greater than or less than the switch-on point. Positive and negative values are permissible, depending on the measured variable in question (e.g. volume flow). **User input:** 5-digit floating-point number, [unit] **Factory setting:** 0 [unit] ✎ Note! ■ The appropriate unit is taken from the UNIT VOLUME FLOW function (0402) . ■ If SYMMETRY is the setting selected in the MEASURING MODE function (4246) and values with different signs are entered for the switch-on and switch-off points, an "INPUT RANGE EXCEEDED" message is issued.

Functional description OUTPUTS→ PULSE/FREQUENCY OUTPUT 1 → CONFIGURATION (STATUS) (only with PROFIBUS DP)	
SWITCH-OFF DELAY (4245)	✎ Note! This function is not available unless the STATUS setting was selected in the OPERATION MODE function (4200). Use this function to define a delay (0 to 100 seconds) for switching off the status output (i.e. signal changes from 1 to 0). The delay starts when the limit value is reached. The status output does switch when the delay has timed out and the switch condition has been valid over the delay time. **User input:** Fixed point number 0.0 to 100.0 s **Factory setting:** 0.0 s
MEASURING MODE (4246)	✎ Note! This function is not available unless the STATUS setting 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 Example for the SYMMETRY measuring mode: On-value: Q = 4, off-value: Q = 10 ① = Status output switched on (conductive) ② = Status output switched off (not conductive)  A0001247 ✎ Note! ■ SYMMETRY cannot be selected unless the values in the ON-VALUE (4242) and OFF-VALUE (4244) functions have the same sign or one of the values is zero. ■ If the signs of the two values differ, SYMMETRY cannot be selected and an "ASSIGNMENT NOT POSSIBLE" message is issued.

Functional description OUTPUTS→ PULSE/FREQUENCY OUTPUT 1 → CONFIGURATION (STATUS) (only with PROFIBUS DP)	
TIME CONSTANT (4247)	✎ Note! This function is not available unless the STATUS setting was selected in the OPERATION MODE function (4200). Use this function to enter a time constant defining how the measuring signal reacts to severely fluctuating measured variables, either very quickly (enter a low time constant) or with damping (enter a high time constant). Damping acts on the measuring signal before the switch status changes, and consequently before switch-on or switch-off delay is activated. The purpose of damping, therefore, is to prevent the status output changing state continuously in response to fluctuations in flow. **User input:** Fixed point number 0.00 to 100.00 s **Factory setting:** 0.00 s

6.2.2 Function group OPERATION

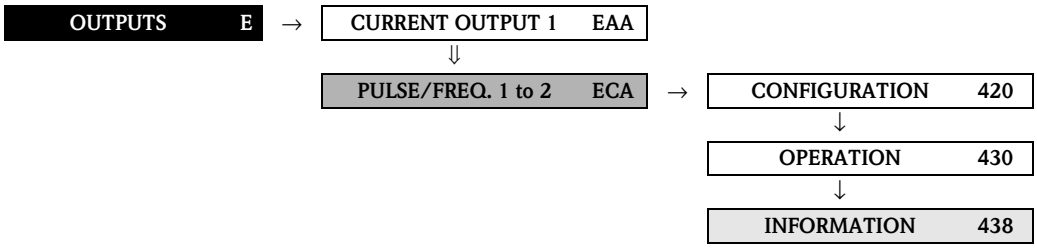


Functional description OUTPUTS→ PULSE/FREQUENCY OUTPUT 1 → OPERATION (FREQUENCY) (only with PROFIBUS DP)	
ACTUAL FREQUENCY (4301)	✎ Note! This function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function (4200). Use this function to view the computed value of the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

Functional description OUTPUTS→ PULSE/FREQUENCY OUTPUT 1 → OPERATION (PULSE) (only with PROFIBUS DP)	
SIMULATION PULSE (4322)	✎ Note! This function is not available unless the PULSE setting was selected in the OPERATION MODE function. Use this function to activate simulation of the pulse output. **Options:** OFF COUNTDOWN The pulses specified in the VALUE SIMULATION PULSE function are output. CONTINUOUSLY Pulses are continuously output with the pulse width specified in the PULSE WIDTH function. Simulation is started once the CONTINUOUSLY option is confirmed with the 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! This 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…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.

Functional description OUTPUTS→ PULSE/FREQUENCY OUTPUT 1 → OPERATION (PULSE) (only with PROFIBUS DP)	
ACTUAL STATUS (4341)	✎ Note! This function is not available unless the STATUS setting was selected in the OPERATION MODE function (4200). Use this function to check the current status of the status output. **Display:** NOT CONDUCTIVE CONDUCTIVE
SIM. SWITCH POINT (4343)	✎ Note! This function is not available unless the STATUS setting was selected in the OPERATION MODE function (4200). Use this function to activate simulation of the status output. **Options:** OFF ON **Factory setting:** OFF ✎ Note! ▪ The "SIMULATION SWITCH POINT" 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 SIM. SWITCH POINT (4343)	✎ Note! This function is not available unless STATUS was selected in the OPERATION MODE function (4200) and the SIMULATION SWITCH POINT function (4342) is active (= ON). Use this function to define the switching response of the status output during the simulation. This value is used to test downstream devices and the measuring device itself. **Options:** NOT CONDUCTIVE CONDUCTIVE **Factory setting:** NOT CONDUCTIVE ☞ Caution! The setting is not saved in the event of a power failure.

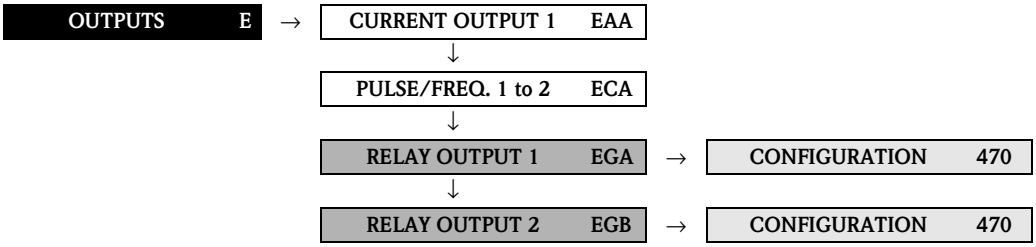
6.2.3 Function group INFORMATION



Functional description OUTPUTS → PULSE/FREQUENCY OUTPUT 1 → INFORMATION (only with PROFIBUS DP)	
TERMINAL NO. **(4380)**	Use this function to display the numbers of the terminals (in the connection compartment) which are used by the pulse/frequency output. **Display:** 22 (+) / 23 (–)

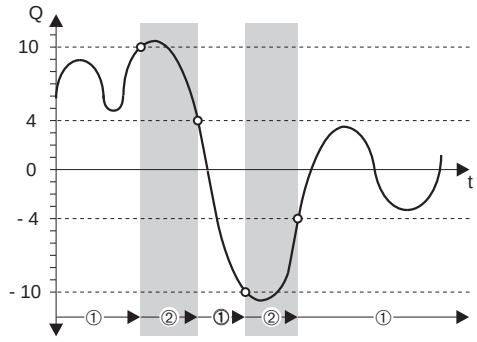
6.3 Group RELAY OUTPUT (1 to 2)

6.3.1 Function group CONFIGURATION

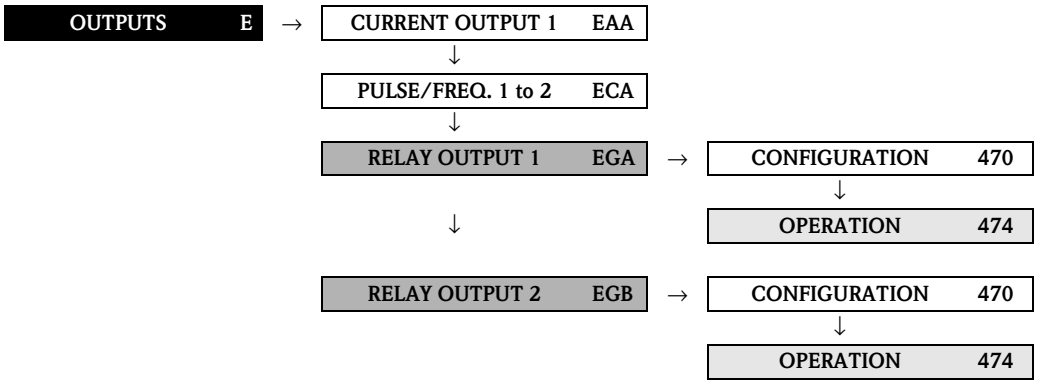


Functional description OUTPUTS → RELAY OUTPUT (1 to 2) → CONFIGURATION (only with PROFIBUS DP)	
ASSIGN RELAY (4700)	Use this function to assign a switching function to the relay output. **Options:** OFF ON (operation) FAULT MESSAGE FAULT MESSAGE & NOTICE MESSAGE LIMIT TOTALIZER (1 to 3) FAILURE (CH1 to CH2) FLOW DIRECTION (CH1 to CH2) FLOW DIRECTION AVERAGE FLOW DIRECTION SUM FLOW DIRECTION DIFFERENCE LIMIT VOLUME FLOW (CH1 to CH2) LIMIT VOLUME FLOW AVERAGE LIMIT VOLUME FLOW SUM LIMIT VOLUME FLOW DIFFERENCE LIMIT SOUND VELOCITY (CH1 to CH2) LIMIT SOUND VELOCITY AVERAGE LIMIT SIGNAL STRENGTH (CH1 to CH2) LIMIT FLOW VELOCITY (CH1 to CH2) LIMIT AVERAGE FLOW VELOCITY **Factory setting:** FAULT MESSAGE
ON-VALUE (4701)	✎ Note! This function is not available unless LIMIT 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 equal to, greater than or less than the switch-off point. Positive or negative values are permissible, depending on the measured variable in question (e.g. volume flow). **User input:** 5-digit floating-point number, [unit] **Factory setting:** 0 [unit] ✎ Note! ■ The appropriate unit is taken from the UNIT VOLUME FLOW function (0402) . ■ 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.

Functional description OUTPUTS → RELAY OUTPUT (1 to 2) → CONFIGURATION (only with PROFIBUS DP)	
SWITCH-ON DELAY (4702)	✎ Note! This function is not available unless LIMIT 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 condition has been valid throughout the delay time. **User input:** Fixed point number 0.0 to 100.0 s **Factory setting:** 0.0 s
OFF-VALUE (4703)	✎ Note! This function is not available unless LIMIT was selected in the ASSIGN RELAY function (4700). Use this function to assign a value to the switch-off point (relay drops out). The value can be equal to, greater than or less than the switch-on point. Positive or negative values are permissible, depending on the measured variable in question (e.g. volume flow). **User input:** 5-digit floating-point number, [unit] **Factory setting:** 0 [unit] ✎ Note! ■ The appropriate unit is taken from the UNIT VOLUME FLOW function (0402) . ■ If SYMMETRY is the setting selected in the MEASURING MODE function (4705) and values with different signs are entered for the switch-on and switch-off points, an "INPUT RANGE EXCEEDED" message is issued.
SWITCH-OFF DELAY (4704)	✎ Note! This function is not available unless LIMIT 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 condition has been valid throughout the delay time. **User input:** Fixed point number 0.0 to 100.0 s **Factory setting:** 0.0 s

Functional 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 switching 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 Example for the SYMMETRY measuring mode: Switch-on point Q = 4 Switch-off point Q = 10 m = Relay energized n = Relay de-energized  A0001247 ✎ 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 signs of the two values differ, SYMMETRY cannot be selected and an "ASSIGNMENT NOT POSSIBLE" message is issued.
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

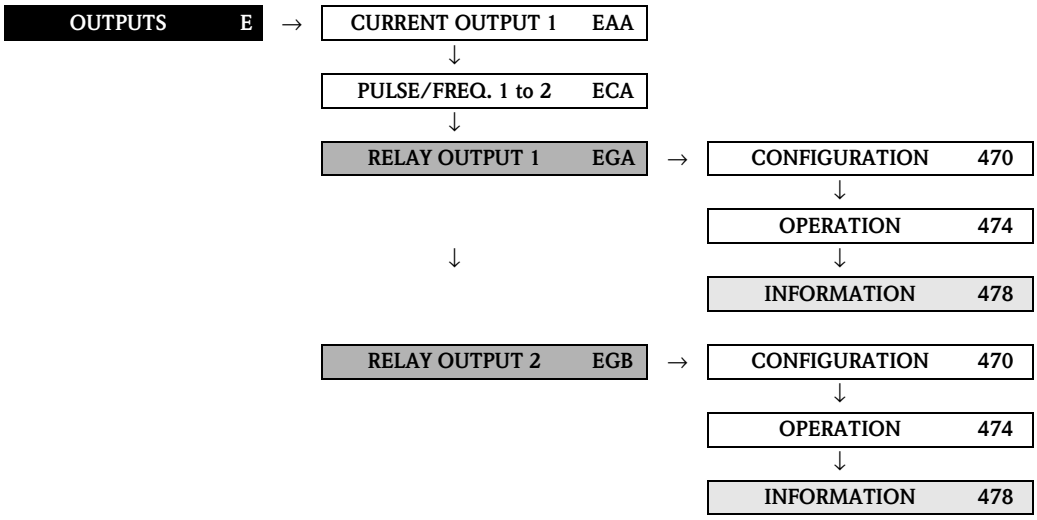
6.3.2 Function group OPERATION



Functional description OUTPUTS → RELAY OUTPUT (1 to 2) → OPERATION (only with PROFIBUS DP)	
ACTUAL STATUS RELAY OUTPUT (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 the Operating Instructions for Prosonic 93 PROFIBUS DP/PA, BA076 D. **Display:** BREAK CONTACT OPEN BREAK CONTACT CLOSED MAKE CONTACT OPEN MAKE CONTACT CLOSED
SIM. SWITCH POINT (4741)	Use this function to activate simulation of the relay output. **Options:** OFF ON **Factory setting:** OFF Note! ■ The "SIMULATION RELAY" message indicates that simulation is active. ■ The measuring device continues to measure while simulation is in progress, i.e. the current measured values are output correctly via the other outputs. Caution! The setting is not saved in the event of a power failure.

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

6.3.3 Function group INFORMATION

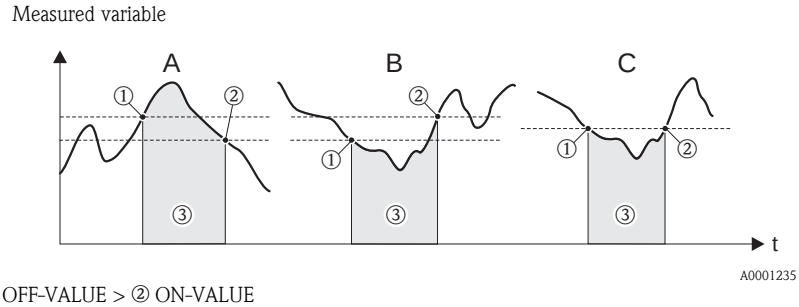


Functional description OUTPUTS → RELAY OUTPUT (1 to 2) → INFORMATION (only with PROFIBUS DP)	
TERMINAL NO. **(4780)**	Use this function to display the numbers of the terminals (in the connection compartment) which are used by the relay output. **Display:** 22 (+) / 23 (–) →RELAY OUTPUT 1 20 (+) / 21 (–) → RELAY OUTPUT 2

6.3.4 Response of the relay output

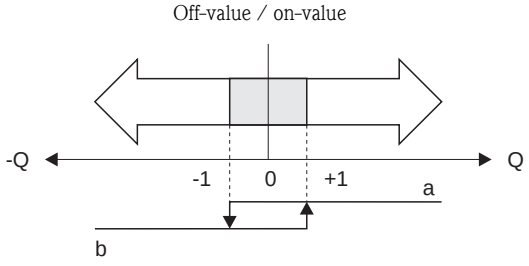
General
If you have configured the relay output signal for “LIMIT VALUE” or “FLOW DIRECTION”, you can define the requisite switch points in the ON-VALUE and OFF-VALUE functions. When the measured variable in question reaches one of these predefined values, the relay output switches as shown in the illustrations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

Relay output configured for limit value
The relay or status output switches as soon as the measured variable undershoots or overshoots a defined switch point.
Application: Monitoring flow or process-related boundary conditions.



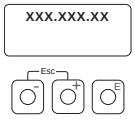
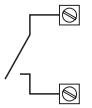
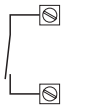
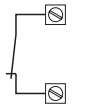
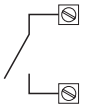
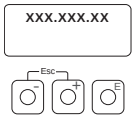
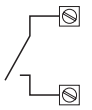
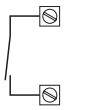
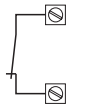
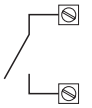
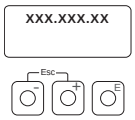
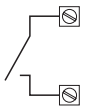
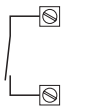
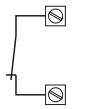
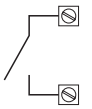
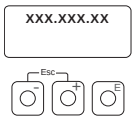
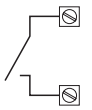
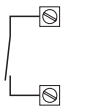
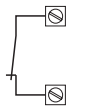
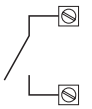
A = Maximum safety → ① OFF-VALUE > ② ON-VALUE
B = Minimum safety → ① OFF-VALUE < ② ON-VALUE
C = Minimum safety → ① OFF-VALUE = ② ON-VALUE (this configuration should be avoided)
③ = Relay de-energized

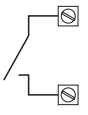
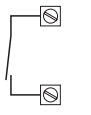
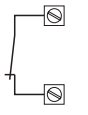
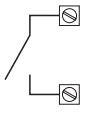
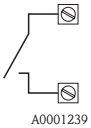
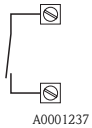
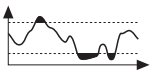
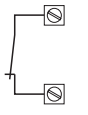
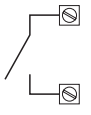
Relay output configured for "flow direction"
The value you entered in the ON-VALUE function defines the switching point for the positive and negative directions of flow.
If, for example, the switch point you define is = 1 m^3/h, the relay drops out at –1 m^3/h and pulls up at +1 m^3/h. Set the switch 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 greater than or equal to the low flow cut off rate.



a = Relay energized
b = Relay de-energized

6.3.5 Switching action of the relay output

Function	Status		Relay coil	Contact*	
				NC	NO
ON (operation)	System in measuring mode	 A0001052	energized	 A0001239	 A0001237
	System not in measuring mode (power supply failed)	 A0001291	de-energized	 A0001240	 A0001238
Fault message	System OK	 A0001052	energized	 A0001239	 A0001237
	(System or process error) Fault → Response to error OUTPUTS/INPUTS AND TOTALIZERS	 A0001291	de-energized	 A0001240	 A0001238
Notice message	System OK	 A0001052	energized	 A0001239	 A0001237
	(System or process error) Fault → Continuation of measuring	 A0001291	de-energized	 A0001240	 A0001238
Fault message or Notice message	System OK	 A0001052	energized	 A0001239	 A0001237
	(System or process error) Fault → Response to error or Note → Continuation of measuring	 A0001291	de-energized	 A0001240	 A0001238

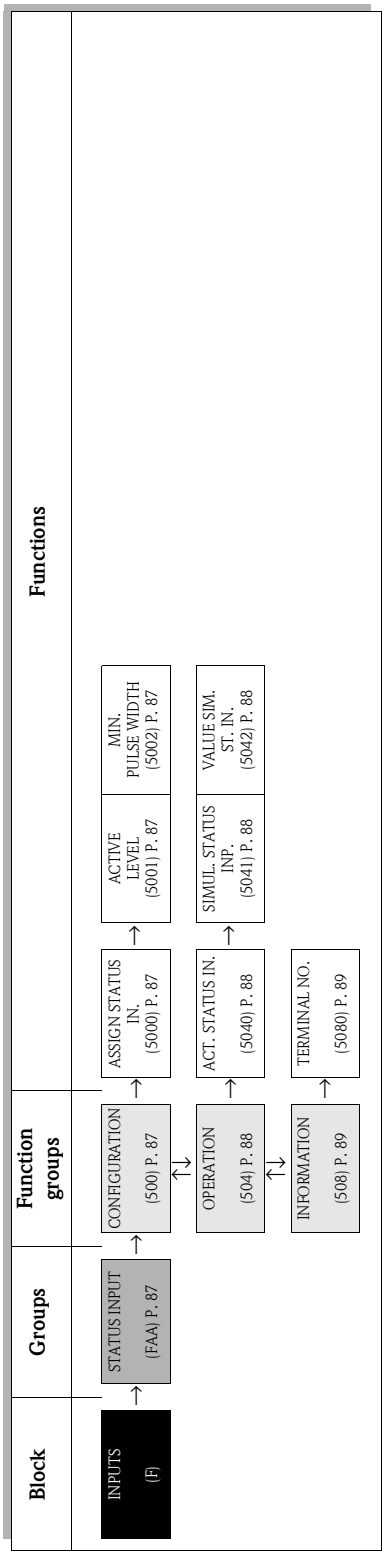
Function	Status	Relay coil	Contact*	
			NC	NO
Flow direction CH1, CH2, AVG. SUM DIFFERENCE	forward  A0001241	energized	 A0001239	 A0001237
	reverse  A0001242	de-energized	 A0001240	 A0001238
Limit value – Volume flow – Totalizer – Sound velocity – Flow velocity – CH1, CH2, AVG. SUM DIFFERENCE	Limit value **not** overshot or undershot  A0001243	energized	 A0001239	 A0001237
	Limit value overshot or undershot  A0001244	de-energized	 A0001240	 A0001238

* Terminal numbers in accordance with the TERMINAL NUMBER function (4780) → Page 82.

✎ Note!
If the measuring device has two relays, the factory setting is:
- Relay 1 → normally open contact
- Relay 2 → normally closed contact

7 Block INPUTS

Note!
Block 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

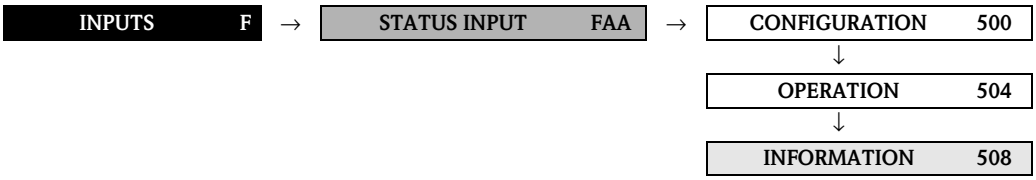
Functional description INPUTS → STATUS INPUT → CONFIGURATION (only with PROFIBUS DP)	
ASSIGN STATUS INPUT (5000)	Use this function to assign a switching function to the status input. **Options:** OFF RESET TOTALIZER (1 to 3) RESET ALL TOTALIZERS POSITIVE ZERO RETURN (CH1 to CH2) POSITIVE ZERO RETURN CH1&CH2 RESET FAULT MESSAGE ZERO ADJUST (CH1 to CH2) **Factory setting:** OFF Caution! Positive zero return is active as long as the level is available at the status input (continuous signal). All other assignments react to a change in level (pulse) at the status input.
ACTIVE LEVEL (5001)	Use this function to define whether the assigned switch function is released or sustained when the signal level is present (HIGH) or not present (LOW). **Options:** HIGH LOW **Factory setting:** HIGH
MIN. 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 the ASSIGN STATUS INPUT function (5000)). **User input:** 20 to 100 ms **Factory setting:** 50 ms

7.1.2 Function group OPERATION

INPUTS F → STATUS INPUT FAA → CONFIGURATION 500
↓
OPERATION 504

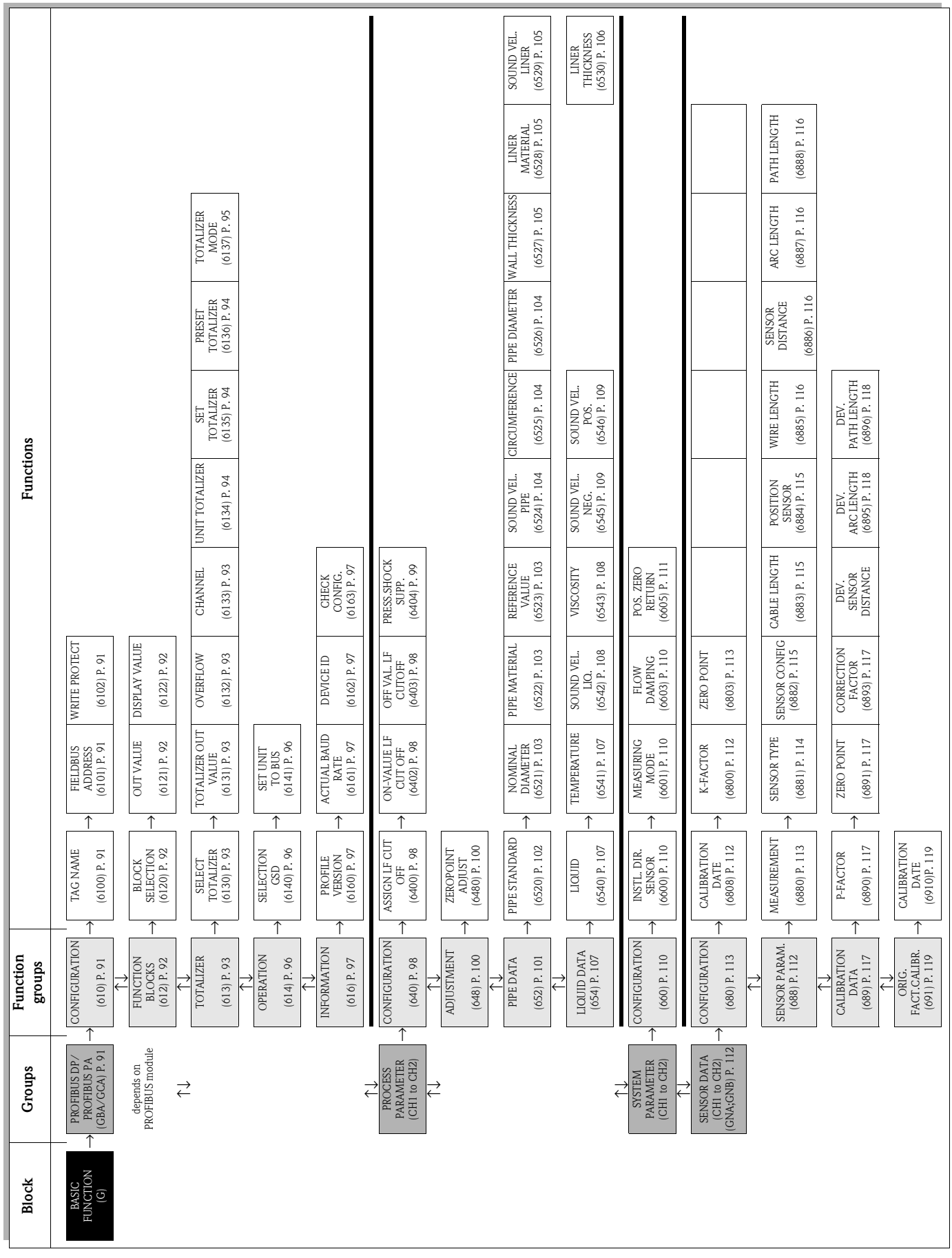
Functional description INPUTS → STATUS INPUT → OPERATION (only with PROFIBUS DP)	
ACTUAL STATUS INPUT (5040)	Use this function to view the current level of the status input. **Display:** HIGH LOW
SIMULATION STATUS INPUT (5041)	Use this function to simulate the status input, i.e. to trigger the function (see Function ASSIGN STATUS INPUT (5000) on Page 87) assigned to the status input. **Options:** OFF ON **Factory setting:** OFF ✎ Note! ▪ The "SIMULATION STATUS INPUT" message indicates that simulation is active. ▪ The measuring device continues to measure while simulation is in progress, i.e. the current measured values are output correctly via the other outputs. ☞ Caution! The setting is not saved in the event of a power failure.
VALUE SIMULATION STATUS INPUT (5042)	✎ Note! The function is not visible unless the SIMULATION STATUS INPUT function (5041) is active (= ON). Use this function to define the level to be assumed at the status output during the simulation. This value is used to test downstream devices and the measuring device itself. **Options:** HIGH LOW **Factory setting:** LOW ☞ Caution! The setting is not saved in the event of a power failure.

7.1.3 Function group INFORMATION



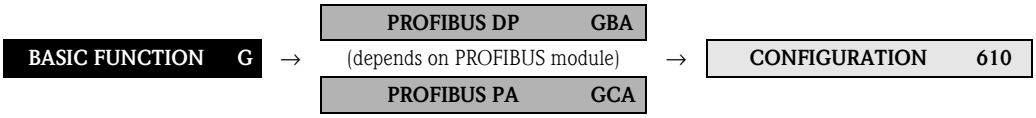
Functional description INPUTS → STATUS INPUT → INFORMATION (only with PROFIBUS DP)	
TERMINAL NO. **(5080)**	Use this function to display the numbers of the terminals (in the connection compartment) which are used by the status input. **Display:** 24 (+) / 25 (–)

8 Block BASIC FUNCTION



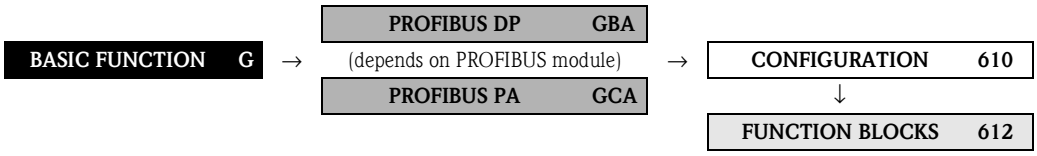
8.1 Group PROFIBUS DP / PROFIBUS PA

8.1.1 Function group CONFIGURATION



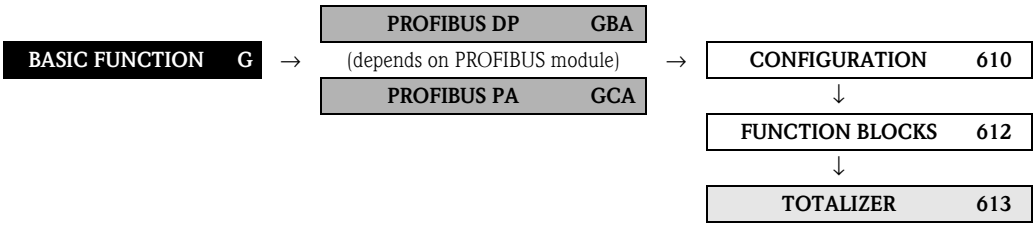
Functional description BASIC FUNCTION → PROFIBUS DP / PROFIBUS PA → CONFIGURATION	
TAG NAME **(6100)**	Use this function to assign a tag name to the measuring device. You can edit and read this tag name via local operation or via the PROFIBUS protocol (Class 2 master). **User input:** max. 16-character text, permissible: A-Z, 0-9, +,-, punctuation marks **Factory setting:** "_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _" (without text)
FIELDBUS ADDRESS **(6101)**	Use this function to define the address for the exchange of data with the PROFIBUS DP/PA protocol. **User input:** 0…126 **Factory setting:** 126
WRITE PROTECT **(6102)**	Use this function to view the position of the jumper via which the general write protection is configured. **Display:** OFF→ not protected ON → protected; it is not possible to change functions either via local operation or via the PROFIBUS protocol (Class 2 master). **Factory setting:** OFF ✎ Note! Write protection is activated and deactivated by means of a jumper on the I/O module (see Operating Instructions for Prosonic Flow 93 PROFIBUS DP/PA, BA 076D).

8.1.2 Function group FUNCTION BLOCKS



Functional description BASIC FUNCTION → PROFIBUS DP / PROFIBUS PA → FUNCTION BLOCKS	
BLOCK SELECTION (6120)	Use this function to select an Analog Input function block or the Analog Output (display value). – If you select an Analog Input function block, the current measured value is displayed in the OUT VALUE function (6121). – If you select the Analog Output (display value), the current measured value is displayed in the DISPLAY VALUE function (6122). **Options:** ANALOG INPUT 1 (factory setting: volume flow CH1) ANALOG INPUT 2 (factory setting: sound velocity CH1) ANALOG INPUT 3 (factory setting: flow velocity CH1) ANALOG INPUT 4 (factory setting: volume flow CH2) ANALOG INPUT 5 (factory setting: sound velocity CH2) ANALOG INPUT 6 (factory setting: flow velocity CH2) ANALOG INPUT 7 (factory setting: average volume flow) ANALOG INPUT 8 (factory setting: volume flow sum) ANALOG OUTPUT 1 (factory setting: display value) **Factory setting:** ANALOG INPUT 1 (volume flow CH1) ✎ Note! If the option PROFILE-GSD was selected in the SELECTION GSD function (6140), the only options that appear in this function are: ANALOG INPUT 1 ANALOG INPUT 2
OUT VALUE (6121)	✎ Note! This function is not available unless one of the following 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 ■ ANALOG INPUT 7 ■ ANALOG INPUT 8 Use this function to display the OUT value, incl. the unit and status, of the Analog Input function block selected in the BLOCK SELECTION function (6120).
DISPLAY VALUE (6122)	✎ Note! This function is not available unless ANALOG OUTPUT 1 was selected in the BLOCK SELECTION function (6120). Use this function to display the display value (output measured value) incl. the unit and status.

8.1.3 Function group TOTALIZER

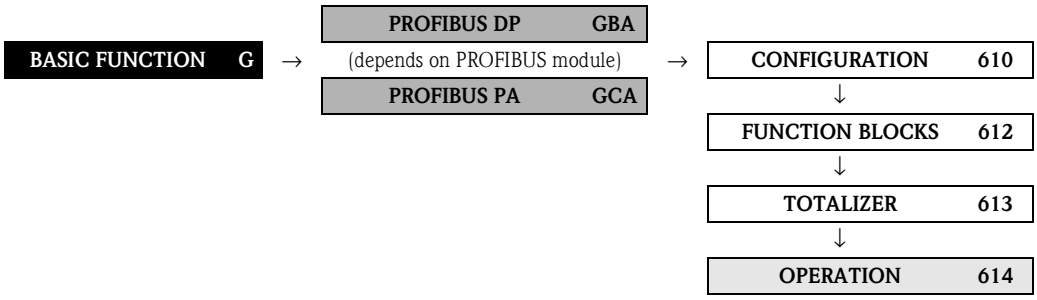


Functional description BASIC FUNCTION → PROFIBUS DP / PROFIBUS PA → TOTALIZER	
SELECT TOTALIZER (6130)	Use this function to select a totalizer. **Options:** TOTALIZER 1 TOTALIZER 2 TOTALIZER 3 **Factory setting:** TOTALIZER 1 ✎ Note! If the option PROFILE-GSD was selected in the SELECTION GSD function (6140) the only option available in this function is TOTALIZER 1.
TOTALIZER OUT VALUE (6131)	Use this function to display the OUT value incl. the unit and status of the totalizer selected in the SELECT TOTALIZER function (6130).
OVERFLOW (6132)	Use this function to view the totaled overflow for the totalizer aggregated since measuring commenced. Total flow quantity is represented by a floating-point number consisting of max. 7 digits. This function can be used to view higher numerical values (>9,999,999) as overflows. The effective quantity is thus the total of OVERFLOW plus the value returned by the SUM function. Example: Reading for 2 overflows: 2 10^7 m^3 (= 20,000,000 m^3). The value displayed in the SUM function = 196,845.7 m^3 Effective total quantity = 20,196,845.7 m^3 **Display:** Integer with exponent, including sign (e.g. 2 E ^{7})
CHANNEL (6133)	Use this function to assign a measured variable to the totalizer. **Options:** OFF VOLUME FLOW CH1 VOLUME FLOW CH2 VOLUME FLOW AVERAGE VOLUME FLOW SUM (CH1+CH2) VOLUME FLOW DIFFERENCE (CH1-CH2) **Factory setting:** VOLUME FLOW CH1 ✎ Note! ■ The totalizer is reset to "0" as soon as the selection is changed. ■ If only one channel is active, the only options displayed in this function are VOLUME FLOW CH1/CH2 and OFF.

Functional description BASIC FUNCTION → PROFIBUS DP / PROFIBUS PA → TOTALIZER	
UNIT TOTALIZER (6134)	Use this function to define a unit for the measured variable of the totalizer. **Options:** Metric → cm^3; dm^3; m^3; ml; l; hl; Ml US → cc; af; ft^3; oz f; gal; Mgal; bbl (normal fluids); bbl (beer); bbl (petrochemicals); bbl (filling tanks) Imperial → gal; Mgal; bbl (beer); bbl (petrochemicals) **Factory setting:** m^3
SET TOTALIZER (6135)	Use this function to assign a status to the totalizer. **Options:** TOTALIZE Total the measured variable selected in the CHANNEL function (6133). RESET Reset the totalizer to zero. PRESET The totalizer is set to the value defined in the PRESET TOTALIZER function (6136). ✎ 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. ✎ Note! This value is not accepted by the totalizer unless the PRESET option is selected in the SET TOTALIZER function (6135). **User input:** –99999…99999 **Factory setting:** 0

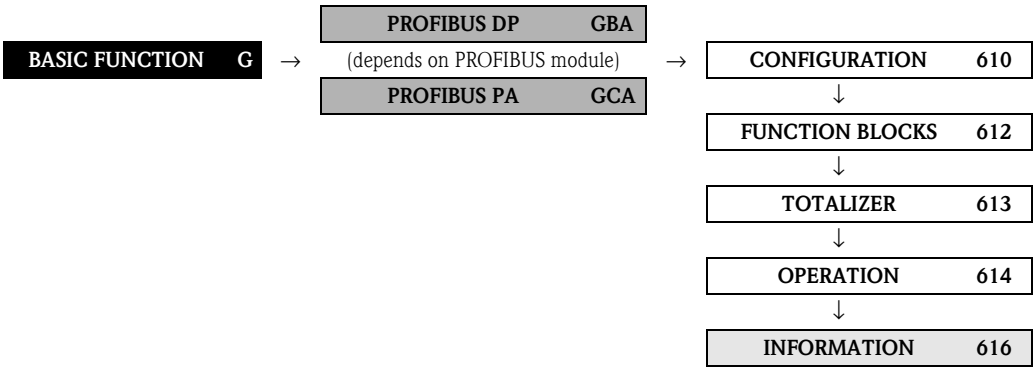
Functional description BASIC FUNCTION → PROFIBUS DP / PROFIBUS PA → TOTALIZER	
TOTALIZER MODE (6137)	Use this function to define how the totalizer totals the flow components. **Options:** BALANCE Positive and negative flow components. The positive and negative flow components are balanced. In other words, net flow in the flow direction is registered. FORWARD / POSITIVE Positive flow components only REVERSE / NEGATIVE Negative flow components only HOLD VALUE (HOLD) The totalizer stops. No further flow components are totaled. **Factory setting:** Totalizer 1: BALANCE Totalizer 2: FORWARD / POSITIVE Totalizer 3: REVERSE / NEGATIVE

8.1.4 Function group OPERATION



Functional description BASIC FUNCTION → PROFIBUS DP / PROFIBUS PA → OPERATION	
SELECTION GSD (6140)	✎ Note! Each PROFIBUS device must verify an ID number allocated by the PNO in the configuration phase. In addition to this device-specific ID number, there are also PROFILE ID numbers which also have to be accepted during the configuration phase to ensure interchangeability among vendors. In such instances, the device might reduce the functionality with regard to cyclic data to a profile-defined level. Use this function to select the configuration behavior of the measuring device. **Options:** MANUFACT.SPEC PROFIL-GSD **Factory setting:** MANUFACT.SPEC
SET UNIT TO BUS (6141)	Use this function to enable transmission of the configured system units to the automation system. The configured system units are transmitted to the automation system by pressing the E key. **Options:** SET UNITS (transmission is started by pressing the E key) ✎ Note! During transmission, the OUT value in the Analog Input Block is automatically scaled to the configured system unit and the OUT unit (output unit) is displayed in the OUT_UNIT parameter. The preconfigured system units are listed in the Operating Instructions for Prosonic Flow 93 PROFIBUS DP/PA, BA 076D. ☝ Caution! Activating this function can cause the output value OUT to change suddenly, and thus affect subsequent control loops.

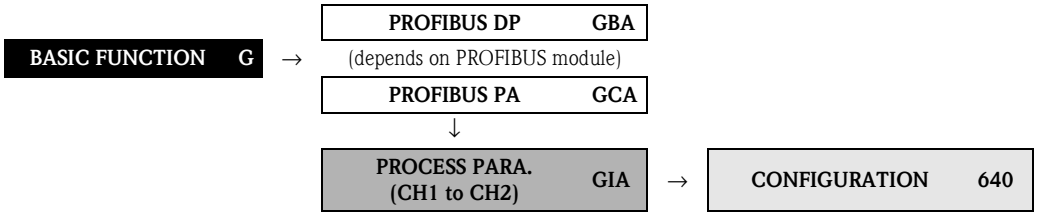
8.1.5 Function group INFORMATION

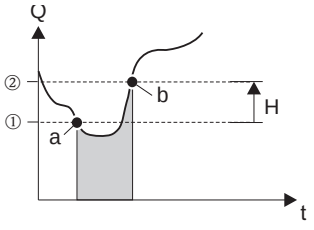


Functional description BASIC FUNCTION → PROFIBUS DP / PROFIBUS PA → FUNCTION BLOCKS	
PROFILE VERSION (6160)	Use this function to view the profile version.
ACTUAL BAUD RATE (6161)	Use this function to view the data transfer rate at which the device communicates. This transfer rate is configured in the automation system.
DEVICE ID (6162)	Use this function to view the manufacturer-specific device identification. **Display:** ■ PROFIBUS DP communication output = 1531 Hex ■ PROFIBUS PA communication output = 1530 Hex ✎ Note! If the option PROFILE-GSD was selected in the SELECTION GSD function (6140) the PROFILE ID = 9741 Hex is displayed in this function.
CHECK CONFIGURATION (6163)	Use this function to display whether the configuration for cyclic data transmission of a Class 1 master was accepted in the Prosonic Flow 93 PROFIBUS. **Display:** ACCEPTED (configuration accepted) NOT ACCEPTED (configuration not accepted)

8.2 Group PROCESS PARAMETER (CH1 to CH2)

8.2.1 Function group CONFIGURATION



Functional description BASIC FUNCTION → PROCESS PARAMETER (CH1 to CH2) → CONFIGURATION	
ASSIGN LF CUTOFF (6400)	Use this function to assign the switch point for low flow cut off rate suppression. **Options:** OFF VOLUME FLOW **Factory setting:** VOLUME 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 **Factory setting:** 0 l/s ✎ Note! The appropriate unit is taken from the UNIT VOLUME FLOW function (0402) → Page 14.
OFF-VALUE LOW FLOW CUT OFF (6403)	Use this function to enter the switch-off (**b**) point for low flow cut off. Enter the switch-off point as a positive hysteresis (**H**) from the switch-on point (**a**). **User input:** Integer 0 to 100% **Factory setting:** 50% Example:  A0003882 ① = switch-on point, ② = switch-off point a = Low flow cut off is switched on b = Low flow cut off is switched off (a + a · H) H = Hysteresis value: 0 to 100% ■ = Low flow cut off active Q = Flow

Functional description

BASIC FUNCTION → PROCESS PARAMETER (CH1 to CH2) → 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 on Page 98).

Use this function to define the time span for active pressure shock suppression.

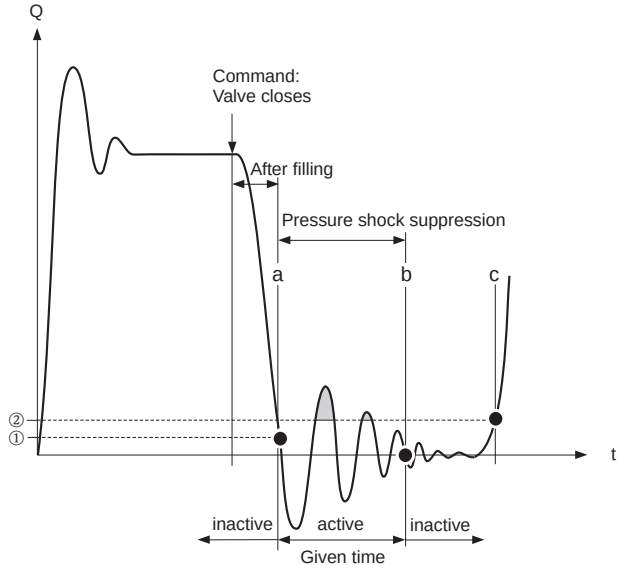
Activation of the pressure shock suppression
Pressure shock suppression is activated after the flow falls below the switch-on point of the low flow cut off (see point **a** in graphic).

While pressure shock suppression is active, the following conditions apply:
- 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).



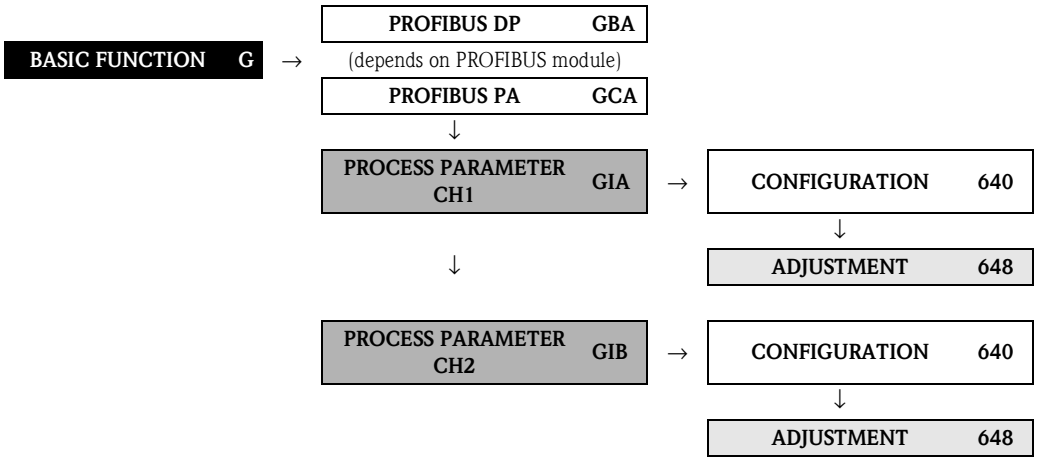
A0001285-en

① = off-value (low flow cut off), ② = on-value (low flow cut off)
a Activated when the on-value for low flow cut off is undershot
b Deactivated once the time specified passes
c Flow values are taken into account again for calculating the pulses
Suppressed values
Q Flow

User input:
max. 4-digit number, incl. unit: 0.00 to 100.0 s

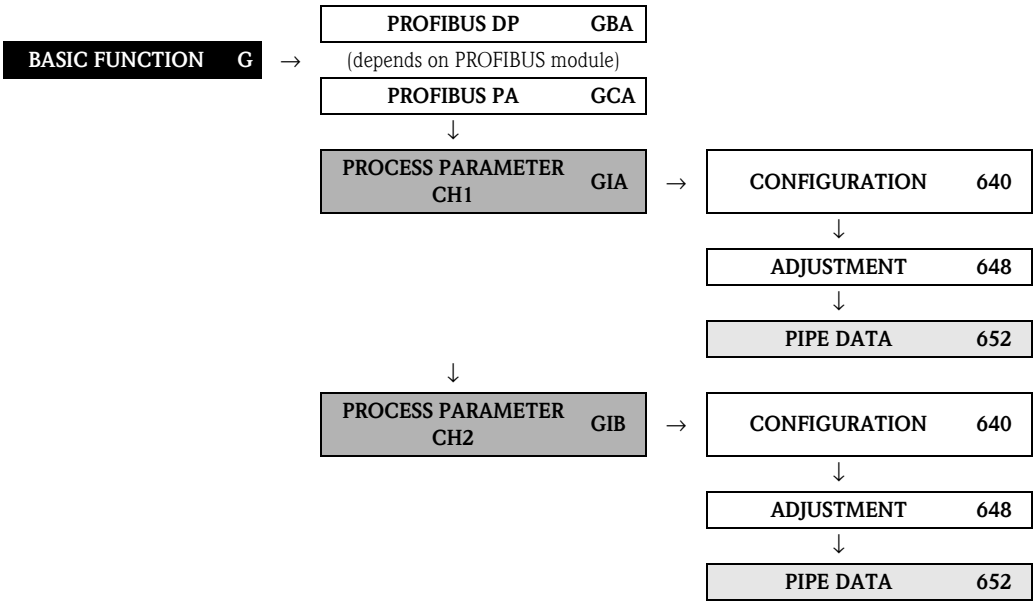
Factory setting:
0.00 s

8.2.2 Function group ADJUSTMENT



Functional description BASIC FUNCTION → PROCESS PARAMETER (CH1 to CH2) → ADJUSTMENT	
ZERO POINT 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 ZERO POINT function (→ Page 117). **User input:** CANCEL START **Factory setting:** CANCEL Caution! Before carrying this out, please refer to the Operating Instructions for Prosonic Flow 93 PROFIBUS DP/PA, BA 076D, 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. with a flow velocity > 0.1 m/s, or has been canceled, then the alarm message "ZERO ADJUST NOT POSSIBLE" is shown on the display.

8.2.3 Function group PIPE DATA



Functional description BASIC FUNCTION → PROCESS PARAMETER (CH1 to CH2) → PIPE DATA	
PIPE STANDARD (6520)	Use this function to select a pipe standard. **Options:** OTHERS DIN: PN10, PN16, 28610, 28614, 28615, 28619 ANSI: SS SCH 40S SS SCH 80S SS SCH 5S SS SCH 10S CS SCH 20 CS SCH 40 CS SCH 80 CS SCH 120 AWWA: CLASS 50, CLASS 53, CLASS 55 ✎ Note! The selection specifies the values for the following functions: ■ PIPE MATERIAL (6522) ■ SOUND VELOCITY PIPE (6524) ■ LINER MATERIAL (6528) If you edit these functions the pipe standard will be reset to the option OTHERS. **Factory setting:** DIN PN10

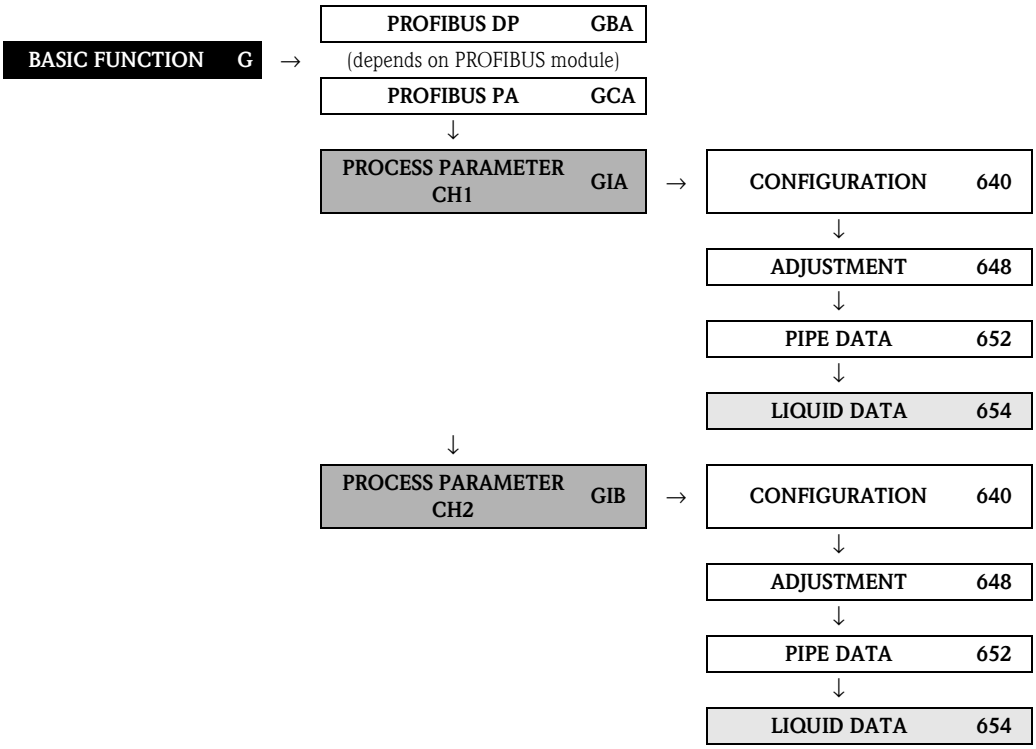
Functional description BASIC FUNCTION → PROCESS PARAMETER (CH1 to CH2) → PIPE DATA	
NOMINAL DIAMETER (6521)	✎ Note! This function does **not** appear if the option OTHERS was selected in the PIPE STANDARD function (6520). Use this function to select the nominal diameter of the pipe. **Options:** OTHERS DN: 15/½", 25/1", 40/1½", 50/2", 80/3", 100/4", 150/6", 200/8", 250/10", 300/12", 400/16", 450/18", 500/20", 600/24", 700/28", 750/30", 800/32", 900/36", 1000/40", 1200/48", 1400/54", 1500/60", 1600/64", 1800/72", 2000/80" ✎ Note! The selection specifies the values for the following functions: ■ CIRCUMFERENCE (6525) ■ PIPE DIAMETER (6526) ■ WALL THICKNESS (6527) If you edit these functions the pipe standard will be reset to the option OTHERS and the NOMINAL DIAMETER function (6521) does not appear. **Factory setting:** 80/3"
PIPE MATERIAL (6522)	This function displays the pipe material determined via the option selected in the PIPE STANDARD function (6520). If you edit the predetermined value the pipe standard will be reset to the option OTHERS and the NOMINAL DIAMETER function (6521) does not appear. The pipe material must be selected if the OTHERS option was selected in the PIPE STANDARD function (6520), and thus no pipe standard is defined. **Options:** CARBON STEEL, DUCTILE IRON, STAINLESS STEEL, SS ANSI 304, SS ANSI 316, SS ANSI 347, SS ANSI 410, SS ANSI 430, HASTELLOY C, PVC, PE, LDPE, HDPE, GRP, PVDF, PA, PP, PTFE, GLASS PYREX, ASBESTOS CEMENT, COPPER, OTHERS **Factory setting:** STAINLESS STEEL
REFERENCE VALUE (6523)	Use this function to enter the thickness of the reference component (e.g. flange) as the basis for measuring the sound velocity of the pipe. ✎ Note! This function does not appear unless the option SOUND VELOCITY PIPE was selected in the MEASUREMENT function (6880, → Page 113). **User input:** 5-digit floating-point number, [unit] **Factory setting:** 5 mm

Functional description BASIC FUNCTION → PROCESS PARAMETER (CH1 to CH2) → PIPE DATA	
SOUND VELOCITY PIPE (6524)	This function displays the sound velocity in the pipe determined via the option selected in the PIPE STANDARD function (6520). If you edit the predetermined value the pipe standard will be reset to the option OTHERS and the NOMINAL DIAMETER function (6521) does not appear. The sound velocity in the pipe must be entered if the OTHERS option was selected in the PIPE STANDARD function (6520), and thus no pipe standard is defined. **Measuring the sound velocity in the pipe** If the sound velocity in the pipe is unknown, it can be measured. For this purpose, the option SOUND VELOCITY PIPE must be selected in the MEASUREMENT function (6880, → Page 113). The sound velocity in the pipe is measured by calling up the SOUND VELOCITY PIPE function (6524). The measured sound velocity, the signal strength and a bar graph appear on the local display. The measurement is valid if 100% is achieved in the bar graph. If you confirm the function with the E key, the SAVE prompt appears. To accept the measured sound velocity, select the option YES by means of the + or − key. ✎ Note! ■ To measure the sound velocity, you require the ultrasonic sensors "DDU18" which you can order as an accessory from Endress+Hauser. ■ A reference value is used as a basis for measuring the sound velocity. This reference value can be edited (→ Page 103). **User input:** Fixed-point number 800 to 3750 m/s **Factory setting:** 3120 m/s
CIRCUMFERENCE (6525)	This function displays the outer circumference of the pipe determined via the option selected in the NOMINAL DIAMETER function (6521). If you edit the predetermined value the pipe standard will be reset to the option OTHERS and the NOMINAL DIAMETER function (6521) does not appear. The pipe outer circumference must be entered here if the OTHERS option was selected in the NOMINAL DIAMETER function (6521), and thus no pipe standard is defined. **User input:** Fixed-point number 31.4 to 15708.0 mm **Factory setting:** 279.3 mm
PIPE DIAMETER (6526)	This function displays the outer diameter of the pipe determined via the option selected in the NOMINAL DIAMETER function (6521). If you edit the predetermined value the pipe standard will be reset to the option OTHERS and the NOMINAL DIAMETER function (6521) does not appear. The pipe outer diameter must be entered here if the OTHERS option was selected in the NOMINAL DIAMETER function (6521), and thus no pipe standard is defined. **User input:** Fixed-point number 10.0 to 5000.0 mm **Factory setting:** 88.9 mm

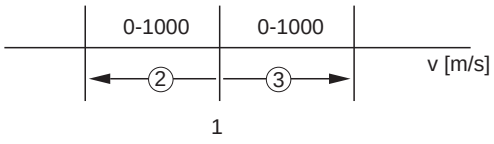
Functional description BASIC FUNCTION → PROCESS PARAMETER (CH1 to CH2) → PIPE DATA	
WALL THICKNESS (6527)	This function displays the thickness of the pipe walls determined via the option selected in the NOMINAL DIAMETER function (6521). If you edit the predetermined value the pipe standard will be reset to the option OTHERS and the NOMINAL DIAMETER function (6521) does not appear. The wall thickness must be entered here if the OTHERS option was selected in the NOMINAL DIAMETER function (6521), and thus no pipe standard is defined. **Measuring the wall thickness** If the wall thickness is unknown, it can be measured. For this purpose, the option WALL THICKNESS must be selected in the MEASUREMENT function, (6880, → Page 113). The wall thickness is measured by calling up the WALL THICKNESS function (6527). The measured wall thickness, the signal strength and a bar graph appear on the local display. The measurement is valid if 100% is achieved in the bar graph. If you confirm the function with the E key, the SAVE prompt appears. To accept the measured wall thickness, select the option YES by means of the + or − key. ✎ Note! To measure the wall thickness, you require the ultrasonic sensors "DDU19" which you can order as an accessory from Endress+Hauser. **User input:** Fixed-point number 0.1 to 100.0 mm **Factory setting:** 3.2 mm
LINER MATERIAL (6528)	This function displays the liner material of the pipe determined via the option selected in the PIPE STANDARD function (6520). If you edit the predetermined value the pipe standard will be reset to the option OTHERS and the NOMINAL DIAMETER function (6521) does not appear. The liner material must be specified if the OTHERS option was selected in the PIPE STANDARD function (6520), and thus no pipe standard is defined. **Options:** LINER NONE MORTAR RUBBER TAR EPOXY OTHERS **Factory setting:** LINER NONE
SOUND VELOCITY LINER (6529)	✎ Note! This function does **not** appear if the option LINER NONE was selected in the LINER MATERIAL function (6528). This function displays the sound velocity of the liner determined via the option selected in the LINER MATERIAL function (6528). If you edit the predetermined value the liner material will be reset to the option OTHERS. The sound velocity of the liner must be entered if the OTHERS option was selected in the LINER MATERIAL function (6528). **User input:** Fixed-point number 800 to 3750 m/s **Factory setting:** Depending on the selection in the LINER MATERIAL function (6528)

Functional description BASIC FUNCTION → PROCESS PARAMETER (CH1 to CH2) → PIPE DATA	
LINER THICKNESS (6530)	✎ Note! This function does **not** appear if the option LINER NONE was selected in the LINER MATERIAL function (6528). Use this function to enter the thickness of the liner. **User input:** Fixed-point number 0.1 to 100.0 mm **Factory setting:** 0 mm

8.2.4 Function group LIQUID DATA



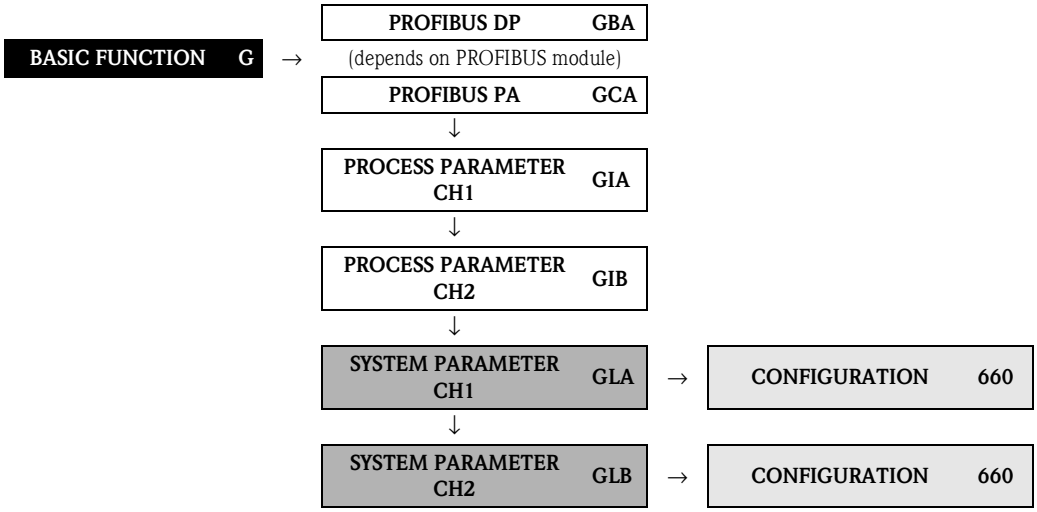
Functional description BASIC FUNCTION → PROCESS PARAMETER (CH1 to CH2) → LIQUID DATA	
LIQUID (6540)	Use this function to select the liquid in the pipe. **Options:** WATER, SEA WATER, DISTILLED WATER, AMMONIA, ALCOHOL, BENZENE, BROMIDE, ETHANOL, GLYCOL, KEROSENE, MILK, METHANOL, TOLUENE, LUBE OIL, DIESEL, PETROL, OTHERS ✎ Note! The selection specifies the values for the sound velocity and viscosity. If OTHERS is selected, these values must be entered via the SOUND VELOCITY LIQUID (6542) and VISCOSITY (6543) functions. **Factory setting:** WATER
TEMPERATURE (6541)	Use this function to enter the process temperature of the liquid. Via the sound velocity, the value influences the determination of the sensor distance. Enter the process temperature at normal operating conditions to achieve an optimum configuration of the measuring system. **User input:** Fixed-point number –273.15 to 726.85 °C (0 to 1000 K) **Factory setting:** 20 °C

Functional description BASIC FUNCTION → PROCESS PARAMETER (CH1 to CH2) → LIQUID DATA	
SOUND VELOCITY LIQUID (6542)	This function displays the sound velocity of the liquid. This is determined via the values entered in the LIQUID (6540) and TEMPERATURE (6541) functions. If you edit the predetermined value the LIQUID function (6540) will be reset to the option OTHERS. The sound velocity of the liquid must be entered if the liquid is not listed in the LIQUID function (6540) and the OTHERS option was selected. **Measuring the sound velocity of the liquid** If the sound velocity of the liquid is unknown, it can be measured. For this purpose, the option SOUND VELOCITY LIQUID must be selected in the MEASUREMENT function (6880, → Page 113). The sound velocity in the liquid is measured by calling up the SOUND VELOCITY LIQUID function (6542). The result of the measurement appears on the local display. If you confirm the function with the E key, the SAVE prompt appears. To accept the measured sound velocity, select the option YES by means of the + or − key. ✎ Note! To measure the sound velocity, you require the ultrasonic sensors "DDU18" which you can order as an accessory from Endress+Hauser. Transmitter search range: The measuring device searches for the measuring signal within a defined sound velocity range. You specify the search range in the SOUND VELOCITY NEGATIVE (6545) or SOUND VELOCITY POSITIVE (6546) functions. An error message is displayed if the sound velocity of the liquid exceeds the search range. ✎ Note! We recommend you select a smaller search range by unfavorable signal conditions (signal strength < 50%).  A0001246 1 = Sound velocity of the liquid ② = Lower search range: is specified in the SOUND VEL. NEGATIVE function (6545) ② = Upper search range: is specified in the SOUND VEL. POSITIVE function (6546) **User input:** Fixed-point number 400 to 3000 m/s **Factory setting:** 1485 m/s
VISCOSITY (6543)	This function displays the viscosity of the liquid. This is determined via the values entered in the LIQUID (6540) and TEMPERATURE (6541) functions. If you edit the predetermined value the LIQUID function (6540) will be reset to the option OTHERS. The viscosity must be entered if the liquid is not listed in the LIQUID function (6540) and the OTHERS option was selected. **User input:** Fixed-point number 0.0 to 5000.0 mm^2/s (cSt) **Factory setting:** 1 mm^2/s

Functional description BASIC FUNCTION → PROCESS PARAMETER (CH1 to CH2) → LIQUID DATA	
SOUND VELOCITY NEGATIVE (6545)	Use this function to specify the lower search range for the sound velocity of the liquid. **User input:** Fixed-point number 0 to 1000 m/s **Factory setting:** 500 m/s ✎ Note! See the explanations in the SOUND VELOCITY LIQUID function (6542).
SOUND VELOCITY POSITIVE (6546)	Use this function to specify the upper search range for the sound velocity of the liquid. **User input:** Fixed-point number 0 to 1000 m/s **Factory setting:** 300 m/s ✎ Note! See the explanations in the SOUND VELOCITY LIQUID function (6542).

8.3 Group SYSTEM PARAMETER (CH1 to CH2)

8.3.1 Function group CONFIGURATION

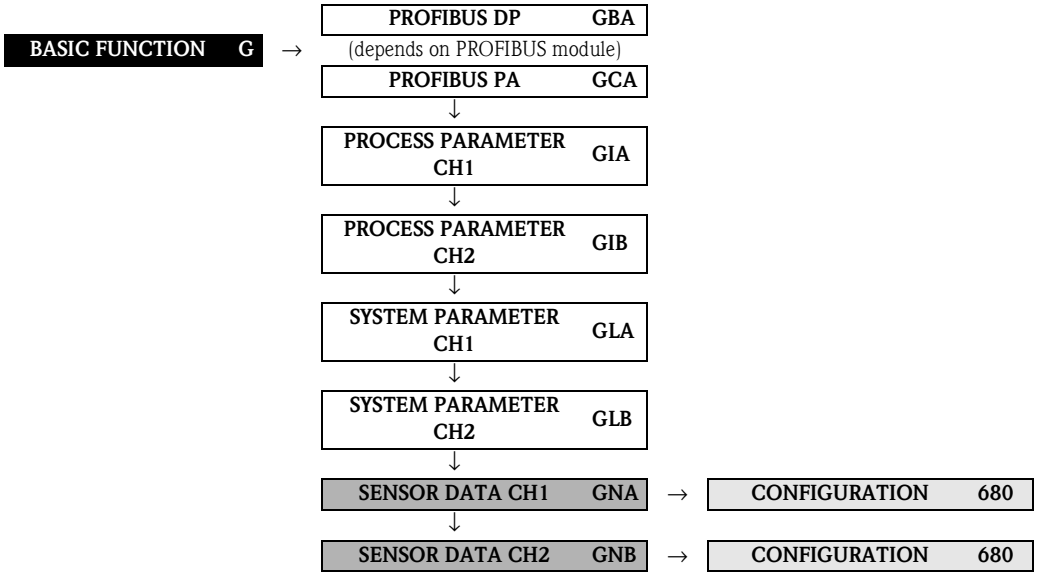


Functional description BASIC FUNCTION → SYSTEM PARAMETER CH1 → CONFIGURATION	
INSTALLATION DIRECTION SENSOR (6600)	Use this function to reverse the sign of the flow quantity, if necessary. **Options:** NORMAL INVERSE (REVERSE) **Factory setting:** NORMAL
MEASURING MODE (6601)	Use this function to specify the flow direction for outputting the signal: Unidirectional: Signal is only output if the flow direction is positive (forward flow). Flow in the negative flow direction (reverse flow) is not taken into account or totalized by the measuring system. Bidirectional: Signal is output with flow in both directions (forward and reverse flow). **Options:** UNIDIRECTIONAL BIDIRECTIONAL **Factory setting:** UNIDIRECTIONAL
FLOW DAMPING (6603)	✎ Note! The system damping acts on all functions and outputs of the measuring device. Use this function to set the filter depth of the digital filter. This reduces the sensitivity of the measuring signal to interference peaks (e.g. high solids content, gas bubbles in the fluid, etc.). The system reaction time increases with the filter setting. **User input:** 0 to 100 s **Factory setting:** 0 s

Functional description BASIC FUNCTION → SYSTEM PARAMETER CH1 → CONFIGURATION	
POSITIVE ZERO RETURN (6605)	Use this function to interrupt evaluation of measured variables. This is necessary when a piping system is being cleaned, for example. This setting acts on all function and outputs of the measuring device. **Options:** OFF ON (signal output is set to the "zero flow" value) **Factory setting:** OFF

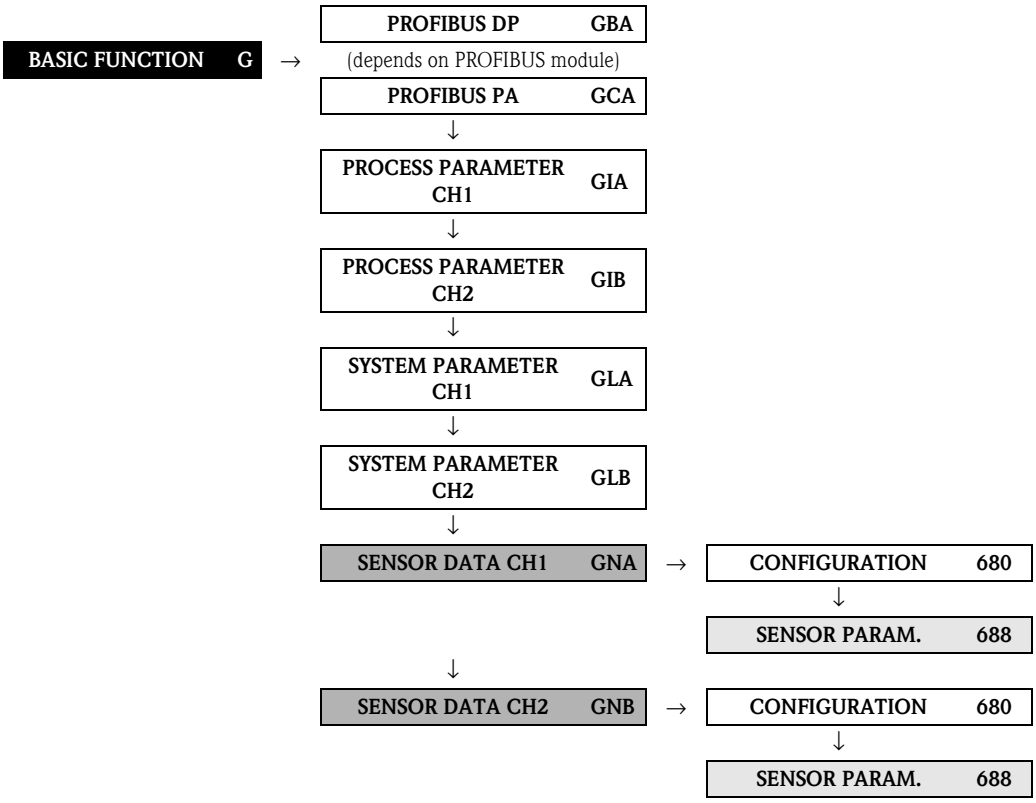
8.4 Group SENSOR DATA (CH1 to CH2)

8.4.1 Function group CONFIGURATION



Functional description BASIC FUNCTION → SENSOR DATA (CH1 to CH2) → CONFIGURATION	
✎ Note! The function group is only available for measuring devices in "Clamp on" version..	
CALIBRATION DATE (6808)	Use this function to view the calibration date (last calibration). ✎ Note! ■ If the measuring device is delivered without calibration, the display shows the value 1.0. ■ If the calibration is reset via the function CALIBRATION DATE (6910), the date is overwritten. **Display:** Format depends on the selection in function FORMAT DATE/TIME (0429)
K-FACTOR (6800)	Use this function to view the current calibration factor for the measuring tube and the measuring sensors. **Display:** 5-digit floating-point number, (including sign) **Factory setting:** depends on the nominal diameter and the calibration
ZERO POINT (6803)	Use this function to view the zero-point correction value for the measuring tube and the measuring sensors The calibration at the factory determines the zero-point correction value. ✎ Note! If the measuring device is delivered without calibration, the display shows the value 0 **Display:** 5-digit floating-point number, (including sign) **Factory setting:** depends on the nominal diameter and the calibration

8.4.2 Function group SENSOR PARAMETER



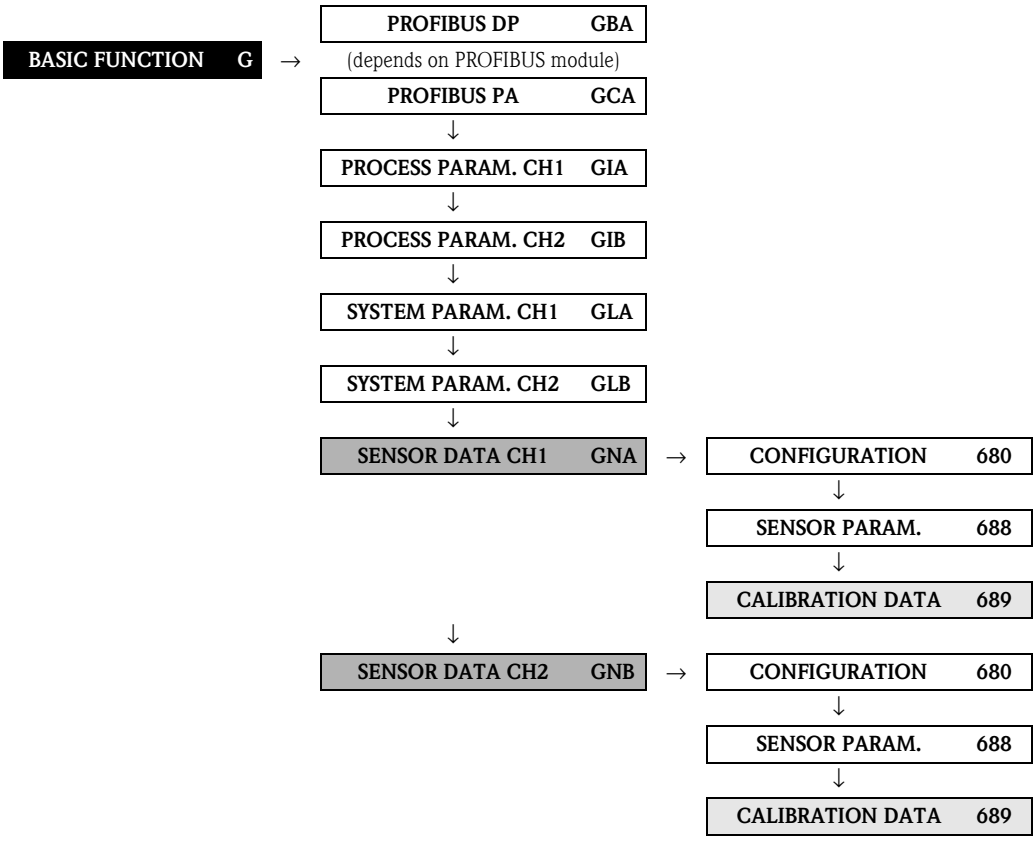
Functional description BASIC FUNCTION → SENSOR DATA (CH1 to CH2) → SENSOR PARAMETER	
MEASUREMENT (6880)	**Options:** OFF CLAMP ON INSERTION SOUND VELOCITY LIQUID SOUND VELOCITY PIPE WALL THICKNESS **Factory setting:** CLAMP ON (for channel 1) OFF (for channel 2)

Functional description BASIC FUNCTION → SENSOR DATA (CH1 to CH2) → SENSOR PARAMETER	
SENSOR TYPE (6881)	✎ Note! This function is only available if the OFF setting was **not** selected in the MEASUREMENT function. Select the appropriate type of measuring sensor. As a rule, a selection is not necessary as the type of measuring sensor has already been set according to the order data (order code). **Options:** (CLAMP ON in the MEASUREMENT function) W-CL-05F-L-B W-CL-1F-L-B W-CL-1F-L-C W-CL-2F-L-B W-CL-6F-L-C P-CL-05F-L-B P-CL-05F-M-B P-CL-1F-L-B P-CL-1F-M-B P-CL-2F-L-B P-CL-2F-M-B P-CL-6F-L-C P-CL-6F-M-C U-CL-2F-L-A **Options:** (INSERTION in the MEASUREMENT function) W-IN-1F-L-B **Options:** (SOUND VELOCITY LIQUID in the MEASUREMENT function) P-CL-1S-L-B P-CL-1S-M-B **Options:** (SOUND VELOCITY PIPE or WALL THICKNESS in the MEASUREMENT function) P-CL-4W-L-B **Factory setting:** depends on the order code

Functional description BASIC FUNCTION → SENSOR DATA (CH1 to CH2) → SENSOR PARAMETER	
SENSOR CONFIGURATION (6882)	Use this function to select the configuration for the ultrasonic sensors, e.g. the number of traverses (in the clamp-on design) or whether single-path or dual-path configuration is present (in the insertion design). ✎ Note! This function is not available unless one of the following options was selected in the MEASUREMENT function (6880): ■ CLAMP ON ■ SOUND VELOCITY LIQUID ■ INSERTION **Options:** NO. TRAVERSE: 1 [1] NO. TRAVERSE: 2 [2] NO. TRAVERSE: 3 [1] NO. TRAVERSE: 4 [2] SINGLE PATH [3] DUAL PATH [3] **Factory setting:** NO. TRAVERSE: 2 ✎ Note! ■ In principle, setting "NO. TRAVERSE: 2" is for the P-sensor DN15 ... DN 65 necessary. ■ For sound velocity measurement it is always required to set this function to "NO. TRAVERSE: 1" or "NO. TRAVERSE: 3". ■ For flow measurement it is basically not recommended to set this function to "NO. TRAVERSE: 3". [1] This option is not available unless CLAMP ON or SOUND VELOCITY LIQUID was selected in the MEASUREMENT function. [2] This option is not available unless CLAMP ON was selected in the MEASUREMENT function. [3] This option is not available unless INSERTION was selected in the MEASUREMENT function.
CABLE LENGTH (6883)	Use this function to select the length of the sensor cable. **Options:** LENGTH 5m/15 feet LENGTH 10m/30 feet LENGTH 15m/45 feet LENGTH 30m/90 feet **Factory setting:** depends on the order code
POSITION SENSOR (6884)	Use this function to view the position of both sensors on the rail. ✎ Note! This option is not available unless CLAMP ON is set in the MEASUREMENT function and the number of traverses is 2 or 4 (see the SENSOR CONFIGURATION function (6882)). **Display:** 5-digit number combination

Functional description BASIC FUNCTION → SENSOR DATA (CH1 to CH2) → SENSOR PARAMETER	
WIRE LENGTH (6885)	The wire length for assembling the sensors at the correct distance apart appears on the display. ✎ Note! This option is not available unless CLAMP ON is set in the MEASUREMENT function and the number of traverses is 1 or 3 (see the SENSOR CONFIGURATION function (6882)). **Display:** max. 5-digit number, including unit (e.g. 200 mm)
SENSOR DISTANCE (6886)	The distance between sensor 1 and sensor 2 as a length measurement appears on the display. **Display:** max. 5-digit number, including unit (e.g. 200 mm)
ARC LENGTH (6887)	The arc length on the pipe appears on the display. ✎ Note! This function is not available unless INSERTION was set in the MEASUREMENT function (6880) and the DUAL PATH option was selected in the SENSOR CONFIGURATION function (6882). **Display:** max. 5-digit number, including unit (e.g. 200 mm)
PATH LENGTH (6888)	The path length appears on the display. ✎ Note! This function is not available unless INSERTION was selected in the MEASUREMENT function. **Display:** max. 5-digit number, including unit (e.g. 200 mm)

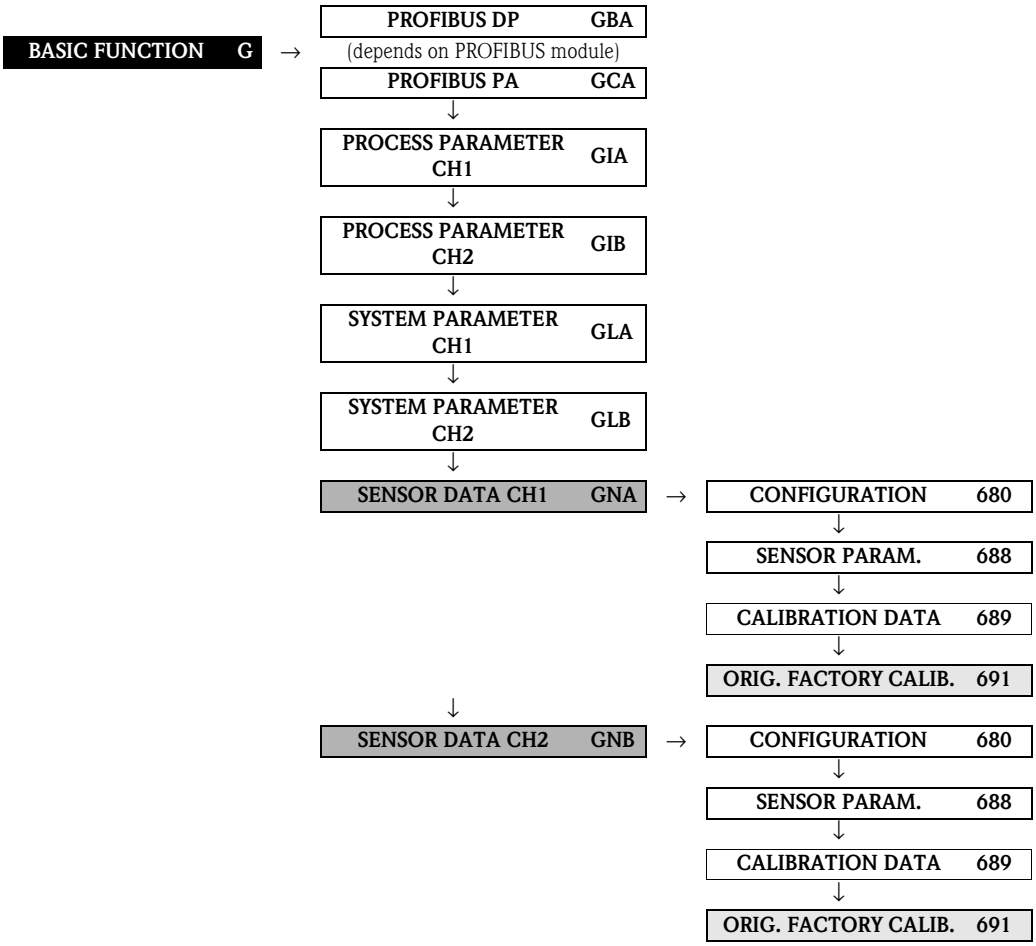
8.4.3 Function group CALIBRATION DATA



Functional description BASIC FUNCTION → SENSOR DATA (CH1 to CH2) → CALIBRATION DATA	
P-FACTOR (6890)	This function displays the p-factor. The p-factor indicates the influence of the velocity distribution of the flow profile inside the pipe; it is dependent on the reynolds number. The p-factor varies in the range 0.75...0.95. If the displayed value ranges 0.75...0.94 the measurement will have a reduced linearity.
ZERO POINT (6891)	Use this function to call up or manually change the zero point correction currently being used. **User input:** 5-digit floating-point number, including unit and sign (e.g. +10.0 ns)
CORRECTION FACTOR (6893)	Use this function to enter a correction factor at the client's site. **User input:** 5-digit floating-point number **Factory setting:** 1.0000 (no correction)
DEVIATION SENSOR DISTANCE (6894)	Use this function to enter a deviation value for the sensor distance. ✎ Note! This option is not available unless INSERTION was selected in the MEASUREMENT function (6880). **User input:** 5-digit floating-point number, including unit and sign (e.g. +2.0000 mm) **Factory setting:** 0 mm

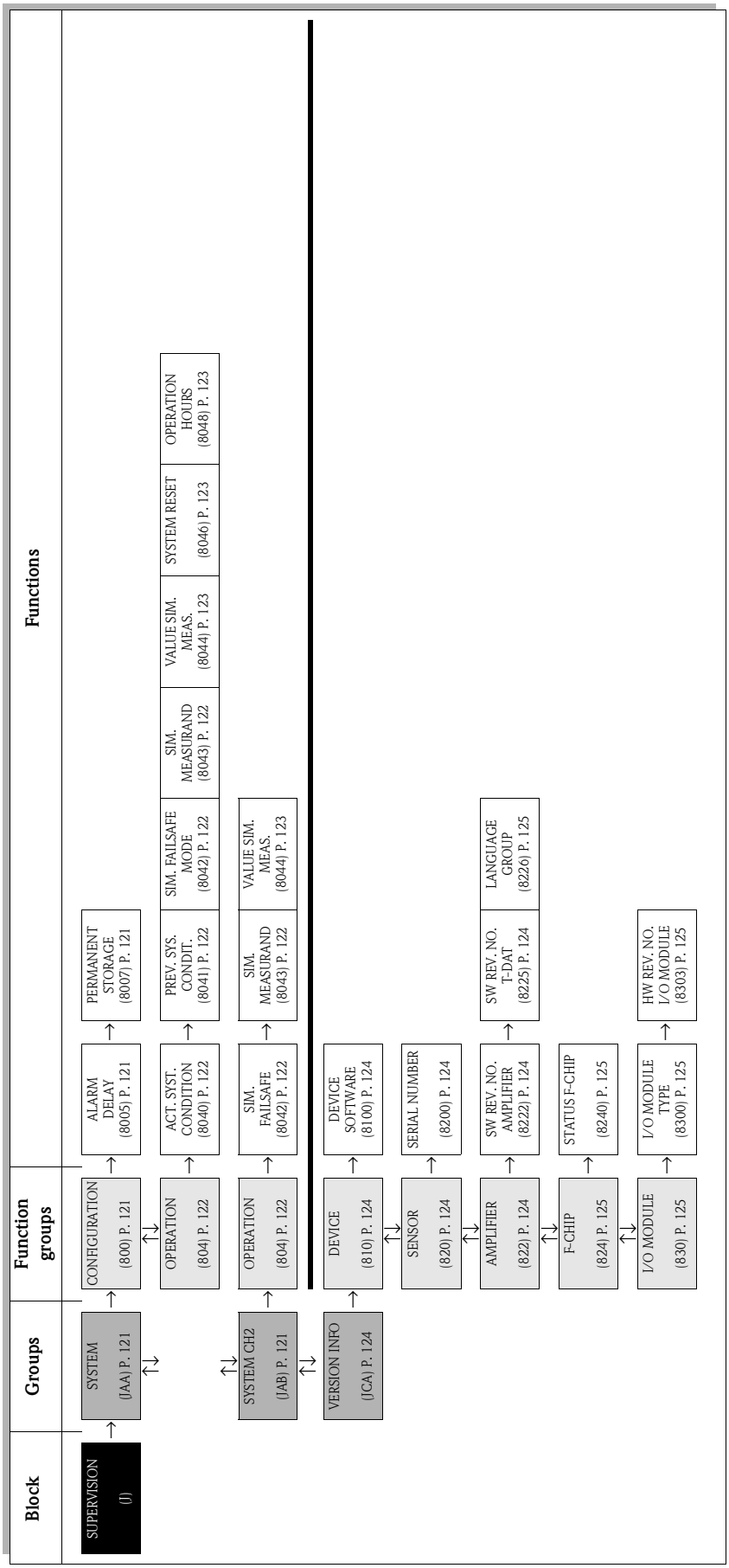
Functional description BASIC FUNCTION → SENSOR DATA (CH1 to CH2) → CALIBRATION DATA	
DEV. ARC LENGTH (6895)	Use this function to enter a deviation value for the arc length. ✎ Note! This function is not available unless INSERTION was set in the MEASUREMENT function (6880) and the DUAL PATH option was selected in the SENSOR CONFIGURATION function (6882). **User input:** 5-digit floating-point number, including unit and sign (e.g. +2.0000 mm) **Factory setting:** 0 mm
DEV. PATH LENGTH (6896)	Use this function to enter a deviation value for the path length. ✎ Note! This option is not available unless INSERTION was selected in the MEASUREMENT function (6880). **User input:** 5-digit floating-point number, including unit and sign (e.g. +2.0000 mm) **Factory setting:** 0 mm

8.4.4 Function group ORIG. FACT. CALIBR.



Functional description BASIC FUNCTION → SENSOR DATA (CH1 to CH2) → ORIG. FACTORY CALIB.	
CALIBRATION DATE (6910)	This function resets the calibration data of the measuring device to the factory settings. Procedure: 1. Enter current date. 2. Store it. The measuring device resets the calibration data to the factory settings and restarts automatically. ✎ Note! ■ The calibration data reset is recorded in the calibration history. ■ The date of the function CALIBRATION DATE (6808) is overwritten. **User input:** Format depends on the selection in function FORMAT DATE/TIME (0429)

9 Block SUPERVISION



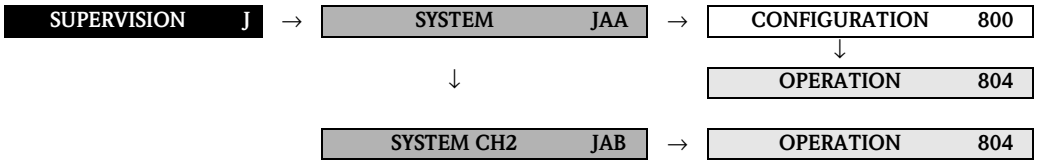
9.1 Group SYSTEM (SYSTEM CH2)

9.1.1 Function group CONFIGURATION

SUPERVISION J → SYSTEM JAA → CONFIGURATION 800

Functional description SUPERVISION → SYSTEM → CONFIGURATION	
ALARM DELAY (8005)	Use this function to specify a time period for suppressing the appearance of fault or notice messages . 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, error and notice messages are delayed by the time corresponding to the setting before being forwarded 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 error and notice messages cannot be suppressed, a value of 0 seconds must be entered here.
PERMANENT STORAGE (8007)	This function displays whether permanent storage of all parameters in the EEPROM is switched on or off. **Options:** OFF ON **Factory setting:** ON

9.1.2 Function group OPERATION

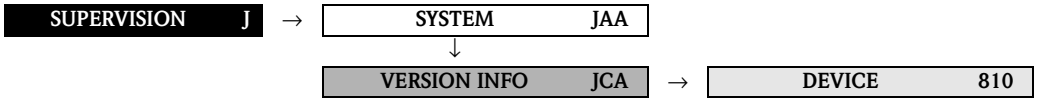


Functional description SUPERVISION → SYSTEM [CH2] → OPERATION	
ACTUAL SYSTEM CONDITION (8040)	Use this function to check the present system condition. **Display:** "SYSTEM OK" or the fault / notice message with the highest priority.
PREVIOUS SYSTEM CONDITIONS (8041)	Use this function to view the fifteen most recent error and notice messages since measuring last started. **Display:** The last 15 fault/notice messages appear on the display.
SIMULATION FAILSAFE MODE (8042)	✎ Note! This function is available in groups SYSTEM+SYSTEM CH2. 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 words "SIMULATION FAILSAFE MODE" appear on the display. **Options:** ON OFF FAILURE (CH1 to CH2) **Factory setting:** OFF ✎ Note! The option FAILURE (CH1...CH2) enables the channel specific simulation of a failure.
SIMULATION MEASURAND (8043)	✎ Note! This function is available in groups SYSTEM+SYSTEM CH2. 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 words "SIMULATION MEASURAND" appear on the display. **Options:** OFF VOLUME FLOW (CH1 to CH2) SOUND VELOCITY (CH1 to CH2) SIGNAL STRENGTH (CH1 to CH2) **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.

Functional description SUPERVISION → SYSTEM [CH2] → OPERATION	
VALUE SIMULATION MEASURAND (8044)	✎ Note! This function is available in groups SYSTEM+SYSTEM CH2. ✎ Note! The function is not visible unless the function SIMULATION MEASURAND (8043) is active. Use this function to specify a selectable value (e.g. 12 m^3/s). This is used to test the associated functions in the device itself and downstream signal loops. **User input:** 5-digit floating-point number, [unit] **Factory setting:** 0 [unit] ☝ Caution! ■ The setting is not saved in the event of a power failure. ■ The appropriate unit is taken from the SYSTEM UNITS (ACA) function group, → Page 14.
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 = 00:00:00 (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)

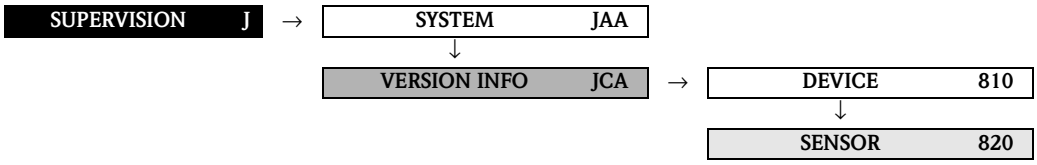
9.2 Group VERSION INFO

9.2.1 Function group DEVICE



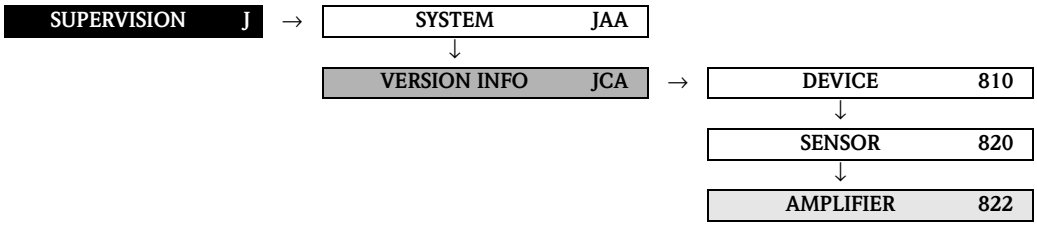
Functional description SUPERVISION → VERSION-INFO → DEVICE	
DEVICE SOFTWARE (8100)	Displays the current device software version.

9.2.2 Function group SENSOR



Functional description SUPERVISION → VERSION INFO → SENSOR	
SERIAL NUMBER (8200)	Use this function to view the serial number of the sensor.

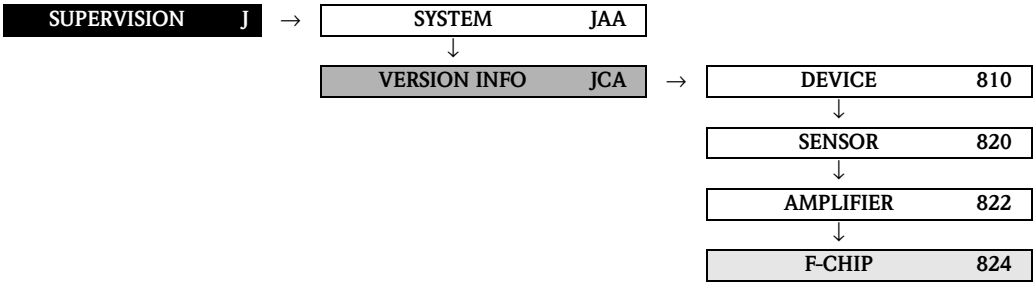
9.2.3 Function group AMPLIFIER



Functional description SUPERVISION → VERSION-INFO → AMPLIFIER	
SOFTWARE REVISION NUMBER AMPLIFIER (8222)	Use this function to view the software revision number of the amplifier.
SOFTWARE REVISION NUMBER T-DAT (8225)	Use this function to view the software revision number of the software used to create the content of the T-DAT.

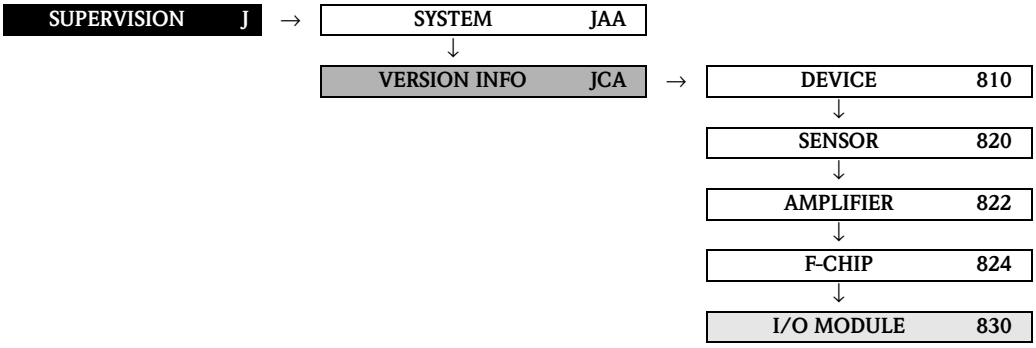
Functional description SUPERVISION → VERSION-INFO → AMPLIFIER	
LANGUAGE GROUP (8226)	Use this function to view the language group. The following language groups can be ordered: WEST EU / USA, EAST EU / SCAND., ASIA, CHINESE. **Display:** available language group ✎ Note! ■ The language options of the available language group are displayed in the LANGUAGE function (2000). ■ You can change the language group via the configuration software FieldCare. Please do not hesitate to contact your Endress+Hauser sales office if you have any questions.

9.2.4 Function group F-CHIP



Functional description SUPERVISION → VERSION-INFO → F-CHIP	
STATUS F-CHIP (8240)	Use this function to check whether an F-CHIP is installed.

9.2.5 Function group I/O MODULE



Functional description SUPERVISION → VERSION-INFO → I/O MODULE	
I/O MODULE TYPE (8300)	Use this function to view the configuration of the I/O module complete with terminal numbers.
SOFTWARE REVISION NUMBER I/O MODULE (8303)	Use this function to view the software revision number of the I/O module.

10 Factory settings

10.1 SI units

Parameter	Factory setting
Nominal diameter	80 [mm]
Low flow cut off (v ≈ 0.04 m/s)	12 [dm^3/min]
Full scale value (v ≈ 2.5 m/s)	750 [dm^3/min]
Pulse value	5.0 [dm^3]
Unit totalizer	dm^3
Unit length	mm
Unit temperature	°C

10.2 US units (for USA and Canada only)

Parameter	Factory setting
Nominal diameter	3"
Low flow cut off (v ≈ 0.04 m/s)	2.5 [gal/min]
Full scale value (v ≈ 2.5 m/s)	200 [gal/min]
Pulse value	2.0 [gal]
Unit totalizer	gal
Unit length	mm
Unit temperature	°C

10.3 Language

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

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Functions 4...

Functions 5...

Functions 6...

Functions 8...

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