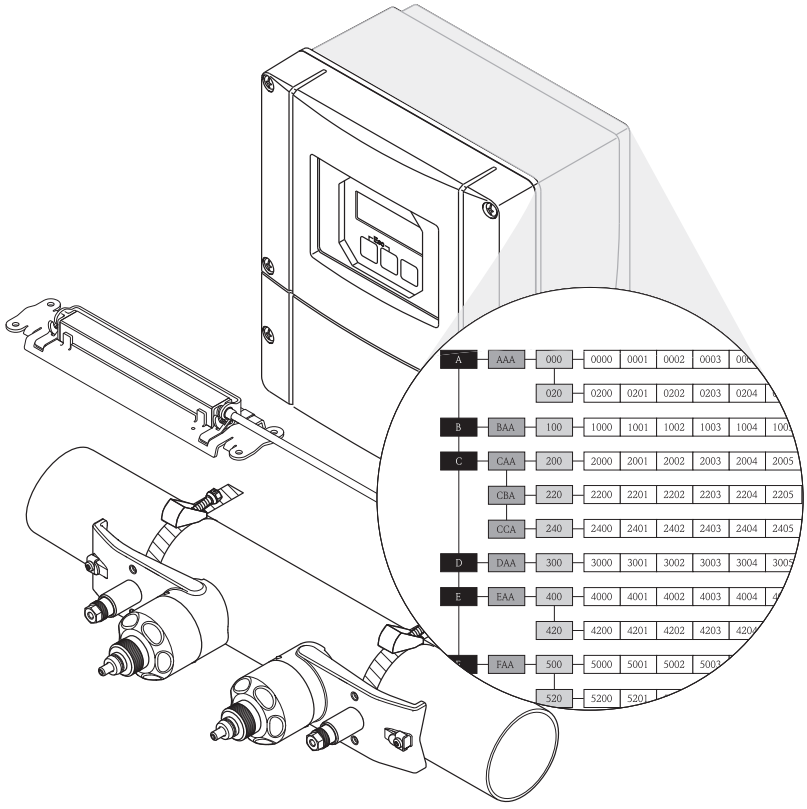
Level Pressure Flow Temperature Liquid Analysis Registration Systems Components Services Solutions

Description of Device Functions

# Proline Prosonic Flow 93

## Ultrasonic Flow Measuring System
## HART

HART® FIELD COMMUNICATION PROTOCOL

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Valid as of version:
V 2.03.XX (Device software)

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People for Process Automation

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# 1 Notes on 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

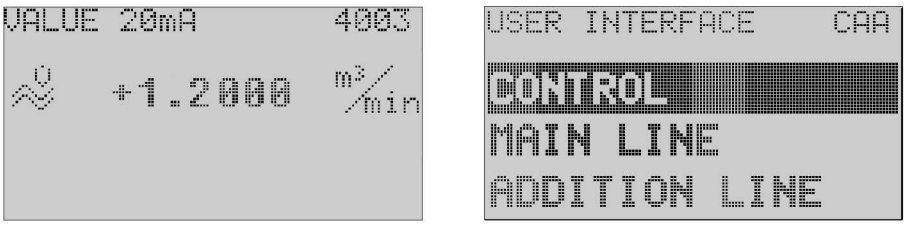
This step-by-step, top-down approach starts with the blocks, the highest level, and works down through the matrix to the description of the function you need:

1. All blocks available, and their related groups, are illustrated on Page 8. 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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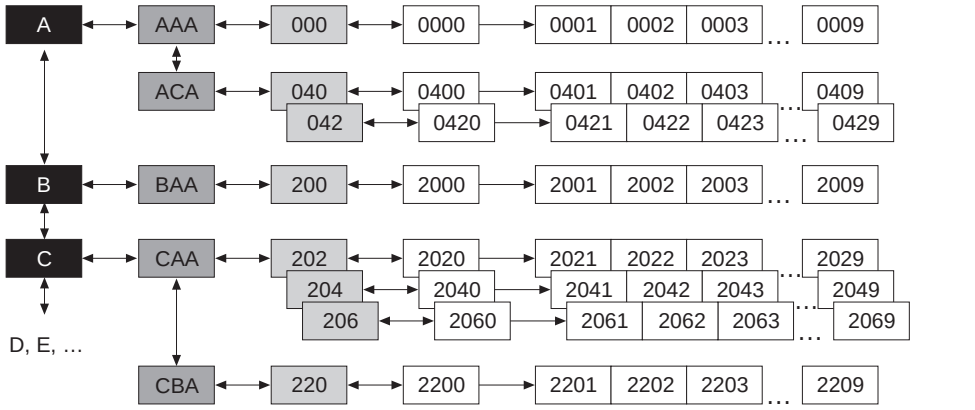
The function-matrix index lists the codes for all the available "cells" in alphabetic and consecutive order, complete with the page references for the corresponding functions.
The index to the function matrix is on Page 143.

# 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. Examples of groups available in the "USER INTERFACE" block are CONTROL, MAIN LINE, ADDITIONAL LINE, etc.

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

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

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

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

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

### 2.1.5 Codes identifying cells

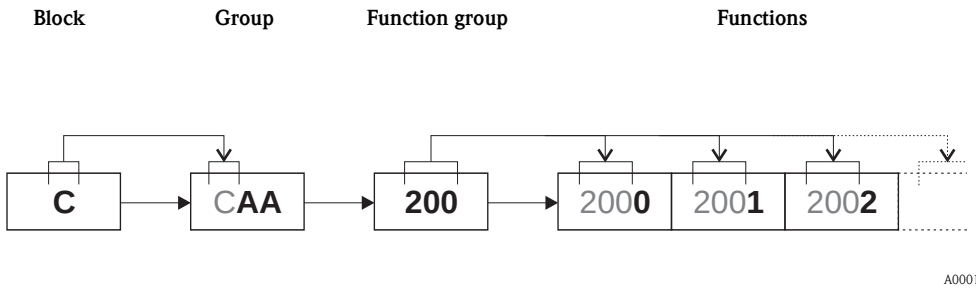
Each cell (block, group, function group and function) in the function matrix has an individual, unique code.

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

**Groups:**
The code consists of three letters (AAA, ABA, BAA, etc.).
The first letter matches the block code (i.e. each group in block A has a code starting with an A_ _; the codes of the groups in block B start with a B _ _, 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.)

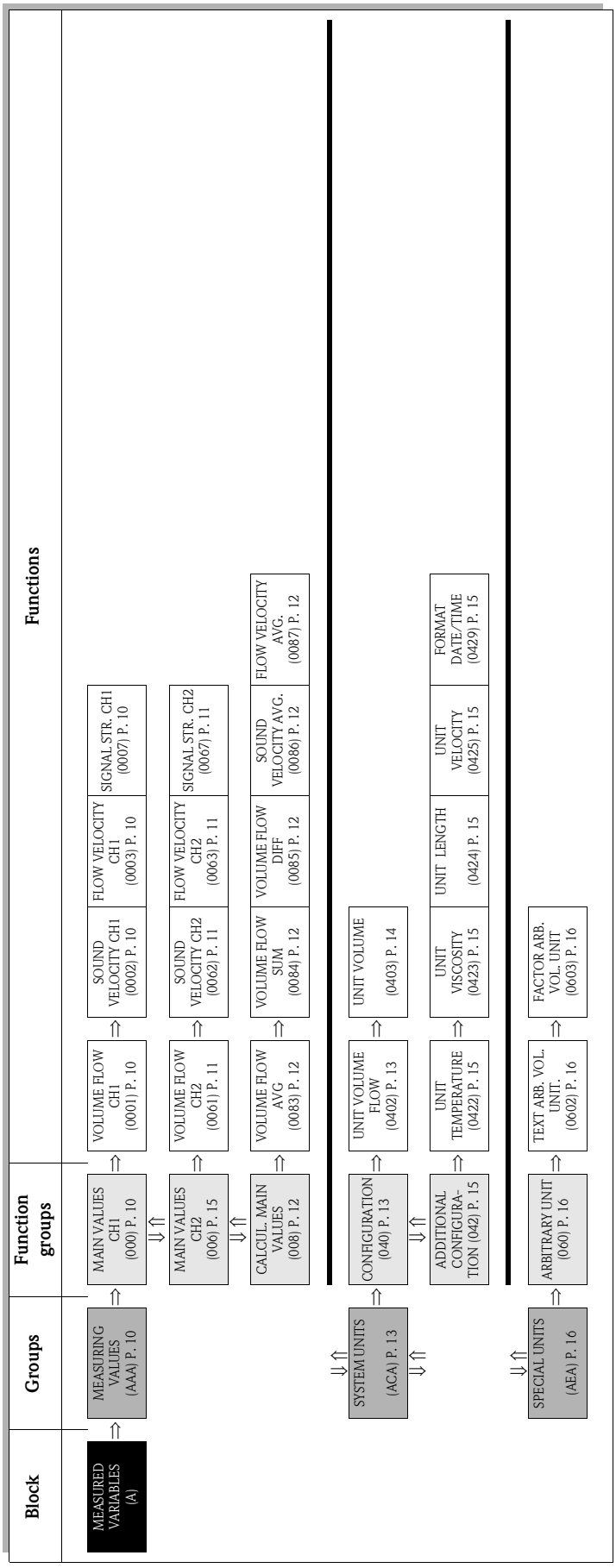
**Functions:**
The code consists of four digits (0000, 0001, 0201, etc.).
The first three digits are the same as the code for the function group.
The last digit in the code is a counter for the functions in the function group, incrementing from 0 to 9 (e.g. function 0005 is the sixth function in group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



## 2.2 Function matrix Proline Prosonic Flow 93

| BLOCKS | | GROUPS | | | FUNCTION GROUPS |
|---|---|---|---|---|---|
| **MEASURED VARIABLES** (see P. 9) | **A** | MEASURING VALUES | AAA | → | see P. 10 |
| | | SYSTEM UNITS | ACA | → | see P. 13 |
| | | SPECIAL UNITS | AEA | → | see P. 16 |
| **QUICK SETUP** (see P. 17) | **B** | Sensor and commissioning setups | | → | see P. 17 |
| **USER INTERFACE** (see P. 25) | **C** | CONTROL | CAA | → | see P. 26 |
| | | MAIN LINE | CCA | → | see P. 30 |
| | | ADDITIONAL LINE | CEA | → | see P. 34 |
| | | INFORMATION LINE | CGA | → | see P. 38 |
| **TOTALIZER** (see P. 42) | **D** | TOTALIZER (1...3) | DAA,B,C | → | see P. 43 |
| | | HANDLING TOTALIZER | DJA | → | see P. 46 |
| **OUTPUTS** (see P. 47) | **E** | CURRENT OUTPUT (1...3) | EAA,B,C | → | see P. 48 |
| | | PULSE/FREQUENCY OUTPUT (1...2) | ECA,B | → | see P. 59 |
| | | RELAY OUTPUT (1...2) | EGA,B | → | see P. 85 |
| **INPUTS** (see P. 94) | **F** | STATUS INPUT | FAA | → | see P. 95 |
| **BASIC FUNCTION** (see P. 97) | **G** | HART | GAA | → | see P. 98 |
| | | PROCESS PARAMETER (CH1...CH2) | GIA,B | → | see P. 100 |
| | | SYSTEM PARAMETER (CH1...CH2) | GLA,B | → | see P. 111 |
| | | SENSOR DATA (CH1...CH2) | GNA,B | → | see P. 112 |
| **SPECIAL FUNCTION** (see P. 119) | **H** | ADVANCED DIAGNOSTICS (CH1,CH2, AVG) | HEA,B,C | → | see P. 120 |
| **SUPERVISION** (see P. 132) | **J** | SYSTEM | JAA | → | see P. 133 |
| | | SYSTEM CH2 | JAB | → | see P. 133 |
| | | VERSION INFO | JCA | → | see P. 137 |

# 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**<br>MEASURED VARIABLES → MEASURING VALUES → MAIN VALUES CH1 | |
|---|---|
| The measuring values of channel 1 currently being measured are displayed in this function group.<br><br>✎ Note!<br>■ The engineering units of all the measured variables shown here can be set in the "SYSTEM UNITS" group.<br>■ If the liquid 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).<br><br>**User interface:**<br>5-digit floating-point number, including unit and sign<br>(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).<br><br>**User interface:**<br>5-digit fixed-point number, incl. units<br>(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).<br><br>**User interface:**<br>5-digit floating-point number, including unit and sign<br>(e.g. 8.0000 m/s, 26.247 ft/s) |
| **SIGNAL STRENGTH CH1 (0007)** | The signal strength appears on the display (channel 1).<br><br>**User interface:**<br>4-digit fixed-point number<br>(e.g. 80.0)<br><br>✎ Note!<br>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<br>MEASURED VARIABLES → MEASURING VALUES → MAIN VALUES CH2 | |
|---|---|
| The measuring values of channel 2 currently being measured are displayed in this function group.<br><br>✎ Note!<br>■ The engineering units of all the measured variables shown here can be set in the "SYSTEM UNITS" group.<br>■ 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).<br><br>**User interface:**<br>5-digit floating-point number, including unit and sign<br>(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).<br><br>**User interface:**<br>5-digit fixed-point number, incl. units<br>(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).<br><br>**User interface:**<br>5-digit floating-point number, including unit and sign<br>(e.g. 8.0000 m/s, 26.247 ft/s) |
| **SIGNAL STRENGTH CH2 (0067)** | The signal strength appears on the display (channel 2).<br><br>**User interface:**<br>4-digit fixed-point number<br>(e.g. 80.0)<br><br>✎ Note!<br>To ensure reliable measurement takes place, Prosonic Flow requires a signal strength of > 30. |

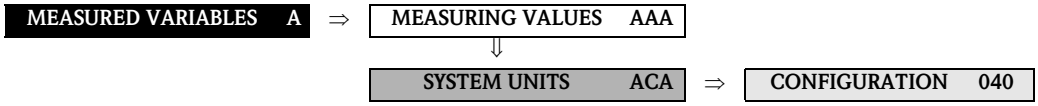
## 3.1.3 Function group CALCULATED MAIN VALUES

**MEASURED VARIABLES A** ⇒ **MEASURING VALUES AAA** ⇒ **CALCUL. MAIN VALUES 008**

| **Functional description**<br>MEASURED VARIABLES → MEASURING VALUES → CALCULATED MAIN VALUES | |
|---|---|
| The calculated measured values appear on the display. The measured values of both channels are used when calculating the values.<br><br>✎ Note!<br>■ The units of measure of all the measured variables shown here can be set in the "SYSTEM UNITS" group.<br>■ If the fluid in the pipe flows backwards, a negative sign prefixes the flow reading on the display. | |
| **VOLUME FLOW AVERAGE (0083)** | The average volume flow appears on the display. Calculated from the measured values: (VOLUME FLOW CH1 + VOLUME FLOW CH2)/2<br><br>**User interface:**<br>5-digit floating-point number, including unit and sign<br>(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<br><br>**User interface:**<br>5-digit floating-point number, including unit and sign<br>(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<br><br>**User interface:**<br>5-digit floating-point number, including unit and sign<br>(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 )/2<br><br>**User interface:**<br>5-digit fixed-point number, incl. units<br>(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 VELOCITY CH1 + FLOW VELOCITY CH2 )/2<br><br>**User interface:**<br>5-digit floating-point number, including unit and sign<br>(e.g. 8.0000 m/s, 26.247 ft/s) |

# 3.2 Group SYSTEM UNITS

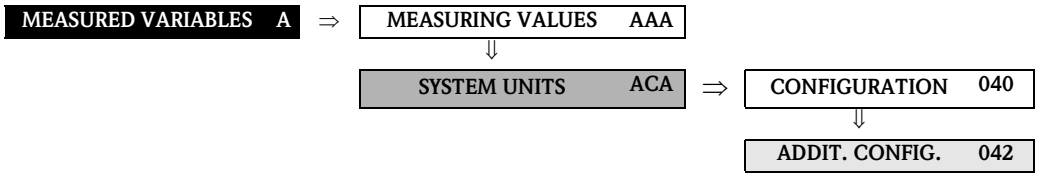
## 3.2.1 Function group CONFIGURATION




| Functional description<br>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.<br><br>The unit you select here is also valid for:<br>■ Current output<br>■ Frequency output<br>■ Relay switch points (limit value, flow direction)<br>■ Creepage<br><br>**Options:**<br>Metric:<br>Cubic centimeter → $cm^3/s$; $cm^3/min$; $cm^3/h$; $cm^3/day$<br>Cubic decimeter → $dm^3/s$; $dm^3/min$; $dm^3/h$; $dm^3/day$<br>Cubic meter → $m^3/s$; $m^3/min$; $m^3/h$; $m^3/day$<br>Milliliter → ml/s; ml/min; ml/h; ml/day<br>Liter → l/s; l/min; l/h; l/day<br>Hectoliter → hl/s; hl/min; hl/h; hl/day<br>Megaliter → Ml/s; Ml/min; Ml/h; Ml/day<br><br>US:<br>Cubic centimeter → cc/s; cc/min; cc/h; cc/day<br>Acre foot → af/s; af/min; af/h; af/day<br>Cubic foot → $ft^3/s$; $ft^3/min$; $ft^3/h$; $ft^3/day$<br>Fluid ounce → oz f/s; oz f/min; oz f/h; oz f/day<br>Gallon → gal/s; gal/min; gal/h; gal/day,<br>US kgal/s; US kgal/min; US kgal/h; US kgal/day<br>Million gallon → Mgal/s; Mgal/min; Mgal/h; Mgal/day<br>Barrel (normal fluids: 31.5 gal/bbl) → bbl/s; bbl/min; bbl/h; bbl/day<br>Barrel (beer: 31.0 gal/bbl) → bbl/s; bbl/min; bbl/h; bbl/day<br>Barrel (petrochemicals: 42.0 gal/bbl) → bbl/s; bbl/min; bbl/h; bbl/day<br>Barrel (filling tanks: 55.0 gal/bbl) → bbl/s; bbl/min; bbl/h; bbl/day<br><br>Imperial<br>Gallon → gal/s; gal/min; gal/h; gal/day<br>Mega gallon → Mgal/s; Mgal/min; Mgal/h; Mgal/day<br>Barrel (beer: 36.0 gal/bbl) → bbl/s; bbl/min; bbl/h; bbl/day<br>Barrel (petrochemicals: 34.97 gal/bbl) → bbl/s; bbl/min; bbl/h; bbl/day<br><br>Arbitrary unit, (see function group ARBITRARY UNIT on Page 16)<br>_ _ _ _ → _ _ _ _/s; _ _ _ _/min; _ _ _ _/h; _ _ _ _/day<br><br>**Factory setting:**<br>l/s<br><br>✎ Note!<br>If you defined a unit of volume in the ARBITRARY UNIT (060) function group (see Page 16) the unit in question is shown here. |

| Functional description<br>MEASURED VARIABLES → SYSTEM UNITS → CONFIGURATION | |
|---|---|
| **UNIT VOLUME (0403)** | Use this function to select the unit for displaying the volume.<br><br>The unit you select here is also valid for:<br>■ Pulse weighting (e.g. $m^3$/p)<br><br>**Options:**<br>Metric:<br>$cm^3$; $dm^3$; $m^3$; ml; l; hl; Ml MEGA<br><br>US:<br>cc; af; ft $^3$; oz f; gal; kgal; Mgal; bbl (NORMAL FLUIDS); bbl (BEER); bbl (PETROCHEMICALS); bbl (FILLING TANKS)<br><br>Imperial:<br>gal; Mgal; bbl (BEER); bbl (PETROCHEMICALS)<br><br>Arbitrary unit:<br>_ _ _ _ (see function group ARBITRARY UNIT on Page 16)<br><br>**Factory setting:**<br>liter<br><br>✎ Note!<br>■ If you defined a unit of volume in the ARBITRARY UNIT (060) function group (see Page 16) the unit in question is shown here.<br><br>■ The unit of the totalizers is independent of your choice here. The unit for each totalizer is selected separately for the totalizer in question. |

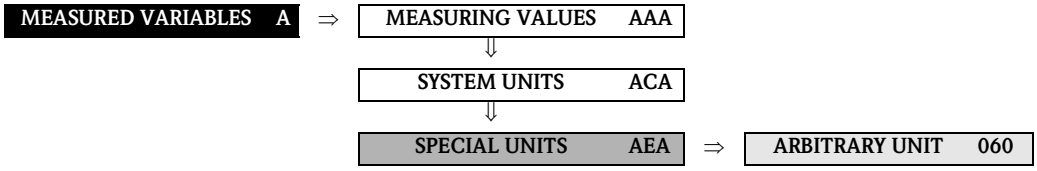
## 3.2.2 Function group ADDITIONAL CONFIGURATION




| Functional description<br>MEASURED VARIABLES → SYSTEM UNITS → ADDITIONAL CONFIGURATION | |
|---|---|
| **UNIT TEMPERATURE (0422)** | Use this function to select the unit for displaying the liquid temperature.<br><br>✎ Note!<br>The liquid temperature is entered in the function TEMPERATURE (see P. 108).<br><br>**Options:**<br>°C (Celsius)<br>K (Kelvin)<br>°F (Fahrenheit)<br>R (Rankine)<br><br>**Factory setting:**<br>°C |
| **UNIT VISCOSITY (0423)** | Use this function to select the unit for liquid viscosity.<br><br>**Options:**<br>$mm^2/s$<br>cSt<br>St<br><br>**Factory setting:**<br>$mm^2/s$ |
| **UNIT LENGTH (0424)** | Use this function to select the unit for the measure of length.<br>The unit you select here is valid for:<br>■ Nominal diameter<br>■ Diameter<br>■ Wall thickness<br>■ Liner thickness<br>■ Path length<br>■ Wire length<br>■ Sensor spacing<br><br>**Options:**<br>MILLIMETER<br>INCH<br><br>**Factory setting:**<br>MILLIMETER |
| **UNIT VELOCITY (0425)** | Use this function to select the unit for displaying the velocity.<br>The unit you select here is valid for:<br>■ Sound velocity<br>■ Flow velocity<br><br>**Options:**<br>m/s<br>ft/s<br><br>**Factory setting:**<br>m/s |
| **FORMAT DATE/TIME (0429)** | Use this function to select the date and time format of the calibration history.<br><br>**Options:**<br>DD.MM.YY 24 H<br>MM/DD/YY 12 H A/P<br>DD.MM.YY 12 H A/P<br>MM/DD/YY 24 H<br><br>**Factory setting:**<br>DD.MM.YY 24 H |

# 3.3 Group SPECIAL UNITS

## 3.3.1 Function group ARBITRARY UNIT




| Functional description<br>MEASURED VARIABLES → SPECIAL UNITS → ARBITRARY UNIT | |
|---|---|
| Use this function group to define an arbitrary unit for the flow rate variable. | |
| **TEXT ARBITRARY VOLUME (0602)** | Use this function to enter a text for the selectable volume (flow) unit. You define only the text, the unit of time is provided from a choice of options (s, min, h, day).<br><br>**User input:**<br>xxxxxxx (max. 4 characters)<br>Valid characters are A–Z, 0–9, +, –, decimal point, white space or underscore<br><br>**Factory setting:**<br>_ _ _ _ (No text)<br><br>Example:<br>If your text entry is "GLAS", this text string appears on the display complete with the unit of time, e.g. "GLAS/min":<br><br>GLAS = Volume (text input)<br>GLAS / min = Volume flow as shown (on the display) |
| **FACTOR ARBITRARY VOLUME (0603)** | Use this function to define a quantity factor (without time) for the free selectable unit. The volume unit on which this factor is based is one liter.<br><br>**User input:**<br>7-digit floating-point number<br><br>**Factory setting:**<br>1<br><br>**Reference quantity:**<br>Liter<br><br>Example:<br>The volume of a glass is 0.5 l → 2 glasses = 1 liter<br>User input: 2 |

# 4 Block QUICK SETUP

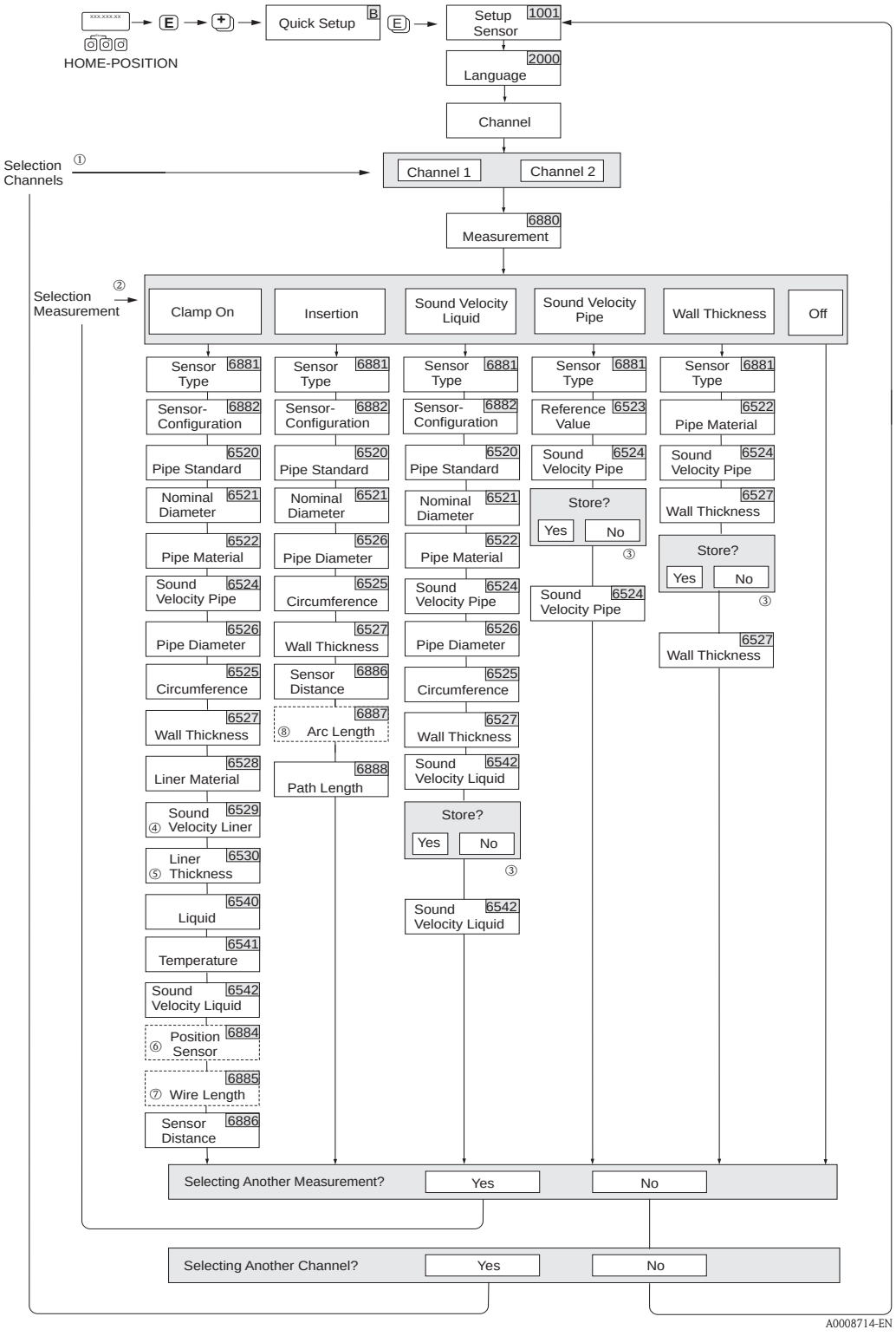
| Block | Group | Function groups | Functions |
|---|---|---|---|
| QUICK SETUP (B) | ⇒ | ⇒ | SETUP SENSOR (1001) P. 17 ⇒ QS COMMIS-SION. (1002) P. 17 \| QS PULSATING FLOW (1003) P. 17 \| T-DAT SAVE/LOAD (1009) P. 18 |

| Functional description<br>QUICK SETUP | |
|---|---|
| **QUICK SETUP SENSOR (1001)** | Use this function to start the Quick Setup menu for assembling the ultrasonic sensors.<br><br>**Options:**<br>YES<br>NO<br><br>**Factory setting:**<br>NO<br><br>✎ Note!<br>You will find a flowchart of the Quick Setup SENSOR menu on Page 19. Please refer to the Operating Instructions Proline Prosonic Flow 93 (BA070D/06/en/....) for more information on Quick Setup menus. |
| **QUICK SETUP COMMISSIONING (1002)** | Use this function to start the Quick Setup menu for commissioning.<br><br>**Options:**<br>YES<br>NO<br><br>**Factory setting:**<br>NO<br><br>✎ Note!<br>You will find a flowchart of the COMMISSIONING Quick Setup menu on Page 21. Please refer to the Operating Instructions Proline Prosonic Flow 93 (BA070D/06/en/....) for more information on Quick Setup menus. |
| **QUICK SETUP PULSATING FLOW (1003)** | Use this function to start the application-specific Quick Setup menu for pulsating flow.<br><br>**Options:**<br>YES<br>NO<br><br>**Factory setting:**<br>NO<br><br>✎ Note!<br>You will find a flowchart of the PULSATING FLOW Quick Setup menu on Page 23. Please refer to the Operating Instructions Proline Prosonic Flow 93 (BA070D/06/en/....) for more information on Quick Setup menus. |

| Functional description<br>QUICK SETUP | |
|---|---|
| **T-DAT SAVE/LOAD (1009)** | Use this function to save the parameter settings / configuration of the **transmitter** in a transmitter DAT (T-DAT), or to load the parameter settings from the T-DAT into the EEPROM (**manual** security function).<br><br>Application examples:<br>■ After commissioning, the current measuring point parameters can be saved to the T-DAT as a backup.<br><br>■ If the transmitter is replaced for some reason, the data from the T-DAT can be loaded into the new transmitter (EEPROM).<br><br>**Options:**<br>CANCEL<br>SAVE (from EEPROM to T-DAT)<br>LOAD (from the T-DAT into EEPROM)<br><br>**Factory setting:**<br>CANCEL<br><br>✎ Note!<br>■ If the power supply fails, the totalizer readings are automatically saved to the EEPROM.<br>■ The option "LOAD" couldn‘t be executed, if the T-DAT is empty or faultily.<br>■ The option "LOAD" and "SAVE" couldn‘t be executed, if no T-DAT be present. |

## 4.1 Quick Setup "Sensor Installation"

The installation distances needed to install the sensors can be determined using the "Sensor Installation" Quick Setup menu.
In the case of measuring devices without a local display, the installation distances can be determined via the FieldCare operating program or with the Applicator online tool.



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).

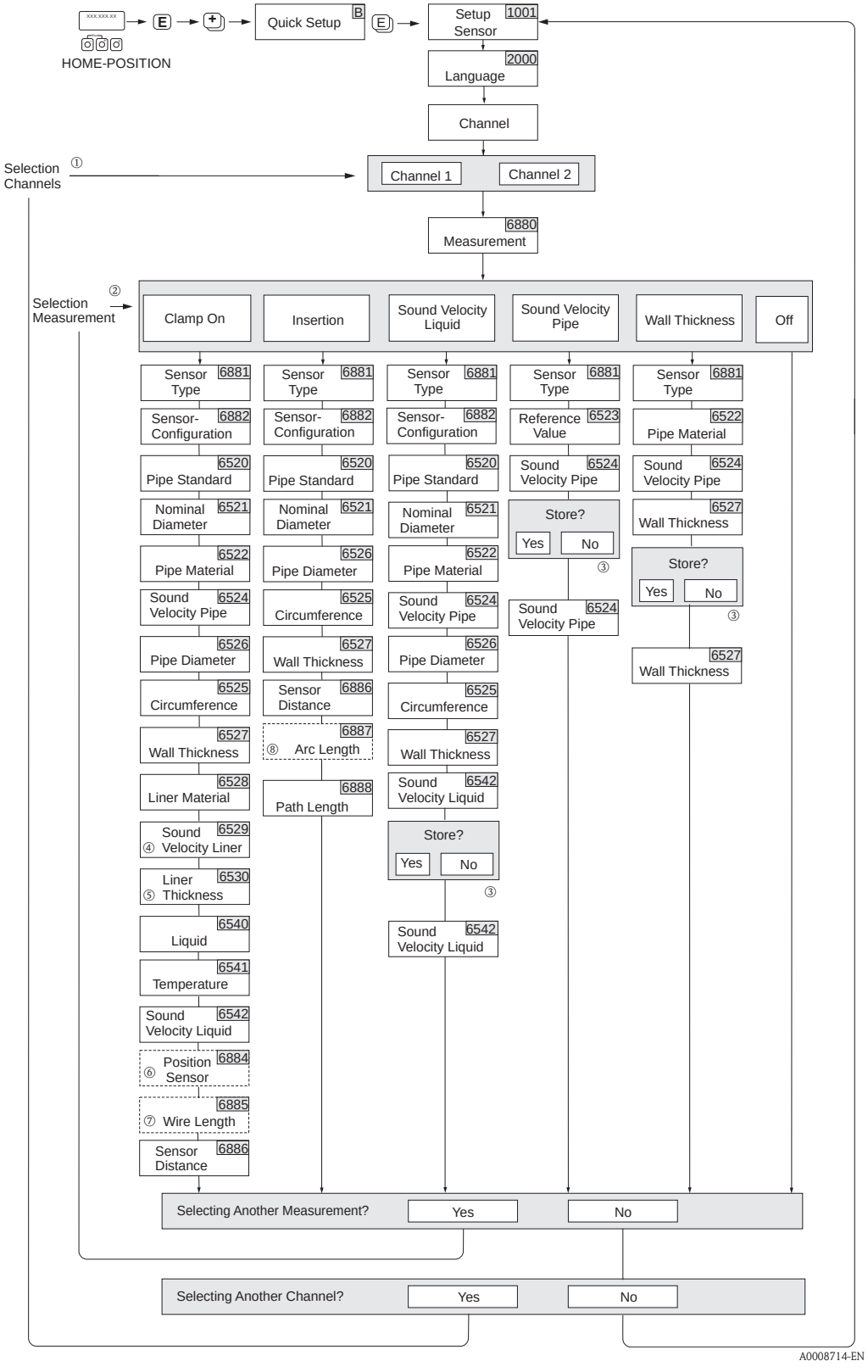
⑥ The POSITION SENSOR function (6884) only appears if:
- The CLAMP ON option is selected in the MEASUREMENT function (6880)
  **and**
- Two traverses are selected in the SENSOR CONFIGURATION function (6882)

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.



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.

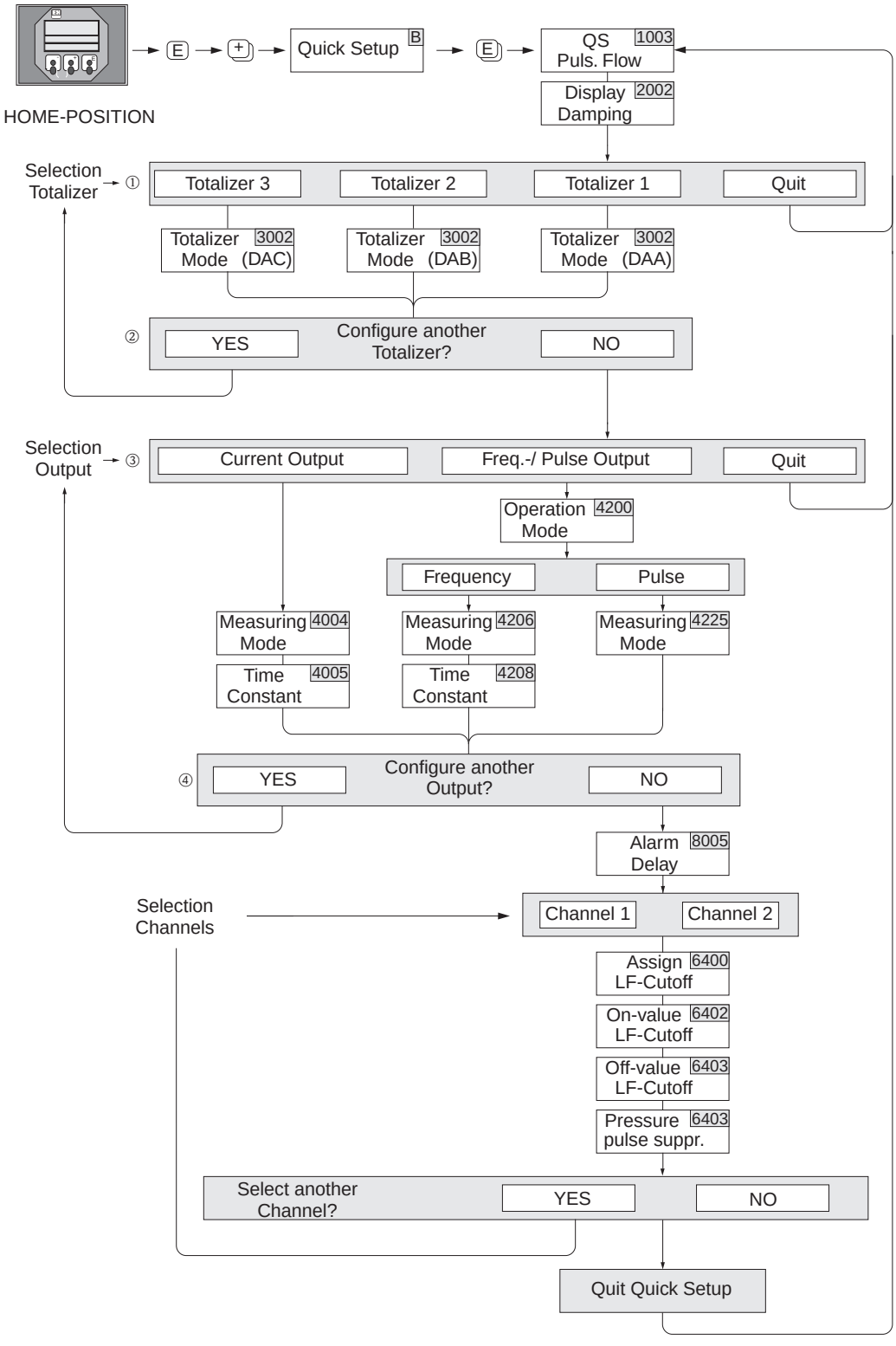
② The "YES" option remains visible until all the units have been configured.
"NO" is the only option displayed when no further units are available.

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.

## 4.3 Quick Setup "Pulsating flow"

With the aid of this Quick Setup, the user is systematically guided through all the device functions that have to be adjusted and configured for measuring operation with pulsating flow. Values that are already configured, such as the measuring range, current range or full scale value, are not changed in the process!




A0009839-EN

Note!
- The display returns to the function SETUP PULSATING FLOW (1003) if you press the ESC key combination during parameter interrogation.
- This Quick Setup can either be called up directly after the "COMMISSIONING" Quick Setup, or it can be called up manually via the SETUP PULSATING FLOW function (1003).

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

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

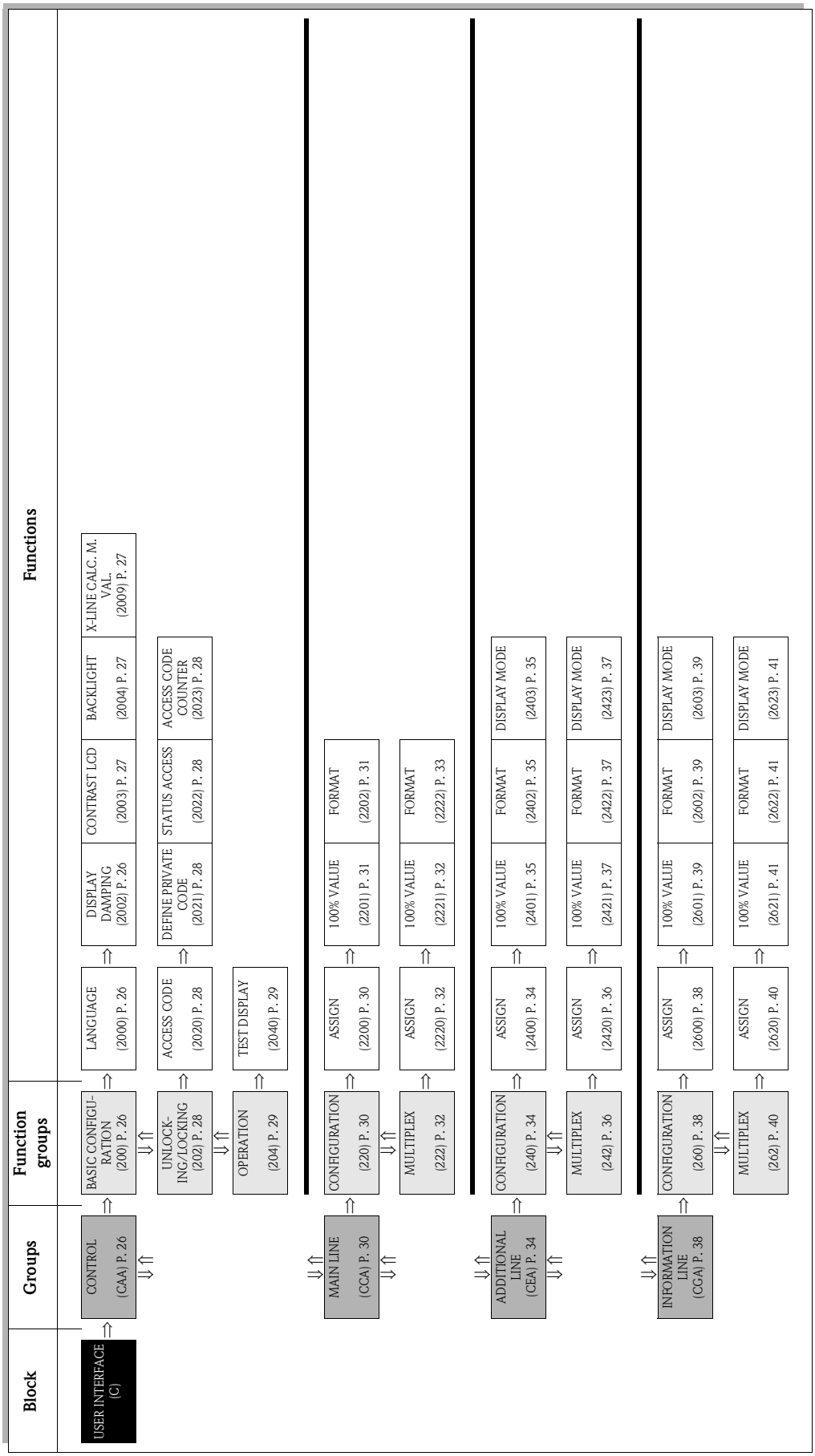
③ Only outputs not yet configured in the current Quick Setup are offered for selection in each cycle.

④ The "YES" option remains visible until all the outputs have been configured.
"NO" is the only option displayed when no further outputs are available.

**Settings for the Pulsating Flow menu in Quick Setup:**

| Fctn. des. | Function name | Suggested settings | Description |
|---|---|---|---|
| **Call up through the function matrix:** | | | |
| B | QUICK SETUP | QS PULSATING FLOW | see P. 17 |
| 1003 | QS PULSATING FLOW | YES | see P. 17 |
| **Basic configuration:** | | | |
| 2002 | DISPLAY DAMPING | 1 s | see P. 26 |
| 3002 | TOTALIZER MODE (DAA) | BALANCE | see P. 44 |
| 3002 | TOTALIZER MODE (DAB) | BALANCE | see P. 44 |
| 3002 | TOTALIZER MODE (DAC) | BALANCE | see P. 44 |
| **Select the signal type: CURRENT OUTPUT (1...2)** | | | |
| 4004 | MEASURING MODE | PULSATING FLOW | see P. 53 |
| 4005 | TIME CONSTANT | 1 s | see P. 55 |
| **Select the signal type: FREQ.-/PULSE OUTPUT (1...n) / operation mode: FREQUENCY** | | | |
| 4206 | MEASURING MODE | PULSATING FLOW | see P. 63 |
| 4208 | TIME CONSTANT | 0 s | see P. 67 |
| **Select the signal type: FREQ.-/PULSE OUTPUT (1...n) / operation mode: PULSE** | | | |
| 4225 | MEASURING MODE | PULSATING FLOW | see P. 71 |
| **Other settings:** | | | |
| 8005 | ALARM DELAY | 0 s | see P. 134 |
| 6400 | ASSIGN LOW FLOW CUT OFF | VOLUME FLOW | see P. 100 |
| 6402 | ON-VALUE LOW FLOW CUT OFF | 3.0 $dm^3$/min resp. 0.8 US-gal/min | see P. 100 |
| 6403 | OFF-VALUE LOW FLOW CUT OFF | 50% | see P. 100 |
| 6404 | PRESSURE SHOCK SUPPRESSION | 0 s | see P. 101 |

# 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<br>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.<br><br>✎ Note!<br>The displayed options depend on the available language group shown in the LANGUAGE GROUP (8226) function.<br><br>**Options:**<br>Language group WEST EU / USA: ENGLISH, DEUTSCH, FRANCAIS, ESPANOL, ITALIANO, NEDERLANDS, PORTUGUESE<br>Language group EAST EU / SCAND.: ENGLISH, NORSK, SVENSKA, SUOMI, POLISH, CZECH, RUSSIAN<br>Language group ASIA: ENGLISH, BAHASA INDONESIA, JAPANESE (syllabary)<br>Language group CHINESE: CHINESE, ENGLISH<br><br>**Factory setting:**<br>Country-dependent, see Page 140<br><br>✎ Note!<br>■ If you press the ⊞ keys simultaneously during startup, the language defaults to "ENGLISH".<br>■ 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).<br><br>**User input:**<br>0...100 seconds<br><br>**Factory setting:**<br>1 s<br><br>✎ Note!<br>Setting the time constant to zero seconds switches off damping. |

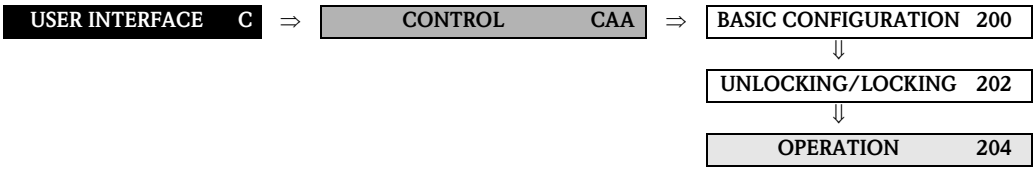
| Functional description<br>USER INTERFACE → CONTROL → BASIC CONFIGURATION | |
|---|---|
| **CONTRAST LCD (2003)** | Use this function to optimize display contrast to suit local operating conditions.<br><br>**User input:**<br>10...100%<br><br>**Factory setting:**<br>50% |
| **BACKLIGHT (2004)** | Use this function to optimize the backlight to suit local operating conditions.<br><br>**User input:**<br>10...100%<br><br>**Factory setting:**<br>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 function ASSIGN (2200, main line), (2400, additional line), (2600, information line) so that the value appears in the line desired.<br><br>✎ Note!<br>This function does **not** appear if OFF was selected on at least one channel in the function MEASUREMENT (6880).<br><br>**Options:**<br>(CH1 + CH2)/2<br>CH1 + CH2<br>CH1 - CH2<br><br>**Factory setting:**<br>(CH1 + CH2)/2 |

## 5.1.2 Function group UNLOCKING/LOCKING

USER INTERFACE C ⇒ CONTROL CAA ⇒ BASIC CONFIGURATION 200
⇓
UNLOCKING/LOCKING 202

| Functional description<br>USER INTERFACE → CONTROL → UNLOCKING/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).<br><br>You can enable programming by entering your personal code (**factory setting = 93**, see function).<br><br>**User input:**<br>max. 4-digit number: 0...9999<br><br>✎ Note!<br>■ The programming levels are disabled if you do not press a key within 60 seconds following automatic return to the HOME position.<br><br>■ You can also disable programming in this function by entering any number (other than the defined private code).<br><br>■ The Endress+Hauser service organization can be of assistance if you mislay your personal code. |
| **DEFINE PRIVATE CODE (2021)** | Use this function to enter a personal code number for enabling programming.<br><br>**User input:**<br>0...9999 (max. 4-digit number)<br><br>**Factory setting:**<br>93<br><br>✎ Note!<br>■ Programming is always enabled with the code "0".<br>■ 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.<br><br>**User interface:**<br>ACCESS CUSTOMER (parameterization possible)<br>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.<br><br>**Display:**<br>Integer (delivery status: 0) |

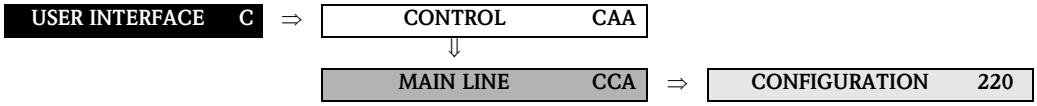
### 5.1.3 Function group OPERATION

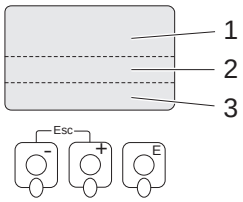



| Functional description<br>USER INTERFACE → CONTROL → OPERATION | |
|---|---|
| **TEST DISPLAY (2040)** | Use this function to test the operability of the local display and its pixels.<br><br>**Options:**<br>OFF<br>ON<br><br>**Factory setting:**<br><br>OFF<br><br>Test sequence:<br>1. Start the test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

# 5.2 Group MAIN LINE

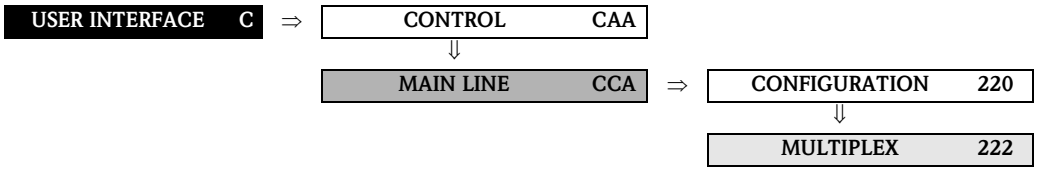
## 5.2.1 Function group CONFIGURATION




| Functional description<br>USER INTERFACE → MAIN LINE → CONFIGURATION | |
|---|---|
| 1 = Main line<br>2 = Additional line<br>3 = Information line<br>  <br><br>A0001253 | |
| **ASSIGN**<br>**(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.<br><br>**Options:**<br>OFF<br>VOLUME FLOW (CH1...CH2)<br>CALCULATED VOLUME FLOW<br>VOLUME FLOW % (CH1...CH2)<br>CALCULATED VOLUME FLOW %<br>SOUND VELOCITY (CH1...CH2)<br>SOUND VELOCITY AVERAGE<br>SIGNAL STRENGTH (CH1...CH2)<br>FLOW VELOCITY (CH1...CH2)<br>FLOW VELOCITY AVERAGE<br>ACTUAL CURRENT (1...3)<br>ACTUAL FREQUENCY (1...2)<br>TOTALIZER (1...3)<br><br>✎ Note!<br>If a channel is not visible, it does not appear in the options. Channels can be displayed or hidden by means of the function MEASUREMENT (6880).<br><br>**Factory setting:**<br>VOLUME FLOW CH1<br><br>**Advanced options with optional software package ADVANCED DIAGNOSTICS:**<br>DEVIATION VOLUME FLOW (CH1...CH2)<br>DEVIATION VOLUME FLOW AVERAGE<br>DEVIATION FLOW VELOCITY (CH1...CH2)<br>DEVIATION FLOW VELOCITY AVERAGE<br>DEVIATION SIGNAL STRENGTH (CH1...CH2)<br>DEVIATION SOUND VELOCITY (CH1...CH2)<br>DEVIATION SOUND VELOCITY AVERAGE<br>DEVIATION ACTUAL TRANSIT TIME (CH1...CH2)<br>DEVIATION ACCEPTANCE RATE (CH1...CH2) |

| Functional description<br>USER INTERFACE → MAIN LINE → CONFIGURATION | |
|---|---|
| **100% VALUE (2201)** | ✎ Note!<br>This function is only available if VOLUME FLOW IN % or CALCULATED VOLUME FLOW IN % is selected in the function ASSIGN (2200).<br><br>Use this function to define the flow value to be shown on the display as the 100% value.<br><br>**User input:**<br>5-digit floating-point number<br><br>**Factory setting:**<br>10l/s |
| **FORMAT (2202)** | Use this function to define the maximum number of places after the decimal point displayed for the reading in the main line.<br><br>**Options:**<br>XXXXX. - XXXX.X - XXX.XX - XX.XXX -X.XXXX<br><br>**Factory setting:**<br>X.XXXX<br><br>✎ Note!<br>■ 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.<br>■ 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

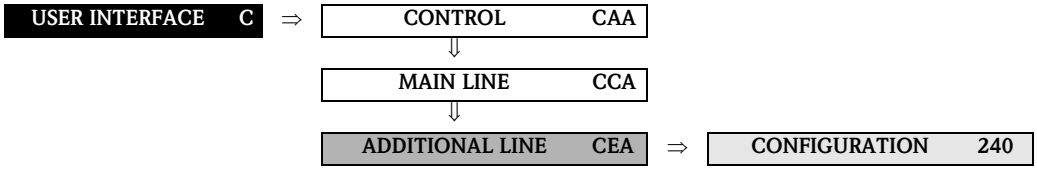


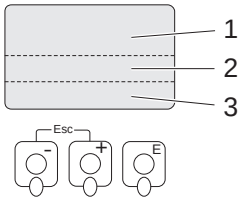

| Functional description<br>USER INTERFACE → MAIN LINE → MULTIPLEX | |
|---|---|
| **ASSIGN (2220)** | Use this function to define a second reading to be displayed in the main line alternatively (every 10 seconds) with the reading defined in the function ASSIGN (2200).<br><br>**Options:**<br>OFF<br>VOLUME FLOW (CH1...CH2)<br>CALCULATED VOLUME FLOW<br>VOLUME FLOW % (CH1...CH2)<br>CALCULATED VOLUME FLOW %<br>SOUND VELOCITY (CH1...CH2)<br>SOUND VELOCITY AVERAGE<br>SIGNAL STRENGTH (CH1...CH2)<br>FLOW VELOCITY (CH1...CH2)<br>FLOW VELOCITY AVERAGE<br>ACTUAL CURRENT (1...3)<br>ACTUAL FREQUENCY (1...2)<br>TOTALIZER (1...3)<br><br>✎ Note!<br>If a channel is not visible, it does not appear in the options. Channels can be displayed or hidden by means of the function MEASUREMENT (6880).<br><br>**Factory setting:**<br>OFF<br><br>**Advanced options with optional software package ADVANCED DIAGNOSTICS:**<br>DEVIATION VOLUME FLOW (CH1...CH2)<br>DEVIATION VOLUME FLOW AVERAGE<br>DEVIATION FLOW VELOCITY (CH1...CH2)<br>DEVIATION FLOW VELOCITY AVERAGE<br>DEVIATION SIGNAL STRENGTH (CH1...CH2)<br>DEVIATION SOUND VELOCITY (CH1...CH2)<br>DEVIATION SOUND VELOCITY AVERAGE<br>DEVIATION ACTUAL TRANSIT TIME (CH1...CH2)<br>DEVIATION ACCEPTANCE RATE (CH1...CH2) |
| **100% VALUE (2221)** | ✎ Note!<br>This function is only available if VOLUME FLOW % or CALCULATED VOLUME FLOW % is selected in the function ASSIGN (2200).<br><br>Use this function to define the flow value to be shown on the display as the 100% value.<br><br>**User input:**<br>5-digit floating-point number<br><br>**Factory setting:**<br>Depends on nominal diameter and country, [value] / [$dm^3$...$m^3$ or US-gal...US-Mgal]<br>Corresponds to the factory setting for the full scale value (see Page 140 ff.). |

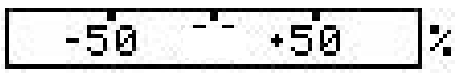
| Functional description<br>USER INTERFACE → MAIN LINE → MULTIPLEX | |
|---|---|
| **FORMAT**<br>**(2222)** | Use this function to define the maximum number of places after the decimal point for the second value displayed in the main line.<br><br>**Options:**<br>XXXXX. - XXXX.X - XXX.XX - XX.XXX -X.XXXX<br><br>**Factory setting:**<br>X.XXXX<br><br>✎ Note!<br>■ 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.<br>■ 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 ADDITIONAL LINE

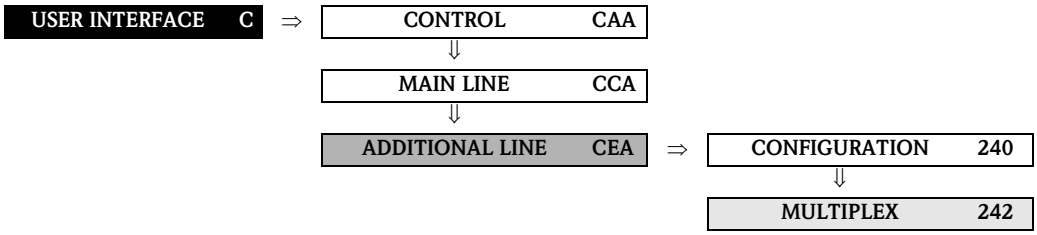
## 5.3.1 Function group CONFIGURATION




| Functional description<br>USER INTERFACE ➞ ADDITIONAL LINE ➞ CONFIGURATION | |
|---|---|
| 1 = Main line<br>2 = Additional line<br>3 = Information line<br>  <br><br>A0001253 | |
| **ASSIGN**<br>**(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.<br><br>**Options:**<br>OFF<br>VOLUME FLOW (CH1...CH2)<br>CALCULATED VOLUME FLOW<br>VOLUME FLOW % (CH1...CH2)<br>CALCULATED VOLUME FLOW %<br>SOUND VELOCITY (CH1...CH2)<br>SOUND VELOCITY AVERAGE<br>SIGNAL STRENGTH (CH1...CH2)<br>FLOW VELOCITY (CH1...CH2)<br>FLOW VELOCITY AVERAGE<br>VOLUME FLOW BARGRAPH IN % (CH1...CH2)<br>CALCULATED VOLUME FLOW BARGRAPH % (CH1...CH2)<br>SIGNAL STRENGTH BARGRAPH % (CH1...CH2)<br>ACTUAL CURRENT (1...3)<br>ACTUAL FREQUENCY (1...2)<br>TOTALIZER (1...3)<br>TAG NAME<br>FLOW DIRECTION (CH1...CH2)<br>CALCULATED FLOW DIRECTION<br><br>**Factory setting:**<br>TOTALIZER 1<br><br>✎ Note!<br>If a channel is not visible, it does not appear in the options. Channels can be displayed or hidden by means of the function MEASUREMENT (6880).<br><br>**Advanced options with optional software package ADVANCED DIAGNOSTICS:**<br>DEVIATION VOLUME FLOW (CH1...CH2)<br>DEVIATION VOLUME FLOW AVERAGE<br>DEVIATION FLOW VELOCITY (CH1...CH2)<br>DEVIATION FLOW VELOCITY AVERAGE<br>DEVIATION SIGNAL STRENGTH (CH1...CH2)<br>DEVIATION SOUND VELOCITY (CH1...CH2)<br>DEVIATION SOUND VELOCITY AVERAGE<br>DEVIATION ACTUAL TRANSIT TIME (CH1...CH2)<br>DEVIATION ACCEPTANCE RATE (CH1...CH2) |

| Functional description<br>USER INTERFACE → ADDITIONAL LINE → CONFIGURATION | |
|---|---|
| **100% VALUE (2401)** | ✎ Note!<br>This function is not available unless one of the following was selected in the function ASSIGN (2400):<br>■ VOLUME FLOW %<br>■ VOLUME FLOW BARGRAPH %<br>■ CALCULATED VOLUME FLOW %<br>■ CALCULATED VOLUME FLOW BARGRAPH %<br><br>Use this function to define the flow value to be shown on the display as the 100% value.<br><br>**User input:**<br>5-digit floating-point number<br><br>**Factory setting:**<br>Depends on nominal diameter and country, [value] / [$dm^3$...$m^3$ or US-gal...US-Mgal]<br>Corresponds to the factory setting for the full scale value (see Page 140 ff.). |
| **FORMAT (2402)** | ✎ Note!<br>This function is not available unless a number was selected in the function ASSIGN (2400).<br><br>Use this function to define the maximum number of places after the decimal point displayed for the reading in the additional line.<br><br>**Options:**<br>XXXXX. - XXXX.X - XXX.XX - XX.XXX -X.XXXX<br><br>**Factory setting:**<br>X.XXXX<br><br>✎ Note!<br>■ 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.<br>■ 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!<br>This function is only available if VOLUME FLOW BARGRAPH IN % or CALCULATED VOLUME FLOW BARGRAPH IN % was selected in the function ASSIGN (2420).<br><br>Use this function to define the format of the bar graph.<br><br>**Options:**<br>STANDARD (Simple bar graph with 25 / 50 / 75% gradations and integrated sign).<br> <br><br>A0001258<br><br>SYMMETRY (Symmetrical bar graph for positive and negative directions of flow, with –50 / 0 / +50% gradations and integrated sign).<br>  <br><br>A0001259<br><br>**Factory setting:**<br>STANDARD |

## 5.3.2 Function group MULTIPLEX

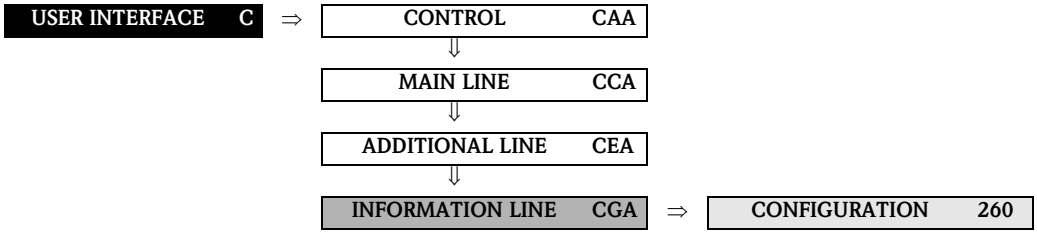


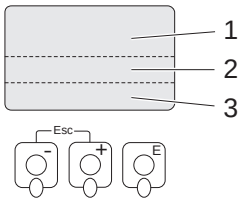

| Functional description<br>USER INTERFACE → ADDITIONAL LINE → MULTIPLEX | |
|---|---|
| **ASSIGN**<br>**(2420)** | Use this function to define the second reading to be displayed in the additional line alternately (every 10 seconds) with the value defined in the function ASSIGN (2400).<br><br>**Options:**<br>OFF<br>VOLUME FLOW (CH1...CH2)<br>CALCULATED VOLUME FLOW<br>VOLUME FLOW % (CH1...CH2)<br>CALCULATED VOLUME FLOW %<br>SOUND VELOCITY (CH1...CH2)<br>SOUND VELOCITY AVERAGE<br>SIGNAL STRENGTH (CH1...CH2)<br>FLOW VELOCITY (CH1...CH2)<br>FLOW VELOCITY AVERAGE<br>VOLUME FLOW BARGRAPH IN % (CH1...CH2)<br>CALCULATED VOLUME FLOW BARGRAPH % (CH1...CH2)<br>SIGNAL STRENGTH BARGRAPH % (CH1...CH2)<br>ACTUAL CURRENT (1...3)<br>ACTUAL FREQUENCY (1...2)<br>TOTALIZER (1...3)<br>TAG NAME<br>FLOW DIRECTION (CH1...CH2)<br>CALCULATED FLOW DIRECTION<br><br>**Factory setting:**<br>OFF<br><br>✎ Note!<br>Multiplex mode is suspended as soon as a fault / notice message is generated.<br>The message in question appears on the display.<br>■ Fault message (identified by a lightning icon):<br>– If ON was selected in the function ACKNOWLEDGE FAULTS (8004), multiplex mode is resumed as soon as the fault has been acknowledged and is no longer active.<br>– If OFF was selected in the function ACKNOWLEDGE FAULTS (8004), multiplex mode is resumed as soon as the fault is no longer active.<br>■ Notice message (identified by an exclamation mark):<br>– Multiplex mode is resumed as soon as the notice message is no longer active.<br><br>If a channel is not visible, it does not appear in the options. Channels can be displayed or hidden by means of the function MEASUREMENT (6880).<br><br>**Advanced options with optional software package ADVANCED DIAGNOSTICS:**<br>DEVIATION VOLUME FLOW (CH1...CH2)<br>DEVIATION VOLUME FLOW AVERAGE<br>DEVIATION FLOW VELOCITY (CH1...CH2)<br>DEVIATION FLOW VELOCITY AVERAGE<br>DEVIATION SIGNAL STRENGTH (CH1...CH2)<br>DEVIATION SOUND VELOCITY (CH1...CH2)<br>DEVIATION SOUND VELOCITY AVERAGE<br>DEVIATION ACTUAL TRANSIT TIME (CH1...CH2)<br>DEVIATION ACCEPTANCE RATE (CH1...CH2) |

| Functional description<br>USER INTERFACE → ADDITIONAL LINE → MULTIPLEX | |
|---|---|
| **100% VALUE (2421)** | ✎ Note!<br>This function is not available unless one of the following was selected in the function ASSIGN (2420):<br>■ VOLUME FLOW %<br>■ VOLUME FLOW BARGRAPH %<br>■ CALCULATED VOLUME FLOW %<br>■ CALCULATED VOLUME FLOW BARGRAPH %<br><br>Use this function to define the flow value to be shown on the display as the 100% value.<br><br>**User input:**<br>5-digit floating-point number<br><br>**Factory setting:**<br>Depends on nominal diameter and country, [value] / [$dm^3$...$m^3$ or US-gal...US-Mgal]<br>Corresponds to the factory setting for the full scale value (see Page 140 ff.). |
| **FORMAT (2422)** | ✎ Note!<br>This function is not available unless a number was selected in the function ASSIGN (2420).<br><br>Use this function to define the maximum number of places after the decimal point for the second value displayed in the additional line.<br><br>**Options:**<br>XXXXX. - XXXX.X - XXX.XX - XX.XXX -X.XXXX<br><br>**Factory setting:**<br>X.XXXX<br><br>✎ Note!<br>■ 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.<br>■ 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!<br>This function is only available if VOLUME FLOW BARGRAPH IN % or CALCULATED VOLUME FLOW BARGRAPH IN % was selected in the function ASSIGN (2420).<br><br>Use this function to define the format of the bar graph.<br><br>**Options:**<br>STANDARD (Simple bar graph with 25 / 50 / 75% gradations and integrated sign).<br> <br><br>A0001258<br><br>SYMMETRY (Symmetrical bar graph for positive and negative directions of flow, with –50 / 0 / +50% gradations and integrated sign).<br> <br><br>A0001259<br><br>**Factory setting:**<br>STANDARD |

# 5.4 Group INFORMATION LINE

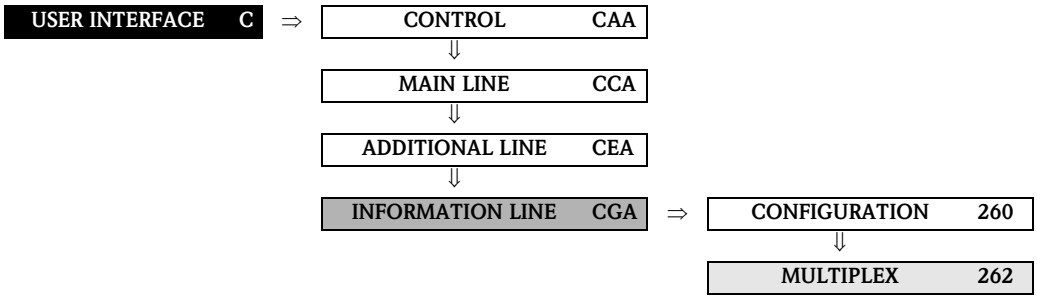
## 5.4.1 Function group CONFIGURATION




| Functional description<br>USER INTERFACE → INFORMATION LINE → CONFIGURATION | |
|---|---|
| 1 = Main line<br>2 = Additional line<br>3 = Information line<br>  <br><br>A0001253 | |
| **ASSIGN**<br>**(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.<br><br>**Options:**<br>OFF<br>VOLUME FLOW (CH1...CH2)<br>CALCULATED VOLUME FLOW<br>VOLUME FLOW % (CH1...CH2)<br>CALCULATED VOLUME FLOW IN %<br>SOUND VELOCITY (CH1...CH2)<br>SOUND VELOCITY AVERAGE<br>SIGNAL STRENGTH (CH1...CH2)<br>FLOW VELOCITY (CH1...CH2)<br>FLOW VELOCITY AVERAGE<br>VOLUME FLOW BARGRAPH % (CH1...CH2)<br>CALCULATED VOLUME FLOW BARGRAPH % (CH1...CH2)<br>SIGNAL STRENGTH BARGRAPH % (CH1...CH2)<br>ACTUAL CURRENT (1...3)<br>ACTUAL FREQUENCY (1...2)<br>TOTALIZER (1...3)<br>TAG NAME<br>OPERATING/SYSTEM CONDITIONS<br>FLOW DIRECTION (CH1...CH2)<br>CALCULATED FLOW DIRECTION<br><br>**Factory setting:**<br>OPERATING/SYSTEM CONDITIONS<br><br>✎ Note!<br>If a channel is not visible, it does not appear in the options. Channels can be displayed or hidden by means of the function MEASUREMENT (6880).<br><br>**Advanced options with optional software package ADVANCED DIAGNOSTICS:**<br>DEVIATION VOLUME FLOW (CH1...CH2)<br>DEVIATION VOLUME FLOW AVERAGE<br>DEVIATION FLOW VELOCITY (CH1...CH2)<br>DEVIATION FLOW VELOCITY AVERAGE<br>DEVIATION SIGNAL STRENGTH (CH1...CH2)<br>DEVIATION SOUND VELOCITY (CH1...CH2)<br>DEVIATION SOUND VELOCITY AVERAGE<br>DEVIATION ACTUAL TRANSIT TIME (CH1...CH2)<br>DEVIATION ACCEPTANCE RATE (CH1...CH2) |

| Functional description<br>USER INTERFACE → INFORMATION LINE → CONFIGURATION | |
|---|---|
| **100% VALUE (2601)** | ✎ Note!<br>This function is not available unless one of the following was selected in the function ASSIGN (2400):<br>■ VOLUME FLOW %<br>■ VOLUME FLOW BARGRAPH %<br>■ CALCULATED VOLUME FLOW %<br>■ CALCULATED VOLUME FLOW BARGRAPH %<br><br>Use this function to define the flow value to be shown on the display as the 100% value.<br><br>**User input:**<br>5-digit floating-point number<br><br>**Factory setting:**<br>Depends on nominal diameter and country, [value] / [$dm^3$...$m^3$ or US-gal...US-Mgal]<br>Corresponds to the factory setting for the full scale value (see Page 140 ff.). |
| **FORMAT (2602)** | ✎ Note!<br>This function is not available unless a number was selected in the function ASSIGN (2600).<br><br>Use this function to define the maximum number of places after the decimal point displayed for the reading in the information line.<br><br>**Options:**<br>XXXXX. - XXXX.X - XXX.XX - XX.XXX -X.XXXX<br><br>**Factory setting:**<br>X.XXXX<br><br>✎ Note!<br>■ 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.<br>■ 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!<br>This function is only available if VOLUME FLOW BARGRAPH IN % or CALCULATED VOLUME FLOW BARGRAPH IN % was selected in the function ASSIGN (2600).<br><br>Use this function to define the format of the bar graph.<br><br>**Options:**<br>STANDARD (Simple bar graph with 25 / 50 / 75% gradations and integrated sign).<br> <br><br>A0001258<br><br>SYMMETRY (Symmetrical bar graph for positive and negative directions of flow, with –50 / 0 / +50% gradations and integrated sign).<br> <br><br>A0001259<br><br>**Factory setting:**<br>STANDARD |

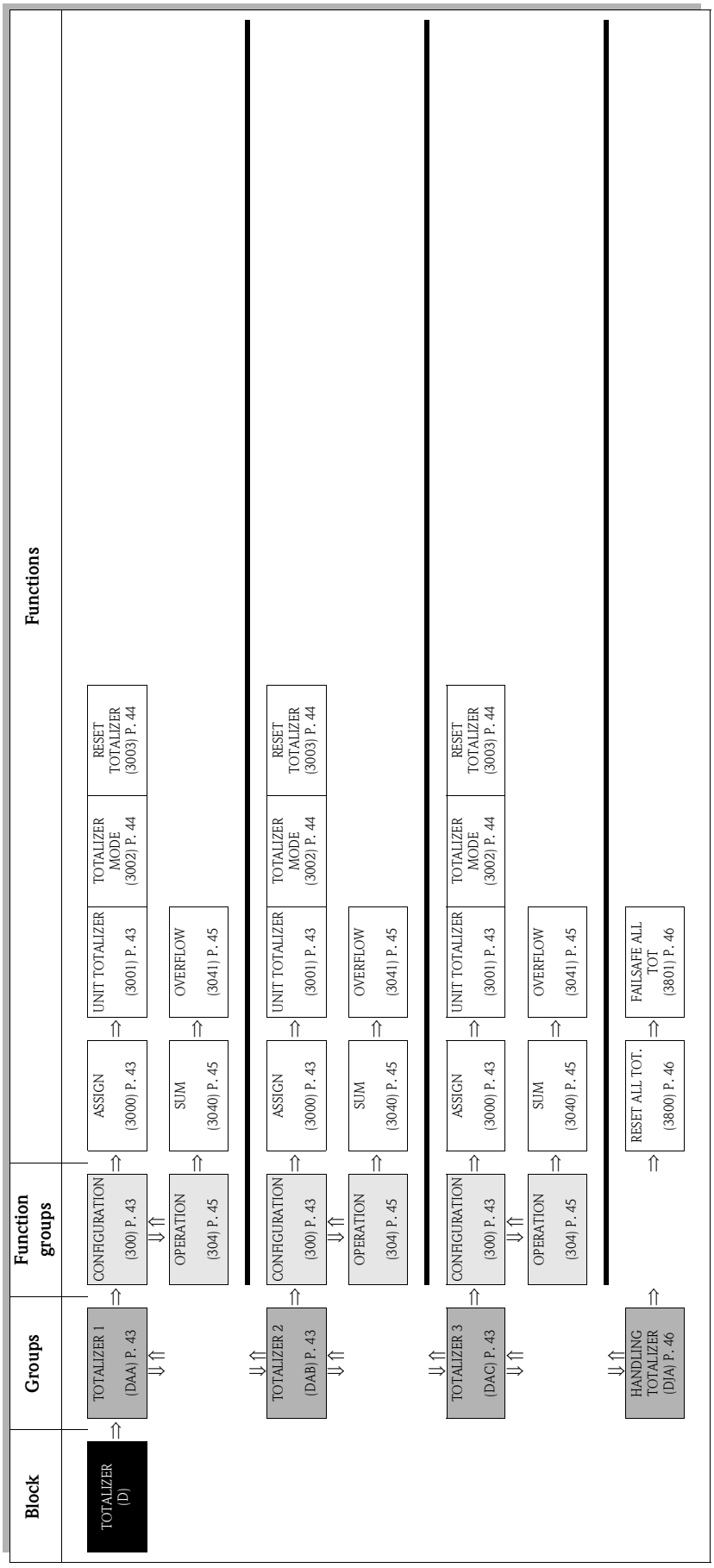
## 5.4.2 Function group MULTIPLEX




| Functional description<br>USER INTERFACE → INFORMATION LINE → MULTIPLEX | |
|---|---|
| **ASSIGN (2620)** | Use this function to define the second reading to be displayed in the information line alternately (every 10 seconds) with the value defined in the function ASSIGN (2600).<br><br>**Options:**<br>OFF<br>VOLUME FLOW (CH1...CH2)<br>CALCULATED VOLUME FLOW<br>VOLUME FLOW % (CH1...CH2)<br>CALCULATED VOLUME FLOW IN %<br>SOUND VELOCITY (CH1...CH2)<br>SOUND VELOCITY AVERAGE<br>SIGNAL STRENGTH (CH1...CH2)<br>FLOW VELOCITY (CH1...CH2)<br>FLOW VELOCITY AVERAGE<br>VOLUME FLOW BARGRAPH % (CH1...CH2)<br>CALCULATED VOLUME FLOW BARGRAPH % (CH1...CH2)<br>SIGNAL STRENGTH BARGRAPH % (CH1...CH2)<br>ACTUAL CURRENT (1...3)<br>ACTUAL FREQUENCY (1...2)<br>TOTALIZER (1...3)<br>TAG NAME<br>OPERATING/SYSTEM CONDITIONS<br>FLOW DIRECTION (CH1...CH2)<br>CALCULATED FLOW DIRECTION<br><br>**Factory setting:**<br>OFF<br><br>✎ Note!<br>Multiplex mode is suspended as soon as a fault / notice message is generated.<br>The message in question appears on the display.<br>■ Fault message (identified by a lightning icon):<br>– If ON was selected in the function ACKNOWLEDGE FAULTS (8004), multiplex mode is resumed as soon as the fault has been acknowledged and is no longer active.<br>– If OFF was selected in the function ACKNOWLEDGE FAULTS (8004), multiplex mode is resumed as soon as the fault is no longer active.<br>■ Notice message (identified by an exclamation mark):<br>– Multiplex mode is resumed as soon as the notice message is no longer active.<br><br>**Advanced options with optional software package ADVANCED DIAGNOSTICS:**<br>DEVIATION VOLUME FLOW (CH1...CH2)<br>DEVIATION VOLUME FLOW AVERAGE<br>DEVIATION FLOW VELOCITY (CH1...CH2)<br>DEVIATION FLOW VELOCITY AVERAGE<br>DEVIATION SIGNAL STRENGTH (CH1...CH2)<br>DEVIATION SOUND VELOCITY (CH1...CH2)<br>DEVIATION SOUND VELOCITY AVERAGE<br>DEVIATION ACTUAL TRANSIT TIME (CH1...CH2)<br>DEVIATION ACCEPTANCE RATE (CH1...CH2) |

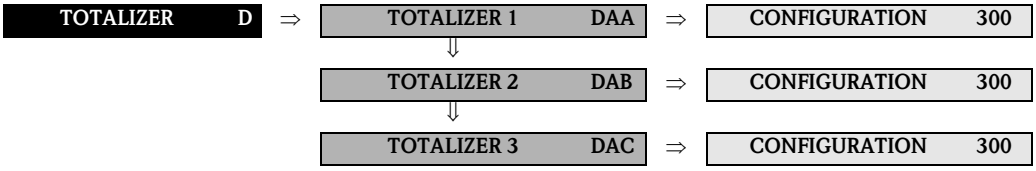
| Functional description<br>USER INTERFACE → INFORMATION LINE → MULTIPLEX | |
|---|---|
| **100% VALUE (2621)** | ✎ Note!<br>This function is not available unless one of the following was selected in the function ASSIGN (2400):<br>■ VOLUME FLOW %<br>■ VOLUME FLOW BARGRAPH %<br>■ CALCULATED VOLUME FLOW %<br>■ CALCULATED VOLUME FLOW BARGRAPH %<br><br>Use this function to define the flow value to be shown on the display as the 100% value.<br><br>**User input:**<br>5-digit floating-point number<br><br>**Factory setting:**<br>Depends on nominal diameter and country, [value] / [$dm^3$...$m^3$ or US-gal...US-Mgal]<br>Corresponds to the factory setting for the full scale value (see Page 140 ff.). |
| **FORMAT (2622)** | ✎ Note!<br>This function is not available unless a number was selected in the function ASSIGN (2600).<br><br>Use this function to define the maximum number of places after the decimal point for the second value displayed in the information line.<br><br>**Options:**<br>XXXXX. - XXXX.X - XXX.XX - XX.XXX -X.XXXX<br><br>**Factory setting:**<br>X.XXXX<br><br>✎ Note!<br>■ 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.<br>■ 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!<br>This function is only available if VOLUME FLOW BARGRAPH IN % or CALCULATED VOLUME FLOW BARGRAPH IN % was selected in the function ASSIGN (2620).<br><br>Use this function to define the format of the bar graph.<br><br>**Options:**<br>STANDARD (Simple bar graph with 25 / 50 / 75% gradations and integrated sign).<br> <br><br>A0001258<br><br>SYMMETRY (Symmetrical bar graph for positive and negative directions of flow, with –50 / 0 / +50% gradations and integrated sign).<br> <br><br>A0001259<br><br>**Factory setting:**<br>STANDARD |

# 6 Block TOTALIZER



# 6.1 Group TOTALIZER (1...3)

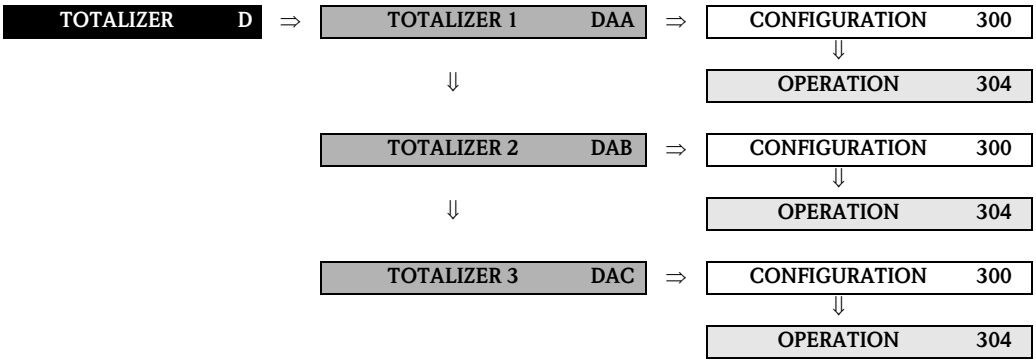
## 6.1.1 Function group CONFIGURATION




| Functional description<br>TOTALIZER ➞ TOTALIZER (1...3) ➞ CONFIGURATION | |
|---|---|
| The function descriptions below apply to totalizers 1...3; the totalizers are independently configurable. | |
| **ASSIGN (3000)** | Use this function to assign a measured variable to the totalizer in question.<br><br>**Options:**<br>OFF<br>VOLUME FLOW (CH1...CH2)<br>VOLUME FLOW AVERAGE<br>VOLUME FLOW SUM (CH1+CH2)<br>VOLUME FLOW DIFFERENCE (CH1-CH2)<br><br>**Factory setting:**<br>CH1 VOLUME FLOW<br><br>✎ Note!<br>■ The totalizer is reset to "0" as soon as the selection is changed.<br>■ If you select OFF in the function group CONFIGURATION of the totalizer in question, only the ASSIGN (3000) function remains visible. |
| **UNIT TOTALIZER (3001)** | Use this function to define the unit for the totalizer's measured variable, as selected beforehand.<br><br>**Options:**<br>Metric<br>$cm^3$; $dm^3$; $m^3$; ml; l; hl; Ml<br><br>US<br>cc; af; ft $^3$; oz f; gal; Mgal; bbl (normal fluids); bbl (beer); bbl (petrochemicals); bbl (filling tanks); US Kgal<br><br>Imperial<br>gal; Mgal; bbl (beer); bbl (petrochemicals)<br><br>Arbitrary unit<br>_ _ _ _ (see function group ARBITRARY UNIT on Page 16)<br><br>**Factory setting:**<br>$m^3$ |

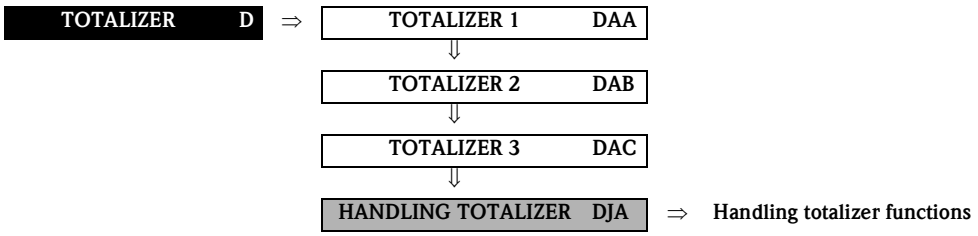
| Functional description<br>TOTALIZER ➞ TOTALIZER (1...3) ➞ CONFIGURATION | |
|---|---|
| **TOTALIZER MODE (3002)** | Use this function to define how the flow components are to be totaled by the totalizer in question.<br><br>**Options:**<br>BALANCE<br>Positive and negative flow components. The positive and negative flow components are balanced. In other words, net flow in the flow direction is registered.<br><br>FORWARD<br>Positive flow components only<br><br>REVERSE<br>Negative flow components only<br><br>**Factory setting:**<br>Totalizer 1 = BALANCE<br>Totalizer 2 = FORWARD<br>Totalizer 3 = REVERSE |
| **RESET TOTALIZER (3003)** | Use this function to reset the sum and the overflow of the totalizer in question (1...3) to zero.<br><br>**Options:**<br>NO<br>YES<br><br>**Factory setting:**<br>NO<br><br>✎ Note!<br>If the device is equipped with a status input, with the appropriate configuration a reset for each individual totalizer can also be triggered by a pulse (see function ASSIGN STATUS INPUT (5000) on page 95). |

## 6.1.2 Function group OPERATION



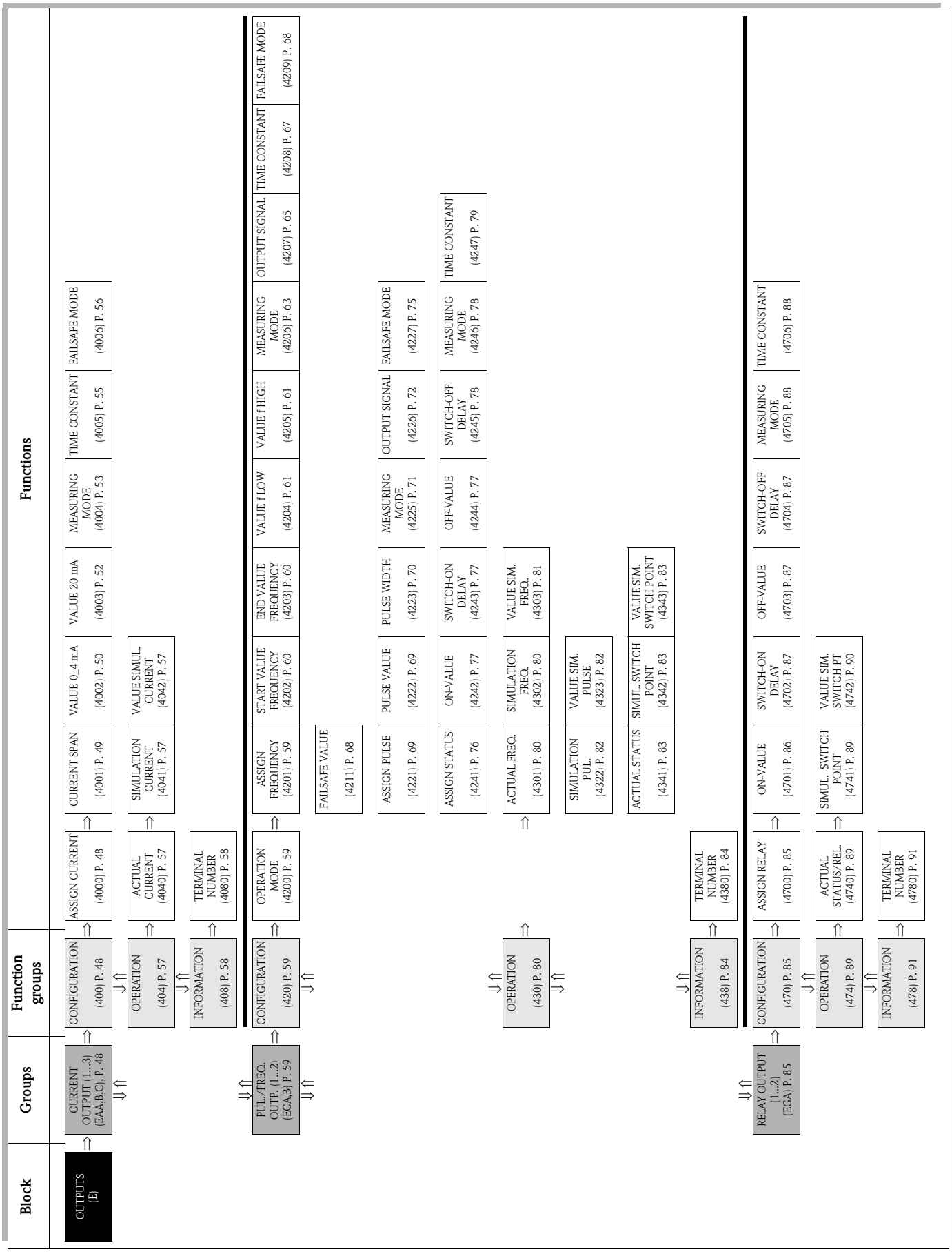

| Functional description<br>TOTALIZER ➞ TOTALIZER (1...3) ➞ OPERATION | |
|---|---|
| The function descriptions below apply to totalizers 1...3; the totalizers are independently configurable. | |
| **SUM (3040)** | Use this function to view the total for the particular totalizer's measured variable aggregated since measuring commenced. The value can be positive or negative, depending on the setting selected in the "TOTALIZER MODE" function (3002), and the direction of flow.<br><br>**User interface:**<br>max. 7-digit floating-point number, including sign and unit (e.g. 15467.04 $m^3$;<br><br>✎ Note!<br>■ The effect of the setting in the "TOTALIZER MODE" function (see Page 44) is as follows:<br>– If the setting is "BALANCE", the totalizer balances flow in the positive and negative directions.<br>– If the setting is "POSITIVE", the totalizer registers only flow in the positive direction.<br>– If the setting is "NEGATIVE", the totalizer registers only flow in the negative direction.<br><br>■ The totalizer's response to faults is defined in the "FAILSAFE ALL TOTALIZERS" function (3801) (see Page 46). |
| **OVERFLOW (3041)** | Use this function to view the totaled overflow for the particular totalizer aggregated since measuring commenced.<br><br>Total flow quantity is represented by a floating-point number consisting of max. 7 digits. You can use this function to view higher numerical values (>9,999,999) as overflows. The effective quantity is thus the total of OVERFLOW plus the value returned by the SUM function.<br><br>Example:<br>Reading for 2 overflows: 2 $10^7$ $dm^3$ (= 20,000,000 $dm^3$)<br>The value displayed in the function SUM = 196 $dm^3$<br>Effective total quantity = 20,196,845.7 $dm^3$<br><br>**User interface:**<br>Integer with exponent, including sign and unit, e.g. 2 $10^7$ $dm^3$ |

## 6.2 Group HANDLING TOTALIZER



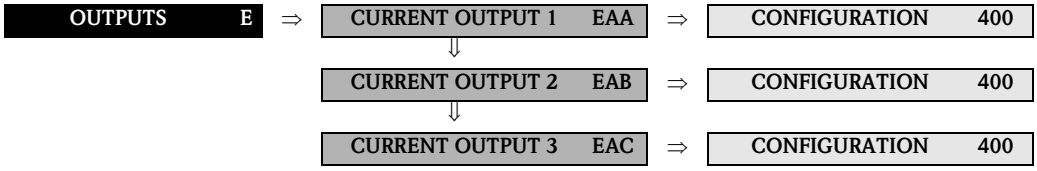

| Functional description<br>TOTALIZER → HANDLING TOTALIZER → Handling totalizer functions | |
|---|---|
| **RESET ALL TOTALIZERS (3800)** | Use this function to reset the totals (including all overflows) of the totalizers (1...3) to "zero" (= RESET).<br><br>**Options:**<br>NO<br>YES<br><br>**Factory setting:**<br>NO<br><br>✎ Note!<br>If the device is equipped with a status input and if it is appropriately configured, a reset for the totalizer (1...3) can also be triggered by a pulse (see function ASSIGN STATUS INPUT (5000) on page 95). |
| **FAILSAFE ALL TOTALIZERS (3801)** | Use this function to define the common response of all totalizers (1...3) in case of error.<br><br>**Options:**<br>STOP<br>The totalizer is paused until the fault is rectified.<br><br>ACTUAL VALUE<br>The totalizer continues to count based on the current flow measuring value. The fault is ignored.<br><br>HOLD VALUE<br>The totalizer continues to count the flow is based on the last valid flow value (before the fault occurred).<br><br>**Factory setting:**<br>STOP |

# 7 Block OUTPUTS



# 7.1 Group CURRENT OUTPUT (1...3)

## 7.1.1 Function group CONFIGURATION




| Functional description<br>OUTPUTS ➞ CURRENT OUTPUT (1...3) ➞ CONFIGURATION | |
|---|---|
| **ASSIGN CURRENT OUTPUT (4000)** | Use this function to assign a measured variable to the current output.<br><br>**Options:**<br>OFF<br>VOLUME FLOW (CH1...CH2)<br>VOLUME FLOW AVERAGE<br>VOLUME FLOW SUM (CH1+CH2)<br>VOLUME FLOW DIFFERENCE (CH1-CH2)<br>SOUND VELOCITY (CH1...CH2)<br>SOUND VELOCITY AVERAGE<br>SIGNAL STRENGTH (CH1...CH2)<br>FLOW VELOCITY (CH1...CH2)<br>FLOW VELOCITY AVERAGE<br><br>**Factory setting:**<br>VOLUME FLOW CH1<br><br>✎ Note!<br>If you select OFF, the only function shown in the function group CONFIGURATION (400) is this function, in other words, ASSIGN CURRENT OUTPUT (4000).<br><br>**Advanced options with optional software package ADVANCED DIAGNOSTICS:**<br>DEVIATION VOLUME FLOW (CH1...CH2)<br>DEVIATION VOLUME FLOW AVERAGE<br>DEVIATION FLOW VELOCITY (CH1...CH2)<br>DEVIATION FLOW VELOCITY AVERAGE<br>DEVIATION SIGNAL STRENGTH (CH1...CH2)<br>DEVIATION SOUND VELOCITY (CH1...CH2)<br>DEVIATION SOUND VELOCITY AVERAGE<br>DEVIATION ACTUAL TRANSIT TIME (CH1...CH2)<br>DEVIATION ACCEPTANCE RATE (CH1...CH2) |

**Functional description**
OUTPUTS → CURRENT OUTPUT (1...3) → CONFIGURATION

**CURRENT SPAN (4001)**

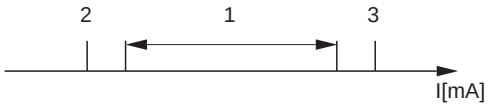
Use this function to define the current span. The selection specifies the operational range and the lower and upper signal on alarm. For the current output 1 the option HART can be defined additionally.

**Options:**
0–20 mA
4–20 mA
4–20 mA HART (only current output1)
4–20 mA NAMUR
4–20 mA HART NAMUR (only current output1)
4–20 mA US
4–20 mA HART US (only current output1)
0–20 mA (25 mA)
4–20 mA (25 mA)
4–20 mA (25 mA) HART (only current output1)

**Factory setting:**
4–20 mA HART NAMUR (für current output 1)
4–20 mA NAMUR (für current output 2)

✎ Note!
- The option HART is only supported by the current output designated as current output 1 in the device software, (terminals 26 and 27, see function TERMINAL NUMBER (4080) on Page 58).
- When switching the hardware from an active (factory setting) to a passive output signal select a current span of 4–20 mA, (Operating Instructions Proline Prosonic Flow 93, BA070D/06/en/.)

**Current span, operational range and signal on alarm level**

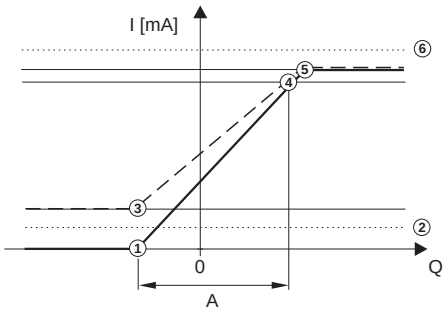



| a | 1 | 2 | 3 |
|---|---|---|---|
| 0-20 mA | 0 - 20.5 mA | 0 | 22 |
| 4-20 mA | 4 - 20.5 mA | 2 | 22 |
| 4-20 mA NAMUR | 3.8 - 20.5 mA | 3.5 | 22.6 |
| 4-20 mA US | 3.9 - 20.8 mA | 3.75 | 22.6 |
| 0-20 mA (25 mA) | 0 - 24 mA | 0 | 25 |
| 4-20 mA (25 mA) | 4 - 24 mA | 2 | 25 |

A0001222

*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 span).
- In case of a fault the behaviour of the current output is according to the selected option in the function FAILSAFE MODE (4006.) Change the error category in the function ASSIGN SYSTEM ERROR (8000) to generate a fault message instead of a notice message.

| Functional description<br>OUTPUTS → CURRENT OUTPUT (1...3) → CONFIGURATION | |
|---|---|
| **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. CH1 volume flow).<br><br>Example:<br>4 mA assigned value = – 250 l/h<br>20 mA assigned value = +750 l/h<br>Calculated current value = 8 mA (at zero flow)<br><br>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.<br><br>Example for STANDARD measuring mode:<br>  <br><br>A0001223<br>① *= Initial value (0...20 mA)*<br>② *= Lower signal on alarm level:: depends on the setting in the function CURRENT SPAN*<br>③ *= Initial value (4...20 mA): depends on the setting in the function CURRENT SPAN*<br>④ *= Full scale value (0/4...20 mA): depends on the setting in the function CURRENT SPAN*<br>⑤ *= Maximum current value: depends on the setting in the function CURRENT SPAN*<br>⑥ *= Failsafe mode (upper signal on alarm level): depends on the setting in the functions CURRENT SPAN (see Page 49) and FAILSAFE MODE, (see Page 56)*<br>*A = Measuring range (the minimum measuring range has to exceed the value that correlates with a flow velocity of 0.3 m/s)*<br><br>**User input:**<br>5-digit floating-point number, with sign<br><br>**Factory setting:**<br>0 [unit]<br><br>✎ Note!<br>■ The appropriate unit is taken from the function UNIT VOLUME FLOW (0402) (see Page 13).<br>■ For details on current span, operational range and signal on alarm level see Page 49.<br><br>☞ Caution!<br>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.<br><br>(Continued on next page) |

## Functional description

OUTPUTS ➞ CURRENT OUTPUT (1...3) ➞ CONFIGURATION

**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 ①), a fault/notice message is generated (#351-354, current range) and the current output responds in accordance with the parameter settings in the function FAILSAFE MODE (4006).

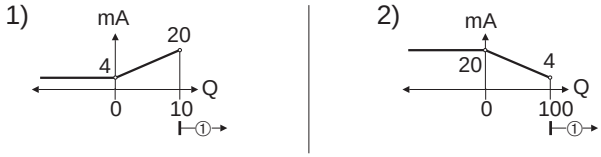
A0001262

**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

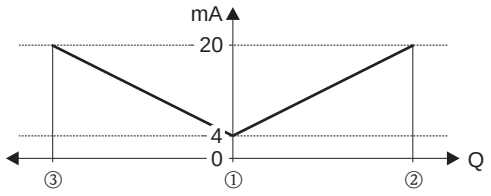
When you enter the values for 0/4 mA and 20 mA, the working range of the measuring device is defined. In doing so, one of the two values is parameterised as zero flow (e.g. 0 $m^3$/h).
If the effective flow drops below or exceeds the value parameterised as the zero flow, no fault/notice message is generated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




A0001264

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

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

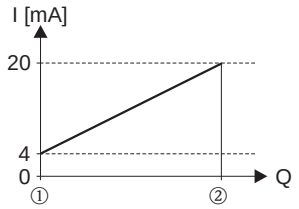
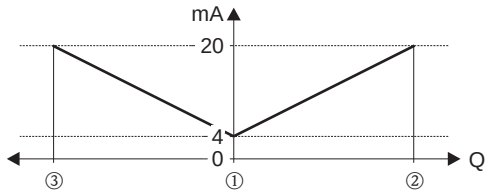


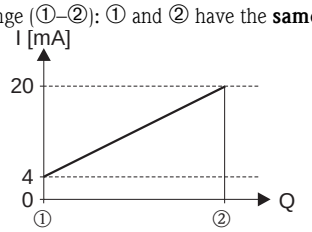
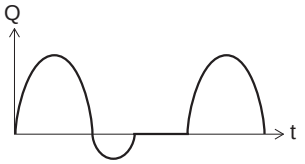
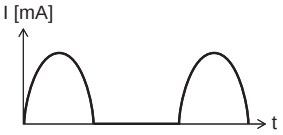
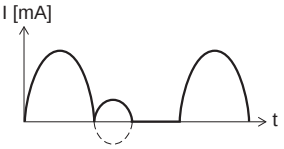
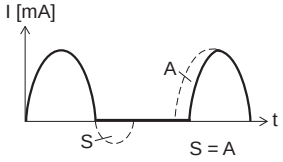

A0001249

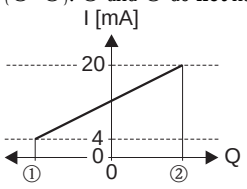
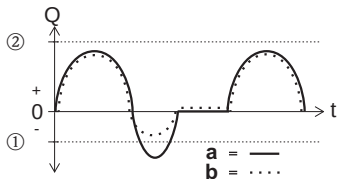
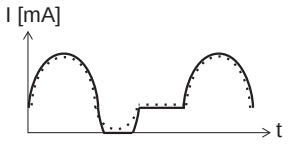
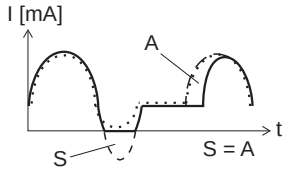
ASSIGN RELAY (4700) = FLOW DIRECTION
With this setting e.g. the flow direction output via a switching contact can be made.

**Parameter setting example D:**
MEASURING MODE (4004) = PULSATING FLOW

| Functional description<br>OUTPUTS → CURRENT OUTPUT (1...3) → CONFIGURATION | |
|---|---|
| **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)). Positive and negative values are permissible, depending on the measured variable in question (e.g. volume flow). The assignment applies for both flow directions for measuring mode SYMMETRY (see Page 53) and only for the selected flow direction for measuring mode STANDARD.<br><br>Example:<br>4 mA assigned value = – 250 l/h<br>20 mA assigned value = +750 l/h<br>Calculated current value = 8 mA (at zero flow)<br><br>Note that values with different signs cannot be entered for 0/4 mA (function 4002) and 20 mA if SYMMETRY is the setting selected in the function MEASURING MODE (4004). In this case the message "INPUT AREA EXCEEDED" appears.<br><br>**User input:**<br>5-digit floating-point number, with sign<br><br>**Factory setting:**<br>depends on the setting in the function ASSIGN CURRENT OUTPUT (4000):<br>volume flow: 20 l/s<br>sound velocity: 1800 m/s<br>flow velocity: 10 m/s<br>corresponds to the factory setting for the final value.<br><br>✎ Note!<br>■ The appropriate unit is taken from the function UNIT VOLUME FLOW (0402) (see Page 13).<br>■ For an example for STANDARD measuring mode see Page 50.<br>■ If a channel is not visible, it does not appear in the options. Channels can be displayed or hidden by means of the function MEASUREMENT (6880).<br><br>☝ Caution!<br>It is very important to read and comply with the information in the function VALUE 0_4 mA (under "☝ Caution"; Examples of parameterization) on Page 50. |

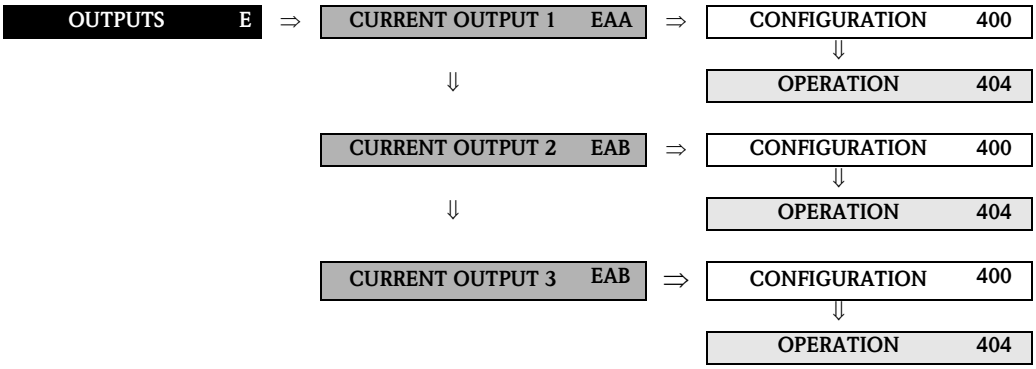
| Functional description<br>OUTPUTS ➞ CURRENT OUTPUT (1...3) ➞ CONFIGURATION | |
|---|---|
| **MEASURING MODE (4004)** | Use this function to define the measuring mode for the current output.<br><br>**Options:**<br>STANDARD<br>SYMMETRY<br>PULSATING FLOW<br><br>The current output signal is proportional to the measured variable. The flow components outside the scaled measuring range (defined by the 0_4 mA VALUE ① and the 20 mA VALUE ②) are taken into account as follows for signal output:<br><br>■ 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).<br>If the other value is exceeded or not achieved, the message "CURRENT OUTPUT AT FULL SCALE VALUE" appears and the current output responds in accordance with the parameter setting in the function FAILSAFE MODE (4006).<br><br>■ 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 function FAILSAFE MODE (4006).<br><br>  <br><br>A0001248<br><br>SYMMETRY<br>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).<br><br>  <br><br>A0001249<br><br>✎ Note!<br>■ The direction of flow can be output via the configurable relay or status outputs.<br>■ 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.<br><br>(Continued on next page) |

| Functional description<br>OUTPUTS → CURRENT OUTPUT (1...3) → CONFIGURATION | |
|---|---|
| **MEASURING MODE**<br>(Continued) | PULSATING FLOW<br>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.<br>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.<br><br>**Factory setting:**<br>STANDARD |
| Detailed explanations and information | **How the current output responds under the following postulated conditions:**<br><br>1. Defined measuring range (①–②): ① and ② have the **same** sign<br>  <br><br>A0001248<br><br>and the following flow behaviour:<br>  <br><br>A0001265<br><br>■ STANDARD<br>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.<br>  <br><br>A0001267<br><br>■ SYMMETRY<br>The current output signal is independent of the direction of flow.<br>  <br><br>A0001268<br><br>■ PULSATING FLOW<br>Flow components outside the measuring range are buffered, balanced and output after a maximum delay of 60 seconds.<br>  <br><br>A0001269<br><br>(Continued on next page) |

| Functional description<br>OUTPUTS ➞ CURRENT OUTPUT (1...3) ➞ CONFIGURATION | |
|---|---|
| Detailed explanations and information<br>(Continued) | 2. Defined measuring range (①–②): ① and ② do **not** have the **same** sign.<br>  <br><br>A0001272<br>3. Flow a (—) outside, b (- -) within the measuring range.<br>  <br><br>A0001273<br>■ STANDARD<br>a (—): The flow components outside the scaled measuring range cannot be taken into account for signal output.<br>A fault message is generated (# 351...354, current range) and the current output responds in accordance with the parameter settings in the function FAILSAFE MODE (4006).<br>b (- -): The current output signal is proportional to the measured variable assigned.<br>  <br><br>A0001274<br>■ SYMMETRY<br>This option is not available under these circumstances, because the 0_4 mA value and the 20 mA value have different signs.<br>■ PULSATING FLOW<br>Flow components outside the measuring range are buffered, balanced and output after a maximum delay of 60 seconds.<br>  <br><br>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).<br><br>**User input:**<br>fixed-point number 0.01...100.00 s<br><br>**Factory setting:**<br>1.00 s |

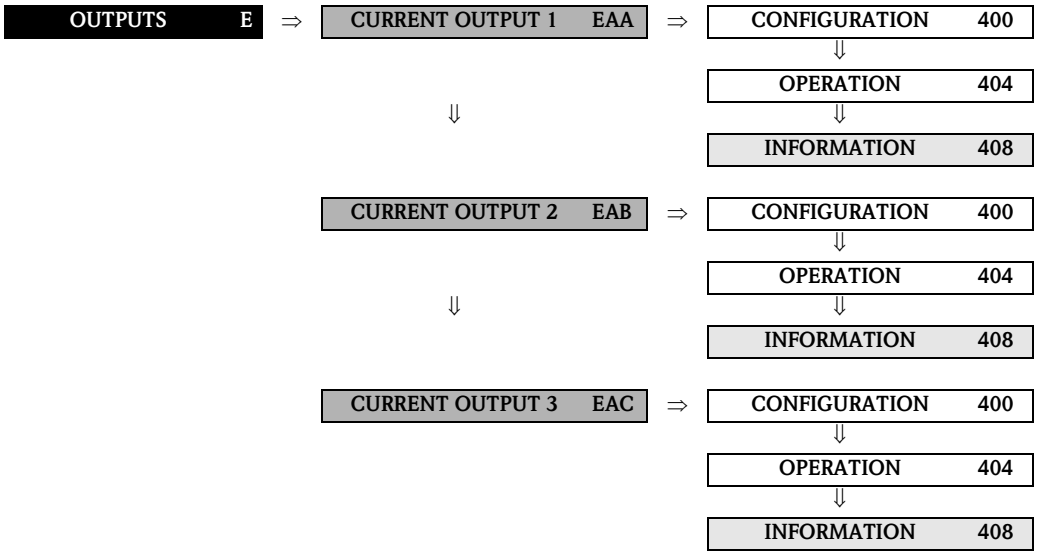
| Functional description<br>OUTPUTS → CURRENT OUTPUT (1...3) → CONFIGURATION | |
|---|---|
| **FAILSAFE MODE (4006)** | For safety reasons it is advisable to ensure that the current output assumes a predefined state in the event of a fault. The setting you select here affects only the current output. It has no effect on other outputs and the display (e.g. totalizers).<br><br>**Options:**<br>MIN. CURRENT<br>The current output adopts the value of the lower signal on alarm level (as defined in the function CURRENT SPAN (4001)<br><br>MAX. CURRENT<br>The current output adopts the value of the upper signal on alarm level (as defined in the function CURRENT SPAN (4001)<br><br>HOLD VALUE (**not recommended**)<br>Measuring value output is based on the last measuring value saved before the error occurred .<br><br>ACTUAL VALUE<br>Measured value output is based on the current flow measurement.<br>The fault is ignored .<br><br>**Factory setting:**<br>MIN. CURRENT |

## 7.1.2 Function group OPERATION




| Functional description<br>OUTPUTS → CURRENT OUTPUT (1...3) → OPERATION | |
|---|---|
| **ACTUAL CURRENT (4040)** | Use this function to view the computed actual value of the output current.<br><br>**User interface:**<br>0.00...25.00 mA |
| **SIMULATION CURRENT (4041)** | Use this function to activate simulation of the current output.<br><br>**Options:**<br>OFF<br>ON<br><br>**Factory setting:**<br>OFF<br><br>✎ Note!<br>■ The "SIMULATION CURRENT OUTPUT" message indicates that simulation is active.<br>■ The measuring device continues to measure while simulation is in progress, i.e. the current measuring values are output correctly via the other outputs.<br><br>☝ Caution!<br>The setting is not saved if the power supply fails. |
| **VALUE SIMULATION CURRENT (4042)** | ✎ Note!<br>The function is not visible unless the function SIMULATION CURRENT (4041) is active (= ON).<br><br>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.<br><br>**User input:**<br>Floating-point number: 0.00...25.00 mA<br><br>**Factory setting:**<br>0.00 mA<br><br>☝ Caution!<br>The setting is not saved if the power supply fails. |

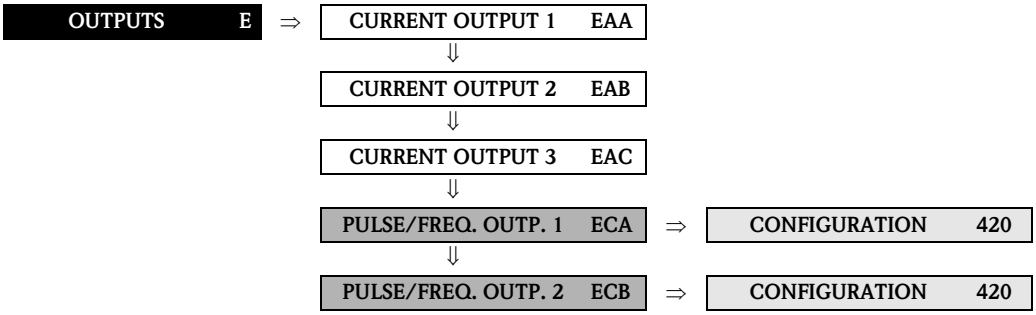
### 7.1.3 Function group INFORMATION




| Functional description<br>OUTPUTS → CURRENT OUTPUT (1...3) → INFORMATION | |
|---|---|
| **TERMINAL NUMBER (4080)** | Use this function to display the numbers of the terminals (in the connection compartment) which are used by the current output. |

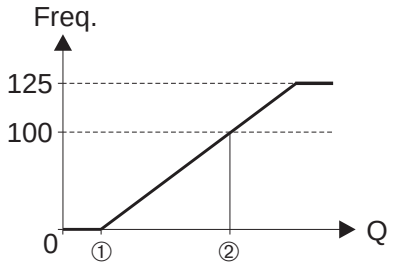
# 7.2 Group PULSE/FREQUENCY OUTPUT (1...2)

## 7.2.1 Function group CONFIGURATION




| Functional description<br>OUTPUTS → PULSE/FREQUENCY OUTPUT (1...2) → CONFIGURATION (GENERAL/FREQUENCY) | |
|---|---|
| **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.<br><br>**Options:**<br>PULSE<br>FREQUENCY<br>STATUS<br><br>**Factory setting:**<br>PULSE |
| **ASSIGN FREQUENCY (4201)** | ✎ Note!<br>This function is not available unless the FREQUENCY setting was selected in the function OPERATION MODE (4200).<br><br>Use this function to assign a measured variable to the frequency output.<br><br>**Options:**<br>VOLUME FLOW (CH1...CH2)<br>VOLUME FLOW AVERAGE<br>VOLUME FLOW SUM (CH1+CH2)<br>VOLUME FLOW DIFFERENCE (CH1-CH2)<br>SOUND VELOCITY (CH1...CH2)<br>SOUND VELOCITY AVERAGE<br>SIGNAL STRENGTH (CH1...CH2)<br>FLOW VELOCITY (CH1...CH2)<br>FLOW VELOCITY AVERAGE<br><br>**Factory setting:**<br>CH1 VOLUME FLOW<br><br>✎ Note!<br>If you select OFF, the only function shown in the CONFIGURATION function group is this function, in other words ASSIGN FREQUENCY (4201).<br><br>**Advanced options with optional software package ADVANCED DIAGNOSTICS:**<br>DEVIATION VOLUME FLOW (CH1...CH2)<br>DEVIATION VOLUME FLOW AVERAGE<br>DEVIATION FLOW VELOCITY (CH1...CH2)<br>DEVIATION FLOW VELOCITY AVERAGE<br>DEVIATION SIGNAL STRENGTH (CH1...CH2)<br>DEVIATION SOUND VELOCITY (CH1...CH2)<br>DEVIATION SOUND VELOCITY AVERAGE<br>DEVIATION ACTUAL TRANSIT TIME (CH1...CH2)<br>DEVIATION ACCEPTANCE RATE (CH1...CH2) |

| Functional description<br>OUTPUTS → PULSE/FREQUENCY OUTPUT (1...2) → CONFIGURATION (GENERAL/FREQUENCY) | |
|---|---|
| **START VALUE FREQUENCY (4202)** | ✎ Note!<br>This function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function (4200).<br><br>Use this function to define an initial frequency for the frequency output. You define the associated measuring value of the measuring range in the functionVALUE f LOW (4204) described on Page 61.<br><br>**User input:**<br>5-digit fixed-point number 0...10000 Hz<br><br>**Factory setting:**<br>0 Hz<br><br>Example:<br>■ VALUE f LOW. = 0 l/h, initial frequency = 0 Hz: i.e. for a flow of 0 l/h, the frequency output is 0 Hz.<br>■ VALUE f LOW = 1 l/h, initial frequency = 10 Hz: i.e. for a flow of 1 l/h, the frequency output is 10 Hz. |
| **END VALUE FREQUENCY (4203)** | ✎ Note!<br>This function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function (4200).<br><br>Use this function to define an end frequency for the frequency output. You define the associated measuring value of the measuring range in the functionVALUE f HIGH (4205) described on Page 61.<br><br>**User input:**<br>5-digit fixed-point number 2...10000 Hz<br><br>**Factory setting:**<br>10000 Hz<br><br>Example:<br>■ 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.<br>■ 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.<br><br>✎ Note!<br>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<br>OUTPUTS → PULSE/FREQUENCY OUTPUT (1...2) → CONFIGURATION (GENERAL/FREQUENCY) | |
|---|---|
| **VALUE f LOW (4204)** | ✎ Note!<br>This function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function (4200).<br><br>Use this function to assign a variable to the start value frequency (4202). The value can be greater or less 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.<br><br>**User input:**<br>5-digit floating-point number<br><br>**Factory setting:**<br>0 [unit]<br><br>✎ Note!<br>▪ Graphic illustration of VALUE f LOW see function VALUE f HIGH (4205) on page 61.<br>▪ The appropriate unit is taken from the group SYSTEM UNITS (**ACA**) (see Page 13). |
| **VALUE f HIGH (4205)** | ✎ Note!<br>This function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function (4200).<br><br>Use this function to assign a variable to the end value frequency (4203).<br>The value can be greater or less than the value assigned to the VALUE f LOW.<br>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.<br>The assignment applies for both flow directions for measuring mode SYMMETRY (see Page 53) and only for the selected flow direction for measuring mode STANDARD.<br><br>**User input:**<br>5-digit floating-point number<br><br>**Factory setting:**<br>depends on the setting in the function ASSIGN FREQUENCY (4201):<br>volume flow: 20 l/s<br>sound velocity: 1800 m/s<br>flow velocity: 10 m/s<br>corresponds to the factory setting for the final value.<br><br>  <br><br>A0001279<br><br>① = *Value f min*<br>② = *Value f max*<br><br>Caution!<br>The frequency output responds differently, depending on the parameters set in the various functions. Some examples of parameter settings and their effect on the frequency output are given in the following section.<br><br>✎ Note!<br>The appropriate unit is taken from the group SYSTEM UNITS (**ACA** ) (see Page 13).<br>(Continued on next page) |

**Functional description**
OUTPUTS → PULSE/FREQUENCY OUTPUT (1...2) → CONFIGURATION (GENERAL/FREQUENCY)

**VALUE f HIGH**
(Continued)

**Parameter setting example A:**
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 s (e.g. -40 $m^3$/h)

and
MEASURING MODE (4206) = STANDARD

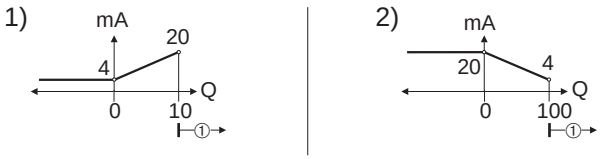
When you enter the values for VALUE f LOW and VALUE f HIGH the working range of the measuring device is defined. If the effective flow drops below or exceeds this working range (see ①), a fault or notice message is generated (#351-354, frequency area) and the frequency output responds in accordance with the parameter settings in the function FAILSAFE MODE (4209).

A0001262

**Parameter setting example B:**
1. VALUE f LOW (4204) = 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) = equal to zero flow s (e.g. 0 $m^3$/h)

and
MEASURING MODE (4206) = STANDARD

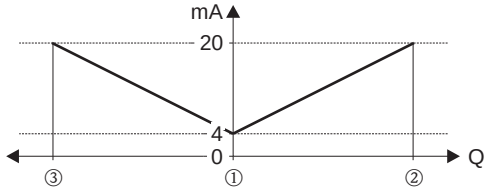
When you enter the values for VALUE f LOW and VALUE f HIGH the working range of the measuring device is defined. In doing so, one of the two values is parameterised as zero flow (e.g. 0 $m^3$/h).
If the effective flow drops below or exceeds the value parameterised as the zero flow, no fault/notice message 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 (#351-354, frequency area) and the frequency output responds in accordance with the parameters set in the function FAILSAFE MODE (4209).




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 (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).




A0001249

ASSIGN RELAY (4700) = FLOW DIRECTION
Flow direction output via a switching contact.

**Parameter setting example D:**
MEASURING MODE (4206) = PULSATING FLOW

## Functional description

OUTPUTS → PULSE/FREQUENCY OUTPUT (1...2) → CONFIGURATION (GENERAL/FREQUENCY)

**MEASURING MODE (4206)**

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

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

**Options:**
STANDARD
SYMMETRY
PULSATING FLOW

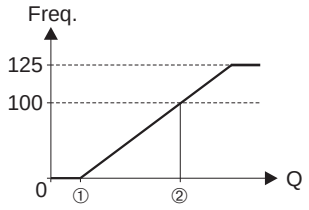
**Factory setting**
STANDARD

**Description of the individual options:**
- STANDARD

The frequency output signal is proportional to the measured variable. The flow components outside the scaled measuring range (defined by the VALUE f LOW. ① and VALUE f HIGH. ②) are not taken into account for signal output.

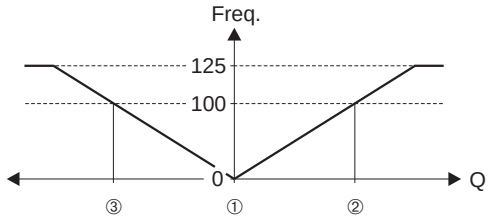
– If one of the values is defined as equal to the zero flow (e.g. = VALUE f LOW 0 $m^3$/h), no message is given if this value is exceeded or not achieved and the frequency output retains its value (0 Hz in the example). If the other value is exceeded or not achieved, the message "FREQUENCY OUTPUT AT FULL SCALE VALUE" appears and the frequency output responds in accordance with the parameter setting in the function FAILSAFE MODE (4209).

– If both values are defined as not equal to the zero flow (e.g. 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 function FAILSAFE MODE (4209).




A0001279

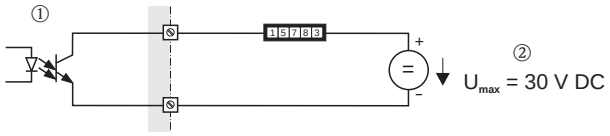
SYMMETRY
The frequency output signal is independent of the direction of flow (absolute amount of the measured variable). The VALUE f LOW ① and VALUE f HIGH ② must have the same sign (+ or –). The VALUE f HIGH ③ (e.g. backflow) corresponds to the mirrored VALUE f HIGH ② (e.g. forward flow).




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 values have different signs, SYMMETRY cannot be selected and an "ASSIGNMENT NOT POSSIBLE" message is displayed.

(Continued on next page)

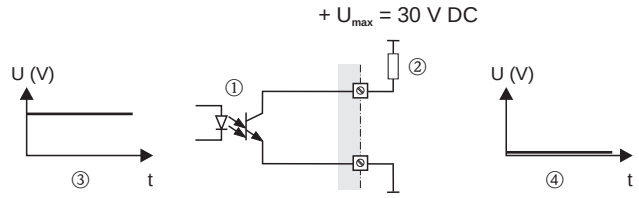
| Functional description<br>OUTPUTS → PULSE/FREQUENCY OUTPUT (1...2) → CONFIGURATION (GENERAL/FREQUENCY) | |
|---|---|
| **MEASURING MODE**<br>(Continued) | ▪ PULSATING FLOW<br>If flow is characterized by severe fluctuations as is the case, for example, with reciprocating pumps, flow components outside the measuring range are buffered, balanced and output after a maximum delay of 60 seconds. If the buffered data cannot be processed within approx. 60 seconds, a fault/notice message appears. Hinweismeldung. 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. |
| **OUTPUT SIGNAL**<br>**(4207)** | ✎ Note!<br>Function is not available unless the FREQUENCY setting was selected in the OPERATING MODE (4200) function.<br><br>For selecting the output configuration of the frequency output.<br><br>**Options:**<br>0 = PASSIVE - POSITIVE<br>1 = PASSIVE - NEGATIVE<br>2 = ACTIVE - POSITIVE<br>3 = ACTIVE - NEGATIVE<br><br>**Factory setting:** PASSIVE - POSITIVE<br><br>**Explanation**<br>▪ PASSIVE = power is supplied to the frequency output by means of an external power supply.<br>▪ ACTIVE = power is supplied to the frequency output by means of the device-internal power supply.<br><br>Configuring the output signal level (POSITIVE or NEGATIVE) determines the quiescent behaviour (at zero flow) of the frequency output.<br>The internal transistor is activated as follows:<br>▪ If POSITIVE is selected, the internal transistor is activated with a **positive** signal level.<br>▪ If NEGATIVE is selected, the internal transistor is activated with a **negative** signal level (0 V).<br><br>✎ Note!<br>With the passive output configuration, the output signal levels of the frequency output depend on the external circuit (see examples).<br><br>**Example for passive output circuit (PASSIVE)**<br>If PASSIVE is selected, the frequency output is configured as an open collector.<br>  <br><br>A0001225<br>① = *Open Collector,* ② = *External power supply*<br>✎ Note!<br>For continuous currents up to 25 mA ($I_{max}$ = 250 mA / 20 ms).<br><br>(continued on next page) |

## Functional description

OUTPUTS ➞ PULSE/FREQUENCY OUTPUT (1...2) ➞ CONFIGURATION (GENERAL/FREQUENCY)

**OUTPUT SIGNAL (4207)**

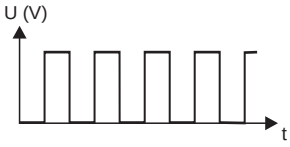
**Example for output configuration PASSIVE-POSITIVE:**
Output configuration with an external pull-up resistance.
In the quiescent state (at zero flow), the output signal level at the terminals is 0 V.




A0004687

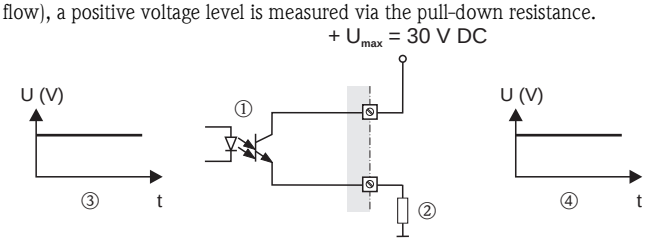
① = *Open Collector,* ② = *Pull-Up-Resistance*
③ = *Transistor activation in "POSITIVE" quiescent state (at zero flow)*
④ = *Output signal level in quiescent state (at zero flow)*

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




A0001975

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




A0004689

① = *Open Collector*
② = *Pull-Down-Resistance*
③ = *Transistor activation in "POSITIVE" quiescent state (at zero flow)*
④ = *Output signal level in quiescent state (at zero flow)*

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

A0001981

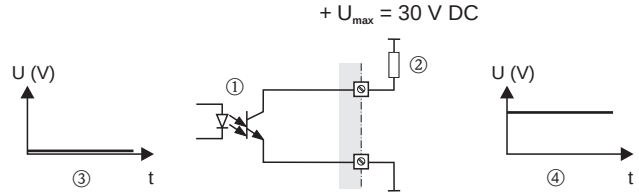
(continued on next page)

## Functional description

OUTPUTS → PULSE/FREQUENCY OUTPUT (1...2) → CONFIGURATION (GENERAL/FREQUENCY)

**OUTPUT SIGNAL**
(Continued)

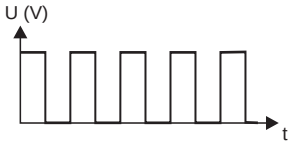
**Example for output configuration PASSIVE-NEGATIVE:**
Output configuration with an external pull-up resistance. In the quiescent state (at zero flow), the output signal level at the terminals is at a positive voltage level.




A0004690

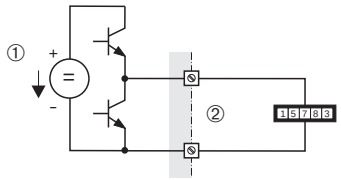
① = *Open Collector*
② = *Pull-Up-Resistance*
③ = *Transistor activation in "NEGATIVE" quiescent state (at zero flow)*
④ = *Output signal level in quiescent state (at zero flow)*

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




A0001981

**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

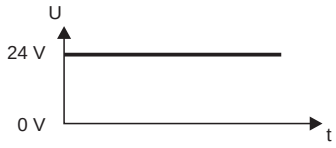
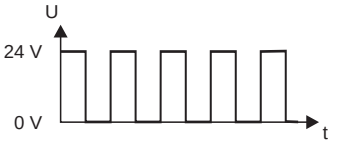
① = *24 V DC internal power supply*
② = *Short-circuit proof output*

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

(continued on next page)

| Functional description<br>OUTPUTS → PULSE/FREQUENCY OUTPUT (1...2) → CONFIGURATION (GENERAL/FREQUENCY) | |
|---|---|
| **OUTPUT SIGNAL**<br>(Continued) | In the operating status (flow present), the output signal level changes from 0 V to a positive voltage level.<br> <br><br>A0004692<br><br>The following applies for the output configuration **ACTIVE-NEGATIVE**:<br>In the quiescent state (at zero flow), the output signal level at the terminals is at a positive voltage level.<br>  <br><br>A0004693<br><br>In the operating status (flow present), the output signal level changes from a positive voltage level to 0 V.<br>  <br><br>A0004710 |
| **TIME CONSTANT**<br>**(4208)** | ✎ Note!<br>This function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function (4200).<br><br>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).<br><br>**User input:**<br>fixed-point number 0.00...100.00 s<br><br>**Factory setting:**<br>1.00 s |

| Functional description<br>OUTPUTS → PULSE/FREQUENCY OUTPUT (1...2) → CONFIGURATION (GENERAL/FREQUENCY) | |
|---|---|
| **FAILSAFE MODE (4209)** | ✎ Note!<br>This function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function (4200).<br><br>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).<br><br>**Options:**<br>FALLBACK VALUE<br>Output is 0 Hz.<br><br>FAILSAFE LEVEL<br>Output is the frequency specified in the FAILSAFE VALUE function (4211).<br><br>HOLD VALUE<br>Measuring value output is based on the last measuring value saved before the error occurred.<br><br>ACTUAL VALUE<br>Measuring value output is based on the current flow measurement (fault is ignored).<br><br>**Factory setting:**<br>FALLBACK VALUE |
| **FAILSAFE VALUE (4211)** | ✎ Note!<br>This function is not available unless FREQUENCY was selected in the function OPERATION MODE (4200) and FAILSAFE LEVEL was selected in the function FAILSAFE MODE (4209).<br><br>Use this function to define the frequency that the measuring device outputs in the event of an error.<br><br>**User input:**<br>max. 5-digit number: 0...12500 Hz<br><br>**Factory setting:**<br>12500 Hz |

| Functional description<br>OUTPUTS → PULSE/FREQUENCY OUTPUT (1...2) → CONFIGURATION (PULSE) | |
|---|---|
| **ASSIGN PULSE (4221)** | ✎ Note!<br>This function is not available unless the PULSE setting was selected in the function OPERATION MODE (4200).<br><br>Use this function to assign a measured variable to the pulse output.<br><br>**Options:**<br>OFF<br>VOLUME FLOW (CH1...CH2)<br>VOLUME FLOW AVERAGE<br>VOLUME FLOW SUM (CH1+CH2)<br>VOLUME FLOW DIFFERENCE (CH1–CH2)<br><br>**Factory setting:**<br>CH1 VOLUME FLOW<br><br>✎ Note!<br>If you select OFF, the only function shown in the CONFIGURATION function group is this function, in other words ASSIGN PULSE (4221). |
| **PULSE VALUE (4222)** | ✎ Note!<br>This function is not available unless the PULSE setting was selected in the function OPERATION MODE (4200).<br><br>Use this function to define the flow at which a pulse is triggered. These pulses can be totalled by an external totalizer and in this way the total flow since measuring commenced can be registered.<br><br>**User input:**<br>5-digit floating-point number, [unit]<br><br>**Factory setting:**<br>1 l/pulse<br><br>✎ Note!<br>The appropriate unit is taken from the function UNIT VOLUME (0403), (see Page 14) |

## Functional description

OUTPUTS → PULSE/FREQUENCY OUTPUT (1...2) → CONFIGURATION (PULSE)

**PULSE WIDTH (4223)**

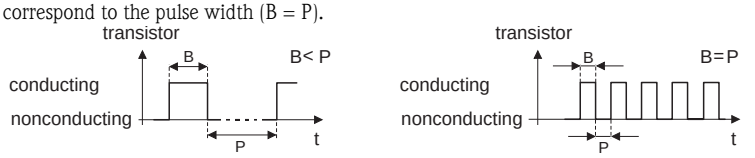
✎ Note!
This function is not available unless the PULSE setting was selected in the function OPERATION MODE (4200).

Use this function to enter the pulse width of the output pulse.

**User input:**
0.05...2000 ms

**Factory setting:**
100 ms

Pulse output is **always** with the pulse width (B) entered in this function. The pauses (P) between the individual pulses are automatically configured. However, they must at least correspond to the pulse width (B = P).




A0001233

B = Pulse width entered (the illustration applies to positive pulses)
P= Intervals between the individual pulses

✎ Note!
When entering the pulse width, select a value that can still be processed by an external totalizer (e.g. mechanical totalizer, PLC, etc.) .

☝ Caution!
If the pulse number or frequency resulting from the pulse value entered, (see function PULSE VALUE (4222) onPage 69) 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<br>OUTPUTS ➞ PULSE/FREQUENCY OUTPUT (1...2) ➞ CONFIGURATION (PULSE) | |
|---|---|
| **MEASURING MODE (4225)** | ✎ Note!<br>This function is not available unless the PULSE setting was selected in the function OPERATION MODE (4200).<br><br>Use this function to define the measuring mode for the pulse output.<br><br>**Options:**<br>STANDARD<br>Only positive flow components are totaled. Negative components are not taken into account.<br><br>STANDARD REVERSE<br>Only negative flow components are totaled. Positive components are not taken into account.<br><br>SYMMETRY<br>Positive and negative flow components are taken into account.<br><br>✎ Note!<br>The direction of flow can be output via the relay output.<br><br>PULSATING FLOW<br>If flow is characterized by severe fluctuations as is the case, for example, with reciprocating pumps, the positive and negative flow components are totalled, with the signs taken into account (e.g. –10 l and +25 l = 15 l).<br><br>Flow components outside the maximum pulse number per second (value/width) are buffered, balanced and output after a maximum delay of 60 seconds. If the buffered data cannot be processed within approx. 60 seconds, a fault/notice message appears.<br><br>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.<br><br>**Factory setting:**<br>STANDARD |

## Functional description

OUTPUTS → PULSE/FREQUENCY OUTPUT (1...2) → CONFIGURATION (PULSE)

**OUTPUT SIGNAL (4226)**

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

For selecting the output configuration of the pulse output.

**Options:**
0 = PASSIVE - POSITIVE
1 = PASSIVE - NEGATIVE
2 = ACTIVE - POSITIVE
3 = ACTIVE - NEGATIVE

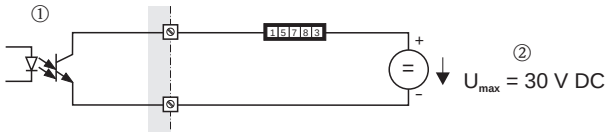
**Factory setting:** PASSIVE - POSITIVE

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

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

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

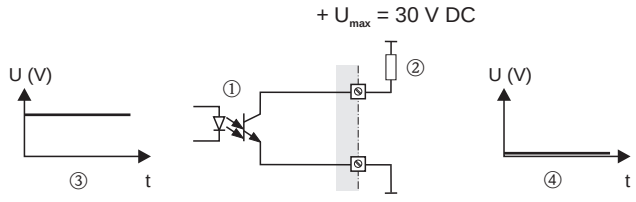



A0001225

① = *Open Collector,* ② = *External power supply*

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

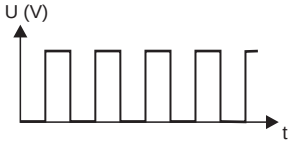
**Example for output configuration PASSIVE-POSITIVE:**
Output configuration with an external pull-up resistance.
In the quiescent state (at zero flow), the output signal level at the terminals is 0 V.




A0004687

① = *Open Collector,* ② = *Pull-Up-Resistance*
③ = *Transistor activation in "POSITIVE" quiescent state (at zero flow)*
④ = *Output signal level in quiescent state (at zero flow)*

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



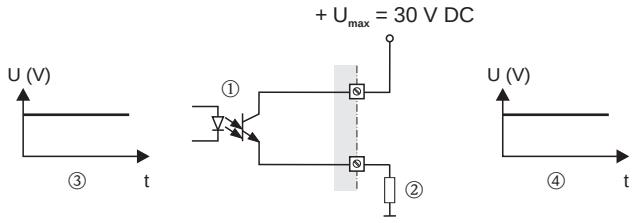

A0001975

(continued on next page)

**Functional description**
OUTPUTS → PULSE/FREQUENCY OUTPUT (1...2) → CONFIGURATION (PULSE)

**OUTPUT SIGNAL**
(Continued)

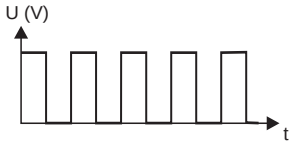
**Example for output configuration PASSIVE-POSITIVE:**
Output configuration with an external pull-down resistance. In the quiescent state (at zero flow), a positive voltage level is measured via the pull-down resistance.




A0004689

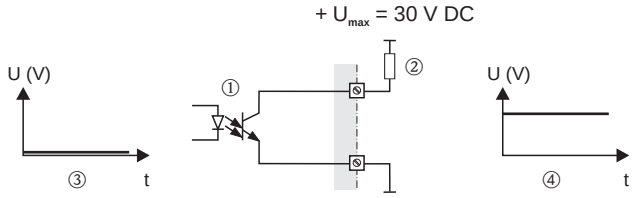
① = *Open Collector*
② = *Pull-Down-Resistance*
③ = *Transistor activation in "POSITIVE" quiescent state (at zero flow)*
④ = *Output signal level in quiescent state (at zero flow)*

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




A0001981

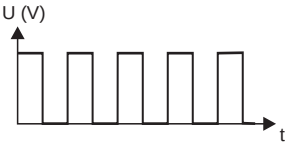
**Example for output configuration PASSIVE-NEGATIVE:**
Output configuration with an external pull-up resistance. In the quiescent state (at zero flow), the output signal level at the terminals is at a positive voltage level.




A0004690

① = *Open Collector*
② = *Pull-Up-Resistance*
③ = *Transistor activation in "NEGATIVE" quiescent state (at zero flow)*
④ = *Output signal level in quiescent state (at zero flow)*

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




A0001981

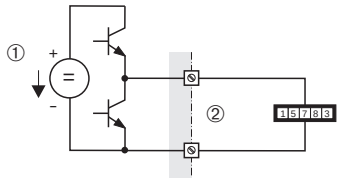
(continued on next page)

## Functional description

OUTPUTS → PULSE/FREQUENCY OUTPUT (1...2) → CONFIGURATION (PULSE)

**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.

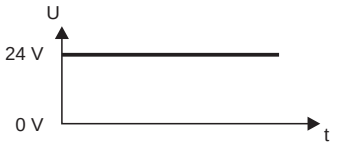
The following applies for the output configuration **ACTIVE-POSITIVE**:
In the quiescent state (at zero flow), the output signal level at the terminals is 0 V.

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

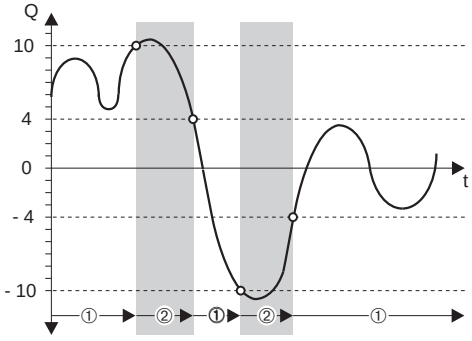
In the operating status (flow present), the output signal level changes from a positive voltage level to 0 V.

A0004710

| Functional description<br>OUTPUTS → PULSE/FREQUENCY OUTPUT (1...2) → CONFIGURATION (PULSE) | |
|---|---|
| **FAILSAFE MODE (4227)** | ✎ Note!<br>This function is not available unless the PULSE setting was selected in the function OPERATION MODE (4200).<br><br>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.<br>It has no effect on other outputs and the display (e.g. totalizers).<br><br>**Options:**<br>FALLBACK VALUE<br>Output is 0 pulse.<br><br>HOLD VALUE<br>Measuring value output is based on the last measuring value saved before the error occurred.<br><br>ACTUAL VALUE<br>Measuring value output is based on the current flow measurement<br>The fault is ignored.<br><br>**Factory setting:**<br>FALL BACK VALUE |

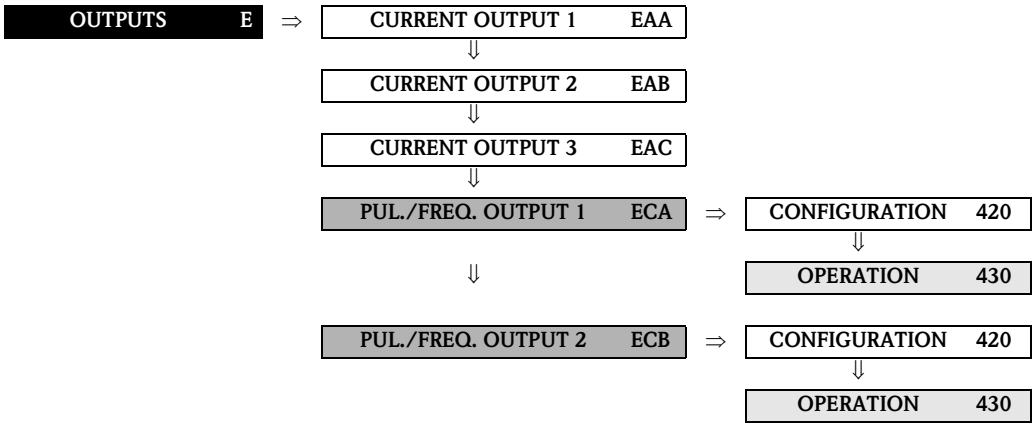
| Functional description<br>OUTPUTS → PULSE/FREQUENCY OUTPUT (1...2) → CONFIGURATION (STATUS) | |
|---|---|
| **ASSIGN STATUS (4241)** | ✎ Note!<br>This function is not available unless the STATUS setting was selected in the function OPERATION MODE (4200).<br><br>Use this function to assign a switching function to the status output.<br><br>**Options:**<br>OFF<br>ON (operation)<br>FAULT MESSAGE<br>FAILURE (CH1...CH2)<br>NOTICE MESSAGE<br>FAULT MESSAGE & NOTICE MESSAGE<br>LIMIT TOTALIZER (1...3)<br>FLOW DIRECTION (CH1...CH2)<br>AVERAGE FLOW DIRECTION<br>FLOW DIRECTION SUM<br>FLOW DIRECTION DIFFERENCE<br>VOLUME FLOW LIMIT VALUE (CH1...CH2)<br>LIMIT AVERAGE VOLUME FLOW<br>LIMIT VOLUME FLOW SUM<br>LIMIT VOLUME FLOW DIFFERENCE<br>LIMIT SOUND VELOCITY (CH1...CH2)<br>LIMIT SOUND VELOCITY AVERAGE<br>LIMIT SIGNAL STRENGTH (CH1..CH2)<br>LIMIT FLOW VELOCITY (CH1...CH2)<br>LIMIT AVERAGE FLOW VELOCITY<br><br>✎ Note!<br>■ The following settings/entries must be made to ensure correct and immediate signal output:<br>– Function SWITCH-ON DELAY (4243) = 0 ms (see Page 77)<br>– Function SWITCH-OFF DELAY (4245) = 0 ms (see Page 78)<br>– Function TIME CONSTANT (4247) = 0 ms (see Page 79)<br>■ The ASSIGN operating mode contains a channel-specific option for the fault messages:<br>– FAULT MESSAGE - all faults are displayed (gen. faults, channel-specific faults for CH1 and channel-specific faults for CH2)<br>– FAULT CH1 - faults affecting channel 2 are not displayed (only gen. faults and channel-specifics faults for CH1)<br>– FAULT CH2 - faults affecting channel 1 are not displayed (only gen. faults and channel-specifics faults for CH2)<br><br>**Factory setting:**<br>FAULT MESSAGE<br><br>✎ Note!<br>■ The behaviour of the status output is a normally closed behaviour, in other words the output is closed (transistor conductive) when normal, error-free measuring is in progress.<br>■ If you select OFF, the only function shown in the CONFIGURATION function group is the function (4241ASSIGN STATUS).<br><br>**Advanced options with optional software package ADVANCED DIAGNOSTICS:**<br>DEVIATION VOLUME FLOW (CH1...CH2)<br>DEVIATION VOLUME FLOW AVERAGE<br>DEVIATION FLOW VELOCITY (CH1...CH2)<br>DEVIATION FLOW VELOCITY AVERAGE<br>DEVIATION SIGNAL STRENGTH (CH1...CH2)<br>DEVIATION SOUND VELOCITY (CH1...CH2)<br>DEVIATION SOUND VELOCITY AVERAGE<br>DEVIATION ACTUAL TRANSIT TIME (CH1...CH2)<br>DEVIATION ACCEPTANCE RATE (CH1...CH2) |

| Functional description<br>OUTPUTS → PULSE/FREQUENCY OUTPUT (1...2) → CONFIGURATION (STATUS) | |
|---|---|
| **ON-VALUE (4242)** | ✎ Note!<br>This function is not available unless STATUS was selected in the function OPERATION MODE (4200) and LIMIT VALUE or FLOW DIRECTION was selected in the function ASSIGN STATUS (4241).<br><br>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, totalizer reading).<br><br>**User input:**<br>5-digit floating-point number, [unit]<br><br>**Factory setting:**<br>0 [unit]<br><br>✎ Note!<br>■ The appropriate unit is taken from the function UNIT VOLUME FLOW (0402).<br><br>■ 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!<br>This function is not available unless STATUS was selected in the function OPERATION MODE (4200) and LIMIT VALUE or FLOW DIRECTION was selected in the function ASSIGN STATUS (4241).<br><br>Use this function to specify a delay (0...100 seconds) for switching on the status output (i.e. signal changes from 0 to 1). The delay starts when the limit value is reached. The status output does switch when the delay has timed out and the switch condition has been valid over the delay time.<br><br>**User input:**<br>fixed-point number 0.0...100.0 s<br><br>**Factory setting:**<br>0.0 s |
| **OFF-VALUE (4244)** | ✎ Note!<br>This function is not available unless STATUS was selected in the function OPERATION MODE (4200) and a LIMIT VALUE was selected in the function ASSIGN STATUS (4241).<br><br>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, totalizer reading).<br><br>**User input:**<br>5-digit floating-point number, [unit]<br><br>**Factory setting:**<br>0 [unit]<br><br>✎ Note!<br>■ The appropriate unit is taken from the function UNIT VOLUME FLOW (0402).<br><br>■ 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<br>OUTPUTS → PULSE/FREQUENCY OUTPUT (1...2) → CONFIGURATION (STATUS) | |
|---|---|
| **SWITCH-OFF DELAY (4245)** | ✎ Note!<br>This function is not available unless the STATUS setting was selected in the function OPERATION MODE (4200).<br><br>Use this function to define a delay (0...100 seconds) for switching off the status output (i.e. signal changes from 1 to 0). The delay starts when the limit value is reached. The status output does switch when the delay has timed out and the switch condition has been valid over the delay time.<br><br>**User input:**<br>fixed-point number 0.0...100.0 s<br><br>**Factory setting:**<br>0.0 s |
| **MEASURING MODE (4246)** | ✎ Note!<br>■ This function is not available unless the STATUS setting was selected in the function OPERATION MODE (4200).<br>■ This function is not visible unless a limit value was assigned to the status output.<br><br>Use this function to define the measuring mode for the status output.<br><br>**Options:**<br>STANDARD<br>The status output signal switches at the defined switch points.<br><br>SYMMETRY<br>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.<br><br>**Factory setting:**<br>STANDARD<br><br>Example for the SYMMETRY measuring mode:<br>Switch-on point: Q = 4<br>Switch-off point: Q = 10<br>① = Status output switched on (conductive)<br>② = Status output switched off (not conductive)<br>  <br><br>A0001247<br><br>✎ Note!<br>■ 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.<br>■ If the signs of the two values differ, SYMMETRY cannot be selected and an "ASSIGNMENT NOT POSSIBLE" message is issued. |

| Functional description<br>OUTPUTS → PULSE/FREQUENCY OUTPUT (1...2) → CONFIGURATION (STATUS) | |
|---|---|
| **TIME CONSTANT (4247)** | ✎ Note!<br>This function is not available unless the STATUS setting was selected in the function OPERATION MODE (4200).<br><br>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.<br><br>**User input:**<br>fixed-point number 0.00...100.00 s<br><br>**Factory setting:**<br>0.00 s |

## 7.2.2 Function group OPERATION



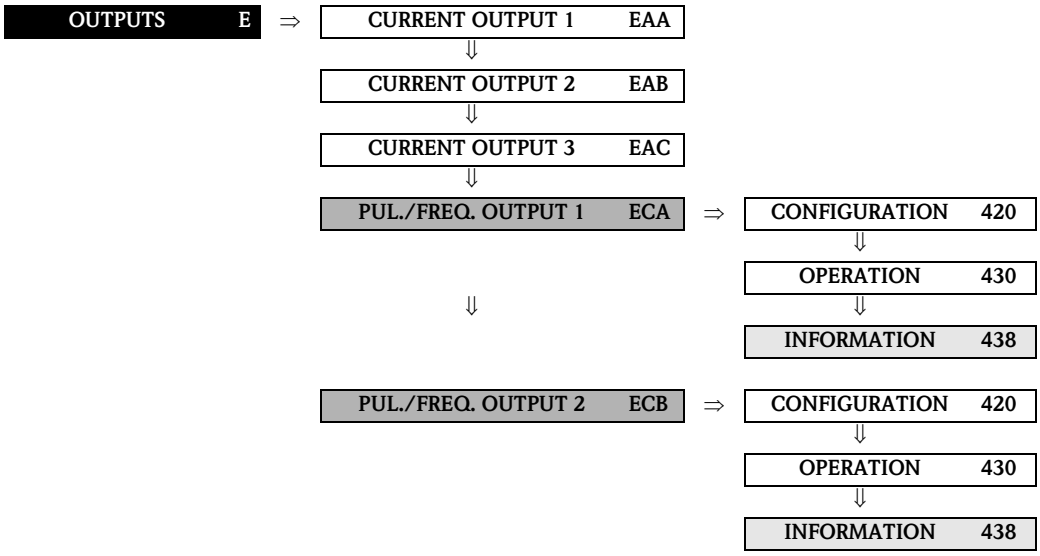

| Functional description<br>OUTPUTS → PULSE/FREQUENCY OUTPUT (1...2) → OPERATION (FREQUENCY) | |
|---|---|
| **ACTUAL FREQUENCY (4301)** | ✎ Note!<br>This function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function (4200).<br><br>Use this function to view the computed value of the output frequency.<br><br>**User interface:**<br>0...12500 Hz |
| **SIMULATION FREQUENCY (4302)** | ✎ Note!<br>This function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function (4200).<br><br>Use this function to activate simulation of the frequency output.<br><br>**Options:**<br>OFF<br>ON<br><br>**Factory setting:**<br>OFF<br><br>✎ Note!<br>■ The "SIMULATION FREQUENCY OUTPUT" message indicates that simulation is active.<br>■ The measuring device continues to measure while simulation is in progress, i.e. the current measuring values are output correctly via the other outputs.<br><br>☝ Caution!<br>The setting is not saved if the power supply fails |

| Functional description<br>OUTPUTS → PULSE/FREQUENCY OUTPUT (1...2) → OPERATION (FREQUENCY) | |
|---|---|
| **VALUE SIMULATION FREQUENCY (4303)** | ✎ Note!<br>This function is not available unless FREQUENCY was selected in the function OPERATION MODE (4200) and the function SIMULATION FREQUENCY (4302) is active (= ON).<br><br>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.<br><br>**User input:**<br>0...12500 Hz<br><br>**Factory setting:**<br>0 Hz<br><br>☝ Caution!<br>The setting is not saved if the power supply fails. |

| Functional description<br>OUTPUTS → PULSE/FREQUENCY OUTPUT (1...2) → OPERATION (PULSE) | |
|---|---|
| **SIMULATION PULSE (4322)** | ✎ Note!<br>This function is not available unless the PULSE option was selected in the OPERATING MODE function.<br><br>Use this function to activate simulation of the pulse output.<br><br>**Options:**<br>OFF<br><br>COUNTDOWN<br>The pulses specified in the VALUE SIMULATION PULSE function are output.<br><br>CONTINUOUSLY<br>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.<br><br>✎ Note!<br>Simulation is started by confirming the CONTINUOUSLY option with the E key.<br>The simulation can be switched off again via the SIMULATION PULSE function.<br><br>**Factory setting:**<br>OFF<br><br>✎ Note!<br>▪ The notice message #631 "SIM. PULSE" indicates that simulation is active.<br>▪ The on/off ratio is 1:1 for both types of simulation.<br>▪ The measuring device continues to measure while simulation is in progress, i.e. the current measured values are output correctly via the other outputs.<br><br>☝ Caution!<br>The setting is not saved if the power supply fails. |
| **VALUE SIMULATION PULSE (4323)** | ✎ Note!<br>This function is not available unless the COUNTDOWN option was selected in the SIMULATION PULSE function.<br><br>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.<br><br>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.<br><br>**User input:**<br>0...10,000<br><br>**Factory setting:**<br>0<br><br>✎ Note!<br>Simulation is started by confirming the simulation value with the E key.<br>The simulation can be switched off again via the SIMULATION PULSE function.<br><br>☝ Caution!<br>The setting is not saved if the power supply fails. |

| Functional description<br>OUTPUTS → PULSE/FREQUENCY OUTPUT (1...2) → OPERATION (STATUS) | |
|---|---|
| **ACTUAL STATUS (4341)** | ✎ Note!<br>This function is not available unless the STATUS setting was selected in the function OPERATION MODE (4200).<br><br>Use this function to check the current status of the status output.<br><br>**User interface:**<br>NOT CONDUCTIVE<br>CONDUCTIVE |
| **SIMULATION SWITCH POINT (4342)** | ✎ Note!<br>This function is not available unless the STATUS setting was selected in the function OPERATION MODE (4200).<br><br>Use this function to activate simulation of the status output.<br><br>**Options:**<br>OFF<br>ON<br><br>**Factory setting:**<br>OFF<br><br>✎ Note!<br>■ The "SIMULATION SWITCH POINT" message indicates that simulation is active.<br>■ The measuring device continues to measure while simulation is in progress, i.e. the current measuring values are output correctly via the other outputs.<br><br>☝ Caution!<br>The setting is not saved if the power supply fails |
| **VALUE SIMULATION SWITCH POINT (4343)** | ✎ Note!<br>This function is not available unless STATUS was selected in the function OPERATION MODE (4200) and the function SIMULATION SWITCH POINT (4342) is active (= ON).<br><br>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.<br><br>**Options:**<br>NOT CONDUCTIVE<br>CONDUCTIVE<br><br>**Factory setting:**<br>NOT CONDUCTIVE<br><br>☝ Caution!<br>The setting is not saved if the power supply fails. |

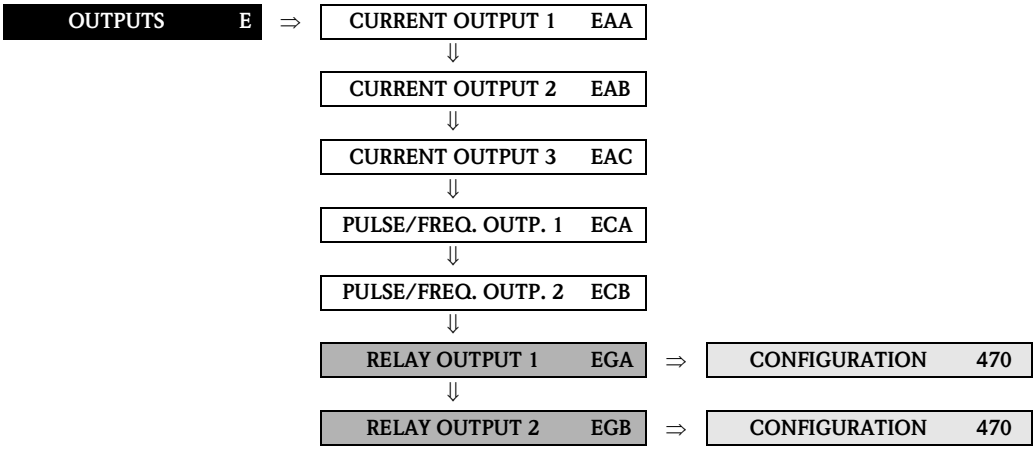
### 7.2.3 Function group INFORMATION




| Functional description<br>OUTPUTS → PULSE/FREQUENCY OUTPUT (1...2) → INFORMATION | |
|---|---|
| **TERMINAL NUMBER (4380)** | Use this function to display the numbers of the terminals (in the connection compartment) which are used by the pulse/frequency output. |

# 7.3 Group RELAY OUTPUT (1...2)

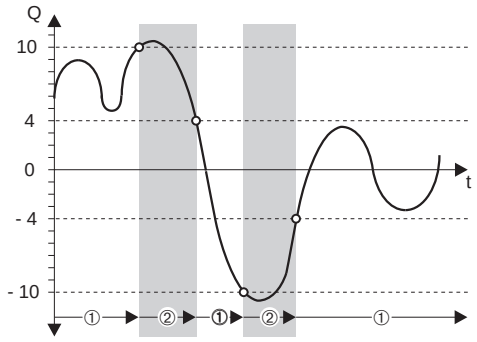
## 7.3.1 Function group CONFIGURATION



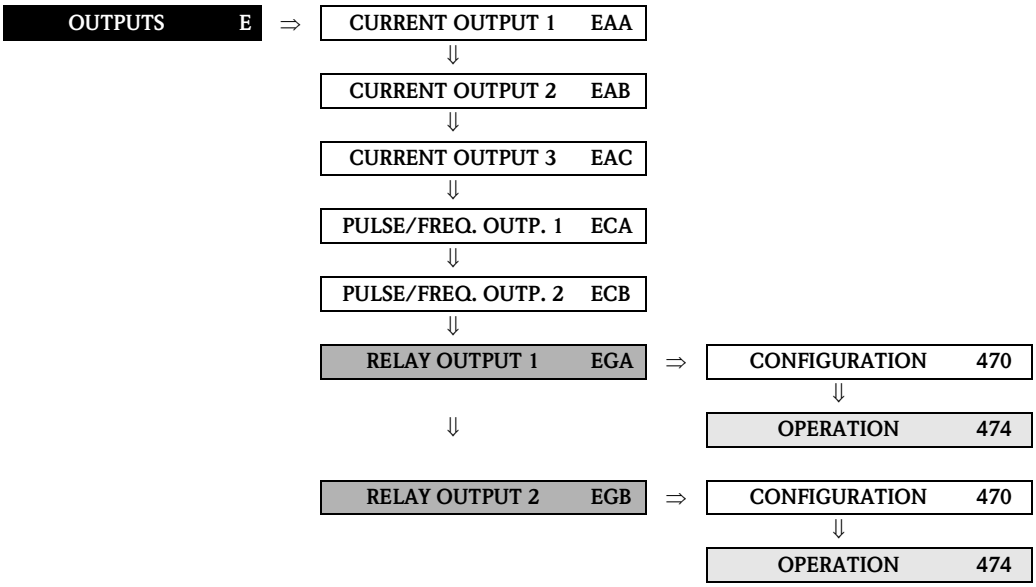

| Functional description<br>OUTPUTS ➞ RELAY OUTPUT (1...2) ➞ CONFIGURATION | |
|---|---|
| **ASSIGN RELAY (4700)** | Use this function to assign a switching function to the relay output.<br><br>**Options:**<br>OFF<br>ON (operation)<br>FAULT MESSAGE<br>NOTICE MESSAGE<br>FAULT MESSAGE & NOTICE MESSAGE<br>LIMIT TOTALIZER (1...3)<br>FAILURE (CH1...CH2)<br>FLOW DIRECTION (CH1...CH2)<br>FLOW DIRECTION AVERAGE<br>FLOW DIRECTION SUM<br>FLOW DIRECTION DIFFERENCE<br>LIMIT VOLUME FLOW (CH1...CH2)<br>LIMIT VOLUME FLOW AVERAGE<br>LIMIT VOLUME FLOW SUM<br>LIMIT VOLUME FLOW DIFFERENCE<br>LIMIT SOUND VELOCITY (CH1...CH2)<br>LIMIT SOUND VELOCITY AVERAGE<br>LIMIT FLOW VELOCITY (CH1..CH2)<br>LIMIT AVERAGE FLOW VELOCITY<br><br>**Factory setting:**<br>FAULT MESSAGE<br><br>(Continued on next page) |

| Functional description<br>OUTPUTS → RELAY OUTPUT (1...2) → CONFIGURATION | |
|---|---|
| **ASSIGN RELAY**<br>(Continued) | ✎ Note!<br>■ It is very important to read and comply with the information on the switching characteristics of the relay output (see Page 92).<br>■ It is advisable to configure at least one relay output as a fault output and define the outputs' response to error.<br>■ The relay output is configured as a normally open (NO or make) contact by default. It can be reconfigured as a normally closed (NC or break) contact by means of a jumper on the relay module, (Operating Instructions Proline Prosonic Flow 93, BA070D/06/en/.).<br>■ If you select OFF, the only function shown in the CONFIGURATION function group is this function, ASSIGN RELAY (4700).<br>■ The following settings/entries must be made to ensure correct and immediate signal output:<br>– Function SWITCH-ON DELAY (4243) = 0 ms, (see Page 77)<br>– Function SWITCH-OFF DELAY (4245) = 0 ms, (see Page 78)<br>– Function TIME CONSTANT (4247) = 0 ms, (see Page 79)<br>■ The ASSIGN operating mode contains a channel-specific option for the fault messages:<br>– FAULT MESSAGE - all faults are displayed (gen. faults, channel-specific faults for CH1 and channel-specific faults for CH2)<br>– FAULT CH1 - faults affecting channel 2 are not displayed (only gen. faults and channel-specifics faults for CH1)<br>– FAULT CH2 - faults affecting channel 1 are not displayed (only gen. faults and channel-specifics faults for CH2)<br><br>**Advanced options with optional software package ADVANCED DIAGNOSTICS:**<br>DEVIATION VOLUME FLOW (CH1...CH2)<br>DEVIATION VOLUME FLOW AVERAGE<br>DEVIATION FLOW VELOCITY (CH1...CH2)<br>DEVIATION FLOW VELOCITY AVERAGE<br>DEVIATION SIGNAL STRENGTH (CH1...CH2)<br>DEVIATION SOUND VELOCITY (CH1...CH2)<br>DEVIATION SOUND VELOCITY AVERAGE<br>DEVIATION ACTUAL TRANSIT TIME (CH1...CH2)<br>DEVIATION ACCEPTANCE RATE (CH1...CH2) |
| **ON-VALUE**<br>**(4701)** | ✎ Note!<br>This function is not available unless LIMIT VALUE or FLOW DIRECTION was selected in the function ASSIGN RELAY (4700).<br><br>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, totalizer reading).<br><br>**User input:**<br>5-digit floating-point number, [unit]<br><br>**Factory setting:**<br>0 [unit]<br><br>✎ Note!<br>■ The appropriate unit is taken from the function UNIT VOLUME FLOW (0402).<br><br>■ Only the switch-on point is available for flow direction output (no switch-off point). If you enter a value not equal to the zero flow (e.g. 5 ), the difference between the zero flow and the value entered corresponds to half the switching hysteresis. |

| Functional description<br>OUTPUTS → RELAY OUTPUT (1...2) → CONFIGURATION | |
|---|---|
| **SWITCH-ON DELAY (4702)** | ✎ Note!<br>This function is not available unless LIMIT VALUE or FLOW DIRECTION was selected in the function ASSIGN RELAY (4700).<br><br>Use this function to define a delay (0...100 seconds) for pull-up (i.e. signal changes from 0 to 1) of the relay output. The delay starts when the limit value is reached. The relay output does switch when the delay has timed out and the switch condition has been valid throughout the delay time.<br><br>**User input:**<br>fixed-point number 0.0...100.0 s<br><br>**Factory setting:**<br>0.0 s |
| **OFF-VALUE (4703)** | ✎ Note!<br>This function is not available unless LIMIT VALUE was selected in the function ASSIGN RELAY (4700).<br><br>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, totalizer reading).<br><br>**User input:**<br>5-digit floating-point number, [unit]<br><br>**Factory setting:**<br>0 [unit]<br><br>✎ Note!<br>■ The appropriate unit is taken from the function UNIT VOLUME FLOW (0402).<br><br>■ 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!<br>This function is not available unless LIMIT VALUE was selected in the function ASSIGN RELAY (4700).<br><br>Use this function to define a delay (0...100 seconds) for drop-out (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.<br><br>**User input:**<br>fixed-point number 0.0...100.0 s<br><br>**Factory setting:**<br>0.0 s |

| Functional description<br>OUTPUTS → RELAY OUTPUT (1...2) → CONFIGURATION | |
|---|---|
| **MEASURING MODE (4705)** | ✎ Note!<br>This function is not visible unless a limit value was assigned to the relay output.<br><br>Use this function to define the measuring mode for the relay output.<br><br>**Options:**<br>STANDARD<br>The relay output signal switches at the defined switch points.<br><br>SYMMETRY<br>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).<br><br>**Factory setting:**<br>STANDARD<br><br>Example for the SYMMETRY measuring mode:<br>Switch-on point Q = 4<br>Switch-off point Q = 10<br>① = Relay energised<br>② = Relay de-energised<br>  <br><br>A0001247<br><br>✎ Note!<br>■ 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.<br><br>■ 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).<br>Damping acts on the measuring signal before the switch status changes, and consequently before switch-on or switch-off delay is activated.<br>The purpose of damping, therefore, is to prevent the relay output changing state continuously in response to fluctuations in flow.<br><br>**User input:**<br>fixed-point number 0.00...100.00 s<br><br>**Factory setting:**<br>0.00 s |

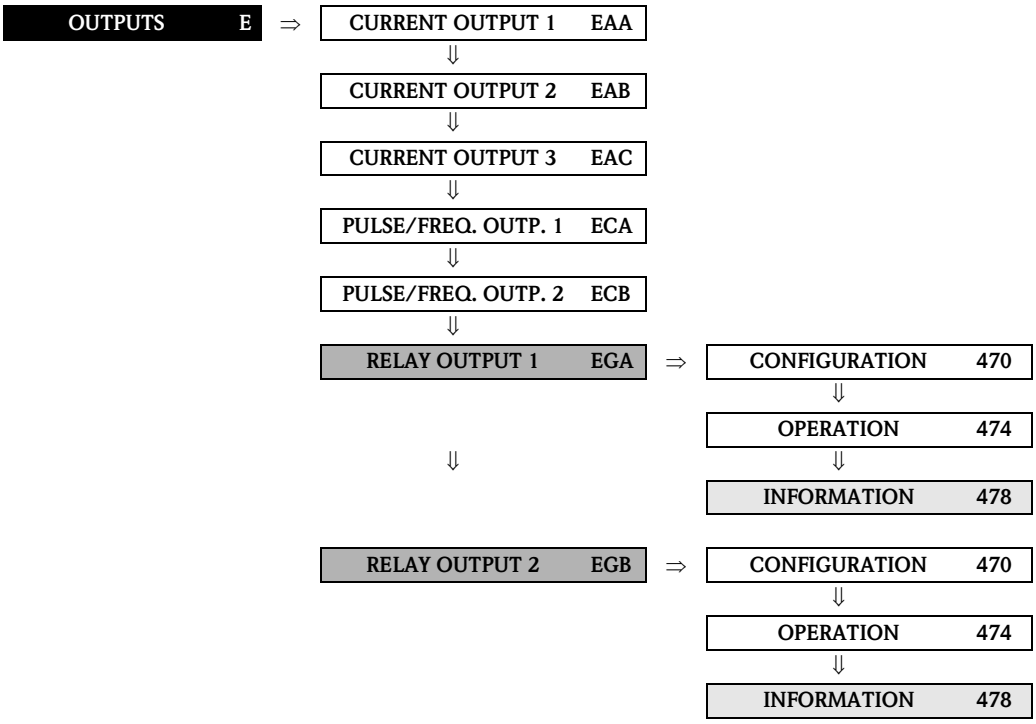
## 7.3.2 Function group OPERATION




| Functional description<br>OUTPUTS → RELAY OUTPUT (1...2) → OPERATION | |
|---|---|
| **ACTUAL STATUS RELAY (4740)** | Use this function to check the current status of the relay output.<br><br>A jumper on the contact side defines the relay output as a normally open (NO or make) or normally closed (NC or break) contact Operating Instructions Proline Prosonic Flow 93, BA070D/06/en/.<br><br>**User interface:**<br>BREAK CONTACT OPEN<br>BREAK CONTACT CLOSED<br>MAKE CONTACT OPEN<br>MAKE CONTACT CLOSED |
| **SIMULATION SWITCH POINT (4741)** | Use this function to activate simulation of the relay output.<br><br>**Options:**<br>OFF<br>ON<br><br>**Factory setting:**<br>OFF<br><br>✎ Note!<br>■ The "SIMULATION RELAY" message indicates that simulation is active.<br>■ The measuring device continues to measure while simulation is in progress, i.e. the current measuring values are output correctly via the other outputs.<br><br>☝ Caution!<br>The setting is not saved if the power supply fails. |

| Functional description<br>OUTPUTS → RELAY OUTPUT (1...2) → OPERATION | |
|---|---|
| **VALUE SIMULATION SWITCH POINT (4742)** | ✎ Note!<br>The function is not visible unless the function SIMULATION SWITCH POINT (4741) is active (= ON).<br><br>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.<br><br>**Options:**<br>Relay output configured as normally open (make) contact:<br>NO OPEN<br>NO CLOSED<br><br>Relay output configured as normally closed (break) contact:<br>NC OPEN<br>NC CLOSED<br><br>☝ Caution!<br>The setting is not saved if the power supply fails. |

### 7.3.3 Function group INFORMATION

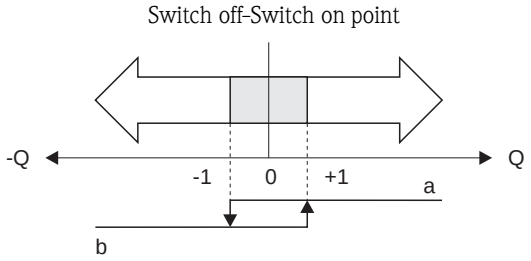



| Functional description<br>OUTPUTS → RELAY OUTPUT (1...2) → INFORMATION | |
|---|---|
| **TERMINAL NUMBER (4780)** | Use this function to display the numbers of the terminals (in the connection compartment) which are used by the relay output. |

## 7.3.4 Information on the response of the relay output

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

**Relay output configured for "flow direction"**
The value you entered in the function ON-VALUE defines the 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.

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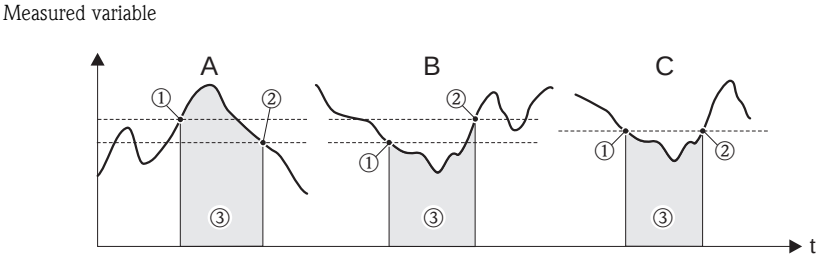
*a Relay energized*
*b Relay de-energized*

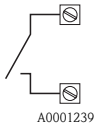
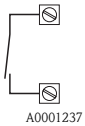
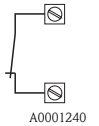
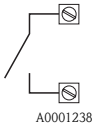
**Relay output configured for limit value**
The relay output signal switches as soon as the measured variable undershoots or overshoots a defined switch point.
Application: Monitoring flow or process-related boundary conditions.

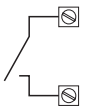
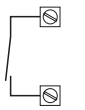
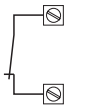
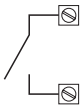
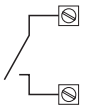
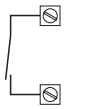
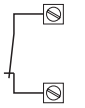
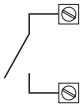
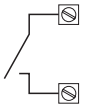
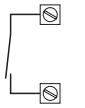
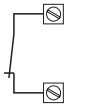
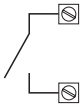
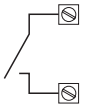
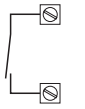
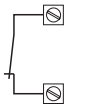
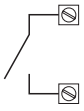
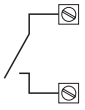
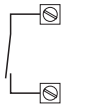
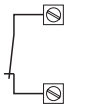
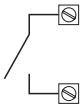



A0001235

A = Maximum safety → ① = SWITCH-OFF POINT > ② SWITCH-ON POINT
B = Minimum safety → ① = SWITCH-OFF POINT < ② SWITCH-ON POINT
C= Minimum safety → ① = SWITCH-OFF POINT = ② SWITCH-ON POINT (this configuration is to avoid)
③ = Relay de-endergized

## 7.3.5 Switching action of the relay output

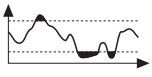
| Function | Status | Relais coil | Contact* | |
|---|---|---|---|---|
| | | | NC | NO |
| **ON (operation)** | System in measuring mode | energized |  A0001239 |  A0001237 |
| | System not in measuring mode (power supply failed) | de-energized |  A0001240 |  A0001238 |

| Function | Status | Relais coil | Contact* | |
|---|---|---|---|---|
| | | | NC | NO |
| **Fault message** | System OK | energized |  A0001239 |  A0001237 |
| | (System or process error)<br>Fault → Response to error<br>Outputs /inputs and totalizers | de-energized |  A0001240 |  A0001238 |
| **Notice message** | System OK | energized |  A0001239 |  A0001237 |
| | (System or process error)<br>Fault → Continuation of measuring | de-energized |  A0001240 |  A0001238 |
| **Fault message or notice message** | System OK | energized |  A0001239 |  A0001237 |
| | (System or process error)<br>Fault → Response to error<br>or<br>Note → Continuation of measuring | de-energized |  A0001240 |  A0001238 |
| **Flow direction** (CH1, CH2 AVG. SUM DIFFERENCE) | forward | energized |  A0001239 |  A0001237 |
| | reverse | de-energized |  A0001240 |  A0001238 |
| **Limit value**<br>– Volume flow<br>– Totalizer<br>– Sound velocity<br>– Flow velocity<br>(CH1, CH2 AVG. SUM DIFFERENCE) | Limit value **not** overshot or undershot | energized |  A0001239 |  A0001237 |
| | Limit value overshot or undershot | de-energized |  A0001240 |  A0001238 |

A0001241

A0001242

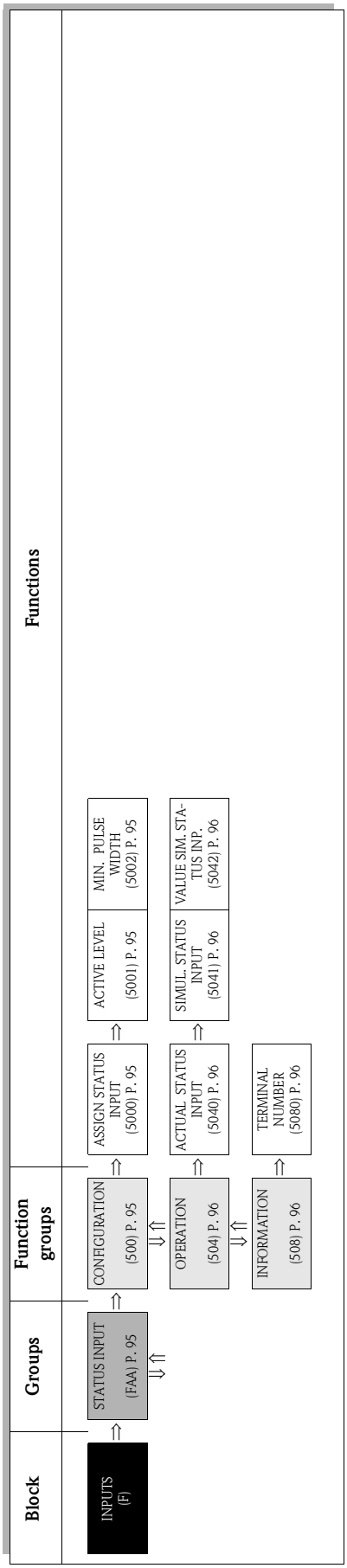
A0001243

 A0001244

* Terminal numbers in accordance with the TERMINAL NUMBER function (4780) on Page 91.

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

# 8 Block INPUTS



# 8.1 Group STATUS INPUT

## 8.1.1 Function group CONFIGURATION

INPUTS F ⇒ STATUS INPUT FAA ⇒ CONFIGURATION 500

| Functional description<br>INPUTS → STATUS INPUT → CONFIGURATION | |
|---|---|
| **ASSIGN STATUS INPUT (5000)** | Use this function to assign a switching function to the status input.<br><br>**Options:**<br>OFF<br>RESET TOTALIZER (1...3)<br>RESET ALL TOTALIZERS<br>POSITIVE ZERO RETURN (CH1...CH2)<br>POSITIVE ZERO RETURN CH1&CH2<br>RESET FAULT MESSAGE<br>ZERO ADJUST (CH1...CH2)<br>ACQUISITION (CH1...CH2)<br>ACQUISITION AVG<br><br>**Factory setting:**<br>OFF<br><br>Caution!<br>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.<br><br>You can configure the status input for the record of process and device parameters in the "Advanced Diagnostics" group via the options ACQUISITION CH1, ACQUISITION CH2 and ACQUISITION AVG. With each change of the level state, an additional value for each diagnosis parameter will be recorded.<br><br>■ ACQUISITION CH1: record of process and device parameters for channel 1<br>■ ACQUISITION CH2: record of process and device parameters for channel 2<br>■ ACQUISITION AVG: record of the average process and device parameters of channel 1 and channel 2<br><br>Note!<br>The options ACQUISITION CH1, ACQUISITION CH2 and ACQUISITION AVG are not available unless the SINGLE SHOT setting was selected in the ACQUISITION MODE function. |
| **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).<br><br>**Options:**<br>HIGH<br>LOW<br><br>**Factory setting:**<br>HIGH |
| **MINIMUM PULSE WIDTH (5002)** | Use this function to define a minimum pulse width which the input pulse must achieve in order to trigger the selected switching function (see function ASSIGN STATUS INPUT (5000) on page 95).<br><br>**User input:**<br>20...100 ms<br><br>**Factory setting:**<br>50 ms |

## 8.1.2 Function group OPERATION

INPUTS F ⇒ STATUS INPUT FAA ⇒ CONFIGURATION 500
⇓
OPERATION 504

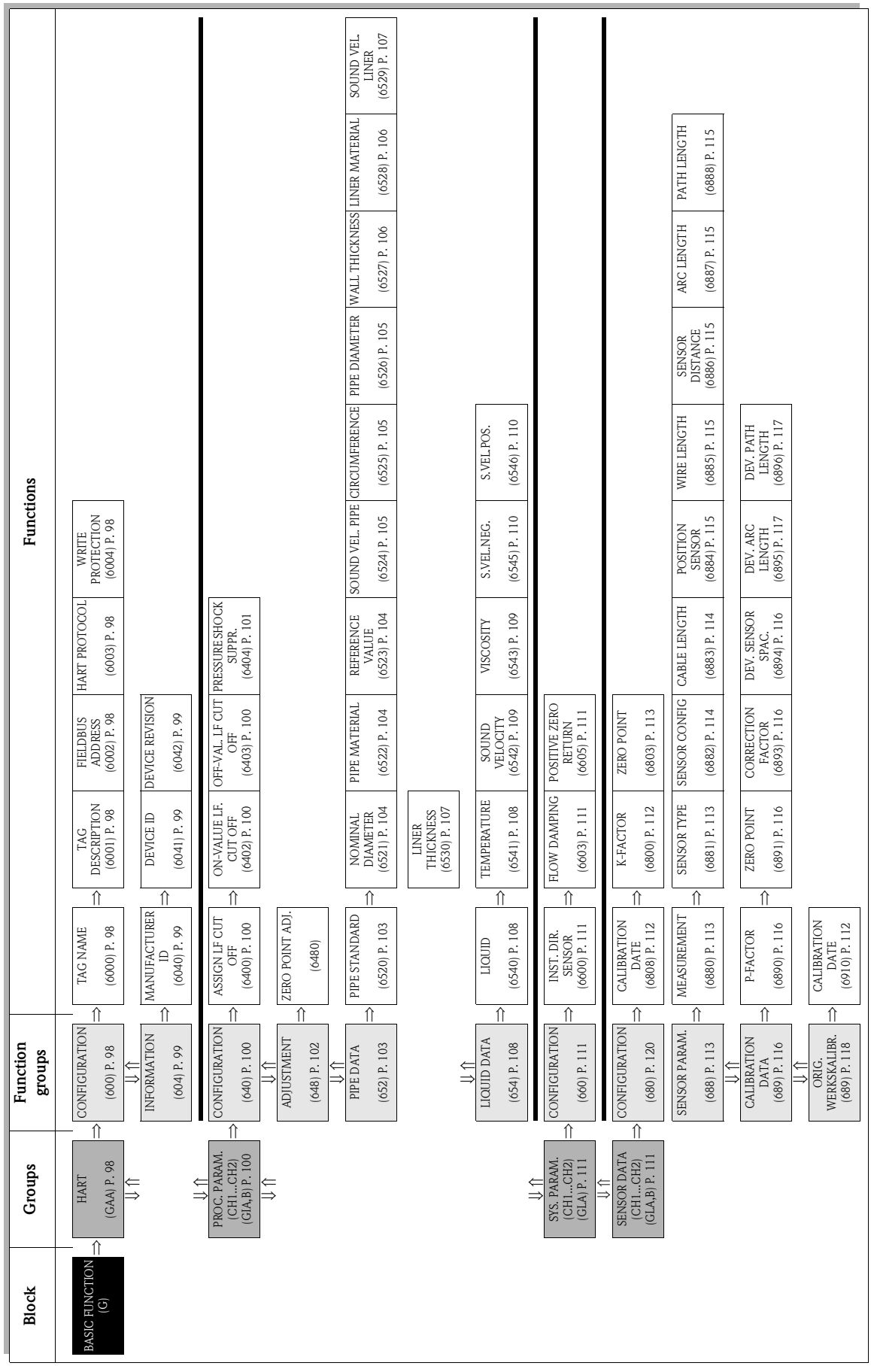
| Functional description<br>INPUTS → STATUS INPUT → OPERATION | |
|---|---|
| **ACTUAL STATUS INPUT (5040)** | Use this function to view the current level of the status input.<br><br>**User interface:**<br>HIGH<br>LOW |
| **SIMULATION STATUS INPUT (5041)** | Use this function to simulate the status input, i.e. to trigger the function (see function ASSIGN STATUS INPUT (5000) on page 95) assigned to the status input.<br><br>**Options:**<br>OFF<br>ON<br><br>**Factory setting:**<br>OFF<br><br>✎ Note!<br>■ The "SIMULATION STATUS INPUT" message indicates that simulation is active.<br>■ The measuring device continues to measure while simulation is in progress, i.e. the current measuring values are output correctly via the other outputs.<br><br>☝ Caution!<br>The setting is not saved if the power supply fails. |
| **VALUE SIMULATION STATUS INPUT (5042)** | ✎ Note!<br>The function is not visible unless the function SIMULATION STATUS INPUT (5041) is active (= ON).<br><br>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.<br><br>**Options:**<br>HIGH<br>LOW<br><br>**Factory setting:**<br>LOW<br><br>☝ Caution!<br>The setting is not saved if the power supply fails. |

## 8.1.3 Function group INFORMATION

INPUTS F ⇒ STATUS INPUT FAA ⇒ CONFIGURATION 500
⇓
OPERATION 504
⇓
INFORMATION 508

| Functional description<br>INPUTS → STATUS INPUT → INFORMATION | |
|---|---|
| **TERMINAL NUMBER (5080)** | Use this function to display the numbers of the terminals (in the connection compartment) which are used by the status input. |

# 9 Block BASIC FUNCTION



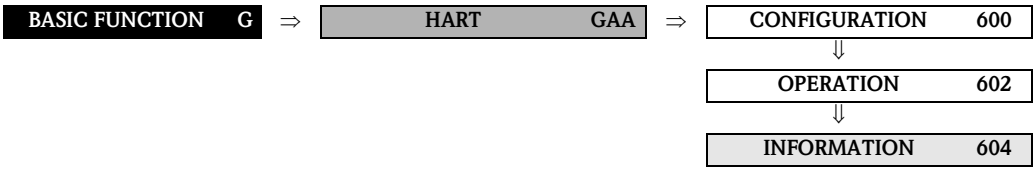
# 9.1 Group HART

## 9.1.1 Function group CONFIGURATION

BASIC FUNCTION G ⇒ HART GAA ⇒ CONFIGURATION 600

| Functional description<br>BASIC FUNCTION → HART → CONFIGURATION | |
|---|---|
| **TAG NAME (6000)** | Use this function to enter a tag name for the measuring device. You can edit and read this tag name at the local display or via the HART protocol.<br><br>**User input:**<br>max. 8-character text, permitted characters are: A–Z, 0–9, +,–, punctuation marks<br><br>**Factory setting:**<br>"_ _ _ _ _ _ _ _" (without text) |
| **TAG DESCRIPTION (6001)** | Use this function to enter a tag description for the measuring device. You can edit and read this tag description at the local display or via the HART protocol.<br><br>**User input:**<br>max. 16-character text, permitted characters are: A–Z, 0–9, +,–, punctuation marks<br><br>**Factory setting:**<br>"_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _" (without text) |
| **FIELDBUS ADDRESS (6002)** | Use this function to define the address for the exchange of data with the HART protocol.<br><br>**User input:**<br>0...15<br><br>**Factory setting:**<br>0<br><br>✎ Note!<br>Addresses 1...15: a constant 4 mA current is applied. |
| **HART PROTOCOL (6003)** | Use this function to display if the HART protocol is active.<br><br>**User interface:**<br>OFF = HART protocol not active<br>ON = HART protocol active<br><br>✎ Note!<br>The HART protocol is activated by selecting 4–20 mA HART or 4–20 mA (25 mA) HART in the function CURRENT SPAN, (see Page 49). |
| **WRITE PROTECTION (6004)** | Use this function to check whether the measuring device can be write-accessed.<br><br>**User interface:**<br>OFF (Data exchange is possible)<br>ON (Data exchange is disabled)<br><br>**Factory setting:**<br>OFF<br><br>✎ Note!<br>Write protection is activated and deactivated by means of a jumper on the I/O module Operating Instructions Proline Prosonic Flow 93, BA070D/06/en/. |

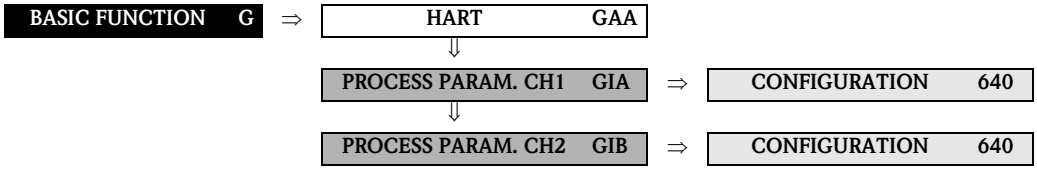
## 9.1.2 Function group INFORMATION

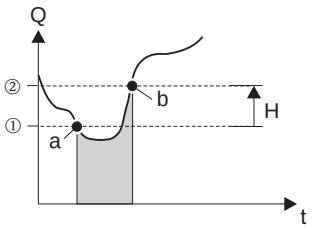


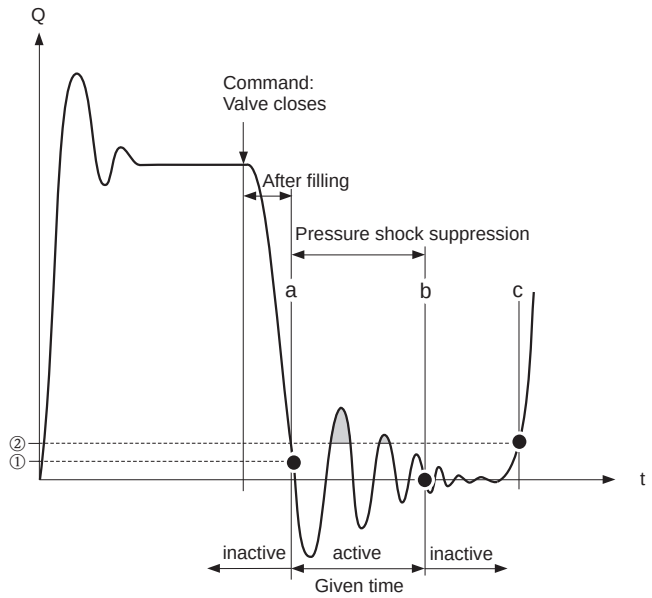

| Functional description<br>BASIC FUNCTION → HART → OPERATION | |
|---|---|
| **MANUFACTURER ID (6040)** | Use this function to view the manufacturer number in decimal numerical format.<br><br>**User interface:**<br>17 (≅ 11 hex) for Endress+Hauser |
| **DEVICE ID (6041)** | Use this function to view the device ID in hexadecimal numerical format.<br><br>**User interface:**<br>59 (≅ 89 dez) for Prosonic Flow 93 |
| **DEVICE REVISION (6042)** | Use this function to view the device-specific revision of the HART-command-interface.<br><br>**Display:**<br>e.g.: 7 |

# 9.2 Group PROCESS PARAMETER (CH1...CH2)

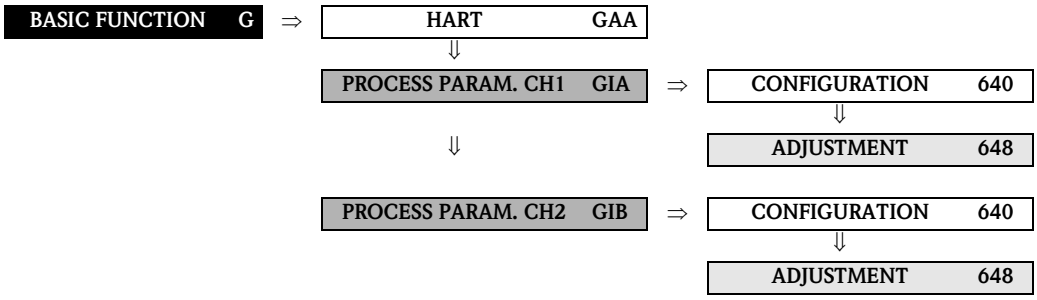
## 9.2.1 Function group CONFIGURATION




| Functional description<br>BASIC FUNCTION → PROCESS PARAMETER (CH1...CH2) → CONFIGURATION | |
|---|---|
| **ASSIGN LOW FLOW CUT OFF (6400)** | Use this function to assign the switch point for low flow cut off rate suppression.<br><br>**Options:**<br>OFF<br>VOLUME FLOW<br><br>**Factory setting:**<br>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.<br><br>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.<br><br>**User input:**<br>5-digit floating-point number<br><br>**Factory setting:**<br>0 l/s<br><br>✎ Note!<br>The appropriate unit is taken from the function UNIT VOLUME FLOW (0402) (see Page 13) |
| **OFF-VALUE LOW FLOW CUT OFF (6403)** | Use this function to enter the switch-off (b) point for low flow cut off.<br>Enter the switch-off point as a positive hysteresis (H) from the switch-on point (a).<br><br>**User input:**<br>Integer 0...100%<br><br>**Factory setting:**<br>50%<br><br>Example:<br>  <br><br>A0003882<br>① = switch-on point ② switch-off point<br><br>a = low flow cutoff is switched on<br>b = low flow cutoff is switched off (a +a · H)<br>H = Hysteresis value: 0 to 100%<br>■ low flow cutoff active<br>Q = Flow |

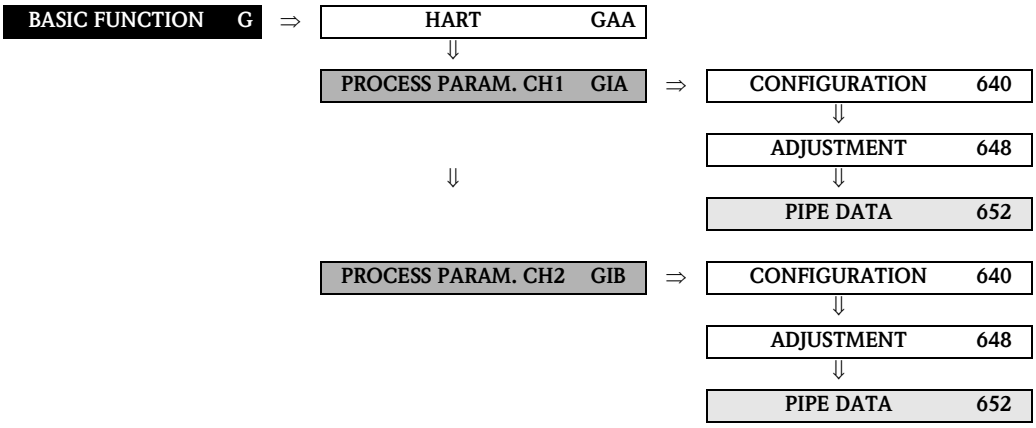
| Functional description<br>BASIC FUNCTION → PROCESS PARAMETER (CH1...CH2) → CONFIGURATION | |
|---|---|
| **PRESSURE SHOCK SUPPRESSION (6404)** | The closure of a valve can cause brief but severe movements of the fluid in the piping system, movements which the measuring system registers. The pulses totalled in this way result in a totalizer reading error, particularly in the case of batching processes. For this reason, the measuring device is equipped with pressure shock suppression (= short-term signal suppression) which can eliminate system-related "disruptions".<br><br>✎ Note!<br>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 100).<br><br>Use this function to define the time span for active pressure shock suppression.<br><br>Activation of the pressure shock suppression<br>Pressure shock suppression is activated after the flow falls below the switch-on point of the low flow cut off (see point **1** in graphic).<br><br>While pressure shock suppression is active, the following conditions apply:<br>■ Current output → outputs the current corresponding to zero flow.<br>■ Pulse/Freq.-output → outputs the frequency corresponding to zero flow.<br>■ Flow reading on display = → 0.<br>■ Totalizer reading → the totalizers are pegged at the last correct value.<br><br>Deactivation of the pressure shock suppression<br>The pressure shock suppression is deactivated after the time interval, set in this function, has passed (see point **2** in graphic).<br><br>✎ Note!<br>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 **3** in graphic).<br><br>  <br><br>*① On-value (creepage) ② Off-value (creepage)*<br>*a = Active when value falls below the on-value of the low flow cut off*<br>*b = Deactivated after specified time expires*<br>*c = Flow values are again used to calculate the pulses*<br>■ *= Suppressed values Q = Flow*<br><br>**User input:**<br>max. 4-digit number, incl. unit: 0.00...100.0 s<br><br>**Factory setting:**<br>0.00 s |

## 9.2.2 Function group ADJUSTMENT




| Functional description<br>BASIC FUNCTION → PROCESS PARAMETER (CH1...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 (see Page 116).<br><br>**Options:**<br>CANCEL<br>START<br><br>**Factory setting:**<br>CANCEL<br><br>Caution!<br>Before carrying this out, please refer to the Operating Instructions Proline Prosonic Flow 93 (BA 070D/06/en/....), for a detailed description of the procedure for zero point adjustment.<br><br>Note!<br>■ Programming is locked during zero point adjustment The message "ZERO ADJUST RUNNING" appears on the display.<br><br>■ 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.<br><br>■ If the Prosonic Flow 93 measuring electronics are fitted with a status input, then the zero point can also be activated by using this input. |

### 9.2.3 Function group PIPE DATA




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

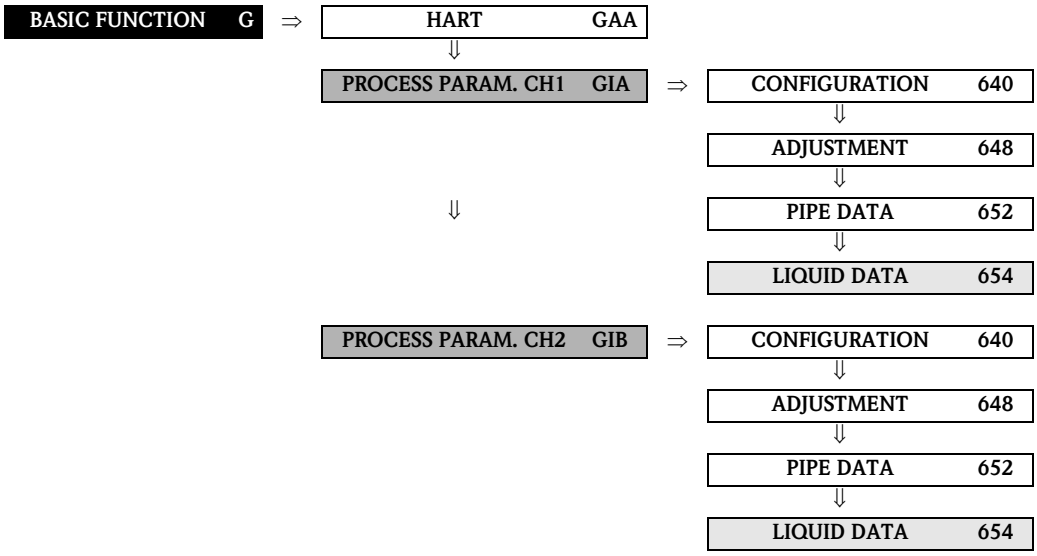
| Functional description<br>BASIC FUNCTION → PROCESS PARAMETER (CH1...CH2) → PIPE DATA | |
|---|---|
| **NOMINAL DIAMETER (6521)** | ✎ Note!<br>This function does not appear if the option OTHERS was selected in the function PIPE STANDARD (6520).<br><br>Use this function to select the nominal diameter of the pipe.<br><br>**Options:**<br>OTHERS<br>DN:<br>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"<br><br>✎ Note!<br>The selection specifies the values for the following functions:<br>■ CIRCUMFERENCE (6525)<br>■ PIPE DIAMETER (6526)<br>■ WALL THICKNESS (6527)<br>If you edit these functions the pipe standard will be reset to the option OTHERS and the function NOMINAL DIAMETER (6521) does not appear.<br><br>**Factory setting:**<br>80/3" |
| **PIPE MATERIAL (6522)** | This function displays the pipe material determined via the value entered in the function PIPE STANDARD (6520). If you edit the predetermined value the pipe standard will be reset to the option OTHERS and the function NOMINAL DIAMETER (6521) does not appear.<br><br>If a pipe standard was not available for selection and the selection OTHER was made in the function PIPE STANDARD (6520) the pipe material must be entered here.<br><br>**Options:**<br>CARBON STEEL, DUCTILE IRON, STAINLESS STEEL, SS ANSI 304, SS ANSI 316, SS ANSI 347, SS ANSI 410, SS ANSI 430, ALLOY C, PVC, PE, LDPE, HDPE, GRP, PVDF, PA, PP, PTFE, GLASS PYREX, ASBESTOS CEMENT, COPPER, OTHER<br><br>**Factory setting:**<br>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.<br><br>✎ Note!<br>This function does not appear unless the option SOUND VELOCITY PIPE was selected in the function MEASUREMENT (6880, Page 113).<br><br>**User input:**<br>5-digit floating-point number, [unit]<br><br>**Factory setting:**<br>5 mm |

| Functional description<br>BASIC FUNCTION → PROCESS PARAMETER (CH1...CH2) → PIPE DATA | |
|---|---|
| **SOUND VELOCITY PIPE (6524)** | This function displays the sound velocity in the pipe determined via the value entered in the function PIPE STANDARD (6520). If you edit the predetermined value the pipe standard will be reset to the option OTHERS and the function NOMINAL DIAMETER (6521) does not appear.<br><br>If a pipe standard was not available for selection and the selection OTHER was made in the function PIPE STANDARD (6520) the sound velocity must be entered here.<br><br>**Measuring the sound velocity in the pipe**<br>If the sound velocity in the pipe is unknown, it can be measured. To do so, select the option SOUND VELOCITY PIPE in the function MEASUREMENT (6880, Page 113). The sound velocity in the pipe is measured by calling up the function SOUND VELOCITY PIPE (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.<br><br>✎ Note!<br>■ To measure the sound velocity, you require the ultrasonic sensors "DDU18" which you can order as an accessory from Endress+Hauser.<br>■ A reference value is used as a basis for measuring the sound velocity. This reference value can be edited. (see function REFERENCE VALUE (6523), page 104)<br><br>**User input:**<br>Fixed-point number 800...6500 m/s<br><br>**Factory setting:**<br>3120 m/s |
| **CIRCUMFERENCE (6525)** | This function displays the outer circumference of the pipe determined via the value entered in the function NOMINAL DIAMETER (6521). If you edit the predetermined value the pipe standard will be reset to the option OTHERS and the function NOMINAL DIAMETER (6521) does not appear.<br>If a nominal diameter was not available for selection and the selection OTHER was made in the function NOMINAL DIAMETER (6521) the outer circumference must be entered here.<br><br>**User input:**<br>Fixed-point number 31.4...15708.0 mm<br><br>**Factory setting:**<br>279.3 mm |
| **PIPE DIAMETER (6526)** | This function displays the outer diameter of the pipe determined via the value entered in the function NOMINAL DIAMETER (6521). If you edit the predetermined value the pipe standard will be reset to the option OTHERS and the function NOMINAL DIAMETER (6521) does not appear.<br>If a nominal diameter was not available for selection and the selection OTHER was made in the function NOMINAL DIAMETER (6521) the outer diameter must be entered here.<br><br>**User input:**<br>Fixed-point number 10.0...5000.0 mm<br><br>**Factory setting:**<br>88.9 mm |

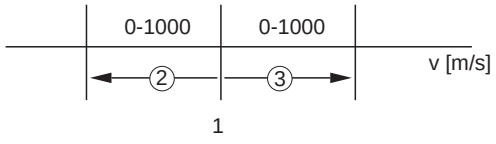
| Functional description<br>BASIC FUNCTION → PROCESS PARAMETER (CH1...CH2) → PIPE DATA | |
|---|---|
| **WALL THICKNESS (6527)** | This function displays the thickness of the pipe walls determined via the value entered in the function NOMINAL DIAMETER (6521). If you edit the predetermined value the pipe standard will be reset to the option OTHERS and the function NOMINAL DIAMETER (6521) does not appear.<br>If a nominal diameter was not available for selection and the selection OTHER was made in the function NOMINAL DIAMETER (6521) the thickness of the pipe wall must be entered here.<br><br>**Measuring the wall thickness**<br>If the wall thickness is unknown, it can be measured. To do so, select the option WALL THICKNESS in the function MEASUREMENT (6880, Page 113). The wall thickness is measured by calling up the function WALL THICKNESS (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.<br><br>✎ Note!<br>To measure the wall thickness, you require the ultrasonic sensors "DDU19" which you can order as an accessory from Endress+Hauser.<br><br>**User input:**<br>Fixed-point number 0.1...100.0 mm<br><br>**Factory setting:**<br>3.2 mm |
| **LINER MATERIAL (6528)** | This function displays the liner material of the pipe determined via the value entered in the function PIPE STANDARD (6520). the pipe standard will be reset to the option OTHERS and the function NOMINAL DIAMETER (6521) does not appear.<br><br>If a pipe standard was not available for selection and the selection OTHER was made in the function PIPE STANDARD (6520) the liner material must be entered here.<br><br>**Options:**<br>LINER NONE<br>MORTAR<br>RUBBER<br>TAR EPOXY<br>OTHERS<br><br>**Factory setting:**<br>LINER NONE |

| Functional description<br>BASIC FUNCTION → PROCESS PARAMETER (CH1...CH2) → PIPE DATA | |
|---|---|
| **SOUND VELOCITY LINER (6529)** | ✎ Note!<br>This function does not appear if the option LINER NONE was selected in the function LINER MATERIAL (6528).<br><br>This function displays the sound velocity of the liner determined via the value entered in the function LINER MATERIAL (6520). If you edit the predetermined value the liner material will be reset to the option OTHERS.<br><br>If a liner material was not available for selection and the selection OTHER was made in the function LINER MATERIAL (6528) the sound velocity of the liner must be entered here.<br><br>**User input:**<br>Fixed-point number 800...6500 m/s<br><br>**Factory setting:**<br>Depending on the selection in the function LINER MATERIAL (6528) |
| **LINER THICKNESS (6530)** | ✎ Note!<br>This function does not appear if the option LINER NONE was selected in the function LINER MATERIAL (6528).<br><br>Use this function to enter the thickness of the liner.<br><br>**User input:**<br>Fixed-point number 0.1...100.0 mm<br><br>**Factory setting:**<br>0 mm |

## 9.2.4 Function group LIQUID DATA



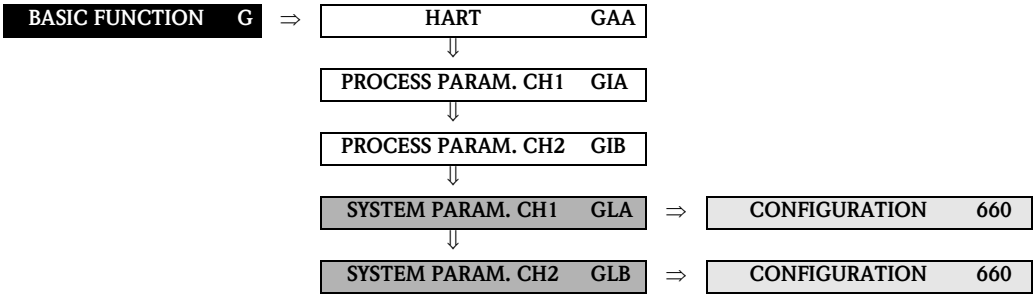

| Functional description<br>BASIC FUNCTION → PROCESS PARAMETER (CH1...CH2) → LIQUID DATA | |
|---|---|
| **LIQUID**<br>**(6540)** | Use this function to select the liquid in the pipe.<br><br>✎ Note!<br>The selection specifies the values for the sound velocity and viscosity. If OTHER is selected, these must be entered via the SOUND VELOCITY LIQUID (6542) and VISCOSITY (6543) functions.<br><br>**Options:**<br>WATER, SEAWATER, DISTILLED WATER, AMMONIA, ALCOHOL, BENZENE, BROMIDE, ETHANOL, GLYCOL, KEROSENE, MILK, METHANOL, TOLUOL, LUBRICATING OIL, FUEL OIL, PETROL, OTHER<br><br>**Factory setting:**<br>WATER |
| **TEMPERATURE**<br>**(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.<br><br>**User input:**<br>Fixed-point number –273.15...726.85 °C (0...1000 K)<br><br>**Factory setting:**<br>20 °C |

| Functional description<br>BASIC FUNCTION → PROCESS PARAMETER (CH1...CH2) → LIQUID DATA | |
|---|---|
| **SOUND VELOCITY LIQUID (6542)** | This function displays the sound velocity of the liquid determined via the values entered in the functions LIQUID (6540) and TEMPERATURE (6541). If you edit the predetermined value the function LIQUID (6540) will be reset to the option OTHERS.<br>If a liquid was not available for selection and the selection OTHER was made in the function LIQUID (6540) the sound velocity must be entered here.<br><br>**Measuring the sound velocity of the liquid**<br>If the sound velocity of the liquid is unknown, it can be measured. To do so, select the option SOUND VELOCITY LIQUID in the function MEASUREMENT (6880, Page 113). The sound velocity in the liquid is measured by calling up the function SOUND VELOCITY LIQUID (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.<br><br>✎ Note!<br>To measure the sound velocity, you require the ultrasonic sensors "DDU18" which you can order as an accessory from Endress+Hauser.<br><br>**Transmitter search range:**<br>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) and SOUND VELOCITY POSITIVE (6546) functions. An error message is displayed if the sound velocity of the liquid exceeds the search range.<br><br>✎ Note!<br>We recommend you select a smaller search range by unfavourable signal conditions (signal strength < 50%).<br><br>  <br><br>A0001246<br><br>1 = Sound velocity of the liquid<br>② = Lower search range: is specified in the SOUND VELOCITY NEGATIVE (6545) function<br>③ = Upper search range: is specified in the SOUND VELOCITY POSITIVE (6546) function<br><br>**User input:**<br>Fixed-point number 400...3000 m/s<br><br>**Factory setting:**<br>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 function LIQUID (6540) will be reset to the option OTHERS.<br>If the liquid is not available for selection in the LIQUID (6540) function and the OTHER option was selected the viscosity must be entered here.<br><br>**User input:**<br>Fixed-point number 0.0...5000.0 cSt<br><br>**Factory setting:**<br>1 $mm^2/s$ |

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

# 9.3 Group SYSTEM PARAMETER (CH1...CH2)

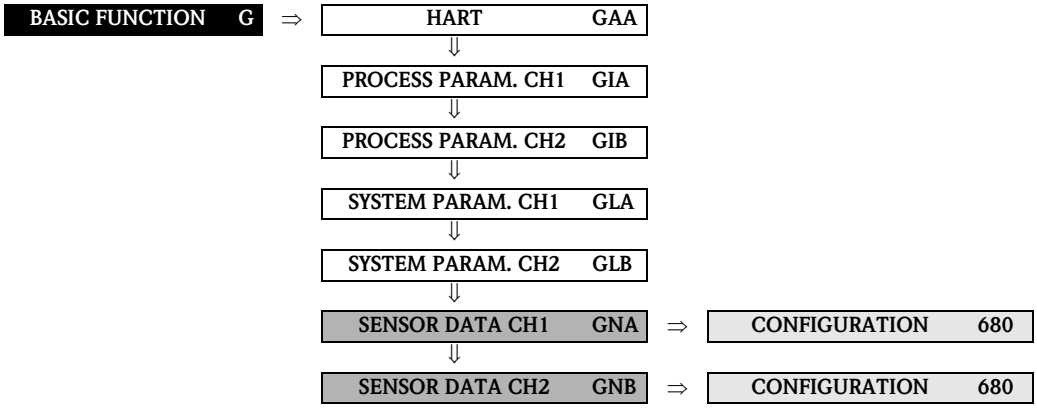
## 9.3.1 Function group CONFIGURATION




| Functional description<br>BASIC FUNCTION → SYSTEM PARAMETER CH1 → CONFIGURATION | |
|---|---|
| **INSTALLATION DIRECTION SENSOR (6600)** | Use this function to reverse the sign of the flow quantity, if necessary.<br><br>**Options:**<br>NORMAL<br>INVERSE<br><br>**Factory setting:**<br>NORMAL |
| **FLOW DAMPING (6603)** | ✎ Note!<br>The system damping acts on all functions and outputs of the measuring device.<br><br>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.<br><br>**User input:**<br>0...100 s<br><br>**Factory setting:**<br>0 |
| **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.<br><br>**Options:**<br>OFF<br>ON → Signal output is set to the "ZERO FLOW" value.<br><br>**Factory setting:**<br>OFF |

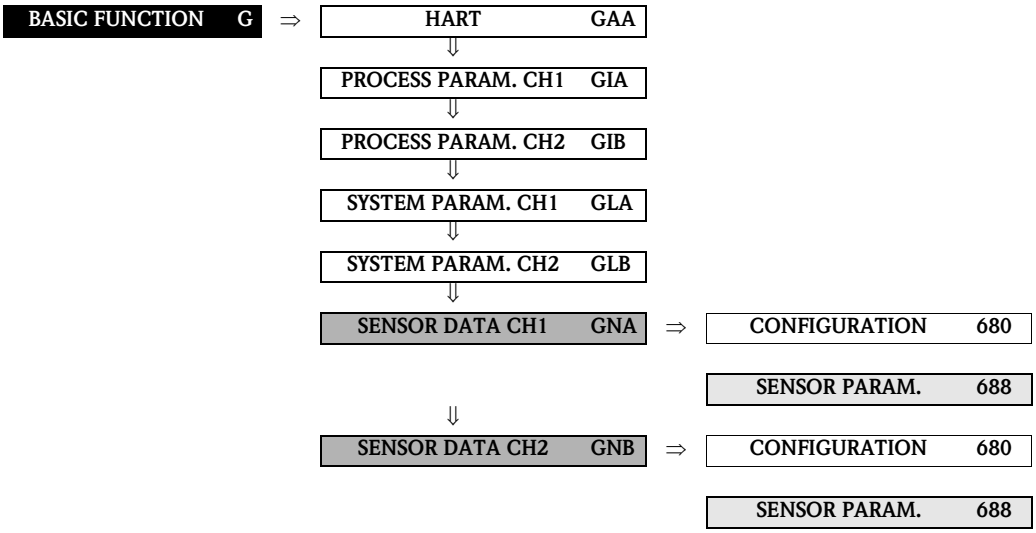
# 9.4 Group SENSOR DATA (CH1...CH2)

## 9.4.1 Function group CONFIGURATION




| Functional description<br>BASIC FUNCTION → SENSOR DATA (CH1...CH2) → CONFIGURATION | |
|---|---|
| ✎ Note!<br>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).<br><br>✎ Note!<br>■ If the measuring device is delivered without calibration, the display shows the value 1.0.<br>■ If the calibration is reset via the function CALIBRATION DATE (6910), the date is overwritten.<br><br>**Factory setting:**<br>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 pipe and the measuring sensors.<br><br>**Display:**<br>5-digit floating-point number, (including sign)<br><br>**Factory setting:**<br>depends on the nominal diameter and the calibration |
| **ZERO POINT (6803)** | Use this function to view the zero-point correction value for the measuring pipe and the measuring sensors<br>The calibration at the factory determines the zero-point correction value.<br><br>✎ Note!<br>If the measuring device is delivered without calibration, the display shows the value 0<br><br>**Display:**<br>5-digit floating-point number, (including sign)<br><br>**Factory setting:**<br>depends on the nominal diameter and the calibration |

## 9.4.2 Function group SENSOR PARAMETER

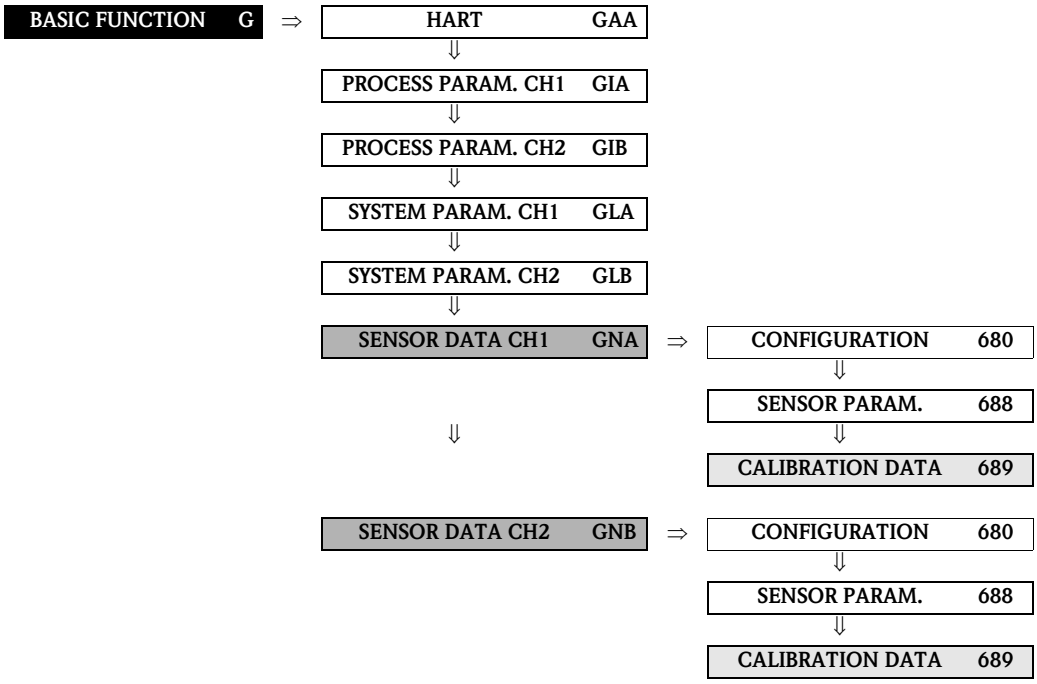



| Functional description<br>BASIC FUNCTION → SENSOR DATA (CH1...CH2) → SENSOR PARAMETER | |
|---|---|
| **MEASUREMENT (6880)** | **Options:**<br>OFF<br>CLAMP ON<br>INSERTION<br>SOUND VELOCITY LIQUID<br>SOUND VELOCITY PIPE<br>WALL THICKNESS<br>**Factory setting:**<br>CLAMP ON for channel 1<br>OFF for channel 2 |
| **SENSOR TYPE (6881)** | ✎ Note!<br>This function is only available if the OFF setting was not selected in the function MEASUREMENT.<br>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).<br>**Options:** (CLAMP ON in the funtion MEASUREMENT)<br>W-CL-05F-L-B<br>W-CL-1F-L-B<br>W-CL-1F-L-C<br>W-CL-2F-L-B<br>P-CL-05F-L-B<br>P-CL-05F-M-B<br>P-CL-1F-L-B<br>P-CL-1F-M-B<br>P-CL-2F-L-B<br>P-CL-2F-M-B<br>P-CL-6F-L-C<br>P-CL-6F-M-C<br>U-CL-2F-L-A<br>W-CL-6F-L-C<br>**Options:** (INSERTION in the function MEASUREMENT)<br>W-IN-1F-L-B<br>**Options:** (SOUND VELOCITY LIQUID in the function MEASUREMENT)<br>P-CL-1S-L-B<br>P-CL-1S-M-B<br>**Options:** (SOUND VELOCITY PIPE / WALL THICKNESS in function MEASUREMENT)<br>P-CL-4W-L-B<br>**Factory setting:**<br>depends on the order code |

| Functional description<br>BASIC FUNCTION → SENSOR DATA (CH1...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).<br><br>✎ Note!<br>This function is not available unless one of the following options was selected in the function MEASUREMENT (6880):<br>■ CLAMP ON<br>■ SOUND VELOCITY LIQUID<br>■ INSERTION<br><br>**Options:**<br>NO. TRAVERSE: 1 [1]<br>NO. TRAVERSE: 2 [2]<br>NO. TRAVERSE: 3 [1]<br>NO. TRAVERSE: 4 [2]<br>SINGLE PATH [3]<br>DUAL PATH [3]<br><br>**Factory setting:**<br>NO. TRAVERSE: 2<br><br>✎ Note!<br>■ In principle, setting "NO. TRAVERSE: 2" is for the P-sensor DN15 ... DN 65 necessary.<br>■ For sound velocity measurement it is always required to set this function to "NO. TRAVERSE: 1" or "NO. TRAVERSE: 3".<br>■ For flow measurement it is basically not recommended to set this function to "NO. TRAVERSE: 3".<br><br>[1] This option is not available unless CLAMP ON or SOUND VELOCITY LIQUID was selected in the function MEASUREMENT.<br>[2] This option is not available unless CLAMP ON was selected in the function MEASUREMENT.<br>[3] This option is not available unless INSERTION was selected in the function MEASUREMENT. |
| **CABLE LENGTH (6883)** | Select the length of the appropriate connecting cable. As a rule, a selection is not necessary as the length has already been set according to the order data (order code).<br><br>**Options:**<br>LENGTH 5 m/15 feet<br>LENGTH 10 m/30 feet<br>LENGTH 15 m/45 feet<br>LENGTH 30 m/90 feet<br>LENGTH 60 m/180 feet<br><br>**Factory setting:**<br>depends on the order code |

| Functional description<br>BASIC FUNCTION → SENSOR DATA (CH1...CH2) → SENSOR PARAMETER | |
|---|---|
| **POSITION SENSOR (6884)** | Use this function to view the position of both sensors on the rail.<br><br>✎ Note!<br>This option is not available unless CLAMP ON is set in the function MEASUREMENT and the number of traverses is 2 or 4 (see function SENSOR CONFIGURATION (6882)).<br><br>**Display:**<br>5-digit number combination |
| **WIRE LENGTH (6885)** | The wire length for assembling the sensors at the correct distance apart appears on the display.<br><br>✎ Note!<br>This option is not available unless CLAMP ON was set in the function MEASUREMENT and the number of traverses is 1 or 3, (see function SENSOR CONFIGURATION (6882)).<br><br>**Display:**<br>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.<br><br>**Display:**<br>max. 5-digit number, including unit (e.g. 200 mm) |
| **ARC LENGTH (6887)** | The arc length on the pipe appears on the display.<br><br>✎ Note!<br>This function is not available unless INSERTION was set in the function MEASUREMENT (6880) and the DUAL PATH option was selected in the function SENSOR CONFIGURATION (6882).<br><br>**Display:**<br>max. 5-digit number, including unit (e.g. 200 mm) |
| **PATH LENGTH (6888)** | The path length appears on the display.<br><br>✎ Note!<br>This function is not available unless INSERTION was selected in the function MEASUREMENT.<br><br>**Display:**<br>max. 5-digit number, including unit (e.g. 200 mm) |

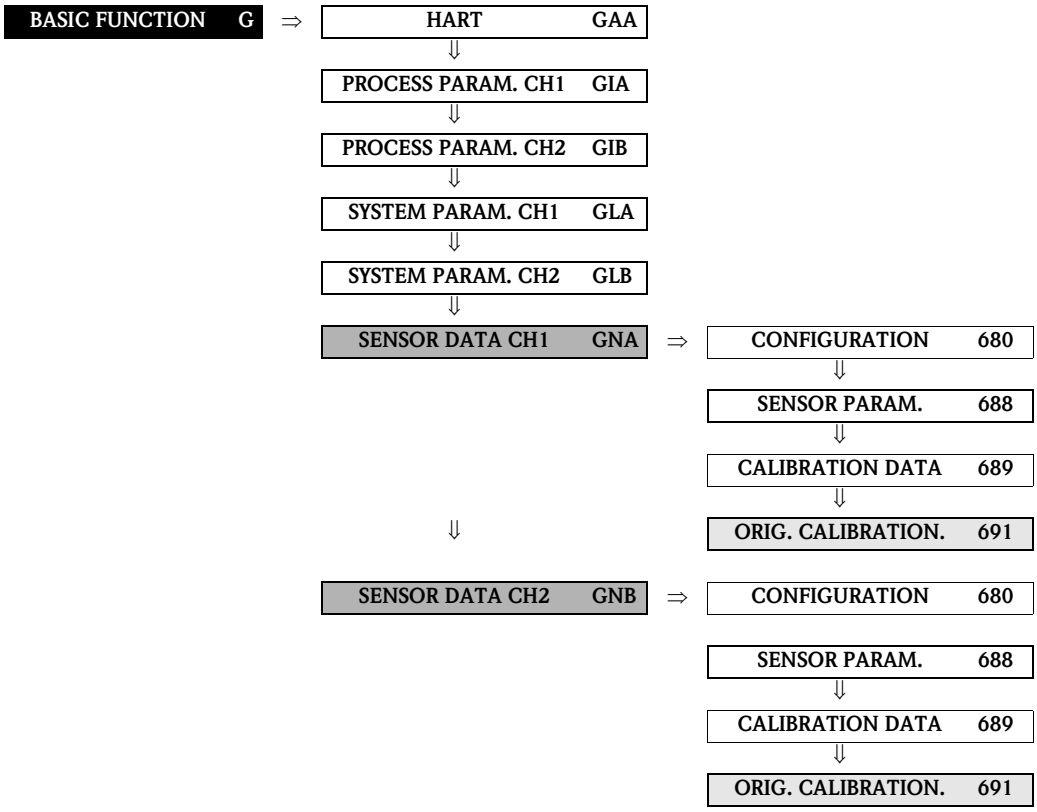
### 9.4.3 Function group CALIBRATION DATA




| Functional description<br>BASIC FUNCTION → SENSOR DATA (CH1...CH2) → CALIBRATION DATA | |
|---|---|
| **P-FACTOR (6890)** | This function displays the p-factor.<br><br>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.<br><br>**User input:**<br>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.<br><br>**User input:**<br>1.0000 (= no correction) |
| **DEVIATION SENSOR DISTANCE (6894)** | Use this function to enter a deviation value for the sensor distance.<br><br>✎ Note!<br>This option is not available unless INSERTION was selected in the function MEASUREMENT (6880).<br><br>**User input:**<br>5-digit floating-point number, including unit and sign (e.g. +2.000 mm)<br><br>**Factory setting:**<br>0 mm |

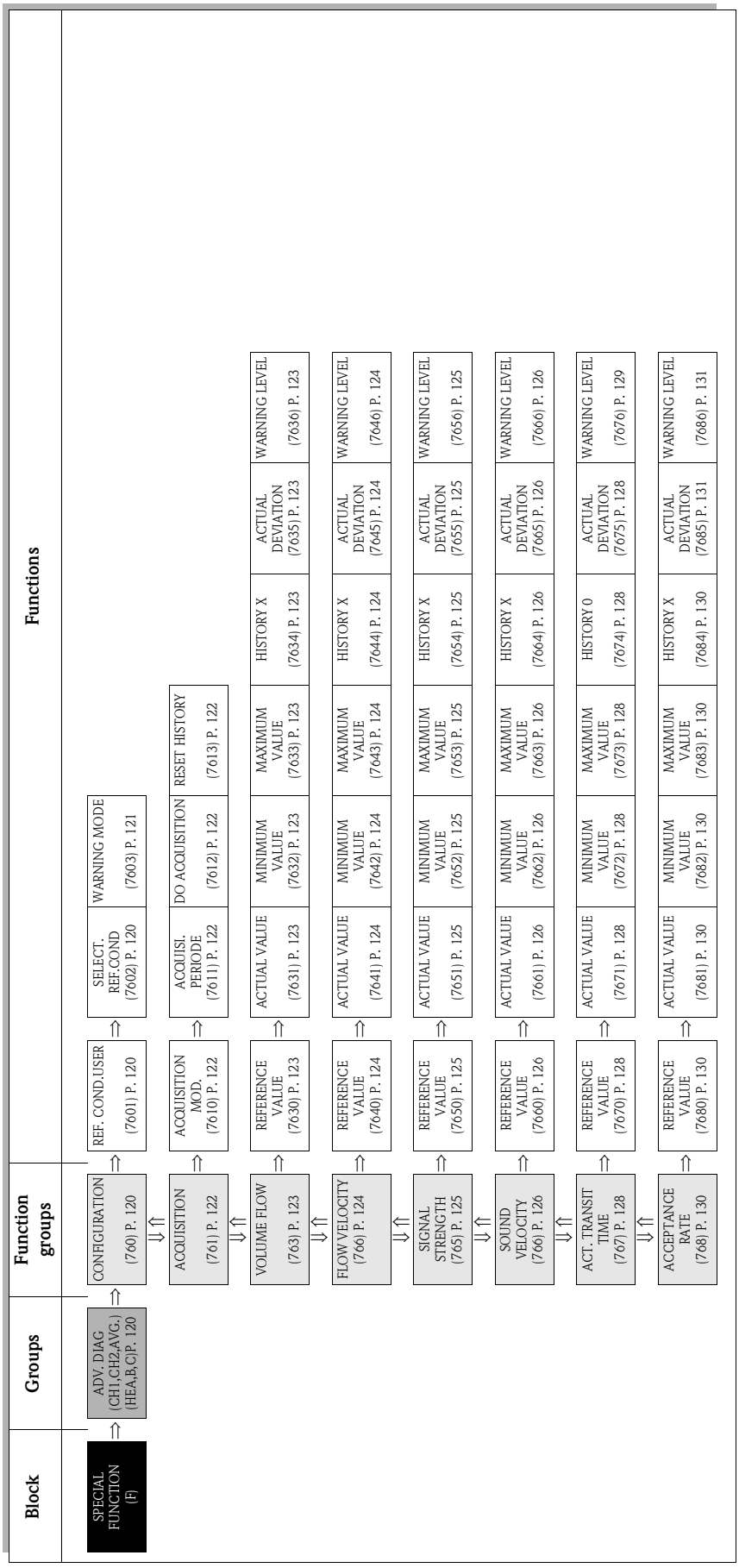
| Functional description<br>BASIC FUNCTION → SENSOR DATA (CH1...CH2) → CALIBRATION DATA | |
|---|---|
| **DEVIATION ARC LENGTH (6895)** | Use this function to enter a deviation value for the arc length.<br><br>✎ Note!<br>This function is not available unless INSERTION was set in the function MEASUREMENT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

### 9.4.4 Function group ORIG. CALIBRATION.



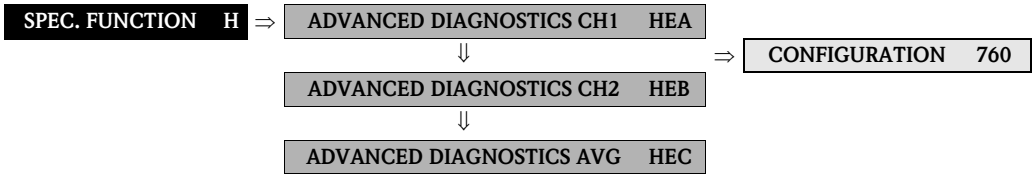

| Functional description<br>BASIC FUNCTION → SENSOR DATA (CH1...CH2) → ORIG. CALIBRATION. | |
|---|---|
| **CALIBRATION DATE (6910)** | This function resets the calibration data of the measuring device to the factory settings.<br><br>Procedure:<br>1. Enter current date.<br>2. Store it.<br><br>The measuring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

# 10 Block SPECIAL FUNCTION



# 10.1 Group ADVANCED DIAGNOSTICS (CH1,CH2,AVG)

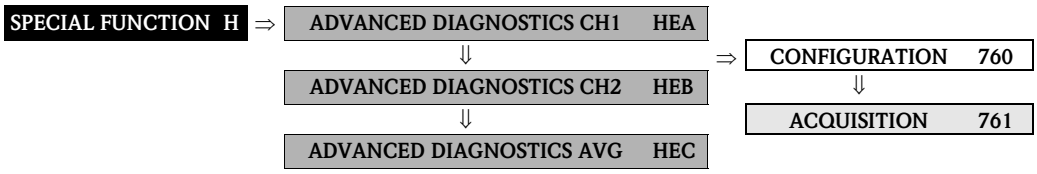
## 10.1.1 Function group CONFIGURATION




| Functional description<br>SPECIAL FUNCTION → ADVANCED DIAGNOSTICS (CH1,CH2,AVG) → CONFIGURATION | |
|---|---|
| In this function group you define the settings for the additional software functionality "Advanced Diagnostics". The functionality is available for channel 1 (ADVANCED DIAGNOSTICS CH1) and channel 2 (ADVANCED DIAGNOSTICS CH2) as well as for the average values of the parameters volume flow, flow velocity and sound velocity (ADVANCED DIAGNOSTICS AVG).<br><br>✎ Note!<br>For further information on the functional concept of the "Advanced Diagnostics" menu please refer to the Operating Instructions Proline Prosonic Flow 93, BA070D/06/en/, chapter "Commissioning" | |
| **REFERENCE CONDITION USER (7601)** | Use this function to start determining the user reference status. The following values are determined:<br>■ VOLUME FLOW<br>■ FLOW VELOCITY<br>■ SIGNAL STRENGTH<br>■ SOUND VELOCITY<br>■ ACTUAL TRANSIT TIME<br>■ ACCEPTANCE RATE<br><br>**Option:**<br>CANCEL<br>START<br><br>**Factory setting:**<br>CANCEL<br><br>✎ Note!<br>■ The values of the user reference status can each be entered manually. These are entered in the REFERENCE VALUE function in the appropriate function group (→ page 123 ff.)<br>■ We recommend to determine the user reference status in the REFERENCE CONDITION USER (7601) function. If entering the reference values manually, you should have good knowledge of the "Advanced Diagnostics" functionality.<br>■ If you have entered reference values manually via the REFERENCE VALUE function, these are overwritten if START is selected. |
| **SELECT REFERENCE CONDITION (7602)** | Use this function to select the reference status which should be used to compare the advanced diagnostics parameters (see function ACQUISITION MODE (7610) on Page 122).<br><br>**Option:**<br>USER<br><br>**Factory setting:**<br>USER |

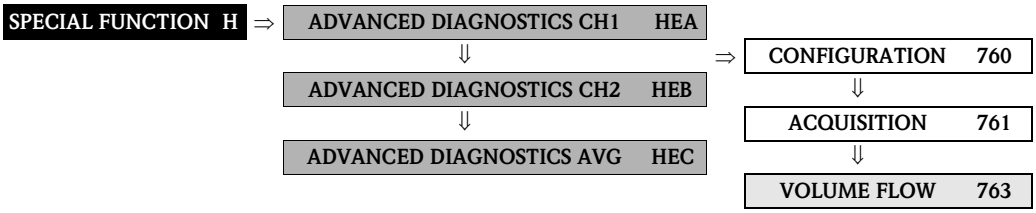
| Functional description<br>SPECIAL FUNCTION → ADVANCED DIAGNOSTICS (CH1,CH2,AVG) → CONFIGURATION | |
|---|---|
| **WARNING MODE (7603)** | Use this function to determine whether a warning should be generated when there is a deviation between the reference status (USER, see function SELECT REFERENCE CONDITION (7602)) and the current measuring values.<br>The values of the following functions are compared to the reference status :<br>■ ACTUAL VALUE (Volume flow) (7631)<br>■ ACTUAL VALUE (Flow velocity) (7641)<br>■ ACTUAL VALUE (Signal strength) (7651)<br>■ ACTUAL VALUE (Sound velocity) (7661)<br>■ ACTUAL VALUE (Actual transit time) (7671)<br>■ ACTUAL VALUE (Acceptance rate) (7681)<br><br>**Option:**<br>OFF<br>ON<br><br>**Factory setting:**<br>OFF |

## 10.1.2 Function group ACQUISITION



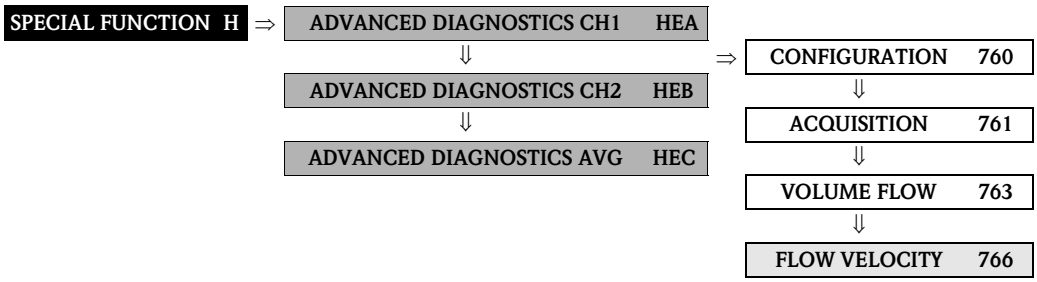

| Functional description<br>SPECIAL FUNCTION → ADVANCED DIAGNOSTICS (CH1,CH2,AVG) → ACQUISITION | |
|---|---|
| **ACQUISITION MODE (7610)** | Use this function to specify whether the advanced diagnostics parameters should be determined on a periodical or single-shot basis.<br><br>**Option:**<br>OFF<br>PERIODICAL<br>SINGLE SHOT<br>**Factory setting:**<br>OFF<br><br>✎ Note!<br>■ The option SINGLE SHOT permits the record of process and device parameters either via the DO ACQUISITION (7612) function or via the status input (see function ASSIGN STATUS INPUT (5000) on page 95).<br>■ See the Chapter on "Commissioning" in the Operating Instructions Proline Prosonic Flow 93, BA070D/06/en/ for more information on advanced diagnostics. |
| **ACQUISITION PERIODE (7611)** | ✎ Note!<br>This function is not available unless PERIODICAL was selected in the ACQUISITION MODE function (7610).<br><br>Use this function to specify the time interval after which the advanced diagnostics parameters should be taken. The time intervall starts with the confirmation of the input.<br>**User input:**<br>0...99999 s<br>**Factory setting:**<br>3600 s<br><br>✎ Note!<br>A reference status must be defined prior to determining the diagnostics parameters, see function SELECT REFERENCE CONDITION (7602). |
| **DO ACQUISITION (7612)** | ✎ Note!<br>This function is not available unless SINGLE SHOT was selected in the ACQUISITION MODE (7610) function<br><br>Use this function to start determining the advanced diagnostics parameters on a single-shot basis.<br><br>**Option:**<br>START – CANCEL<br>**Factory setting:**<br>CANCEL<br><br>✎ Note!<br>A reference status must be defined prior to determining the diagnostics parameters, see function SELECT REFERENCE CONDITION (7602). |
| **RESET HISTORY (7613)** | Use this function to delete all history values.<br><br>**Option:**<br>NO - YES<br>**Factory setting:**<br>NO |

## 10.1.3 Function group VOLUME FLOW



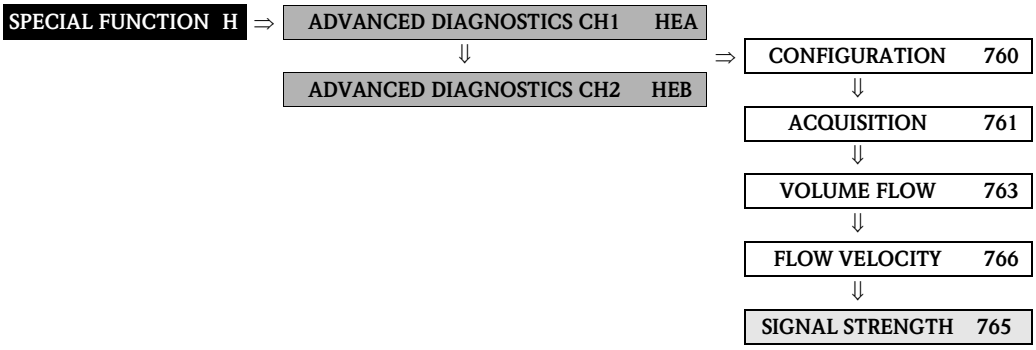

| Functional description<br>SPECIAL FUNCTION → ADVANCED DIAGNOSTICS (CH1,CH2,AVG) → VOLUME FLOW | |
|---|---|
| The volume flow can be monitored in this function group and compared with a reference value.<br><br>✎ Note!<br>The appropriate unit is taken from the function UNIT VOLUME FLOW (0402) (see Page 13). | |
| **REFERENCE VALUE (7630)** | The reference value for the volume flow appears on the display.<br>**User Interface:**<br>5-digit floating-point number, including unit and sign<br><br>✎ Note!<br>The reference value is taken from the REFERENCE CONDITION USER (7601) function. It can also be entered manually here. The reference value entered is overwritten if you select the START option in the REFERENCE CONDITION USER (7601) function. |
| **ACTUAL VALUE (7631)** | The measured volume flow appears on the display<br>**User Interface:**<br>5-digit floating-point number, including unit and sign |
| **MINIMUM VALUE (7632)** | The lowest volume flow value since the saved values were last reset appears on the display.<br><br>**User Interface:**<br>5-digit floating-point number, including unit and sign |
| **MAXIMUM VALUE (7633)** | The lowest volume flow value since the saved values were last reset appears on the display<br>**User Interface:**<br>5-digit floating-point number, including unit and sign |
| **HISTORY X (7634)** | Three of the last ten stored volume flow values appear on the display. Please use the ▫-keys to scroll through the list. 'X' indicates the position. E.g. HISTORY 0 shows the latest value at the first position in the display. To reset the list use the function RESET HISTORY (7613).<br>**User Interface:**<br>5-digit floating-point number, including unit and sign |
| **ACTUAL DEVIATION (7635)** | This function displays deviation between the measured volume flow and the reference values (USER), see Page 120, selected in the function SELECT REFERENCE CONDITION (7602).<br><br>**User Interface:**<br>5-digit floating-point number, including unit and sign |
| **WARNING LEVEL (7636)** | ✎ Note!<br>This function is not available unless ON was selected in the WARNING MODE (7603) function.<br><br>Use this function to specify a limit value for the volume flow. A notice message is generated if the limit value is exceeded.<br>**User input:**<br>0...99999%<br>**Factory setting:**<br>100% |

## 10.1.4 Function group FLOW VELOCITY



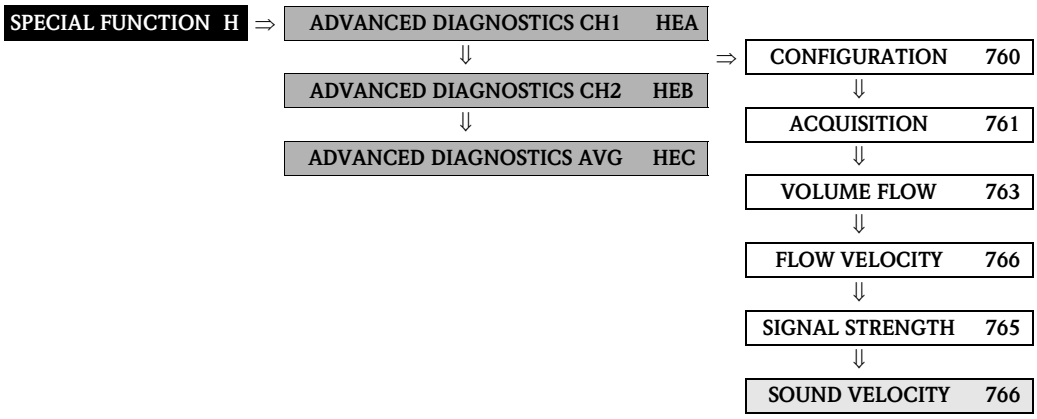

| Functional description<br>SPECIAL FUNCTION → ADVANCED DIAGNOSTICS (CH1,CH2,AVG) → FLOW VELOCITY | |
|---|---|
| The flow velocity can be monitored in this function group and compared with a reference value.<br><br>✎ Note!<br>The appropriate unit is taken from the function UNIT VELOCITY (0425) (see Page 15). | |
| **REFERENCE VALUE (7640)** | The reference value for the flow velocity appears on the display.<br>**User Interface:**<br>5-digit floating-point number, including unit and sign<br><br>✎ Note!<br>The reference value is taken from the REFERENCE CONDITION USER (7601) function. It can also be entered manually here. The reference value entered is overwritten if you select the START option in the REFERENCE CONDITION USER (7601) function. |
| **ACTUAL VALUE (7641)** | The measured flow velocity appears on the display<br>**User Interface:**<br>5-digit floating-point number, including unit and sign |
| **MINIMUM VALUE (7642)** | The lowest flow velocity value since the saved values were last reset appears on the display.<br>**User Interface:**<br>5-digit floating-point number, including unit and sign |
| **MAXIMUM VALUE (7643)** | The lowest flow velocity value since the saved values were last reset appears on the display<br>**User Interface:**<br>5-digit floating-point number, including unit and sign |
| **HISTORY X (7644)** | Three of the last ten stored flow velocity values appear on the display. Please use the ⊞/⊟-keys to scroll through the list. 'X' indicates the position. E.g. HISTORY 0 shows the latest value at the first position in the display. To reset the list use the function RESET HISTORY (7613).<br>**User Interface:**<br>5-digit floating-point number, including unit and sign |
| **ACTUAL DEVIATION (7645)** | This function displays deviation between the measured flow velocity and the reference values (USER), see Page 120, selected in the function SELECT REFERENCE CONDITION (7602).<br>**User Interface:**<br>5-digit floating-point number, including unit and sign |
| **WARNING LEVEL (7646)** | ✎ Note!<br>This function is not available unless ON was selected in the WARNING MODE (7603) function.<br><br>Use this function to specify a limit value for the volume flow. A notice message is generated if the limit value is exceeded..<br><br>**User input:**<br>0...99999%<br>**Factory setting:**<br>100% |

### 10.1.5 Function group SIGNAL STRENGTH




| Functional description<br>SPECIAL FUNCTION → ADVANCED DIAGNOSTICS (CH1,CH2,AVG) → SIGNAL STRENGTH | |
|---|---|
| The signal strength can be monitored in this function group and compared with a reference value. | |
| **REFERENCE VALUE (7650)** | The reference value for the signal strength appears on the display.<br>**User Interface:**<br>5-digit floating-point number<br><br>✎ Note!<br>The reference value is taken from the REFERENCE CONDITION USER (7601) function. It can also be entered manually here. The reference value entered is overwritten if you select the START option in the REFERENCE CONDITION USER (7601) function. |
| **ACTUAL VALUE (7651)** | The measured signal strength appears on the display<br>**User Interface:**<br>5-digit floating-point number |
| **MINIMUM VALUE (7652)** | The lowest signal strength value since the saved values were last reset appears on the display.<br>**User Interface:**<br>5-digit floating-point number |
| **MAXIMUM VALUE (7653)** | The lowest signal strength value since the saved values were last reset appears on the display<br>**User Interface:**<br>5-digit floating-point number |
| **HISTORY X (7654)** | Three of the last ten stored signal strength values appear on the display. Please use the ⊞/⊟-keys to scroll through the list. 'X' indicates the position. E.g. HISTORY 0 shows the latest value at the first position in the display. To reset the list use the function RESET HISTORY (7613).<br>**User Interface:**<br>5-digit floating-point number |
| **ACTUAL DEVIATION (7655)** | This function displays deviation between the measured signal strength and the reference values (USER), see Page 120, selected in the function SELECT REFERENCE CONDITION (7602).<br>**User Interface:**<br>5-digit floating-point number, including unit and sign |
| **WARNING LEVEL (7656)** | ✎ Note!<br>This function is not available unless ON was selected in the WARNING MODE (7603) function.<br><br>Use this function to specify a limit value for the volume flow. A notice message is generated if the limit value is exceeded.<br>**User input:**<br>0...99999%<br>**Factory setting:**<br>100% |

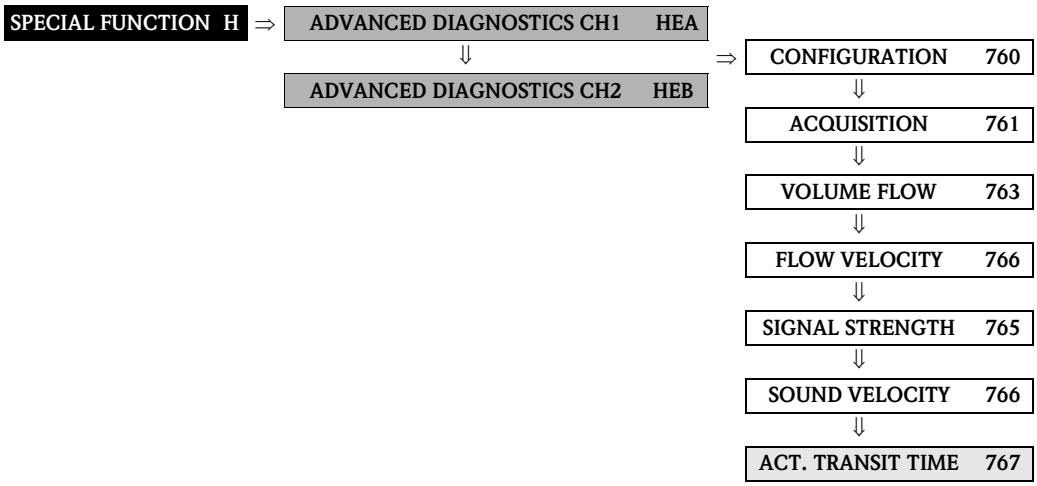
## 10.1.6 Function group SOUND VELOCITY




| Functional description<br>SPECIAL FUNCTION → ADVANCED DIAGNOSTICS (CH1,CH2,AVG) → SOUND VELOCITY | |
|---|---|
| The sound velocity can be monitored in this function group and compared with a reference value.<br><br>✎ Note!<br>The appropriate unit is taken from the function UNIT VELOCITY (0425) (see Page 15). | |
| **REFERENCE VALUE (7660)** | The reference value for the sound velocity appears on the display.<br><br>**User Interface:**<br>5-digit floating-point number, including unit<br><br>✎ Note!<br>The reference value is taken from the REFERENCE CONDITION USER (7601) function. It can also be entered manually here. The reference value entered is overwritten if you select the START option in the REFERENCE CONDITION USER (7601) function. |
| **ACTUAL VALUE (7661)** | The measured sound velocity appears on the display<br><br>**User Interface:**<br>5-digit floating-point number, including unit |
| **MINIMUM VALUE (7662)** | The lowest sound velocity value since the saved values were last reset appears on the display.<br><br>**User Interface:**<br>5-digit floating-point number, including unit |
| **MAXIMUM VALUE (7663)** | The lowest sound velocity value since the saved values were last reset appears on the display<br><br>**User Interface:**<br>5-digit floating-point number, including unit |
| **HISTORY X (7664)** | Three of the last ten stored sound velocity values appear on the display. Please use the ⊞/⊟-keys to scroll through the list. 'X' indicates the position. E.g. HISTORY 0 shows the latest value at the first position in the display. To reset the list use the function RESET HISTORY (7613).<br><br>**User Interface:**<br>5-digit floating-point number, including unit |
| **ACTUAL DEVIATION (7665)** | This function displays deviation between the measured sound velocity and the reference values (USER), see Page 120, selected in the function SELECT REFERENCE CONDITION (7602).<br><br>**User Interface:**<br>5-digit floating-point number, including unit |

| Functional description<br>SPECIAL FUNCTION → ADVANCED DIAGNOSTICS (CH1,CH2,AVG) → SOUND VELOCITY | |
|---|---|
| **WARNING LEVEL (7666)** | ✎ Note!<br>This function is not available unless ON was selected in the WARNING MODE (7603) function.<br><br>Use this function to specify a limit value for the volume flow. A notice message is generated if the limit value is exceeded.<br><br>**User input:**<br>0...99999%<br><br>**Factory setting:**<br>100% |

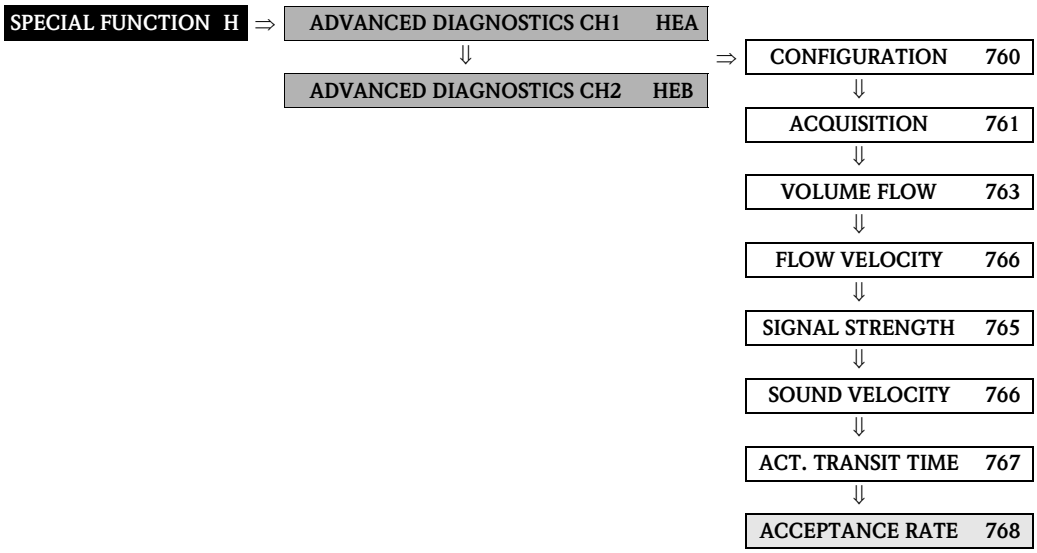
## 10.1.7 Function group ACTUAL TRANSIT TIME




| Functional description<br>SPECIAL FUNCTION → ADVANCED DIAGNOSTICS CH1 → ACTUAL TRANSIT TIME | |
|---|---|
| The actual transit time can be monitored in this function group and compared with a reference value. | |
| **REFERENCE VALUE (7670)** | The reference value for the actual transition time appears on the display.<br><br>**User Interface:**<br>5-digit floating-point number, including unit<br><br>✎ Note!<br>The reference value is taken from the REFERENCE CONDITION USER (7601) function. It can also be entered manually here. The reference value entered is overwritten if you select the START option in the REFERENCE CONDITION USER (7601) function. |
| **ACTUAL VALUE (7671)** | The measured actual transition time appears on the display<br><br>**User Interface:**<br>5-digit floating-point number, including unit |
| **MINIMUM VALUE (7672)** | The lowest actual transition time value since the saved values were last reset appears on the display.<br><br>**User Interface:**<br>5-digit floating-point number, including |
| **MAXIMUM VALUE (7673)** | The lowest actual transition time value since the saved values were last reset appears on the display<br><br>**User Interface:**<br>5-digit floating-point number, including |
| **HISTORY X (7674)** | Three of the last ten stored actual transition time values appear on the display. Please use the ⊡-keys to scroll through the list. 'X' indicates the position. E.g. HISTORY 0 shows the latest value at the first position in the display. To reset the list use the function RESET HISTORY (7613).<br><br>**User Interface:**<br>5-digit floating-point number, including unit |
| **ACTUAL DEVIATION (7675)** | This function displays deviation between the measured actual transition time and the reference values (USER), see Page 120, selected in the function SELECT REFERENCE CONDITION (7602).<br><br>**User Interface:**<br>5-digit floating-point number, including unit and sign |

| Functional description<br>SPECIAL FUNCTION → ADVANCED DIAGNOSTICS CH1 → ACTUAL TRANSIT TIME | |
|---|---|
| **WARNING LEVEL (7676)** | ✎ Note!<br>This function is not available unless ON was selected in the WARNING MODE (7603) function.<br><br>Use this function to specify a limit value for the volume flow. A notice message is generated if the limit value is exceeded..<br><br>**User input:**<br>0...99999%<br><br>**Factory setting:**<br>100% |

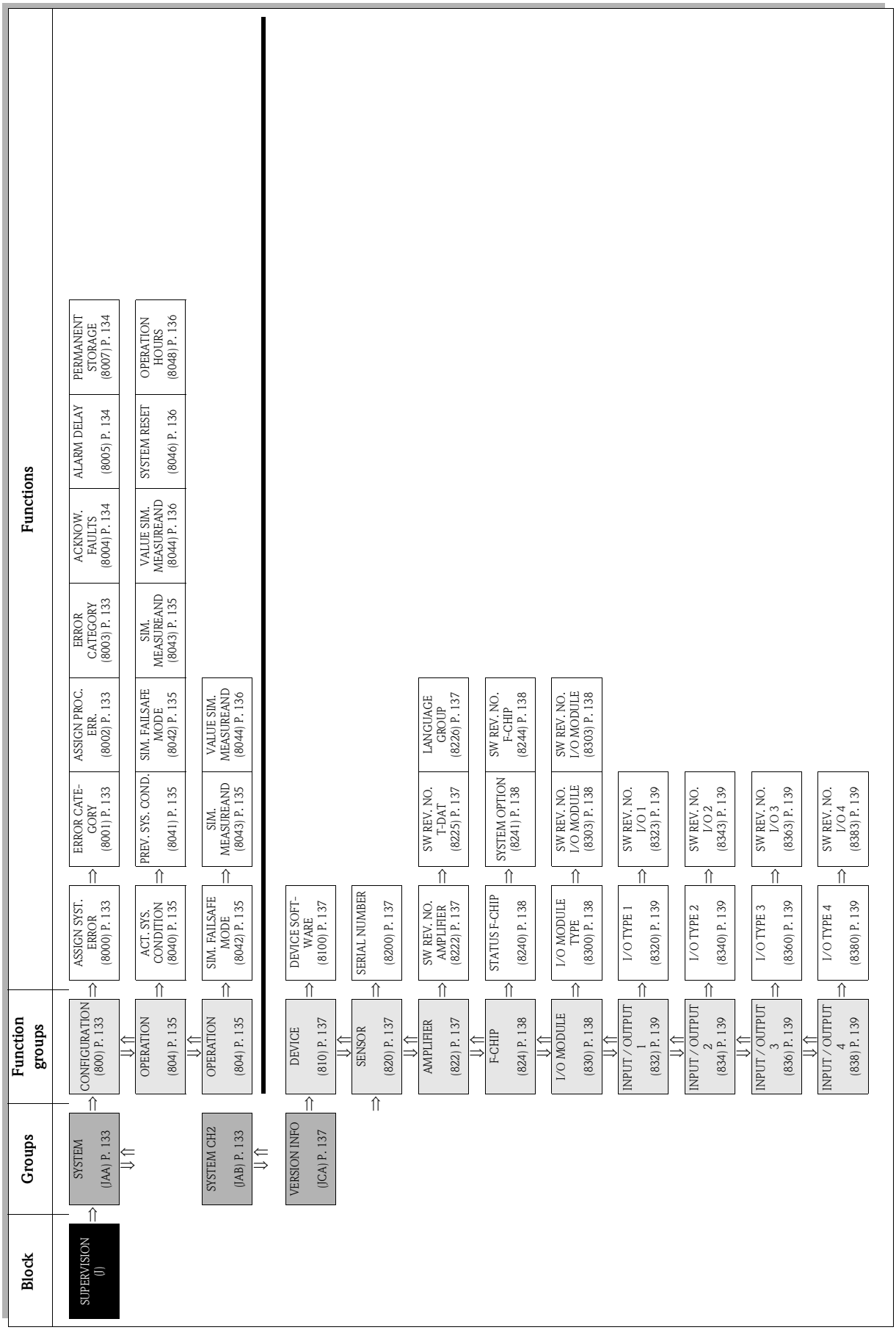
## 10.1.8 Function group ACCEPTANCE RATE




| **Functional description**<br>SPECIAL FUNCTION → ADVANCED DIAGNOSTICS CH1 → ACCEPTANCE RATE | |
|---|---|
| The acceptance rate can be monitored in this function group and compared with a reference value. The acceptance rate indicates the proportion of measurements which are used in flow calculation. | |
| **REFERENCE VALUE (7680)** | The reference value for the acceptance rate appears on the display.<br><br>**User Interface:**<br>5-digit floating-point number<br><br>✎ Note!<br>The reference value is taken from the REFERENCE CONDITION USER (7601) function. It can also be entered manually here. The reference value entered is overwritten if you select the START option in the REFERENCE CONDITION USER (7601) function. |
| **ACTUAL VALUE (7681)** | The measured acceptance rate appears on the display<br><br>**User Interface:**<br>5-digit floating-point number |
| **MINIMUM VALUE (7682)** | The lowest acceptance rate value since the saved values were last reset appears on the display.<br><br>**User Interface:**<br>5-digit floating-point number |
| **MAXIMUM VALUE (7683)** | The lowest acceptance rate value since the saved values were last reset appears on the display<br><br>**User Interface:**<br>5-digit floating-point number |
| **HISTORY X (7684)** | Three of the last ten stored acceptance rate values appear on the display. Please use the ⊟-keys to scroll through the list. 'X' indicates the position. HISTORY 0 shows the latest value at the first position in the display. To reset the list use the function RESET HISTORY (7613).<br><br>**User Interface:**<br>5-digit floating-point number |

| Functional description<br>SPECIAL FUNCTION → ADVANCED DIAGNOSTICS CH1 → ACCEPTANCE RATE | |
|---|---|
| **ACTUAL DEVIATION (7685)** | This function displays deviation between the measured acceptance rate and the reference values (USER), see Page 120, selected in the function SELECT REFERENCE CONDITION (7602).<br><br>**User Interface:**<br>5-digit floating-point number, including unit and sign |
| **WARNING LEVEL (7686)** | ✎ Note!<br>This function is not available unless ON was selected in the WARNING MODE (7603) function.<br><br>Use this function to specify a limit value for the volume flow. A notice message is generated if the limit value is exceeded..<br><br>**User input:**<br>0...99999%<br><br>**Factory setting:**<br>100% |

# 11 Block SUPERVISION



# 11.1 Group SYSTEM (SYSTEM CH2)

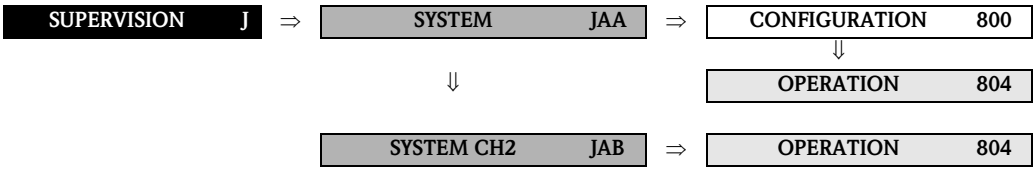
## 11.1.1 Function group CONFIGURATION

SUPERVISION J ⇒ SYSTEM JAA ⇒ CONFIGURATION 800

| Functional description<br>SUPERVISION → SYSTEM → CONFIGURATION | |
|---|---|
| **ASSIGN SYSTEM ERROR (8000)** | Use this function to view all system errors and the associated error categories (fault message or notice message). If you select a single system error you can change its error category.<br><br>**User interface:**<br>CANCEL<br>List of system errors with an icon preceding each entry.<br><br>✎ Note!<br>■ Press the E key twice to call up the function ERROR CATEGORY (8001).<br>■ Use the +/− key combination or select "CANCEL" in the system error list to exit the function.<br>■ A list of possible system errors is provided in the Operating Instructions Proline Prosonic Flow 93, BA070D/06/en/. |
| **ERROR CATEGORY (8001)** | Use this function to define whether a system error triggers a notice message or a fault message. If you select "FAULT MESSAGES", all outputs respond to an error in accordance with their defined error response patterns.<br><br>**Options:**<br>NOTICE MESSAGES (display only)<br>FAULT MESSAGES (outputs and display)<br><br>✎ Note!<br>Press the E key twice to call up the function ASSIGN SYSTEM ERROR (8000). |
| **ASSIGN PROCESS ERROR (8002)** | Use this function to view all process errors and the associated error categories (fault message or notice message). If you select a single process error you can change its error category.<br><br>**User interface:**<br>CANCEL<br>List of process errors with an icon preceding each entry.<br><br>✎ Note!<br>■ Press the E key twice to call up the function ERROR CATEGORY (8003).<br>■ Use the +/− key combination or select "CANCEL" in the process error list to exit the function.<br>■ A list of possible process errors is provided in the Operating Instructions Proline Prosonic Flow 93, BA070D/06/en/. |
| **ERROR CATEGORY (8003)** | Use this function to define whether a process error triggers a notice message or a fault message. If you select "FAULT MESSAGES", all outputs respond to an error in accordance with their defined error response patterns.<br><br>**Options:**<br>NOTICE MESSAGES (display only)<br>FAULT MESSAGES (outputs and display)<br><br>✎ Note!<br>Press the E key twice to call up the function ASSIGN PROCESS ERROR (8002). |

| Functional description<br>SUPERVISION → SYSTEM → CONFIGURATION | |
|---|---|
| **ACKNOWLEDGE FAULTS (8004)** | Use this function to define the measuring device's response to fault messages.<br><br>**Options:**<br>OFF<br>The measuring device resumes normal operation when the fault is rectified. The fault message disappears automatically.<br><br>ON<br>The measuring device resumes normal operation when the fault is rectified. The fault message has to be acknowledged by pressing the E key on the local display.<br><br>**Factory setting:**<br>OFF |
| **ALARM DELAY (8005)** | Use this function to specify a time period for suppressing the appearance of fault or notice messages .<br><br>Depending on the setting and the type of error, this suppression acts on:<br>■ Display<br>■ Relay output<br>■ Current output<br>■ Frequency output<br><br>**User input:**<br>0...100 s (in steps of one second)<br><br>**Factory setting:**<br>0 s<br><br>Caution!<br>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 wheter permanent storage of all parameters in the EEPROM is switched on or off.<br><br>**Options:**<br>OFF<br>ON<br><br>**Factory setting:**<br>ON |

## 11.1.2 Function group OPERATION

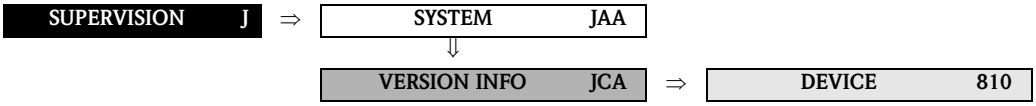



| Functional description<br>SUPERVISION → [CH2] SYSTEM → OPERATION | |
|---|---|
| **ACTUAL SYSTEM CONDITION (8040)** | Use this function to check the present system condition.<br><br>**User interface:**<br>"SYSTEM OK" or the fault / notice message with the highest priority. |
| **PREVIOUS SYSTEM CONDITIONS (8041)** | Use this function to view the fifteen most recent error and notice messages since measuring last started.<br><br>**User interface:**<br>The last 15 fault/notice messages appear on the display. |
| **SIMULATION FAILSAFE MODE (8042)** | ✎ Note!<br>This function is available in groups SYSTEM+SYSTEM CH2.<br><br>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.<br><br>**Options:**<br>ON<br>OFF<br>FAILURE (CH1...CH2)<br><br>**Factory setting:**<br>OFF<br><br>✎ Note!<br>The option FAILURE (CH1...CH2) enables the channel specific simulation of a failure. |
| **SIMULATION MEASURAND (8043)** | ✎ Note!<br>This function is available in groups SYSTEM+SYSTEM CH2.<br><br>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.<br><br>**Options:**<br>OFF<br>VOLUME FLOW (CH1...CH2)<br>SOUND VELOCITY (CH1...CH2)<br>SIGNAL STRENGTH (CH1...CH2)<br><br>**Factory setting:**<br>OFF<br><br>☝ Caution!<br>■ The measuring device cannot be used for measuring while this simulation is in progress.<br>■ The setting is not saved if the power supply fails. |

| Functional description<br>SUPERVISION → [CH2] SYSTEM → OPERATION | |
|---|---|
| **VALUE SIMULATION MEASURAND (8044)** | ✎ Note!<br>This function is available in groups SYSTEM+SYSTEM CH2.<br><br>✎ Note!<br>The function is not visible unless the function SIMULATION MEASURAND (8043) is active.<br><br>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.<br><br>**User input:**<br>5-digit floating-point number, [unit]<br><br>**Factory setting:**<br>0 [unit]<br><br>☝ Caution!<br>■ The setting is not saved if the power supply fails.<br>■ The appropriate unit is taken from the function group SYSTEM UNITS (ACA), (see Page 13). |
| **SYSTEM RESET (8046)** | Use this function to perform a reset of the measuring system.<br><br>**Options:**<br>NO<br>RESTART SYSTEM (restart without interrupting power supply)<br><br>**Factory setting:**<br>NO |
| **OPERATION HOURS (8048)** | The hours of operation of the device appear on the display.<br><br>**Display:**<br>Depends on the number of hours of operation elapsed:<br>Hours of operation < 10 hours → display format = 00:00:00 (hr:min:sec)<br>Hours of operation 10...10,000 hours → display format = 0000:00 (hr:min)<br>Hours of operation > 10,000 hours → display format = 000000 (hr) |

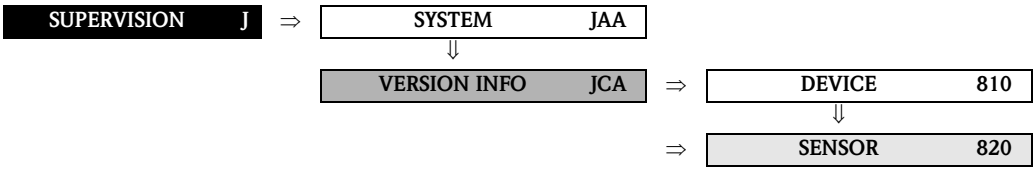
# 11.2 Group VERSION INFO

## 11.2.1 Function group DEVICE



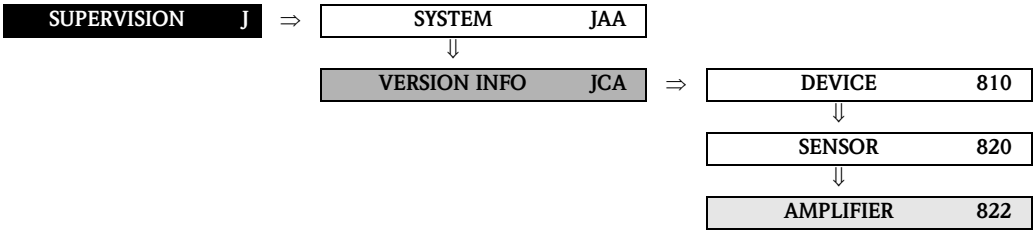

| Functional description<br>SUPERVISION → VERSION INFO → DEVICE | |
|---|---|
| **DEVICE SOFTWARE (8100)** | Displays the current device software version. |

## 11.2.2 Function group SENSOR



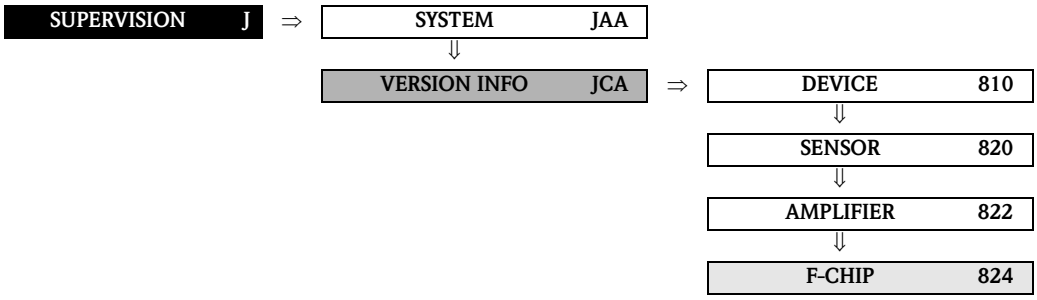

| Functional description<br>SUPERVISION → VERSION INFO → SENSOR | |
|---|---|
| **SERIAL NUMBER (8200)** | Use this function to view the serial number of the sensor. |

## 11.2.3 Function group AMPLIFIER



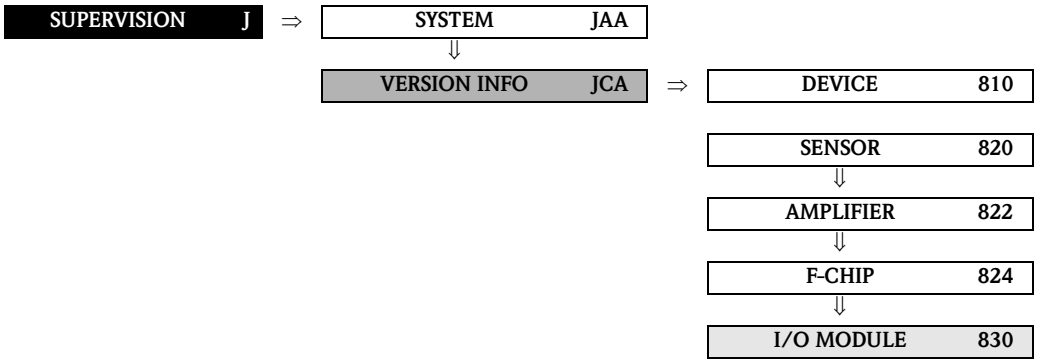

| Functional description<br>SUPERVISION → VERSION INFO → AMPLIFIER | |
|---|---|
| **SOFTWARE REVISION NUMBER AMPLIFIER (8222)** | Use this function to view the software revision number of the amplifier. |
| **SOFTWARE REVISION NUMBER T-DAT (8225)** | Use this function to view the software revision number of the software used to create the content of the T-DAT. |
| **LANGUAGE GROUP (8226)** | Use this function to view the language group.<br>The following language groups can be ordered: WEST EU / USA, EAST EU / SCAND., ASIA, CHINESE.<br><br>**Display:**<br>available language group<br><br>✎ Note!<br>■ The language options of the available language group are displayed in the LANGUAGE (2000) function.<br>■ 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. |

### 11.2.4 Function group F-CHIP



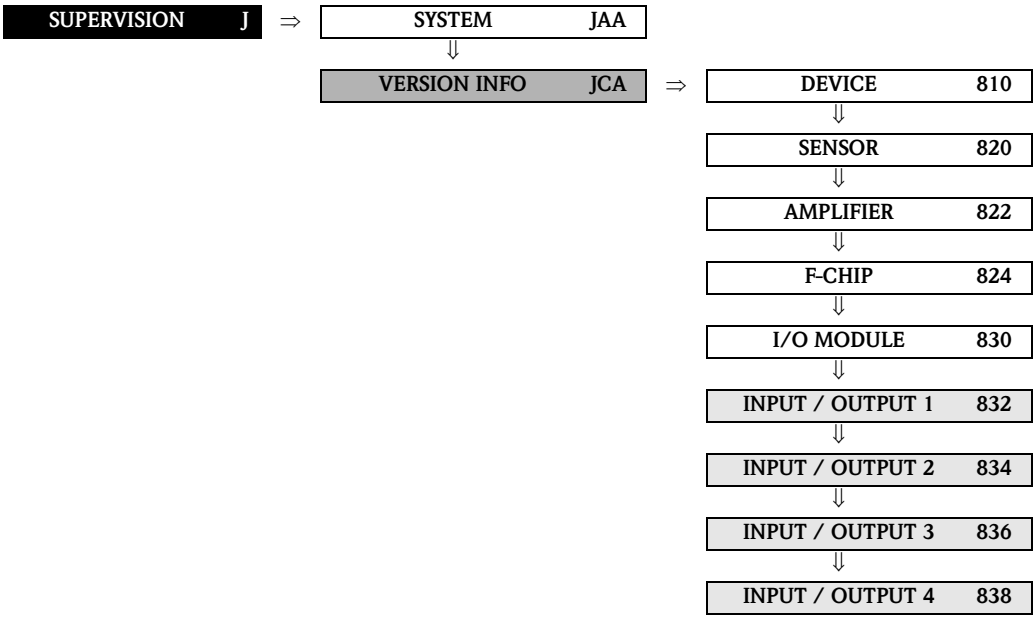

| Functional description<br>SUPERVISION → VERSION INFO → F-CHIP | |
|---|---|
| **STATUS F-CHIP (8240)** | Use this function to check whether an F-CHIP is installed. |
| **SYSTEM OPTION (8241)** | ✎ Note!<br>This function is not available unless the measuring device is equipped an F-CHIP.<br><br>Use this function to check which system option is installed. |
| **SOFTWARE REVISION NUMBER F-CHIP (8244)** | ✎ Note!<br>This function is not available unless the measuring device is equipped an F-CHIP.<br><br>Use this function to view the software revision number of the F-CHIP. |

### 11.2.5 Function group I/O MODULE




| Functional description<br>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. |

### 11.2.6 Function groups INPUT /OUTPUT 1...4




| Functional description<br>SUPERVISION → VERSION INFO → INPUT / OUTPUT 1...4 | |
|---|---|
| **TYPE INPUT/OUTPUT:**<br>**1 = (8320)**<br>**2 = (8340)**<br>**3 = (8360)**<br>**4 = (8380)** | Use this function to view the assembly of the I/O sub-module. |
| **SOFTWARE REVISION NUMBER I/O SUB-MODULE:**<br>**1 = (8323)**<br>**2 = (8343)**<br>**3 = (8363)**<br>**4 = (8383)** | Use this function to view the software revision number of the I/O sub-module. |

# 12 Factory settings

## 12.1 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 |

## 12.2 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 |

## 12.3 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 |

# 13 Index function matrix

## Blocks

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