













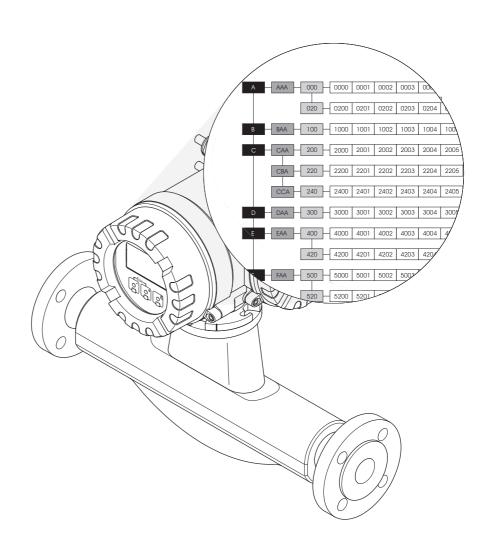




Description of Device Functions

# Proline Promass 84 MODBUS RS485

Coriolis Mass Flow Measuring System





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## 1 Using this manual

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

## 1.1 Finding a function description

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

#### 1.1.1 Using the table of contents

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

#### 1.1.2 Using the graphic of the function matrix

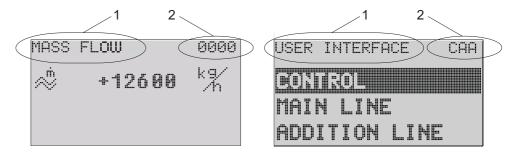
This step-by-step, top-down approach starts with the blocks, the highest level, and factory down through the matrix to the description of the function you need:

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

#### 1.1.3 Using the index of the function matrix

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

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



A0004821

Fig. 1: Local display

- 1 Name of the function, e.g. mass flow, user interface
- 2 Function code, e.g. 0000, CAA

The index for the function matrix is on Page 133.

### 2 Function matrix

## 2.1 General layout of the function matrix

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

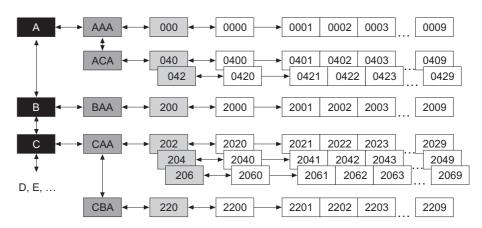


Fig. 2: Layout of the function matrix

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

The blocks are the highest-level grouping of the operation options for the device. The blocks include, for example: MEASURED VARIABLES, QUICK SETUP, USER INTERFACE, TOTALIZER, etc.

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

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

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

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

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

Each function group consists of one or more functions. The functions are used to operate and parameterize the measuring instrument. Numerical values can be entered or parameters selected and saved.

The functions in the "BASIC CONFIGURATION" function group include LANGUAGE, DISPLAY DAMPING, CONTRAST LCD, etc. The procedure for changing the language of the user interface, for example, is as follows:

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

#### 2.1.5 Codes identifying cells

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

#### Blocks:

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

#### Groups:

The code consists of three letters (AAA, ABA, BAA, etc.).

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

#### Function groups:

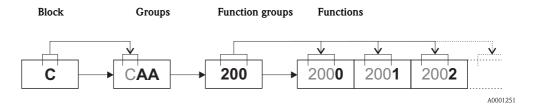
The code consists of three digits (000, 001, 100, etc.).

#### **Functions:**

The code consists of four digits (0000, 0001, 0201, etc.).

The first three digits are the same as the code for the function group.

The last digit in the code is a counter for the functions in the function group, incrementing from 0 to 9 (e.g. function 0005 is the sixth function in group 000).



## 2.2 Illustration of the function descriptions

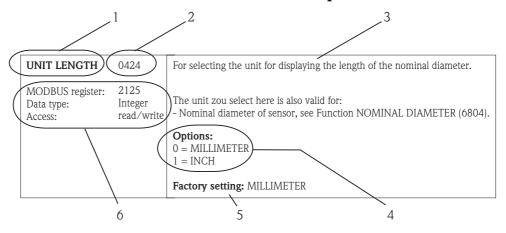


Fig. 3: Example for the description of a function

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- 1 Name of the function
- 2 Number of the function (appears on the local display; is **not** identical to the MODBUS RS485 register address)
- 3 Description of the function
- 4 Selection or entry options or display
- 5 Factory setting (the measuring device is delivered with this setting/selected option)
- 6 Information on communication via MODBUS RS485
  - MODBUS RS485 register (information in decimal numerical format)
  - Data type: float (length = 4 bytes), integer (length = 2 bytes), string (length = depends on function)
  - Possible ways of accessing the function:

read = read access via function code 03, 04 or 23

write = write access via function code 06, 16 or 23

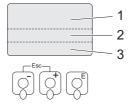


#### Note!

If a nonvolatile device parameter is modified via the MODBUS RS485 function codes 06, 16 or 23, this change is saved in the EEPROM of the measuring device. The number of writes to the EEPROM is technically restricted to a maximum of 1 million. Attention must be paid to this limit since, if exceeded, it results in data loss and measuring device failure. For this reason, avoid constantly writing nonvolatile device parameters via the MODBUS RS485!

## 2.3 Display lines on the local display

The local display is split into various display lines.



A0001253

Fig. 4: Local display

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

The values are assigned to the individual lines in the USER INTERFACE block, see Page 29.

## 2.4 Function matrix Proline Promass 84

Blocks			Groups		Fun	ction groups
CUSTODY TRANSFER (see P. 10)	Z	$\rightarrow$			$\rightarrow$	see Page 10
<b>↓</b> ↑						
MEASURED VARIABLES	Α	$\rightarrow$	MEASURING VALUES	AAA	$\rightarrow$	see Page 13
(see P. 12)			SYSTEM UNITS	ACA	$\rightarrow$	see Page 14
<b>↓</b> ↑					-	
QUICK SETUP (see P. 19)	В	$\rightarrow$	Commissioning and application setups	3	$\rightarrow$	see Page 19
$\downarrow \uparrow$					_	
USER INTERFACE	С	$\rightarrow$	CONTROL	CAA	$\rightarrow$	see Page 29
(see P. 28)			MAIN LINE	CCA	$\rightarrow$	see Page 33
			ADDITIONAL LINE	CEA	$\rightarrow$	see Page 37
$\downarrow \uparrow$			INFORMATION LINE	CGA	$\rightarrow$	see Page 41
					,	
TOTALIZER	D	$\rightarrow$	TOTALIZER 1	DAA	$\rightarrow$	see Page 46
(see P. 45)			TOTALIZER 2	DAB	$\rightarrow$	see Page 46
			TOTALIZER 3	DAC	$\rightarrow$	see Page 46
$\downarrow \uparrow$			HANDLING TOTALIZER	DJA	$\rightarrow$	see Page 49
					7	
OUTPUTS	E	$\rightarrow$	CURRENT OUTPUT	EAA	$\rightarrow$	see Page 51
(see P. 50)			PULSE/FREQ. OUTPUT 1	ECA	$\rightarrow$	see Page 62
			RELAY OUTPUT 1	EGA	$\rightarrow$	see Page 89
$\downarrow \uparrow$			RELAY OUTPUT 2	EGB	$\rightarrow$	see Page 89
					7	
INPUTS	F	$\rightarrow$	STATUS INPUT	FAA	$\rightarrow$	see Page 99
(see P. 98)						
<b>↓</b> ↑			NORDNIA DO 105	00.4	7	D 400
BASIC FUNCTION (see P. 102)	G	$\rightarrow$	MODBUS RS485	GDA	$\rightarrow$	see Page 103
(3001.102)			PROCESS PARAMETER	GIA	$\rightarrow$	see Page 106
1.			SYSTEM PARAMETER	GLA	$\rightarrow$	see Page 115
$\downarrow \uparrow$			SENSOR DATA	GNA	$\rightarrow$	see Page 116
			CVCTEM	IΛΛ	1 .	see Page 121
SUPERVISION (see P. 120)	J	$\rightarrow$	SYSTEM VERSION INFO	JAA	$\rightarrow$	_
(555 1. 125)			VERSION-INFO	JCA	$\rightarrow$	see Page 124

## 3 Block CUSTODY TRANSFER

Block	Group	Function groups		Func	ctions	
CUSTODY TRANSFER (Z)	⇒	⇒	CUSTODY TRANSFER Z000 P. 10	PULSE OUT.1 C.T. Z001 P. 10	CURR. OUT. 1 C.T. Z003 P. 10	TOTALIZER 1 C.T. Z006 P. 11
			TOTALIZER 2 C.T. Z007 P. 11	TOTALIZER 3 C.T. Z008 P. 11	MODBUS CFG C.T. Z009 P. 11	

# **Function description**CUSTODY TRANSFER

Note!

- If the measuring device is configured in accordance with the NTEP or MC approvals, this block (CUSTODY TRANSFER) is not available.
- If the measuring system is set to custody transfer and the hardware is sealed, then all the measuring instrument functions marked with a lock symbol are protected against access. For additional information on this topic, refer to the Operating Instructions for Proline Promass 84 MODBUS RS485 (BA129D) in Chapter 7.3.1, "Setting up custody transfer measurement".
- These functions are not available to be used again until you disable custody transfer mode of the measuring system. For additional information on this topic, refer to the Operating Instructions for Proline Promass 84 MODBUS RS485 (BA129D) in Chapter 7.3.2, "Disabling custody transfer measurement".

CUSTODY TRANSFER	Z000	Use this function to check whether the measuring point is set to custody transfer.  Display:
MODBUS register: Data type: Access:	7550 Integer read	0 = C.T. NO 1 = C.T. YES Factory setting:
		C.T. NO
PULSE OUTPUT 1 CUSTODY TRANSFER  MODBUS register: Data type: Access:	Z001  7551 Integer read/write	Note! This function is available only if the measuring instrument has a pulse output 1.  Selection of the pulse output 1 for transferring the calibrated signal.  Options: 0 = NO 1 = YES  Factory setting: NO
CURRENT OUTPUT 1 CUSTODY TRANSFER  MODBUS register: Data type: Access:	Z003  7553 Integer read/write	Note! This function is available only if the measuring instrument has a current output 1.  Selection of the current output 1 for transferring the calibrated signal.  Options: 0 = NO 1 = YES  Factory setting: NO

		Function description CUSTODY TRANSFER
TOTALIZER 1 CUSTODY	Z006	Selection of the totalizer 1 for transferring the calibrated signal.
TRANSFER		Options:
1	7556	0 = NO 1 = YES
MODBUS register: Data type:	Integer read/write	Factory setting:
Access:	read/ write	NO
TOTALIZER 2 CUSTODY TRANSFER	Z007	Selection of the totalizer 2 for transferring the calibrated signal.  Options:
		0 = NO
MODBUS register:	7557 Integer	1 = YES
Data type: Access:	read/write	Factory setting: NO
TOTALIZER 3 CUSTODY	Z008	Selection of the totalizer 3 for transferring the calibrated signal.
TRANSFER		<b>Options:</b> 0 = NO
1	7558	1 = YES
MODBUS register: Data type:	Integer read/write	Factory setting:
Access:		NO
MODBUS	Z009	Selection of the MODBUS communication for transferring the calibrated signal.
CONFIGURATION CUSTODY		Options:
TRANSFER		0 = NO
1	7559	1 = YES
MODBUS register:	Integer	Factory setting: NO
Data type: Access:	read/write	TVO

## 4 Block MEASURED VARIABLES

Block	Groups	Function groups					Functions	ns
MEASURED VARIABLES (A)	MEASURING  ⇒ VALUES  (AAA) P. 13	→ MAIN VALUES ⇒ (000) P. 13	MASS FLOW ⇒	VOLUME FLOW (0001) P. 13	CORRECTED VOLUME FLOW (0004) P. 13	DENSITY (0005) P. 13	REFERENCE DENSITY (0006) P. 13	TEMPERATURE (0008) P. 13
	<b>←</b> ← ⇒ ⇒							
	NITS	CONFIGURATION UNIT MASS FLOW	UNIT MASS FLOW		UNIT MASS UNIT VOL. FLOW UNIT VOLUME UNIT CORR. VOL. H.O.W.	UNIT VOLUME	UNIT CORR. VOL.	UNIT CORR.
	(ACA) P. 14	(040) P. 14	(0400) P. 14	(0401) P. 14	(0402) P. 15	(0403) P. 15	(0404) P. 16	(0405) P. 16
		(⇒						
		ADDITIONAL CONFIGURATION ⇒		UNIT REF.	UNIT	UNIT	UNIT	
		(042) P. 17	(0420) P. 17	(0421) P. 17		(0424) P. 18	(0426) P. 18	

## 4.1 Group MEASURING VALUES

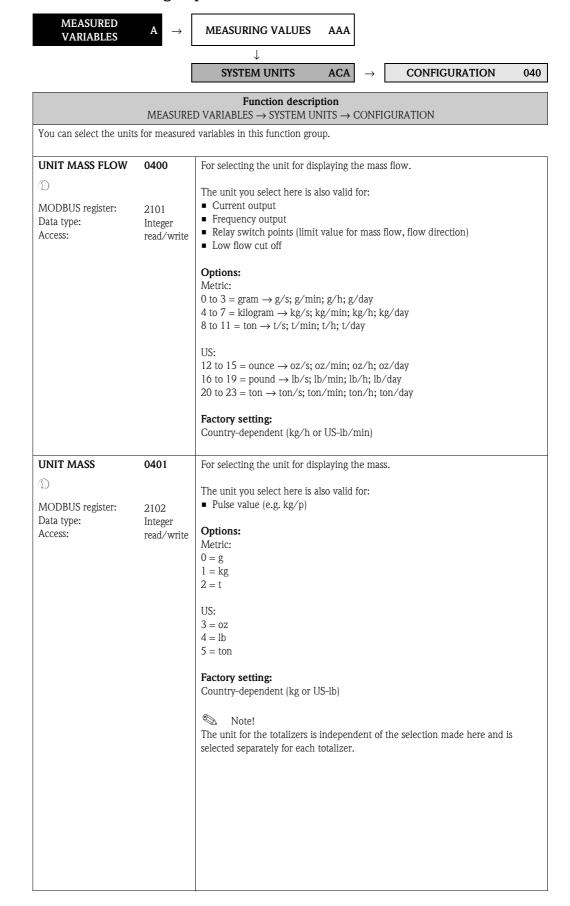
## 4.1.1 Function group MAIN VALUES



	MEASURED	Function description $ \mbox{VARIABLES} \rightarrow \mbox{MEASURING VALUES} \rightarrow \mbox{MAIN VALUES} $
		bles shown here can be set in the SYSTEM UNITS group. vards, a negative sign prefixes the flow reading on the display.
MASS FLOW	0000	The currently measured mass flow appears on the display.
MODBUS register:  Data type: Access:	2007 247 Float read	<b>Display:</b> 5-digit floating-point number, including unit and sign (e.g. 462.87 kg/h; -731.63 lb/min; etc.)
VOLUME FLOW MODBUS register: Data type: Access:	0001 2009 253 Float read	The calculated volume flow appears on the display. The volume flow is derived from the measured mass flow and the measured density of the fluid.  Display: 5-digit floating-point number, including unit and sign (e.g. 5.5445 dm³/min; 1.4359 m³/h; -731.63 gal/d; etc.)
CORRECTED VOLUME FLOW MODBUS register: Data type: Access:	0004 2011 Float read	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 <sup>3</sup> /h; 7.9846 scm/day; etc.)
DENSITY MODBUS register: Data type: Access:	0005 2013 249 Float read	The currently measured density or its specific gravity appears on the display. <b>Display:</b> 5-digit floating point number, incl. unit (e.g. 1.2345 kg/dm³; 993.5 kg/m³; 1.0015 SG_20 °C; etc.)
REFERENCE DENSITY MODBUS register: Data type: Access:	0006 2015 Float read	The density of the fluid, at reference temperature, appears on the display. The reference density can be measured or also specified via the function FIXED REFERENCE DENSITY (6461), (see Page 110).  Display: 5-digit floating point number, incl. unit (e.g. 1.2345 kg/dm³; 993.5 kg/m³; 1.0015 SG_20 °C; etc.)
TEMPERATURE MODBUS register: Data type: Access:	0008 2017 251 Float read	The currently measured temperature appears on the display.  Display: Max. 4-digit fixed-point number, including unit and sign (e.g23.4 °C; 160.0 °F; 295.4 K; etc.)

## 4.2 Group SYSTEM UNITS

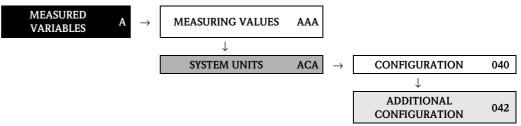
#### 4.2.1 Function group CONFIGURATION



	MEASUREI	Function description  D VARIABLES → SYSTEM UNITS → CONFIGURATION
UNIT VOLUME	0402	For selecting the unit for displaying the volume flow.
FLOW  MODBUS register: Data type: Access:	2103 Integer read/write	The unit you select here is also valid for:  Current output  Frequency output  Relay switch points (limit value for volume flow, flow direction)  Low flow cut off
		Options:  Metric: $0 \text{ to } 3 = \text{cubic centimeter} \rightarrow \text{cm}^3/\text{s}; \text{cm}^3/\text{min}; \text{cm}^3/\text{h}; \text{cm}^3/\text{day}$ $4 \text{ to } 7 = \text{cubic decimeter} \rightarrow \text{dm}^3/\text{s}; \text{dm}^3/\text{min}; \text{dm}^3/\text{h}; \text{dm}^3/\text{day}$ $8 \text{ to } 11 = \text{cubic meter} \rightarrow \text{m}^3/\text{s}; \text{m}^3/\text{min}; \text{m}^3/\text{h}; \text{m}^3/\text{day}$ $12 \text{ to } 15 = \text{milliliter} \rightarrow \text{ml/s}; \text{ml/min}; \text{ml/h}; \text{ml/day}$ $16 \text{ to } 19 = \text{liter} \rightarrow \text{l/s}; \text{l/min}; \text{l/h}; \text{l/day}$ $20 \text{ to } 23 = \text{hectoliter} \rightarrow \text{hl/s}; \text{hl/min}; \text{hl/h}; \text{hl/day}$ $24 \text{ to } 27 = \text{megaliter} \rightarrow \text{Ml/s}; \text{Ml/min}; \text{Ml/h}; \text{Ml/day}$ US: $28 \text{ to } 31 = \text{cubic centimeter} \rightarrow \text{cc/s}; \text{cc/min}; \text{cc/h}; \text{cc/day}$ $32 \text{ to } 35 = \text{acre foot} \rightarrow \text{af/s}; \text{af/min}; \text{af/h}; \text{af/day}$ $36 \text{ to } 39 = \text{cubic foot} \rightarrow \text{ft}^3/\text{s}; \text{ft}^3/\text{min}; \text{ft}^3/\text{h}; \text{ft}^3/\text{day}$ $40 \text{ to } 43 = \text{fluid ounce} \rightarrow \text{oz f/s}; \text{oz f/min}; \text{oz f/h}; \text{oz f/day}$ $44 \text{ to } 47 = \text{gallon} \rightarrow \text{gal/s}; \text{gal/min}; \text{gal/h}; \text{Kgal/h}; \text{Kgal/day}$ $88 \text{ to } 92 = \text{kilo gallon} \rightarrow \text{Kgal/s}; \text{Kgal/min}; \text{Kgal/h}; \text{Mgal/day}$ $48 \text{ to } 51 = \text{milling gallon} \rightarrow \text{Mgal/s}; \text{Mgal/min}; \text{Mgal/h}; \text{Mgal/day}$
		48 to 51 = million gallon → Mgal/s; Mgal/min; Mgal/h; Mgal/day 52 to 55 = barrel (normal fluids: 31.5 gal/bbl) → bbl/s; bbl/min; bbl/h; bbl/da 56 to 59 = barrel (beer: 31.0 gal/bbl) → bbl/s; bbl/min; bbl/h; bbl/day 60 to 63 = barrel (petrochemicals: 42.0 gal/bbl) → bbl/s; bbl/min; bbl/h; bbl/day 64 to 67 = barrel (filling tanks: 55.0 gal/bbl) → bbl/s; bbl/min; bbl/h; bbl/day Imperial: 68 to 71 = gallon → gal/s; gal/min; gal/h; gal/day 72 to 75 = mega gallon → Mgal/s; Mgal/min; Mgal/h; Mgal/day 76 to 79 = barrel (beer: 36.0 gal/bbl) → bbl/s; bbl/min; bbl/h; bbl/day 80 to 83 = barrel (petrochemicals: 34.97 gal/bbl) → bbl/s; bbl/min; bbl/h; bbl/day Factory setting:
LINIT VOLUME	0402	Country-dependent (m <sup>3</sup> /h or US-Mgal/day)
MODRUS avaistus	0403	For selecting the unit for displaying the volume.  The unit you select here is also valid for:  Pulse value (e.g. m <sup>3</sup> /p)
MODBUS register: Data type: Access:	2104 Integer read/write	Options: 0 to 6 = metric $\rightarrow$ cm <sup>3</sup> ; dm <sup>3</sup> ; m <sup>3</sup> ; ml; l; hl; Ml Mega
		7 to $16 = \text{US} \rightarrow \text{cc}$ ; af; ft <sup>3</sup> ; oz f; gal; Mgal; bbl (normal fluids); bbl (beer); bbl (petrochemicals); bbl (filling tanks); $22 = \text{Kgal}$
		17 to 20 = Imperial $\rightarrow$ gal; Mgal; bbl (beer); bbl (petrochemicals)
		Factory setting: m <sup>3</sup>
		Note!  The unit for the totalizers is independent of the selection made here and is selected separately for each totalizer.

		Function description
	MEASURE	D VARIABLES → SYSTEM UNITS → CONFIGURATION
UNIT CORRECTED VOLUME FLOW	0404	For selecting the unit for displaying the corrected volume flow.
1		The unit you select here is also valid for:  Current output
MODBUS register:	2105	Frequency output  Frequency output
Data type:	2105 Integer	■ Relay switch points (limit value for corrected volume flow, flow direction)
Access:	read/write	■ Low flow cut off
		Options:
		Metric: 0 = NL/s
		1 = NI/min
		2 = NI/h
		3 = NI/day $4 = Nm3/s$
		$5 = Nm^3/min$
		$6 = Nm^3/h$
		$7 = Nm^3/day$
		US: $8 = \text{Sm}^3/\text{s}$
		$9 = \text{Sm}^3/\text{min}$
		$10 = \text{Sm}^3/\text{h}$
		11 = Sm3/day $12 = Scf/s$
		13 = Scf/min
		14 = Scf/h
		15 = Scf/day
		Factory setting: Nm <sup>3</sup> /h
UNIT CORRECTED	0405	For selecting the unit for displaying the corrected volume.
VOLUME	0403	
$\bigcirc$		The unit you select here is also valid for:  Pulse value (e.g. Nm³/p)
MODBUS register:	2106	Ontions
Data type: Access:	Integer	Options: Metric:
Access.	read/write	$0 = Nm^3$
		1 = NI
		US:
		$2 = Sm^3$ $3 = Scf$
		Factory setting: Nm <sup>3</sup>
		Note!
		Note!  The unit for the totalizers is independent of the selection made here and is
		selected separately for each totalizer.
1		

## 4.2.2 Function group ADDITIONAL CONFIGURATION



MEA	ASURED VARIA	Function description ABLES $ ightarrow$ System Units $ ightarrow$ Additional configuration
UNIT DENSITY	0420	For selecting the unit for displaying the density.
MODBUS register: Data type: Access:	2107 Integer read/write	The unit you select here is also valid for:  Current output  Frequency output  Relay switch points (limit value for density)  Density response value for EPD  Density adjustment value
		Options: 0 to 10 = metric $\rightarrow$ g/cm <sup>3</sup> ; g/cc; kg/dm <sup>3</sup> ; kg/l; kg/m <sup>3</sup> ; SD 4 °C, SD 15 °C, SD 20 °C; SG 4 °C, SG 15 °C, SG 20 °C
		11 to 16 = US $\rightarrow$ lb/ft <sup>3</sup> ; lb/gal; lb/bbl (normal fluids); lb/bbl (beer); lb/bbl (petrochemicals); lb/bbl (filling tanks)
		17 to 19 = Imperial → lb/gal; lb/bbl (beer); lb/bbl (petrochemicals)
		Factory setting: kg/l
		SD = Specific Density, SG = Specific Gravity The specific density is the ratio of fluid density to water density (at water temperature = $4$ , $15$ , $20$ °C).
UNIT REFERENCE DENSITY	0421	For selecting the unit for displaying the reference density.
$\bigcirc$		The unit you select here is also valid for:
MODBUS register: Data type: Access:	2108 Integer read/write	<ul> <li>Current output</li> <li>Frequency output</li> <li>Relay switch points (limit value for density)</li> <li>Fixed reference density (for calculation of corrected volume flow)</li> </ul>
		Options: Metric: $1 = kg/Nl$ $2 = kg/Nm^3$
		US: 0 = g/Scc 3 = kg/Sm <sup>3</sup> 4 = lb/Scf
		Factory setting: kg/Nl

	IDED III D	Function description
	1	ABLES $ ightarrow$ System Units $ ightarrow$ Additional configuration
TEMPERATURE  MODBUS register: Data type:	2109 Integer read/write	For selecting the unit for displaying the temperature.  The unit you select here is also valid for:  Current output  Frequency output  Relay switch points (limit value for temperature)  Reference temperature (for corrected vol. measurement with measured reference density)  Options:  0 = °C (Celsius)  1 = K (Kelvin)  2 = °F (Fahrenheit)  3 = °R (Rankine)  Factory setting: °C
MODBUS register: Data type:	0424 2125 Integer read/write	For selecting the unit for displaying the length of the nominal diameter.  The unit you select here is valid for:  Nominal diameter of sensor (function NOMINAL DIAMETER (6804) on Page 116)  Options:  High selecting:  Nominal diameter of sensor (function NOMINAL DIAMETER (6804) on Page 116)  Factory setting:  MILLIMETER
UNIT PRESSURE	0426	For selecting the unit for displaying the pressure.
MODBUS register: Data type:	2130 Integer read/write	The unit you select here is valid for:  Specified pressure (function PRESSURE (6501) on Page 114)  Options:  0 = bara 1 = barg 2 = psia 3 = psig  Factory setting: bar g

## 5 Block QUICK SETUP

Block	Group / Function groups	Functions					
QUICK SETUP (B)	⇒	OS COMMISSION (1002) P. 19	⇒	OS - PULS. FLOW (1003) P. 19	OS - GAS MEASUREMENT (1004) P. 19	QS - COM- MUNICATION (1006) P. 19	T-DAT SAVE/LOAD (1009) P. 20

	Function description  QUICK SETUP				
■ The flowcharts of the various	nilable by means of the local display. Quick Setups are provided on the pages to follow. the Setups, refer to the Operating Instructions for Proline Promass 84 MODBUS RS485,				
QUICK SETUP 1002 COMMISSIONING	For starting the Setup menu.  Options: NO YES  Factory setting: NO				
QUICK SETUP 1003 PULSATING FLOW	Note! Function only available for measuring devices with a current or frequency output. For starting the Setup menu.  Options: NO YES  Factory setting: NO				
QUICK SETUP GAS 1004 MEASUREMENT	For starting the Setup menu.  Options: NO YES  Factory setting: NO				
QUICK SETUP 1006 COMMUNICATION	For starting the Setup menu.  Options: NO YES  Factory setting: NO				

# **Function description** QUICK SETUP T-DAT 1009 Use this function to save the parameter settings / configuration of the SAVE/LOAD transmitter in a transmitter DAT (T-DAT), or to load the parameter settings from the T-DAT into the EEPROM (manual backup function). Application examples: MODBUS register: 2401 • After commissioning, the current measuring point parameters can be saved to Data type: Integer Access: the T-DAT as a backup. read/write • If the transmitter is replaced for some reason, the data from the T-DAT can be loaded into the new transmitter (EEPROM). Options: 0 = CANCEL1 = SAVE(from EEPROM to T-DAT) 2 = LOAD (from the T-DAT into EEPROM) Factory setting: CANCEL Note! ■ If the target device has an older software version, the message "TRANSM. SW-DAT" is displayed during startup. Then only the SAVE function is available. This function is only possible if the target device has the same software version as, or a more recent software version than, the source device. ■ SAVE This function is always available.

## 5.1 Quick Setup

In the case of measuring devices without a local display, the individual parameters and functions must be configured via the configuration program, e.g. FieldCare.

If the measuring device is equipped with a local display, all the important device parameters for standard operation can be configured quickly and easily by means of the "Commissioning" Quick Setup menu.

- Quick Setup Commissioning, see below
- Quick Setup Pulsating Flow → Page 23
- Quick Setup Gas Measurement → Page 25
- Quick Setup Communication → Page 26

#### 5.1.1 Quick Setup Commissioning



#### Note!

- The display returns to the function SETUP COMMISSIONING (1002) if you press the display returns to the function SETUP commission (1002) if you press the display returns to the function SETUP commission. The stored parameters remain valid.
- The "COMMISSIONING" Quick Setup must be carried out before another Quick Setup is run.
- ① The "DELIVERY SETTINGS" 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 The promt ony appears if a current output and/or pulse/frequency output is available. Only the outputs not yet configured in the current Setup are offered for selection in each cycle.
- ⑤ The "YES" option remains visible until all the outputs have been configured. "NO" is the only option displayed when no further outputs are available.
- The "automatic parameterization of the display" option contains the following basic settings/factory settings:
  - YES Main line = mass flow
    Additional line = totalizer 1
    Information line = operating/system condition
  - NO The existing (selected) settings remain.
- ② The execution of other Quick Setups are described in the following chapters.

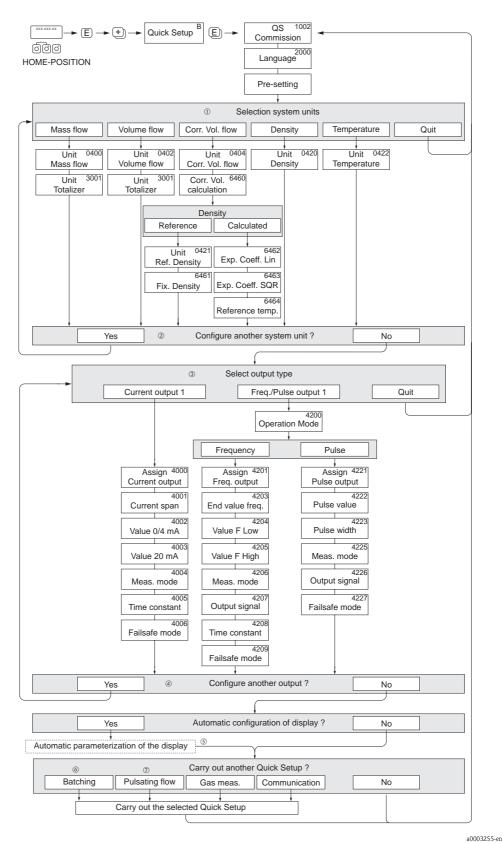


Fig. 5: "QUICK SETUP COMMISSIONING"- menu for straightforward configuration of the major device functions

#### 5.1.2 Quick Setup Pulsating Flow

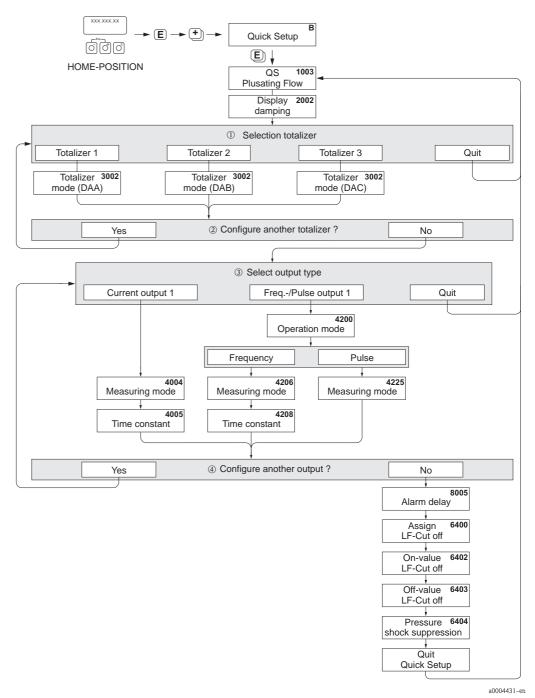


Fig. 6: "OUICK SETUP PULSATING FLOW" menu for operation with severely pulsating flow.
Recommended settings are found on the following page.

- ① Only totalizers not yet configured in the current Setup are offered for selection in each cycle.
- ③ Only the output not yet configured in the current Setup is offered for selection in the second cycle.
- $\begin{tabular}{ll} @ The "YES" option remains visible until both outputs have been parameterized. \\ "NO" is the only option displayed when no further outputs are available. \\ \end{tabular}$



#### Note!

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

Quick Setup "Pulsating Flow"					
HOME position $\rightarrow$ $\blacksquare$ $\rightarrow$ MEASURAND $\rightarrow$ $\boxdot$ $\rightarrow$ QUICK SETUP $\rightarrow$ $\blacksquare$ $\rightarrow$ QS PULSATING FLOW (1003)					
Function No. Function name Selection with To next function with I					
1003	QS PULS. FLOW	YES After is pressed by way of confirmation, the Quick Setup menu calls up all the subsequent functions in succession.			

Basic configur	ation	
2002	DISPLAY DAMPING	1 s
3002	TOTALIZER MODE (DAA)	BALANCE (Totalizer 1)
3002	TOTALIZER MODE (DAB)	BALANCE (Totalizer 2)
3002	TOTALIZER MODE (DAC)	BALANCE (Totalizer 3)
Signal type for	"CURRENT OUTPUT 1"	
4004	MEASURING MODE	PULS. FLOW
4005	TIME CONSTANT	1 s
Signal type for	"FREQ./PULSE OUTPUT 1" (for FREQUEN	NCY operating mode)
4206	MEASURING MODE	PULS. FLOW
4208	TIME CONSTANT	0 s
Signal type for	"FREQ./PULSE OUTPUT 1" (for PULSE ope	erating mode)
4225	MEASURING MODE	PULS. FLOW
Other settings		
8005	ALARM DELAY	0 s
6400	ASSIGN LOW FLOW CUTOFF	MASS FLOW
6402	ON-VALUE LOW FLOW CUT OFF	Setting depends on diameter:  DN 2 = 0.10 [kg/h] or [l/h]  DN 4 = 0.45 [kg/h] or [l/h]  DN 8 = 2.0 [kg/h] or [l/h]  DN 15 = 6.5 [kg/h] or [l/h]  DN 25 = 18 [kg/h] or [l/h]  DN 40 = 45 [kg/h] or [l/h]  DN 50 = 70 [kg/h] or [l/h]  DN 80 = 180 [kg/h] or [l/h]  DN 100 = 350 [kg/h] or [l/h]  DN 150 = 650 [kg/h] or [l/h]  DN 250 = 1800 [kg/h] or [l/h]
6403	OFF-VALUE LOW FLOW CUTOFF	50%
6404	PRESSURE SHOCK SUPPRESSION	0 s

Back to the HOME position:

- ightarrow Press and hold down Esc key ightharpoonup for longer than three seconds or ightharpoonup Repeatedly press and release Esc key ightharpoonup ightharpoonup Exit the function matrix step by step

### 5.1.3 Quick Setup Gas Measurement

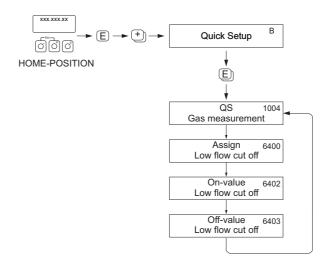


Fig. 7: QUICK SETUP GAS MEASUREMENT menu

A0002502-EN

Quick Setup "	Quick Setup "Gas measurement"				
MEASURED VA	$1 \rightarrow \blacksquare \rightarrow \text{MEASURED VARIA}$ ARIABLE $\rightarrow \boxdot \rightarrow \text{QUICK SET}$ $\rightarrow \blacksquare \rightarrow \text{QS-GAS MEASURE}$	UP (B)			
Function No.	Function name	Setting to be selected ( ( ) ) (to next function with ( )			
1004	OS GAS MEASUREMENT	YES After  is pressed by way of confirmation, the Ouick Setup menu calls up all the subsequent functions in succession.			
▼					
6400	ASSIGN LOW FLOW CUTOFF	On account of the low mass flow involved when gas flows are measured, it is advisable not use a low flow cutoff.			
1		Setting: OFF			
6402	ON-VALUE LOW FLOW CUT OFF	If the ASSIGNMENT LOW FLOW CUTOFF function was not set to "OFF", the following applies:			
		Setting: 0.0000 [unit]			
		User input: Flow rates for gas measurements are low, so the value for the switch-on point (= low flow cutoff) must be correspondingly low.			
6403	OFF-VALUE LOW FLOW CUTOFF	If the ASSIGNMENT LOW FLOW CUTOFF function was not set to "OFF", the following applies:			
		Setting: 50%			
		User input: Enter the switch-off point as a positive hysteresis in %, referenced to the switch-on point.			
▼ Back to the HO	ME position:				

#### Note!

Quick Setup automatically deactivates the function EMPTY PIPE DETECTION (6420) so that the instrument can measure flow at low gas pressures.

Endress+Hauser 25

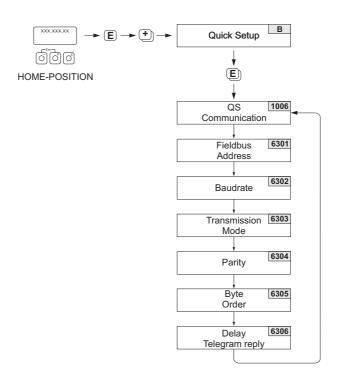
ightarrow Press and hold down Esc key is for longer than three seconds or

ightarrow Repeatedly press and release Esc key ightharpoonup Exit the function matrix step by step

#### 5.1.4 Quick Setup Communication

To establish serial data transfer, various arrangements between the MODBUS master and MODBUS slave are required which have to be taken into consideration when configuring various functions.

These functions can be configured quickly and easily by means of the "Communication" Quick Setup. The following table explains the parameter configuration options in more detail.



A0004430-en

Function name	Suggested settings	Description
ugh the function matrix:		
QUICK SETUP	QUICK SETUP COMMUNICATION	see P. 19
QUICK SETUP COMMUNICATION	YES	see P. 19
uration:	Factory setting:	
FIELDBUS ADDRESS	247	see P. 103
BAUDRATE	19200 BAUD	see P. 103
TRANSMISSION MODE	RTU	see P. 104
PARITY	EVEN	see P. 104
BYTE ORDER	1 - 0 - 3- 2	see P. 104
DELAY TELE. REPLY	10 ms	see P. 105
	QUICK SETUP COMMUNICATION  uration:  FIELDBUS ADDRESS  BAUDRATE  TRANSMISSION MODE  PARITY  BYTE ORDER	QUICK SETUP COMMUNICATION  QUICK SETUP COMMUNICATION  YES  Pactory setting:  FIELDBUS ADDRESS  BAUDRATE  19200 BAUD  TRANSMISSION MODE  RTU  PARITY  EVEN  BYTE ORDER  QUICK SETUP COMMUNICATION  YES  Factory setting:  FACTORY SETTING:  FACTORY SETTING:  FACTORY SETTING:  FACTORY SETTING:  TO STATE OF THE PARITY EVEN  TO STATE OF THE PARITY EVEN

## 5.2 Data back-up/transfer

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

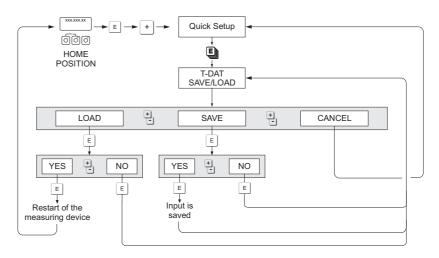
This is required for the following applications:

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



#### Note!

Installing and removing the T-DAT  $\rightarrow$  Operating Instructions for Proline Promass 84 MODBUS RS485, BA129D



a0001221-en

Data storage/transmission with T-DAT SAVE/LOAD

Information on the LOAD and SAVE options available:

#### LOAD:

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



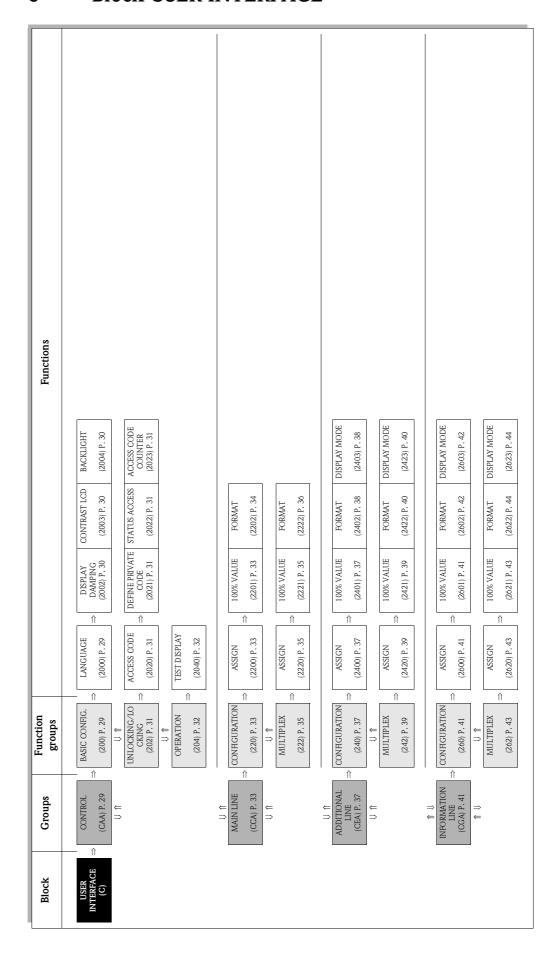
#### Note:

- Any settings already saved on the EEPROM are deleted.
- This option is only available if the T-DAT contains valid data.
- This option can only be executed if the software version of the T-DAT is the same as, or more recent than, that of the EEPROM. If this is not the case, the error message "TRANSM. SW-DAT" appears after restarting and the LOAD function is then no longer available.

#### SAVE:

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

## 6 Block USER INTERFACE



## 6.1 Group CONTROL

## 6.1.1 Function group BASIC CONFIGURATION

USER INTERFACE	$C \rightarrow$	CONTROL CAA → BASIC CONFIGURATION 200
	USER IN	Function description TERFACE → CONTROL → BASIC CONFIGURATION
LANGUAGE	2000	For selecting the language for all texts, parameters and messages shown on the
(only for NTEP, MC)		local display.
(only for NTEP, MC) MODBUS register: Data type: Access:	2502 Integer read/write	Note!  The displayed options depend on the language group available. The language group that is supplied with the measuring device is displayed in the LANGUAGE GROUP (8226) function (see Page 126).  Options: (for language group WEST EU / USA)  0 = ENGLISH  1 = DEUTSCH  2 = FRANCAIS  3 = ESPANOL  4 = ITALIANO  5 = NEDERLANDS  12 = PORTUGUESE  Options: (for language group EAST EU / SCAND)
		0 = ENGLISH 7 = NORSK 8 = SVENSKA 9 = SUOMI 13 = POLISH 14 = RUSSIAN 15 = CZECH  Options: (for language group ASIA) 0 = ENGLISH 10 = BAHASA INDONESIA 11 = JAPANESE (syllabary)
		Options: (for language group CHINA) $0 = \text{ENGLISH}$ $16 = \text{CHINESE}$
		Factory setting: Depends on country, see Page 130
		Note! ■ If you press the □/□ keys simultaneously 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 Endress+Hauser sales office if you have any questions.

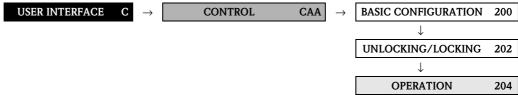
DISPLAY DAMPING  (only for NTEP, MC)  MODBUS register: Data type: Access:	2503 Float read/write	For entering a time constant which defines how the display reacts to severely fluctuating flow variables, either very quickly (enter a low time constant) or with damping (enter a high time constant).  Input: 0 to 100 seconds  Factory setting: 1 s  Note! Entering the value "0" (seconds) means that the damping is switched off.		
CONTRAST LCD  (only for NTEP, MC)  MODBUS register: Data type: Access:	2003  2505 Float read/write	For adjusting the display contrast to suit local operating conditions.  Input: 10 to 100%  Factory setting: 50%		
BACKLIGHT  (only for NTEP, MC)  MODBUS register: Data type: Access:	2566 Float read/write	For adjusting the backlight to suit local operating conditions.  Input: 0 to 100%  Note! Entering the value "0" means that the backlight is "switched off". The display then no longer emits any light, i.e. the display texts can no longer be read in the dark.  Factory setting: 50%		

## 6.1.2 Function group UNLOCKING/LOCKING

USER INTERFACE C  $\rightarrow$  CONTROL CAA  $\rightarrow$  BASIC CONFIGURATION 200  $\downarrow$  UNLOCKING/LOCKING 202

		UNLOCKING/LOCKING 202
	USER IN	Function description TERFACE → CONTROL → UNLOCKING/LOCKING
ACCESS CODE MODBUS register: Data type: Access:	2020 2508 Float read/write	Note! This function is only relevant for local operation and has no effect on access via MODBUS RS485 communication.
		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 $\  \  \  \  \  \  $ dr $\  \  \  \  \  $ keys in any function, the measuring system automatically goes to this function and the prompt to enter the code appears on the display (when programming is disabled).
		You can enable programming by entering your personal code ( <b>factory setting = 84,</b> see function DEFINE PRIVATE CODE (2021)).
		To set the measuring instrument to access-protection mode, enter the <b>custody code 8400</b> here. This locks all the functions that are marked with a keyhole symbol $(\square)$ .
		Input: Max. 4-digit number: 0 to 9999
		<ul> <li>Note!</li> <li>Programming is disabled if you do not press a key within 60 seconds following automatic return to the HOME position.</li> <li>You can also disable programming in this function by entering any number (other than the defined private code).</li> <li>The Endress+Hauser service organization can be of assistance if you mislay your personal code.</li> </ul>
DEFINE PRIVATE CODE  (Only for NTEP, MC)	2021	Note! This function is only relevant for local operation and has no effect on access via MODBUS RS485 communication.
MODBUS register: Data type:	2510 Float	For specifying a personal code for enabling programming in the function ACCESS CODE.
Access:	read/write	Input: 0 to 9999 (max. 4-digit number)
		Factory setting: 84
		<ul> <li>Note!</li> <li>Programming is always enabled with the code "0".</li> <li>Programming has to be enabled before this code can be changed. When programming is disabled this function is not available, thus preventing others from accessing your personal code.</li> </ul>
STATUS ACCESS MODBUS register: Data type: Access:	2022 2512 Integer read	Indicates whether access to the function matrix is currently possible (ACCESS CUSTOMER) or whether configuration is locked (LOCKED).  Display:  0 = LOCKED (parameterization disabled)
		1 = ACCESS CUSTOMER (parameterization possible)
ACCESS CODE COUNTER	2023	Displays how often the customer code, service code or the digit "0" (code-free) has been entered to gain access to the function matrix.
MODBUS register: Data type: Access:	2568 Integer read	<b>Display:</b> Max. 7-digit number: 0 to 9999999
		Factory setting: 0

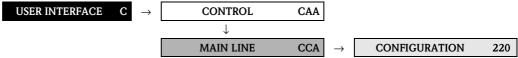
## 6.1.3 Function group OPERATION



		OPERATION 204
	US	Function description SER INTERFACE $\rightarrow$ CONTROL $\rightarrow$ OPERATION
TEST DISPLAY	2040	For testing the operability of the local display and its pixels.
MODBUS register: Data type: Access:	2513 Integer read/write	<b>Options:</b> 0 = OFF 1 = ON
		Factory setting: OFF
		Test sequence: 1. Start the test by selecting "ON".
		2. All pixels of the main line, additional line and information line are darkened for minimum 0.75 seconds.
		3. Main line, additional line and information line show an "8" in each field for minimum 0.75 seconds.
		4. Main line, additional line and information line show a "0" in each field for minimum 0.75 seconds.
		5. Main line, additional line and information line show nothing (blank display) for minimum 0.75 second.
		When the test is completed, the local display returns to its initial state and the setting changes to "OFF".

## 6.2 Group MAIN LINE

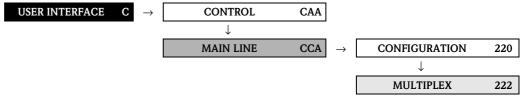
## **6.2.1** Function group CONFIGURATION



		MAIN LINE CCA → CONFIGURATION 220			
Function description					
ASSIGN	2200	For assigning a value to be displayed to the main line (top line in the local display). This value is displayed during normal operation.			
MODBUS register: Data type: Access:	2514 Integer read/write	Options: (standard)  0 = OFF  1 = MASS FLOW  2 = MASS FLOW IN %  3 = VOLUME FLOW IN %  5 = CORRECTED VOLUME FLOW  6 = CORRECTED VOLUME FLOW IN %  7 = DENSITY  8 = REFERENCE DENSITY  9 = TEMPERATURE  15 = ACTUAL CURRENT  18 = ACTUAL FREQUENCY  20 = TOTALIZER 1  21 = TOTALIZER 2  22 = TOTALIZER 3  98 = CUSTODY TRANSFER  Factory setting:  MASS FLOW			
1000/ MALLIE	2201				
MODBUS register: Data type: Access:	2519 Float read/write	Note! This function is not available unless one of the following was selected in the ASSIGN function (2200): ■ MASS FLOW IN % ■ VOLUME FLOW IN % ■ CORRECTED VOLUME FLOW IN % For specifying the flow value to be shown on the display as the 100% value.  User input: 5-digit floating-point number  Factory setting: depends on nominal diameter and country → Page 129 ff.			

FORMAT	2202	For selecting the maximum number of places after the decimal point to be	
<b>(</b> )		displayed for the display value.	
MODBUS register: Data type: Access:	2516 Integer read/write	Options: 0 = XXXXX 1 = XXXX.X 2 = XXX.XX 3 = XX.XXX	
		4 = X.XXXX	
		Factory setting: X.XXXX	
		Note!	
		<ul> <li>Note that this setting only affects the reading as it appears on the display, it had no influence on the accuracy of the system's calculations.</li> <li>The places after the decimal point as computed by the measuring device cannot always be displayed, depending on this setting and the engineering unit. In such instances an arrow appears on the display between the measuring value and the engineering unit (e.g. 1.2 → kg/h), indicating that the measuring system is computing with more decimal places than can be shown on the display.</li> </ul>	

## **6.2.2** Function group MULTIPLEX

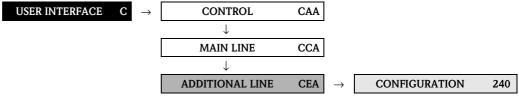


		WIOLITELEX ZZZ
Function description  USER INTERFACE $\rightarrow$ CONTROL $\rightarrow$ CONFIGURATION		
ASSIGN	2220	For assigning a second reading to be displayed in the main line alternately (every 10 seconds) with the value defined in the ASSIGN function (2200).
MODBUS register: Data type: Access:	2522 Integer read/write	Options: (standard) 0 = OFF 1 = MASS FLOW 2 = MASS FLOW IN % 3 = VOLUME FLOW IN % 5 = CORRECTED VOLUME FLOW 6 = CORRECTED VOLUME FLOW IN % 7 = DENSITY 8 = REFERENCE DENSITY 9 = TEMPERATURE 15 = ACTUAL CURRENT 18 = ACTUAL FREQUENCY 20 = TOTALIZER 1 21 = TOTALIZER 2 22 = TOTALIZER 3 98 = CUSTODY TRANSFER  Factory setting: OFF
100% VALUE	2221	
MODBUS register: Data type: Access:	2524 Float read/write	Note! This function is not available unless one of the following was selected in the ASSIGN function (2220):  MASS FLOW IN %  VOLUME FLOW IN %  CORRECTED VOLUME FLOW IN %  For specifying the flow value to be shown on the display as the 100% value.  User input: 5-digit floating-point number  Factory setting:
		depends on nominal diameter and country → Page 129 ff.

# Function description USER INTERFACE → CONTROL → CONFIGURATION **FORMAT** 2222 For selecting the maximum number of places after the decimal point to be displayed for the display value. Options: MODBUS register: 2523 0 = XXXXXData type: Integer 1 = XXXX.XAccess: read/write 2 = XXX.XX3 = XX.XXX4 = X.XXXXFactory setting: X.XXXX Note! • Note that this setting only affects the reading as it appears on the display, it has no influence on the accuracy of the system's calculations. ■ The places after the decimal point as computed by the measuring device cannot always be displayed, depending on this setting and the engineering unit. In such instances an arrow appears on the display between the measuring value and the engineering unit (e.g. $1.2 \rightarrow kg/h$ ), indicating that the measuring system is computing with more decimal places than can be shown on the display.

# 6.3 Group ADDITIONAL LINE

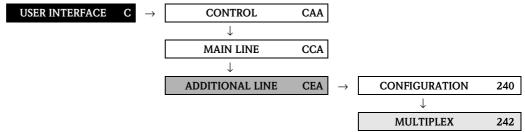
# 6.3.1 Function group CONFIGURATION



	L	ADDITIONAL LINE CEA $\rightarrow$	CONFIGURATION 2	240
		Function description		
		$\begin{array}{c} TERFACE \to ADDITIONAL \ LINE \to CONFIC \\ L = & \\ L = &$		
ASSIGN	2400	For assigning a value to be displayed to the a display). This value is displayed during norn		ocal
MODBUS register: Data type: Access:	2527 Integer read/write	Options: 0 = OFF 1 = MASS FLOW 2 = MASS FLOW IN % 3 = VOLUME FLOW IN % 5 = CORRECTED VOLUME FLOW IN % 5 = CORRECTED VOLUME FLOW IN % 7 = DENSITY 8 = REFERENCE DENSITY 9 = TEMPERATURE 10 = MASS FLOW BARGRAPH IN % 11 = VOLUME FLOW BARGRAPH IN % 12 = CORRECTED VOLUME FLOW BARG 15 = ACTUAL CURRENT 18 = ACTUAL FREQUENCY 20 = TOTALIZER 1 20 = TOTALIZER 2 22 = TOTALIZER 3 98 = CUSTODY TRANSFER 23 = TAG NAME  Factory setting: TOTALIZER 1	RAPH IN %	
100% VALUE  MODBUS register: Data type: Access:	2401  2529 Float read/write	Note! This function is not available unless one of the ASSIGN function (2400):  MASS FLOW IN %  VOLUME FLOW IN %  CORRECTED VOLUME FLOW IN %  MASS FLOW BARGRAPH IN %  VOLUME FLOW BARGRAPH IN %  CORRECTED VOLUME FLOW BARGRAPH IN %  CORRECTED VOLUME FLOW BARGRAPH IN %  For specifying the flow value to be shown of the	NPH IN % n the display as the 100% value.	

HORMAT  PORMAT  2402    For selecting the maximum number of places after the decimal point to be displayed for the display value.    MODBUS register: Data type: Integer Pread/write	Function description							
displayed for the display value.    MODBUS register: Data type:   Access:								
Data type:    Data type:   Integer   read/write     0 = XXXXX   2   XXXXX   2   XXXXX   2   XXXXX   3   XXXXX   4   XXXXX   4   XXXXX   4   XXXXX   4   XXXXX   5   XXXXX   XXXXX   5   XXXXX   XXXX   XXXX   XXXX   XXXX   XXXX   XXXX   XXXX   XXXX   XXXX   XXX		2402	·					
MODBUS register: Data type: Access:  2531 Integer read/write  CORRECTED VOLUME FLOW BARGRAPH IN %  VOLUME FLOW BARGRAPH IN %  CORRECTED VOLUME FLOW BARGRAPH IN %  Use this function to define the format of the bar graph.  Options: 0 = STANDARD 1 = SYMMETRY  Factory setting: STANDARD  Illustration of bar graph  125 + 50 + 75  Fig. 8:  Bar graph for STANDARD option Simple bar graph with 25 / 50 / 75% gradations and integrated sign.  Fig. 9:  Bar graph for SYMMETRY option Symmetrical bar graph for positive and negative directions of flow, with	Data type:	Integer	<ul> <li>0 = XXXXX</li> <li>1 = XXXX.X</li> <li>2 = XXX.XX</li> <li>3 = XX.XXX</li> <li>4 = X.XXXX</li> <li>Factory setting:</li> <li>X.XXXX</li> <li>Note!</li> <li>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.</li> <li>The places after the decimal point as computed by the measuring device cannot always be displayed, depending on this setting and the engineering unit. In such instances an arrow appears on the display between the measuring value and the engineering unit (e.g. 1.2 → kg/h), indicating that the measuring system is computing with more decimal places than can be shown on the</li> </ul>					
MODBUS register: Data type: Access:  2531 Integer read/write  MODBUS register: Data type: Access:  2531 Integer read/write  MASS FLOW BARGRAPH IN %  VOLUME FLOW BARGRAPH IN %  CORRECTED VOLUME FLOW BARGRAPH IN %  Use this function to define the format of the bar graph.  Options: 0 = STANDARD 1 = SYMMETRY  Factory setting: STANDARD  Illustration of bar graph  125 + 50 + 75  Fig. 8: Bar graph for STANDARD option Simple bar graph with 25 / 50 / 75% gradations and integrated sign.  Fig. 9: Bar graph for SYMMETRY option Symmetrical bar graph for positive and negative directions of flow, with	DISPLAY MODE	2403						
	MODBUS register: Data type:	2531 Integer	This function is not available unless one of the following was selected in the ASSIGN function (2400):  • MASS FLOW BARGRAPH IN %  • VOLUME FLOW BARGRAPH IN %  • CORRECTED VOLUME FLOW BARGRAPH IN %  Use this function to define the format of the bar graph.  Options:  0 = STANDARD  1 = SYMMETRY  Factory setting: STANDARD  Illustration of bar graph  • 25 + 50 + 75  **  **  **  **  **  **  **  **  **					

# **6.3.2** Function group MULTIPLEX

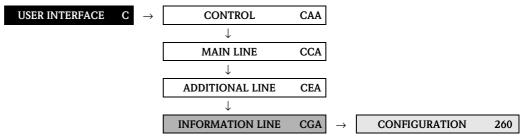


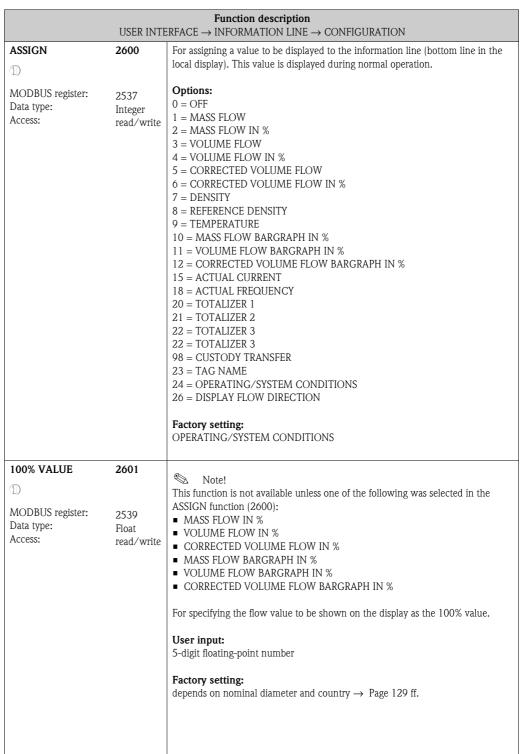
	IISER I	Function description  INTERFACE $\rightarrow$ ADDITIONAL LINE $\rightarrow$ MULTIPLEX
ASSIGN	2420	For assigning a second reading to be displayed in the main line alternately (every 10 seconds) with the value defined in the ASSIGN function (2400).
MODBUS register: Data type: Access:	2532 Integer read/write	Options:  0 = OFF  1 = MASS FLOW  2 = MASS FLOW IN %  3 = VOLUME FLOW IN %  5 = CORRECTED VOLUME FLOW  6 = CORRECTED VOLUME FLOW IN %  7 = DENSITY  8 = REFERENCE DENSITY  9 = TEMPERATURE  10 = MASS FLOW BARGRAPH IN %  11 = VOLUME FLOW BARGRAPH IN %  12 = CORRECTED VOLUME FLOW BARGRAPH IN %  15 = ACTUAL CURRENT  18 = ACTUAL FREQUENCY  20 = TOTALIZER 1  21 = TOTALIZER 2  22 = TOTALIZER 3  98 = CUSTODY TRANSFER  23 = TAG NAME  Factory setting:  OFF
MODBUS register: Data type: Access:	2421 2534 Float read/write	Note! This function is not available unless one of the following was selected in the ASSIGN function (2420): ■ MASS FLOW IN % ■ VOLUME FLOW IN % ■ CORRECTED VOLUME FLOW IN % ■ MASS FLOW BARGRAPH IN % ■ VOLUME FLOW BARGRAPH IN % ■ CORRECTED VOLUME FLOW BARGRAPH IN % ■ CORRECTED VOLUME FLOW BARGRAPH IN % ■ CORRECTED VOLUME FLOW BARGRAPH IN %  For specifying the flow value to be shown on the display as the 100% value.  User input: 5-digit floating-point number  Factory setting: depends on nominal diameter and country → Page 129 ff.

(D)	USER I								
	422	Function description  USER INTERFACE $\rightarrow$ ADDITIONAL LINE $\rightarrow$ MULTIPLEX							
MODBUS register: 2.4		For selecting the maximum number of places after the decimal point to be displayed for the display value.							
Data type: In	533 nteger ead/write	Options:  0 = XXXXX  1 = XXXX.X  2 = XXX.XX  3 = XX.XXX  4 = X.XXXX  Factory setting: X.XXXX  Note!  Note that this setting only affects the reading as it appears on the display, it has no influence on the accuracy of the system's calculations.  The places after the decimal point as computed by the measuring device cannot always be displayed, depending on this setting and the engineering unit. In such instances an arrow appears on the display between the measuring value and the engineering unit (e.g. 1.2 → kg/h), indicating that the measuring system is computing with more decimal places than can be shown on the display.							
DISPLAY MODE 24	423								
MODBUS register: 25 Data type: In	536 hteger ead/write	This function is not available unless one of the following was selected in the ASSIGN function (2420):  • MASS FLOW BARGRAPH IN %  • VOLUME FLOW BARGRAPH IN %  • CORRECTED VOLUME FLOW BARGRAPH IN %  Use this function to define the format of the bar graph.  Options: 0 = STANDARD 1 = SYMMETRY  Factory setting: STANDARD  Illustration of bar graph  • 25 + 50 + 75  **  A0001258  Fig. 10: Bar graph for STANDARD option Simple bar graph with 25 / 50 / 75% gradations and integrated sign.  - 50 - 50 / 0 / +50% gradations and integrated sign.							

# 6.4 Group INFORMATION LINE

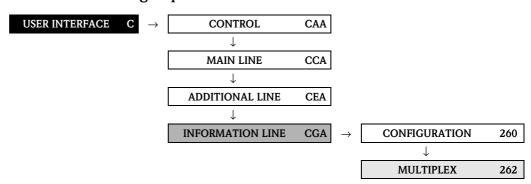
# 6.4.1 Function group CONFIGURATION

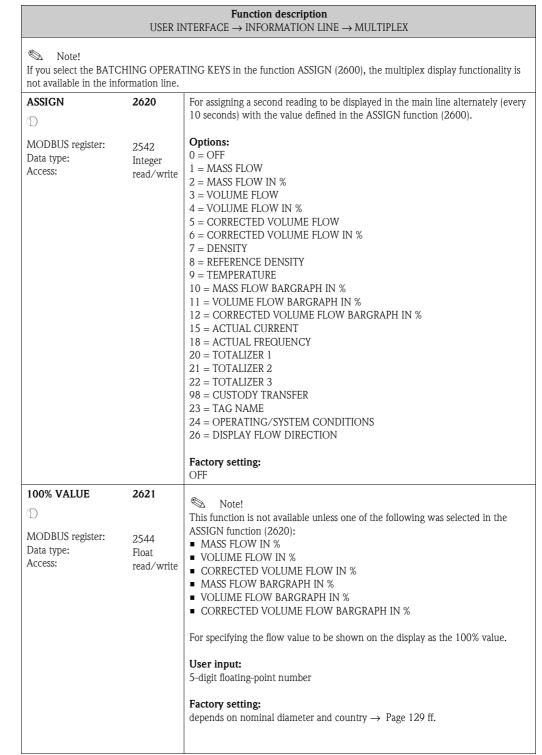




Function description							
USER INTERFACE $ ightarrow$ Information line $ ightarrow$ Configuration							
<b>FORMAT</b>	2602	For selecting the maximum number of places after the decimal point to be displayed for the display value.					
MODBUS register: Data type: Access:	2538 Integer read/write	Options:  0 = XXXXX  1 = XXXX.X  2 = XXX.XX  3 = XX.XXX  4 = X.XXXX  Factory setting: X.XXXX  Note!  Note that this setting only affects the reading as it appears on the display, it has no influence on the accuracy of the system's calculations.  The places after the decimal point as computed by the measuring device cannot always be displayed, depending on this setting and the engineering unit. In such instances an arrow appears on the display between the measuring value and the engineering unit (e.g. 1.2 → kg/h), indicating that the measuring system is computing with more decimal places than can be shown on the display.					
DISPLAY MODE	2603						
MODBUS register: Data type: Access:	2541 Integer read/write	Note! This function is not available unless one of the following was selected in the ASSIGN function (2600):  • MASS FLOW BARGRAPH IN %  • VOLUME FLOW BARGRAPH IN %  • CORRECTED VOLUME FLOW BARGRAPH IN %  Use this function to define the format of the bar graph.  Options: 0 = STANDARD 1 = SYMMETRY  Factory setting: STANDARD  Illustration of bar graph  • 25 + 50 + 75  **  **  **  **  **  **  **  **  **					

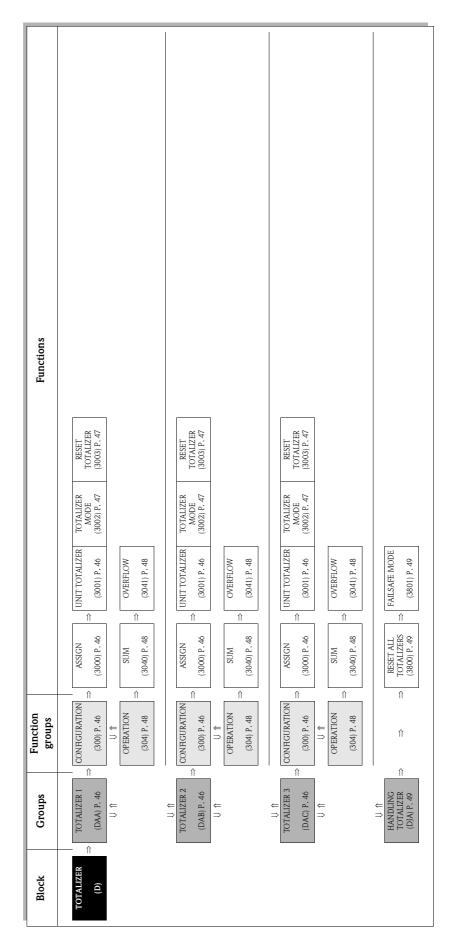
# 6.4.2 Function group MULTIPLEX





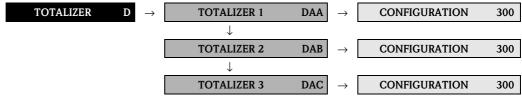
		Function description					
USER INTERFACE $ ightarrow$ INFORMATION LINE $ ightarrow$ MULTIPLEX							
FORMAT	2622	For selecting the maximum number of places after the decimal point to be displayed for the display value.					
MODBUS register: Data type: Access:	2543 Integer read/write	Options:  0 = XXXXX  1 = XXXX.X  2 = XXX.XX  3 = XX.XXX  4 = X.XXXX  Factory setting: X.XXXX  Note!  Note that this setting only affects the reading as it appears on the display, it has no influence on the accuracy of the system's calculations.  The places after the decimal point as computed by the measuring device cannot always be displayed, depending on this setting and the engineering unit. In such instances an arrow appears on the display between the measuring value and the engineering unit (e.g. 1.2 → kg/h), indicating that the measuring system is computing with more decimal places than can be shown on the display.					
MODBUS register: Data type: Access:	2546 Integer read/write	Note! This function is not available unless one of the following was selected in the ASSIGN function (2620):  MASS FLOW BARGRAPH IN %  VOLUME FLOW BARGRAPH IN %  CORRECTED VOLUME FLOW BARGRAPH IN %  Use this function to define the format of the bar graph.  Options: 0 = STANDARD 1 = SYMMETRY  Factory setting: STANDARD  Illustration of bar graph  1					

# 7 Block TOTALIZER



# 7.1 Group TOTALIZER (1 to 3)

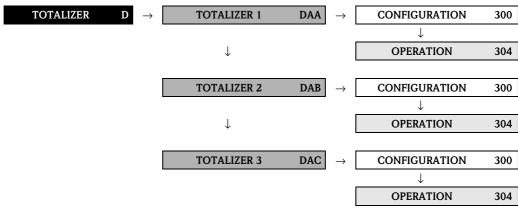
# 7.1.1 Function group CONFIGURATION



	-								
		TOTALIZER 3 DAC → CONFIGURATION 300							
		Function description							
TOTALIZER → TOTALIZER (1 to 3) → CONFIGURATION									
Note! The function descriptio	Note! The function descriptions below apply to totalizers 1 to 3; the totalizers are independently configurable.								
ASSIGN	3000	For assigning a measured variable to the totalizer in question.							
MODBUS register: Totalizer 1 Totalizer 2 Totalizer 3 Data type: Access:	2601 2801 3001 Integer read/write	Options: 0 = OFF 1 = MASS FLOW 2 = VOLUME FLOW 3 = CORRECTED VOLUME FLOW  Factory setting: MASS FLOW  Note! ■ This function cannot be changed if:  - The measuring device has been configured in accordance with NTEP or MC approval.  - The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for the available functions Z006 to Z008 in the CUSTODY TRANSFER block. ■ The totalizer is reset to "0" as soon as the selection is changed. ■ If you select OFF in the function group CONFIGURATION of the totalizer in question, only the ASSIGN (3000) function remains visible.							
UNIT TOTALIZER	3001	For selecting the unit for the measured variable assigned in the function ASSIGN (3000).							
MODBUS register:  Totalizer 1  Mass flow  Volume flow  Corr. vol. flow  Totalizer 2  Mass flow  Volume flow  Corr. vol. flow  Totalizer 3  Mass flow  Volume flow  Corr. vol. flow  Totalizer 3  Mass flow  Volume flow  Access:	2602 2603 2604 2802 2803 2804 3002 3003 3004 Integer read/write	Options: for the MASS FLOW assignment 0 to 2 = metric $\rightarrow$ g; kg; t 3 to 4 = US $\rightarrow$ oz; lb; ton  Factory setting: kg  Options: for the VOLUME FLOW assignment 0 to 6 = metric $\rightarrow$ cm <sup>3</sup> ; dm <sup>3</sup> ; m <sup>3</sup> ; ml; l; hl; Ml Mega  7 to 16 = US $\rightarrow$ cc; af; ft <sup>3</sup> ; oz f; gal; Mgal; bbl (normal fluids); bbl (beer); bbl (petrochemicals); bbl (filling tanks) 22 = Kgal  17 to 20 = Imperial $\rightarrow$ gal; Mgal; bbl (beer); bbl (petrochemicals)  Factory setting: m <sup>3</sup>							
		(continued on next page)							

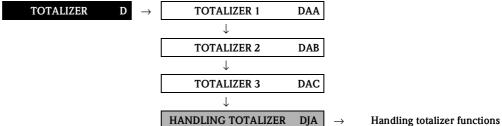
	TOTAI	Function description  LIZER $\rightarrow$ TOTALIZER (1 to 3) $\rightarrow$ CONFIGURATION
UNIT TOTALIZER (continued)	3001	<b>Options:</b> for the CORRECTED VOLUME FLOW assignment 0 to 1 = metric $\rightarrow$ NI; Nm <sup>3</sup> 2 to 3 = US $\rightarrow$ Sm <sup>3</sup> ; Scf
		Factory setting: Nm <sup>3</sup>
		<ul> <li>Note!         This function cannot be changed if:         The measuring device has been configured in accordance with NTEP or MC approval.     </li> <li>The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for the available functions</li> </ul>
		Z006 to Z008 in the CUSTODY TRANSFER block.
TOTALIZER MODE	3002	For selecting how the totalizer should operate.
MODRIE auditus		Options: 0 = BALANCE
MODBUS register: Totalizer 1 Totalizer 2 Totalizer 3	2605 2805 3005	Positive and negative flow components. The positive and negative flow components are balanced. In other words, net flow in the flow direction is registered.
Data type: Access:	Integer read/write	1 = FORWARD Only positive flow components
		2 = REVERSE Only negative flow components
		Factory setting: Totalizer 1 = BALANCE Totalizer 2 = FORWARD Totalizer 3 = REVERSE
		<ul> <li>Note!         This function cannot be changed if:         The measuring device has been configured in accordance with NTEP or MC approval.     </li> <li>The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for the available functions Z006 to Z008 in the CUSTODY TRANSFER block.</li> </ul>
RESET TOTALIZER	3003	Resets the total and the overflow of the totalizer to zero.
(I)		Options:
MODBUS register: Totalizer 1	2608	0 = NO  1 = YES
Totalizer 2 Totalizer 3	2808	Factory setting:
Data type:	3008 Integer	NO NO
Access:	read/write	<ul> <li>Note!</li> <li>This function cannot be changed if:         <ul> <li>The measuring device has been configured in accordance with NTEP or MC approval.</li> <li>The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for the available functions Z006 to Z008 in the CUSTODY TRANSFER block.</li> </ul> </li> </ul>
		■ If the device is equipped with a status input, with the appropriate configuration a reset for each individual totalizer can also be triggered by a pulse (see the function ASSIGN STATUS INPUT (5000) on Page 99).

# 7.1.2 Function group OPERATION



	TOTALIZER 3 DAC $\rightarrow$ CONFIGURATION 300							
	↓							
	OPERATION 304							
Function description $  TOTALIZER \rightarrow TOTALIZER \ (1 \ to \ 3) \rightarrow OPERATION $								
Note! The function descriptions below  SUM  MODBUS register: Totalizer 1  Totalizer 2  2810  Totalizer 3  Data type: Access:  Tead	Displays the total for the totalizer's measured variable aggregated since measuring began. The value can be positive or negative, depending on the setting selected in the function "TOTALIZER MODE" (3002), and the direction of flow.  Display:  max. 7-digit floating-point number, including sign and unit (e.g. 15467.04 m³; -4925.631 kg)  Note!  Note!  The effect of the setting in the "TOTALIZER MODE" function (see Page 47) is as follows:  If the setting is "BALANCE", the totalizer balances flow in the positive and negative directions.  If the setting is "FORWARD", the totalizer registers only flow in the positive direction.  If the setting is "REVERSE", the totalizer registers only flow in the negative direction.  The totalizer's response to faults is defined in the "FAILSAFE MODE" function (3801), (see Page 49).							
OVERFLOW  MODBUS register: Totalizer 1 2612 Totalizer 2 2812 Totalizer 3 3012 Data type: Float Access: read	Displays the total for the totalizer's overflow aggregated since measuring began.  Total flow quantity is represented by a floating-point number consisting of max. 7 digits. You can use this function to view higher numerical values (>9,999,999) as overflows. The effective quantity is thus the total of OVERFLOW plus the value returned by the SUM function.  Example:  Reading for 2 overflows: 2 E7 kg (= 20,000,000 kg).  The value displayed in the function SUM = 196,845.7 kg  Effective total quantity = 20,196,845.7 kg  Display:  integer with exponent, including sign and unit, e.g. 2E7 kg							

# 7.2 Group HANDLING TOTALIZER



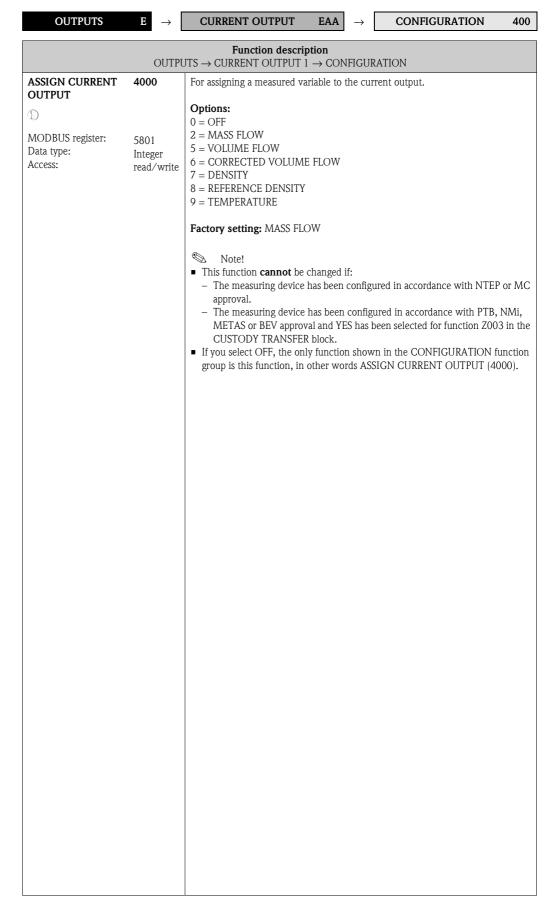
	L	$\begin{array}{ccc} \textbf{HANDLING TOTALIZER} & \textbf{DJA} & \rightarrow & \textbf{Handling totalizer functions} \end{array}$					
RESET ALL TOTALIZERS  MODBUS register: Data type: Access:	2609 Integer read/write	Resets the totals and the overflows of all totalizers to zero.  Options: 0 = NO 1 = YES  Factory setting: NO  Note!  This function cannot be changed if:  The measuring device has been configured in accordance with NTEP or MC approval.  The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for the available functions Z006 to Z008 in the CUSTODY TRANSFER block.  If the device has a status input and if it is appropriately configured, a reset for the totalizer (1 to 3) can also be triggered by a pulse (see the ASSIGN STATUS INPUT function (5000) on Page 99).					
FAILSAFE MODE	3801	Use this function to define the common response of all totalizers (1 to 3) to error.					
MODBUS register: Data type: Access:	2607 Integer read/write	Options: 0 = STOP The totalizers are paused until the fault is rectified.  1 = ACTUAL VALUE The totalizer continues to count based on the current flow measuring value. The fault is ignored.  2 = HOLD VALUE The totalizers continue to count the flow based on the last valid flow value (before the error occurred).  Factory setting: STOP  Note! This function cannot be changed if:  • The measuring device has been configured in accordance with NTEP or MC approval.  • The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for the available functions Z006 to Z008 in the CUSTODY TRANSFER block.					

# 8 Block OUTPUTS

		FAILSAFE MODE (4209) P. 71								
		TIME CONSTANT FA								
		OUTPUT SIGNAL (4207) P. 68	TWA TS NOO	(4247) P. 82						
	TIME CONSTANT   FAILSAFE MODE   (4005) P. 59	MEASURING MODE (4200) P. 67	Щ	MODE (4246) P. 81					TIME CONSTANT (4706) P. 92	
suc	TIME CONSTANT (4005) P. 58	(4205) P. 05	OUTPUT SIGNAL (4226) P. 75 SWITCH-OFF	DELAY (4245) P. 80					MEASURING MODE (4705) P. 91	
Functions	MEASURING MODE (4004) P. 55	(4204) P. 64	MEASURING MODE (4225) P. 74 OFF-VALITE	(4244) P. 80					SWITCH-OFF DELAY (4704) P. 91	
	VALUE 20 mA (4003) P. 55	END VALUE REGUENCY (4203) P. 64	(4223) P. 73	DELAY (4243) P. 79	VALUE SIMUL. FREO. (4303) P. 84		VALUE SIM. SWITCH PNT. (4343) P. 87		OFF-VALUE (4703) P. 90	
	VALUE 0_4 mA (4002) P. 53 VALUE SIM. CURRENT (4042) P. 60	START VALUE FREGUENCY (4202) P. 63	PULSE VALUE (4222) P. 72 ON-VALITE	(4242) P. 79	SIMULATION FREQUENCY (4302) P. 83	VALUE SIM. IMPULS (4323) P. 86	SIMULATION SWITCH POINT (4342) P. 87		SWITCH-ON DELAY (4702) P. 90	VALUE SIM. SWITCH PNT. (4742) P. 93
	CURRENT SPAN (4001) P. S2 SIMULATION CURRENT (4041) P. 60	ASSIGN REGUENCY (4201) P. 63 FAILSAFE VALUE (4211) P. 71	ASSIGN PULSE (4221) P. 72	(4241) P. 78	ACTUAL FREQUENCY (4301) P. 83	SIMULATION PULSE (4322) P. 85	ACTUAL STATUS (4341) P. 87		ON-VALUE (4701) P. 90	SIMULATION SWITCH POINT (4741) P. 93
	ASSIGN CURRENT OUTPUT (4000) P. 51 ACTUAL CURRENT (4040) P. 60  TERMINAL NUMBER (4080) P. 61	OPERATION MODE ⇒ (4200) P. 62			î			TERMINAL NUMBER (4380) P. 88	ASSIGN RELAY (4700) P. 89 ⇒	ACTUAL STATUS RELAY (4740) P. 93 TERMINAL NUMBER (4780) P. 94
Function groups	CONFIGURATION  ⇒ (400) P. 51  U ↑  OPERATION  U ↑  U ↑  (404) P. 60  U ↑  U ↑  (1408) P. 61	CONHGURATION  ⇒ (420) P. 62  U ↑		⇒	OPERATION ⇒ (430) P. 83  U		<b>¢</b> =	UNFORMATION (438) P. 88	CONFIGURATION ⇒ (470) P. 89	U ∏  OPERATION  (474) P. 93  U ∏  INFORMATION  (478) P. 94
Groups	CURRENT OUTPUT (EAA) P. 51	PULSE/REG OUTPUT (ECA) P. 62						<b>←</b> =	to 2 3B)	
Block	OUTPUTS  (E)									

# 8.1 Group CURRENT OUTPUT

# 8.1.1 Function group CONFIGURATION



For selecting the current span. The selection specifies the operational range and

### **Function description** OUTPUTS → CURRENT OUTPUT 1 → CONFIGURATION

# **CURRENT SPAN**

4001

5802

Integer

read/write

MODBUS register: Data type: Access:

the lower and upper signal on alarm.

## Options:

0 = 0 - 20 mA (25 mA)

1 = 4-20 mA (25 mA)

3 = 0 - 20 mA

4 = 4-20 mA

6 = 4-20 mA NAMUR

8 = 4-20 mA US

Factory setting: 4-20 mA NAMUR or 4-20 mA US



Note!

- This function **cannot** be changed if:
  - The measuring device has been configured in accordance with NTEP or MC approval.
  - The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z003 in the CUSTODY TRANSFER block.
- When switching the hardware from an active (factory setting) to a passive output signal, select a current span of 4-20 mA (please refer to the Operating Instructions for Proline Promass 84 MODBUS RS485, BA129D).



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

A0002959

Fig. 16: Overview of current span, operational range and signal on alarm level

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



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

### Function description OUTPUTS $\rightarrow$ CURRENT OUTPUT 1 $\rightarrow$ CONFIGURATION

#### VALUE 0 4 mA

MODBUS register: 5803 Data type: Float Access: read/write

4002

Use this function to assign the 0/4 mA current a value.

The value can be higher or lower than the value assigned to 20 (function VALUE 20 mA (4003), see Page 55). Positive and negative values are permissible, depending on the measured variable in question (e.g. mass flow).

#### Example:

4 mA assigned value = -250 kg/h

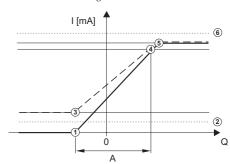
20 mA assigned value = +750 kg/h

Calculated current value = 8 mA (at zero flow)



- This function **cannot** be changed if:
  - The measuring device has been configured in accordance with NTEP or MC
  - The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z003 in the CUSTODY TRANSFER block.
- Note that values with different signs cannot be entered for 0/4 mA and 20 mA if SYMMETRY is the setting selected for the MEASURING MODE function (4004). In this case, the message "INPUT RANGE EXCEEDED" appears on the display.

Example for STANDARD measuring mode:



A0001223

- ① = Lower range-value (0 to 20 mA)
- ② = Lower signal on alarm level: depends on the setting in the function CURRENT SPAN
- 3 = Lower range-value (4 to 20 mA): depends on the setting in the function CURRENT SPAN
- 4 = Full scale value (0/4 to 20 mA): depends on the setting in the function CURRENT SPAN
- (5) = Maximum current value: depends on the setting in the function CURRENT SPAN
- 6 = Failsafe mode (upper signal on alarm level): depends on the setting in the functions CURRENT SPAN (see Page 52) and FAILSAFE MODE (see Page 59)

A = Measuring range

### User input:

5-digit floating-point number, with sign

### Factory setting:

0 [kg/h] or 0.5 [kg/l] or -50 [°C]



Note!

- The appropriate unit is taken from the following functions:
  - UNIT MASS FLOW (0400)
  - UNIT VOLUME FLOW (0402)
  - UNIT CORRECTED VOLUME FLOW (0404)
  - UNIT DENSITY (0420)
  - UNIT REFERENCE DENSITY (0421)
  - UNIT TEMPERATURE (0422) (see Page 14 to Page 18).



Caution!

The current output responds differently, depending on the parameters set in the various functions. Some examples of parameter settings and their effect on the current output are given in the following section.

(continued on next page)

### **Function description**

OUTPUTS  $\rightarrow$  CURRENT OUTPUT 1  $\rightarrow$  CONFIGURATION

# VALUE 0\_4 mA (continued)

### Parameter setting example A:

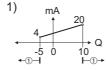
- 1. VALUE 0\_4 mA (4002) = not equal to zero flow (e.g. -5 kg/h) VALUE 20 mA (4003) = not equal to zero flow (e.g. 10 kg/h) or
- 2. VALUE 0\_4 mA (4002) = not equal to zero flow (e.g. 100 kg/h) VALUE 20 mA (4002) = not equal to zero flow (e.g. -40 kg/h)

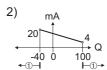
and

4002

MEASURING MODE (4004) = STANDARD

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





A0001262

### Parameter setting example B:

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

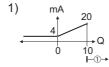
and

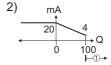
MEASURING MODE (4004) = STANDARD

When you enter the values for 0/4 mA and 20 mA, the working range of the measuring device is defined. In doing so, one of the two values is parameterized as zero flow (e.g. 0 kg/h).

If the effective flow drops below or exceeds the value parameterized as  $\,$  the zero flow, no fault/notice message is generated and the current output retains its value.

If the effective flow drops below or exceeds the other value, a fault/notice message is generated (#351 to 354, current range) and the current output responds in accordance with the parameter settings in the function FAILSAFE MODE (4006).





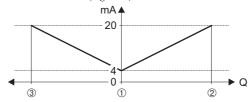
A0001264

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

### Parameter setting example C:

MEASURING MODE (4004) = SYMMETRY

The current output signal is independent of the direction of flow (absolute amount of the measured variable). The  $0_4$  mA value ① and the 20 mA value ② must have the same sign (+ or -). The 20 mA VALUE ③ (e.g. backflow) corresponds to the mirrored 20 mA VALUE ② (e.g. flow).



A0001249

ASSIGN STATUS (4241) = FLOW DIRECTION

With this setting e.g. the flow direction output via a switching contact can be made.

### Parameter setting example D:

MEASURING MODE (4004) = PULSATING FLOW  $\rightarrow$  Page 55 ff.

# Function description OUTPUTS $\rightarrow$ CURRENT OUTPUT 1 $\rightarrow$ CONFIGURATION Use this function to assign the 20 mA current a value. VALUE 20 mA 4003 The value can be higher or lower than the value assigned to 0/4 (function VALUE 0\_4 mA (4002), see Page 53). Positive and negative values are permissible, depending on the measured variable in question (e.g. mass flow). MODBUS register: 5805 Data type: Float Example: Access: read/write 4 mA assigned value = -250 kg/h20 mA assigned value = +750 kg/hCalculated current value = 8 mA (at zero flow) Note that values with different signs cannot be entered for 0/4 mA and 20 mA if SYMMETRY is the setting selected for the MEASURING MODE function (4004). In this case, the message "INPUT RANGE EXCEEDED" appears on the display. User input: 5-digit floating-point number, with sign Factory setting: Depends on nominal diameter [kg/h] or 2 [kg/l] or 200 [°C] Note! ■ This function cannot be changed if: - The measuring device has been configured in accordance with NTEP or MC - The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z003 in the CUSTODY TRANSFER block. ■ The appropriate unit is taken from the following functions: - UNIT MASS FLOW(0400) - UNIT VOLUME FLOW(0402) - UNIT CORRECTED VOLUME FLOW(0404) - UNIT DENSITY(0420) - UNIT REFERENCE DENSITY(0421) UNIT TEMPERATURE(0422) (see Page 14 to Page 18). (see Page 14).

■ The appropriate unit is taken from the function UNIT MASS FLOW (0400),

■ An example for selecting the STANDARD option in the function MEASURING MODE (4004) can be found on Page 56.



It is very important to read and comply with the information in the function VALUE 0\_4 mA (under of "Caution", examples of parameter settings) on Page 53.

(D)	
MODBUS register:	5807
Data type:	Integer
Access:	read/write

4004

**MEASURING** 

MODE

For selecting the measuring mode for the current output.

# Options:

0 = STANDARD

1 = SYMMETRY

2 = PULSATING FLOW

## Factory setting:

STANDARD



Note!

This function cannot be changed if:

- $\,\blacksquare\,$  The measuring device has been configured in accordance with NTEP or MC
- The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z003 in the CUSTODY TRANSFER block.

(continued on next page)

# $\begin{tabular}{ll} \textbf{Function description} \\ \textbf{OUTPUTS} \rightarrow \textbf{CURRENT OUTPUT 1} \rightarrow \textbf{CONFIGURATION} \\ \end{tabular}$

# MEASURING MODE

(continued)

# Description of the individual options:

STANDARD

4004

The current output signal is proportional to the measured variable. The flow components outside the scaled measuring range (defined by the  $0_4$  mA VALUE ① and the 20 mA VALUE ②) are taken into account as follows for signal output.

- If one of the values is defined as equal to the zero flow (e.g. VALUE 0\_4 mA = 0 m³/h), no message is given if this value is exceeded or not achieved and the current output retains its value (in example 4 mA). If the other value is exceeded or not achieved, the message "CURRENT OUTPUT AT FULL SCALE VALUE" appears and the current output responds in accordance with the parameter setting in the function FAILSAFE MODE (4006).
- If both values defined are not equal to the zero flow (for example VALUE  $0\_4~\text{mA} = -5~\text{m}^3/\text{h}$ , VALUE  $20~\text{mA} = 10\text{m}^3/\text{h}$ ), the message "CURRENT OUTPUT AT FULL SCALE VALUE" appears if the measuring range is exceeded or not achieved and the current output responds in accordance with the parameter settings in the function FAILSAFE MODE (4006).

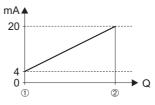
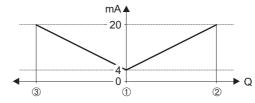


Fig. 17: Example for STANDARD measuring mode

A000124

#### SYMMETRY

The current output signal is independent of the direction of flow (absolute amount of the measured variable). The  $0_4$  mA value 0 and the 20 mA value 0 must have the same sign (+ or -). The "20 mA value" 0 (e.g. backflow) corresponds to the mirrored 20 mA value 0 (e.g. flow).



A0001249

Fig. 18: Example for SYMMETRY measuring mode

### Not Not

- $\,\blacksquare\,$  The direction of flow can be output via the configurable relay or status outputs.
- SYMMETRY cannot be selected unless the values in the VALUE 0\_4 mA (4002) and VALUE 20 mA (4003) functions have the same sign or one of the values is zero. If the values have different signs, SYMMETRY cannot be selected and an "ASSIGNMENT NOT POSSIBLE" message is displayed.

# PULSATING FLOW

If flow is characterized by severe fluctuations as is the case, for example, with reciprocating pumps, flow components outside the measuring range are buffered, balanced and output after a maximum delay of 60 seconds. If the buffered data cannot be processed within approx. 60 seconds, a fault/notice message appears. Under certain plant conditions, flow values can aggregate in the buffer, for example in the case of prolonged and unwanted fluid backflow. However, this buffer is reset in all relevant programming adjustments which affect the current output.

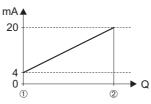
# Function description

# OUTPUTS $\rightarrow$ CURRENT OUTPUT $1 \rightarrow$ CONFIGURATION

Detailed explanations and information

# How the current output responds under the following postulated conditions:

1. Defined measuring range ( $\bigcirc$ - $\bigcirc$ ):  $\bigcirc$  and  $\bigcirc$  have the **same** sign



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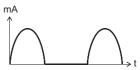
and the following flow behavior:



A0001265

## STANDARD

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



A0001267

### ■ SYMMETRY

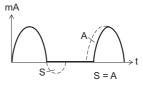
The current output signal is independent of the direction of flow.



A0001268

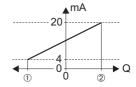
# ■ PULSATING FLOW

Flow components outside the measuring range are buffered, balanced and output after a maximum delay of  $60\ \text{seconds}.$ 



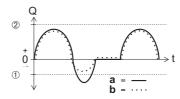
A0001269

2. Defined measuring range  $(\bigcirc - \bigcirc)$ :  $\bigcirc$  and  $\bigcirc$  do **not have the same** sign.



A0001272

Flow a (—) outside, b (--) within the measuring range.



A0001273

(continued on next page)

# **Function description**

# OUTPUTS → CURRENT OUTPUT 1 → CONFIGURATION

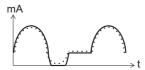
Detailed explanations and information (continued)

#### ■ STANDARD

a (—): The flow components outside the scaled measuring range cannot be taken into account for signal output.

A fault message is generated (#351 to 354, current range) and the current output responds in accordance with the parameter settings in the function  $% \left( 1\right) =\left( 1\right) \left( 1\right)$ FAILSAFE MODE (4006).

b (--): The current output signal is proportional to the measured variable assigned.

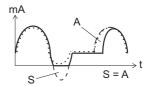


### SYMMETRY

This option is not available under these circumstances because the 0\_4 mA value and the 20 mA value have different signs.

### ■ PULSATING FLOW

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



# TIME CONSTANT

4005

1

MODBUS register: 5808 Data type: Float Access: read/write

Entering a time constant defines how the current output signal reacts to severely fluctuating measured variables, either very quickly (enter a low time constant) or with damping (enter a high time constant).

### User input:

fixed-point number 0.01 to 100.00 s

### Factory setting:

1.00 s



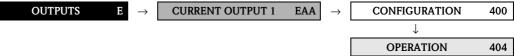
Note!

This function cannot be changed if: ■ The measuring device has been configured in accordance with NTEP or MC

- The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z003 in the CUSTODY TRANSFER block.

# **Function description** OUTPUTS $\rightarrow$ CURRENT OUTPUT $\stackrel{-}{1} \rightarrow$ CONFIGURATION **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). MODBUS register: 5810 **Options:** Data type: Integer 0 = MIN. CURRENT Access: read/write The current output adopts the value of the lower signal on alarm level (as defined in the function CURRENT SPAN (4001), see Page 52). 1 = MAX. CURRENT The current output adopts the value of the upper signal on alarm level (as defined in the function CURRENT SPAN (4001), see Page 52). 2 = HOLD VALUE (**not recommended**) Measured value output is based on the last measured value saved before the error occurred. 3 = ACTUAL VALUEMeasured value output is based on the current flow measurement. The fault is ignored. Factory setting: MIN. CURRENT Note! This function **cannot** be changed if: ■ The measuring device has been configured in accordance with NTEP or MC • The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z003 in the CUSTODY TRANSFER block.

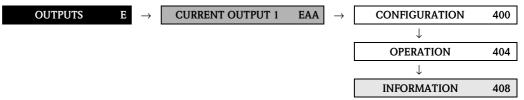
# 8.1.2 Function group OPERATION



		OPERATION 404	
Function description  OUTPUTS $\rightarrow$ CURRENT OUTPUT $\rightarrow$ OPERATION			
ACTUAL CURRENT	4040	Use this function to view the computed actual value of the output current.	
MODBUS register: Data type: Access:	5811 Float read	<b>Display:</b> 0.00 to 25.00 mA	
SIMULATION CURRENT	4041	Activates simulation of the current output.	
(D)		Options: 0 = OFF	
MODBUS register: Data type: Access:	5813 Integer read/write	1 = ON  Factory setting: OFF	
		<ul> <li>Note!</li> <li>This function cannot be changed if:         <ul> <li>The measuring device has been configured in accordance with NTEP or MC approval.</li> <li>The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z003 in the CUSTODY TRANSFER block.</li> </ul> </li> <li>If simulation is active, the "SIMULATION CURRENT OUTPUT" message is displayed.</li> <li>The measuring device continues to measure while simulation is in progress, i.e. the current measured values are output correctly via the other outputs.</li> </ul>	
VALUE SIMULATION	4042	Use this function to define a freely selectable value (e.g. 12 mA) to be output at the current output. This value is used to test downstream devices and the	
CURRENT		measuring device itself.	
MODBUS register: Data type: Access:	5814 Float read/write	User input: 0.00 to 25.00 mA  Factory setting: 0.00 mA	
		Note!  This function cannot be changed if:  The measuring device has been configured in accordance with NTEP or MC approval.  The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z003 in the CUSTODY TRANSFER block.  This function is displayed only if the function SIMULATION CURR. (4041) is active (= ON).  Caution!  The setting is not saved in the event of a power failure.	

60

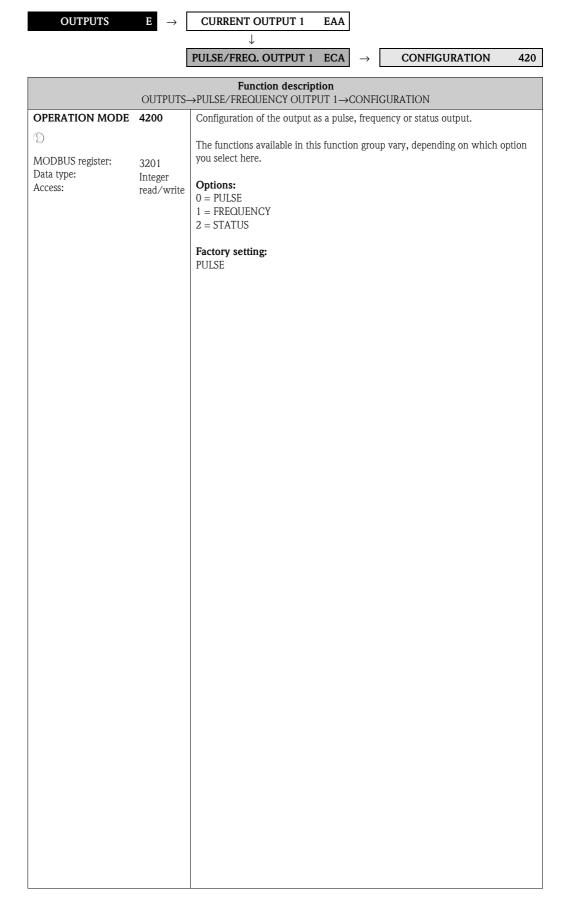
# **8.1.3** Function group INFORMATION



TERMINAL NUMBER  MODBUS register: Data type: read  NUMBER  MODBUS register: Polarity read  Numbers of the terminals used by the current output (in the connection compartment)  Polarity  Polarity  Display:  3 = 20 (+) / 21 (-)
NUMBER  MODBUS register: 5816 Data type: Integer Access: read  Numbers of the terminals used by the current output (in the connection compartment) Polarity  Display:

# 8.2 Group PULSE/FREQUENCY OUTPUT 1

# 8.2.1 Function group CONFIGURATION



# Function description OUTPUTS $\rightarrow$ PULSE/FREQUENCY OUTPUT 1 $\rightarrow$ CONFIGURATION (FREQUENCY) ASSIGN 4201 For assigning a measured variable to the frequency output. **FREQUENCY Options:** 0 = OFF2 = MASS FLOW MODBUS register: 3202 5 = VOLUME FLOW Data type: Integer Access: 6 = CORRECTED VOLUME FLOW read/write 7 = DENSITY8 = REFERENCE DENSITY 9 = TEMPERATUREFactory setting: MASS FLOW Note! ■ This function **cannot** be changed if: The measuring device has been configured in accordance with NTEP or MC - The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z001 in the CUSTODY TRANSFER block. ■ This function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function (4200). ■ If you select OFF, the only function shown in the CONFIGURATION function group is ASSIGN FREQUENCY (4201). **START VALUE** 4202 For defining an initial frequency for the frequency output. You define the **FREQUENCY** associated measured value of the measuring range in the function VALUE f LOW (4204).User input: MODBUS register: 3203 5-digit fixed-point number: 0 to 10000 Hz Data type: Float Access: read/write Factory setting: 0 Hz Example: ■ VALUE f LOW = 0 kg/h, start value frequency = 0 Hz This means that at a flow rate of 0 kg/h, a frequency of 0 Hz is output. ■ VALUE f LOW = 1 kg/h, start value frequency = 10 Hz This means that at a flow rate of 1 kg/h, a frequency of 10 Hz is output. Note! ■ This function **cannot** be changed if: $-\,$ The measuring device has been configured in accordance with NTEP or MC - The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z001 in the CUSTODY TRANSFER block. ■ This function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function (4200).

### **Function description** OUTPUTS $\rightarrow$ PULSE/FREQUENCY OUTPUT 1 $\rightarrow$ CONFIGURATION (FREQUENCY) **END VALUE** For defining a full scale frequency for the frequency output. You define the **FREQUENCY** associated measured value of the measuring range in the function VALUE-f HIGH (4205).User input: MODBUS register: 3205 5-digit fixed-point number: 2 to 10000 Hz Data type: Float Access: read/write Factory setting: 10000 Hz Example: ■ VALUE f HIGH = 10000 kg/h, full scale value = 10000 Hz This means that at a flow rate of 10000 kg/h, a frequency of 10000 Hz is ■ VALUE f HIGH = 3600 kg/h, full scale value = 10000 Hz This means that at a flow rate of 3600 kg/h, a frequency of 10000 Hz is output. Note! ■ This function **cannot** be changed if: - The measuring device has been configured in accordance with NTEP or MC The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z001 in the CUSTODY TRANSFER block. ■ This function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function (4200). ■ In the FREQUENCY operating mode the output signal is symmetrical (on/off ratio = 1:1). At low frequencies the pulse duration is limited to a maximum of 2 seconds, i.e. the on/off ratio is no longer symmetrical. VALUE f LOW 4204 Use this function to assign a variable to the START VALUE FREQUENCY(4202). The value can be higher or lower than the value assigned to the VALUE f HIGH. Positive and negative values are permissible, depending on the measured variable in question (e.g. mass flow). You define a measuring range by defining the VALUE MODBUS register: 3207 f LOW and VALUE f HIGH values. Data type: Float Access: read/write Input: 5-digit floating-point number Factory setting: 0 [kg/h] or 0 [kg/l] or -50 [°C] Note! ■ This function **cannot** be changed if: - The measuring device has been configured in accordance with NTEP or MC - The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z001 in the CUSTODY TRANSFER block. ■ This function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function (4200). • For a graphic illustration of the VALUE F LOW, see the VALUE-f HIGH (4205) ■ Note that values with different signs cannot be entered for VALUE F LOW and VALUE F HIGH, if SYMMETRY is the setting selected for the MEASURING MODE function (4206). In this case, the message "INPUT RANGE EXCEEDED" appears on the display. ■ The appropriate unit is taken from the following functions: - UNIT MASS FLOW(0400) - UNIT VOLUME FLOW(0402) - UNIT CORRECTED VOLUME FLOW(0404) - UNIT DENSITY(0420) UNIT REFERENCE DENSITY(0421) UNIT TEMPERATURE(0422)

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(see Page 14 to Page 18).

# Function description OUTPUTS $\rightarrow$ PULSE/FREQUENCY OUTPUT 1 $\rightarrow$ CONFIGURATION (FREQUENCY)

### VALUE-f HIGH

4205

1

MODBUS register: 3209
Data type: Float
Access: read/write

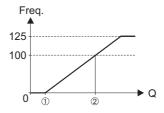
Use this function to assign a variable to the END VALUE FREQUENCY (4203). The value can be higher or lower than the value assigned to the VALUE F LOW. Positive and negative values are permissible, depending on the measured variable in question (e.g. mass flow). You define a measuring range by defining the VALUE f LOW and VALUE f HIGH values.

Input: 5-digit floating-point number

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



- This function **cannot** be changed if:
  - The measuring device has been configured in accordance with NTEP or MC approval.
  - The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z001 in the CUSTODY TRANSFER block.
- This function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function (4200).
- Note that values with different signs cannot be entered for VALUE F LOW and VALUE F HIGH, if SYMMETRY is the setting selected for the MEASURING MODE function (4206). In this case, the message "INPUT RANGE EXCEEDED" appears on the display.



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- $\bigcirc$  = Value f low
- 2 = Value f high

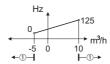
### Parameter setting example 1:

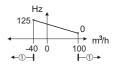
- 1. VALUE f LOW (4204) = not equal to zero flow (e.g. -5 kg/h) VALUE-f HIGH (4205) = not equal to zero flow (e.g. 10 kg/h) or
- 2. VALUE f LOW (4204) = not equal to zero flow (e.g. 100 kg/h) VALUE-f HIGH (4205) = not equal to zero flow (e.g. -40 kg/h)

and

MEASURING MODE (4206) = STANDARD

When you enter the values for VALUE f LOW and VALUE f HIGH the working range of the measuring device is defined. If the effective flow drops below or exceeds this working range (see Fig. 0), a fault/notice message is generated (#355 to 358, frequency range) and the frequency output responds in accordance with the parameter settings in the function FAILSAFE MODE (4209).





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(continued on next page)

### **Function description**

OUTPUTS  $\rightarrow$  PULSE/FREQUENCY OUTPUT 1  $\rightarrow$  CONFIGURATION (FREQUENCY)

# VALUE-f HIGH

(continued)

#### 4205

## Parameter setting example 2:

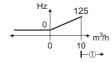
- 1. VALUE f LOW (4204) = not equal to zero flow (e.g. 0 kg/h) VALUE-f HIGH (4205) = not equal to zero flow (e.g. 10 kg/h) or
- 2. VALUE f LOW (4204) = not equal to zero flow (e.g. 100 kg/h) VALUE-f HIGH (4205) = not equal to zero flow (e.g. 0 kg/h)

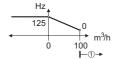
and

MEASURING MODE (4206) = STANDARD

When you enter the values for VALUE f LOW and VALUE f HIGH the working range of the measuring device is defined. In doing so, one of the two values is parameterized as zero flow (e.g. 0 kg/h).

If the effective flow drops below or exceeds the value parameterized as the zero flow, no fault/notice message is generated and the frequency output retains its value. If the effective flow drops below or exceeds the other value, a fault/notice message is generated (#355 to 358, frequency range) and the frequency output responds in accordance with the parameter settings in the function FAILSAFE MODE (4209).





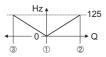
A0001277

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

### Parameter setting example 3:

MEASURING MODE (4206) = SYMMETRY

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



A0001278

ASSIGN STATUS (4241) = FLOW DIRECTION

With this setting e.g. the flow direction output via a switching contact can be made.

# Parameter setting example 4:

MEASURING MODE (4206) = PULSATING FLOW  $\rightarrow$  Page 67 ff.

# $\begin{tabular}{ll} \textbf{Function description} \\ \textbf{OUTPUTS} \rightarrow \textbf{PULSE/FREQUENCY} \ \textbf{OUTPUT} \ 1 \rightarrow \textbf{CONFIGURATION} \ (\textbf{FREQUENCY}) \\ \end{tabular}$

### MEASURING MODE



MODBUS register: 3211
Data type: Integer
Access: read/write

4206

## No:

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

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

#### Options:

0 = STANDARD

1 = SYMMETRY

2 = PULSATING FLOW

## Factory setting: STANDARD

Note!

This function cannot be changed if:

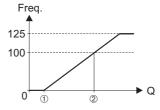
- The measuring device has been configured in accordance with NTEP or MC approval.
- The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for the available functions Z001 in the CUSTODY TRANSFER block.

## Description of the individual options:

STANDARD

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

- If one of the values is defined as equal to the zero flow (e.g. VALUE f LOW = 0 m³/h), no message is given if this value is exceeded or not achieved and the frequency output retains its value (0 Hz in the example). If the other value is exceeded or not achieved, the message "FREQUENCY OUTPUT AT FULL SCALE VALUE" appears and the frequency output responds in accordance with the parameter setting in the function FAILSAFE MODE (4209).
- If both values defined are not equal to the zero flow (for example VALUE f LOW = -5 m³/h; VALUE F HIGH = 10m³/h), the message "FREQUENCY OUTPUT AT FULL SCALE VALUE" appears if the measuring range is exceeded or not achieved and the frequency output responds in accordance with the parameter settings in the function FAILSAFE MODE (4209).

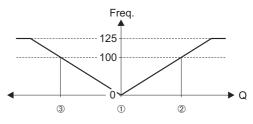


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Fig. 19: STANDARD measuring mode

### **SYMMETRY**

The frequency output signal is independent of the direction of flow (absolute amount of the measured variable). The VALUE f LOW  $\odot$  and VALUE f HIGH  $\circledcirc$  must have the same sign (+ or -). The VALUE F HIGH  $\circledcirc$  (e.g. backflow) corresponds to the mirrored VALUE F HIGH  $\circledcirc$  (e.g. flow).



A0001280

Fig. 20: SYMMETRY measuring mode

(continued on next page)

# **Function description** OUTPUTS $\rightarrow$ PULSE/FREQUENCY OUTPUT 1 $\rightarrow$ CONFIGURATION (FREQUENCY) **MEASURING** MODE • The direction of flow can be output via the configurable relay or status outputs. (continued) ■ SYMMETRY cannot be selected unless the values in the VALUE f LOW (4204) and VALUE-f HIGH (4205) functions have the same sign or one of the values is zero. If the values have different signs, SYMMETRY cannot be selected and an "ASSIGNMENT NOT POSSIBLE" message is displayed. PHI SATING FLOW $\,\blacksquare\,$ If flow is characterized by severe fluctuations as is the case, for example, with reciprocating pumps, flow components outside the measuring range are buffered, balanced and output after a maximum delay of 60 seconds. If the buffered data cannot be processed within approx. 60 seconds, a fault/notice message appears. • Under certain plant conditions, flow values can aggregate in the buffer, for example in the case of prolonged and unwanted fluid backflow. However, this buffer is reset in all relevant programming adjustments which affect the frequency output. **OUTPUT SIGNAL** 4207 For selecting the output configuration of the frequency output. Options: 0 = PASSIVE - POSITIVE MODBUS register: 3212 1 = PASSIVE - NEGATIVE Data type: Integer 2 = ACTIVE - POSITIVE (this selection is not supported) Access: read/write 3 = ACTIVE - NEGATIVE (this selection is not supported) 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! ■ This function **cannot** be changed if: The measuring device has been configured in accordance with NTEP or MC - The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z001 in the CUSTODY TRANSFER block. ■ This function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function (4200). • With the passive output configuration, the output signal levels of the frequency output depend on the external circuit (see examples).

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(continued on next page)

# **Function description**

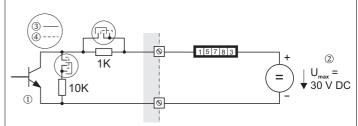
# OUTPUTS $\rightarrow$ PULSE/FREQUENCY OUTPUT 1 $\xrightarrow{}$ CONFIGURATION (FREQUENCY)

#### **OUTPUT SIGNAL** 4207

(continued)

## Example for passive output circuit (PASSIVE)

If PASSIVE is selected, the frequency output is configured as an open collector.



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- ① = Open collector
- ② = External power supply
- $\Im = Line monitoring off$
- (4) = Line monitoring on (default)

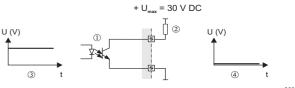


For continuous currents up to 25 mA ( $I_{max}$  = 250 mA / 20 ms).

# Example for output configuration PASSIVE-POSITIVE:

Output configuration with an external pull-up resistance.

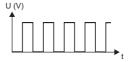
In the quiescent state (at zero flow), the output signal level at the terminals is 0 V.



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

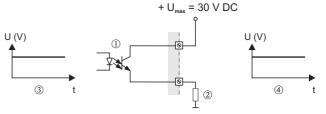


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## Example for output configuration PASSIVE-POSITIVE:

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)

(continued on next page)

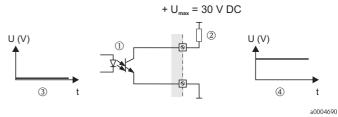
# **Function description** OUTPUTS $\rightarrow$ PULSE/FREQUENCY OUTPUT 1 $\rightarrow$ CONFIGURATION (FREQUENCY) **OUTPUT SIGNAL** In the operating status (flow present), the output signal level changes from a positive voltage level to 0 V.



## **Example for output configuration PASSIVE-NEGATIVE:**

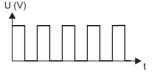
Output configuration with an external pull-up resistance.

In the quiescent state (at zero flow), the output signal level at the terminals is at a positive voltage level.



- ① = Open collector
- ② = Pull-Up-Resistance
- ③ = Transistor activation in NEGATIVE quiescent state (at zero flow)
- 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.



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#### TIME CONSTANT 4208



MODBUS register: Data type: Access:

(continued)

3213 Float read/write

Entering a time constant defines how the frequency output signal reacts to severely fluctuating measured variables, either very quickly (enter a low time constant) or with damping (enter a high time constant).

# User input:

fixed-point number 0.00 to 100.00 s

# Factory setting:

0.00 s



- This function **cannot** be changed if:
  - The measuring device has been configured in accordance with NTEP or MC approval.
  - $\,-\,$  The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z001 in the CUSTODY TRANSFER block.
- This function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function (4200).

# Function description OUTPUTS $\rightarrow$ PULSE/FREQUENCY OUTPUT 1 $\rightarrow$ CONFIGURATION (FREQUENCY)

### FAILSAFE MODE

LSAFE MODE 42



MODBUS register: 3215
Data type: Integer
Access: read/write

For safety reasons it is advisable to ensure that the frequency output assumes a predefined state in the event of a fault. The setting you select here affects only the frequency output. It has no effect on other outputs and the display (e.g. totalizers).

#### Options:

0 = FALLBACK VALUE Output is 0 Hz.

#### 1 = FAILSAFE LEVEL

Output is the frequency specified in the FAILSAFE LEVEL function (4211).

#### 2 = HOLD VALUE

Measured value output is based on the last measured value saved before the error occurred.

# 3 = ACTUAL VALUE

Measured value output is based on the current flow measurement. The fault is ignored.

### Factory setting:

FALLBACK VALUE



- This function **cannot** be changed if:
  - The measuring device has been configured in accordance with NTEP or MC approval.
  - The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z001 in the CUSTODY TRANSFER block.
- This function is not available unless the FREOUENCY setting was selected in the OPERATION MODE function (4200).

# FAILSAFE LEVEL 4211



MODBUS register:
Data type:
Access:

(

3216

Float

read/write

Note!

This function is not available unless FREQUENCY was selected in the OPERATION MODE function (4200) and FAILSAFE LEVEL was selected in the FAILSAFE MODE function (4209).

For specifying the frequency that the measuring device outputs in the event of an error.

## User input:

max. 5-digit number: 0 to 12500 Hz

# Factory setting:

12500 Hz



- This function **cannot** be changed if:
  - The measuring device has been configured in accordance with NTEP or MC approval.
  - The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z001 in the CUSTODY TRANSFER block.
- This function is not available unless FREQUENCY was selected in the OPERATION MODE function (4200) and FAILSAFE LEVEL was selected in the FAILSAFE MODE function (4209).

Function description		
ASSIGN PULSE	4221	Use this function to assign a measured variable to the pulse output.
MODBUS register: Data type: Access:	3223 Integer read/write	Options: 0 = OFF 2 = MASS FLOW 5 = VOLUME FLOW 6 = CORRECTED VOLUME FLOW
		Factory setting:  MASS FLOW  Note! ■ This function cannot be changed if:  - The measuring device has been configured in accordance with NTEP or MC approval.  - The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z001 in the CUSTODY TRANSFER block.  ■ This function is not available unless the PULSE setting was selected in the OPERATION MODE function (4200).  ■ If you select OFF, the only function shown in the CONFIGURATION function group is this function, in other words ASSIGN PULSE (4221).
MODBUS register:	<b>4222</b> 3224	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.  **Iser input:
Data type: Access:	Float read/write	User input:  S-digit floating-point number [unit]  Factory setting: Depends on nominal diameter  Note!  This function cannot be changed if:  The measuring device has been configured in accordance with NTEP or MC approval.  The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z001 in the CUSTODY TRANSFER block.  This function is not available unless the PULSE setting was selected in the OPERATION MODE function (4200).  The appropriate unit is taken from the UNIT MASS FLOW (0400), UNIT VOLUME FLOW (0402) or UNIT CORRECTED VOLUME FLOW (0404) function (see Page 14 to Page 18).

## $\begin{tabular}{ll} \textbf{Function description} \\ \textbf{OUTPUTS} \rightarrow \textbf{PULSE}/\textbf{FREQUENCY OUTPUT 1} \rightarrow \textbf{CONFIGURATION (PULSE)} \\ \end{tabular}$

#### PULSE WIDTH

#### · 422



MODBUS register: 3226
Data type: Float
Access: read/write

#### ⊗ N

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

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

#### User input:

0.05 to 2000 ms

#### Factory setting:

100 ms

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

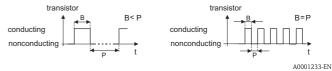


Fig. 21: Pulse width

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



- This function **cannot** be changed if:
  - The measuring device has been configured in accordance with NTEP or MC approval.
  - The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z001 in the CUSTODY TRANSFER block.
- This function is not available unless the PULSE setting was selected in the OPERATION MODE function (4200).
- When entering the pulse width, select a value that can still be processed by an
  external totalizer (e.g. mechanical totalizer, PLC, etc.).



If the pulse number or frequency resulting from the pulse value entered (see function PULSE VALUE (4222) on Page 72) and from the current flow is too large to maintain the pulse width selected (the time interval is smaller than the pulse width B entered), a system error message is generated (#359 to 362, pulse buffer) after approx. 5 seconds buffer/balance time.

#### **Function description** OUTPUTS → PULSE/FREQUENCY OUTPUT 1 → CONFIGURATION (PULSE)

#### **MEASURING** MODE

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

MODBUS register: Data type: Access:

3228 Integer read/write

#### Options:

0 = STANDARD

Only positive flow components are totaled. Negative components are not taken into account.

#### 1 = SYMMETRY

Positive and negative flow components are taken into account.



The direction of flow can be output via the relay output.

#### 2 = PULSATING FLOW

If flow is characterized by severe fluctuations as is the case, for example, with reciprocating pumps, the positive and negative flow components are totaled, with the signs taken into account (e.g. -101 and +251 = 151).

Flow components outside the maximum pulse number per second (value/width) are buffered, balanced and output after a maximum delay of 60 seconds. If the buffered data cannot be processed within approx. 60 seconds, a fault/notice message appears.

Under certain plant conditions, flow values can aggregate in the buffer, for example in the case of prolonged and unwanted fluid backflow. However, this buffer is reset in all relevant programming adjustments which affect the pulse output.

#### 3 = STANDARD REVERSE

Only negative flow components are totaled. Positive components are not taken into account.

#### Factory setting:

STANDARD



Note!

- This function **cannot** be changed if:
  - The measuring device has been configured in accordance with NTEP or MC
  - The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z001 in the CUSTODY TRANSFER block.
- This function is not available unless the PULSE setting was selected in the OPERATION MODE function (4200).

#### **Function description**

#### OUTPUTS → PULSE/FREQUENCY OUTPUT 1 → CONFIGURATION (PULSE)

#### OUTPUT SIGNAL

For selecting the output configuration of the pulse output.



MODBUS register: 3229 Data type: Integer

Access: read/write

#### Options:

0 = PASSIVE - POSITIVE

1 = PASSIVE - NEGATIVE

2 = ACTIVE - POSITIVE (this selection is not supported) 3 = ACTIVE - NEGATIVE (this selection is not supported)

#### Factory setting: PASSIVE - POSITIVE

#### Explanation

 $\label{eq:passive} \mbox{PASSIVE} = \mbox{power is supplied to the pulse output by means of an external power supply.}$ 

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:

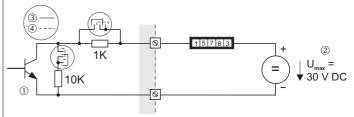
- If POSITIVE is selected, the internal transistor is activated with a positive signal level.
- If NEGATIVE is selected, the internal transistor is activated with a **negative** signal level (0 V).



- This function **cannot** be changed if:
  - The measuring device has been configured in accordance with NTEP or MC approval.
  - The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z001 in the CUSTODY TRANSFER block.
- This function is not available unless the PULSE setting was selected in the OPERATION MODE function (4200).
- 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.



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- ① = Open collector
- ② = External power supply
- ③ = Line monitoring off
- (4) = Line monitoring on (default)



For continuous currents up to 25 mA ( $I_{\mbox{\scriptsize max}} = 250$  mA / 20 ms).

(continued on next page)

#### Function description

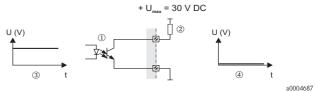
OUTPUTS → PULSE/FREQUENCY OUTPUT 1 → CONFIGURATION (PULSE)

## OUTPUT SIGNAL 422 (continued)

#### **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.



- 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.

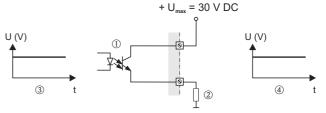


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#### **Example for output configuration PASSIVE-POSITIVE:**

Output configuration with an external pull-down resistance.

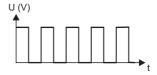
In the quiescent state (at zero flow), a positive voltage level is measured via the pull-down resistance.



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- 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  $\mbox{\rm V}.$ 



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(continued on next page)

#### Function description

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

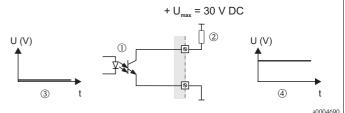
### OUTPUT SIGNAL 422

(continued)

#### **Example for output configuration PASSIVE-NEGATIVE:**

Output configuration with an external pull-up resistance.

In the quiescent state (at zero flow), the output signal level at the terminals is at a positive voltage level.



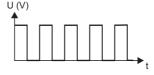
① = Open collector

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  $\mbox{\rm V}.$ 



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#### FAILSAFE MODE 4227

1

MODBUS register: Data type: Access:

3230 Integer read/write For safety reasons it is advisable to ensure that the pulse output assumes a predefined state in the event of a fault. The setting you select here affects only the pulse output. It has no effect on other outputs and the display (e.g. totalizers).

#### Options:

0 = FALLBACK VALUE Output is 0 pulse.

#### 3 = ACTUAL VALUE

Measured value output is based on the current flow measurement. The fault is ignored.

#### 4 = MAX. PULSE RATE

Outputs the maximum pulse rate f = 1/(2xT)

#### Factory setting:

FALLBACK VALUE



- This function **cannot** be changed if:
  - The measuring device has been configured in accordance with NTEP or MC approval.
- The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z001 in the CUSTODY TRANSFER block.
- This function is not available unless the PULSE setting was selected in the OPERATION MODE function (4200).

## **Function description** OUTPUTS $\rightarrow$ PULSE/FREQUENCY OUTPUT 1 $\rightarrow$ CONFIGURATION (STATUS) **ASSIGN STATUS** Use this function to assign a switching function to the status output. Options: 0 = OFFMODBUS register: 3236 1 = ON (operation)Data type: Integer 2 = FAULT MESSAGE Access: read/write 3 = NOTICE MESSAGE 4 = FAULT MESSAGE or NOTICE MESSAGE 5 = EMPTY PIPE DETECTION (only with active function)6 = FLOW DIRECTION 7 = MASS FLOW LIMIT VALUE 8 = VOLUME FLOW LIMIT VALUE 14 = CORRECTED VOLUME FLOW LIMIT VALUE 15 = DENSITY LIMIT VALUE 16 = REFERENCE DENSITY LIMIT VALUE 17 = TEMPERATURE LIMIT VALUE 19 = TOTALIZER 1 LIMIT VALUE 20 = TOTALIZER 2 LIMIT VALUE 21 = TOTALIZER 3 LIMIT VALUE Factory setting: FAULT MESSAGE Note! ■ This function **cannot** be changed if: - The measuring device has been configured in accordance with NTEP or MC - The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z001 in the CUSTODY TRANSFER block. ■ This function is available only if the STATUS setting was selected in the OPERATION MODE (4200) function. ■ The behavior of the status output is a normally closed behavior, in other words the output is closed (transistor conductive) when normal, error-free measuring is in progress. "Normal, error-free" operation: Flow direction = forwards; limit values = not exceeded; no fault or notice message present. - Switching response like relay output, see Page 96 ■ If you select OFF, the only function shown in the CONFIGURATION function group is this function, in other words ASSIGN STATUS (4241). • Switching response like relay output, see Page 96.

#### Function description OUTPUTS → PULSE/FREQUENCY OUTPUT 1 → CONFIGURATION (STATUS)

#### **ON-VALUE**

#### 4242



MODBUS register: 3237 Data type: Float Access: read/write Use this function to assign a value to the switch-on point (activation of the status output). The value can be higher or lower than the switch-off point. Positive or negative values are permissible, depending on the measured variable in question (e.g. mass flow, totalizer reading).

#### User input:

5-digit floating-point number [unit]

#### Factory setting:

0 [kg/h] or 2 [kg/l] or 200 [°C]



- This function cannot be changed if:
  - The measuring device has been configured in accordance with NTEP or MC
  - The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z001 in the CUSTODY TRANSFER block.
- This function is not available unless STATUS was selected in the OPERATION MODE function (4200) and LIMIT VALUE or FLOW DIRECTION was selected in the ASSIGN STATUS function (4241).
- If SYMMETRY is selected in the function MEASURING MODE (4246) and values with different signs are entered for the switch-on and switch-off points, the notice message "INPUT RANGE EXCEEDED" appears.
- Only the switch-on point is available for flow direction output (no switch-off point). If you enter a value not equal to the zero flow (e.g. 5), the difference between the zero flow and the value entered corresponds to half the switchover hysteresis.

#### SWITCH-ON DELAY 4243



MODBUS register: 3239 Data type: Float Access: read/write Use this function to define a delay (0 to 100 seconds) for the switch-on (i.e. signal changes from "not conductive" to "conductive") of the status output. The delay starts when the limit value is reached. The status output does switch when the delay has timed out and the switch on condition has been valid over the delay time.

#### User input:

fixed-point number: 0.0 to 100.0 s

#### Factory setting:

 $0.0 \, s$ 



Note! ■ This function **cannot** be changed if:

- The measuring device has been configured in accordance with NTEP or MC
- The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z001 in the CUSTODY TRANSFER block.
- This function is not available unless STATUS was selected in the OPERATION MODE function (4200) and LIMIT VALUE or FLOW DIRECTION was selected in the ASSIGN STATUS function (4241).

### **Function description** OUTPUTS $\rightarrow$ PULSE/FREQUENCY OUTPUT 1 $\rightarrow$ CONFIGURATION (STATUS) **OFF-VALUE** Use this function to assign a value to the switch-off point (deactivation of the status output). The value can be higher or lower than the switch-on point. 1 Positive and negative values are permissible, depending on the measured variable MODBUS register: 3241 in question (e.g. mass flow, totalizer reading). Data type: Float read/write Access: User input: 5-digit floating-point number [unit] Factory setting: 0 [kg/h] or 2 [kg/l] or 200 [°C] Note! ■ This function cannot be changed if: - The measuring device has been configured in accordance with NTEP or MC - The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z001 in the CUSTODY TRANSFER block. ■ This function is not available unless STATUS was selected in the OPERATION MODE function (4200) and LIMIT VALUE was selected in the ASSIGN STATUS function (4241). ■ The appropriate unit is taken from the function UNIT VOLUME FLOW (0402) or UNIT MASS FLOW (0400). ■ If SYMMETRY is selected in the function MEASURING MODE (4246) and values with different signs are entered for the switch-on and switch-off points, the notice message "INPUT RANGE EXCEEDED" appears. SWITCH-OFF 42.45 Use this function to define a delay (0 to 100 seconds) for the switch-off (i.e. signal **DELAY** changes from "conductive" to "not conductive") of the status output. The delay starts when the limit value is reached. The status output does switch when the (1) delay has timed out and the switch off condition has been valid over the delay time. MODBUS register: 3243 Data type: Float User input: Access: read/write fixed-point number: 0.0 to 100.0 s Factory setting: $0.0 \, s$ Note! ■ This function **cannot** be changed if: The measuring device has been configured in accordance with NTEP or MC - The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z001 in the CUSTODY TRANSFER block. ■ This function is not available unless the STATUS setting was selected in the OPERATION MODE function (4200).

## Function description OUTPUTS $\rightarrow$ PULSE/FREQUENCY OUTPUT 1 $\rightarrow$ CONFIGURATION (STATUS)

#### MEASURING MODE

1

MODBUS register: 3245
Data type: Integer
Access: read/write

4246

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

#### Options:

0 = STANDARD

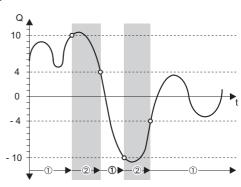
The status output signal switches at the defined switch points.

#### 1 = SYMMETRY

The status output signal switches at the defined switch points, irrespective of the sign. If you define a switch point with a positive sign, the status output signal switches as soon as the value is reached in the negative direction (negative sign), (see illustration).

#### Factory setting:

STANDARD



1000104

Fig. 22: Example for the SYMMETRY measuring mode

Switch-on point Q = 4

Switch-off point Q = 10

 $① = Status \ output \ switched \ on \ (conductive)$ 

② = Status output switched off (nonconductive)



- This function **cannot** be changed if:
  - The measuring device has been configured in accordance with NTEP or MC approval.
  - The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z001 in the CUSTODY TRANSFER block.
- This function is not available unless STATUS was selected in the OPERATION MODE function (4200) and the status output was assigned a limit value.
- SYMMETRY cannot be selected unless the values in the ON-VALUE (4242) and OFF-VALUE (4244) functions have the same sign or one of the values is
- If the values have different signs, SYMMETRY cannot be selected and an "ASSIGNMENT NOT POSSIBLE" message is displayed.

Data type:

Access:

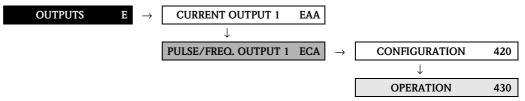
#### **Function description** OUTPUTS $\rightarrow$ PULSE/FREQUENCY OUTPUT 1 $\rightarrow$ CONFIGURATION (STATUS) TIME CONSTANT Entering a time constant defines how the measuring signal reacts to severely fluctuating measured variables, either very quickly (enter a low time constant) or with damping (enter a high time constant). Damping acts on the measuring signal before the switch status changes, and consequently before switch-on or switch-off MODBUS register: 3246 delay is activated. The purpose of damping, therefore, is to prevent the status Float output changing state continuously in response to fluctuations in flow. read/write User input: fixed-point number 0.00 to 100.00 s Factory setting:

0.00 s

Note!

- This function **cannot** be changed if:
  - The measuring device has been configured in accordance with NTEP or MC approval.
  - The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z001 in the CUSTODY TRANSFER block.
- $\,\blacksquare\,$  This function is not available unless the STATUS setting was selected in the OPERATION MODE function (4200).

## 8.2.2 Function group OPERATION



OI	Function description OUTPUTS $\rightarrow$ PULSE/FREQUENCY OUTPUT 1 $\rightarrow$ OPERATION (FREQUENCY)				
ACTUAL FREQUENCY	4301	Use this function to view the computed actual value of the output frequency.			
MODBUS register: Data type: Access:	3218 Float read	Display: 0 to 12500 Hz  Note! This function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function (4200).			
SIMULATION FREQUENCY	4302	Activates simulation of the frequency output.			
MODBUS register: Data type: Access:	3220 Integer read/write	Options: 0 = OFF 1 = ON  Factory setting: OFF  Note!  This function cannot be changed if:  The measuring device has been configured in accordance with NTEP or MC approval.  The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z001 in the CUSTODY TRANSFER block.  This function is not available unless the FREQUENCY setting was selected in the OPERATION MODE function (4200).  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.			

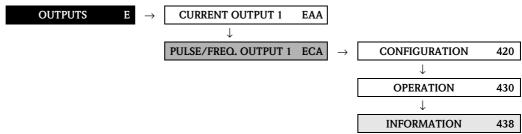
# **Function description** OUTPUTS → PULSE/FREQUENCY OUTPUT 1 → OPERATION (FREQUENCY) VALUE 4303 Define a selectable frequency value (e.g. $500\ Hz$ ) which should be output at the **SIMULATION** frequency output (with maximum pulse frequency or shortened minimum pulse **FREQUENCY** width). This value is used to test downstream devices and the measuring device itself. User input: MODBUS register: 3221 0 to 12500 Hz Data type: Float Access: read/write Factory setting: 0 Hz Note! ■ This function **cannot** be changed if: $\,-\,$ The measuring device has been configured in accordance with NTEP or MC approval. - The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z001 in the CUSTODY TRANSFER block. ■ This function is not available unless FREQUENCY was selected in the OPERATION MODE function (4200) and the SIMULATION FREQUENCY function (4302) is active (= ON). Caution! The setting is not saved in the event of a power failure.

	OUTPUTS →	Function description PULSE/FREQUENCY OUTPUT 1 $\rightarrow$ OPERATION (PULSE)
SIMULATION	4322	Activates simulation of the pulse output.
PULSE		<b>Options:</b> 0 = OFF
MODBUS register: Data type: Access:	3233 Integer read/write	1 = COUNTDOWN The pulses specified in the VALUE SIMULATION PULSE function are output.
		$\label{eq:2.2} 2 = 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 $$\mathbb{E}$ key.$
		Note! Simulation is started by confirming the CONTINUOUSLY option with the key. The simulation can be switched off again via the SIMULATION PULSE function.
		Factory setting: OFF
		Note!  This function cannot be changed if:  The measuring device has been configured in accordance with NTEP or MC approval.  The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z001 in the CUSTODY TRANSFER block.  This function is available only if the PULSE setting was selected in the OPERATION MODE (4200) function.  The notice message #631 "SIM. PULSE" indicates that simulation is active.  The on/off ratio is 1:1 for both types of simulation.  The measuring device continues to measure while simulation is in progress, i.e. the current measured values are output correctly via the other outputs.  Caution!  The setting is not saved in the event of a power failure.

# **Function description** OUTPUTS → PULSE/FREQUENCY OUTPUT 1 → OPERATION (PULSE) VALUE Specify the number of pulses (e.g. 50) to be output during the simulation. This **SIMULATION** value is used to test downstream devices and the measuring device itself. The **PULSE** pulses are output with the pulse width specified in the PULSE WIDTH function. The on/off ratio is 1:1. 1 Simulation is started once the specified value is confirmed with the 🗉 key. MODBUS register: 3234 The display remains at 0 if the specified pulses have been output. Data type: Float Access: read/write User input: 0 to 10 000 Factory setting: Note! ■ This function **cannot** be changed if: - The measuring device has been configured in accordance with NTEP or MC - The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z001 in the CUSTODY TRANSFER block. ■ This function is not available unless the COUNTDOWN setting was selected in the function SIMULATION PULSE. ■ Simulation is started by confirming the simulation value with the 🗉 key. The simulation can be switched off again via the SIMULATION PULSE function. Caution! The setting is not saved in the event of a power failure.

	OUTPUTS → I	Function description PULSE/FREQUENCY OUTPUT 1 $\rightarrow$ OPERATION (STATUS)
ACTUAL STATUS	4341	Use this function to check the current status of the status output.
MODBUS register: Data type: Access:	3248 Integer read	Display: 0 = NOT CONDUCTIVE 1 = CONDUCTIVE
		This function is not available unless the STATUS setting was selected in the OPERATION MODE function (4200).
SIMULATION SWITCH POINT	4342	Use this function to activate simulation of the status output.
		Options: 0 = OFF 1 = ON
MODBUS register: Data type: Access:	3249 Integer read/write	Factory setting: OFF
		<ul> <li>Note!</li> <li>This function cannot be changed if:         <ul> <li>The measuring device has been configured in accordance with NTEP or MC approval.</li> <li>The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z001 in the CUSTODY TRANSFER block.</li> </ul> </li> <li>This function is available only if the STATUS setting was selected in the OPERATION MODE (4200) function.</li> <li>The "SIMULATION STATUS OUTPUT" message indicates that simulation is active.</li> <li>The measuring device continues to measure while simulation is in progress, i.e. the current measured values are output correctly via the other outputs.</li> <li>Caution!</li> <li>The setting is not saved in the event of a power failure.</li> </ul>
VALUE SIMULATION SWITCH POINT	4343	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.
MODBUS register: Data type: Access:	3250 Integer read/write	Options:  0 = NOT CONDUCTIVE  1 = CONDUCTIVE  Factory setting: NOT CONDUCTIVE  Note!  This function cannot be changed if:
		<ul> <li>The measuring device has been configured in accordance with NTEP or MC approval.</li> <li>The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z001 in the CUSTODY TRANSFER block.</li> <li>■ This function is not available unless STATUS was selected in the OPERATION MODE function (4200) and the SIMULATION SWITCH POINT function (4342) is active (= ON).</li> <li>Caution!</li> <li>The setting is not saved in the event of a power failure.</li> </ul>

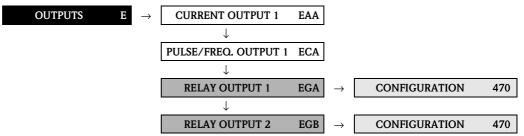
## **8.2.3** Function groupINFORMATION

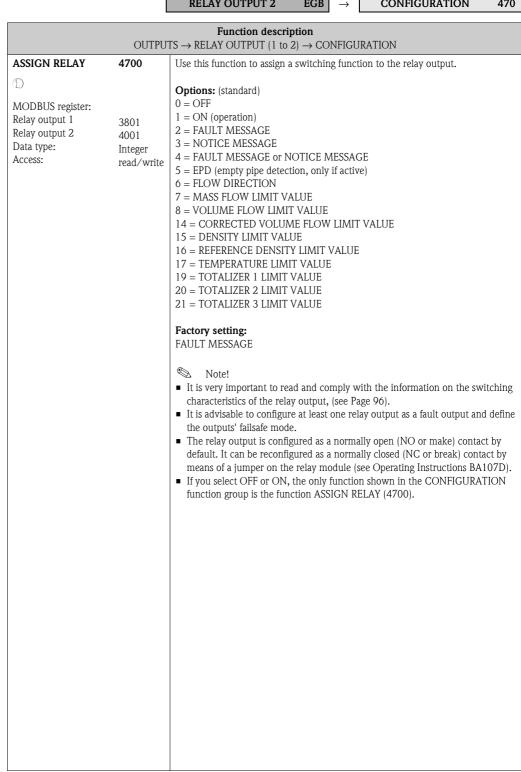


	Function description OUTPUTS→PULSE/FREQUENCY OUTPUT 1→INFORMATION				
TERMINAL NUMBER	4380	Use this function to view the numbers of the terminals (in the connection compartment) and the polarity used by the pulse/frequency output.			
MODBUS register: Data type: Access:	3251 Integer read	<b>Display:</b> 2 = 22 (+) / 23 (-)			

## 8.3 Group RELAY OUTPUT (1 to 2)

### 8.3.1 Function group CONFIGURATION



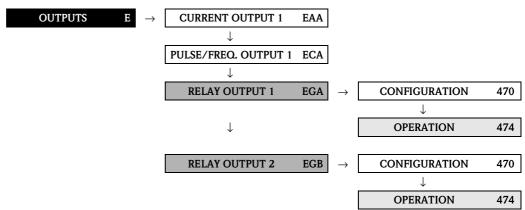


Function description  OUTPUTS $\rightarrow$ RELAY OUTPUT (1 to 2) $\rightarrow$ CONFIGURATION			
ON-VALUE  MODBUS register: Relay output 1 Relay output 2 Data type: Access:	3802 4002 Float read/write	Note! This function is not available unless LIMIT VALUE or FLOW DIRECTION was selected in the ASSIGN RELAY function (4700).  Use this function to assign a value to the switch-on point (relay output pulls up). The value can be higher or lower than the switch-off point. Positive or negative values are permissible, depending on the measured variable in question (e.g. mass flow, totalizer reading).  User input: 5-digit floating-point number [unit]  Factory setting: 0 [kg/h] or 2 [kg/l] or 200 [°C]  Note!  The appropriate unit is taken from the function UNIT VOLUME FLOW (0402) or UNIT MASS FLOW (0400).  Only the switch-on point is available for flow direction output (no switch-off point). If you enter a value not equal to the zero flow (e.g. 5), the difference between the zero flow and the value entered corresponds to half the switchover hysteresis.	
SWITCH-ON DELAY  MODBUS register: Relay output 1 Relay output 2 Data type: Access:	3804 4004 Float read/write	Note! This function is not available unless LIMIT VALUE or FLOW DIRECTION was selected in the ASSIGN RELAY function (4700).  Use this function to define a delay (0 to 100 seconds) for pull-up (i.e. signal changes from 0 to 1) of the relay output. The delay starts when the limit value is reached. The relay output does switch when the delay has timed out and the switch on condition has been valid over the delay time.  User input: fixed-point number 0.0 to 100.0 s  Factory setting: 0.0 s	
OFF-VALUE  MODBUS register: Relay output 1 Relay output 2 Data type: Access:	4703  3806 4006 Float read/write	Note! This function is not available unless LIMIT VALUE was selected in the ASSIGN RELAY function (4700).  Use this function to assign a value to the switch-off point (relay drops out). The value can be higher or lower than the switch-on point. Positive or negative values are permissible, depending on the measured variable in question (e.g. mass flow, totalizer reading).  User input: 5-digit floating-point number [unit]  Factory setting: 0 [kg/h] or 2 [kg/l] or 200 [°C]  Note!  The appropriate unit is taken from the function UNIT VOLUME FLOW (0402) or UNIT MASS FLOW (0400).  If SYMMETRY is selected in the function MEASURING MODE (4705) and values with different signs are entered for the switch-on and switch-off points, the notice message "INPUT RANGE EXCEEDED" appears.	

	Function description  OUTPUTS $\rightarrow$ RELAY OUTPUT (1 to 2) $\rightarrow$ CONFIGURATION				
MODBUS register: Relay output 1 Relay output 2 Data type: Access:	3808 4008 Float read/write	Note! This function is not available unless LIMIT VALUE was selected in the ASSIGN RELAY function (4700).  Use this function to define a delay (0 to 100 seconds) for dropout (i.e. signal changes from 1 to 0) of the relay output.  The delay starts when the limit value is reached.  The relay output does switch when the delay has timed out and the switch off condition has been valid over the delay time.			
		User input: fixed-point number 0.0 to 100.0 s  Factory setting: 0.0 s			
MEASURING MODE  MODBUS register: Relay output 1 Relay output 2 Data type: Access:	3810 4010 Integer read/write	Note! This function is not available unless LIMIT VALUE was selected in the ASSIGN RELAY function (4700).  Use this function to define the measuring mode for the relay output.  Options: 0 = STANDARD The relay output signal switches at the defined switch points.  1 = SYMMETRY The relay output signal switches at the defined switch points, irrespective of the sign. If you define a switch point with a positive sign, the relay output switches as soon as the value is reached in the negative direction (negative sign), (see illustration).  Factory setting: STANDARD  Options:  1 = SYMMETRY The relay output signal switches at the defined switch points, irrespective of the sign. If you define a switch point with a positive sign, the relay output switches as soon as the value is reached in the negative direction (negative sign), (see illustration).  Factory setting: STANDARD  A000124: Fig. 23: Example for the SYMMETRY measuring mode Switch-on point Q = 4 Switch-off point Q = 10  © Relay energized © Relay de-energized Symmetry cannot be selected unless the values in the ON-VALUE (4701) and OFF-VALUE (4703) functions have the same sign or one of the values is zero.  If the values have different signs, SYMMETRY cannot be selected and an "ASSIGNMENT NOT POSSIBLE" message is displayed.			

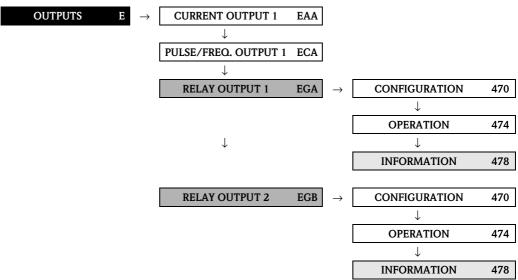
Function description  OUTPUTS → RELAY OUTPUT (1 to 2) → CONFIGURATION				
TIME CONSTANT  MODBUS register: Relay output 1	<b>4706</b> 3811	Entering a time constant defines how the measuring signal reacts to severely fluctuating measured variables, either very quickly (enter a low time constant) or with damping (enter a high time constant). Damping acts on the measuring signal before the switch status changes, and consequently before switch-on or switch-off delay is activated. The purpose of damping, therefore, is to prevent the relay		
Relay output 2 Data type: Access:	4011 Float read/write	output changing state continuously in response to fluctuations in flow. <b>User input:</b> fixed-point number: 0.00 to 100.00 s		
		Factory setting: 0.00 s		

### 8.3.2 Function group OPERATION



		OPERATION 474
	OUTI	Function description  PUTS $\rightarrow$ RELAY OUTPUT (1 to 2) $\rightarrow$ OPERATION
ACTUAL STATUS RELAY	4740	Use this function to check the current status of the relay output.
MODBUS register: Relay output 1 3813 Relay output 2 4013 Data type: Integer Access: read	A jumper on the contact side defines the relay output as a normally open (NO or maker) or normally closed (NC or breaker) contact (see Operating Instructions for Proline Promass 84 MODBUS RS485, BA129D).  Display:  0 = BREAK CONTACT OPEN 1 = BREAK CONTACT CLOSED 2 = MAKE CONTACT OPEN 3 = MAKE CONTACT CLOSED	
SIMULATION SWITCH POINT	4741	Use this function to activate simulation of the relay output.
①  MODBUS register:		<b>Options:</b> 0 = OFF 1 = ON
Relay output 1 Relay output 2 Data type: Access:	3814 4014 Integer read/write	Factory setting: OFF  Note! The "SIMULATION RELAY" message indicates that simulation is active. The measuring device continues to measure while simulation is in progress, i.e. the current measured values are output correctly via the other outputs.  Caution! The setting is not saved in the event of a power failure.
VALUE SIMULATION SWITCH POINT	4742	Note! The function is not visible unless the function SIMULATION SWITCH POINT (4741) is active.
MODBUS register: Relay output 1 Relay output 2 Data type: Access:	3815 4015 Integer read/write	Use this function to define the status of the relay output during the simulation. This value is used to test downstream devices and the measuring device itself. Depending on the relay configuration (as make or break contact) the following selections are available.  Options: Relay output configured as NC (breaker) contact
		0 = BREAK CONTACT OPEN 1 = BREAK CONTACT CLOSED
		Options: Relay output configured as NO (maker) contact 2 = MAKE CONTACT OPEN 3 = MAKE CONTACT CLOSED
		Caution! The setting is not saved in the event of a power failure.

### 8.3.3 Function group INFORMATION



		INFORMATION	478	
Function description  OUTPUTS → RELAY OUTPUT (1 to 2) → INFORMATION				
TERMINAL NUMBER	4780	Use this function to view the numbers of the terminals (in the connection compartment) and the polarity used by the relay output.		
MODBUS register: Relay output 1 Relay output 2 Data type: Access:	3816 4016 Integer read	<b>Display:</b> $2 = 22 (+) / 23 (-) \rightarrow \text{RELAY OUTPUT 1}$ $3 = 20 (+) / 21 (-) \rightarrow \text{RELAY OUTPUT 2}$		

### 8.3.4 Information on the response of the relay output

#### General

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

#### Relay output configured for "flow direction"

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

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

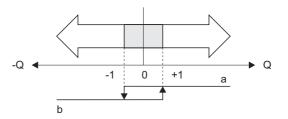


Fig. 24: Relay output configured for "flow direction"

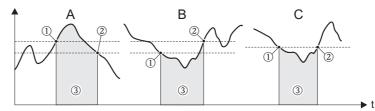
- a Relay energized
- b Relay de-energized

#### Relay output configured for "limit value"

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

Application: Monitoring flow or process-related boundary conditions.

Measured variable



A0001235

A0001236

Fig. 25: Relay output configured for "limit value"

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

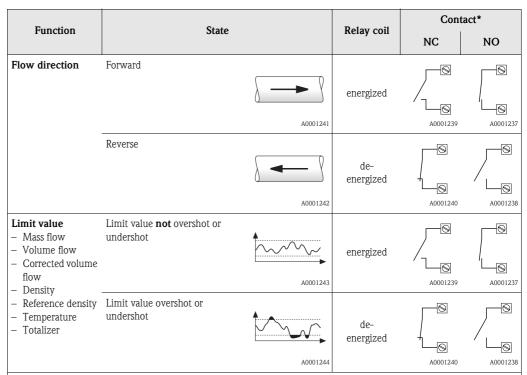
A = Maximum safety (SWITCH-OFF POINT > SWITCH-ON POINT)

*B* = *Minimum safety (SWITCH-OFF POINT < SWITCH-ON POINT)* 

C = Minimum safety (SWITCH-OFF POINT = SWITCH-ON POINT, this configuration is to be avoided)

## 8.3.5 Switching behavior of the relay output

Function	State		Relay coil	Conta	
011 ( 11 )				NC	NO
ON (operation)	System in measuring mode	XXX.XXX.XX	energized	A0001239	A0001237
	System not in measuring mode (power supply failed)	XXX.XXXXX	de- energized	A0001240	A0001238
Fault message	System OK	XXX.XXX.XX	energized	A0001239	A0001237
	(System or process error) Fault → Failsafe mode, outputs/inputs and totalizers	XXX.XXXXX	de- energized	A0001240	A0001238
Notice message	System OK	XXX.XXX.XX	energized	A0001239	A0001237
	(System or process error) Fault → Continuation of measuring	XXX.XXXXX	de- energized	A0001240	A0001238
Fault message or Notice message	System OK	XXX.XXX.XX	energized	A0001239	A0001237
	(System or process error) Fault → Response to error or Note → Continuation of measuring	XXX.XXXXX	de- energized	A0001240	A0001238
Empty pipe detection (EPD)	Measuring tube full		energized	A0001239	A0001237
	Measuring tube partially filled /empty measuring tube		de- energized	A0001240	A0001238



<sup>\*</sup> Terminal numbers in accordance with the TERMINAL NUMBER function (4780) on Page 94.



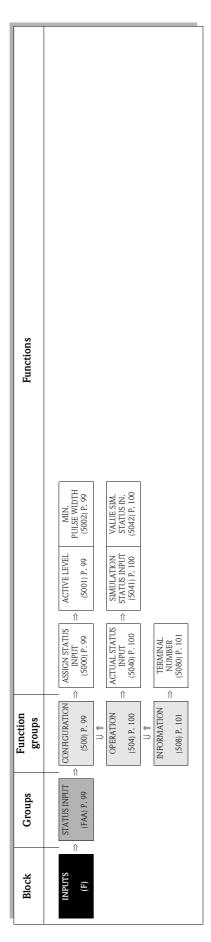
If the measuring device has two relays, the factory setting is:

- Relay 1  $\rightarrow$  normally open contact (NO)
- Relay  $2 \rightarrow$  normally closed contact (NC)



When using the optional software package BATCHING, it is advisable for the contacts (either normally open or normally closed contacts) to have the same switching response for all relay outputs used.

## 9 Block INPUTS



## 9.1 Group STATUS INPUT

## 9.1.1 Function group CONFIGURATION

INPUTS F  $\rightarrow$  STATUS INPUT FAA  $\rightarrow$  CONFIGURATION 500

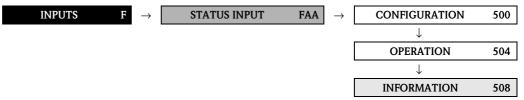
	IN	Function description  PUTS $\rightarrow$ STATUS INPUT $\rightarrow$ CONFIGURATION
ASSIGN STATUS	5000	Use this function to assign a switching function to the status input.
MODBUS register: Data type: Access:	4301 Integer read/write	Options: 0 = OFF 1 = RESET TOTALIZER 1 2 = RESET TOTALIZER 2 3 = RESET TOTALIZER 3 4 = RESET ALL TOTALIZERS 5 = POSITIVE ZERO RETURN 8 = ZEROPOINT ADJUST
		Factory setting: OFF
		Caution! POSITIVE ZERO RETURN is active as long as the level is available at the status input (continuous signal). All other assignments react to a change in level (pulse) at the status input.
ACTIVE LEVEL	5001	Use this function to define whether the assigned function (see function ASSIGN STATUS INPUT(5000)) is released when the signal level is present (HIGH) or not present (LOW).
MODBUS register: Data type: Access:	4302 Integer read/write	Options: 1 = HIGH 0 = LOW
		Factory setting: HIGH
MINIMUM PULSE WIDTH	5002	Use this function to define a minimum pulse width which the input pulse must achieve in order to trigger the selected switching function, (see function ASSIGN STATUS INPUT (5000)).
MODBUS register: Data type: Access:	4303 Float read/write	User input: 20 to 100 ms  Factory setting: 50 ms

## 9.1.2 Function group OPERATION



		OPERATION 504				
	Function description INPUTS → STATUS INPUT → OPERATION					
ACTUAL STATUS INPUT	5040	Use this function to view the current level of the status input.				
MODBUS register: Data type: Access:	4305 Integer read	Display: 0 = LOW 1 = HIGH				
SIMULATION STATUS INPUT	5041	Use this function to simulate the status input, in other words to trigger the function assigned to the status input (see the function ASSIGN STATUS INPUT (5000) on Page 99).				
MODBUS register: Data type: Access:	4306 Integer read/write	Display: 0 = OFF 1 = ON  Factory setting:				
		Note!  The "SIMULATION STATUS INPUT" notice message indicates that simulation is active.  The measuring device continues to measure while simulation is in progress, i.e. the current measured values are output correctly via the other outputs.  Caution!  The setting is not saved in the event of a power failure.				
VALUE SIMULATION STATUS INPUT	5042	Note! The function is not visible unless the function SIMULATION STATUS INPUT (5041) is active.				
MODBUS register: Data type: Access:	4307 Integer read/write	Use this function to define the level to be assumed at the status output during the simulation. This value is used to test downstream devices and the measuring device itself.				
		Factory setting: LOW  Caution!				
		The setting is not saved in the event of a power failure.				

## 9.1.3 Function group INFORMATION



Function description				
MODBUS register: Data type: Access	4308 Integer read	<b>Display:</b> 1 = 24 (+) / 25 (-)		

## 10 Block BASIC FUNCTION

	SCAN LIST REGISTER 1 to 16 (6308) P. 105								
	WRITE PROTECTION (6307) P. 105		RESTORE ORIGINAL (6488) P. 113						
	DELAY TELE. REPLY (6306) P. 105		DENSITY ADJUSTMENT (6487) P. 113						
ons	BYTE ORDER (6305) P. 104		MEASURE FLUID 2 (6486) P. 113					COEFF. C 5 (6855) P. 118	
Functions	PARITY (6304) P. 104	EPD EXC.CURR. (6426) P. 109	TEMPERATURE (6464) P. 111 DENSITY SET VALUE 2 (6485) P. 113				COEFF. KD2 (6844) P. 117	COEFF. C 4 (6854) P. 118	
	TRANSMISSION MODE (6303) P. 104		COEF. SOR. (6463) P. 110 MEASURE FLUID 1 (6484) P. 112		POSITIVE ZERO RETURN (6605) P. 115		COEFF. KD1 (6843) P. 117	COEFF. C 3 (6853) P. 118	MAX. TEMP. CARRIER (6863) P. 119
	BAUDRATE (6302) P. 103	ON-VALUE LF OFF-VALUE LF CUT OFF (6402) P. 106 (6402) P. 106 EPD VALUE LOW EPD VALUE HIGH (6423) P. 108 EXENSION EXPANSION	COEFF (6462) P. 110 DENSITY SET VALUE 1 (6483) P. 112		FLOW DAMPING (6603) P. 115	NOMINAL DIAMETER (6804) P. 116	COEFF. KT (6842) P. 117	COEFF. C 2 (6852) P. 118	MIN. TEMP. CARRIER (6862) P. 119
	FIELDBUS ADDRESS (6301) P. 103	ON-VALUE LF CUT' OFF (6402) P. 106 EPD VALUE LOW (6423) P. 108	REFERENCE DENSITY DENSITY ADJUST MODE (6482) P. 112	PRESSURE (6501) P. 114	DENSITY DAMPING (6602) P. 115	ZERO POINT (6803) P. 116	COEFF. KM 2 (6841) P. 117	COEFF. C 1 (6851) P. 118	MAX. TEMP. MEAS. (6861) P. 119
	TAG NAME ⇒ (6300) P. 103	ASSIGN LF CUT OFF (6400) P. 106  EPD (6420) P. 108  COR VOI CALC	(6460) P. 110  ZERO POINT ADJUSTMENT (6480) P. 112	PRESSURE MODE ⇒	INST. DIR. SENSOR (6600) P. 115	K-FACTOR ⇒	COEFF. KM ⇒ (6840) P. 117	COEFF. C 0 ⇒ (6850) P. 118	MIN. TEMP. MEAS. ⇒ (6860) P. 119
Function groups	CONFIGURATION ⇒ (630) P. 103	CONHGURATION ⇒ (640) P. 106  U ff  EPD PARAMETER  (642) P. 108  U ff  U ff  EPT PREPRINT	<b>1 1</b>	U ↑ PRESSURE CORRECTION ⇒ (650) P. 114	CONFIGURATION ⇒ (660) P. 115	CONFIGURATION ⇒ (680) P. 116  U ↑	ELOW COEFF. ⇒ (684) P. 117	DENSITY COEFFICIENT (685) P. 118	ADDITIONAL COEFFICIENT (686) P. 119
Groups	MODBUS RS485 ⇒ (GDA) P. 103	PROCESS PARAMETRR (GIA) P. 106  U ↑		<b>←</b>	SYSTEM PARAMETER (GLA) P. 115	SENSOR DATA (GNA) P. 116			
Block	BASIC FUNCTION ⇒ (G)								

## 10.1 Group MODBUS RS485

## 10.1.1 Function group CONFIGURATION

BASIC FUNCTION G  $\rightarrow$  MODBUS RS485 GDA  $\rightarrow$  CONFIGURATION 630

	BASIC F	Function description Unction → Modbus RS485 → Configuration
TAG NAME	6300	For entering a tag name for the measuring device. You can edit and read this tag name via the local display or the MODBUS RS485 protocol.
MODBUS register: Data type: Access:	4901 String (16) read/write	User input: max. 16-character text, permissible: A-Z, 0-9, +, -, punctuation marks  Factory setting: "" (No text)
		<ul> <li>Note!         This function cannot be changed if:         ■ The measuring device has been configured in accordance with NTEP or MC approval.     </li> <li>■ The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z009 in the CUSTODY TRANSFER block.</li> </ul>
FIELDBUS ADDRESS	6301	For entering the device address.
1		User input: 1 to 247
MODBUS register: Data type: Access:	4910 Integer read/write	Factory setting: 247
		Note!  This function <b>cannot</b> be changed if:  ■ The measuring device has been configured in accordance with NTEP or MC approval.  ■ The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z009 in the CUSTODY TRANSFER block.
BAUDRATE	6302	For selecting the baudrate.
MODBUS register: Data type: Access:	4912 Integer read/write	Options: 0 = 1200 BAUD 1 = 2400 BAUD 2 = 4800 BAUD 3 = 9600 BAUD 4 = 19200 BAUD 5 = 38400 BAUD 6 = 57600 BAUD 7 = 115200 BAUD
		Factory setting: 19200 BAUD
		<ul> <li>Note!         This function cannot be changed if:         ■ The measuring device has been configured in accordance with NTEP or MC approval.         ■ The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z009 in the CUSTODY TRANSFER block.     </li> </ul>

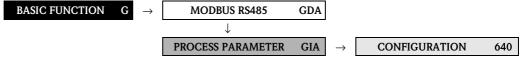
Function description  BASIC FUNCTION → MODBUS RS485 → CONFIGURATION				
TRANSMISSION	6303	For selecting the data transfer mode.		
MODE  MODBUS register: Data type: Access:	4913 Integer read/write	Options:  0 = RTU 1 = ASCII  Factory setting: RTU  Note!  RTU = transmission of data in binary form. Error protection via CRC16.  RTU = transmission of data in the form of readable ASCII characters. Error protection via LRC.  This function cannot be changed if:  The measuring device has been configured in accordance with NTEP or MC approval.  The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z009 in the CUSTODY TRANSFER block.		
PARITY	6304	For selecting whether no parity bit or an even or uneven parity bit should be transmitted. The options available depend on the TRANSMISSION MODE function:		
MODBUS register: Data type: Access:	4914 Integer read/write	Options: (for TRANSMISSION MODE = RTU)  0 = EVEN  1 = UNEVEN  2 = NONE  Options: (for TRANSMISSION MODE = ASCII)  0 = EVEN  1 = UNEVEN  Factory setting: EVEN  Note!  This function cannot be changed if:		
		<ul> <li>The measuring device has been configured in accordance with NTEP or MC approval.</li> <li>The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z009 in the CUSTODY TRANSFER block.</li> </ul>		
BYTE ORDER	6305	For selecting the byte transmission sequence for the Integer, Float and String data types.		
MODBUS register: Data type: Access:	4915 Integer read/write	Options: 0 = 0-1-2-3 1 = 3-2-1-0 2 = 2-3-0-1 3 = 1-0-3-2 Factory setting: 1-0-3-2		
		<ul> <li>Note!</li> <li>The transmission sequence must suit the MODBUS master.</li> <li>For additional information, refer to the "Byte transmission order" section in the Operating Instructions for Proline Promass 84 MODBUS RS485, BA129D.</li> <li>This function cannot be changed if:         <ul> <li>The measuring device has been configured in accordance with NTEP or MC approval.</li> <li>The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z009 in the CUSTODY TRANSFER block.</li> </ul> </li> </ul>		

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	DACIO FI	Function description
		UNCTION → MODBUS RS485 → CONFIGURATION
DELAY TELE. REPLY	6306	For entering a delay time after which the measuring device replies to the request telegram of the MODBUS master. This allows communication to be adapted to slow MODBUS RS485 masters.
MODBUS register: Data type: Access:	4916 Float read/write	User input: 0 to 100 ms
		Factory setting: 10 ms
		<ul> <li>Note!         This function cannot be changed if:         The measuring device has been configured in accordance with NTEP or MC approval.     </li> <li>The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z009 in the CUSTODY TRANSFER block.</li> </ul>
WRITE PROTECTION	6307	Indicates whether write access to the measuring device is possible via local operation or MODBUS RS485.
MODBUS register: Data type: Access:	4918 Integer read	Display: 0 = OFF (write access via MODBUS possible) 1 = ON (write access via MODBUS blocked)
		Factory setting: OFF
		Note! Hardware write protection is activated and deactivated by means of a jumper on the I/O board (see Operating Instructions for Proline Promass 84 MODBUS RS485, BA129D).
SCAN LIST REGISTER 1 to 16	6308	By entering the register address, up to 16 device parameters can be grouped in the auto-scan buffer where they are assigned to the scan list registers 1 to 16. The data of the device parameters assigned here are read out via the register addresses 5051 to 5081.
MODBUS register: SCAN LIST REG. 1 SCAN LIST REG. 2	5001 5002	User input: 0 to 9999
SCAN LIST REG. 3 SCAN LIST REG. 4 SCAN LIST REG. 5	5003 5004 5005	Factory setting:
SCAN LIST REG. 6 SCAN LIST REG. 7 SCAN LIST REG. 8 SCAN LIST REG. 9 SCAN LIST REG. 10 SCAN LIST REG. 11 SCAN LIST REG. 12	5006 5007 5008 5009 5010 5011 5012	<ul> <li>Note!</li> <li>For additional information and examples of using the auto-scan buffer, refer to the Operating Instructions for Proline Promass 84 MODBUS RS485, BA129D.</li> <li>This function cannot be changed if:         <ul> <li>The measuring device has been configured in accordance with NTEP or MC approval.</li> </ul> </li> </ul>
SCAN LIST REG. 13 SCAN LIST REG. 14 SCAN LIST REG. 15 SCAN LIST REG. 16 Data type:	5013 5014 5015 5016 Integer	<ul> <li>The measuring device has been configured in accordance with PTB, NMi, METAS or BEV approval and YES has been selected for function Z009 in the CUSTODY TRANSFER block.</li> </ul>
Access:	read/write	

## 10.2 Group PROCESS PARAMETER

## 10.2.1 Function group CONFIGURATION



	L	PROCESS PARAMETER GIA → CONFIGURATION 640			
ASSIGN LOW FLOW CUTOFF  MODBUS register: Data type: Access:	6400 5101 Integer read/write	Use this function to assign the switch point for low flow cut off rate suppression.  Options: 0 = OFF 1 = MASS FLOW 2 = VOLUME FLOW 3 = CORRECTED VOLUME FLOW  Factory setting: MASS FLOW			
ON-VALUE LOW FLOW CUT OFF  MODBUS register: Data type: Access:	5138 Float read/write	Use this function to assign a value to the switch-on point for low flow cut off.  Low flow cut off is active if the value entered is not equal to 0. The sign of the flow value is highlighted on the display to indicate that low flow cut off is active.  User input: 5-digit floating-point number, [unit]  Factory setting: Depends on nominal diameter  Note! The appropriate unit is taken from the function group SYSTEM UNITS (see Page 14).			
OFF-VALUE LOW FLOW CUTOFF  MODBUS register: Data type: Access:	6403  5104 Float read/write	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%   ① ② ② ② ② ② ② ② ② ② ② ③ ③ ③ ③ ③ ③ ③ ③			

#### **Function description** BASIC FUNCTION → PROCESS PARAMETER → CONFIGURATION

#### PRESSURE SHOCK 6404 SUPPRESSION



MODBUS register: 5140 Data type: Float Access: read/write

The closure of a valve can cause brief but severe movements of the fluid in the piping system, movements which the measuring system registers.

The pulses totaled in this way result in a totalizer reading error, particularly in the case of batching processes. For this reason, the measuring device is equipped with pressure shock suppression (= short-term signal suppression) which can eliminate system-related "disruptions".

#### Note!

Note that pressure shock suppression cannot be used unless the low flow cut off is active, (see function ON-VALUE LOW FLOW CUT OFF on Page 106).

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

#### Activation of the pressure shock suppression

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

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

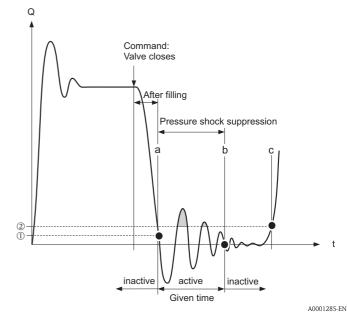
- Flow reading on display  $\rightarrow$  0
- lacktriangledown Totalizer reading ightarrow the totalizers are pegged at the last correct value.

#### Deactivation of the pressure shock suppression

The pressure shock suppression is deactivated after the time interval, set in this function, has passed (see point in graphic).



The actual flow value is displayed and output, when the time interval for the pressure shock suppression has passed and the flow exceeds the switch-off point of the low flow cut off (see point in graphic).



1 = Off-value (low flow cut off), 2 = On-value (low flow cut off)

Active when value falls below the on-value of the low flow cut off

h Deactivated after specified time expires

Flow values are again used to calculate the pulses С

Suppressed values

Q Flow

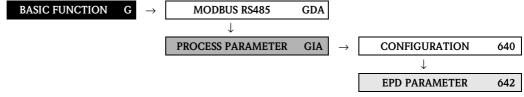
#### User input:

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

#### Factory setting:

 $0.00 \, s$ 

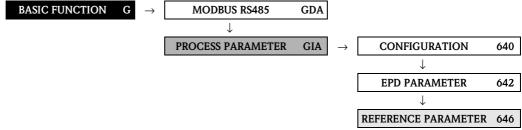
## 10.2.2 Function group EPD PARAMETER



		EPD PARAMETER 04Z		
Function description BASIC FUNCTION $\rightarrow$ PROCESS PARAMETER $\rightarrow$ EPD PARAMETER				
EMPTY PIPE DETECTION	6420	Use this function to activate the empty pipe detection (EPD). With empty measuring tubes the density of the fluid falls below the value specified in the function EPD VALUE LOW.		
MODBUS register: Data type: Access:	5106 Integer read/write	<b>Options:</b> 0 = OFF 1 = ON		
		Factory setting: Liquid: ON Gas: OFF		
		Caution!  Select a correspondingly low EPD response value in the function EPD VALUE LOW, so that the difference to the effective density of the fluid is sufficiently large enough. This ensures that totally empty measuring tubes and not partially filled ones are detected.  For gas measurement we strongly recommend to switch off empty pipe detection.		
EPD VALUE LOW	6423	Note! This function is not available unless the ON selection was selected in the EMPTY PIPE DETECTION function.		
MODBUS register: Data type: Access:	5110 Float read/write	Use this function to set a lower threshold for the measured density value, in order to detect possible problems in the process indicated by too low density.		
		User input: 5-digit floating-point number  Factory setting: 0.2000 g/cc		
EPD VALUE HIGH	6424	Note! This function is not available unless the ON selection was selected in the EMPTY PIPE DETECTION function.		
MODBUS register: Data type: Access:	5112 Float read/write	Use this function to set an upper threshold for the measured density value.		
		User input: 5-digit floating-point number  Factory setting: 6.0000 g/cc		
EPD RESPONSE TIME	6425	Use this function to enter the time span for which the criteria for an empty pipe have to be satisfied without interruption before a notice message or fault message is generated.		
MODBUS register: Data type: Access:	5108 Float	<b>User input:</b> fixed-point number: 1.0 to 60 s		
ACCESS.	read/write	Factory setting: 1.0 s		

Function description  BASIC FUNCTION → PROCESS PARAMETER → EPD PARAMETER		
EPD EXC.CURR.	6426	Empty pipe detection (EPD) can be switched on in this function.
MODBUS register: Data type: Access:	5233 Float read/write	In the event of inhomogeneous fluids or air bubbles, the exciting current of the measuring pipes increases. If the exciting current specified in this function is overshot, error message #700 "EPD ACTIVE" is output similar to the EPD VALUE LOW () function.
		User input: 5-digit floating-point number
		Factory setting: 100 mA (deactivated)
		Note! The function is not activated until a value under 100 mA is input. Entering the value 100 mA deactivates the function.

### 10.2.3 Function group REFERENCE PARAMETER

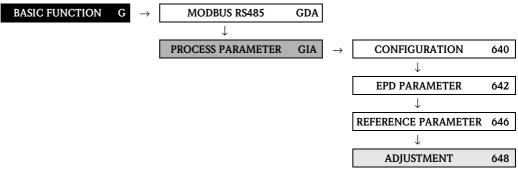


ВА	SIC FUNCTION	Function description on $\rightarrow$ Process parameter $\rightarrow$ reference parameter
CORRECTED VOLUME CALCULATION	6460	This function is used to set the reference density for calculating the corrected volume flow.
MODBUS register: Data type: Access:	5129 Integer read/write	Options:  0 = CALCULATED REFERENCE DENSITY  1 = FIXED REFERENCE DENSITY  Factory setting:  CALCULATED REFERENCE DENSITY
FIXED REFERENCE DENSITY  MODBUS register: Data type: Access:	6461 5130 Float read/write	Note! This function is not available unless the FIXED REFERENCE DENSITY setting was selected in the CORRECTED VOLUME CALCULATION function (6460).  In this function, a fixed value for the reference density can be entered, with which the corrected volume flow or corrected volume is calculated.  User input: 5-digit floating-point number  Factory setting: 1 kg/Nl
EXPANSION COEFFICIENT  MODBUS register: Data type: Access:	5132 Float read/write	Note! This function is not available unless the CALCULATED REFERENCE DENSITY setting was selected in the CORRECTED VOLUME CALCULATION function (6460).  For temperature-compensated calculations of the reference density an expansion coefficient specific to the fluid is required and can be entered in this function (see REFERENCE TEMPERATURE (6464) function on Page 111).  User input: 5-digit floating-point number  Factory setting: 0.5000 e-3 [1/K]
EXPANSION COEFFICIENT SQUARE  MODBUS register: Data type: Access:	6463 5134 Float read/write	Use this function to enter a square expansion coefficient, if the temperature compensation follows a nonlinear behavior (see REFERENCE TEMPERATURE (6464) function on Page 111).  User input: 5-digit floating-point number  Factory setting: 0 e-6 [1/K²]

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	Function description  BASIC FUNCTION → PROCESS PARAMETER → REFERENCE PARAMETER			
REFERENCE	6464			
TEMPERATURE		Note! This function is not available unless the CALCULATED REFERENCE DENSITY setting was selected in the CORRECTED VOLUME CALCULATION function (6460).		
MODBUS register: Data type: Access:	5136 Float read/write	For entering the reference temperature for calculating the corrected volume flow the corrected volume and the reference density.		
		User input: 5-digit floating-point number		
		Factory setting: 20.000 °C		
		The reference density is calculated as follows: $\rho_N = \rho \cdot (1 + \alpha \Delta t + \beta \Delta t^2) \; ; \Delta \; \text{where} \; t = t - t_N$		
		$\begin{array}{l} \rho_N = \text{Reference density} \\ \rho = \text{currently measured fluid density (measuring value Promass)} \\ t = \text{Actual measured temperature of fluid (measuring value Promass)} \\ t_N = \text{Reference temperature for calculating the reference density (e.g. 20 °C)} \\ \alpha = \text{Vol. expansion coefficient of the fluid, unit [1/K] (K = Kelvin)} \\ \beta = \text{Square volumetric expansion coefficient of the fluid, unit [1/K^2]} \end{array}$		

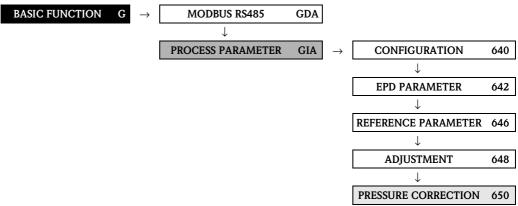
### 10.2.4 Function group ADJUSTMENT



		ADJUSTMENT 648		
	Function description  BASIC FUNCTION → PROCESS PARAMETER → ADJUSTMENT			
ZERO POINT ADJUSTMENT	6480	This function enables a zero point adjustment to be automatically carried out. The new zero point determined by the measuring system is adopted by the function ZERO POINT.		
MODBUS register: Data type: Access:	5121 Integer read/write	Options: 0 = CANCEL 1 = START		
		Factory setting: CANCEL		
		Caution!  Before carrying this out, please refer to the Operating Instructions for Proline Promass 84 MODBUS RS485, BA129D for a detailed description of the procedure for zero point adjustment.		
		<ul> <li>Note!</li> <li>Programming is locked during zero point adjustment.         The message "ZERO ADJUST RUNNING" appears on the display.     </li> <li>If the zero point adjustment is not possible (e.g. if v &gt; 0.1 m/s) or has been canceled, the alarm message "ZERO ADJUST NOT POSSIBLE" appears on the display.</li> <li>If the Promass 84 measuring electronics are fitted with a status input, then the zero point adjustment can also be activated by using this input.</li> </ul>		
DENSITY ADJUST MODE	6482	Use this function to select whether a 1-point or a 2-point density adjustment should be carried out.		
1		Options:		
MODBUS register:	5180	0 = CANCEL		
Data type:	Integer	1 = 1-POINT		
Access:	read/write	2 = 2-POINT		
DENSITY SET VALUE 1	6483	Use this function to enter the density setpoint value for the first fluid for which you want to carry out field density adjustment.		
(D)		User input:		
	5404	5-digit floating-point number, incl. unit		
MODBUS register: Data type: Access:	5124 Float read/write	<ul> <li>Note!</li> <li>The preset density entered here should not vary from the actual fluid density by a more than ±10%.</li> <li>The appropriate unit is taken from the function group SYSTEM UNITS (see Page 14).</li> </ul>		
MEASURE FLUID 1	6484	In this function the actual density of the first fluid is measured for density adjustment.		
MODBUS register: Data type: Access:	5126 Integer read/write	Options: 0 = CANCEL 1 = START		

	Function description			
	BASIC FU	$\operatorname{NCTION}  o \operatorname{PROCESS}$ PARAMETER $ o$ ADJUSTMENT		
DENSITY SET VALUE 2	6485	Use this function to enter the density setpoint value for the second fluid for which you want to carry out field density adjustment.		
$\bigcirc$		Hear input.		
MODBUS register:		User input: 5-digit floating-point number, incl. unit		
Data type:	5181	o alge notation point nations, mon and		
Access:	Float	Note!		
	read/write	■ The preset density entered here should not vary from the actual fluid density by		
		a more than ±10%.  The difference between the density setpoint values must be at least 0.2 kg/l.		
		■ The appropriate unit is taken from the function group SYSTEM UNITS		
		(see Page 14).		
MEASURE FLUID 2	6486	In this function the current density of the second fluid is measured for density		
(D)		adjustment.		
		Options:		
MODBUS register: Data type:	5183	0 = CANCEL		
Access:	Integer read/write	1 = START		
DENSITY	6487	With this function a density adjustment can be carried out on site.		
ADJUSTMENT	0.07	The density adjustment values will thus be recalculated and stored. This ensures		
(1)		that the values dependent on density calculations (e.g. volume flow) are as		
		accurate as possible.		
MODBUS register:	5127	Note!		
Data type: Access:	Integer read/write	Note!  Before carrying this out, please refer to the Operating Instructions for Proline		
riccoo.	reau/ write	Promass 84 MODBUS RS485, BA129D for a detailed description of the procedure		
		for density adjustment.		
		Two times of adjustment are negative.		
		Two types of adjustment are possible:  1-point density adjustment (with one fluid)		
		This type of density adjustment is necessary under the following conditions:		
		■ The sensor does not measure exactly the density value that the user expects on		
		the basis of laboratory analyses.  The fluid properties are outside the measuring points set at the factory, or the		
		reference operating conditions used to calibrate the measuring device.		
		■ The plant is used solely for measuring a fluid whose density is to be determined		
		very accurately under constant conditions.		
		2-point density adjustment (with two fluids)		
		This type of adjustment must always be carried out when the measuring tubes are		
		changed mechanically, e.g. due to deposits, abrasion or corrosion:		
		In such instances, the measuring tube resonance frequency is influenced in such a		
		way that it is no longer compatible with the calibration data determined at the factory.		
		The 2-point density adjustment takes these mechanically-based changes into		
		account and calculates new, adjusted calibration data.		
		Options: 0 = CANCEL		
		1 = MEASURE FLUID 1		
		2 = MEASURE FLUID 2		
		3 = DENSITY ADJUST		
		Factory setting:		
		CANCEL		
RESTORE	6488	With this function the original density coefficient determined at the factory are		
ORIGINAL		restored.		
1		Options:		
MODBUS register:	5120	0 = NO		
Data type:	5128 Integer	1 = YES		
Access:	read/write	F		
		Factory setting: NO		

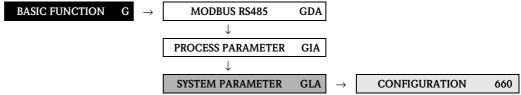
### 10.2.5 Function group PRESSURE CORRECTION



BA	Function description BASIC FUNCTION $\rightarrow$ PROCESS PARAMETER $\rightarrow$ PRESSURE CORRECTION			
PRESSURE MODE  MODBUS register: Data type: Access:	6500  5184 Integer read/write	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 can be compensated, (see also Operating Instructions for Proline Promass 84 MODBUS RS485, BA129D, "Performance characteristics" section).  Options:  0 = OFF  1 = FIX (a fixed process pressure for pressure correction is specified).  Factory setting: OFF		
PRESSURE  MODBUS register: Data type: Access:	6501  5185 Float read/write	Note! This function is not available unless the FIXED setting was selected in the PRESSURE MODE function (6500).  Use this function to enter the value for the process pressure which should be used during pressure correction.  User input: 7-digit floating-point number  Factory setting: 0 bar g  Note! The appropriate unit is taken from the function group SYSTEM UNITS (see Page 14).		

# 10.3 Group SYSTEM PARAMETER

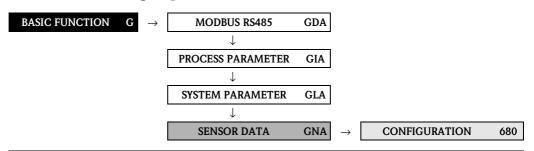
## 10.3.1 Function group CONFIGURATION



	Function description  BASIC FUNCTION $\rightarrow$ SYSTEM PARAMETER $\rightarrow$ CONFIGURATION			
INSTALLATION DIRECTION SENSOR  MODBUS register: Data type: Access:	5501 Integer read/write	Use this function to reverse the sign of the flow direction, if necessary.  Note!  Ascertain the actual direction of fluid flow with reference to the direction indicated by the arrow on the sensor (nameplate).  Options:  0 = NORMAL (flow as indicated by the arrow)  1 = INVERSE (flow opposite to direction indicated by the arrow)  Factory setting:  NORMAL		
DENSITY DAMPING  MODBUS register: Data type: Access:	6602  5508 Float read/write	The density filter allows the sensitivity of the density measuring signal to be lowered with respect to variations in the density of the fluid, e.g. with inhomogeneous liquids. The damping acts on all functions and outputs of the measuring device.  User input: max. 5-digit number, including unit: 0.00 to 100.00 s  Factory setting: Liquid: 0.00 s Gas: 0.25 s		
FLOW DAMPING  MODBUS register: Data type: Access:	6603  5510 Float read/write	Setting the filter depth of the digital filter. The sensitivity of the flow measurement signal can be reduced with respect to interference peaks (e.g. in the event of a high solid content, gas bubbles in the fluid etc.). The reaction time of the measuring device increases with every increase in the filter setting. The damping acts on all functions and outputs of the measuring device.  User input:  0 to 100 s  Factory setting:  0 s		
POSITIVE ZERO RETURN  MODBUS register: Data type: Access:	6605  5503 Integer read/write	Use this function to interrupt evaluation of measured variables. This is necessary when a piping system is being cleaned, for example.  This setting acts on all function and outputs of the measuring device.  Options:  0 = OFF  1 = ON (signal output is set to the "ZERO FLOW" value, temperature and density are still output)  Factory setting:  OFF		

#### 10.4 Group SENSOR DATA

#### 10.4.1 Function group CONFIGURATION



# $\label{eq:function} \textbf{Function} \ \, \textbf{description} \\ \textbf{BASIC FUNCTION} \ \, \textbf{\rightarrow} \ \, \textbf{SENSOR DATA} \ \, \textbf{\rightarrow} \ \, \textbf{CONFIGURATION} \\ \textbf{ONCOME TO THE SENSOR DATA} \ \, \textbf{\rightarrow} \ \, \textbf{CONFIGURATION} \\ \textbf{ONCOME TO THE SENSOR DATA} \ \, \textbf{\rightarrow} \ \, \textbf{CONFIGURATION} \\ \textbf{ONCOME TO THE SENSOR DATA} \ \, \textbf{\rightarrow} \ \, \textbf{CONFIGURATION} \\ \textbf{ONCOME TO THE SENSOR DATA} \ \, \textbf{\rightarrow} \ \, \textbf{CONFIGURATION} \\ \textbf{ONCOME TO THE SENSOR DATA} \ \, \textbf{\rightarrow} \ \, \textbf{CONFIGURATION} \\ \textbf{ONCOME TO THE SENSOR DATA} \ \, \textbf{\rightarrow} \ \, \textbf{CONFIGURATION} \\ \textbf{ONCOME TO THE SENSOR DATA} \ \, \textbf{\rightarrow} \ \, \textbf{CONFIGURATION} \\ \textbf{ONCOME TO THE SENSOR DATA} \ \, \textbf{\rightarrow} \ \, \textbf{CONFIGURATION} \\ \textbf{ONCOME TO THE SENSOR DATA} \ \, \textbf{CONFIGURATION} \\ \textbf{ONCOME TO THE SENSOR DATA} \ \, \textbf{CONFIGURATION} \\ \textbf{ONCOME TO THE SENSOR DATA} \ \, \textbf{CONFIGURATION} \\ \textbf{ONCOME TO THE SENSOR DATA} \ \, \textbf{CONFIGURATION} \\ \textbf{ONCOME TO THE SENSOR DATA} \ \, \textbf{CONFIGURATION} \\ \textbf{ONCOME TO THE SENSOR DATA} \ \, \textbf{CONFIGURATION} \\ \textbf{ONCOME TO THE SENSOR DATA } \ \, \textbf{CONFIGURATION} \\ \textbf{ONCOME TO THE SENSOR DATA } \ \, \textbf{CONFIGURATION} \\ \textbf{ONCOME TO THE SENSOR DATA } \ \, \textbf{CONFIGURATION} \\ \textbf{ONCOME TO THE SENSOR DATA } \ \, \textbf{CONFIGURATION} \\ \textbf{ONCOME TO THE SENSOR DATA } \ \, \textbf{CONFIGURATION} \\ \textbf{ONCOME TO THE SENSOR DATA } \ \, \textbf{CONFIGURATION} \\ \textbf{ONCOME TO THE SENSOR DATA } \ \, \textbf{CONFIGURATION} \\ \textbf{ONCOME TO THE SENSOR DATA } \ \, \textbf{CONFIGURATION} \\ \textbf{ONCOME TO THE SENSOR DATA } \ \, \textbf{CONFIGURATION} \\ \textbf{ONCOME TO THE SENSOR DATA } \ \, \textbf{CONFIGURATION} \\ \textbf{ONCOME TO THE SENSOR DATA } \ \, \textbf{CONFIGURATION} \\ \textbf{ONCOME TO THE SENSOR DATA } \ \, \textbf{CONFIGURATION} \\ \textbf{ONCOME TO THE SENSOR DATA } \ \, \textbf{CONFIGURATION} \\ \textbf{ONCOME TO THE SENSOR DATA } \ \, \textbf{CONFIGURATION} \\ \textbf{ONCOME TO THE SENSOR DATA } \ \, \textbf{CONFIGURATION} \\ \textbf{ONCOME TO THE SENSOR DATA } \ \, \textbf{CONFIGURATION} \\ \textbf{ONCOME TO THE SENSOR DATA } \ \, \textbf{CONFIGURATION} \\ \textbf{ONCOME TO THE SENSOR DATA } \ \, \textbf{CONFIGURATION} \\ \textbf{ONCOME TO THE SENSOR DATA } \ \, \textbf{CONFIGURATION} \\ \textbf{ONCOME TO THE SENSOR DATA } \ \, \textbf{CONFIGURATION} \\ \textbf{ONCO$

All sensor data (calibration factor, zero point and nominal diameter) are set at the factory and saved on the S-DAT sensor memory chip.

Caution!

Under normal circumstances you should not change the following parameter settings, because changes affect numerous functions of the entire measuring facility in general and the accuracy of the measuring system in particular. For this reason, the functions described below cannot be changed even when you enter your personal code.

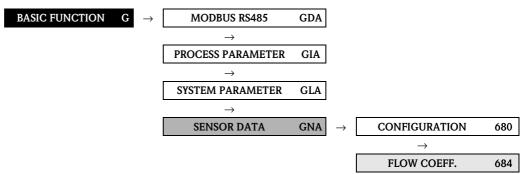
Contact the Endress+Hauser service organization if you have any questions about these functions.

Note

The individual values of the functions are also provided on the sensor nameplate.

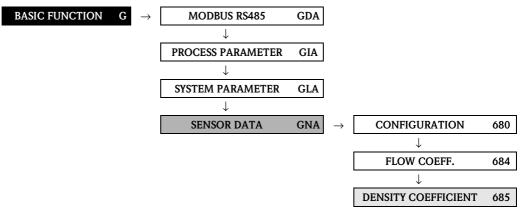
K-FACTOR	6800	This function shows the current calibration factor for the sensor.
MODBUS register: Data type: Access:	7513 Float read	Factory setting: Depends on nominal diameter and calibration
ZERO POINT	6803	This function shows the current zero point correction value for the sensor.
MODBUS register: Data type: Access:	7527 Float read/write	Display: max. 5-digit number: -99999 to +99999  Factory setting: Depends on calibration
NOMINAL DIAMETER  MODBUS register: mm inch Data type: Access:	7525 7526 Integer read	Display: Nominal diameter of the sensor  0 = DN 1 or 1/24"  1 = DN 2 or 1/12"  2 = DN 3 or 1/8"  3 = DN 3.5 or 9/64"  4 = DN 4 or 5/32"  5 = DN 6 or 1/4"  6 = DN 8 or 5/16"  7 = DN 10 or 3/8"  8 = DN 15 or 1/2"  10 = DN 20 or 3/4"  11 = DN 25 or 1"  13 = DN 32 or 1 1/4"  14 = DN 40 or 1 1/2"  16 = DN 50 or 2"  18 = DN 65 or 2 1/2"  19 = DN 80 or 3"  20 = DN 100 or 4"  21 = DN 125 or 5"  22 = DN 150 or 6"  23 = DN 200 or 8"  24 = DN 250 or 10"

## 10.4.2 Function group FLOW COEFFICIENT



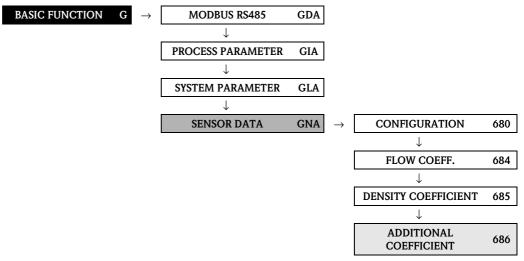
			FLOW COEFF.	084
		Franchism described:		
		Function description UNCTION $\rightarrow$ SENSOR DATA $\rightarrow$ FLOW COE		
All flow coefficients are	set at the fac	tory. All the sensor's parameter settings are sa	ved on the S-DAT memory chip.	
Contact the Endress+H	auser service	organization if you have any questions about	these functions.	
TEMPERATURE COEFFICIENT KM	6840	This function shows the temperature coefficient KM.		
MODBUS register: Data type: Access:	7519 Float read			
TEMPERATURE COEFFICIENT KM2	6841	This function shows the temperature coeffic	cient KM2.	
MODBUS register: Data type: Access:	7521 Float read			
TEMPERATURE COEFFICIENT KT	6842	This function shows the temperature coeffic	cient KT.	
MODBUS register: Data type: Access:	7523 Float read			
CALIBRATION COEFFICIENT KD 1	6843	This function shows the calibration coefficient	ent KD 1.	
MODBUS register: Data type: Access:	7515 Float read			
CALIBRATION COEFFICIENT KD 2	6844	This function shows the calibration coefficient	ent KD 2.	
MODBUS register: Data type: Access:	7517 Float read			

### 10.4.3 Function group DENSITY COEFFICIENT



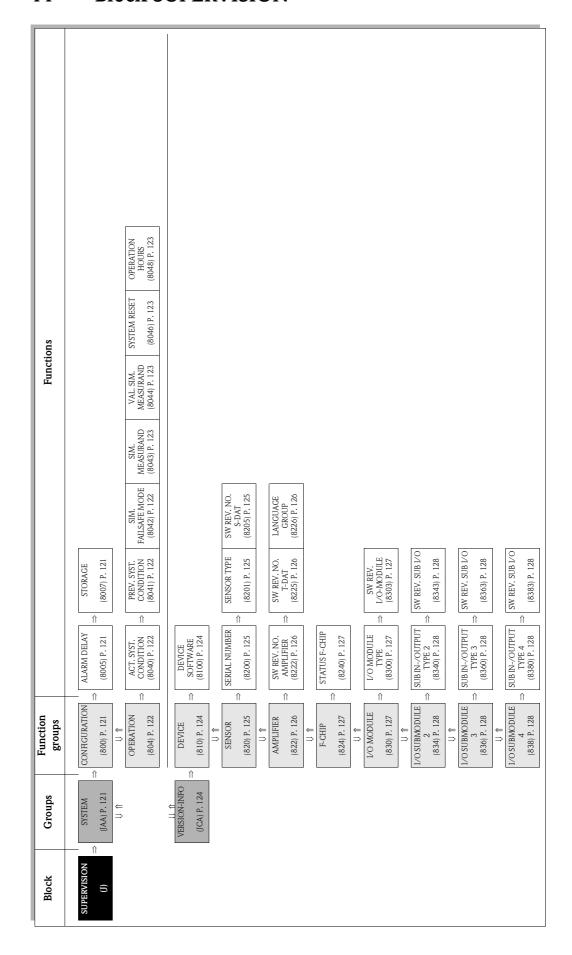
		DENSITY COEFFICIENT 685		
Function description				
All density coefficients	are set at the	factory. All the sensor's parameter settings are saved on the S-DAT memory chip.		
Contact the Endress+l	Hauser service	organization if you have any questions about these functions.		
DENSITY COEFF. C0	6850	This function shows the actual density coefficient CO.		
(I)		Caution!		
MODBUS register: Data type: Access:	7501 Float read	A density adjustment can alter the calibration value of this coefficient.		
DENSITY COEFF. C1	6851	This function shows the actual density coefficient C1.		
(I)		Caution!		
MODBUS register: Data type: Access:	7503 Float read	A density adjustment can alter the calibration value of this coefficient.		
DENSITY COEFF. C2	6852	This function shows the actual density coefficient C2.		
(1)		Caution!		
MODBUS register: Data type: Access:	7505 Float read	A density adjustment can alter the calibration value of this coefficient.		
DENSITY COEFF.	6853	This function shows the actual density coefficient C3.		
(D)		Caution!		
MODBUS register: Data type: Access:	7507 Float read	A density adjustment can alter the calibration value of this coefficient.		
DENSITY COEFF. C4	6854	This function shows the actual density coefficient C4.		
1		Caution!		
MODBUS register: Data type: Access:	7509 Float read	A density adjustment can alter the calibration value of this coefficient.		
DENSITY COEFF. C5	6855	This function shows the actual density coefficient C5.		
0		Caution!		
MODBUS register: Data type: Access:	7511 Float read	A density adjustment can alter the calibration value of this coefficient.		

### 10.4.4 Function group ADDITIONAL COEFFICIENT



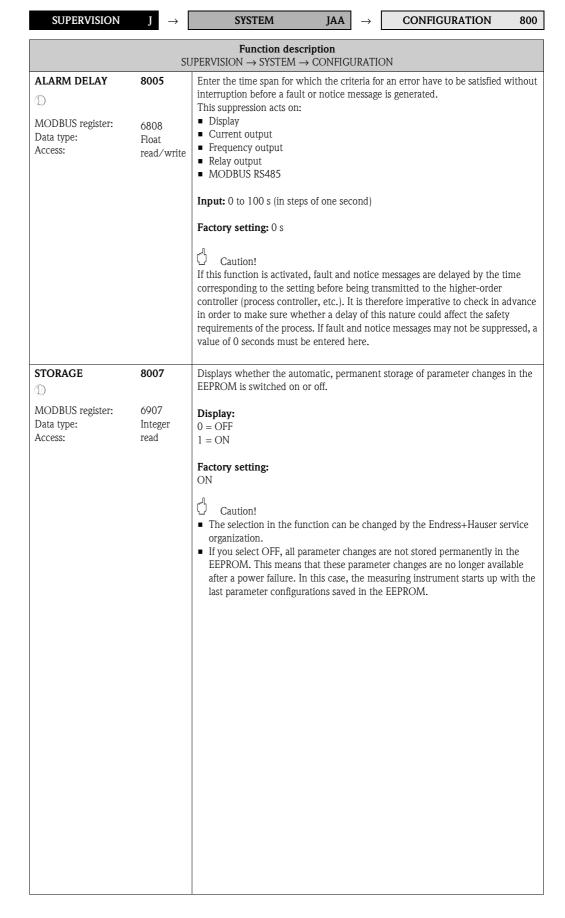
		COEFFICIENT		
		Function description		
	Function description  BASIC FUNCTION $\rightarrow$ SENSOR DATA $\rightarrow$ ADDITIONAL COEFFICIENT			
All sensor data are set	All sensor data are set at the factory. All the sensor's parameter settings are saved on the S-DAT memory chip.			
	,,	0		
Caution!				
These functions are use	ed for displayir	ng device parameters only and consequently cannot be accessed.		
Contact the Endress+F	lauser service	organization if you have any questions about these functions.		
MINIMAL	6860	The lowest fluid temperature measured appears on the display.		
TEMPERATURE MEASURED	0000	The towest haid temperature incubated appears on the display.		
MODBUS register:	7529			
Data type:	Float			
Access:	read			
MAXIMAL	6861	The highest fluid temperature measured appears on the display.		
TEMPERATURE	0001	The ingliest haid temperature incasured appears on the display.		
MEASURED				
MODBUS register:	7531			
Data type:	Float			
Access:	read			
MINIMAL	6862	The lowest carrier tube temperature measured appears on the display.		
TEMPERATURE		,		
CARRIER TUBE				
MODBUS register:	7533			
Data type:	Float			
Access:	read			
MAXIMUM	6863	The highest carrier tube temperature measured appears on the display.		
TEMPERATURE		o and		
CARRIER TUBE				
MODBUS register:	7535			
Data type:	Float			
Access:	read			

## 11 Block SUPERVISION

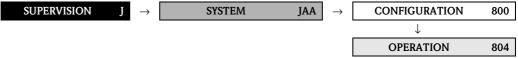


#### 11.1 Group SYSTEM

#### 11.1.1 Function group CONFIGURATION



## 11.1.2 Function group OPERATION

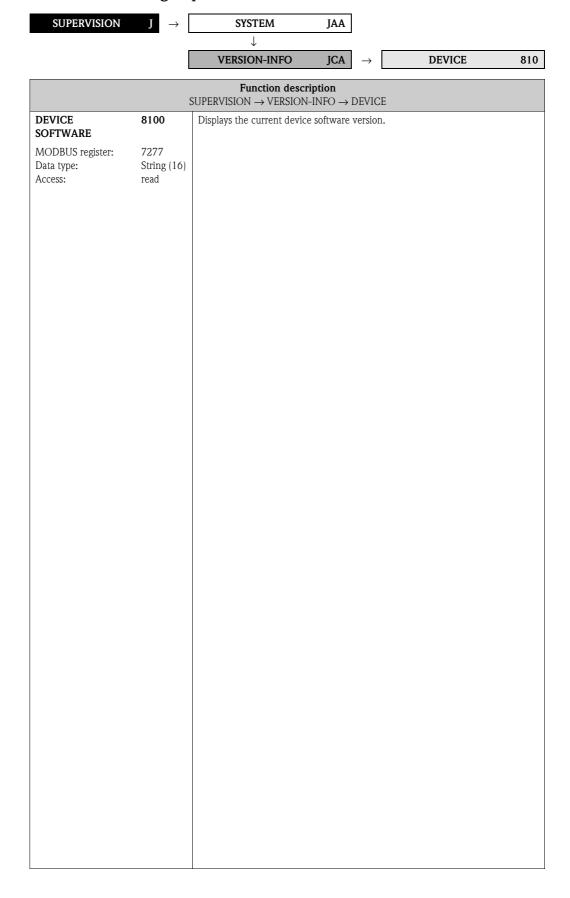


		OPERATION 804
		Function description SUPERVISION $\rightarrow$ SYSTEM $\rightarrow$ OPERATION
ACTUAL SYSTEM CONDITION	8040	Displays the present system condition.
MODBUS register: Data type: Access:	6859 Integer read	Display:  1 = "SYSTEM OK"  or  The fault / notice message with the highest priority.
MODBUS register: Data type: Access:	6821 String (18) read	Note! For additional information, refer to the "System or process error messages" section in the Operating Instructions for Proline Promass 84 MODBUS RS485, BA129D.
PREVIOUS SYSTEM CONDITIONS	8041	Use this function to view the sixteen most recent fault and notice messages since measuring last started.
MODBUS register: Data type: Access:	See Note Integer read	<b>Display:</b> The 16 most recent fault or notice messages.
		Note to MODBUS!  The various previous system conditions are available via the following MOBBUS registers (data MODBUS register Integer/String):  Fault/notice message 1 = MODBUS register 6860  Fault/notice message 2 = MODBUS register 6861  Fault/notice message 3 = MODBUS register 6862  Fault/notice message 4 = MODBUS register 6863  Fault/notice message 5 = MODBUS register 6864  Fault/notice message 5 = MODBUS register 6865  Fault/notice message 6 = MODBUS register 6866  Fault/notice message 7 = MODBUS register 6866  Fault/notice message 8 = MODBUS register 6867  Fault/notice message 9 = MODBUS register 6868  Fault/notice message 10 = MODBUS register 6869  Fault/notice message 11 = MODBUS register 6870  Fault/notice message 12 = MODBUS register 6871  Fault/notice message 13 = MODBUS register 6872  Fault/notice message 14 = MODBUS register 6873  Fault/notice message 15 = MODBUS register 6874  Fault/notice message 16 = MODBUS register 6875  Note!  For additional information, refer to the "System or process error messages" section in the Operating Instructions for Proline Promass 84 MODBUS RS485, BA129D.
SIMULATION FAILSAFE MODE	8042	Use this function to set all inputs, outputs and totalizers to their defined failsafe modes, in order to check whether they respond correctly. During this time, the message "SIMULATION FAILSAFE MODE" appears on the display.
MODBUS register: Data type: Access:	6812 Integer read/write	<b>Options:</b> 0 = OFF 1 = ON
		Factory setting: OFF

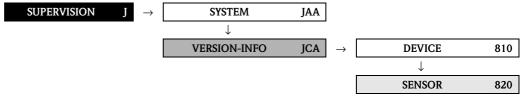
Function description $SUPERVISION \rightarrow SYSTEM \rightarrow OPERATION$						
SIMULATION MEASURAND	8043	Use this function to set all inputs, outputs and totalizers to their defined flow-response modes, in order to check whether they respond correctly. During this time, the message "SIMULATION MEASURAND" appears on the display.				
MODBUS register: Data type: Access:	6813 Integer read/write	Options: 0 = OFF 1 = MASS FLOW 2 = VOLUME FLOW 3 = CORRECTED VOLUME FLOW 4 = DENSITY 5 = REFERENCE DENSITY 6 = TEMPERATURE  Factory setting: OFF				
		Caution!  The measuring device cannot be used for measuring while this simulation is in progress.  The setting is not saved in the event of a power failure.				
VALUE SIMULATION MEASURAND	8044	Note! The function is not visible unless the function SIMULATION MEASURAND (8043) is active.				
MODBUS register: Data type: Access:	6814 Float read/write	For entering a freely selectable value (e.g. 12 m³/s) to check the associated functions in the device itself and downstream signal loops.  User input: 5-digit floating-point number [unit]  Factory setting: 0 [unit]  Caution!  The setting is not saved in the event of a power failure.  The appropriate unit is taken from the function group SYSTEM UNITS (ACA) (see Page 14).				
SYSTEM RESET  MODBUS register: Data type: Access:	6817 Integer read/write	Use this function to perform a reset of the measuring system.  Options: 0 = NO 1 = RESTART SYSTEM (restart without interrupting power supply)  Factory setting: NO				
OPERATION HOURS MODBUS register: Data type: Access:	8048 6810 Float read	The hours of operation of the device appear on the display.  Display: Depends on the number of hours of operation elapsed  Hours of operation < 10 hours → display format = 0:00:00 (hr:min:sec)  Hours of operation 10 to 10,000 hours → display format = 0000:00 (hr:min)  Hours of operation > 10,000 hours → display format = 000000 (hr)				

# 11.2 Group VERSION-INFO

## 11.2.1 Function group DEVICE

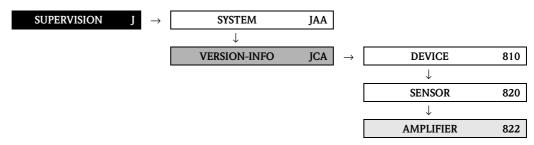


## 11.2.2 Function group SENSOR



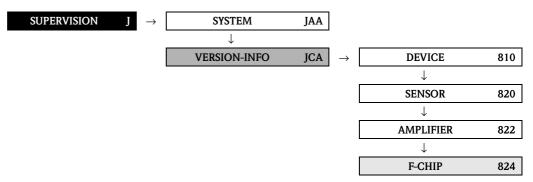
SERIAL NUMBER MODBUS register: Data type: Access:	<b>8200</b> 7003 String (16) read	Use this function to view the serial number of the sensor.						
SENSOR TYPE MODBUS register: Data type: Access:	<b>8201</b> 7012 String (16) read	Use this function to view the sensor type (e.g. Promass F).						
SW REV. NO. S-DAT MODBUS register: Data type: Access:	8205 7021 String (16) read	Use this function to view the software revision number of the software used to create the content of the S-DAT.						

## 11.2.3 Function group AMPLIFIER



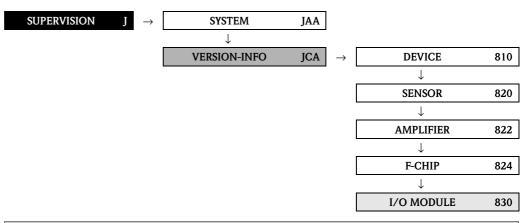
Function description $ SUPERVISION \rightarrow VERSION-INFO \rightarrow AMPLIFIER $						
SW REV. NO. AMPLIFIER	8222	Use this function to view the software revision number of the amplifier.				
MODBUS register: Data type: Access:	7039 String (16) read					
SW REV. NO. T-DAT	8225	Use this function to view the software revision number of the software used to create the content of the T-DAT.				
MODBUS register: Data type: Access:	7048 String (16) read					
LANGUAGE GROUP	8226	Displays the installed language group.				
MODBUS register: Data type: Access:	7262 Integer read	Display:  0 = TYPE UNKNOWN  1 = WEST EU / USA  2 = EAST EU / SCAND  3 = ASIA.  4 = CHINA  Note!  ■ The language options of the available language group are displayed in the LANCUAGE (2000) function.  ■ You can change the language group via the configuration software FieldCare. Please do not hesitate to contact your Endress+Hauser sales office if you have any questions.				

### 11.2.4 Function group F-CHIP



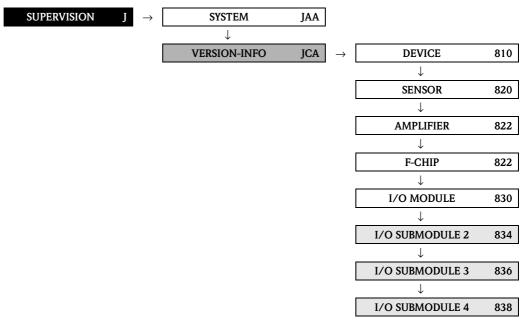
$\begin{array}{c} \textbf{Function description} \\ \text{SUPERVISION} \rightarrow \text{VERSION-INFO} \rightarrow \text{F-CHIP} \end{array}$						
STATUS F-CHIP MODBUS register: Data type: Access:	<b>8240</b> 7057 Integer read	Use this function to check whether an F-CHIP is installed and which software options are available.  Display: 0 = NO F-CHIP HW 7 = FAILURE 8 = CRITICAL FAIL. 9 = DEVICE ID				

### 11.2.5 Function group I/O MODULE



Function description					
I/O MODULE TYPE MODBUS register: Data type: Access:	8300 7086 Integer read	Displays the configuration of the I/O module.  Display: 12 = MODBUS RS485			
SW REV. NO. I/O MODULE	8303	Use this function to view the software revision number of the I/O module.			
MODBUS register: Data type: Access:	7078 String (18) read				

### 11.2.6 Function groups I/O SUBMODULE 2 to 4



Function description SUPERVISION $\rightarrow$ VERSION-INFO $\rightarrow$ I/O SUBMODULE 2 to 4						
SUB IN-/OUTPUT TYPE 2	8340	Displays the configuration of the I/O submodule.				
MODBUS register: Data type: Access:	7106 Integer read	<b>Display:</b> 7 = STATUS INPUT				
SW REV. NO. SUB IN-/OUTPUT TYPE 2	8343	Use this function to view the software revision number of the corresponding submodule.				
MODBUS register: Data type: Access:	7190 String (18) read					
SUB IN-/OUTPUT TYPE 3	8360	Displays the configuration of the I/O submodule.				
MODBUS register: Data type: Access:	7107 Integer read	Display: 0 = TYPE UNKNOWN 5 = PULS/FREQ. OUT. 6 = STATUS/REL. OUT				
SW REV. NO. SUB IN-/OUTPUT TYPE 3	8363	Use this function to view the software revision number of the corresponding submodule.				
MODBUS register: Data type: Access:	7199 String (18) read					
SUB IN-/OUTPUT TYPE 4	8380	Displays the configuration of the I/O submodule.				
MODBUS register: Data type: Access:	7108 Integer read	Display: 0 = TYPE UNKNOWN 4 = CURRENT OUTPUT 6 = STATUS/REL. OUT				
SW REV. NO. SUB IN-/OUTPUT TYPE 4	8383	Use this function to view the software revision number of the corresponding submodule.				
MODBUS register: Data type: Access:	7199 String (18) read					

# 12 Factory settings

## 12.1 SI units (not for USA and Canada)

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

Nom. diameter	Low flow cut off		Full scal	Full scale value		Pulse value	
[mm]	(approx. v = 0.04  m/s)		(approx. v	(approx. $v = 2 \text{ m/s}$ )		(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	
	Ī	N 15, 25, 40,	50 "FB" = Full b	ore versions Pro	mass I		

### 12.1.2 Low flow cut off, full scale value, pulse value - Gas

Nom. diameter	Low flow cut off		Full scal	Full scale value		Pulse value	
[mm]	(approx. $v = 0.01 \text{ m/s}$ )		(approx. $v = 2 \text{ m/s}$ )		(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	
	Γ	ON 15, 25, 40,	50 "FB" = Full be	ore versions Pro	mass I		

## 12.1.3 Language

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

## 12.1.4 Density, length, temperature

	Unit
Density	kg/l
Length	mm
Temperature	°C

## 12.2 US units (only for USA and Canada)

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

Nominal diameter	Low flow cut off		Full scale value		Pulse value	
[mm]	(approx. v =	0.04 m/s)	(approx. v	= 2  m/s	(approx. 2 pulse	e/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
		N 15, 25, 40,	50 "FB" = Full bo	ore versions Pron	nass I	

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

Nominal diameter	Low flow cut off		Full scale value		Pulse value	
[mm]	(approx. v =	0.01 m/s)	(approx. v	= 2  m/s	(approx. 2 puls	se/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
	Ĺ	N 15, 25, 40,	50 "FB" = Full bo	ore versions Pron	nass I	

#### 12.2.3 Language, density, length, temperature

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

# Index of function matrix

B = OUICK SETUP 19 500 = CONFIGURATION 90 CONFIGURATION 100 C DISTRIBUTERACE 28 504 = OPERATION 100 C D = TOTALIZER 45 508 = NTORMATION 100 C D = TOTALIZER 45 508 = NTORMATION 100 C D = CONFIGURATION 100 C D = CONFIGURATIO	B = CULICK SETUP	Blocks	474 = OPERATION	
C = USER INTERFACE	C = USER INTERFACE	A = MEASURED VARIABLES		
D = TOTALIZER	D = TOTALIZER	B = QUICK SETUP		
D = TOTALIZER	D = TOTALIZER	C = USER INTERFACE		
E - OUTPUT	E = OUTPUT		508 = INFORMATION	10
F = INPIT	F = INPIT		630 = CONFIGURATION	103
G = BASIC FUNCTION   102   642 = EPD PARAMETER   101   J = SUPERVISION   120   644 = ADJUSTMENT   112   GOUDS   640 = REFERENCE PARAMETER   101   GFOUDS   640 = ADJUSTMENT   112   648 = ADJUSTMENT   112   648 = ADJUSTMENT   112   649 = ADJUSTMENT   112   649 = ADJUSTMENT   112   640 = CONFIGURATION   113   640 = REFERENCE PARAMETER   101   641 = ADJUSTMENT   112   642 = ADJUSTMENT   112   643 = ADJUSTMENT   113   644 = ADJUSTMENT   112   645 = ADJUSTMENT   112   646 = ADJUSTMENT   113   646 = ADJUSTMENT   113   646 = ADJUSTMENT   113   646 = ADJUSTMENT   113   647 = ADJUSTMENT   113   648 = ADJUSTMENT   113   649 = FLOW COEFFICIENT   113   649 = FLOW COEFFICIENT   113   640 = ADJUTIONAL LOSEFICIENT   113   640 = ADJUTIONAL LOSEFICIENT   113   640 = ADJUTIONAL LOSEFICIENT   113   640 = ADJUTIONAL COEFFICIENT   113   640 = ADJUTIONAL COEFFICIENT   113   640 = ADJUTIONAL COEFFICIENT   114   649 = FLOW COEFFICIENT   114   640 = FLOW COEFFICIENT   114   641 = ADJUSTMENT   114   642 = FLOW COEFFICIENT   114   644 = ADJUSTMENT   114   644 = FLOW COEFFICIENT   114   645 = FLOW	G = BASIC FUNCTION   102   642 = EPD PARAMETER   10   J = SUPERVISION   120   644 = ADILISTMENT   11   Groups   600 = CONFIGURATION   11   AAA = MEASURING VALUES   13   680 = CONFIGURATION   11   AAA = MEASURING VALUES   13   680 = CONFIGURATION   11   CAA = CONTROL   29   685 = DENISITY COEFFICIENT   11   CAA = CONTROL   29   685 = DENISITY COEFFICIENT   11   CAA = ADDITIONAL LINE   33   686 = ADDITIONAL COEFFICIENT   11   CEA = ADDITIONAL LINE   37   800 = CONFIGURATION   12   CAG = INFORMATION LINE   41   804 = PEVICE   12   DAB = TOTALIZER   40   810 = DEVICE   12   DAB = TOTALIZER   40   820 = SENSOR   12   DAC = TOTALIZER   40   820 = SENSOR   12   DAC = TOTALIZER   40   820 = SENSOR   12   DAC = TOTALIZER   40   821 = ADDITIONAL COEFFICIENT   11   CECA = PAILIZER   40   820 = SENSOR   12   DAC = TOTALIZER   40   820 = SENSOR   12   DAC = TOTALIZER   40   820 = SENSOR   12   DAC = TOTALIZER   40   821 = ADDITIONAL COEFFICIENT   12   DAC = TOTALIZER   40   820 = SENSOR   12   DAC = TOTALIZER   40   821 = ADDITIONAL COEFFICIENT   11   DAC = TOTALIZER   40   820 = SENSOR   12   DAC = TOTALIZER   40   40 = SENSOR   12   DAC = TOTALIZER   40 = SENS			
SUPERVISION   120   646 = REFERENCE PARAMETER   117	SUPERVISION   120   646 - REFERENCE PARAMETER   11		642 = EPD PARAMETER	108
AC   AC   AC   AC   AC   AC   AC	Crours		646 = REFERENCE PARAMETER	110
Groups	CFORUS		648 = ADJUSTMENT	112
AAA = MEASURING VALUES   13   680 = CONFIGURATION   111   CAA = CONTROL   29   685 = DENSITY COEFFICIENT   111   CAA = CONTROL   29   685 = DENSITY COEFFICIENT   111   CAA = CONTROL   37   800 = CONFIGURATION   121   CGA = MAIN LINE   33   686 = ADDITIONAL COEFFICIENT   111   CGA = INFORMATION LINE   41   804 = OPERATION   122   DAA = TOTALIZER 1   40   810 = DEVICE   122   DAA = TOTALIZER 2   40   820 = SENSOR   122   DAC = TOTALIZER 3   40   822 = AMPLIFIER   122   EAA = OUTPUTS   51   830 = L/O MODULE   122   EAA = OUTPUTS   51   830 = L/O MODULE   122   ECA = PULSE/FREQUENCY OUTPUT   62   832 = INPUT/OUTPUT   1   122   ECA = RELAY OUTPUT 2   89   834 = L/O SUBMODULE 3   122   ECA = FROCESS PARAMETER   106   GLA = SYSTEM   121   2003 = CURSTODY TRANSFER   104   GLA = SYSTEM   121   2003 = CURSTODY TRANSFER   104   GLA = SYSTEM   121   2003 = CURSTODY TRANSFER   104   GNA = SENSOR DATA   116   2003 = CURSTODY	AAA = MEASURING VALUES 13 680 = CONFIGURATION 11. CAA = CONTROL 29 685 = DENSITY COEFFICIENT 11. CAA = CONTROL 29 685 = DENSITY COEFFICIENT 11. CAA = CONTROL 37 800 = CONFIGURATION 1. CGA = MAIN LINE 37 800 = CONFIGURATION 1. CGA = AINTONAL LINE 37 800 = CONFIGURATION 1. CGA = INFORMATION LINE 41 804 = OPERATION 1. DAA = TOTALIZER 1 46 810 = DEVICE 1. DAA = TOTALIZER 2 46 820 = SENSOR 1. DAB = TOTALIZER 3 46 822 = AMPLIFER 1. DAA = TOTALIZER 3 46 822 = AMPLIFER 1. DAA = OUTPUTS. 51 830 = L/O MODULE 1. ECA = PULSE/FREQUENCY OUTPUT 62 832 = INPUT/OUTPUT 1 1. DAA = STATUS INPUT 9 838 = L/O SUBMODULE 2 1. DAC = ARELAY OUTPUT 1 89 834 = L/O SUBMODULE 3 1. DAC = ARELAY OUTPUT 2 89 836 = L/O SUBMODULE 3 1. DAC = ARELAY OUTPUT 1 1. DAC = CONFIGURATION 1. DAB = TOTALIZER 3 1. DAB = TO			
AAA = MEASURING VALUES   13   680 = CONFIGURATION   111   CAA = CONTROL   29   685 = DENSITY COEFFICIENT   111   CAA = CONTROL   29   685 = DENSITY COEFFICIENT   111   CAA = CONTROL   37   800 = CONFIGURATION   121   CGA = MAIN LINE   33   686 = ADDITIONAL COEFFICIENT   111   CGA = INFORMATION LINE   41   804 = OPERATION   122   DAA = TOTALIZER 1   40   810 = DEVICE   122   DAA = TOTALIZER 2   40   820 = SENSOR   122   DAC = TOTALIZER 3   40   822 = AMPLIFIER   122   EAA = OUTPUTS   51   830 = L/O MODULE   122   EAA = OUTPUTS   51   830 = L/O MODULE   122   ECA = PULSE/FREQUENCY OUTPUT   62   832 = INPUT/OUTPUT   1   122   ECA = RELAY OUTPUT 2   89   834 = L/O SUBMODULE 3   122   ECA = FROCESS PARAMETER   106   GLA = SYSTEM   121   2003 = CURSTODY TRANSFER   104   GLA = SYSTEM   121   2003 = CURSTODY TRANSFER   104   GLA = SYSTEM   121   2003 = CURSTODY TRANSFER   104   GNA = SENSOR DATA   116   2003 = CURSTODY	AAA = MEASURING VALUES 13 680 = CONFIGURATION 11. CAA = CONTROL 29 685 = DENSITY COEFFICIENT 11. CAA = CONTROL 29 685 = DENSITY COEFFICIENT 11. CAA = CONTROL 37 800 = CONFIGURATION 1. CGA = MAIN LINE 37 800 = CONFIGURATION 1. CGA = AINTONAL LINE 37 800 = CONFIGURATION 1. CGA = INFORMATION LINE 41 804 = OPERATION 1. DAA = TOTALIZER 1 46 810 = DEVICE 1. DAA = TOTALIZER 2 46 820 = SENSOR 1. DAB = TOTALIZER 3 46 822 = AMPLIFER 1. DAA = TOTALIZER 3 46 822 = AMPLIFER 1. DAA = OUTPUTS. 51 830 = L/O MODULE 1. ECA = PULSE/FREQUENCY OUTPUT 62 832 = INPUT/OUTPUT 1 1. DAA = STATUS INPUT 9 838 = L/O SUBMODULE 2 1. DAC = ARELAY OUTPUT 1 89 834 = L/O SUBMODULE 3 1. DAC = ARELAY OUTPUT 2 89 836 = L/O SUBMODULE 3 1. DAC = ARELAY OUTPUT 1 1. DAC = CONFIGURATION 1. DAB = TOTALIZER 3 1. DAB = TO	Groups	660 = CONFIGURATION	115
ACA = SYSTEM UNITS	ACA = SYSTEM UNITS	AAA = MEASURING VALUES	680 = CONFIGURATION	110
CAA = CONTROL	CAA = CONTROL	ACA = SYSTEM UNITS	684 = FLOW COEFFICIENT	117
CCA = MAIN LINE	CCA = MAIN LINE		685 = DENSITY COEFFICIENT	118
CGA = INFORMATION LINE	SCA = INFORMATION LINE		686 = ADDITIONAL COEFFICIENT	119
CGA = INFORMATION LINE	SA	CEA = ADDITIONAL LINE	800 = CONFIGURATION	12
DAA = TOTALIZER 1	DAA = TOTALIZER		804 = OPERATION	122
DAB = TOTALIZER 2	DAB = TOTALIZER 2	DAA = TOTALIZER 1	810 = DEVICE	124
DAC = TOTALIZER 3	DAC = TOTALIZER 3			
DJA = HANDLING TOTALIZER	DJA = HANDLING TOTALIZER		822 = AMPLIFIER	120
EAA = OUTPUTS ECA = PULSE/FREQUENCY OUTPUT 62 ECA = PULSE/FREQUENCY OUTPUT 62 ECA = PULSE/FREQUENCY OUTPUT 62 ECA = RELAY OUTPUT 1 89 834 = I/O SUBMODULE 2 122 ECB = RELAY OUTPUT 2 89 836 = I/O SUBMODULE 3 122 ECB = RELAY OUTPUT 2 89 836 = I/O SUBMODULE 3 122 ECB = RELAY OUTPUT 2 89 836 = I/O SUBMODULE 3 122 ECB = RELAY OUTPUT 2 89 836 = I/O SUBMODULE 3 122 ECB = RELAY OUTPUT 2 89 836 = I/O SUBMODULE 3 122 ECB = RELAY OUTPUT 2 89 836 = I/O SUBMODULE 3 122 ECB = RELAY OUTPUT 2 89 836 = I/O SUBMODULE 3 122 ECB = RELAY OUTPUT 2 89 836 = I/O SUBMODULE 3 122 ECB = RELAY OUTPUT 2 89 836 = I/O SUBMODULE 3 122 ECB = RELAY OUTPUT 2 89 836 = I/O SUBMODULE 3 122 ECB = RELAY OUTPUT 3 124 ECB = RELAY OUTPUT 1 125 ECB = RELAY OUTPUT 1 126 832 = INPUT/OUTPUT 1 127 ECB = RELAY OUTPUT 2 89 836 = I/O SUBMODULE 3 122 ECB = RELAY OUTPUT 2 89 836 = I/O SUBMODULE 3 122 ECB = RELAY OUTPUT 3 124 ECG = RELAY OUTPUT 3 125 ECGA = RELAY OUTPUT 1 126 ECGA = RELAY OUTPUT 1 127 ECGA = RELAY OUTPUT 1 127 ECGA = RELAY OUTPUT 1 127 ECGA = RELAY OUTPUT 1 128 836 = I/O SUBMODULE 3 129 ECGA = RELAY OUTPUT 1 120 836 = I/O SUBMODULE 3 122 ECG = CUSTODY TRANSFER 11 122 ECG = CONFIGURATION 11 ECGA = RELAY OUTPUT 1 122 ECGA = RELAY OUTPUT 1 122 ECGA = RELAY OUTPUT 2 122 ECGA = RELAY OUTPUT 2 123 ECGA = RELAY OUTPUT 2 124 ECGA = RELAY OUTPUT 2 125 ECGA = RELAY OUTPUT 1 122 ECGA = RELAY OUTPUT 2 125 ECGA = RELAY OUTPUT 1 122 ECGA = RULTIPLEX 123 ECGA = ROTALIZER 1 124 ECGA = RULTIPLEX 125 ECGA = RULTIPLEX 126 ECGA = RULTIPLEX 127 ECGA = RULTIPLEX 127 ECGA = RULTIPLEX 127 ECGA = RULTIPLEX 128 ECGA = RULTIPLEX 129 ECGA = RULTIPLEX 120 ECGA = RULTI	EAA = OUTPUTS ECA = PULSE/FREQUENCY OUTPUT ECA = PELAY OUTPUT 1 ECA = PELAY OUTPUT 1 ECA = RELAY OUTPUT 1 ECA = RELAY OUTPUT 2 ECB = RELAY OUTPUT 1 ECB = RELAY OUTPUT 1 ECB = RELAY OUTPUT 2 ECB = RELAY OUTPUT 2 ECB = RELAY OUTPUT 1 ECB = RELAY OUTPUT 2 ECB = RELAY OUTPUT 1 ECB = RELAY OUTPUT 1 ECB = RELAY OUTPUT 1 ECB = RELAY OUTPUT 2 ECB = RELAY OUTPUT 1 ECB = SAS = I/O SUBMODULE 2 ECB = RELAY OUTPUT 1 ECB = ECL = VIDENCH S ECC = VIDENC			
ECA = PULSE/FREQUENCY OUTPUT	ECA = PULSE/FREQUENCY OUTPUT			
EGA = RELAY OUTPUT 1         89         834 = I/O SUBMODULE 2         128           EGB = RELAY OUTPUT 2         89         836 = I/O SUBMODULE 3         122           FAA = STATUS INPUT         99         838 = I/O SUBMODULE 3         122           GDA = MODBUS RS485         103         103           GIA = PROCESS PARAMETER         106         107           GLA = SYSTEM PARAMETER         115         2000 = CUSTODY TRANSFER         10           GNA = SENSOR DATA         116         2001 = PULS, OUT, 1 C.T.         10           JAA = SYSTEM         121         2003 = CURR, OUT, 1 C.T.         10           JCA = VERSION INFO         124         2006 = TOTALIZER 1 C.T.         1           JCA = VERSION INFO         124         2007 = TOTALIZER 2 C.T.         1           JCA = VERSION INFO         124         2008 = TOTALIZER 3 C.T.         1           JCA = VERSION INFO         124         2009 = MODBUS CONFIGURATION         1           JCA = VERSION INFO         124         2009 = MODBUS CONFIGURATION         1           JCA = OVERGURATION         17         2008 = TOTALIZER 3 C.T.         1           JCA = OVERGURATION         17         2009 = MODBUS CONFIGURATION         1           JCA = OVERGURATION         30	EGA = RELAY OUTPUT 1         89         834 = I/O SUBMODULE 2         12.           EGB = RELAY OUTPUT 2         89         836 = I/O SUBMODULE 3         12.           FAA = STATUS INPUT         99         838 = I/O SUBMODULE 3         12.           GDA = MODBUS RS485         103         103         12.           GIA = PROCESS PARAMETER         106         Functions Z         12.           GLA = SYSTEM PARAMETER         116         200 = CUSTODY TRANSFER         1.           JAA = SYSTEM         121         2003 = CURR. OUT. 1 C.T.         1.           JAA = SYSTEM         121         2003 = CURR. OUT. 1 C.T.         1.           JCA = VERSION INFO         124         2006 = TOTALIZER 2 C.T.         1.           JCA = VERSION INFO         124         2007 = TOTALIZER 3 C.T.         1.           JCA = VERSION INFO         14         CUSTODY TRANSFER         1.           JCA = VERSION INFO         14         CUSTODY TRANSFER         1.           JCA = VERSION INFO         14         CUSTODY TRANSFER         1.           JCA = CONFIGURATION         17         CUSTODY TRANSFER         1.           JCA = ADDITIONAL CONFIGURATION         17         CUSTODY TRANSFER         1.           JCA = OPERATION	ECA = PULSE/FREQUENCY OUTPUT		
EGB = RELAY OUTPUT 2	EGB = RELAY OUTPUT 2		834 = I/O SUBMODULE 2	128
FAA = STATUS INPUT   99   838 = I/O SUBMODULE 4   128	FAA = STATUS INPUT         99         838 = I/O SUBMODULE 4         12           GDA = MODBUS RS485         103           GIA = PROCESS PARAMETER         106         2000 = CUSTODY TRANSFER         11           GNA = SENSOR DATA         116         2001 = PULS. OUT. 1 C.T.         16           JAA = SYSTEM         121         2003 = CURR. OUT. 1 C.T.         17           JCA = VERSION INFO         124         2006 = TOTALIZER 1 C.T.         1           Function groups         2008 = TOTALIZER 2 C.T.         1           000 = MAIN VALUES         13         2009 = MODBUS CONFIGURATION         1           040 = CONFIGURATION         17         200 = BASIC CONFIGURATION         17           200 = BASIC CONFIGURATION         29         00         0000 = MAIN VALUES         1           201 = UNLOCKING/LOCKING         31         0000 = MAIN VALUES         1           202 = CONFIGURATION         29         0000 = MAIN VALUES         1           202 = CONFIGURATION         31         0000 = MASS FLOW         1           202 = CONFIGURATION         32         0000 = TEMPERATURE         1           202 = CONFIGURATION         33         0001 = VOLUME FLOW         1           240 = CONFIGURATION         41         040			
GDA = MODBUS RS485	GDA = MODBUS RS485   103   GIA = PROCESS PARAMETER   106   GLA = SYSTEM PARAMETER   115   2000 = CUSTODY TRANSFER   11   2001 = PULS. OUT. 1 C.T.   11   2001 = PULS. OUT. 1 C.T.   12   2003 = CURR. OUT. 1 C.T.   12   2004 = COTALIZER 1 C.T.   13   2004 = TOTALIZER 2 C.T.   1   2005 = TOTALIZER 2 C.T.   1   2006 = ADITIONAL CONFIGURATION   14   2006 = ADITIONAL CONFIGURATION   17   200 = BASIC CONFIGURATION   29   202 = UNLOCKING/LOCKING   31   2000 = TEMPERATURE   1   2000 = TEMPERATURE			
GIA = PROCESS PARAMETER 106 GLA = SYSTEM PARAMETER 115 GNA = SENSOR DATA 116 JAA = SYSTEM 121 JCA = VERSION INFO 124 Function groups 000 = MAIN VALUES 13 000 = MAIN VALUES 13 000 = MAIN VALUES 13 000 = BASIC CONFIGURATION 17 200 = BASIC CONFIGURATION 29 020 = UNLOCKING/LOCKING 31 020 = OORFIGURATION 33 0001 = VOLUME FLOW 15 222 = MULTIPLEX 35 0004 = CONFIGURATION 37 0005 = DENSITY 15 220 = CONFIGURATION 37 0006 = REFERENCE DENSITY 16 240 = OORFIGURATION 41 040 = CONFIGURATION 37 040 = CONFIGURATION 37 040 = OONFIGURATION 37 040 = OONFIGURATION 37 040 = OONFIGURATION 38 040 = VOLUME FLOW 15 040 = OONFIGURATION 37	GIA = PROCESS PARAMETER			
GLA = SYSTEM PARAMETER	GLA = SYSTEM PARAMETER			
GNA = SENSOR DATA	GNA = SENSOR DATA			
JAA = SYSTEM   121   Z003 = CURR. OUT. 1 C.T.   16     JCA = VERSION INFO   124   Z006 = TOTALIZER 1 C.T.   17     Z007 = TOTALIZER 2 C.T.   17     Z008 = TOTALIZER 3 C.T.   17     Z008 = TOTALIZER 3 C.T.   17     Z008 = TOTALIZER 3 C.T.   18     Z009 = MAIN VALUES   13   Z009 = MODBUS CONFIGURATION     Q40 = CONFIGURATION   14   CUSTODY TRANSFER   19     Q42 = ADDITIONAL CONFIGURATION   29     Z02 = UNLOCKING/LOCKING   31   2000 = MASS FLOW   2000 = TEMPERATURE	JAA = SYSTEM   121   Z003 = CURR. OUT. 1 C.T.   1   JCA = VERSION INFO   124   Z006 = TOTALIZER 1 C.T.   1   Z007 = TOTALIZER 2 C.T.   1   Z007 = TOTALIZER 2 C.T.   1   Z007 = TOTALIZER 3 C.T.   1   Z007 = TOTALIZER 3 C.T.   1   Z009 = MODBUS CONFIGURATION   14   CUSTODY TRANSFER   1   Z009 = MODBUS CONFIGURATION   200 = BASIC CONFIGURATION   29   Z008 = TOTALIZER 3 C.T.   2   Z009 = MODBUS CONFIGURATION   200 = BASIC CONFIGURATION   29   Z009 = MODBUS CONFIGURATION   29   Z009 = MODBUS CONFIGURATION   200 = CONFIGURATION   200 = MASS FLOW   1   Z00 = CONFIGURATION   31   Z0000 = TEMPERATURE   1   Z00 = CONFIGURATION   33   Z0000 = TEMPERATURE   1   Z00 = CONFIGURATION   37   Z0005 = DENSITY   2   Z0000 = TEMPERATURE   2   Z00 = CONFIGURATION   37   Z0005 = DENSITY   2   Z00 = CONFIGURATION   37   Z0005 = DENSITY   2   Z00 = CONFIGURATION   2   Z00 = CONFIGURATI			
JCA = VERSION INFO	JCA = VERSION INFO			
Function groups         Z008 = TOTALIZER 3 C.T.         1           000 = MAIN VALUES         13         Z009 = MODBUS CONFIGURATION           040 = CONFIGURATION         14         CUSTODY TRANSFER         1           042 = ADDITIONAL CONFIGURATION         17         0         0           202 = UNLOCKING/LOCKING         31         0000 = MASS FLOW         15           204 = OPERATION         32         0000 = TEMPERATURE         15           220 = CONFIGURATION         33         0001 = VOLUME FLOW         15           222 = MULTIPLEX         35         0004 = CORRECTED VOLUME FLOW         15           242 = MULTIPLEX         39         0006 = REFERENCE DENSITY         15           242 = MULTIPLEX         39         0006 = REFERENCE DENSITY         15           260 = CONFIGURATION         41         0400 = UNIT MASS FLOW         14           262 = MULTIPLEX         39         0006 = REFERENCE DENSITY         15           300 = CONFIGURATION         46         0402 = UNIT VOLUME FLOW         15           304 = OPERATION         48         0403 = UNIT VOLUME         15           404 = OPERATION         51         0404 = UNIT CORRECTED VOLUME         16           408 = INFORMATION         61         0422	Function groups         Z008 = TOTALIZER 3 C.T.         1           000 = MAIN VALUES         13         Z009 = MODBUS CONFIGURATION           040 = CONFIGURATION         14         CUSTODY TRANSFER         1           042 = ADDITIONAL CONFIGURATION         17         0         0           202 = UNLOCKING/LOCKING         31         0000 = MASS FLOW         1           204 = OPERATION         32         0000 = TEMPERATURE         1           204 = CONFIGURATION         33         0001 = VOLUME FLOW         1           222 = MULTIPLEX         35         0004 = CORRECTED VOLUME FLOW         1           240 = CONFIGURATION         37         0005 = DENSITY         1           242 = MULTIPLEX         39         0006 = REFERENCE DENSITY         1           260 = CONFIGURATION         41         0400 = UNIT MASS FLOW         1           262 = MULTIPLEX         43         0401 = UNIT MASS         1           304 = OPERATION         46         0402 = UNIT VOLUME FLOW         1           304 = OPERATION         48         0403 = UNIT CORRECTED VOLUME FLOW         1           404 = OPERATION         60         0405 = UNIT CORRECTED VOLUME         1           408 = INFORMATION         61         0420 = UNIT DENSITY			
000 = MAIN VALUES       13       Z009 = MODBUS CONFIGURATION         040 = CONFIGURATION       14       CUSTODY TRANSFER       1         042 = ADDITIONAL CONFIGURATION       17       000 = BASIC CONFIGURATION       29         202 = UNLOCKING/LOCKING       31       0000 = MASS FLOW       15         204 = OPERATION       32       0000 = TEMPERATURE       15         220 = CONFIGURATION       33       0001 = VOLUME FLOW       15         222 = MULTIPLEX       35       0004 = CORRECTED VOLUME FLOW       15         240 = CONFIGURATION       37       0005 = DENSITY       15         242 = MULTIPLEX       39       0006 = REFERENCE DENSITY       15         260 = CONFIGURATION       41       0400 = UNIT MASS FLOW       14         262 = MULTIPLEX       43       0401 = UNIT MASS       14         300 = CONFIGURATION       46       0402 = UNIT VOLUME FLOW       15         304 = OPERATION       48       0403 = UNIT CORRECTED VOLUME FLOW       16         404 = OPERATION       51       0404 = UNIT CORRECTED VOLUME FLOW       16         408 = INFORMATION       61       0420 = UNIT DENSITY       17         420 = CONFIGURATION       62       0421 = UNIT REFERENCE DENSITY       17	000 = MAIN VALUES       13       Z009 = MODBUS CONFIGURATION         040 = CONFIGURATION       14       CUSTODY TRANSFER       1         042 = ADDITIONAL CONFIGURATION       17       00       BASIC CONFIGURATION       29         202 = UNLOCKING/LOCKING       31       0000 = MASS FLOW       1         204 = OPERATION       32       0000 = TEMPERATURE       1         220 = CONFIGURATION       33       0001 = VOLUME FLOW       1         222 = MULTIPLEX       35       0004 = CORRECTED VOLUME FLOW       1         240 = CONFIGURATION       37       0005 = DENSITY       1         242 = MULTIPLEX       39       0006 = REFERENCE DENSITY       1         260 = CONFIGURATION       41       0400 = UNIT MASS FLOW       1         262 = MULTIPLEX       43       0401 = UNIT MASS       1         304 = OPERATION       46       0402 = UNIT VOLUME FLOW       1         304 = OPERATION       48       0403 = UNIT CORRECTED VOLUME FLOW       1         404 = OPERATION       51       0404 = UNIT CORRECTED VOLUME FLOW       1         408 = INFORMATION       61       0420 = UNIT DENSITY       1         430 = OPERATION       62       0421 = UNIT REFERENCE DENSITY       1			
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Zero point			116
Zero point adjustment			
zero point adjustment	• •	• •	. 112
Zahlen			
100% Value			
Additional line			37
Additional line (Multiplex)			
Information line			41
Information line (Multiplex)			
Main line			
Main line (Multiplex)			35

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