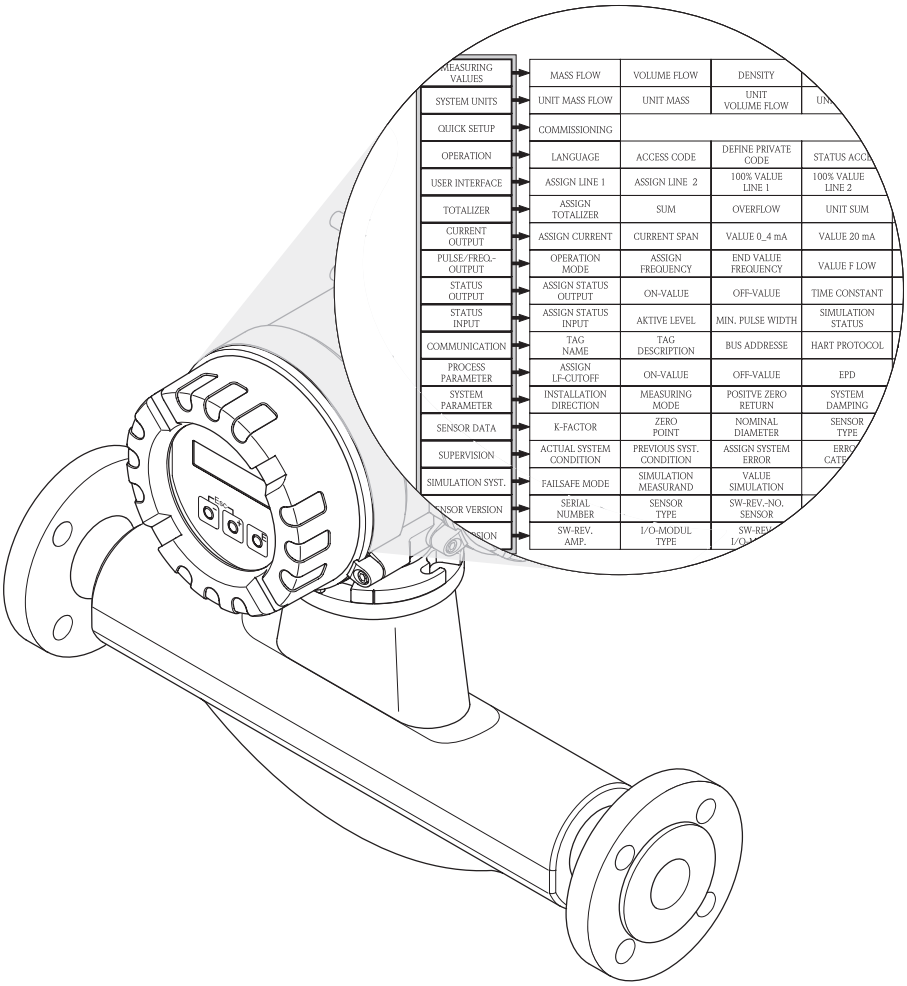
Level | Pressure | Flow | Temperature | Liquid Analysis | Registration | Systems Components | Services | Solutions

Description of Device Functions

Proline Promass 80

Coriolis Mass Flow Measuring System

HART® FIELD COMMUNICATION PROTOCOL



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Valid as of software version:
V 3.00.XX (device software)

Endress+Hauser
People for Process Automation

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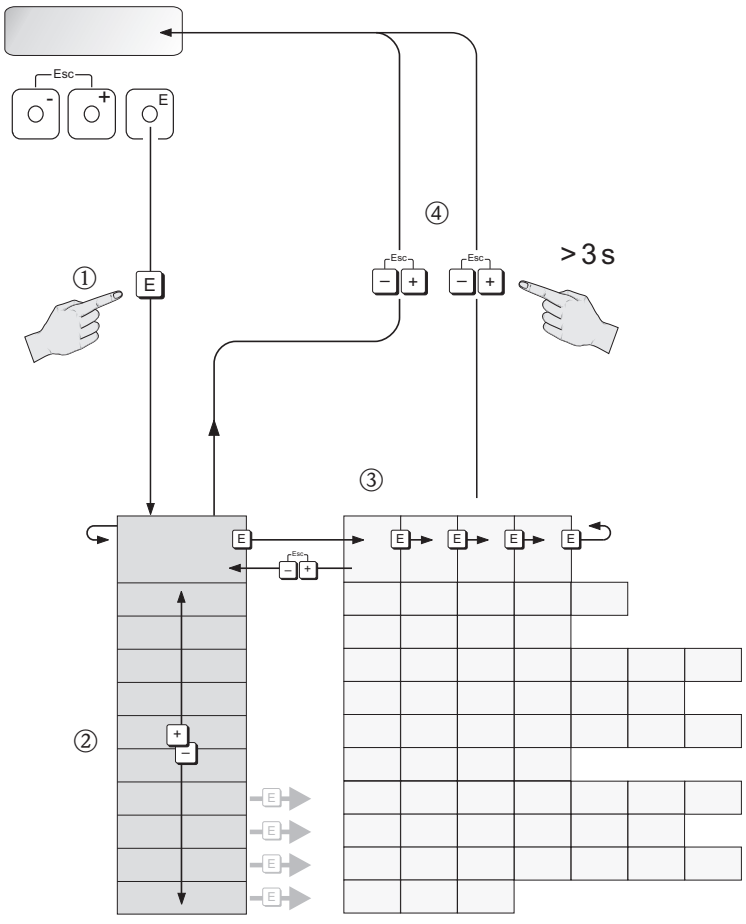
1 Function matrix Promass 80

1.1 The function matrix: layout and use

The function matrix is a two-level construct: the groups form one level, functions the other. The groups are the highest-level grouping of the control options for the measuring device. Each group comprises a number of functions.
You select a group in order to access the individual functions for controlling or configuring the measuring device.

You will find an overview of the groups in the table of contents on page 3 and in the graphical representation of the function matrix on Page 6.
You will also find an overview of the functions on Page 6, complete with the page references of the detailed function descriptions.
The descriptions of the individual functions start on Page 7.

Example of how to configure a function (in this case changing the language for the user interface):
① Entry into the function matrix (E key).
② Select the OPERATION group.
③ Select the LANGUAGE function, change the setting from ENGLISH to DEUTSCH with +/− and save E (all texts displayed on the user interface appear in German).
④ Exit the function matrix (ESC > 3 seconds).



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1.2 Graphical illustration of the function matrix

2 Group MEASURING VALUES

Function description MEASURING VALUES	
✎ Note! ■ The engineering unit of the measured variable shown here can be set in the "SYSTEM UNITS" group (see Page 8). ■ If the fluid in the pipe flows backwards, a negative sign prefixes the flow reading on the display.	
MASS FLOW	In this function, the currently measured mass flow appears on the display. **Display:** 5-digit floating-point number, including unit and sign (e.g. 462.87 kg/h; –731.63 lb/min; etc.)
VOLUME FLOW	In this function, the currently measured volumetric flow appears on the display. **Display:** 5-digit floating-point number, including unit and sign (e.g. 5.5445 dm^3/min; 1.4359 m^3/h; –731.63 gal/d; etc.)
CORRECTED VOLUME FLOW	The calculated corrected volume flow appears on the display. The calculated corrected volume flow is derived from the measured mass flow and the reference density of the fluid (density at reference temperature, measured or fixed entry). **Display:** 5-digit floating-point number, including unit and sign (e.g. 1.3549 Nm^3/h; 7.9846 scm/day; etc.)
DENSITY	In this function, the currently measured density or the specific gravity appears on the display. **Display:** 5-digit fixed-point number, including unit (e.g. 1.2345 kg/dm^3; 993.5 kg/dm^3; etc.)
REFERENCE DENSITY	The density of the fluid, at reference temperature, appears on the display. The reference density can be calculated with the measured density or also specified via the function FIXED REFERENCE DENSITY. **Display:** 5 digit floating-point number, incl. unit corr. to 0.100000...6.00000 kg/dm^3 (e.g. 1.2345 kg/dm^3; 993.5 kg/m^3; 1.0015 SG_20 °C; etc.)
TEMPERATURE	In this function, the currently measured temperature appears on the display. **Display:** 5-digit floating-point number, including unit and sign (e.g. –23.4 °C; 160.0 °F; 295.4 K; etc.)

3 Group SYSTEM UNITS

Function description SYSTEM UNITS	
You can select the unit for the measured variable in this function group.	
UNIT MASS FLOW	Use this function to select the unit for displaying the mass flow (mass/time). The unit you select here is also valid for: ■ Current output ■ Frequency output ■ Switching points (limit value for mass flow, flow direction) ■ Low flow cut off **Options:** Metric: gram → g/s; g/min; g/h; g/day kilogram → kg/s; kg/min; kg/h; kg/day Metric ton → t/s; t/min; t/h; t/day US: ounce → oz/s; oz/min; oz/h; oz/day pound → lb/s; lb/min; lb/h; lb/day ton → ton/s; ton/min; ton/h; ton/day **Factory setting:** Country dependent (kg/h or US lb/day)
UNIT MASS	Use this function to select the unit for displaying the mass. The unit you select here is also valid for: ■ Pulse value (e.g. kg/p) **Options:** Metric → g; kg; t US → oz; lb; ton **Factory setting:** Country dependent (kg or US lb) ✎ Note! The unit for the totalizer is independent of your choice here, it is selected separately in the TOTALIZER 1/2 function group (see Page 20).

Function description SYSTEM UNITS	
UNIT VOLUME FLOW	Use this function to select the unit for the volume flow. The unit you select here is also valid for: ■ Current output ■ Frequency output ■ Switching points (limit value for volume flow, flow direction) ■ Low flow cut off **Options:** Metric: Cubic centimeter → cm^3/s; cm^3/min; cm^3/h; cm^3/day Cubic decimeter → dm^3/s; dm^3/min; dm^3/h; dm^3/day Cubic meter → m^3/s; m^3/min; m^3/h; m^3/day Milliliter → ml/s; ml/min; ml/h; ml/day Liter → l/s; l/min; l/h; l/day Hectoliter → hl/s; hl/min; hl/h; hl/day Megaliter → Ml/s; Ml/min; Ml/h; Ml/day US: Cubic centimeter → cc/s; cc/min; cc/h; cc/day Acre foot → af/s; af/min; af/h; af/day Cubic foot → ft^3/s; ft^3/min; ft^3/h; ft^3/day Fluid ounce → oz f/s; oz f/min; oz f/h; oz f/day Gallon → gal/s; gal/min; gal/h; gal/day Kilo gallon → Kgal/s; Kgal/min; Kgal/h; Kgal/day Million gallon → Mgal/s; Mgal/min; Mgal/h; Mgal/day Barrel (normal fluids: 31.5 gal/bbl) → bbl/s; bbl/min; bbl/h; bbl/day Barrel (beer: 31.0 gal/bbl) →bbl/s; bbl/min; bbl/h; bbl/day Barrel (petrochemicals: 42.0 gal/bbl) → bbl/s; bbl/min; bbl/h; bbl/day Barrel (filling tanks: 55.0 gal/bbl) → bbl/s; bbl/min; bbl/h; bbl/day Imperial: Gallon → gal/s; gal/min; gal/h; gal/day Mega gallon → Mgal/s; Mgal/min; Mgal/h; Mgal/day Barrel (beer: 36.0 gal/bbl) → bbl/s; bbl/min; bbl/h; bbl/day Barrel (petrochemicals: 34.97 gal/bbl) → bbl/s; bbl/min; bbl/h; bbl/day **Factory setting:** Country dependent (m^3/h or US Mgal/day)
UNIT VOLUME	Use this function to select the unit for the volume. The unit you select here is also valid for: ■ Pulse value (e.g. m^3/p) **Options:** Metric → cm^3; dm^3; m^3; ml; l; hl; Ml US → cc; af; ft^3; oz f; gal; Kgal; Mgal; bbl (normal fluids); bbl (beer); bbl (petrochemicals); bbl (filling tanks) Imperial → gal; Mgal; bbl (beer); bbl (petrochemicals) **Factory setting:** Country dependent (m^3 or US Mgal) ✎ Note! The unit for the totalizer is independent of your choice here, it is selected separately in the TOTALIZER 1/2 function group (see Page 20).

Function description SYSTEM UNITS	
UNIT CORRECTED VOLUME FLOW	Use this function to select the unit for displaying the corrected volume flow (corrected volume/time). The unit you select here is also valid for: ■ Current outputs ■ Frequency outputs ■ Relay switch points (limit value for corrected volume flow, flow direction) ■ Low flow cut off **Options:** Metric: Nl/s Nl/min Nl/h Nl/day Nm^3/s Nm^3/min Nm^3/h Nm^3/day US: Sm^3/s; Sm^3/min; Sm^3/h; Sm^3/day Scf/s; Scf/min; Scf/h; Scf/day **Factory setting:** Nm^3/h
UNIT CORR. VOLUME	Use this function to select the unit for displaying the corrected volume. The unit you select here is also valid for: ■ Pulse value (e.g. Nm^3/p) **Options:** Metric: Nm^3 Nl US: Sm^3 Scf **Factory setting:** Nm^3 ✎ Note! The unit of the totalizers is independent of your choice here. The unit for each totalizer is selected separately for the totalizer in question.

Function description SYSTEM UNITS	
UNIT DENSITY	Use this function to select the unit for displaying the fluid density. The unit you select here is also valid for: ■ Current output ■ Frequency output ■ Switching points ■ Density adjustment value ■ Density response value for EPD **Options:** Metric → g/cm^3; g/cc; kg/dm^3; kg/l; kg/m^3; SD 4 °C, SD 15 °C, SD 20 °C; SG 4 °C, SG 15 °C, SG 20 °C US → lb/ft^3; lb/gal; lb/bbl (normal fluids); lb/bbl (beer); lb/bbl (petrochemicals); lb/bbl (filling tanks) Imperial → lb/gal; lb/bbl (beer); lb/bbl (petrochemicals) **Factory setting:** kg/l SD = Specific Density, SG = Specific Gravity The specific density is the ratio of fluid density to water (at water temperature = 4, 15, 20 °C)
UNIT REFERENCE DENSITY	Use this function to select the unit for displaying the reference density. The unit you select here is also valid for: ■ Current outputs ■ Frequency outputs ■ Relay switch points (limit value for density) ■ Fixed reference density (for calculation of corrected volume flow) **Options:** Metric: kg/Nm^3 kg/Nl US: g/Scc kg/Sm^3 lb/Scf **Factory setting:** kg/Nl
UNIT TEMPERATURE	Use this function to select the unit for displaying the temperature. The unit you select here is also valid for: ■ Current output ■ Frequency output ■ Switching points **Options:** °C (CELSIUS) K (KELVIN) °F (FAHRENHEIT) R (RANKINE) **Factory setting:** °C (CELSIUS)

Function description SYSTEM UNITS	
UNIT LENGTH	Use this function to select the unit for the unit of length for nominal diameter. The unit you select here is also valid for: ■ nominal diameter of the sensor (see the NOMINAL DIAMETER function on Page 57). **Options:** MILLIMETER INCH **Factory setting:** Country dependent (MILLIMETER or INCH)
UNIT PRESSURE	Use this function to select the unit for pressure. The unit you select here is also valid for: ■ Specified pressure (see function PRESSURE on Page 53) **Options:** BAR G PSI G BAR A PSI A **Factory setting:** BAR G

4 Group QUICK SETUP

Function description QUICK SETUP	
QUICK SETUP COMMISSIONING	Use this function to start the Setup menu for commissioning. **Options:** NO YES **Factory setting:** NO

Note!
- The display returns to the QUICK SETUP COMMISSIONING cell if you press the key combination during parameter interrogation.

① The “DELIVERY SETTING” option sets every selected unit to the factory setting.
The “ACTUAL SETTING” option accepts the units you previously configured.

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

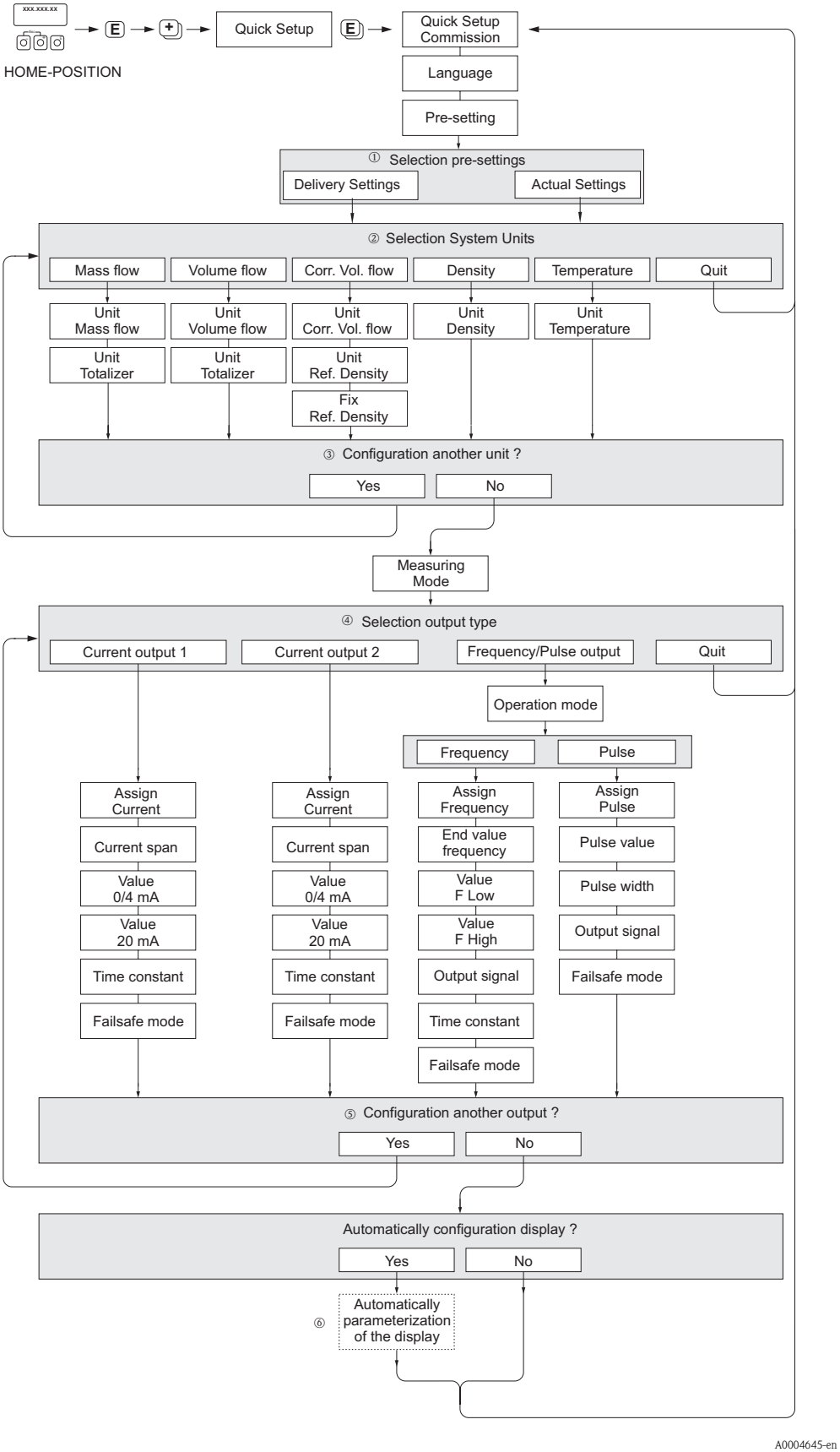
③ The “YES” option remains visible until all the units have been configured. “NO” is the only option displayed when no further units are available.

④ Only outputs not yet configured in the current Setup are offered for selection in each cycle.

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

⑥ The “automatic parameterization of the display” option contains the following basic settings/ factory settings:
YES: Line 1= Mass flow; Line 2 = Totalizer 1
NO: The existing (selected) settings remain.

Number reference (① – ⑥) see next page


HOME-POSITION
Quick Setup
Quick Setup Commission
Language
Pre-setting
① Selection pre-settings
Delivery Settings
Actual Settings
② Selection System Units
Mass flow
Volume flow
Corr. Vol. flow
Density
Temperature
Quit
Unit Mass flow
Unit Volume flow
Unit Corr. Vol. flow
Unit Density
Unit Temperature
Unit Totalizer
Unit Totalizer
Unit Ref. Density
Fix Ref. Density
③ Configuration another unit ?
Yes
No
Measuring Mode
④ Selection output type
Current output 1
Current output 2
Frequency/Pulse output
Quit
Operation mode
Frequency
Pulse
Assign Current
Current span
Value 0/4 mA
Value 20 mA
Time constant
Failsafe mode
Assign Current
Current span
Value 0/4 mA
Value 20 mA
Time constant
Failsafe mode
Assign Frequency
End value frequency
Value F Low
Value F High
Output signal
Time constant
Failsafe mode
Assign Pulse
Pulse value
Pulse width
Output signal
Failsafe mode
⑤ Configuration another output ?
Yes
No
Automatically configuration display ?
Yes
No
⑥ Automatically parameterization of the display

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5 Group OPERATION

Function description OPERATION	
LANGUAGE	Use this function to select the language for all texts, parameters and messages shown on the local display. ✎ Note! The displayed options depend on the available language group shown in the LANGUAGE GROUP function. **Options:** Language group WEST EU / USA: ENGLISH DEUTSCH FRANCAIS ESPANOL ITALIANO NEDERLANDS PORTUGUESE Language group EAST EU / SCAND: ENGLISH NORSK SVENSKA SUOMI POLISH RUSSIAN CZECH Language group ASIA: ENGLISH BAHASA INDONESIA JAPANESE (syllabary) Language group CHINA: CHINESE ENGLISH **Factory setting:** Country-dependent (Page 63) ✎ Note! ■ If you press the ⏎ keys at startup, the language defaults to “ENGLISH”. ■ You can change the language group via the configuration software FieldCare. Please do not hesitate to contact your E+H sales office if you have any questions.

Function description OPERATION	
ACCESS CODE	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 ⊡ key in any function the measuring system automatically goes to this function and the prompt to enter the code appears on the display (programming disabled). You can enable programming by entering the personal code (**Factory setting = 80**, see the DEFINE PRIVATE CODE function) **User input:** max. 4-digit number: 0...9999 ✎ Note! ■ The programming levels are disabled if you do not press a key within 60 seconds following return to the HOME position. ■ You can also disable programming in this function by entering any number (other than the defined private code). ■ The Endress+Hauser service organization can be of assistance if you lose your personal code.
DEFINE PRIVATE CODE	Use this function to define a personal code number for enabling programming. **User input:** max. 4-digit number: 0...9999 **Factory setting:** 80 ✎ Note! ■ If you define the personal code number = 0, the programming is always enabled. ■ Programming has to be enabled before this code can be changed. When programming is disabled the function can't be changed, this precaution prevents others from changing your personal code without your knowledge and consent.
STATUS ACCESS	Use this function to check the access status for the function matrix. **Display:** ACCESS CUSTOMER (Parameterization enabled) LOCKED (Parameterization disabled)
ACCESS CODE COUNTER	Displays how often the customer code, service code or the digit "0" (code-free) has been entered to gain access to the function matrix. **Display:** max. 7-digit number: 0...9999999 **Factory setting:** 0

6 Group USER INTERFACE

Function description USER INTERFACE	
ASSIGN LINE 1	Use this function to define the display value assigned to the main line (the upper line of the local display) for display during normal measuring operation. **Options:** OFF MASS FLOW MASS FLOW IN % VOLUME FLOW VOLUME FLOW IN % DENSITY TEMPERATURE TOTALIZER 1 TOTALIZER 2 CORRECTED VOLUME FLOW CORRECTED VOLUME FLOW IN % REFERENCE DENSITY **Factory setting:** MASS FLOW
ASSIGN LINE 2	Use this function to define the display value assigned to the additional line (the bottom line of the local display) for display during normal measuring operation. **Options:** OFF MASS FLOW MASS FLOW IN % VOLUME FLOW VOLUME FLOW IN % DENSITY TEMPERATURE TOTALIZER 1 TAG NAME OPERATION/SYSTEM CONDITION DISPLAY FLOW DIRECTION MASS FLOW BARGRAPH IN % VOLUME FLOW BARGRAPH IN % TOTALIZER 2 CORRECTED VOLUME FLOW CORRECTED VOLUME FLOW IN % CORRECTED VOLUME FLOW BARGRAPH IN % REFERENCE DENSITY **Factory setting:** TOTALIZER

Function description USER INTERFACE	
100% VALUE (Line 1)	✎ Note! This function is not available unless one of the following was selected in the ASSIGN LINE 1 function: ■ MASS FLOW IN % ■ VOLUME FLOW IN % ■ CORRECTED VOLUME FLOW IN % Use this function to define the flow value to be shown on the display as the 100% value of the variable assigned to line 1. **User input:** 5-digit floating-point number **Factory setting:** ■ 10 kg/s (if MASS FLOW IN % or MASS FLOW BARGRAPH IN % is selected) ■ 10 l/s (if VOLUME FLOW IN % or VOLUME FLOW BARGRAPH IN % is selected)
100% VALUE (Line 2)	✎ Note! This function is not available unless one of the following was selected in the ASSIGN LINE 2 function: ■ MASS FLOW IN % ■ VOLUME FLOW IN % ■ MASS FLOW BARGRAPH IN % ■ VOLUME FLOW BARGRAPH IN % ■ CORRECTED VOLUME FLOW BARGRAPH IN % Use this function to define the flow value to be shown on the display as the 100% value of the variable assigned to line 2. **User input:** 5-digit floating-point number **Factory setting:** ■ 10 kg/s (if MASS FLOW IN % or MASS FLOW BARGRAPH IN % is selected) ■ 10 l/s (if VOLUME FLOW IN % or VOLUME FLOW BARGRAPH IN % is selected)
FORMAT	Use this function to define the maximum number of places after the decimal point displayed for the reading in the main line. **Options:** XXXXX. - XXXX.X - XXX.XX - XX.XXX -X.XXXX **Factory setting:** X.XXXX ✎ Note! ■ Note that this setting only affects the reading as it appears on the display, it has no influence on the accuracy of the system's calculations. ■ The places after the decimal point as computed by the measuring device cannot always be displayed, depending on this setting and the engineering unit. In these instances an arrow appears on the display between the measured value and the engineering unit (e.g. 1.2 → kg/h), indicating that the measuring system is computing with more decimal places than can be shown on the display.

Function description USER INTERFACE	
DISPLAY DAMPING	Use this function to enter a time constant defining how the display reacts to severely fluctuating flow variables, either very quickly (enter a low time constant) or with damping (enter a high time constant). **User input:** 0...100 s **Factory setting:** 1 s ✎ Note! Setting the time constant to zero seconds switches off damping.
CONTRAST LCD	Use this function to optimize display contrast to suit local operating conditions. **User input:** 10...100% **Factory setting:** 50%
BACKLIGHT	Use this function to optimize the backlight to suit local operating conditions. **User input:** 0...100% ✎ Note! Entering the value “0” means that the backlight is “switched off”. The display then no longer emits any light, i.e. the display texts can no longer be read in the dark. **Factory setting:** 50%
TEST DISPLAY	Use this function to test the operability of the local display and its pixels. **Options:** OFF ON **Factory setting:** OFF Test sequence: 1. Start the test by selecting ON. 2. All pixels of the main line and additional line are darkened for minimum 0.75 second. 3. Main line and additional line show an “8” in each field for minimum 0.75 second. 4. Main line and additional line show a “0” in each field for minimum 0.75 second. 5. Main line and additional line show nothing (blank display) for minimum 0.75 second. 6. When the test completes the local display returns to its initial state and the setting changes to OFF.

7 Group TOTALIZER 1/2

Function description TOTALIZER 1/2	
ASSIGN TOTALIZER	Use this function to assign a measured variable to the totalizer. **Options:** MASS FLOW VOLUME FLOW CORRECTED VOLUME FLOW **Factory setting:** MASS FLOW ✎ Note! The totalizer is reset to "0" as soon as the selection is changed.
SUM	Use this function to view the total for the totalizer measured variable aggregated since measuring commenced. The value can be positive or negative. **Display:** max. 7-digit floating-point number, including sign and unit (e.g. 15467.04 kg) ✎ Note! The totalizer response to faults is defined in the FAILSAFE MODE function (see Page 22).
OVERFLOW	Use this function to view the overflow for the totalizer aggregated since measuring commenced. Total flow quantity is represented by a floating decimal 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. Example: Reading for 2 overflows: 2 E7 kg (= 20,000,000 kg) The value returned by the SUM function = 196,845.7 kg Effective total quantity = 20,196,845.7 kg **Display:** Integer with exponent, including sign and unit, e.g. 2 E7 kg

Function description TOTALIZER 1/2	
UNIT TOTALIZER	Use this function to define the unit for the totalizer measured variable, as selected beforehand. **Options (for the MASS FLOW assignment):** Metric → g; kg; t US → oz; lb; ton **Factory setting:** Depends on nominal diameter and country, [value] / [g ...kg or US oz...US ton] corresponding to the totalizer unit factory setting (see Page 63 ff.) **Options (for the VOLUME FLOW assignment):** Metric → cm^3; dm^3; m^3; ml; l; hl; Ml US → cc; af; ft^3; oz f; gal; Kgal; Mgal; bbl (normal fluids); bbl (beer); bbl (petrochemicals); bbl (filling tanks) Imperial → gal; Mgal; bbl (beer); bbl (petrochemicals) **Options (for the CORRECTED VOLUME FLOW assignment):** Metric → Nl; Nm^3 US → Sm^3; Scf **Factory setting:** Depends on nominal diameter and country, [value] / [dm^3 ...m^3 or US gal...US Mgal] corresponding to the totalizer unit factory setting (see Page 63 ff.)
TOTALIZER MODE	Use this function to define how the flow components are to be totalized. **Options:** BALANCE Positive and negative flow components. The positive and negative flow components are balanced. In other words, net flow in the flow direction is registered. FORWARD Only positive flow components are totalized. REVERSE Only negative flow components are totalized. **Factory setting:** Totalizer 1 = BALANCE Totalizer 2 = FORWARD
RESET TOTALIZERS	Use this function to reset the sum and the overflow of the totalizer to “zero” (= RESET). **Options:** NO YES **Factory setting:** NO ✎ Note! If the device has a status input and is appropriately configured, a reset for the totalizer can also be triggered by a pulse.

8 Group HANDLING TOTALIZER

Function description HANDLING TOTALIZER	
RESET ALL TOTALIZERS	Use this function to reset the totals (including all overflows) of the totalizers (1...2) to "zero" (= RESET). **Options:** NO YES **Factory setting:** NO ✎ Note! If the device has a status input and if it is appropriately configured, a reset for the totalizer (1...2) can also be triggered by a pulse (see the ASS. STATUS INP. function).
FAILSAFE MODE	Use this function to define the response of all totalizers (1...2) to a fault. **Options:** STOP The totalizer is paused until the fault is rectified. ACTUAL VALUE The totalizer continues to count based on the current flow measured value. The fault is ignored. HOLD VALUE The totalizer continues to count the flow based on the last valid flow value (before the fault occurred). **Factory setting:** STOP

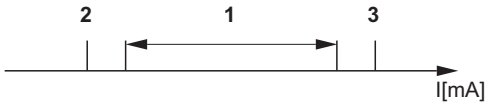
9 Group CURRENT OUTPUT 1/2

Function description CURRENT OUTPUT 1/2	
ASSIGN CURRENT OUTPUT	Use this function to assign a measured variable to the current output. **Options:** OFF MASS FLOW VOLUME FLOW CORRECTED VOLUME FLOW DENSITY REFERENCE DENSITY TEMPERATURE **Factory setting:** MASS FLOW ✎ Note! If you select OFF, the only function shown in this group is these (ASSIGN CURRENT OUTPUT) function.
CURRENT SPAN	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 output 1) 4–20 mA NAMUR 4–20 mA HART NAMUR (only current output 1) 4–20 mA US 4–20 mA HART US (only current output 1) 0–20 mA (25 mA) 4–20 mA (25 mA) 4–20 mA (25 mA) HART (only current output 1) **Factory setting:** 4–20 mA HART NAMUR (for current output 1) 4–20 mA NAMUR (for all additional current outputs) ✎ Note! ■ The option HART is only supported by the current output designated as current output 1 in the device software, (terminals 26 and 27). ■ When switching the hardware from an active (factory setting) to a passive output signal, select a current span of 4–20 mA (see Operating Instructions for Proline Promass 80, BA 057D/06/en). (continued on next page)

Function description CURRENT OUTPUT 1/2

CURRENT SPAN
(contd)

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 HART	4 - 20.5 mA	2	22
4-20 mA NAMUR	3.8 - 20.5 mA	3.5	22.6
4-20 mA HART NAMUR	3.8 - 20.5 mA	3.5	22.6
4-20 mA US	3.9 - 20.8 mA	3.75	22.6
4-20 mA HART 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
4-20 mA (25 mA) HART	4 - 24 mA	2	25

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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 and VALUE 20 mA a notice message is generated (#351...352, current span).
- In case of a fault the behavior of the current output is according to the selected option in the function FAILSAFE MODE. Change the error category in the function ASSIGN SYSTEM ERROR to generate a fault message instead of a notice message.

VALUE 0_4 mA

✎ Note!
This function is not available unless the DENSITY, REFERENCE DENSITY or TEMPERATURE option was selected in the ASSIGN CURRENT OUTPUT function.

Use this function to assign a value to the 0/4 mA current, (see “Setting the span by means of the 0_4 mA and 20 mA value“ on Page 25).

User input:
5-digit floating-point number (with sign for the TEMPERATURE measured variable)

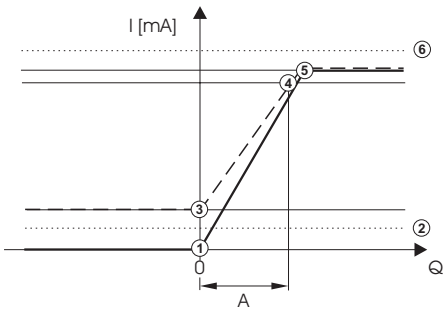
Factory setting:
0.5 [kg/l] or –50 [°C]

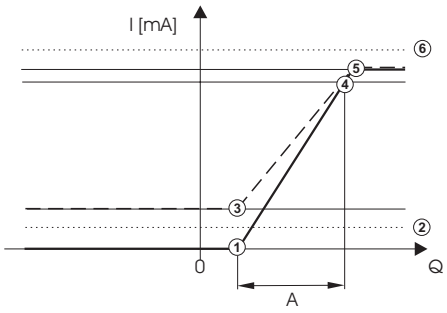
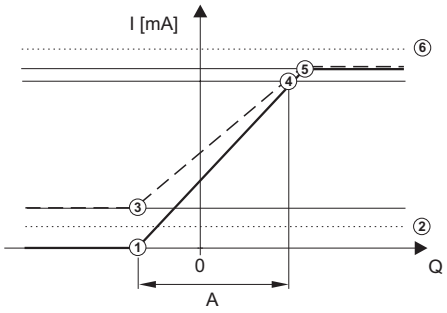
VALUE 20 mA

Use this function to assign a value to the 20 mA current, (see “Setting the span by means of the 0_4 mA and 20 mA value” on Page 25).

User input:
5-digit floating-point number (with sign for the MASS FLOW, VOLUME FLOW, CORRECTED VOLUME FLOW and TEMPERATURE measured variables)

Factory setting:
Depends on nominal diameter [kg/h] or 2 [kg/l] or 200 [°C]

Function description CURRENT OUTPUT 1/2	
Setting the span by means of the 0_4 mA and 20 mA value	The span for the measured variable selected in the ASSIGN CURRENT OUTPUT function is specified via the VALUE 0_4 mA and VALUE 20 mA functions. The span is defined differently, depending on the measured variable selected: **MASS FLOW, VOLUME FLOW and CORRECTED VOLUME FLOW** ■ The VALUE 0_4 mA function is not available; the value for the zero flow (0 kg/h or 0m^3/h) is assigned to the 0/4 mA current. ■ The flow value for the 20 mA current is defined in the VALUE 20 mA function, (input range –99999 to +99999). The appropriate unit is taken from the UNIT MASS FLOW, UNIT VOLUME FLOW and UNIT CORRECTED VOLUME FLOW function. Example (for STANDARD measuring mode):  A0004733 ① = *Initial value (0...20 mA)* ②= *Lower signal on alarm level: depends on the setting in the function CURRENT SPAN* ③= *Initial value (4...20 mA): depends on the setting in the function CURRENT SPAN* ④ = *Full scale value (0/4...20 mA): depends on the setting in the function CURRENT SPAN* ⑤ = *Maximum current value: depends on the setting in the function CURRENT SPAN* ⑥ = *Failsafe mode (upper signal on alarm level): depends on the setting in the functions CURRENT SPAN and FAILSAFE MODE* *A = Measuring range* (continued on next page)

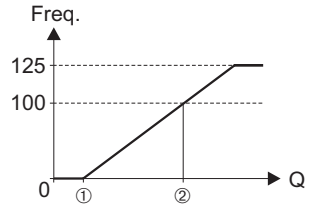
Function description CURRENT OUTPUT 1/2	
Setting the span by means of the 0_4 mA and 20 mA value (contd)	**DENSITY and REFERENCE DENSITY** ■ The density value for the 0/4 mA current is defined in the VALUE 0_4 mA function, (input range 0.0000 to +99999). The appropriate unit is taken from the UNIT DENSITY function. ■ The density value for the 20 mA current is defined in the VALUE 20 mA function, (input range 0.0000 to +99999). The appropriate unit is taken from the UNIT DENSITY and UNIT REF. DENSITY function. Example (for STANDARD measuring mode):  A0004734 ① = *Initial value (0...20 mA)* ②= *Lower signal on alarm level: depends on the setting in the function CURRENT SPAN* ③= *Initial value (4...20 mA): depends on the setting in the function CURRENT SPAN* ④ = *Full scale value (0/4...20 mA): depends on the setting in the function CURRENT SPAN* ⑤ = *Maximum current value: depends on the setting in the function CURRENT SPAN* ⑥ = *Failsafe mode (upper signal on alarm level): depends on the setting in the functions CURRENT SPAN and FAILSAFE MODE* *A = Measuring range* **TEMPERATURE** ■ The temperature value for the 0/4 mA current is defined in the VALUE 0_4 mA function, (input range –99999 to +99999). The appropriate unit is taken from the UNIT TEMPERATURE function. ■ The temperature value for the 20 mA current is defined in the VALUE 20 mA function, (input range –99999 to +99999). The appropriate unit is taken from the UNIT TEMPERATURE function. ✎ Note! Values with different signs **cannot** be entered for the 0_4 mA and 20 mA values if SYMMETRY is the option selected in the MEASURING MODE function, (see Page 54). The message “INPUT RANGE EXCEEDED” appears on the display. Example (for STANDARD measuring mode):  A0001223 ① = *Initial value (0...20 mA)* ②= *Lower signal on alarm level: depends on the setting in the function CURRENT SPAN* ③= *Initial value (4...20 mA): depends on the setting in the function CURRENT SPAN* ④ = *Full scale value (0/4...20 mA): depends on the setting in the function CURRENT SPAN* ⑤ = *Maximum current value: depends on the setting in the function CURRENT SPAN* ⑥ = *Failsafe mode (upper signal on alarm level): depends on the setting in the functions CURRENT SPAN and FAILSAFE MODE* *A = Measuring range*

Function description CURRENT OUTPUT 1/2	
TIME CONSTANT	Use this function to enter a time constant defining how the current output signal reacts to severely fluctuating measured variables, either very quickly (enter a low time constant) or with damping (enter a high time constant). **User input:** Fixed-point number 0.01...100.00 s **Factory setting:** 1.00 s
FAILSAFE MODE	For safety reasons it is advisable to ensure that the current output assumes a predefined state in the event of a fault. The setting you select here affects only the current output. It has no effect on other outputs and the display (e.g. totalizers). **Options:** MIN. CURRENT VALUE The current output adopts the value of the lower signal on alarm level (as defined in the function CURRENT SPAN. MAX. CURRENT VALUE The current output adopts the value of the upper signal on alarm level (as defined in the function CURRENT SPAN. HOLD VALUE (**not recommended**) Measuring value output is based on the last measuring value saved before the error occurred . ACTUAL VALUE Measured value output is based on the current flow measurement. The fault is ignored. **Factory setting:** MIN. CURRENT VALUE
ACTUAL CURRENT	Use this function to view the computed value of the output current. **Display:** 0.00...25.00 mA
SIMULATION CURRENT	Use this function to activate simulation of the current output. **Options:** OFF ON **Factory setting:** OFF Note! ■ The "SIMULATION CURRENT OUTPUT" message indicates that simulation is active. ■ The measuring device continues to measure while simulation is in progress, i.e. the current measured values are output correctly via the other outputs. Caution! The setting is not saved if the power supply fails.

Function description CURRENT OUTPUT 1/2	
VALUE SIMULATION CURRENT	✎ Note! This function is not available unless the SIMULATION CURRENT function is active (= ON). Use this function to define a selectable value (e.g. 12 mA) to be output at the current output. This value is used to test downstream devices and the measuring device itself. **User input:** floating-point number: 0.00...25.00 mA **Factory setting:** 0.00 mA ☝ Caution! The setting is not saved if the power supply fails.

10 Group PULSE/FREQUENCY OUTPUT

Function description PULSE/FREQUENCY OUTPUT	
OPERATION MODE	Use this function to configure the output as a pulse or frequency output. The functions available in this function group vary, depending on which option you select here. **Options:** PULSE FREQUENCY **Factory setting:** PULSE
ASSIGN FREQUENCY	✎ Note! This function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function. Use this function to assign a measured variable to the frequency output. **Options:** OFF MASS FLOW VOLUME FLOW CORRECTED VOLUME FLOW DENSITY REFERENCE DENSITY TEMPERATURE **Factory setting:** MASS FLOW ✎ Note! If you select OFF, the only functions shown in this function group are ASSIGN FREQUENCY and OPERATION MODE.
END VALUE FREQ.	✎ Note! This function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function. Use this function to define a full scale frequency for the frequency output. You define the associated measured value of the measuring range in the VALUE F HIGH function described on Page 30. **User input:** 4-digit fixed-point number: 2...1000 Hz **Factory setting:** 1000 Hz Example: ■ VALUE F HIGH = 1000 kg/h, full scale frequency = 1000 Hz: i.e. a frequency of 1000 Hz is output at a flow of 1000 kg/h. ■ VALUE F HIGH = 3600 kg/h, full scale frequency = 1000 Hz: i.e. a frequency of 1000 Hz is output at a flow of 3600 kg/h. ✎ Note! In the FREQUENCY operating mode the output signal is symmetrical (on/off ratio = 1:1). At low frequencies the pulse duration is limited to a maximum of 2 seconds, i.e. the on/off ratio is no longer symmetrical.

Function description PULSE/FREQUENCY OUTPUT	
VALUE F LOW	✎ Note! This function is not available unless the DENSITY, REFERENCE DENSITY or TEMPERATURE option was selected in the ASSIGN FREQUENCY function. Use this function to assign a value to the start value frequency (0 Hz), (see "Setting the span by means of the f-min. and f-max. value" on Page 30). **User input:** 5-digit floating-point number (with sign for the TEMPERATURE measured variable) **Factory setting:** 0.5 [kg/l] or –50 [°C]
VALUE F HIGH	Use this function to assign a value to the END VALUE FREQ., (see "Setting the span by means of the f-min. and f-max. value" on Page 30). **User input:** 5-digit floating-point number (with sign for the MASS FLOW, VOLUME FLOW, CORRECTED VOLUME FLOW and TEMPERATURE measured variables) **Factory setting:** Depends on nominal diameter [kg/h] or 2 [kg/l] or 200 [°C]
Setting the span by means of the f-min. and f-max. value	The span for the measured variable selected in the ASSIGN FREQUENCY function is specified via the VALUE F LOW and VALUE F HIGH functions. The span is defined differently, depending on the measured variable selected: **MASS FLOW, VOLUME FLOW and CORRECTED VOLUME FLOW** ■ The VALUE F LOW function is not available; the value for the zero flow (0 kg/h or 0m^3/h) is assigned to the start value frequency. ■ The flow value for the end value frequency is defined in the VALUE F HIGH function, (input range –99999 to +99999). The appropriate unit is taken from the UNIT MASS FLOW, UNIT VOLUME FLOW and UNIT CORRECTED VOLUME FLOW function. Example (for standard measuring mode):  A0001279 ①= Flow value at which a frequency of 0 Hz should be output (preset, cannot be edited). ②= Flow value at which the frequency, defined in the END VALUE FREQ. function, should be output (entry in VALUE F HIGH function). (continued on next page)

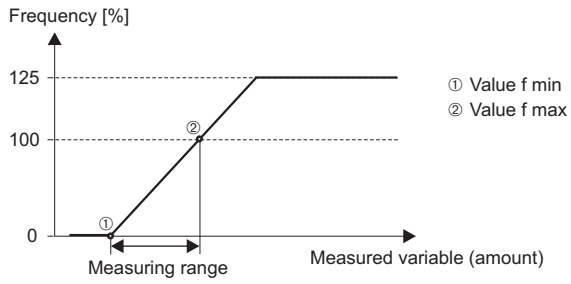
Function description PULSE/FREQUENCY OUTPUT

Setting the span means of the f-min. and f-max. value (contd)

DENSITY and REFERENCE DENSITY

- The density value for the start value frequency is defined in the VALUE F LOW function, (input range 0.0000 to +99999). The appropriate unit is taken from the UNIT DENSITY and UNIT REF. DENSITY function.
- The density value for the end value frequency is defined in the VALUE F HIGH function, (input range 0.0000 to +99999). The appropriate unit is taken from the UNIT DENSITY and UNIT REF. DENSITY function.

Example (for standard measuring mode):



A0004735-en

① = Density value and reference density at which a frequency of 0 Hz should be output (entry in VALUE F LOW function).

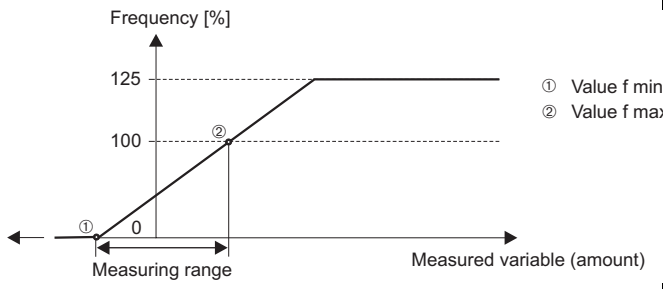
② = Density value and reference density at which the frequency, defined in the END VALUE FREQ. function, should be output (entry in VALUE F HIGH function).

TEMPERATURE

- The temperature value for the 0/4 mA current is defined in the VALUE F LOW function, (input range –99999 to +99999). The appropriate unit is taken from the UNIT TEMPERATURE function.
- The temperature value for the 20 mA current is defined in the VALUE F HIGH function, (input range –99999 to +99999). The appropriate unit is taken from the UNIT TEMPERATURE function.

✎ Note!
Values with different signs **cannot** be entered for the VALUE F LOW and VALUE F HIGH if SYMMETRY is the option selected in the MEASURING MODE function (see Page 54). The message “INPUT RANGE EXCEEDED” appears on the display.

Example (for standard measuring mode):



A0004736-en

① = Temperature value at which a frequency of 0 Hz should be output (entry in VALUE F LOW function).

② = Temperature value at which the frequency, defined in the END VALUE FREQ. function, should be output (entry in VALUE F HIGH function).

Function description PULSE/FREQUENCY OUTPUT

OUTPUT SIGNAL

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

In this function the output can be configured in such a way that it suits an external totalizer.

Options:
PASSIVE - POSITIVE
PASSIVE - NEGATIVE

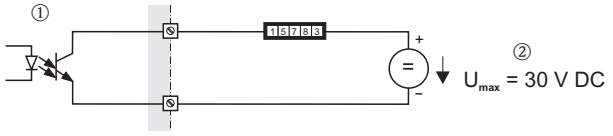
Factory setting: PASSIVE - POSITIVE

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

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

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

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

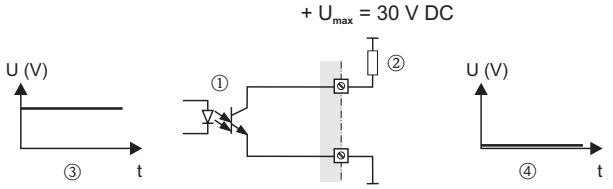


A0001225

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

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

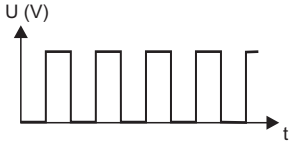
Example for output configuration PASSIVE-POSITIVE:
Output configuration with an external pull-up resistance.
In the quiescent state (at zero flow), the output signal level at the terminals is 0 V.



A0004687

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

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



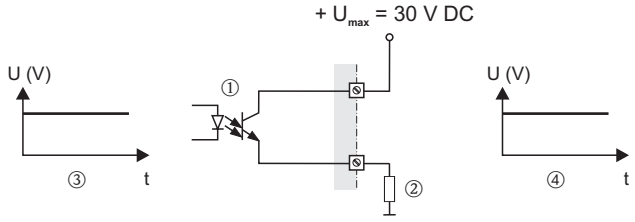
A0001975

(continued on next page)

Function description PULSE/FREQUENCY OUTPUT

OUTPUT SIGNAL
(contd)

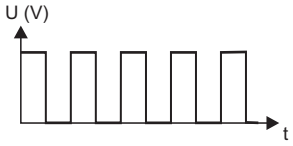
Example for output configuration PASSIVE-POSITIVE:
Output configuration with an external pull-down resistance.
In the quiescent state (at zero flow), a positive voltage level is measured via the pull-down resistance.



A0004689

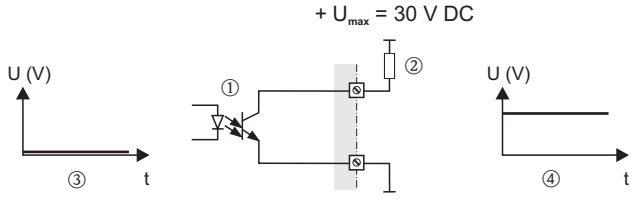
① = *Open collector*
② = *Pull-down resistance*
③ = *Transistor activation in "POSITIVE" quiescent state (at zero flow)*
④ = *Output signal level in quiescent state (at zero flow)*

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



A0001981

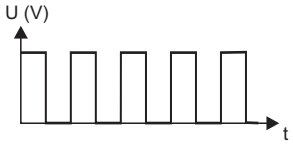
Example for output configuration PASSIVE-NEGATIVE:
Output configuration with an external pull-up resistance.
In the quiescent state (at zero flow), the output signal level at the terminals is at a positive voltage level.



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)*

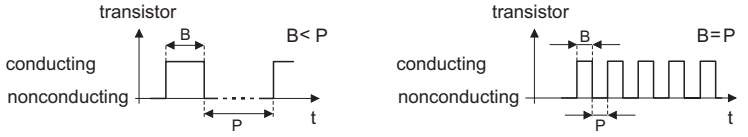
In the operating status (flow present), the output signal level changes from a positive voltage level to 0 V.



A0001981

Function description PULSE/FREQUENCY OUTPUT	
TIME CONSTANT	✎ Note! This function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function. Use this function to enter a time constant defining how the frequency output signal reacts to severely fluctuating measured variables, either very quickly (enter a low time constant) or with damping (enter a high time constant). **User input:** floating-point number: 0.00...100.00 s **Factory setting:** 0.00 s
FAILSAFE MODE	✎ Note! This function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function. For reasons of safety it is advisable to ensure that the frequency output assumes a predefined state in the event of a fault. Use this function to define this state. The setting you select here affects only the frequency output. It has no effect on other outputs and the display (e.g. totalizer). **Options:** FALLBACK VALUE Output is 0 Hz. FAILSAFE LEVEL Output is the frequency specified in the FAILSAFE VALUE function. ACTUAL VALUE Measured value output is based on the current flow measurement. The fault is ignored. **Factory setting:** FALLBACK VALUE
FAILSAFE VALUE	✎ Note! This function is not available unless FREQUENCY was selected in the OPERATION MODE function and FAILSAFE LEVEL was selected in the FAILSAFE MODE function. Use this function to define the frequency that the measuring device outputs in the event of a fault. **User input:** max. 4-digit number: 0...1250 Hz **Factory setting:** 1250 Hz
ACTUAL FREQUENCY	✎ Note! This function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function. Use this function to view the computed value of the output frequency. **Display:** 0...1250 Hz

Function description PULSE/FREQUENCY OUTPUT	
SIMULATION FREQUENCY	✎ Note! This function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function. Use this function to activate simulation of the frequency output. **Options:** OFF ON **Factory setting:** OFF ✎ Note! ■ The "SIMULATION FREQUENCY OUTPUT" message indicates that simulation is active. ■ The measuring device continues to measure while simulation is in progress, i.e. the current measured values are output correctly via the other outputs. ☝ Caution! The setting is not saved if the power supply fails.
VALUE SIMULATION FREQUENCY	✎ Note! This function is not available unless FREQUENCY was selected in the OPERATION MODE function and the VALUE SIMULATION FREQUENCY function is active (= ON). Use this function to define a selectable frequency value (e.g. 500 Hz) to be output at the frequency output. This value is used to test downstream devices and the measuring device itself. **User input:** 0...1250 Hz **Factory setting:** 0 Hz ☝ Caution! The setting is not saved if the power supply fails.
ASSIGN PULSE	✎ Note! This function is not available unless the PULSE setting was selected in the OPERATION MODE function. Use this function to assign a measured variable to the pulse output. **Options:** OFF MASS FLOW VOLUME FLOW CORRECTED VOLUME FLOW **Factory setting:** MASS FLOW ✎ Note! If you select OFF, the only functions shown in this function group are ASSIGN PULSE and OPERATION MODE.

Function description PULSE/FREQUENCY OUTPUT	
PULSE VALUE	✎ Note! This function is not available unless the PULSE setting was selected in the OPERATION MODE function. Use this function to define the flow at which a pulse is triggered. These pulses can be totaled by an external totalizer, and the total flow quantity since measuring started can be registered in this way. **User input:** 5-digit floating-point number **Factory setting:** Depends on nominal diameter and country, [value] [kg or lb] / pulse; corresponding to the factory setting for the pulses value (see see Page 63 ff.) ✎ Note! The appropriate unit is taken from the function group SYSTEM UNITS (see Page 8).
PULSE WIDTH	✎ Note! This function is not available unless the PULSE setting was selected in the OPERATION MODE function. Use this function to enter the maximum pulse width of the output pulses. **User input:** 0.5...2000 ms **Factory setting:** 100 ms Pulse output is **always** with the pulse width (B) entered in this function. The intervals (P) between the individual pulses are automatically configured. However, they must at least correspond to the pulse width (B = P).  A0001233-en B = Pulse width entered (the illustration applies to positive pulses) P = Intervals between the individual pulses ✎ Note! When entering the pulse width, select a value that can still be processed by an external totalizer (e.g. mechanical totalizer, PLC, etc.). ☝ Caution! If the pulse number or frequency resulting from the pulse value entered, (see function PULSE VALUE on Page 36), and from the current flow is too large to maintain the pulse width selected (interval P is smaller than the pulse width B entered), a system error message (pulse memory) is generated after buffering/balancing time.

Function description PULSE/FREQUENCY OUTPUT

OUTPUT SIGNAL

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

In this function the output can be configured in such a way that it suits an external totalizer. Depending on the application, the direction of the pulses can be selected here.

Options:
PASSIVE - POSITIVE
PASSIVE - NEGATIVE

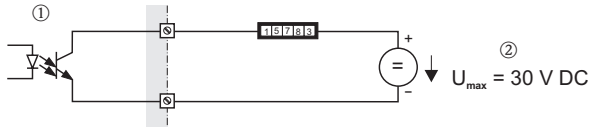
Factory setting: PASSIVE - POSITIVE

Explanation
- PASSIVE = power is supplied to the pulse output by means of an external power supply.

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

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

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

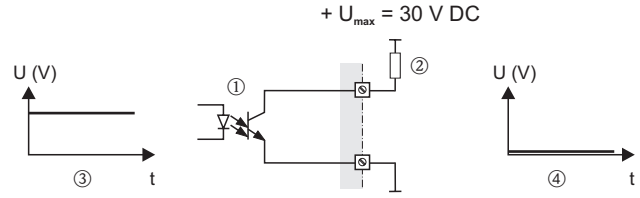


A0001225

① = *Open collector*
② = *External power supply*

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

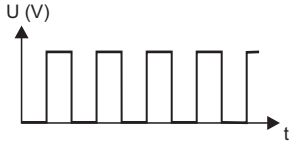
Example for output configuration PASSIVE-POSITIVE:
Output configuration with an external pull-up resistance.
In the quiescent state (at zero flow), the output signal level at the terminals is 0 V.



A0004687

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

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



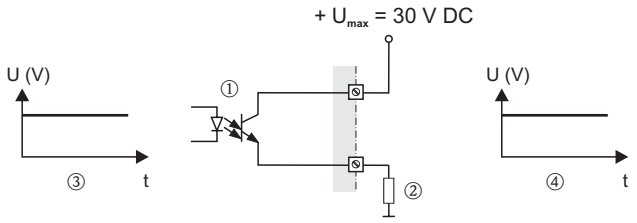
A0001975

(continued on next page)

Function description PULSE/FREQUENCY OUTPUT

OUTPUT SIGNAL
(contd)

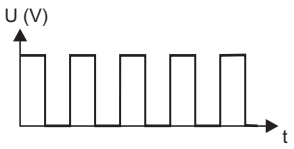
Example for output configuration PASSIVE-POSITIVE:
Output configuration with an external pull-down resistance.
In the quiescent state (at zero flow), a positive voltage level is measured via the pull-down resistance.



A0004689

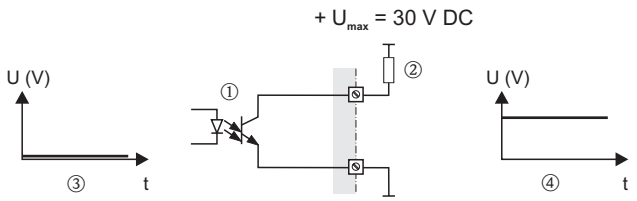
① = *Open collector*
② = *Pull-down resistance*
③ = *Transistor activation in "POSITIVE" quiescent state (at zero flow)*
④ = *Output signal level in quiescent state (at zero flow)*

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



A0001981

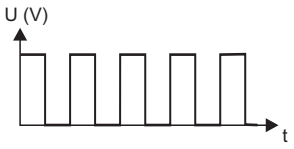
Example for output configuration PASSIVE-NEGATIVE:
Output configuration with an external pull-up resistance.
In the quiescent state (at zero flow), the output signal level at the terminals is at a positive voltage level.



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

Function description PULSE/FREQUENCY OUTPUT	
FAILSAFE MODE	✎ Note! This function is not available unless the PULSE setting was selected in the OPERATION MODE function. For reasons of safety it is advisable to ensure that the pulse output assumes a predefined state in the event of a fault. Use this function to define this state. The setting you select here affects only the pulse output. It has no effect on other outputs and the display (e.g. totalizer). **Options:** FALLBACK VALUE Output is 0 pulse. HOLD VALUE Measured value output is based on the last measured value saved before the fault occurred. ACTUAL VALUE Measured value output is based on the current flow measurement. The fault is ignored. **Factory setting:** FALLBACK VALUE
SIMULATION PULSE	✎ Note! This function is not available unless the PULSE setting was selected in the OPERATING MODE function. Use this function to activate simulation of the pulse output. **Options:** OFF COUNTDOWN The pulses specified in the VALUE SIMULATION PULSE function are output. CONTINUOUSLY Pulses are continuously output with the pulse width specified in the PULSE WIDTH function. Simulation is started once the CONTINUOUSLY option is confirmed with the E key. ✎ Note! Simulation is started by confirming the CONTINUOUSLY option with the E key. The simulation can be switched off again via the SIMULATION PULSE function. **Factory setting:** OFF ✎ Note! ■ The notice message #631 “SIM. PULSE” indicates that simulation is active. ■ The on/off ratio is 1:1 for both types of simulation. ■ The measuring device continues to measure while simulation is in progress, i.e. the current measured values are output correctly via the other outputs. ☝ Caution! The setting is not saved if the power supply fails.

Function description PULSE/FREQUENCY OUTPUT	
VALUE SIMULATION PULSE	✎ Note! This function is not available unless the COUNTDOWN option was selected in the SIMULATION PULSE function. Use this function to specify the number of pulses (e.g. 50) which are output during the simulation. This value is used to test downstream devices and the measuring device itself. The pulses are output with the pulse width specified in the PULSE WIDTH function. The on/off ratio is 1:1. Simulation is started once the specified value is confirmed with the E key. The display remains at 0 if the specified pulses have been output. **User input:** 0...10 000 **Factory setting:** 0 ✎ Note! Simulation is started by confirming the simulation value with the E key. The simulation can be switched off again via the SIMULATION PULSE function. ☝ Caution! The setting is not saved if the power supply fails.

11 Group STATUS OUTPUT

Function description STATUS OUTPUT	
This group is not available unless the measuring device is fitted with a status output.	
ASSIGN STATUS OUTPUT	Use this function to assign a switching function to the status output. **Options:** OFF ON (operation) FAULT MESSAGE NOTICE MESSAGE FAULT MESSAGE or NOTICE MESSAGE EMPTY PIPE DETECTION (only if function is active) FLOW DIRECTION LIMIT MASS FLOW LIMIT VOLUME FLOW LIMIT CORRECTED VOLUME FLOW LIMIT DENSITY LIMIT REFERENCE DENSITY LIMIT TEMPERATURE **Factory setting:** FAULT MESSAGE ✎ Note! ■ The behavior of the status output is of the quiescent-current type, in other words the output is closed (status output conductive) when normal, error-free measuring is in progress. ■ Please read and comply with the information on the switching characteristics of the status output (see Page 43, 44). ■ If you select OFF, the only function shown in this function group is this function, in other words ASSIGN STATUS OUTPUT.
SWITCH-ON POINT	✎ Note! This function is not available unless the LIMIT VALUE or FLOW DIRECTION option was selected in the ASSIGN STATUS OUTPUT function. Use this function to assign a value to the switch-on point (→ status output conductive). The value can be greater or less than the switch-off point. Positive and negative values are permissible. **User input:** 5-digit floating-point number **Factory setting:** 0 [kg/h] or 0 [m^3/h] or 2 [kg/l] or 200 [°C]
SWITCH-OFF POINT	✎ Note! This function is not available unless the LIMIT VALUE setting was selected in the ASSIGN STATUS OUTPUT function. Use this function to assign a value to the switch-off point (→ status output not conductive). The value can be greater or less than the switch-on point. Positive and negative values are permissible. **User input:** 5-digit floating-point number **Factory setting:** 0 [kg/h] or 0 [m^3/h] or 2 [kg/l] or 200 [°C]

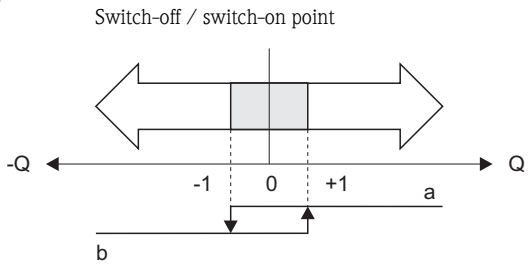
Function description STATUS OUTPUT	
TIME CONSTANT	✎ Note! This function is not available unless one of the following was selected in the ASSIGN STATUS function: ■ FLOW DIRECTION ■ LIMIT MASS FLOW ■ LIMIT VOLUME FLOW ■ LIMIT CORRECTED VOLUME FLOW ■ LIMIT DENSITY ■ LIMIT REFERENCE DENSITY ■ LIMIT TEMPERATURE Use this function to enter a time constant defining how the status output reacts to severely fluctuating measured variables, either very quickly (enter a low time constant) or with damping (enter a high time constant). The purpose of damping, therefore, is to prevent the status output changing state continuously in response to fluctuations in flow. **User input:** 5-digit floating-point number: 0.00...100.00 s **Factory setting:** 0.00 s
ACTUAL STATUS OUTPUT	Use this function to check the current status of the status output. **Display:** NOT CONDUCTIVE CONDUCTIVE
SIMULATION SWITCH POINT	Use this function to activate simulation of the status output. **Options:** OFF ON **Factory setting:** OFF ✎ Note! ■ The “SIMULATION STATUS OUTPUT” message indicates that simulation is active. ■ The measuring device continues to measure while simulation is in progress, i.e. the current measured values are output correctly via the other outputs. ☝ Caution! The setting is not saved if the power supply fails.
VALUE SIMULATION SWITCH POINT	✎ Note! This function is not available unless the ON setting was selected in the SIMULATION SWITCH POINT function. 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. **User input:** NOT CONDUCTIVE CONDUCTIVE **Factory setting:** NOT CONDUCTIVE ☝ Caution! The setting is not saved if the power supply fails.

11.1 Information on the response of the status output

General
If you have configured the status output for “LIMIT” 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 status output signal switches as shown in the illustrations below.

Status output configured for direction of flow
The value you entered in the ON-VALUE function defines the switching points for the positive and negative directions of flow.

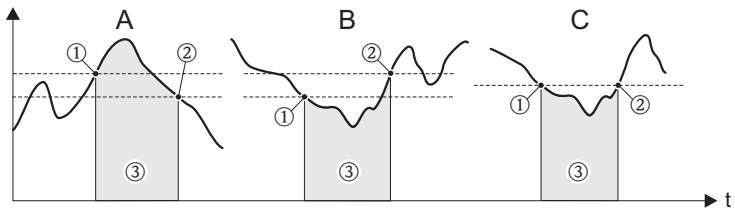
If, for example, the switching point you define is = 1 kg/h, the status output is not conductive at –1 kg/h and is conductive at +1 kg/h. Set the switching point to 0 if your process calls for direct switchover (no switching hysteresis). If low flow cut off is used, it is advisable to set hysteresis to a value greater than or equal to the low flow cut off rate.



A0001236

a = Status output conductive
b = Status output not conductive

Status output configured for limit value
The status output signal switches as soon as the measured variable falls below or exceeds a defined switching point.
Application: Monitoring flow or process-related boundary conditions.

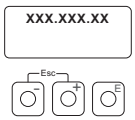
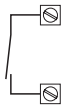
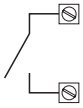
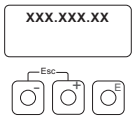
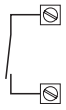
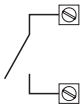
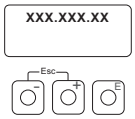
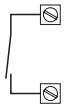
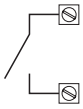
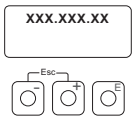
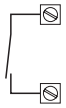
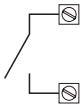
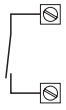
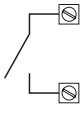


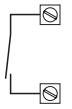
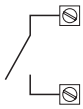
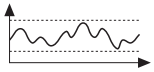
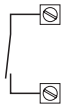
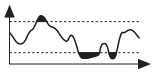
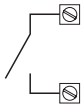
A0001235①

① = Switch-off point, ② = switch-on point, ③ = relay de-energized

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

11.2 Switching action of the status output

Function	State	Open Collector (Transistor)
ON (operation)	System in measuring mode  A0001052	conductive  A0001237
	System not in measuring mode (power supply failure)  A0001291	not conductive  A0001238
Fault message	System OK  A0001052	conductive  A0001237
	(System or process error) Fault → Error response of outputs, inputs and totalizer  A0001291	not conductive  A0001238
Notice message	System OK  A0001052	conductive  A0001237
	(System or process error) Fault → Continuation of measuring  A0001291	not conductive  A0001238
Fault message or Notice message	System OK  A0001052	conductive  A0001237
	(System or process error) Fault → Response to error or Info → Continuation of measuring  A0001291	not conductive  A0001238
Empty pipe detection (EPD)	Fluid density above response level, e.g. full measuring tube  A0004737	conductive  A0001237
	Fluid density below response level, e.g. empty measuring tube  A0004738	not conductive  A0001238

Function	State		Open Collector (Transistor)	
Flow direction	forward	 A0001241	conductive	 A0001237
	reverse	 A0001242	not conductive	 A0001238
Limit value ■ Mass flow ■ Volume flow ■ corrected volume flow ■ Density ■ Reference density ■ Temperature	Limit value not overshot or undershot	 A0001243	conductive	 A0001237
	Limit value overshot or undershot	 A0001244	not conductive	 A0001238

12 Group STATUS INPUT

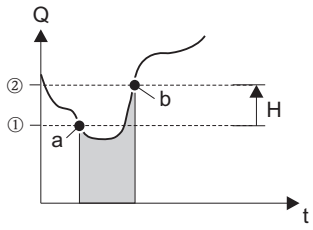
Function description STATUS INPUT	
This group is not available unless the measuring device is fitted with a status input I/O module.	
ASSIGN STATUS INPUT	Use this function to assign a switching function to the status input. **Options:** OFF RESET TOTALIZER 1 POSITIVE ZERO RETURN ZEROPOINT ADJUSTMENT RESET TOTALIZER 2 RESET ALL TOTALIZERS **Factory setting:** OFF ✎ Note! Positive zero return is active as long as the active level is available at the status input (continuous signal). All other assignments react to a change in level (pulse) at the status input.
ACTIVE LEVEL	Use this function to define whether the assigned function (see ASSIGN STATUS INPUT function) is released when the signal level is present (HIGH) or not present (LOW). **Options:** HIGH LOW **Factory setting:** HIGH
MIN. PULSE WIDTH	Use this function to define a minimum width which the input pulse must achieve in order to trigger the defined switching function. **User input:** 20...100 ms **Factory setting:** 50 ms
SIMULATION STATUS INPUT	Use this function to activate simulation of the status input, in other words to trigger the function assigned to the status input (see the ASSIGN STATUS INPUT function on Page 46). **Options:** OFF ON **Factory setting:** OFF ✎ Note! ▪ The “SIMULATION STATUS INPUT” message indicates that simulation is active. ▪ The measuring device continues to measure while simulation is in progress, i.e. the current measured values are output correctly via the outputs. ☝ Caution! The setting is not saved if the power supply fails.

Function description STATUS INPUT	
VALUE SIMULATION STATUS INPUT	Note! This function is not available unless the ON setting was selected in the SIMULATION STATUS INPUT function. Use this function to select the level to be assumed at the status input during the simulation. **Options:** HIGH LOW **Factory setting:** LOW Caution! The setting is not saved if the power supply fails.

13 Group COMMUNICATION

Function description COMMUNICATION	
TAG NAME	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. **User input:** max. 8-character text, permissible: A-Z, 0-9, +, –, punctuation marks **Factory setting:** "_ _ _ _ _ _ _ _" (without text)
TAG DESCRIPTION	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. **User input:** max. 16-character text, permissible: A-Z, 0-9, +, –, punctuation marks **Factory setting:** "_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _" (without text)
BUS ADDRESS	Use this function to define the address for the exchange of data with the HART protocol. **User input:** 0...15 **Factory setting:** 0 ✎ Note! Addresses 1...15: a constant 4 mA current is applied.
HART PROTOCOL	Use this function to display if the HART protocol is active. **Display:** OFF = HART protocol not active ON = HART protocol active ✎ Note! The HART protocol can be activated with the selection 4-20 mA HART or 4-20 mA (25 mA) HART in the CURRENT SPAN function (see Page 23).
MANUFACTURER ID	Use this function to view the manufacturer ID in decimal numerical format. **Display:** Endress+Hauser 17 = (≅ 11 hex) for Endress+Hauser
DEVICE ID	Use this function to view the device ID in hexadecimal numerical format. **Display:** 50 = (≅ 80 dez) for Promass 80
DEVICE REVISION	The device-specific revision of the HART command interface appears on the display. **Display:** e.g.: 5

14 Group PROCESS PARAMETER

Function description PROCESS PARAMETER	
ASSIGN LF CUT OFF	Use this function to assign the switching point for the low flow cut off. **Options:** OFF MASS FLOW VOLUME FLOW CORRECTED VOLUME FLOW **Factory setting:** MASS FLOW
ON-VALUE LOW FLOW CUT OFF	Use this function to assign the on value for the low flow cut off. Low flow cut off is active if the setting is a value not equal to 0. The sign of the flow value is highlighted on the display to indicate that low flow cut off is active. **User input:** 5-digit floating-point number **Factory setting:** Depends on nominal diameter ✎ Note! The appropriate unit is taken from the function group SYSTEM UNITS (see Page 8).
OFF-VALUE LOW FLOW CUT OFF	Enter the off-value (**b**) of the low flow cut off. Enter the switch-off point as a positive hysteresis (H) from the switch-on point (**a**). **User input:** Integer 0 to 100% **Factory setting:** 50%  A0003882 ① = *On-value* ② = *Off-value* *a* *Low flow cut off is switched on* *b* *Low flow cut off is switched off (a + a · H)* *H* *Hysteresis: 0 to 100%* ■ *Low flow cut off active* *Q* *Flow*

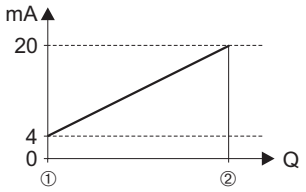
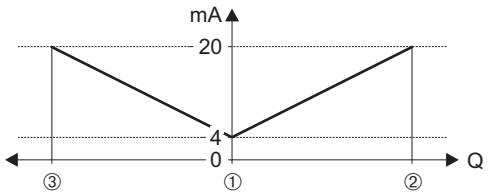
Function description PROCESS PARAMETER	
EMPTY PIPE DETECTION (EPD)	Use this function to activate the empty pipe detection (EPD). With empty measuring tubes the density of the fluid falls below a specified value (see EPD LOW VALUE function). **Options:** OFF ON **Factory setting:** Liquid: ON Gas: OFF Caution! ■ Select a correspondingly low EPD LOW VALUE so that the difference to the effective density of the fluid is sufficiently large enough. This ensures that totally empty measuring tubes and not partially filled ones are detected. ■ For gas measurement we strongly recommend to switch off empty pipe detection.
EPD LOW VALUE	Note! This function is not available unless the ON setting was selected in the EPD function. Use this function to set a lower threshold for the measured density value, in order to detect possible problems in the process indicated by too low density. **User input:** 5-digit floating-point number **Factory setting:** 0.2000 kg/l
EPD VALUE HIGH	Note! This function is not available unless the ON setting was selected in the EPD function. Use this function to set an upper threshold for the measured density value. **User input:** 5-digit floating-point number **Factory setting:** 6.0000 kg/l
EPD RESPONSE TIME	Use this function to enter the time span for which the criteria for an empty pipe have to be satisfied without interruption before a notice message or fault message is generated. **User input:** fixed-point number: 1.0...60.0 s **Factory setting:** 1.0 s

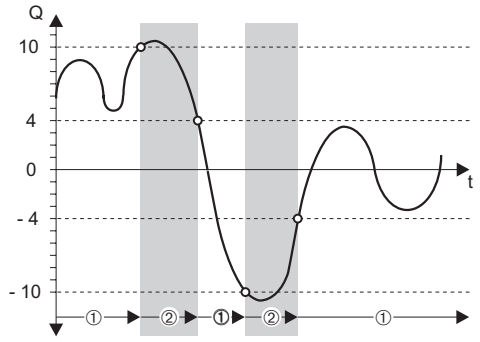
Function description PROCESS PARAMETER	
EPD EXC. CURRENT	Use this function to activate the empty pipe detection (EPD). In the event of air pockets or if fluids are not homogeneous, the excitation current of the measuring pipes increases. If the excitation current configured in this function is overshot, error message #700 is output similar to the EPD LOW VALUE and EPD HIGH VALUE functions. **User input:** 5-digit floating-point number **Factory setting:** 100 mA (deactivated) ✎ Note! The function is not activated until a value under 100 mA is entered. The function is deactivated if 100 mA is entered.
FIXED REFERENCE DENSITY	In this function you can enter a fixed value for the reference density which is used to calculate the corrected volume flow or corrected volume. **User input:** 5-digit floating-point number **Factory setting:** 1 kg/Nl
ZERO ADJUST.	With this function you can automatically start zero point adjustment. The zero point value determined by the measuring system in this way is applied to the function ZERO POINT (see Page 57). **User input:** CANCEL START **Factory setting:** CANCEL ☝ Caution! Before carrying out the calibration, please refer to BA 057D/06/en "Promass 80 Operating Instructions" where a detailed description of the zero point adjustment is given. ✎ Note! ■ Programming is locked during zero point adjustment and the display shows: "ZERO ADJUST RUNNING". ■ 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. ■ If the Promass 80 measuring electronics are fitted with a status input, then the zero point can also be activated by using this input. ■ After Zero point adjustment is completed, the new zero point can be called up with the E key. If the E key is pressed again, you return to the ZERO ADJUST. function.
DENSITY SET POINT	In this function, enter the density set value of the particular fluid for which you want to carry out a field density adjustment. **User input:** 5 digit floating-point number, incl. units (corresponding to 0.1...5.9999 kg/l) **Factory setting:** 0 kg/l ✎ Note! ■ The preset density entered here should not vary from the actual fluid density by a more than ±10%. ■ The appropriate unit is taken from the function group SYSTEM UNITS (see Page 8).

Function description PROCESS PARAMETER	
MEASURE FLUID	In this function the actual density of the fluid is measured for the density adjustment. **Options:** CANCEL START
DENSITY ADJUST	With this function a density adjustment can be carried out on site. The density set value will thus be recalculated and stored. This ensures that the values dependent on density calculations (e.g. volume flow) are as accurate as possible. Caution! Before carrying out a density adjustment, please refer to BA 057D/06/en "Promass 80 Operating Instructions" where a detailed description of the density adjustment is given. Note! The density adjustment can be executed if: ■ The sensor does not accurately measure the density which the operator expects based on laboratory trials. ■ The characteristics of the fluid are outside the measuring points set at the factory or reference conditions under which the flowmeter has been calibrated. ■ The plant is used solely for measuring a fluid whose density is to be determined very accurately under constant conditions. **Options:** CANCEL DENSITY ADJUST **Factory setting:** CANCEL
RESTORE ORIGINAL	With this function the original density coefficient determined at the factory are restored. **Options:** NO YES Factory setting: NO
PRESSURE MODE	Use this function to configure an automatic pressure correction. In this way, the effect of a pressure deviation between the calibration and process pressures on the measured error for mass flow is compensated for, (see also Operating Instructions "Proline Promass 80", BA 057D/06/en/, Accuracy Chapter). **Options:** OFF PRESSUREFIX (A fixed process pressure for pressure correction is specified) **Factory setting:** OFF

Function description PROCESS PARAMETER	
PRESSURE	✎ Note! This function is not available unless FIX was selected in the PRESSURE MODE function. Use this function to enter the value for the process pressure which should be used during pressure correction. **User input:** 7-digit floating-point number **Factory setting:** 0 bar g ✎ Note! The appropriate unit is taken from the function group SYSTEM UNITS (see Page 8).

15 Group SYSTEM PARAMETER

Function description SYSTEM PARAMETER	
INSTALLATION DIRECTION SENSOR	Use this function to reverse the sign of the measured variable, if necessary. ✎ Note! Ascertain the actual direction of fluid flow with reference to the direction indicated by the arrow on the sensor (nameplate). **Options:** NORMAL (flow as indicated by the arrow) INVERSE (flow opposite to direction indicated by the arrow) **Factory setting:** NORMAL
MEASURING MODE	Use this function to define the measuring mode for all outputs. **Options:** STANDARD SYMMETRY **Factory setting:** STANDARD The responses of the individual outputs in each of the measuring modes are described in detail below: **Current and frequency output** STANDARD The output signals of the current and frequency output are proportional to the measured variable. The flow components outside the scaled measuring range (between VALUE 0_4 mA or VALUE F LOW ① and VALUE 20 mA or VALUE F HIGH ②), are not taken into account for signal output but a message “CURRENT SPAN AT FULL SCALE VALUE” or “FREQUENCY RANGE AT FULL SCALE VALUE” is issued. Example for current output:  A0001248 SYMMETRY The output signals of the current and frequency output are independent of the direction of flow (absolute amount of the measured variable). The “VALUE 20 mA” or “VALUE F HIGH” ③ (e.g. backflow) corresponds to the mirrored VALUE 20 mA or VALUE F HIGH ② (e.g. flow). Example for current output:  A0001249 (continued on next page)

Function description SYSTEM PARAMETER	
MEASURING MODE (contd)	**Pulse output** STANDARD Only positive flow components are totaled. Negative components are not taken into account. SYMMETRY Positive and negative flow components are taken into account. ✎ Note! The direction of flow can be output via the configurable status output. **Status output** ✎ Note! Only if in the ASSIGN STATUS function the LIMIT option is selected. STANDARD The status output signal switches at the defined switching points. SYMMETRY The status output signal switches at the defined switching points, irrespective of the sign. In other words, if you define a switching 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). Example for the SYMMETRY measuring mode: Switch-on point: Q = 4 Switch-off point: Q = 10 ① = Status output switched on (conductive) ② = Status output switched off (non-conductive)  A0001247
POSITIVE ZERO RETURN	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 functions and outputs of the measuring device. **Options:** OFF ON (signal output is set to zero flow value, temperature and density are output normally) **Factory setting:** OFF

Function description SYSTEM PARAMETER	
DENSITY DAMPING	The density filter allows the sensitivity of the density measuring signal to be lowered with respect to variations in the density of the fluid, e.g. with inhomogeneous liquids. **User input:** max. 5-digit number, including unit: 0.00...100.00 s **Factory setting:** 0.00 s ✎ Note! The damping acts on all functions and outputs of the measuring device.
FLOW DAMPING	Use this function to set the filter depth of the digital filter. Using the interference blanking (= time constant for exponential filter) the sensitivity of the flow measurement signal can be reduced with respect to transient flows and interference peaks; e.g. with fluid containing solids or gas bubbles, etc. The reaction time of the measuring system increases with an increase in the filter setting. **User input:** 0...100 s **Factory setting:** Liquid: 0.00 s Gas: 0.25 s ✎ Note! The damping acts on all functions and outputs of the measuring device.

16 Group SENSOR DATA

Function description SENSOR DATA	
All sensor data, including calibration factor, zero point, nominal diameter, etc. are set at the factory. All the sensor's parameter settings are saved on the S-DAT memory chip. Caution! Under normal circumstances you should not change these parameter settings, because changes affect numerous functions of the entire measuring facility in general, and the accuracy of the measuring system in particular. Consequently, most of the functions described below can be accessed only by entering a special **service code**, which is not the same as your private code number. Contact the E+H service organization if you have any questions about these functions.	
K-FACTOR	This function shows the current calibration factor for the sensor. **Factory setting:** depends on nominal diameter and calibration Note! If the service code is used to call this function, this value can be edited.
ZERO POINT	This function shows the current zero-point correction value for the sensor. **User input:** max. 5-digit number: –99999...+99999 **Factory setting:** depends on calibration
NOMINAL DIAMETER	This function shows the nominal diameter for the sensor. **Factory setting:** depends on the size of the sensor Note! If the service code is used to call this function, this value can be edited.
TEMPERATURE COEFFICIENT KM	This function shows the temperature coefficient KM.
TEMPERATURE COEFFICIENT KM 2	This function shows the temperature coefficient KM 2.
TEMPERATURE COEFFICIENT KT	This function shows the temperature coefficient KT.
CALIBRATION COEFFICIENT KD 1	This function shows the calibration coefficient KD 1.
CALIBRATION COEFFICIENT KD 2	This function shows the calibration coefficient KD 2.

Function description SENSOR DATA	
DENSITY COEFFICIENT C0	This function shows the actual density coefficient C 0. Caution! A density adjustment can alter the calibration value of this coefficient.
DENSITY COEFFICIENT C1	This function shows the actual density coefficient C 1. Caution! A density adjustment can alter the calibration value of this coefficient.
DENSITY COEFFICIENT C2	This function shows the actual density coefficient C 2. Caution! A density adjustment can alter the calibration value of this coefficient.
DENSITY COEFFICIENT C3	This function shows the actual density coefficient C 3. Caution! A density adjustment can alter the calibration value of this coefficient.
DENSITY COEFFICIENT C4	This function shows the actual density coefficient C 4. Caution! A density adjustment can alter the calibration value of this coefficient.
DENSITY COEFFICIENT C5	This function shows the actual density coefficient C 5. Caution! A density adjustment can alter the calibration value of this coefficient.
MINIMUM FLUID TEMPERATURE	Display of the lowest fluid temperature measured.
MAXIMUM FLUID TEMPERATURE	Display of the highest fluid temperature measured.
MINIMUM CARRIER TUBE TEMPERATURE	Note! This function is not available for the Promass 80 E measuring device. The lowest carrier tube temperature measured appears on the display.
MAXIMUM CARRIER TUBE TEMPERATURE	Note! This function is not available for the Promass 80 E measuring device. The highest carrier tube temperature measured appears on the display.

17 Group SUPERVISION

Function description SUPERVISION	
CURRENT SYSTEM CONDITION	Use this function to check the current system status. **Display:** "SYSTEM OK" or the fault / notice message with the highest priority.
PREVIOUS SYSTEM CONDITIONS	Use this function to view the fifteen most recent fault and notice messages since measuring last started. **Display:** The 15 most recent fault or notice messages.
ASSIGN SYSTEM ERROR	Use this function to view all system messages and the associated error categories (fault message or notice message). If you select a single system fault you can change its error category. **Display:** List of system errors ✎ Note! ■ Press the E key twice to call the ERROR CATEGORY function. ■ Use the +/- key combination or select CANCEL in the system error list to exit the function.
ERROR CATEGORY	Use this function to define whether a system fault triggers a notice message or a fault message. If you select "FAULT MESSAGES", all outputs respond to a fault in accordance with their defined error response patterns. **Options:** NOTICE MESSAGES (display only) FAULT MESSAGES (outputs and display) ✎ Note! ■ Press the E key twice to call the function ASSIGN SYSTEM ERROR. ■ Use the +/- key combination to exit the function.
ASSIGN PROCESS ERROR	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. **Display:** List of process errors ✎ Note! ■ Press the E key twice to call the ERROR CATEGORY function. ■ Use the +/- key combination or select CANCEL in the process error list to exit the function.

Function description SUPERVISION	
ERROR CATEGORY	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 a fault in accordance with their defined error response patterns. **Options:** NOTICE MESSAGES (display only) FAULT MESSAGES (outputs and display) ✎ Note! ■ Press the E key twice to call the ASSIGN PROCESS ERROR function. ■ Use the ⊕⊖ key combination to exit the function.
ALARM DELAY	Use this function to define a time span for which the criteria for an error have to be satisfied without interruption before an error or notice message is generated. Depending on the setting and the type of fault, this suppression acts on: ■ Display ■ Current output ■ Frequency output ■ Status output **User input:** 0...100 s (in steps of one second) **Factory setting:** 0 s ☝ Caution! If this function is activated fault and notice messages are delayed by the time corresponding to the setting before being 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 fault and notice messages cannot be suppressed, a value of 0 seconds must be entered here.
SYSTEM RESET	Use this function to perform a reset of the measuring system. **Options:** NO RESTART SYSTEM (restart without interrupting line supply) **Factory setting:** NO
OPERATION HOURS	The hours of operation of the device appear on the display. **Display:** Depends on the number of hours of operation elapsed: Hours of operation < 10 hours → display format = 0:00:00 (hr:min:sec) Hours of operation 10...10,000 hours → display format = 0000:00 (hr:min) Hours of operation > 10,000 hours → display format = 000000 (hr)
PERMANENT STORAGE	This function indicates whether permanent saving of all the parameters in the EEPROM is switched on or off. **Display:** "OFF" or "ON" **Factory setting:** ON

18 Group SIMULATION SYSTEM

Function description SIMULATION SYSTEM	
SIMULATION FAILSAFE MODE	Use this function to set all inputs, outputs and totalizer to their defined fault response modes, in order to check whether they respond correctly. During this time, the words "SIMULATION FAILSAFE MODE" appear on the display. **Options:** OFF ON **Factory setting:** OFF
SIMULATION MEASURAND	Use this function to set all inputs, outputs and totalizer to their defined flow-response modes, in order to check whether they respond correctly. During this time, the words "SIMULATION MEASURAND" appear on the display. **Options:** OFF MASS FLOW VOLUME FLOW CORRECTED VOLUME FLOW DENSITY REFERENCE DENSITY TEMPERATURE **Factory setting:** OFF Caution! ■ The measuring device cannot be used for measuring while this simulation is in progress. ■ The setting is not saved if the power supply fails.
VALUE SIMULATION MEASURAND	Note! This function is not available unless the SIMULATION MEASURAND function is active. Use this function to define a selectable value (e.g. 12 kg/s). This value is used to test downstream devices and the measuring device itself. **User input:** 5-digit floating-point number **Factory setting:** 0 kg/h (MASS FLOW) 0 m^3/h (VOLUME FLOW) 0 Nm^3/h(CORRECTED VOLUME FLOW) 0 kg/l(DENSITY) 0 kg/NI(REFERENCE DENSITY) 0 °C(TEMPERATURE) Caution! The setting is not saved if the power supply fails.

19 Group SENSOR VERSION

Function description SENSOR VERSION	
SERIAL NUMBER	Use this function to view the serial number of the sensor.
SENSOR TYPE	Use this function to view the sensor type (e.g. Promass F).
SOFTWARE REVISION NUMBER S-DAT	Use this function to view the software revision number of the S-DAT.

20 Group AMPLIFIER VERSION

Function description AMPLIFIER VERSION	
DEVICE SOFTWARE	Displays the current device software version.
SOFTWARE REVISION NUMBER AMPLIFIER	Use this function to view the software revision number of the amplifier.
LANGUAGE GROUP	Use this function to view the language group. The following language groups can be ordered: WEST EU / USA, EAST EU / SCAND., ASIA , CHINA. **Display:** available language group ✎ Note! ■ The language options of the available language group are displayed in the LANGUAGE function. ■ You can change the language group via the configuration software FieldCare. Please do not hesitate to contact your E+H sales office if you have any questions.
I/O MODULE TYPE	Use this function to view the I/O type (input/output type).
SOFTWARE REVISION NUMBER I/O MODULE	Use this function to view the software revision number of the I/O module.

21 Factory settings

21.1 SI units (not for USA and Canada)

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

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

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

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

Language density, length, temperature, reference density

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

	Unit
Density	kg/l
Length	mm
Temperature	°C
Reference density	kg/Nl

21.2 US units (only for USA and Canada)

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

Nominal diameter [mm]	Low flow cut off (approx. v = 0.04 m/s)		Full scale value (approx. v = 2 m/s)		Pulse value (approx. 2 pulse/s at 2 m/s)	
1	0.003	lb/min	0.15	lb/min	0.002	lb/p
2	0.015	lb/min	0.75	lb/min	0.020	lb/p
4	0.066	lb/min	3.30	lb/min	0.020	lb/p
8	0.300	lb/min	15.00	lb/min	0.200	lb/p
15	1.000	lb/min	50.00	lb/min	0.200	lb/p
15 FB	2.600	lb/min	130.00	lb/min	2.000	lb/p
25	2.600	lb/min	130.00	lb/min	2.000	lb/p
25 FB	6.600	lb/min	330.00	lb/min	2.000	lb/p
40	6.600	lb/min	330.00	lb/min	2.000	lb/p
40 FB	11.000	lb/min	550.00	lb/min	20.000	lb/p
50	11.000	lb/min	550.00	lb/min	20.000	lb/p
50 FB	26.000	lb/min	1300.00	lb/min	20.000	lb/p
80	26.000	lb/min	1300.00	lb/min	20.000	lb/p
100	44.000	lb/min	2200.00	lb/min	20.000	lb/p
150	95.000	lb/min	4800.00	lb/min	200.000	lb/p
250	260.00	lb/min	13000.00	lb/min	200.000	lb/p
DN 15, 25, 40, 50 “FB” = Full bore versions Promass I						

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

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

Language, density, length, temperature, reference density

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

Index of key words

Numerics

A

B

C

D

E

F

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People for Process Automation

BA058D/06/en/09.08
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FM+SGML 6.0