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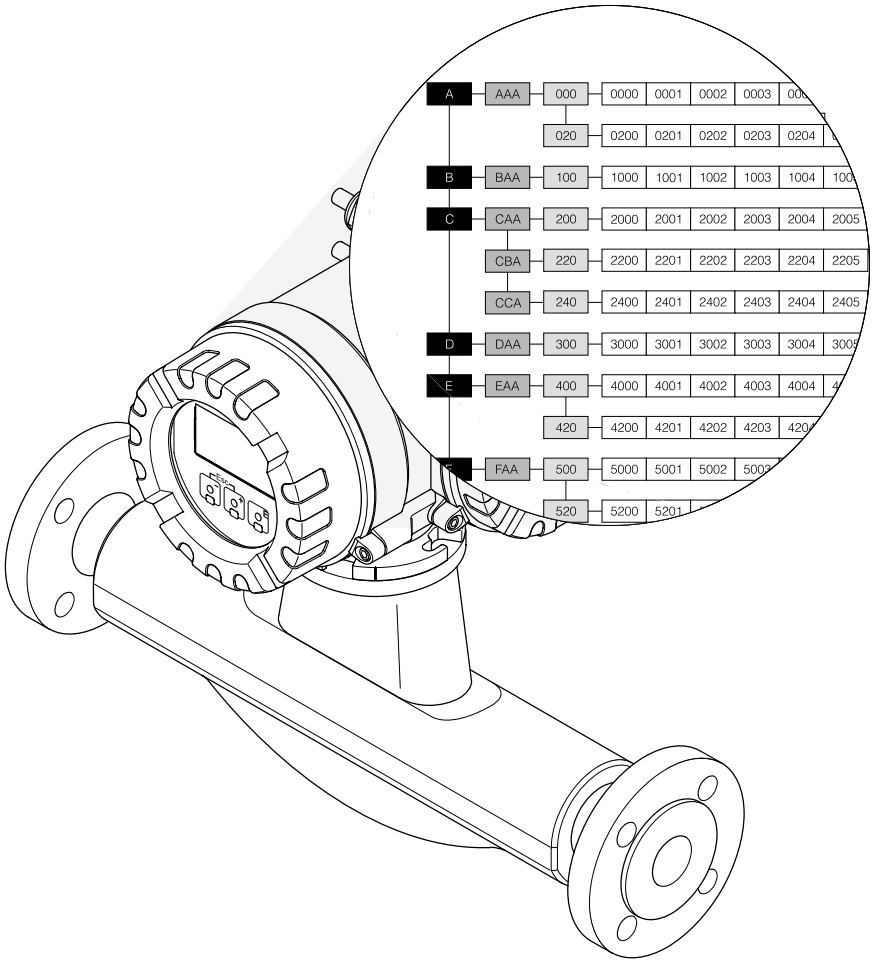
Valid as software version:
V 1.00.XX (amplifier)
V 1.00.XX (communication)

promass 83
FOUNDATION Fieldbus
Coriolis Mass Flow Measuring System

Description of Device Functions



PROline
Evolution in flow

Endress+Hauser
The Power of Know How

Operation Promass 83 FOUNDATION Fieldbus

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Table of contents for local operation

1 Notes on using this manual

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

1.1 Using the table of contents to locate a function description

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

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

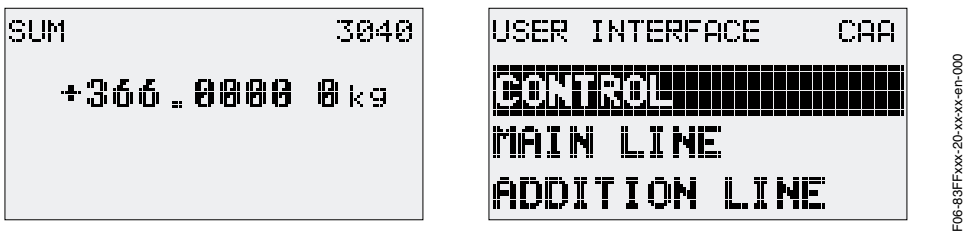
This step-by-step, top-down approach starts with the blocks, the highest level, and works down through the matrix to the description of the function you need:

1. All available blocks and their corresponding subgroups are shown on Page 10. Select the block (or the group within the block) which you need for your application and use the page reference to locate the information corresponding to the next level.
2. The page in question contains a graphic showing of the block with all its subordinate groups, function groups and functions.
   Select the function which you need for your application and use the page reference to locate the detailed function description.

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

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

Example:



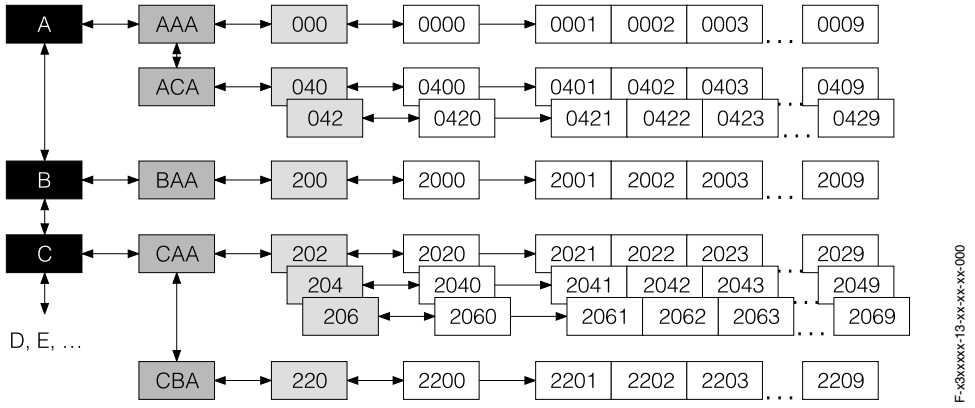
The function-matrix index lists the codes for all the available "cells" in alphabetic and consecutive order, complete with the page references for the corresponding functions. The index to the function matrix is on Page 67.

2 Function matrix

2.1 General layout of the function matrix

The function matrix consists of four levels:

Blocks -> Groups -> Function groups -> Functions



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 CONFIGURATION, UN-/LOCKING, OPERATION, etc.

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

Each function group consists of one or more functions. The functions are used to operate and parameterize the device. Numerical values can be entered resp. 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 “USER INTERFACE” block
2. Select the “CONTROL” group
3. Select the “BASIC CONFIGURATION” function group
4. Select the “LANGUAGE” function (this is where the language can be selected).

2.1.5 Codes identifying cells

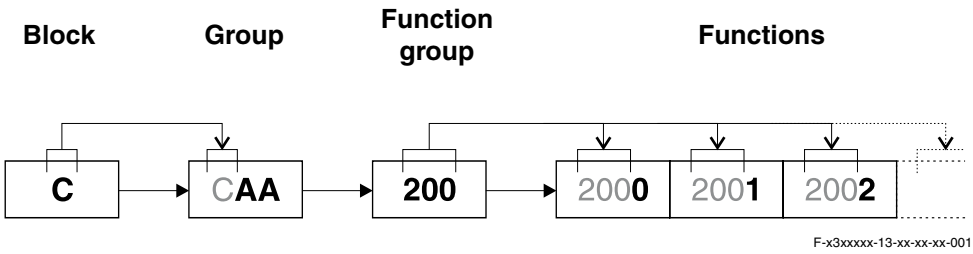
Each cell (block, group, function group and function) in the function matrix has an individual, unique code.

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

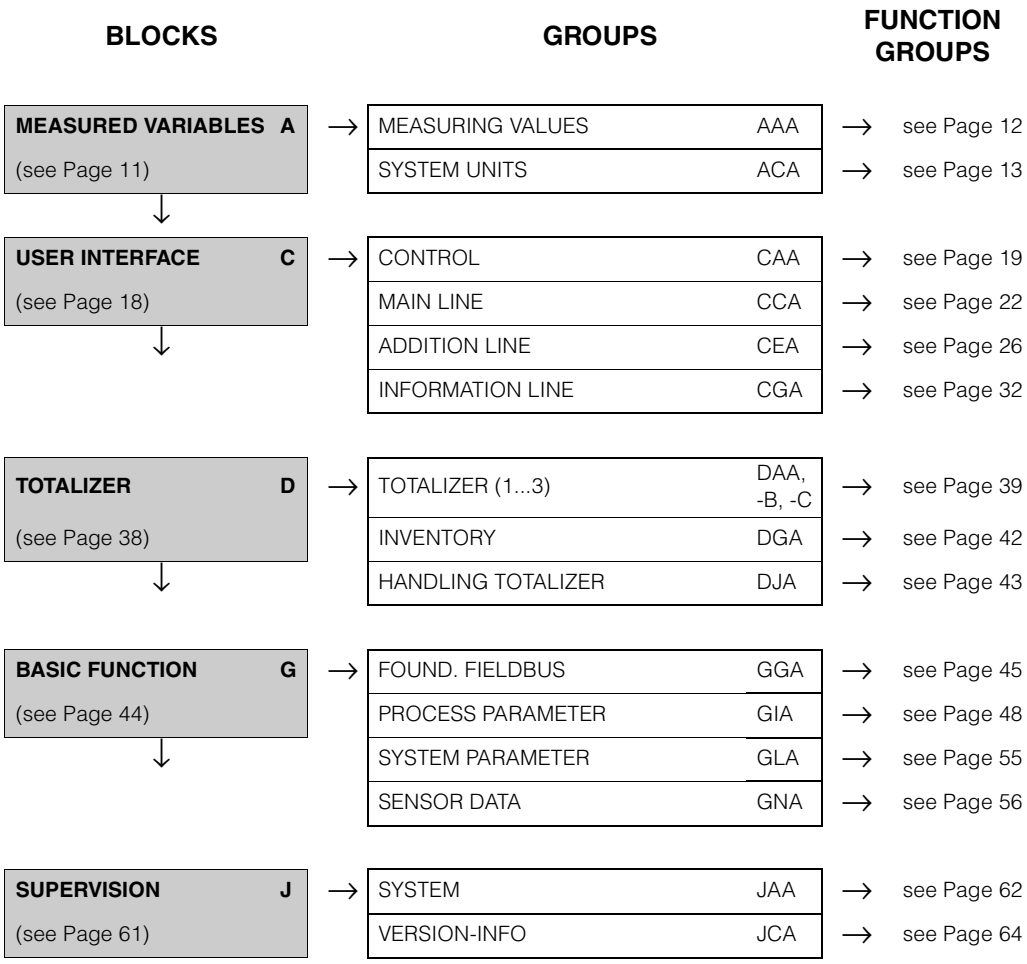
Groups:
The code consists of three letters (AAA, ABA, BAA, etc.).
The first letter matches the block code (i.e. each group in block A has a code starting with an "A", in other words A _ _; the codes of the groups in block B start with a "B", in other words B_ _ , and so on). The other two letters are for identifying the group within the respective block.

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

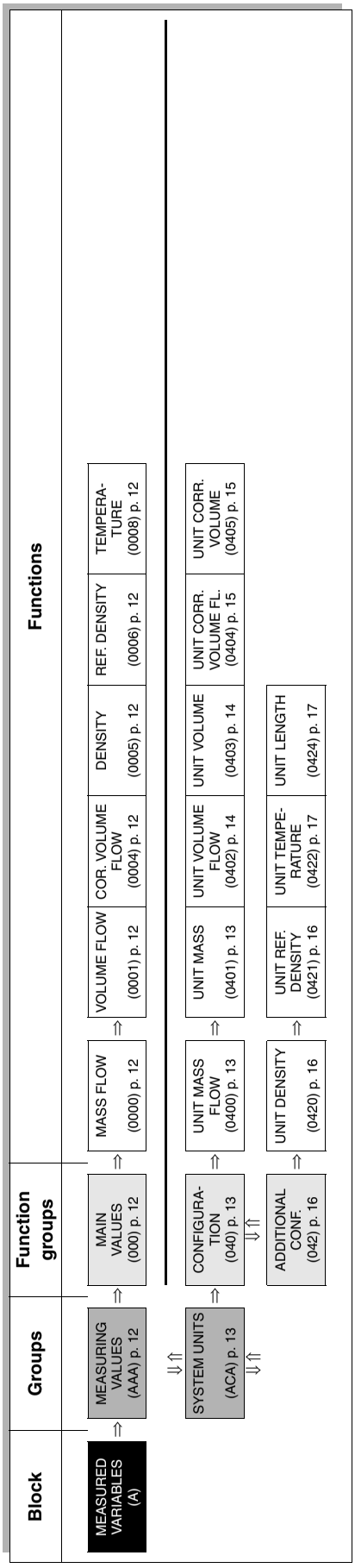
Functions:
The code consists of four digits (0000, 0001, 0201, etc.).
The first three digits are the same as the code for the function group.
The last digit in the code is a counter for the functions in the function group, incrementing from 0 to 9 (e.g. function 0005 is the sixth function in group 000).



2.2 Function matrix PROline Promass 83



3 Block MEASURED VARIABLES



3.1 Group MEASURING VALUES

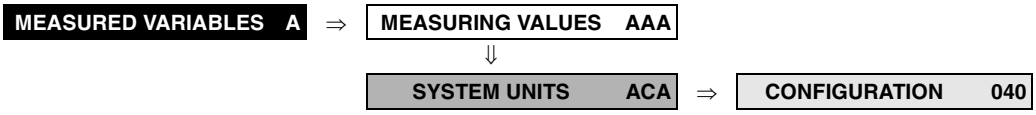
3.1.1 Function group MAIN VALUES

MEASURED VARIABLES A ⇒ **MEASURING VALUES AAA** ⇒ **MAIN VALUES 000**

Function description MEASURED VARIABLES → MEASURING VALUES → MAIN VALUES	
✎ Note! • The units of measure of all the measured variables shown here can be set in the “SYSTEM UNITS” group. • If the fluid in the pipe flows backwards, a negative sign prefixes the flow reading on the display.	
MASS FLOW (0000)	The currently measured mass flow appears on the display. **Display shows:** 5-digit floating-point number, including unit and sign (e.g. 462.87 kg/h; -731.63 lb/min; etc.)
VOLUME FLOW (0001)	The volume flow appears on the display. The volume flow is derived from the measured mass flow and the measured density of the fluid. **Display shows:** 5-digit floating-point number, including unit and sign (e.g. 5.5445 dm^3/min; 1.4359 m^3/h; -731.63 gal/d; etc.)
CORRECTED VOLUME FLOW (0004)	The corrected volume flow appears on the display. The corrected volume flow is derived from the measured mass flow and the reference density (density at reference temperature, measured or fixed entry) of the fluid. **Display shows:** 5-digit floating-point number, including unit and sign (e.g. 1.3549 Nm^3/h; 7.9846 scm/day; etc.)
DENSITY (0005)	The currently measured density or its specific gravity appears on the display. **Display shows:** 5-digit floating-point number, including unit corresponding to 0.100000...6.00000 kg/dm^3 (e.g. 1.2345 kg/dm^3; 993.5 kg/dm^3; 1.0015 SG_20 °C; etc.)
REFERENCE DENSITY (0006)	The density of the fluid, at reference temperature, appears on the display. The reference density can either be measured or entered as a fixed value (see FIXED REFERENCE DENSITY (6461) function on Page 51). **Display shows:** 5-digit floating-point number, including unit corresponding to 0.100000...6.00000 kg/dm^3 (e.g. 1.2345 kg/dm^3; 993.5 kg/dm^3; 1.0015 SG_20 °C; etc.)
TEMPERATURE (0008)	The currently measured temperature appears on the display. **Display shows:** max. 4-digit fixed-point number, including unit and sign (e.g. -23.4 °C; 160.0 °F; 295.4 K; etc.)

3.2 Group SYSTEM UNITS

3.2.1 Function group CONFIGURATION

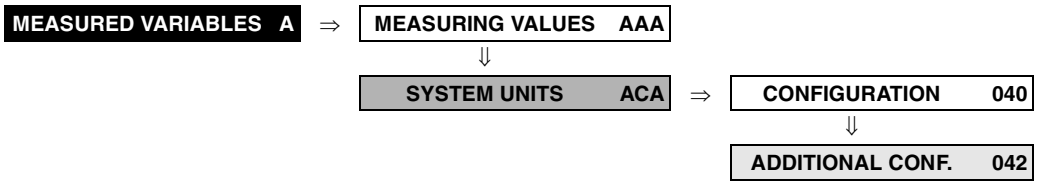


Function description MEASURED VARIABLES ➞ SYSTEM UNITS ➞ CONFIGURATION	
You can select the units for measured variables in this function group. ✎ Note! The units selected here have no effect on the Fieldbus. They are only used for the local display and for assigned instrument functions.	
UNIT MASS FLOW (0400)	Use this function to select the unit for displaying the mass flow (mass/time). The unit you select here is also valid for: • Switching points (limit value for mass flow, flow direction) • Low flow cut off **Options:** Metric: gram → g/s; g/min; g/h; g/day kilogram → kg/s; kg/min; kg/h; kg/day ton → t/s; t/min; t/h; t/day US: ounce → oz/s; oz/min; oz/h; oz/day pound → lb/s; lb/min; lb/h; lb/day ton → ton/s; ton/min; ton/h; ton/day **Factory setting:** kg/h
UNIT MASS (0401)	Use this function to select the unit for displaying the mass. The unit you select here is also valid for: • Pulse weighting (e.g. kg/p) **Options:** Metric → g; kg; t US → oz; lb; ton **Factory setting:** kg ✎ Note! The unit of the totalizers is independent of your choice here. The unit for each totalizer is selected separately for the totalizer in question.

Function description MEASURED VARIABLES → SYSTEM UNITS → CONFIGURATION	
UNIT VOLUME FLOW (0402)	Use this function to select the unit for displaying the volume flow (volume/time). The unit you select here is also valid for: • Switching points (limit value for volume flow, flow direction) • Low flow cut off **Options:** Metric: Cubic centimeter → cm^3/s; cm^3/min; cm^3/h; cm^3/day Cubic decimeter → dm^3/s; dm^3/min; dm^3/h; dm^3/day Cubic meter → m^3/s; m^3/min; m^3/h; m^3/day Milliliter → ml/s; ml/min; ml/h; ml/day Liter → l/s; l/min; l/h; l/day Hectoliter → hl/s; hl/min; hl/h; hl/day Megaliter → Ml/s; Ml/min; Ml/h; Ml/day US: Cubic centimeter → cc/s; cc/min; cc/h; cc/day Acre foot → af/s; af/min; af/h; af/day Cubic foot → ft^3/s; ft^3/min; ft^3/h; ft^3/day Fluid ounce → oz f/s; oz f/min; oz f/h; oz f/day Gallon → gal/s; gal/min; gal/h; gal/day Million gallon → Mgal/s; Mgal/min; Mgal/h; Mgal/day Barrel (normal fluids: 31.5 gal/bbl) → bbl/s; bbl/min; bbl/h; bbl/day Barrel (beer: 31.0 gal/bbl) → bbl/s; bbl/min; bbl/h; bbl/day Barrel (petrochemicals: 42.0 gal/bbl) → bbl/s; bbl/min; bbl/h; bbl/day Barrel (filling tanks: 55.0 gal/bbl) → bbl/s; bbl/min; bbl/h; bbl/day Imperial: Gallon → gal/s; gal/min; gal/h; gal/day Mega gallon → Mgal/s; Mgal/min; Mgal/h; Mgal/day Barrel (beer: 36.0 gal/bbl) → bbl/s; bbl/min; bbl/h; bbl/day Barrel (petrochemicals: 42.0 gal/bbl) → bbl/s; bbl/min; bbl/h; bbl/day **Factory setting:** m^3/h
UNIT VOLUME (0403)	Use this function to select the unit for displaying the volume. The unit you select here is also valid for: • Pulse weighting (e.g. m^3/p) **Options:** Metric → cm^3; dm^3; m^3; ml; l; hl; Ml US → cc; af; ft^3; oz f; gal; Mgal; bbl (normal fluids); bbl (beer); bbl (petrochemicals); bbl (filling tanks) Imperial → gal; Mgal; bbl (beer); bbl (petrochemicals) **Factory setting:** m^3 ✎ Note! The unit of the totalizers is independent of your choice here. The unit for each totalizer is selected separately for the totalizer in question.

Function description MEASURED VARIABLES → SYSTEM UNITS → CONFIGURATION	
UNIT CORRECTED VOLUME FLOW (0404)	Use this function to select the unit for displaying the corrected volume flow (corrected volume/time). The unit you select here is also valid for: • Switching points (limit value for corrected volume flow, flow direction) • Low flow cut off **Options:** Metric: Nl/s Nl/min Nl/h Nl/day Nm^3/s Nm^3/min Nm^3/h Nm^3/day US: Sm^3/s; Sm^3/min; Sm^3/h; Sm^3/day Scf/s; Scf/min; Scf/h; Scf/day **Factory setting:** Nm^3/h
UNIT CORRECTED VOLUME (0405)	Use this function to select the unit for displaying the corrected volume. The unit you select here is also valid for: • Pulse weighting (e.g. Nm^3/p) **Options:** Metric: Nm^3 Nl US: Sm^3 Scf **Factory setting:** Nm^3 ✎ Note! The unit of the totalizers is independent of your choice here. The unit for each totalizer is selected separately for the totalizer in question.

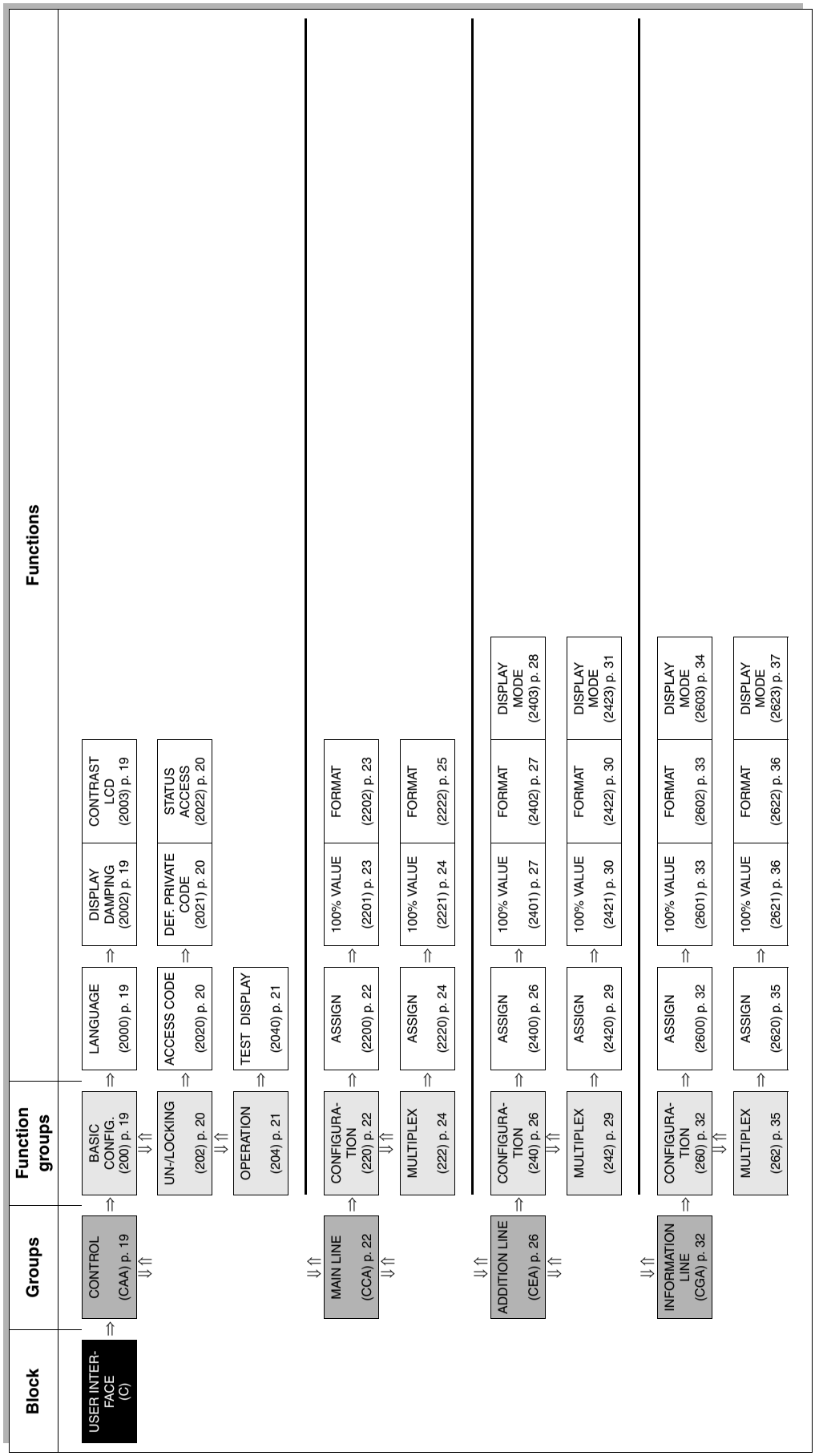
3.2.2 Function group ADDITIONAL CONFIGURATION



Function description MEASURED VARIABLES ➞ SYSTEM UNITS ➞ ADDITIONAL CONFIGURATION	
✎ Note! The units selected here have no effect on the Fieldbus. They are only used for the local display and for assigned instrument functions.	
UNIT DENSITY (0420)	Use this function to select the unit for displaying the fluid density. The unit you select here is also valid for: • Switching points (limit value for density) • Density adjustment value • Density responce value for EPD **Options:** Metric → g/cm^3; g/cc; kg/dm^3; kg/l; kg/m^3; SD 4 °C, SD 15 °C, SD 20 °C; SG 4 °C, SG 15 °C, SG 20 °C US → lb/ft^3; lb/gal; lb/bbl (normal fluids); lb/bbl (beer); lb/bbl (petrochemicals); lb/bbl (filling tanks) Imperial → lb/gal; lb/bbl (beer); lb/bbl (petrochemicals) **Factory setting:** kg/l SD = Specific Density, SG = Specific Gravity The specific density is the ratio of fluid density to water (at water temperature = 4, 15, 20 °C)
UNIT REFERENCE DENSITY (0421)	Use this function to select the unit for displaying the reference density. The unit you select here is also valid for: • Switching points (limit value for density) • Fixed reference density (for calculation of corrected volume flow) **Options:** Metric: kg/Nm^3 kg/Nl US: g/Scc kg/Sm^3 lb/Scf **Factory setting:** kg/Nl

Function description MEASURED VARIABLES → SYSTEM UNITS → ADDITIONAL CONFIGURATION	
UNIT TEMPERATURE (0422)	Use this function to select the unit for displaying the temperature. The unit you select here is also valid for: • Switching points (limit value for temperature) • Reference temperature (for corrected volume measurement with measured reference density) **Options:** °C (Celsius) K (Kelvin) °F (Fahrenheit) R (Rankine) **Factory setting:** °C
UNIT LENGTH (0424)	Use this function to select the unit for displaying the length for nominal diameter. The unit you select here is valid for: • Nominal diameter of the sensor (see the NOMINAL DIAMETER (6804) function on Page 56). **Options:** MILLIMETER INCH **Factory setting:** MILLIMETER

4 Block USER INTERFACE



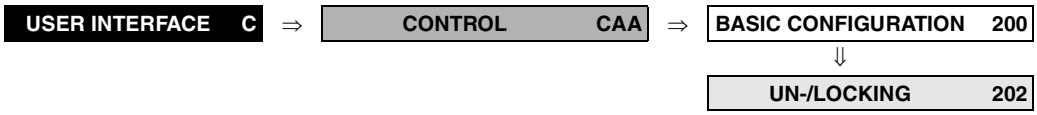
4.1 Group CONTROL

4.1.1 Function group BASIC CONFIGURATION

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

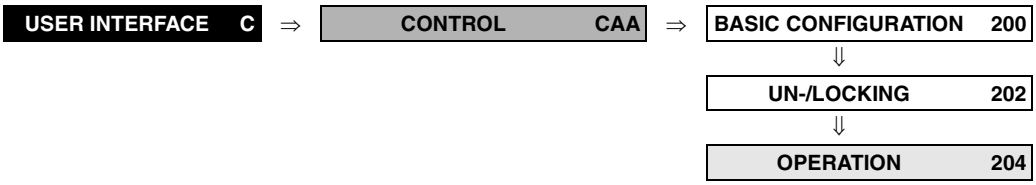
Function description USER INTERFACE ➞ CONTROL ➞ BASIC CONFIGURATION	
LANGUAGE (2000)	Use this function to select the language for all texts, parameters and messages shown on the local display. **Options:** ENGLISH DEUTSCH FRANCAIS ESPANOL ITALIANO NEDERLANDS DANSK NORSK SVENSKA SUOMI BAHASA INDONESIA JAPANESE (syllabary) ✎ Note! If you press the ⊡ keys simultaneously during startup, the language defaults to "ENGLISH".
DISPLAY DAMPING (2002)	Use this function to enter a time constant defining how the display reacts to severely fluctuating flow variables, either very quickly (enter a low time constant) or with damping (enter a high time constant). **User input:** 0...100 seconds **Factory setting:** 1 s ✎ Note! Setting the time constant to zero seconds switches off damping.
CONTRAST LCD (2003)	Use this function to optimize display contrast to suit local operating conditions. **User input:** 10...100% **Factory setting:** 50%

4.1.2 Function group UN-/LOCKING



Function description USER INTERFACE ➞ CONTROL ➞ UN-/LOCKING	
ACCESS CODE (2020)	All data of the measuring system are protected against inadvertent change. Programming is disabled and the settings cannot be changed until a code is entered in this function. If you press the ⊡ key in any function the measuring system automatically goes to this function and the prompt to enter the code appears on the display (programming disabled). You can enable programming by entering the personal code (Factory setting = 83, see the DEFINE PRIVATE CODE (2021) function). **User input:** max. 4-digit number: 0...9999 ✎ Note! • The programming levels are disabled if you do not press a key within 60 seconds following automatic return to the HOME position. • You can also disable programming in this function by entering any number (other than the defined private code). • The Endress+Hauser service organization can be of assistance if you mislay your personal code. • Certain functions are not accessible unless a special service code is entered. This code is known only to the Endress+Hauser service organization. Please contact your Endress+Hauser service center if you require clarification. • In this function, access to programming is only valid for local configuration. If functions or parameters are to be changed over Fieldbus, programming must be released separately in the parameter "Un/Locking - Access code" (see Page 115).
DEFINE PRIVATE CODE (2021)	Use this function to enter a personal code number for enabling programming. **User input:** 0...9999 (max. 4-digit number) **Factory setting:** 83 ✎ Note! • If you define the personal code number = 0, the programming is always enabled. • Programming has to be enabled before this code can be changed. When programming is disabled the function can't be changed, this precaution prevents others from changing your personal code without your knowledge and consent.
STATUS ACCESS (2022)	Use this function to check the access status for the function matrix. **Display shows:** ACCESS CUSTOMER (Parameterization enabled) ACCESS SERVICE (Parameterization enabled) LOCKED (Parameterization disabled)

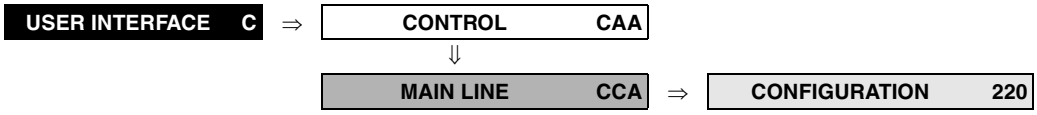
4.1.3 Function group OPERATION

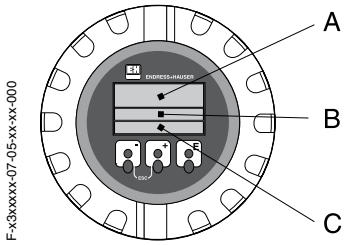


Function description USER INTERFACE → CONTROL → OPERATION	
TEST DISPLAY (2040)	Use this function to test the operability of the local display and its pixels. **Options:** OFF ON **Factory setting:** OFF Test sequence: 1. Start the test by selecting ON. 2. All pixels of the main line, additional line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

4.2 Group MAIN LINE

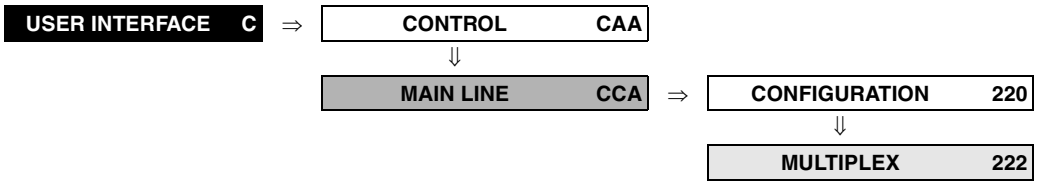
4.2.1 Function group CONFIGURATION



Function description USER INTERFACE → MAIN LINE → CONFIGURATION	
 A = main line, B = additional line, C = information line	
ASSIGN (2200)	Use this function to define the display value assigned to the main line (the top line of the local display) during normal measuring operation. **Options:** OFF MASS FLOW MASS FLOW IN % VOLUME FLOW VOLUME FLOW IN % CORRECTED VOLUME FLOW CORRECTED VOLUME FLOW IN % DENSITY REFERENCE DENSITY TEMPERATURE TOTALIZER 1 TOTALIZER 2 TOTALIZER 3 AI 1 - OUT VALUE AI 2 - OUT VALUE AI 3 - OUT VALUE AI 4 - OUT VALUE AI 5 - OUT VALUE AI 6 - OUT VALUE AI 7 - OUT VALUE PID - IN VALUE (controlled variable) PID - CAS_IN VALUE (external set point) PID - OUT VALUE (manipulated variable) **Factory setting:** MASS FLOW

Function description USER INTERFACE → MAIN LINE → CONFIGURATION	
100% VALUE (2201)	✎ 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 % Use this function to define the flow value to be shown on the display as the 100% value. **User input:** 5-digit floating-point number **Factory setting:** 10 kg/s, 10 l/s resp. 10 Nl/s
FORMAT (2202)	Use this function to define the maximum number of places after the decimal point displayed for the reading in the main line. **Options:** XXXXX. - XXXX.X - XXX.XX - XX.XXX -X.XXXX **Factory setting:** X.XXXX ✎ Note! • Note that this setting only affects the reading as it appears on the display, it has no influence on the accuracy of the system's calculations. • The places after the decimal point as computed by the measuring device cannot always be displayed, depending on this setting and the engineering unit. In these instances an arrow appears on the display between the measured value and the engineering unit (e.g. 1.2→ kg/h), indicating that the measuring system is computing with more decimal places than can be shown on the display.

4.2.2 Function group MULTIPLEX

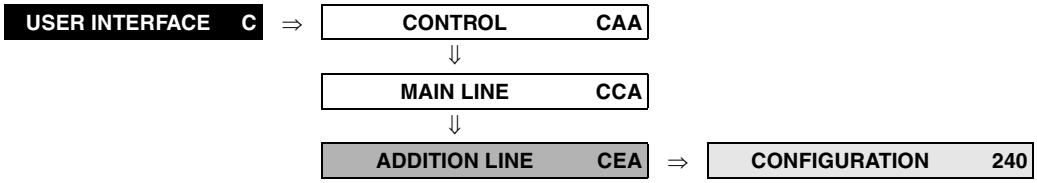


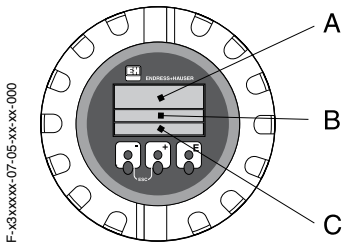
Function description USER INTERFACE → MAIN LINE → MULTIPLEX	
ASSIGN (2220)	Use this function to define the second reading to be displayed in the main line alternately (every 10 seconds) with the value defined in the ASSIGN function (2200). **Options:** OFF MASS FLOW MASS FLOW IN % VOLUME FLOW VOLUME FLOW IN % CORRECTED VOLUME FLOW CORRECTED VOLUME FLOW IN % DENSITY REFERENCE DENSITY TEMPERATURE TOTALIZER 1 TOTALIZER 2 TOTALIZER 3 AI 1 - OUT VALUE AI 2 - OUT VALUE AI 3 - OUT VALUE AI 4 - OUT VALUE AI 5 - OUT VALUE AI 6 - OUT VALUE AI 7 - OUT VALUE PID - IN VALUE (controlled variable) PID - CAS_IN VALUE (external set point) PID - OUT VALUE (manipulated variable) **Factory setting:** OFF
100% VALUE (2221)	✎ 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 % Use this function to define the flow value to be shown on the display as the 100% value. **User input:** 5-digit floating-point number **Factory setting:** 10 kg/s, 10 l/s resp. 10 Nl/s

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

4.3 Group ADDITION LINE

4.3.1 Function group CONFIGURATION

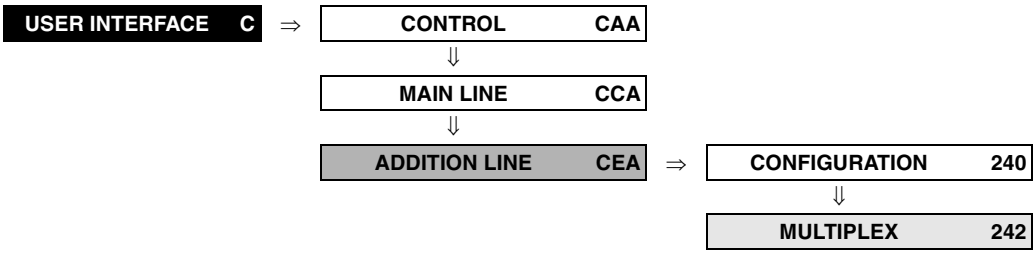


Function description USER INTERFACE → ADDITION LINE → CONFIGURATION	
 A = main line, B = additional line, C = information line	
ASSIGN (2400)	Use this function to define the display value assigned to the additional line (the middle line of the local display) during normal measuring operation. **Options:** OFF MASS FLOW MASS FLOW IN % VOLUME FLOW VOLUME FLOW IN % CORRECTED VOLUME FLOW CORRECTED VOLUME FLOW IN % DENSITY REFERENCE DENSITY TEMPERATURE MASS FLOW BARGRAPH IN % VOLUME FLOW BARGRAPH IN % CORRECTED VOLUME FLOW BARGRAPH IN % TOTALIZER 1 TOTALIZER 2 TOTALIZER 3 TAG NAME AI 1 - OUT VALUE AI 2 - OUT VALUE AI 3 - OUT VALUE AI 4 - OUT VALUE AI 5 - OUT VALUE AI 6 - OUT VALUE AI 7 - OUT VALUE PID - IN VALUE (controlled variable) PID - CAS_IN VALUE (external set point) PID - OUT VALUE (manipulated variable) DEVICE PD-TAG BLANK LINE **Factory setting:** TOTALIZER 1

Function description USER INTERFACE → ADDITION LINE → CONFIGURATION	
100% VALUE (2401)	✎ Note! This function is not available unless one of the following was selected in the ASSIGN function (2400): • MASS FLOW IN % • VOLUME FLOW IN % • CORRECTED VOLUME FLOW IN % • MASS FLOW BARGRAPH IN % • VOLUME FLOW BARGRAPH IN % • CORRECTED VOLUME FLOW BARGRAPH IN % Use this function to define the flow value to be shown on the display as the 100% value. **User input:** 5-digit floating-point number **Factory setting:** 10 kg/s, 10 l/s resp. 10 Nl/s
FORMAT (2402)	✎ Note! This function is not available unless a number was selected in the ASSIGN function (2400). Use this function to define the maximum number of places after the decimal point displayed for the reading in the additional line. **Options:** XXXXX. - XXXX.X - XXX.XX - XX.XXX -X.XXXX **Factory setting:** X.XXXX ✎ Note! • Note that this setting only affects the reading as it appears on the display, it has no influence on the accuracy of the system's calculations. • The places after the decimal point as computed by the measuring device cannot always be displayed, depending on this setting and the engineering unit. In these instances an arrow appears on the display between the measured value and the engineering unit (e.g. 1.2 → kg/h), indicating that the measuring system is computing with more decimal places than can be shown on the display.

Function description USER INTERFACE → ADDITION LINE → CONFIGURATION	
DISPLAY MODE (2403)	✎ Note! 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:** STANDARD Simple bar graph with 25 / 50 / 75% gradations and integrated sign.  F-x3xxxxx-20-xx-xx-xx-000 SYMMETRY Symmetrical bar graph for positive and negative directions of flow, with -50 / 0 / +50% gradations and integrated sign.  F-x3xxxxx-20-xx-xx-xx-001 **Factory setting:** STANDARD

4.3.2 Function group MULTIPLEX



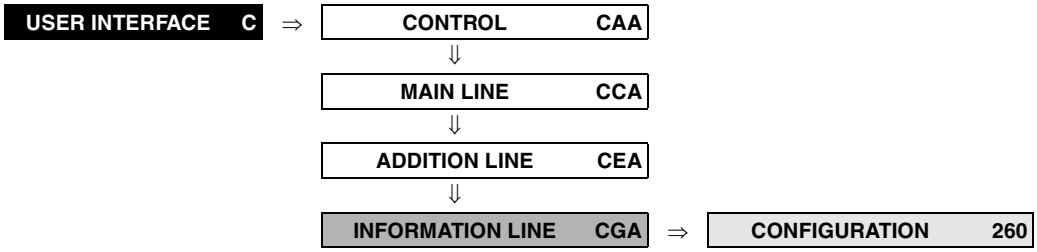
Function description USER INTERFACE → ADDITION LINE → MULTIPLEX	
ASSIGN (2420)	Use this function to define the second reading to be displayed in the additional line alternately (every 10 seconds) with the value defined in the ASSIGN function (2400). **Options:** OFF MASS FLOW MASS FLOW IN % VOLUME FLOW VOLUME FLOW IN % CORRECTED VOLUME FLOW CORRECTED VOLUME FLOW IN % DENSITY REFERENCE DENSITY TEMPERATURE MASS FLOW BARGRAPH IN % VOLUME FLOW BARGRAPH IN % CORRECTED VOLUME FLOW BARGRAPH IN % NOMINAL CURRENT (1...3) NOMINAL FREQUENCY (1...2) TOTALIZER 1 TOTALIZER 2 TOTALIZER 3 TAG NAME AI 1 - OUT VALUE AI 2 - OUT VALUE AI 3 - OUT VALUE AI 4 - OUT VALUE AI 5 - OUT VALUE AI 6 - OUT VALUE AI 7 - OUT VALUE PID - IN VALUE (controlled variable) PID - CAS_IN VALUE (external set point) PID - OUT VALUE (manipulated variable) DEVICE PD-TAG BLANK LINE **Factory setting:** OFF ✎ Note! Multiplex mode is suspended as soon as a fault/notice message is generated. The message in question appears on the display. • Fault message (identified by a lightning icon): Multiplex mode is resumed as soon as the fault message is no longer active. • Notice message (identified by an exclamation mark): Multiplex mode is resumed as soon as the notice message is no longer active.

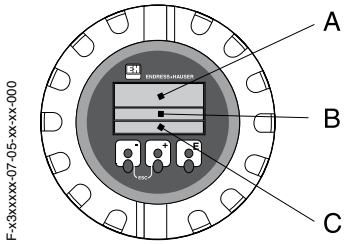
Function description USER INTERFACE → ADDITION LINE → MULTIPLEX	
100% VALUE (2421)	✎ Note! This function is not available unless one of the following was selected in the ASSIGN function (2420): • MASS FLOW IN % • VOLUME FLOW IN % • CORRECTED VOLUME FLOW IN % • MASS FLOW BARGRAPH IN % • VOLUME FLOW BARGRAPH IN % • CORRECTED VOLUME FLOW BARGRAPH IN % Use this function to define the flow value to be shown on the display as the 100% value. **User input:** 5-digit floating-point number **Factory setting:** 10 kg/s, 10 l/s resp. 10 Nl/s
FORMAT (2422)	✎ Note! This function is not available unless a number was selected in the ASSIGN function (2420). Use this function to define the maximum number of places after the decimal point for the second value displayed in the additional line. **Options:** XXXXX. - XXXX.X - XXX.XX - XX.XXX -X.XXXX **Factory setting:** X.XXXX ✎ Note! • Note that this setting only affects the reading as it appears on the display, it has no influence on the accuracy of the system's calculations. • The places after the decimal point as computed by the measuring device cannot always be displayed, depending on this setting and the engineering unit. In these instances an arrow appears on the display between the measured value and the engineering unit (e.g. 1.2 → kg/h), indicating that the measuring system is computing with more decimal places than can be shown on the display.

Function description USER INTERFACE → ADDITION LINE → MULTIPLEX	
DISPLAY MODE (2423)	✎ Note! 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:** STANDARD Simple bar graph with 25 / 50 / 75% gradations and integrated sign.  F-x3xxxxx-20-xx-xx-xx-000 SYMMETRY Symmetrical bar graph for positive and negative directions of flow, with -50 / 0 / +50% gradations and integrated sign.  F-x3xxxxx-20-xx-xx-xx-001 **Factory setting:** STANDARD

4.4 Group INFORMATION LINE

4.4.1 Function group CONFIGURATION

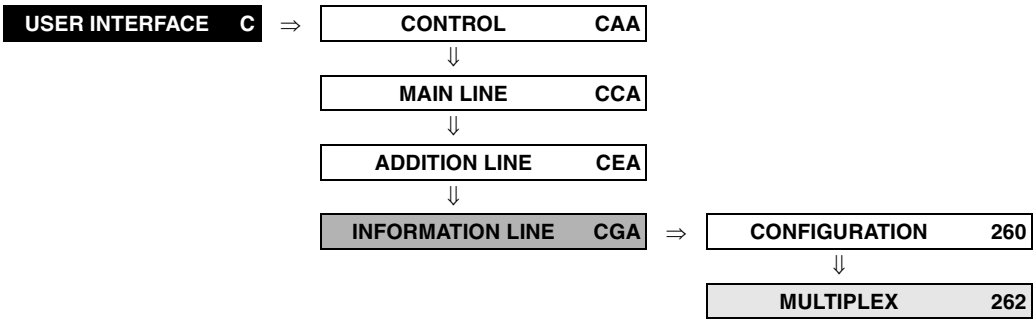


Function description USER INTERFACE ➞ INFORMATION LINE ➞ CONFIGURATION	
 A = main line, B = additional line, C = information line	
ASSIGN (2600)	Use this function to define the display value assigned to the information line (the bottom line of the local display) during normal measuring operation. **Options:** OFF MASS FLOW MASS FLOW IN % VOLUME FLOW VOLUME FLOW IN % CORRECTED VOLUME FLOW CORRECTED VOLUME FLOW IN % DENSITY REFERENCE DENSITY TEMPERATURE MASS FLOW BARGRAPH IN % VOLUME FLOW BARGRAPH IN % CORRECTED VOLUME FLOW BARGRAPH IN % TOTALIZER 1 TOTALIZER 2 TOTALIZER 3 TAG NAME OPERATING/SYSTEM CONDITIONS DISPLAY FLOW DIRECTION AI (1...7) - OUT VALUE PID - IN VALUE (controlled variable) PID - CAS_IN VALUE (external set point) PID - OUT VALUE (manipulated variable) DEVICE PD-TAG BLANK LINE **Factory setting:** OPERATING/SYSTEM CONDITIONS

Function description USER INTERFACE → INFORMATION LINE → CONFIGURATION	
100% VALUE (2601)	✎ Note! This function is not available unless one of the following was selected in the ASSIGN function (2600): • MASS FLOW IN % • VOLUME FLOW IN % • CORRECTED VOLUME FLOW IN % • MASS FLOW BARGRAPH IN % • VOLUME FLOW BARGRAPH IN % • CORRECTED VOLUME FLOW BARGRAPH IN % Use this function to define the flow value to be shown on the display as the 100% value. **User input:** 5-digit floating-point number **Factory setting:** 10 kg/s, 10 l/s resp. 10 Nl/s
FORMAT (2602)	✎ Note! This function is not available unless a number was selected in the ASSIGN function (2600). Use this function to define the maximum number of places after the decimal point displayed for the reading in the information line. **Options:** XXXXX. - XXXX.X - XXX.XX - XX.XXX -X.XXXX **Factory setting:** X.XXXX ✎ Note! • Note that this setting only affects the reading as it appears on the display, it has no influence on the accuracy of the system's calculations. • The places after the decimal point as computed by the measuring device cannot always be displayed, depending on this setting and the engineering unit. In these instances an arrow appears on the display between the measured value and the engineering unit (e.g. 1.2 → kg/h), indicating that the measuring system is computing with more decimal places than can be shown on the display.

Function description USER INTERFACE → INFORMATION LINE → CONFIGURATION	
DISPLAY MODE (2603)	✎ 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:** STANDARD Simple bar graph with 25 / 50 / 75% gradations and integrated sign.  F-x3xxxxx-20-xx-xx-xx-000 SYMMETRY Symmetrical bar graph for positive and negative directions of flow, with -50 / 0 / +50% gradations and integrated sign.  F-x3xxxxx-20-xx-xx-xx-001 **Factory setting:** STANDARD

4.4.2 Function group MULTIPLEX

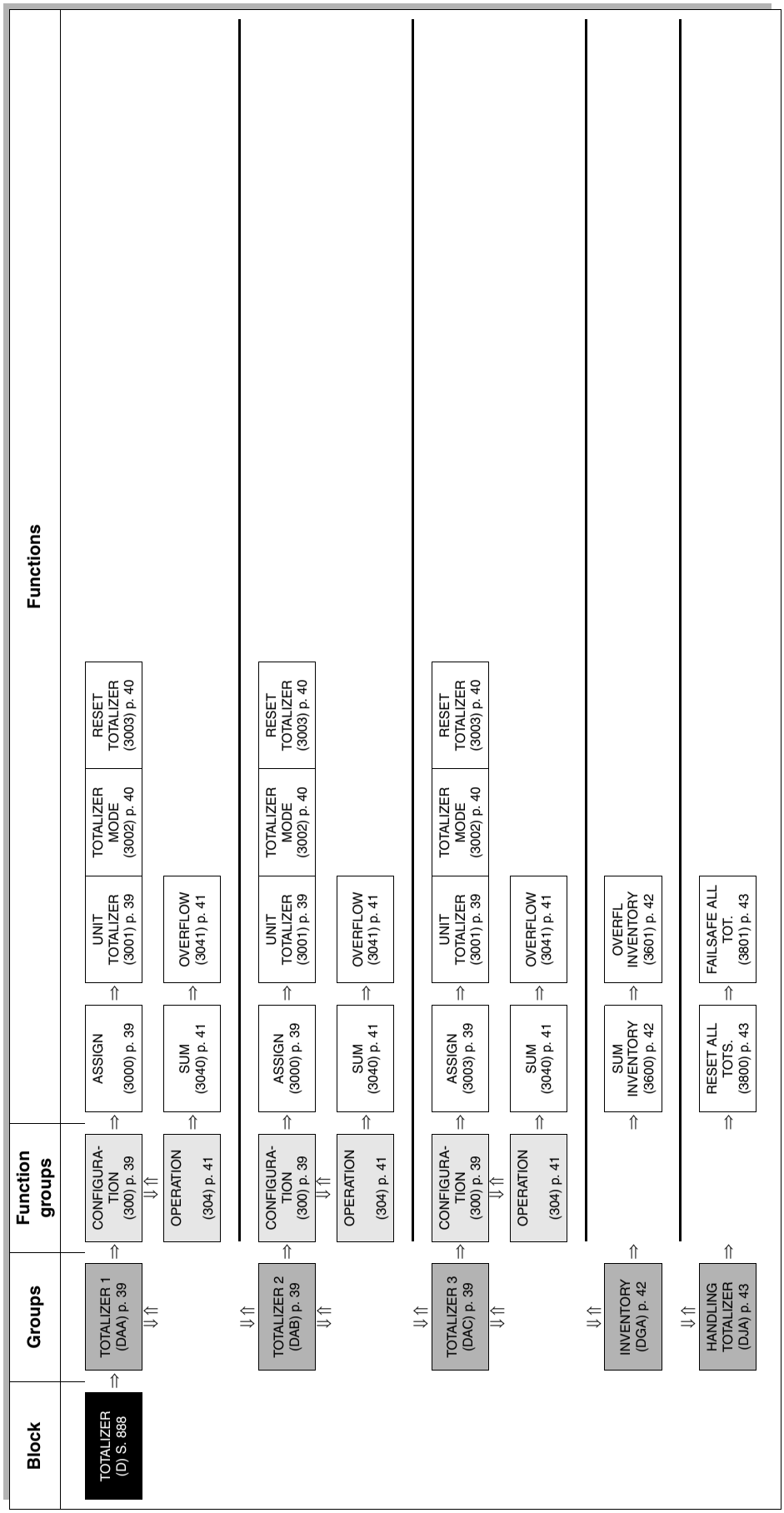


Function description USER INTERFACE → INFORMATION LINE → MULTIPLEX	
ASSIGN (2620)	Use this function to define the second reading to be displayed in the information line alternately (every 10 seconds) with the value defined in the ASSIGN function (2600). **Options:** OFF MASS FLOW MASS FLOW IN % VOLUME FLOW VOLUME FLOW IN % CORRECTED VOLUME FLOW CORRECTED VOLUME FLOW IN % DENSITY REFERENCE DENSITY TEMPERATURE MASS FLOW BARGRAPH IN % VOLUME FLOW BARGRAPH IN % CORRECTED VOLUME FLOW BARGRAPH IN % TOTALIZER 1 TOTALIZER 2 TOTALIZER 3 TAG NAME OPERATING/SYSTEM CONDITIONS DISPLAY FLOW DIRECTION AI 1 - OUT VALUE AI 2 - OUT VALUE AI 3 - OUT VALUE AI 4 - OUT VALUE AI 5 - OUT VALUE AI 6 - OUT VALUE AI 7 - OUT VALUE PID - IN VALUE (controlled variable) PID - CAS_IN VALUE (external set point) PID - OUT VALUE (manipulated variable) DEVICE PD-TAG BLANK LINE **Factory setting:** OFF ✎ Note! Multiplex mode is suspended as soon as a fault/notice message is generated. The message in question appears on the display. • Fault message (identified by a lightning icon): Multiplex mode is resumed as soon as the fault message is no longer active. • Notice message (identified by an exclamation mark): Multiplex mode is resumed as soon as the notice message is no longer active.

Function description USER INTERFACE → INFORMATION LINE → MULTIPLEX	
100% VALUE (2621)	✎ Note! This function is not available unless one of the following was selected in the ASSIGN function (2620): • MASS FLOW IN % • VOLUME FLOW IN % • CORRECTED VOLUME FLOW IN % • MASS FLOW BARGRAPH IN % • VOLUME FLOW BARGRAPH IN % • CORRECTED VOLUME FLOW BARGRAPH IN % Use this function to define the flow value to be shown on the display as the 100% value. **User input:** 5-digit floating-point number **Factory setting:** 10 kg/s, 10 l/s resp. 10 Nl/s
FORMAT (2622)	✎ Note! This function is not available unless a number was selected in the ASSIGN function (2620). Use this function to define the maximum number of places after the decimal point for the second value displayed in the information line. **Options:** XXXXX. - XXXX.X - XXX.XX - XX.XXX -X.XXXX **Factory setting:** X.XXXX ✎ Note! • Note that this setting only affects the reading as it appears on the display, it has no influence on the accuracy of the system's calculations. • The places after the decimal point as computed by the measuring device cannot always be displayed, depending on this setting and the engineering unit. In these instances an arrow appears on the display between the measured value and the engineering unit (e.g. 1.2 → kg/h), indicating that the measuring system is computing with more decimal places than can be shown on the display.

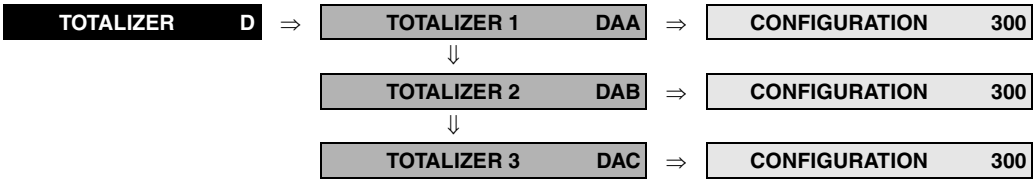
Function description USER INTERFACE → INFORMATION LINE → MULTIPLEX	
DISPLAY MODE (2623)	✎ Note! This function is not available unless one of the following was selected in the ASSIGN function (2620): • MASS FLOW BARGRAPH IN % • VOLUME FLOW BARGRAPH IN % • CORRECTED VOLUME FLOW BARGRAPH IN % Use this function to define the format of the bar graph. **Options:** STANDARD Simple bar graph with 25 / 50 / 75% gradations and integrated sign.  F-x3xxxxx-20-xx-xx-xx-000 SYMMETRY Symmetrical bar graph for positive and negative directions of flow, with -50 / 0 / +50% gradations and integrated sign.  F-x3xxxxx-20-xx-xx-xx-001 **Factory setting:** STANDARD

5 Block TOTALIZER



5.1 Group TOTALIZERS (1...3)

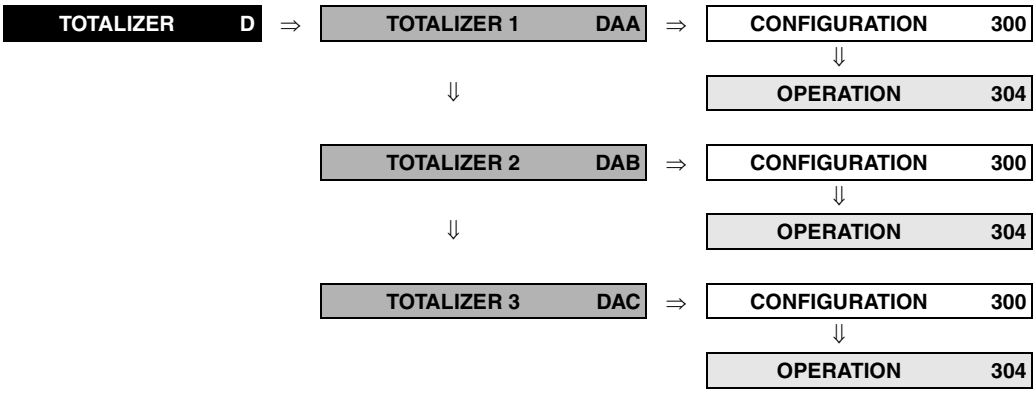
5.1.1 Function group CONFIGURATION



Function description TOTALIZER → TOTALIZERS (1...3) → CONFIGURATION	
The function descriptions below apply to totalizers 1...3; the totalizers are independently configurable.	
ASSIGN (3000)	Use this function to assign a measured variable to the totalizer. **Options:** OFF MASS FLOW VOLUME FLOW CORRECTED VOLUME FLOW **Factory setting:** MASS FLOW ✎ Note! • The totalizer is reset to "0" as soon as the selection is changed. • If you select OFF, the only function shown in this function group is this function (ASSIGN).
UNIT TOTALIZER (3001)	Use this function to define the unit for the totalizer's measured variable, as selected beforehand. **Options (for the MASS FLOW assignment):** Metric → g; kg; t US → oz; lb; ton **Factory setting:** kg **Options (for the VOLUME FLOW assignment):** Metric → cm^3; dm^3; m^3; ml; l; hl; Ml US → cc; af; ft^3; oz f; gal; Mgal; bbl (normal fluids); bbl (beer); bbl (petrochemicals); bbl (filling tanks) Imperial → gal; Mgal; bbl (beer); bbl (petrochemicals) **Factory setting:** m^3 **Options (for the CORRECTED VOLUME FLOW assignment):** Metric → Nl; Nm^3 US → Sm^3; Scf **Factory setting:** Nm^3 ✎ Note! The unit selected here have no effect on the Fieldbus. It is only used for the local display and for assigned instrument functions.

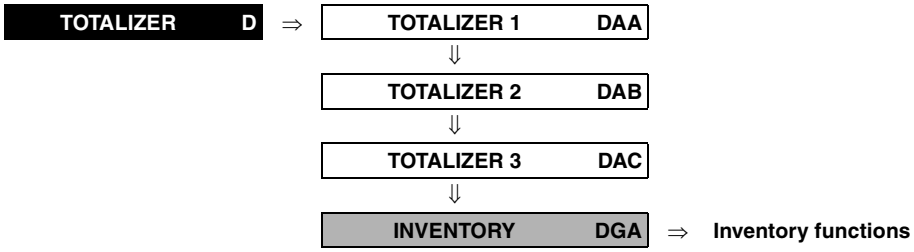
Function description TOTALIZER ➞ TOTALIZERS (1...3) ➞ CONFIGURATION	
TOTALIZER MODE (3002)	Use this function to define how the flow components are to be totaled by the totalizer. **Options:** BALANCE (positive and negative flow components) The positive and negative flow components are balanced. In other words, net flow in the flow direction is registered. FORWARD Positive flow components only REVERSE Negative flow components only **Factory setting:** Totalizer 1 = BALANCE Totalizer 2 = FORWARD Totalizer 3 = REVERSE
RESET TOTALIZER (3003)	Use this function to reset the sum and the overflow of the totalizer to zero. **Options:** NO YES **Factory setting:** NO

5.1.2 Function group OPERATION



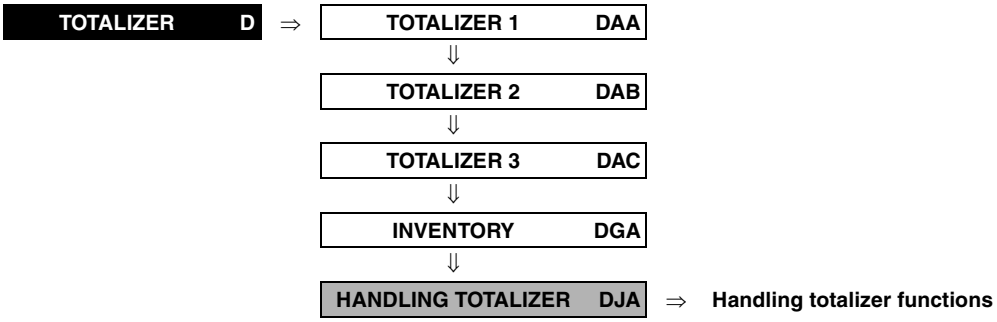
Function description TOTALIZER ➞ TOTALIZERS (1...3) ➞ OPERATION	
The function descriptions below apply to totalizers 1...3; the totalizers are independently configurable.	
SUM (3040)	Use this function to view the total for the totalizer's measured variable aggregated since measuring commenced. The value can be positive or negative, depending on the setting selected in the "TOTALIZER MODE" function (3002), and the direction of flow. **Display shows:** max. 7-digit floating-point number, including sign and unit (e.g. 15467.04 m^3; -4925.631 kg) ✎ Note! • The effect of the setting in the "TOTALIZER MODE" function (see Page 40) is as follows: – If the setting is "BALANCE", the totalizer balances flow in the positive and negative directions. – If the setting is "POSITIVE", the totalizer registers only flow in the positive direction. – If the setting is "NEGATIVE", the totalizer registers only flow in the negative direction. • The totalizer's response to faults is defined in the "FAILSAFE ALL TOTALIZERS" function (3801) (see Page 43). • If the service code is used to call this function, this value is editable.
OVERFLOW (3041)	Use this function to view the overflow for the totalizer aggregated since measuring commenced. Total flow quantity is represented by a floating-point number consisting of max. 7 digits. You can use this function to view higher numerical values (>9,999,999) as overflows. The effective quantity is thus the total of OVERFLOW plus the value returned by the SUM function. Example: Reading for 2 overflows: 2 10^7 kg (= 20,000,000 kg) The value returned by the SUM function = 196,845.7 kg Effective total quantity = 20,196,845.7 kg **Display shows:** integer with exponent, including sign and unit, e.g. 2 10^7kg ✎ Note! If the service code is used to call this function, this value is editable.

5.2 Group INVENTORY



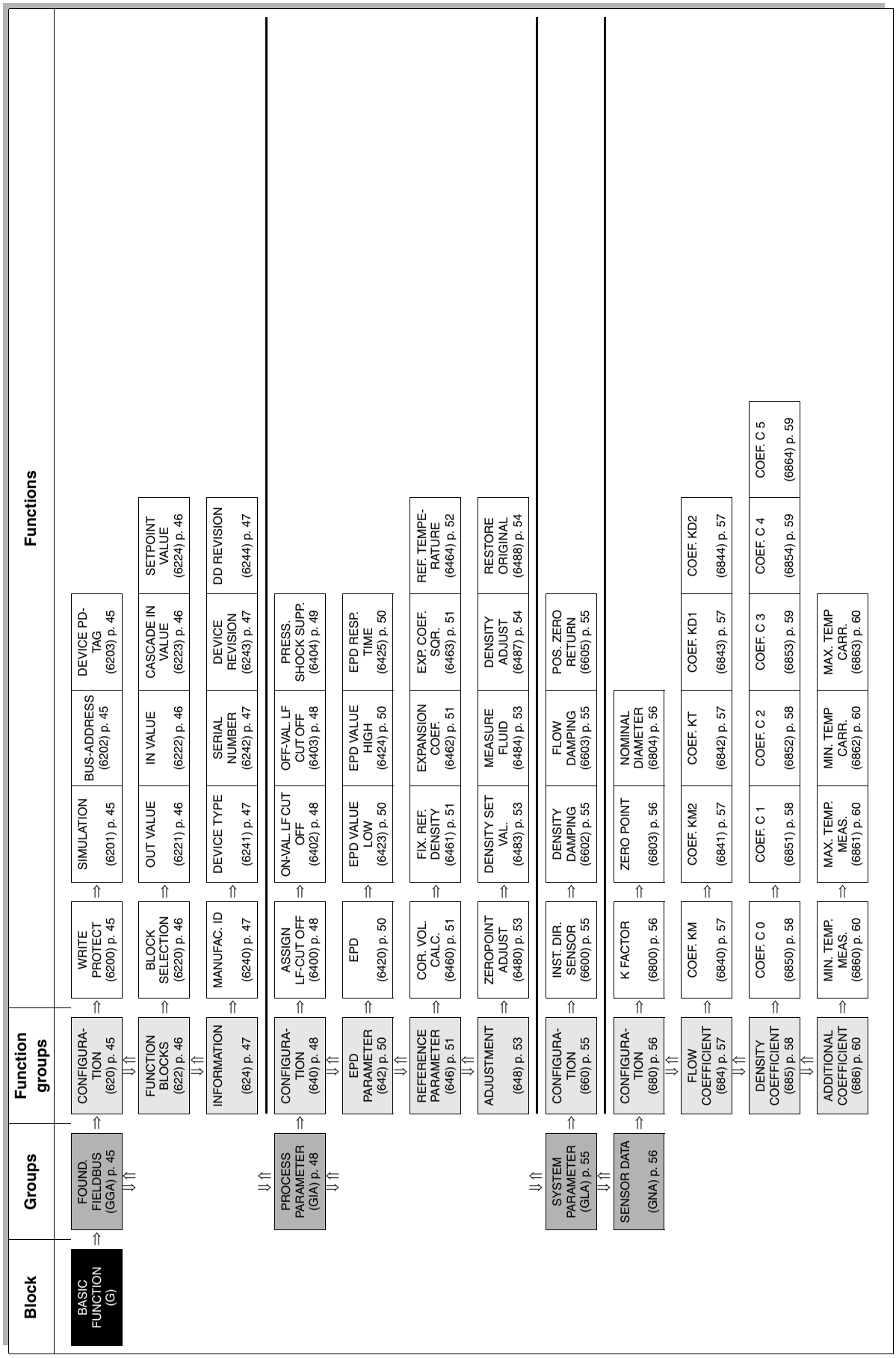
Function description TOTALIZER → INVENTORY → Inventory totalizer functions	
✎ Note! The group INVENTORY is only accessible when the programming is enabled by service code.	
SUM INVENTORY (3600)	Use this function to view the flow quantity for the inventory totalizer aggregated since commissioning (unit in kg). All flow components are totaled, irrespective of their direction of flow (positive / negative). **Display shows:** 7-digit floating-point number [kg]
OVERFLOW INVENTORY (3601)	Use this function to view the overflow for the inventory totalizer aggregated since commissioning (unit in kg). **Display shows:** 7-digit integer with exponential coefficient [kg]

5.3 Group HANDLING TOTALIZER



Function description TOTALIZER ➞ HANDLING TOTALIZER ➞ Totalizer administration functions	
RESET ALL TOTALIZERS (3800)	Use this function to reset the totals (including all overflows) of the totalizers (1...3) to "zero" (= RESET). **Options:** NO YES **Factory setting:** NO Caution! Note that the inventory totalizer (see Page 42) is not reset.
FAILSAFE ALL TOTALIZERS (3801)	Use this function to define the common response of all totalizers (1...3) to error. **Options:** STOP The totalizer is paused until the fault is rectified. The totalizer stops at the last value prior to the occurrence of the error. ACTUAL VALUE The totalizer continues to count is based on the current flow measured value. The fault is ignored. HOLD VALUE The totalizer continues to count the flow is based on the last valid flow value (before the fault occurred). **Factory setting:** STOP Caution! The inventory totalizer (called SUM INVENTORY, see Page 42) can't be assigned its own individual response to error. If an error occurs the inventory totalizer stops at the last value prior to the occurrence of the error (corresponds to STOP).

6 Block BASIC FUNCTION



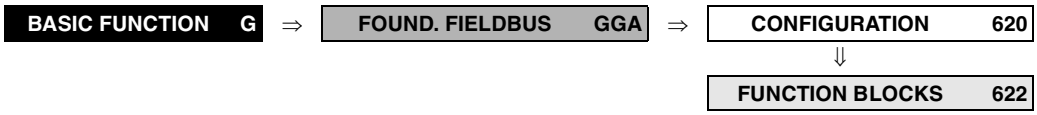
6.1 Group FOUNDATION FIELDBUS

6.1.1 Function group CONFIGURATION

BASIC FUNCTION G ⇒ **FOUND. FIELDBUS GGA** ⇒ **CONFIGURATION 620**

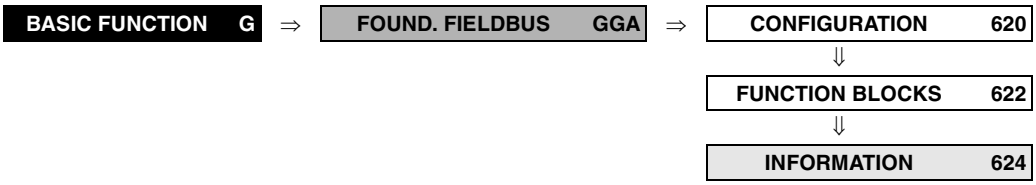
Function description BASIC FUNCTION → FOUNDATION FIELDBUS → CONFIGURATION	
WRITE PROTECT (6200)	Use this function to check whether the measuring device can be write accessed via Fieldbus. **Display shows:** OFF Access to device parameter via FF is possible ON Access to device parameter via FF is **not** possible **Factory setting:** ON ✎ Note! Hardware write protection is activated and deactivated by means of a jumper on the I/O board (see Operating Instruction Promass 83 BA 065D/06/en/).
SIMULATION (6201)	Use this function to check whether a simulation in the Analog Input Function Block is possible. **Display shows:** OFF Simulation in the Analog Input and Discrete Output Function Block is **not** possible. ON Simulation in the Analog Input and Discrete Output Function Block is possible **Factory setting:** OFF ✎ Note! • The Simulation mode is activated and deactivated by means of a jumper on the I/O board (see Operating Instruction Promass 83 BA 065D/06/en/). • The status of the simulation mode is also shown in the parameter "BLOCK_ERR" of the Resource Block (see Page 80).
BUS-ADDRESS (6202)	✎ Note! The service code has to be entered in order to access this function. If the service code is used to call this function, this value can be edited.
DEVICE PD-TAG (6203)	Use this function to enter a tag name for the measuring device. **User input:** max. 32-character text, permissible: A-Z, 0-9, +,-, punctuation marks **Factory setting:** E+H_PROMASS_83_XXXXXXXXXXX

6.1.2 Function group FUNCTION BLOCKS



Function description BASIC FUNCTION → FOUND. FIELDBUS → OPERATION	
BLOCK SELECTION (6220)	In this function, a function block can be selected, whose value and status is shown in the following functions. **Options:** ANALOG INPUT 1 ANALOG INPUT 2 ANALOG INPUT 3 ANALOG INPUT 4 ANALOG INPUT 5 ANALOG INPUT 6 ANALOG INPUT 7 PID **Factory setting:** ANALOG INPUT 1
OUT VALUE (6221)	Display of the output value OUT, incl. unit and status of the selected Analog Input or PID function in the function BLOCK SELECTION (6220).
IN VALUE (6222)	✎ Note! This function is not available unless the PID selection was selected in the BLOCK SELECTION (6220) function. Display of the controlled variable IN, incl. unit and status of the selected Analog Input or PID function in the function BLOCK SELECTION (6220).
CASCADE IN VALUE (6223)	✎ Note! This function is not available unless the PID selection was selected in the BLOCK SELECTION (6220) function. Display of an analog set value, incl. units and status, taken over from an external function block.
SETPOINT VALUE (6224)	✎ Note! • This function is not available unless the PID selection was selected in the BLOCK SELECTION (6220) function. • If the service code is used to call this function, this value can be edited. Display of the set value, incl. units and status, for the PID function block.

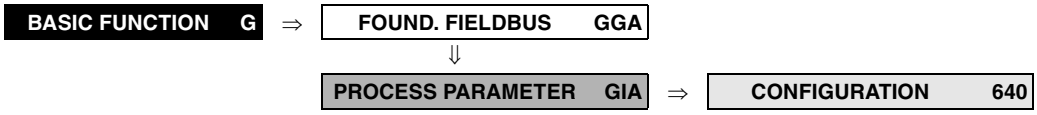
6.1.3 Function group INFORMATION



Function description BASIC FUNCTION → FOUND. FIELDBUS → OPERATION	
MANUFACTURER ID (6240)	Use this function to view the manufacturer ID in decimal numerical format. **Display shows:** 452B48 (hex) for Endress+Hauser
DEVICE TYPE (6241)	Use this function to view the device ID in hexadecimal numerical format. **Display shows:** 1051 (dez) for Promass 83 FOUNDATION Fieldbus
SERIAL NUMBER (6242)	Use this function to view the serial number. **Display shows:** 11-digit number
DEVICE REVISION (6243)	Use this function to view the device Revision number. **Display shows:** 1
DD REVISION (6244)	Use this function to view the Revision number of the Device Description. **Display shows:** 1

6.2 Group PROCESS PARAMETER

6.2.1 Function group CONFIGURATION



Function description BASIC FUNCTION → PROCESS PARAMETER → CONFIGURATION	
ASSIGN LOW FLOW CUT OFF (6400)	Use this function to assign the switching point for Low flow cut off rate suppression. **Options:** OFF MASS FLOW VOLUME FLOW CORRECTED VOLUME FLOW **Factory setting:** MASS FLOW
ON-VALUE LOW FLOW CUT OFF (6402)	Use this function to assign a value to the switch-on point for Low flow cut off. Low flow cut off is active if the setting is a value not equal to 0. The sign of the flow value is highlighted on the display to indicate that Low flow cut off is active. **User input:** depends on nominal diameter **Factory setting:** 0.0000 ✎ Note! The appropriate unit is taken from the corresponding unit function in the group SYSTEM UNITS (see Page 13).
OFF-VALUE LOW FLOW CUT OFF (6403)	Use this function to assign a value to the switch-off point for Low flow cut off. Enter the OFF-VALUE as a positive hysteresis from the ON-VALUE. **User input:** 0...100% **Factory setting:** 50%

Function description

BASIC FUNCTION → PROCESS PARAMETER → CONFIGURATION

PRESSURE SHOCK SUPPRESSION (6404)

The closure of a valve can cause brief but severe movements of the fluid in the piping system, movements which the measuring system registers. The pulses totaled in this way result in a totalizer reading error, particularly in the case of filling 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 ON-VALUE LOW FLOW CUT OFF function on Page 48).

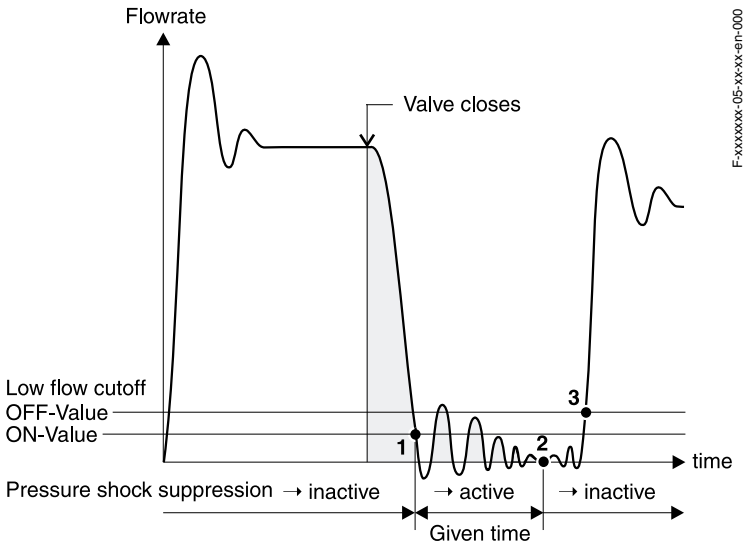
Use this function to define the time span for active pressure shock suppression.

Activation of the Pressure shock suppression
Pressure pulse suppression is activated after the flow falls below the ON_Value of the Low flow cut off (see point **1** in grafic).

While Pressure shock suppression is active, the following conditions apply:
- Flow reading on display → 0
- Totalizer reading → the totalizers are pegged at the last correct value.

Deactivation of the Pressure shock suppression
The Pressure shock suppression is deactivated after the time interval, set in this function, has passed (see point **2** in grafic).

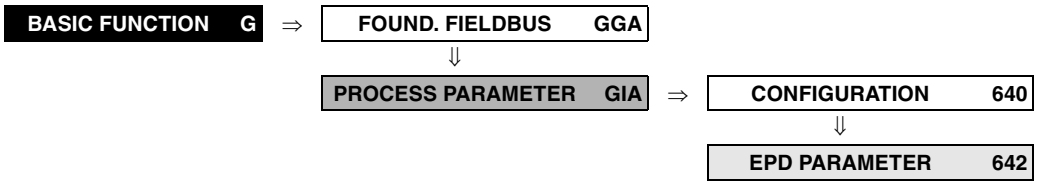
✎ Note!
The actual flow value is displayed and output, when the time interval for the Pressure shock suppression has passed and the flow exceeds the OFF-VALUE of the Low flow cut off (see point **3** in grafic).



User input:
max. 4-digit number, incl. unit: 0.00...100.00 s

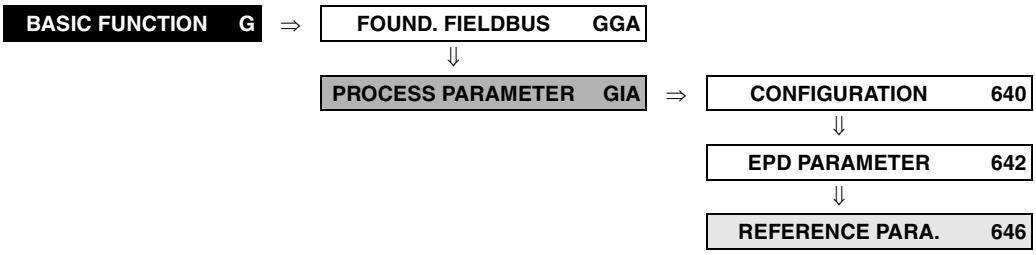
Factory setting:
0.00 s

6.2.2 Function group EPD PARAMETER



Function description BASIC FUNCTION → PROCESS PARAMETER → EPD PARAMETER	
EMPTY PIPE DETECTION (6420)	Use this function to activate the empty pipe detection (EPD). With empty measuring tubes the density of the fluid falls below a specified value (see EPD VALUE LOW function). **Options:** OFF - ON **Factory setting:** OFF Caution! • Select a correspondingly low EPD responce value in the EPD VALUE LOW function, 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. Use this function to set an 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. Use this function to set an upper threshold for the measured density value. **User input:** 5-digit floating-point number **Factory setting:** 6.0000 g/cc
EPD RESPONSE TIME (6425)	Use this function to enter the time span for which the criteria for an empty pipe have to be satisfied without interruption before a notice message or fault message is generated. **User input:** fixed-point number: 1.0...60.0 s **Factory setting:** 1.0 s

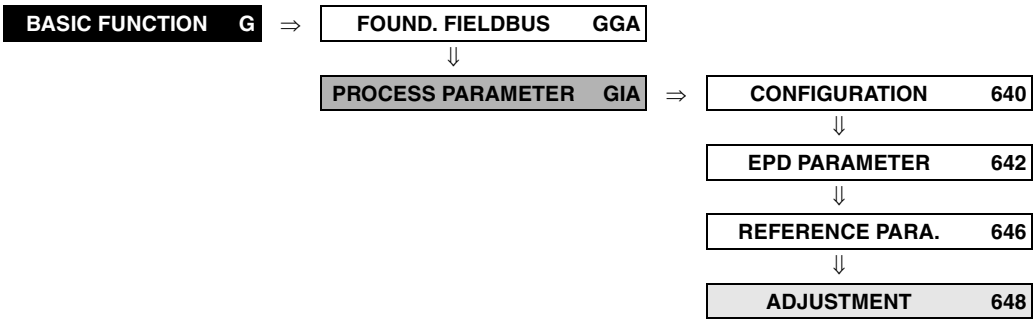
6.2.3 Function group REFERENCE PARAMETER



Function description BASIC FUNCTION → PROCESS PARAMETER → REFERENCE PARAMETER	
CORRECTED VOLUME CALCULATION (6460)	This function is used to set the reference density for calculating the corrected volume flow. **Options:** FIXED REFERENCE DENSITY CALCULATED REFERENCE DENSITY **Factory setting:** CALCULATED REFERENCE DENSITY
FIXED REFERENCE DENSITY (6461)	✎ Note! This function is not available unless the FIXED REFERENCE DENSITY setting was selected in the COR. VOL. CALC. function (6460). In this function, a fixed value for the reference density can be entered, with which the corrected volume flow or corrected volume is calculated. **User input:** 5-digit floating-point number **Factory setting:** 1 kg/Nl
EXPANSION COEFFICIENT (6462)	✎ Note! This function is not available unless the CALCULATED REFERENCE DENSITY setting was selected in the COR. VOL. CALC. 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. **User input:** 5-digit floating-point number **Factory setting:** 0.5000 e-3 [1/K]
EXPANSION COEFFICIENT SQUARELY (6463)	Use this function to enter a squarely expansion coefficient, if the temperature compensation follows a non-linear behaviour. **User input:** 5-digit floating-point number **Factory setting:** 0 e-6 [$1/K^2$]

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

6.2.4 Function group ADJUSTMENT

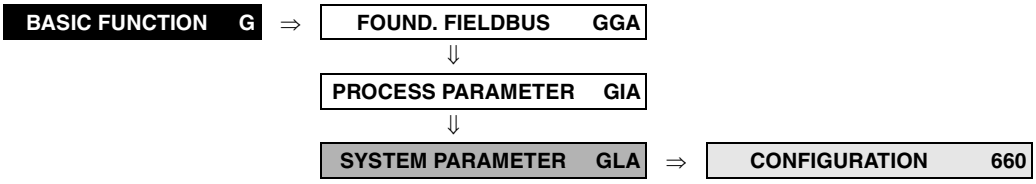


Function description BASIC FUNCTION → PROCESS PARAMETER → ADJUSTMENT	
ZEROPOINT ADJUST (6480)	This function enables a zero point adjustment to be automatically carried out. The new zero point determined by the measuring system is adopted by the ZERO POINT function (see Page 56). **Options:** CANCEL START **Factory setting:** CANCEL Caution! Before carrying out the calibration, please refer to BA059D/06/en "Promass 83 Operating Instructions" where a detailed description of the zero point adjustment is given. Note! • Programming is locked during zero point adjustment and the display shows: "ZERO ADJUST RUNNING". • If the zero point adjustment is not possible, e.g. with a flow velocity > 0.1 m/s, or has been cancelled, then the alarm message "ZERO ADJUST NOT POSSIBLE" is shown on the display. This error is communicated to the subsequent function blocks via the status "UNCERTAIN" for the process variables.
DENSITY SET VALUE (6483)	In this function, enter the density set value of the fluid for which you want to carry out a field density adjustment. **User input:** 5-digit floating-point number, incl. units Note! • The preset density entered here should not vary from the actual fluid density by a more than ±10%. • The appropriate unit is taken from the corresponding UNIT function in the group SYSTEM UNITS (see Page 13).
MEASURE FLUID (6484)	In this function the actual density of the fluid is measured for the density adjustment. **Options:** CANCEL START

Function description BASIC FUNCTION → PROCESS PARAMETER → ADJUSTMENT	
DENSITY ADJUST (6487)	With this function a density adjustment can be carried out on site. The density adjustment values will thus be recalculated and stored. This ensures that the values dependent on density calculations (e.g. volume flow) are as accurate as possible. ✎ Note! Before carrying out a density adjustment, please refer to BA059D/06/en "Promass 83 Operating Instructions" where a detailed description of the density adjustment is given. **1-point density adjustment (with one fluid)** This type of density adjustment is necessary under the following conditions: • The sensor does not accurately measure the density which the operator expects based on laboratory trials. • The characteristics of the fluid are outside the measuring points set at the factory or reference conditions under which the flowmeter has been calibrated. • The plant is used solely for measuring a fluid whose density is to be determined very accurately under constant conditions. **User input:** CANCEL DENSITY ADJUST **Factory setting:** CANCEL
RESTORE ORIGINAL (6488)	With this function the original density coefficient determined at the factory are restored. **Options:** NO YES **Factory setting:** NO

6.3 Group SYSTEM PARAMETER

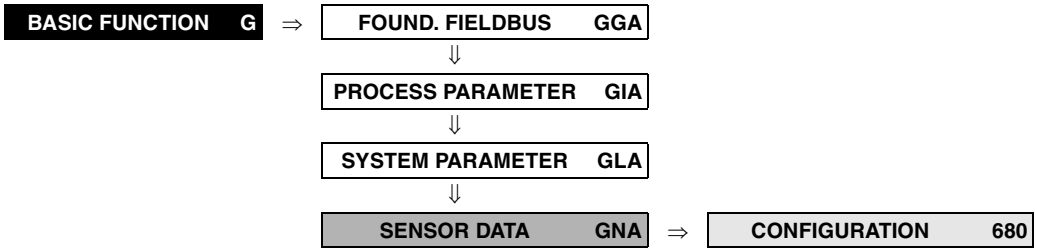
6.3.1 Function group CONFIGURATION



Function description BASIC FUNCTION → SYSTEM PARAMETER → CONFIGURATION	
INSTALLATION DIRECTION SENSOR (6600)	Use this function to reverse the sign of the flow quantity, if necessary. **Options:** NORMAL (flow as indicated by the arrow) INVERSE (flow opposite to direction indicated by the arrow) **Factory setting:** NORMAL ✎ Note! Ascertain the actual direction of fluid flow with reference to the direction indicated by the arrow on the sensor (nameplate).
DENSITY DAMPING (6602)	The density filter allows the sensitivity of the density measuring signal to be lowered with respect to variations in the density of the fluid, e.g. with inhomogeneous liquids. The damping acts on all functions of the measuring device. **User input:** max. 5-digit number, including unit: 0.00...100.00 s **Factory setting:** 0.00 s
FLOW DAMPING (6603)	Using the interference blanking (= time constant for exponential filter) the sensitivity of the flow measurement signal can be reduced with respect to transient flows and interference peaks; e.g. with fluid containing solids or gas bubbles, etc. The damping acts on all functions of the measuring device. **User input:** 0...100 s **Factory setting:** 0 s
POSITIVE ZERO RETURN (6605)	Use this function to interrupt evaluation of measured variables. This is necessary when a piping system is being cleaned, for example. This setting acts on all functions of the measuring device. **Options:** OFF ON (signal output is set to the zero flow value, temperature and density are output normally) **Factory setting:** OFF ✎ Note! An active positive zero return is communicated to the subsequent function blocks via the status "UNCERTAIN" for the process variables.

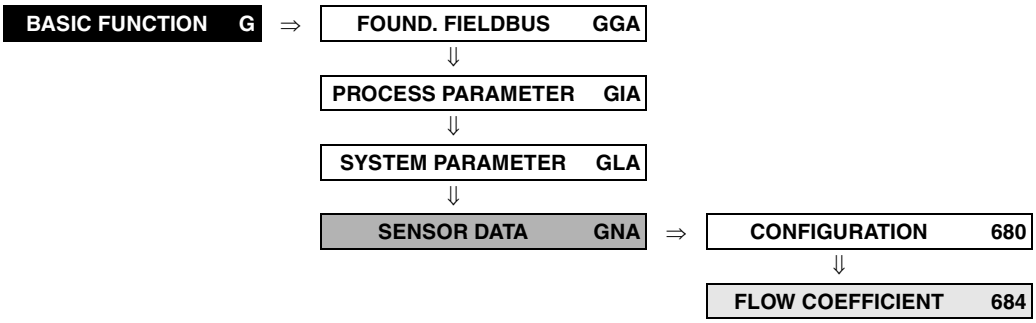
6.4 Group SENSOR DATA

6.4.1 Function group CONFIGURATION



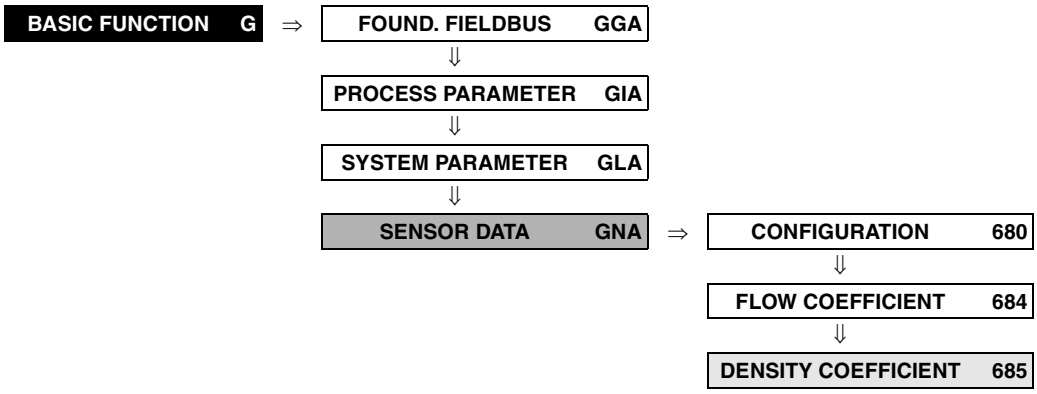
Function description BASIC FUNCTION → SENSOR DATA → CONFIGURATION	
All sensor data, including nominal diameter, calibration factor, and zero point are set at the factory. All the sensor's parameter settings are saved on the S-DAT memory chip. ☝ Caution! Under normal circumstances you should not change these parameter settings, because changes affect numerous functions of the entire measuring facility in general, and the accuracy of the measuring system in particular. Consequently, the functions described below can be accessed only by entering a special **service code**, which is not the same as your private code number. Contact the E+H service organization if you have any questions about these functions.	
K FACTOR **(6800)**	This function shows the current calibration factor for the sensor. **Factory setting:** depends on nominal diameter and calibration ✎ Note! If the service code is used to call this function, this value can be edited.
ZERO POINT **(6803)**	This function shows the current zero-point correction value for the sensor. **User input:** max. 5-digit number: -99999 ...+99999 **Factory setting:** depends on calibration
NOMINAL DIAMETER **(6804)**	This function shows the nominal diameter for the sensor. **Factory setting:** depends on the size of the sensor ✎ Note! If the service code is used to call this function, this value can be edited.

6.4.2 Function group FLOW COEFFICIENT



Function description BASIC FUNCTION → SENSOR DATA → FLOW COEFFICIENT	
All flow coefficient are set at the factory. All the sensor's parameter settings are saved on the S-DAT memory chip. ☝ Caution! Under normal circumstances it is not necessary to change these default settings. Consequently, the functions described below can be accessed only by entering a special **service code**, which is not the same as your private code number. Contact the E+H service organization if you have any questions about these functions.	
TEMPERATURE COEFFICIENT KM (6840)	This function shows the temperatur coefficient KM.
TEMPERATURE COEFFICIENT KM 2 (6841)	This function shows the temperatur coefficient KM 2.
TEMPERATURE COEFFICIENT KT (6842)	This function shows the temperatur coefficient KT.
CALIBRATION COEFFICIENT KD 1 (6843)	This function shows the calibration coefficient KD 1.
CALIBRATION COEFFICIENT KD 2 (6844)	This function shows the calibration coefficient KD 2.

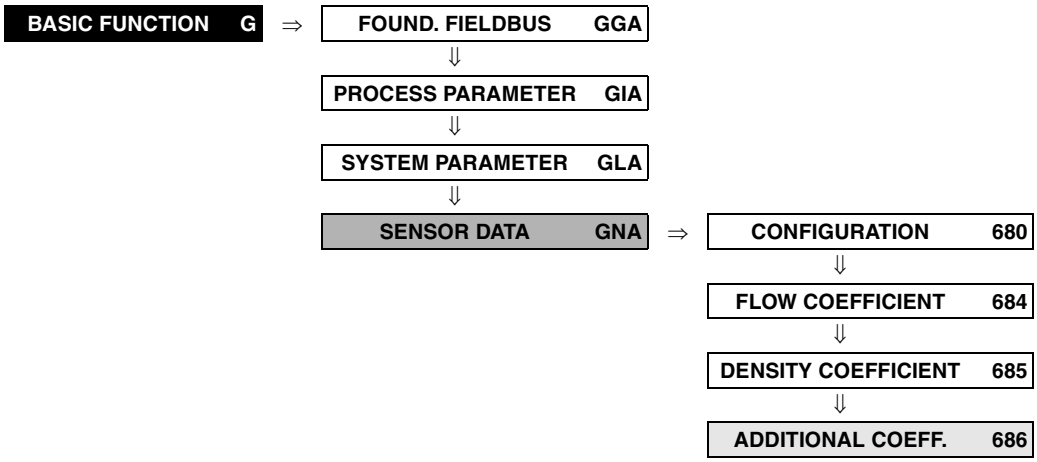
6.4.3 Function group DENSITY COEFFICIENT



Function description BASIC FUNCTION → SENSOR DATA → DENSITY COEFFICIENT	
All density coefficient are set at the factory. All the sensor's parameter settings are saved on the S-DAT memory chip. ☝ Caution! Under normal circumstances it is not necessary to change these default settings. Consequently, the functions described below can be accessed only by entering a special **service code**, which is not the same as your private code number. Contact the E+H service organization if you have any questions about these functions.	
DENSITY COEFFICIENT C 0 (6850)	This function shows the actual density coefficient C 0. ✎ Note! If the service code is used to call this function, this value can be edited. ☝ Caution! A density adjustment can alter the calibration value of this coefficient.
DENSITY COEFFICIENT C 1 (6851)	This function shows the actual density coefficient C 1. ✎ Note! If the service code is used to call this function, this value can be edited. ☝ Caution! A density adjustment can alter the calibration value of this coefficient.
DENSITY COEFFICIENT C 2 (6852)	This function shows the actual density coefficient C 2. ✎ Note! If the service code is used to call this function, this value can be edited. ☝ Caution! A density adjustment can alter the calibration value of this coefficient.

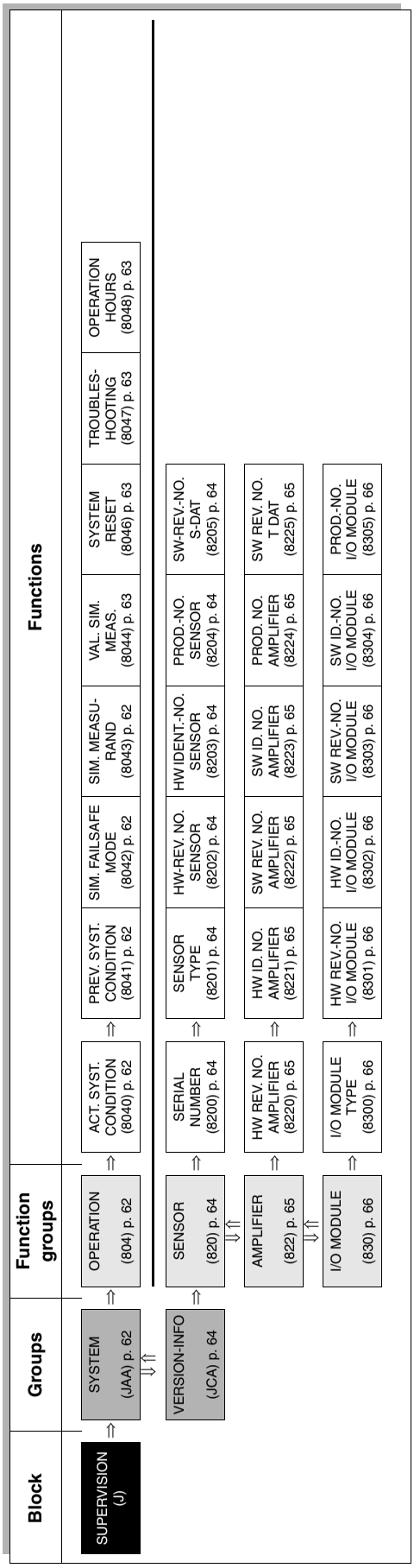
Function description BASIC FUNCTION → SENSOR DATA → DENSITY COEFFICIENT	
DENSITY COEFFICIENT C 3 (6853)	This function shows the actual density coefficient C 3. ✎ Note! If the service code is used to call this function, this value can be edited. ☝ Caution! A density adjustment can alter the calibration value of this coefficient.
DENSITY COEFFICIENT C 4 (6854)	This function shows the actual density coefficient C 4. ✎ Note! If the service code is used to call this function, this value can be edited. ☝ Caution! A density adjustment can alter the calibration value of this coefficient.
DENSITY COEFFICIENT C 5 (6855)	This function shows the actual density coefficient C 5. ✎ Note! If the service code is used to call this function, this value can be edited. ☝ Caution! A density adjustment can alter the calibration value of this coefficient.

6.4.4 Function group ADDITIONAL COEFFICIENT



Function description BASIC FUNCTION → SENSOR DATA → ADDITIONAL COEFFICIENT	
All sensor data are set at the factory. All the sensor's parameter settings are saved on the S-DAT memory chip. Caution! These functions are used for displaying device parameters only and consequently cannot be accessed. Contact the E+H service organization if you have any questions about these functions.	
MINIMAL TEMPERATURE MEASURED (6860)	Display of the lowest fluid temperature measured.
MAXIMAL TEMPERATURE MEASURED (6861)	Display of the highest fluid temperature measured.
MINIMAL TEMPERATURE CARRIER TUBE (6862)	Display of the lowest carrier tube temperature measured.
MAXIMAL TEMPERATURE CARRIER TUBE (6863)	Display of the highest carrier tube temperature measured.

7 Block SUPERVISION



7.1 Group SYSTEM

7.1.1 Function group OPERATION

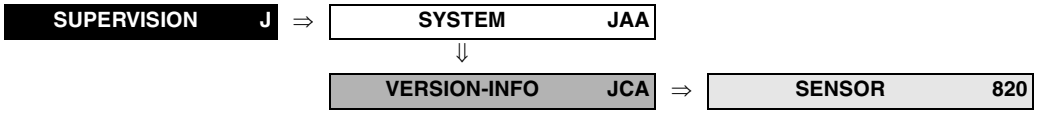
SUPERVISION J ⇒ SYSTEM JAA ⇒ OPERATION 804

Function description SUPERVISION → SYSTEM → OPERATION	
ACTUAL SYSTEM CONDITION (8040)	Use this function to check the present system status. **Display shows:** "SYSTEM OK" or the fault / notice message with the highest priority.
PREVIOUS SYSTEM CONDITION (8041)	Use this function to view the fifteen most recent error and notice messages since measuring last started. **Display shows:** The 15 most recent error or notice messages
SIMULATION FAILSAFE MODE (8042)	Use this function to set all totalizers to their defined error-response modes, in order to check whether they respond correctly. During this time, the words "SIMULATION FAILSAFE MODE" appear on the display. **Options:** ON OFF **Factory setting:** OFF ✎ Note! An active simulation of the failsafe mode is communicated to the subsequent function blocks via the status "UNCERTAIN" for the process variables.
SIMULATION MEASURAND (8043)	In this function, the simulation of a process variable can be activated. The simulation value is set in the function VALUE SIMULATION MEASURAND (8044). During this time, the words "SIMULATION MEASURAND" appear on the display. **Options:** OFF MASS FLOW VOLUME FLOW CORRECTED VOLUME FLOW DENSITY REFERENCE DENSITY TEMPERATURE **Factory setting:** OFF ☝ Caution! • The measuring device cannot be used for measuring while this simulation is in progress. • The setting is not saved if the power supply fails. ✎ Note! • An active simulation of the measurand is communicated to the subsequent function blocks via the status "UNCERTAIN" for the process variables. • The simulation is independent of the position of the jumper for the simulation mode on the I/O board.

Function description SUPERVISION → SYSTEM → OPERATION	
VALUE SIMULATION MEASURAND (8044)	✎ Note! The function is not visible unless the SIMULATION MEASURAND function (8043) is active. Use this function to define a selectable value (e.g. 12 m^3/s). This is used to test the associated functions in the flowmeter itself and downstream function blocks. **User input:** 5-digit floating-point number **Factory setting:** 0 ☝ Caution! The setting is not saved if the power supply fails.
SYSTEM RESET (8046)	Use this function to perform a reset of the measuring system. **Options:** NO RESTART SYSTEM (restart without interrupting power supply) **Factory setting:** NO
TROUBLESHOOTING (8047)	Use this function to rectify errors in the EEPROM (Error message AMP SW-EEPROM, # 012). The EEPROM is divided into a number of blocks. Only blocks which an error has occurred are shown. Select the block in question and press the E-key to clear the error. ✎ Note! When you clear an error in a block, the parameters of the block you select are reset to their factory settings.
OPERATION HOURS (8048)	✎ Note! The service code has to be entered in order to access this function. Use this function to read the operating hours of the measuring device. **Display shows:** 00:00:00 = hr : min : sec 0000:00 = hr : min 000000 = hr

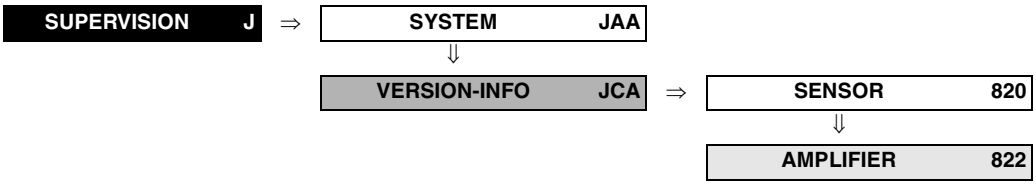
7.2 Group VERSION-INFO

7.2.1 Function group SENSOR



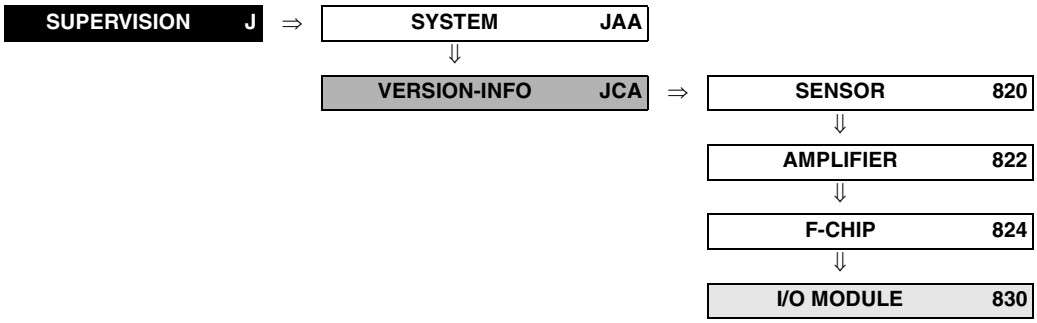
Function description SERVICE & ANALYSIS → APPLICATION → TESTPOINTS	
SERIAL NUMBER (8200)	Use this function to view the serial number of the sensor.
SENSOR TYPE (8201)	Use this function to view the sensor type (e.g. Promass F).
HARDWARE REVISION NUMBER SENSOR (8202)	Use this function to view the hardware revision number of the sensor.
HARDWARE ID NUMBER SENSOR (8203)	✎ Note! The service code has to be entered in order to access this function. Use this function to view the hardware ID number of the sensor.
PRODUCTION NUMBER SENSOR (8204)	✎ Note! The service code has to be entered in order to access this function. Use this function to view the production number of the sensor.
SOFTWARE REVISION NUMBER S-DAT™ (8205)	Use this function to view the software revision number of the software used to create the content of the S-DAT™.

7.2.2 Function group AMPLIFIER



Function description SUPERVISION → VERSION-INFO → AMPLIFIER	
HARDWARE REVISION NUMBER AMPLIFIER (8220)	Use this function to view the hardware revision number of the amplifier.
HARDWARE ID NUMBER AMPLIFIER (8221)	✎ Note! The service code has to be entered in order to access this function. Use this function to view the hardware ID number of the amplifier.
SOFTWARE REVISION NUMBER AMPLIFIER (8222)	Use this function to view the software revision number of the amplifier.
SOFTWARE ID NUMBER AMPLIFIER (8223)	✎ Note! The service code has to be entered in order to access this function. Use this function to view the software ID number of the amplifier.
PRODUCTION NUMBER AMPLIFIER (8224)	✎ Note! The service code has to be entered in order to access this function. Use this function to view the production number of the amplifier.
SOFTWARE REVISION NUMBER T-DAT™ (8225)	Use this function to view the software revision number of the software used to create the content of the T-DAT™.

7.2.3 Function group I/O MODULE



Function description SUPERVISION → VERSION-INFO → I/O MODULE	
I/O MODULE TYPE (8300)	Use this function to view the configuration of the I/O module complete with terminal numbers.
HARDWARE REVISION NUMBER I/O MODULE (8301)	Use this function to view the hardware revision number of the I/O module.
HARDWARE ID NUMBER I/O MODULE (8302)	✎ Note! The service code has to be entered in order to access this function. Use this function to view the hardware ID number of the I/O module.
SOFTWARE REVISION NUMBER I/O MODULE (8303)	Use this function to view the software revision number of the I/O module.
SOFTWARE ID NUMBER I/O MODULE (8304)	✎ Note! The service code has to be entered in order to access this function. Use this function to view the software ID number of the I/O module.
PRODUCTION NUMBER I/O MODULE (8305)	✎ Note! The service code has to be entered in order to access this function. Use this function to view the production number of the I/O module.

8 Index key words for function matrix

9 Index key words for local operation

E

F

G

H

I

Table of contents for FOUNDATION Fieldbus

1 Operation via FOUNDATION Fieldbus

1.1 Block model

In the FOUNDATION Fieldbus all the device parameters are categorised according to their functional properties and task and are generally assigned to three different blocks. A block may be regarded as a container in which parameters and the associated functionalities are contained. A FOUNDATION Fieldbus device has the following block types:

- A Resource Block
  The Resource Block contains all the device-specific characteristics of the device.

- One or more Transducer blocks (transmission blocks)
  The Transducer block contains all the measuring technology and device-specific parameters of the device. The measurement principles (e.g. flow, temperature) are depicted in the Transducer blocks in accordance with the FOUNDATION Fieldbus specification.

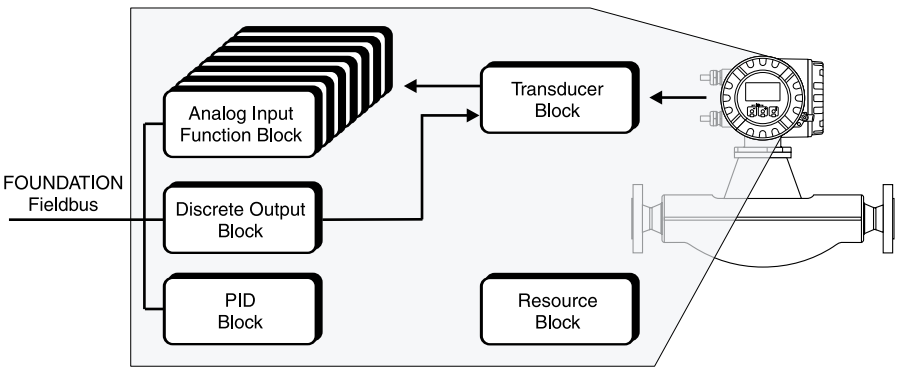
- One or more function blocks
  Function blocks contain the automation functions of the device. We distinguish between different function blocks, e.g. Analog Input Function Block, Analog Output function block, PID function block (PID controller), etc. Each of these function blocks is used to process different application functions.

Different automation tasks can be realized depending on the arrangement and connection of the individual blocks. In addition to these blocks, a field device may have any number of further blocks, e.g. several Analog Input Function Blocks if more than one process variable is available to from the field device.

Blocks used by the Promass 83 FF
The Promass 83 FF has the following blocks:
- A Resource Block

- A Transducer block for the measuring principle flow

- Nine function blocks
  – Seven Analog Input function blocks for the process variables Mass Flow, Volume Flow, Corrected Volume Flow, Density, Reference Density, Temperature and Totalizer 1 to 3.
  – One Discrete Output function block
  – One PID function block



The sensor signal is first prepared specifically for the flow in the measuring block (the Transducer block). The process variables (Volume Flow and Totalizer) are then passed to the Analog Input Function Blocks for technical processing (e.g. scaling, limit value processing).

The process variables go through the complete function block algorithm and are available to other function blocks, e.g. the PID block, as a starting variable for connecting the desired application function.

Using the Discrete Output function block (DO), various actions and functions in the Promass 83 FF can be initiated and controlled via FOUNDATION Fieldbus.

2 Resource Block

A Resource Block contains all the data that uniquely identifies and characterises the field device. It is an electronic version of a nameplate on the field device. Parameters of the Resource Block include device type, device name, manufacturer ID, serial number, etc.

A further task of the Resource Blocks is the management of overall parameters and functions that have an influence on the execution of the remaining blocks in the field device. The Resource Block is thus the central unit that also checks the device status and thereby influences or controls the operability of the other blocks and thus also of the device. Since the Resource Block has no block input and block output data, it cannot be linked with other blocks.

The major functions and parameters of the Resource Block are listed below; you will find an overview of all the available parameters starting on Page 79.

2.1 Selecting the operating mode

The operating mode is set via the parameter group MODE_BLK (see Page 82). The Resource Block supports the following operating modes:

– AUTO
– OOS

Note!
The block status OOS is also shown via the parameter BLOCK_ERR (see Page 80). In operating mode OOS, if write protection is not enabled, you can access all the write parameters without restriction.

2.2 Block status

The current operating status of the Resource Block is shown in the parameter RS_STATE (see Page 83).

The Resource Block can take on the following states:

– STANDBY	The Resource Block is in operating mode OOS. The remaining blocks cannot be executed.
– ONLINE LINKING	The connections configured between the function blocks have not yet been linked.
– ONLINE	Normal operating status; the Resource Block is in operating mode AUTO. The connections configured between the function blocks have been linked.

2.3 Write protection and simulation

Write protection of the device parameters and simulation in the Analog Input and Discrete Output Function Block can be locked or unlocked via a jumper setting on the FOUNDATION Fieldbus I/O board (see Operating Instructions Promass 83 FF, BA 065D/06/en).

The parameter WRITE_LOCK (see Page 83) shows the status of the hardware write protection. The following statuses are possible:

– LOCKED = device data cannot be modified
– NOT LOCKED = device data can be modified

The parameter BLOCK_ERR (see Page 80) indicates whether a simulation is possible in the Analog Input and Discrete Output Function Block.

– Simulation Active = Simulation is possible in the Analog Input and Discrete Output Function Block

2.4 Alarm detection and processing

Process alarms provide information on particular block statuses and block events. The status of the process alarms is communicated to the fieldbus host system via the parameter BLOCK_ALM (see Page 79). The parameter ACK_OPTION (see Page 79) specifies whether an alarm must be acknowledged via the fieldbus host system.

The following process alarms are generated by the Resource Block:

- **Block process alarms**
  The following block process alarms of the Resource Block are shown via the parameter BLOCK_ALM (see Page 79):
  – OUT OF SERVICE
  – SIMULATE ACTVE

- **Write protection process alarm**
  If write protection is disabled on the FOUNDATION Fieldbus I/O board, then prior to communicating the change of status to the fieldbus host system the alarm priority specified in the parameter WRITE_PRI (see Page 85) is checked. The alarm priority specifies the action taken when the write protection alarm WRITE_ALM (see Page 85) is enabled.

Note!
- If the option of a process alarm has **not** been enabled in the parameter ACK_OPTION (see Page 79), this process alarm can only be acknowledged in the parameter BLOCK_ALM (see Page 79).

- The parameter ALARM_SUM (see Page 79) shows the current status of all the process alarms.

2.5 Parameters Resource Block

The following table shows all the available parameters of the Resource Block.

Resource Block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
ACK_OPTION	**AUTO - OOS**	This parameter is used to specify whether a process alarm must be acknowledged at the time of alarm recognition by the fieldbus host system. If this option is enabled the process alarm is acknowledged automatically. **Options:** DISC ALM Write protection no longer exists, and thus the data can be accessed. BLOCK ALM Block alarm **Factory setting:** The option is not enabled for any alarm, the alarms must be acknowledged.
ALARM_SUM	**AUTO - OOS**	Displays the current status of the process alarms in the Resource Block. **Display:** DISC ALM Write protection no longer exists, and thus the data can be accessed. BLOCK ALM Block alarm ✎ Note! In addition the process alarms can also be disabled in this parameter group.
ALERT_KEY	**AUTO - OOS**	Entry of the identification number of the plant unit. This information can be used by the fieldbus host system for sorting alarms and events. **User input:** 1...255 **Factory setting:** 0
BLOCK_ALM	**AUTO - OOS**	Displays the current block status with information on pending configuration, hardware or system errors, including details of the alarm time (date, time) when the error occurred. The block alarm is triggered in the event of the following block errors: • SIMULATE ACTIVE • OUT OF SERVICE ✎ Note! If the option of the alarm has **not** been enabled in the parameter ACK_OPTION, the alarm can only be acknowledged via this parameter.

Resource Block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
BLOCK_ERR	**read only**	Displays the active block error. **Display:** SIMULATION ACTIVE Simulation is possible in the Analog Input function block via the parameter SIMULATE and in the Discrete Output block via parameter SIMULATE_D (for simulation mode configuration see also Operating Instructions Promass 83 FF BA 065D/06/en/). OUT OF SERVICE The block has the status "Out Of Service".
CLR_FSTATE	**AUTO - OOS**	This parameter can be used to manually disable the security behaviour of the Discrete Output function block. **Options:** UNINITIALIZED OFF CLEAR (security behaviour disabled) ✎ Note! The security behaviour of the Discrete Output Block can be manually activated in the parameter SET_FSTATE.
CONFIRM_ TIME	**AUTO - OOS**	Specifies the confirmation time for the event report. If the device does not receive confirmation within this time then the event report is sent to the fieldbus host system again. **Factory setting:** 640000 $^{1}/_{32}$ ms
CYCLE_SEL	**AUTO - OOS**	Displays the block execution method used by the fieldbus host system. ✎ Note! The block execution method is selected by the fieldbus host system.
CYCLE_TYPE	**read only**	Displays the block execution methods supported by the device. **Display:** SCHEDULED (timed block execution method) BLOCK EXECUTION (sequential block execution method)
DD_ RESOURCE	**read only**	Displays the reference source for the device description in the device. **Display:** (NULL) ✎ Note! If there is no device description in the device then the designation (NULL) is displayed.
DD_REV	**read only**	Displays the revision number of the device description.
DEV_REV	**read only**	Displays the revision number of the device.
DEV_TYPE	**read only**	Displays the device type in decimal numerical format. **Display:** 4177 (≙ 0 x 1051 hex) for Promass 83 FF

Resource Block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
FAULT_STATE	**read only**	Current status display of the security behaviour of the Discrete Output function block. **Display:** UNINITIALIZED CLEAR (security behaviour not active) ACTIVE (security behaviour active)
FEATURES	**read only**	Displays the additional options supported by the device. **Display:** REPORTS Event report is sent. FAULTSTATE The security behaviour of the Discrete Output Block is supported (see parameter CLR_STATE and SET_STATE). HARD W LOCK Hardware write protection.
FEATURES_ SEL	**AUTO - OOS**	Selects the additional options of the device. **Options:** UNICODE (is not supported). REPORTS Event report is sent. The fieldbus host system must acknowledge receipt of the event report. FAULTSTATE The security behaviour of the Discrete Output Block is supported (see parameter CLR_STATE and SET_STATE). SOFT W LOCK (is not supported). HARD W LOCK Hardware write protection (this option has no effect). OUT READ BACK (is not supported). DIRECT WRITE (is not supported).
FREE_TIME	**read only**	Displays the free system time (in percent) available for execution of further function blocks. ✎ Note! Since the function blocks of the Promass 83 FF are permanently configured, this parameter always displays the value 0%.
FREE_SPACE	**read only**	Displays the free system memory (in percent) available for execution of further function blocks. ✎ Note! Since the function blocks of the Promass 83 FF are permanently configured, this parameter always displays the value 0%.
GRANT_DENY	**AUTO - OOS**	Releases or restricts the access authorisation of a fieldbus host system on the field device. ✎ Note! This parameter is not evaluated by the Promass 83 FF.

Resource Block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
HARD_TYPES	**read only**	Displays the input signal type for the Analog Input function block. **Display:** SCALAR INPUT (scalable analog input value) DISCRETE OUTPUT
ITK_VER	**read only**	Displays the revision state of the Interoperability Test Kits (ITK). **Display:** 4.0
LIM_NOTIFY	**AUTO - OOS**	This parameter is used to specify the number of event reports that can exist unconfirmed at the same time. **User input:** 0...24 **Factory setting:** 24
MANUFAC_ID	**read only**	Displays the manufacturer's ID number. **Display:** 0 x 452B48 = Endress + Hauser
MAX_NOTIFY	**read only**	Displays the maximum number of event reports supported by the device that can exist unconfirmed at the same time. **Display:** 24
MEMORY_SIZE	**read only**	Displays the available configuration memory in kilobytes. ✎ Note! This parameter is not supported.
MIN_CYCLE_T	**read only**	Displays the execution time of all the function blocks present in the device (Promass 83 FF = 1 PID, 1 DO plus 7 AI function blocks). **Display:** 6400 $^{1}/_{32}$ ms (≅ 200ms)
MODE_BLK	**AUTO - OOS**	Displays the current (Actual) and desired (Target) operating mode of the Resource Block, the permitted modes (Permitted) supported by the Resource Block and the normal operating mode (Normal). **Display:** AUTO - OOS The Resource Block supports the following operating modes: • AUTO (automatic operation) In this mode the execution of the remaining blocks (Transducer block, AI and PID function block) is permitted. • OOS (Out Of Service) The block has the status "Out Of Service". In this mode execution of the remaining blocks (Transducer block, AI and PID function block) is blocked. These blocks are forced into OOS and cannot be set to AUTO mode. ✎ Note! The current operating status of the Resource Block is also shown via the parameter RS_STATE (see Page 83).

Resource Block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
NV_CYCLE_T	**read only**	Displays the time interval for which the dynamic device parameters are stored in the non-volatile memory. The time interval displayed relates to storage of the following dynamic device parameters: • OUT • PV • FIELD_VAL ✎ Note! Since the Promass 83 FF does not store the dynamic device parameter in the non-volatile memory, this parameter always displays the value 0 $^{1}/_{32}$ ms.
RESTART	**AUTO - OOS**	This parameter is used to reset the device in various ways. **Options:** UNINITIALIZED RUN Normal operating status. RESOURCE (is not supported) DEFAULTS The device data and the connections of the function blocks are reset to the factory settings. PROCESSOR Warm start of device, processor restart.
RS_STATE	**read only**	Displays the current operating status of the Resource Block. **Display:** STANDBY The Resource Block is in operating mode OOS. The remaining blocks cannot be executed. ONLINE LINKING The configured connections between the function blocks have not yet been made. ONLINE Normal operating status, the Resource Block is in operating mode AUTO. The configured connections between the function blocks have been made.
SET_FSTATE	**AUTO - OOS**	This parameter can be used to manually enable the security behaviour of the Discrete Output function block. **Options:** UNINITIALIZED OFF SET (the security behaviour will be enabled) ✎ Note! The security behaviour of the Discrete Output Block can be manually deactivated in the parameter CLR_FSTATE.

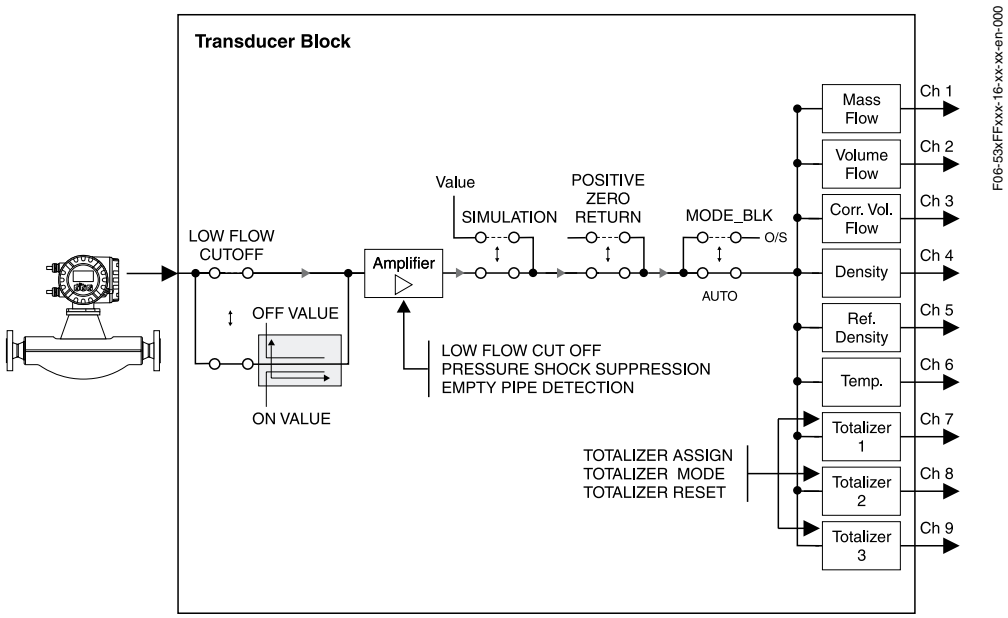
Resource Block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
SHED_RCAS	**AUTO - OOS**	Specifies the monitoring time for checking the connection between the fieldbus host system and the PID function block in operating mode RCAS. On expiry of the monitoring time the PID function block switches from operating mode RCAS to the operating mode selected in the parameter SHED_OPT (see Page 181). **Factory setting:** 640000 $^{1}/_{32}$ ms
SHED_ROUT	**AUTO - OOS**	Specifies the monitoring time for checking the connection between the fieldbus host system and the PID function block in operating mode ROUT. On expiry of the monitoring time the PID function block switches from operating mode ROUT to the operating mode selected in the parameter SHED_OPT (see Page 181). **Factory setting:** 640000 $^{1}/_{32}$ ms
STRATEGY	**AUTO - OOS**	Parameter for grouping and thus faster evaluation of blocks. Grouping is carried out by entering the same numerical value in the parameter STRATEGY for each individual block. **Factory setting:** 0 ✎ Note! This data is neither checked nor processed by the Resource block.
ST_REV	**read only**	Displays the revision status of the static data. ✎ Note! The revision status is incremented on each modification of static data.
TAG_DESC	**AUTO - OOS**	Entry of a user-specific text of max. 32 characters for unique identification and assignment of the block. **Factory setting:** "_ _ _ _ _ _ _ _" without text
TEST_RW	**AUTO - OOS**	✎ Note! This parameter is required only for interoperability tests and has no meaning in normal operation.
UPDATE_EVT	**read only**	Displays whether static block data has been modified, including date and time.

Resource Block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
WRITE_ALM	**AUTO - OOS**	Displays the status of the write protection alarm. ✎ Note! • The alarm is triggered if the write protection is disabled. • If the option of the alarm has **not** been enabled in the parameter ACK_OPTION, the alarm can only be acknowledged via this parameter.
WRITE_LOCK	**read only**	Displays the status of the hardware write protection. **Display:** UNINITIALIZED LOCKED Device data cannot be modified via fieldbus NOT LOCKED Device data can be modified via fieldbus ✎ Note! For hardware write protection configuration see also Operating Instruction Promass 83 FF, BA 065D/06/en/.
WRITE_PRI	**AUTO - OOS**	Specifies the behaviour of a write protection alarm (parameter "WRITE_ALM"). **User input:** 0 The write protection alarm is not evaluated. 1 No report to the fieldbus host system in the event of a write protection alarm. 2 Reserved for block alarms. 3-7 The write protection alarm is output with the appropriate priority (3 = low priority, 7 = high priority) to the fieldbus host system as a user notice. 8-15 The write protection alarm is output with the appropriate priority (8 = low priority, 15 = high priority) to the fieldbus host system as a critical alarm. **Factory setting:** 0

3 Transducer Block

The Transducer block of the Promass 83 FF contains all the measurement- and device-specific parameters of the flowmeter. All the settings directly connected with the flow measurement/application are made here. It forms the interface between the sensor-specific measured value preprocessing and the Analog Input Function Blocks required for automation.
A Transducer block allows you to influence the input and output values of a function block. The parameters of a Transducer block include information on the sensor type, sensor configuration, physical units, calibration, damping, diagnosis, etc. as well as the device-specific parameters.

The diagram shows the internal structure of the Transducer block:



3.1 Signal processing

The Transducer block receives several signals from the sensor as input values (mass, density, temperature). Other process variables (volume, standard volume) are derived from these signals. The input signals further processed via an amplifier.
The parameter "Simulation - Value Measurand" (see Page 100) allows you to specify a simulation value for the Transducer block in order to test assigned parameters in the device and subsequent function blocks.
A low flow cut off allows you to hide measurement inaccuracies in the low-flow sector. The parameter "Low Flow Cut Off - On-Value" (see Page 93) allows you to define a limit value. If the measured flow value is below this limit value then the output value of 0 is output.
In addition, the parameter "System - Positive Zero Return" (see Page 103) allows you to switch the measured value to "Zero Flow". This is necessary when a piping system is being cleaned, for example.
The process variables of the Transducer blocks are output via the parameters Mass Flow, Volume Flow, Corrected Volume Flow, Density, Reference Density, Temperature and Totalizer 1 to 3. A process variable, e.g. mass flow, volume flow, etc., can be assigned to the individual totalizers. Each totalizer can be manually reset using the parameter Totalizer (1 - 3) - Reset.
The major functions and parameters of the Transducer block are listed below, you will find an overview of all the available parameters starting on Page 89.

3.2 Block output values

The Transducer block has nine permanent process variables:
- Mass Flow
- Volume Flow
- Corrected volume Flow
- Density
- Reference density
- Temperature
- Totalizer 1
- Totalizer 2
- Totalizer 3

Assignment of which process variable is copied in the subsequent Analog Input Function Block is carried out using the CHANNEL parameter of the Analog Input Function Block (see Page 141):

- The mass flow process variable (parameter Mass Flow, Page 94) of the Transducer block is assigned to the subsequent Analog Input Function Block by selecting CHANNEL = 1 → Mass Flow in the CHANNEL parameter there.

- The volume flow process variable (parameter Volume Flow, Page 130) of the Transducer block is assigned to the subsequent Analog Input Function Block by selecting CHANNEL = 2 → Volume Flow in the CHANNEL parameter there.

- The corrected volume flow process variable (parameter Corrected Volume Flow, Page 90) of the Transducer block is assigned to the subsequent Analog Input Function Block by selecting CHANNEL = 3 → Corrected Volume Flow in the CHANNEL parameter there.

- The density process variable (parameter Density, Page 90) of the Transducer block is assigned to the subsequent Analog Input Function Block by selecting CHANNEL = 4 → Density in the CHANNEL parameter there.

- The reference density process variable (parameter Reference Density, Page 95) of the Transducer block is assigned to the subsequent Analog Input Function block by selecting CHANNEL = 5 → Reference Density in the CHANNEL parameter there.

- The temperature process variable (parameter Temperature, Page 108) of the Transducer block is assigned to the subsequent Analog Input Function Block by selecting CHANNEL = 6 → Temperature in the CHANNEL parameter there.

- The totalizer 1 process variable (parameter Totalizer 1, Page 108) of the Transducer block is assigned to the subsequent Analog Input Function Block by selecting CHANNEL = 7 → Totalizer 1 in the CHANNEL parameter there.

- The totalizer 2 process variable (parameter Totalizer 2, Page 110) of the Transducer block is assigned to the subsequent Analog Input Function Block by selecting CHANNEL = 8 → Totalizer 2 in the CHANNEL parameter there.

- The totalizer 3 process variable (parameter Totalizer 3, Page 112) of the Transducer block is assigned to the subsequent Analog Input Function Block by selecting CHANNEL = 9 → Totalizer 3 in the CHANNEL parameter there.

3.3 Selecting the operating mode

The operating mode is set via the parameter group MODE_BLK (see Page 94). The Resource Block supports the following operating modes:
- AUTO
- MAN
- OOS

Note!
The block status OOS is also shown via the parameter BLOCK_ERR (see Page 90). In operating mode OOS, if write protection is not enabled and the access code is entered, you can access all the write parameters without restriction.

3.4 Alarm detection and processing

The Transducer block does not generate any process alarms. The status of the process variables of the Transducer block is evaluated in the subsequent Analog Input Function Blocks. If the Analog Input Function Block receives no input value that can be evaluated from the Transducer block then a process alarm is generated. This process alarm is displayed in the parameter BLOCK_ERR of the Analog Input Function Block (see Page 141) (BLOCK_ERR = Input Failure / process variable has BAD status).
The parameter BLOCK_ERR of the Transducer block (see Page 90) displays the device error that produced the input value that could not be evaluated and thus triggered the process alarm in the Analog Input Function Block. Similarly, the active device error of the Transducer block is displayed in the parameter Transducer Error (see Page 115).
More information on remedying errors can be found in the Operating Instructions Promass 83 FF BA 065D/06/en.

3.5 Diagnosis

The status of the device is displayed via the following parameters specified in the FOUNDATION Fieldbus specification:
- BLOCK_ERR (see Page 90)
- Transducer Error (see Page 115)

Detailed information on the current device status is shown in the device-specific parameter "Diagnosis - Actual System Condition" (see Page 91).

3.6 Accessing the device-specific parameters

To access the device-specific parameters the following requirements must be met:
1. Hardware write protection must be disabled.
2. The correct code must be entered in the parameter "Un/Locking - Access code" (see Page 115).

3.7 Transducer block parameters

The following table shows all the available parameters of the Transducer block.
A gray ▢ background marks the manufacturer-specific parameters. These parameters are not accessible until the Un-/Locking Access Code has been entered.

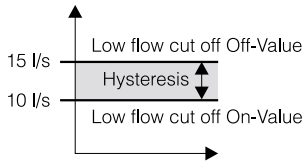
Transducer block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
ALERT_KEY	**AUTO - MAN - OOS**	For entry of the identification number of the plant unit. This information can be used by the fieldbus host system for sorting alarms and events. **User input:** 1...255 **Factory setting:** 0
Amplifier - HW-Revision	**read only**	Use this parameter to view the hardware revision number of the amplifier.
Amplifier - HW-Identification	**read only**	Use this parameter to view the hardware ID number of the amplifier.
Amplifier - SW-Revision	**read only**	Use this parameter to view the software revision number of the amplifier.
Amplifier - SW-Identification	**read only**	Use this parameter to view the software ID number of the amplifier.
Amplifier - Production-No.	**read only**	Use this parameter to view the production number of the amplifier.
Amplifier - SW-Rev. T-DAT	**read only**	Use this parameter to view the software revision number of the software used to create the content of the T-DAT.
BLOCK_ALM	**AUTO - MAN - OOS**	Displays the current block status with information on pending configuration, hardware or system errors, including details of the alarm time (date, time) when the error occurred. ✎ Note! • In addition the active block alarm can be acknowledged in this parameter group. • The Promass 83 FF does not use this parameter to display a process alarm since these are generated in the parameter "BLOCK_ALM" of the Analog Input Function Block (see Seite 140).

Transducer block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
BLOCK_ERR	**read only**	Displays the active block error. **Display:** SIMULATE ACTIVE Simulation via the parameter "Simulation - Measurand" (see Page 100) in the Transducer block is enabled. OUT OF SERVICE The block has the status "Out Of Service". DEVICE NEEDS MAINTENANCE NOW The device needs to be checked since an active device error is pending. A detailed display of the cause of the device error can be called up via the parameter "Diagnosis - Actual System Condition" (see Page 91) in the Transducer block.
Corrected Volume	**read only**	Displays the current measured value and the status of the third process variable (Corrected Volume Flow) made available to the Analog Input Function Block as an input value.
Corrected Volume Unit	**read only**	Displays the unit of the corrected volume flow. ✎ Note! The unit is set in the associated Analog Input Function Block via the parameter group "XD_SCALE" (see Seite 150).
Density	**read only**	Displays the current measured value and the status of the fourth process variable (Density) made available to the Analog Input Function Block as an input value.
Density Unit	**read only**	Displays the unit of the density. ✎ Note! The unit is set in the associated Analog Input Function Block via the parameter group "XD_SCALE" (see Seite 150).
Density Adjustment - Set Value	**AUTO - MAN - OOS**	In this parameter, enter the density set value of the fluid for which you want to carry out a field density adjustment. **User input:** 5-digit floating-point number ✎ Note! The preset density entered here should not vary from the actual fluid density by a more than ±10%.
Density Adjustment - Unit	**read only**	Displays the unit of the density adjustment. ✎ Note! The appropriate unit is taken from the corresponding parameter "System Unit - Density" (see Seite 106).
Density Adjustment - Measure Fluid	**AUTO - MAN - OOS**	In this parameter the actual density of the fluid is measured for the density adjustment. **Options:** CANCEL START

Transducer block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
Density Adjustment	**AUTO - MAN - OOS**	With this parameter a density adjustment can be carried out. The density adjustment values will thus be recalculated and stored. This ensures that the values dependent on density calculations (e.g. mass flow) are as accurate as possible. ✎ Note! Before carrying out a density adjustment, please refer to BA059D/06/en "Promass 83 FF Operating Instructions" where a detailed description of the density adjustment is given. **1-point density adjustment (with one fluid)** This type of density adjustment is necessary under the following conditions: • The sensor does not accurately measure the density which the operator expects based on laboratory trials. • The characteristics of the fluid are outside the measuring points set at the factory or reference conditions under which the flowmeter has been calibrated. • The plant is used solely for measuring a fluid whose density is to be determined very accurately under constant conditions. **User input:** CANCEL START **Factory setting:** CANCEL
Density Adjustment - Restore Original	**AUTO - MAN - OOS**	With this parameter the original density coefficient determined at the factory are restored. **Options:** NO YES **Factory setting:** NO
Diagnosis - Actual System Condition	**read only**	Displays the current system status. ✎ Note! A precise error description as well as notes on remedying errors can be found in the Operating Instructions Promass 83 FF BA065D/06/en.
Diagnosis - Prev. System Condition	**read only**	Displays the last error message that occurred. ✎ Note! The display can be reset manually using the parameter "Diagnosis - Prev. System Condition Reset".
Diagnosis - Reset Prev. System Condition	**AUTO - MAN - OOS**	Resets the stored error message in the parameter "Diagnosis - Prev. System Condition". **Options:** NO YES

Transducer block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
Diagnosis - Alarm Delay	**AUTO - MAN - OOS**	Use this parameter to define a time span for which the criteria for an error have to be satisfied without interruption, before an error or notice message is generated. ✎ Note! Depending on the setting and the type of error, this suppression acts on the display. **User input:** 0...100 s (in steps of one second) **Factory setting:** 0 s ☝ Caution! If this parameter is activated error and notice messages are delayed by the time corresponding to the setting before being forwarded to the higher-order controller (process controller, etc.). It is therefore imperative to check in advance in order to make sure whether a delay of this nature could affect the safety requirements of the process. If error and notice messages cannot be suppressed, a value of 0 seconds must be entered here.
EPD - Empty Pipe Detection	**AUTO - MAN - OOS**	Use this parameter to activate the empty pipe detection (EPD). With empty measuring tubes the density of the fluid falls below a specified value (see parameter "EPD - Low Value"). **Options:** OFF ON **Factory setting:** OFF ☝ Caution! • Select a correspondingly low EPD responce value in the EPD VALUE LOW parameter, so that the difference to the effective density of the fluid is sufficiently large enough. This ensures that totally empty measuring tubes and not partially filled ones are detected. • For gas measurement we strongly recommend to switch off empty pipe detection.
EPD - Low Value	**AUTO - MAN - OOS**	Use this parameter to set an 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
EPD - High Value	**AUTO - MAN - OOS**	Use this parameter to set an upper threshold for the measured density value. **User input:** 5-digit floating-point number **Factory setting:** 6.0000

Transducer block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
EPD - Unit	**read only**	Displays the unit of the empty pipe detection (EPD). ✎ Note! The appropriate unit is taken from the parameter "System Unit - Density" (see Seite 106).
EPD - Responcetime	**AUTO - MAN - OOS**	Use this parameter to enter the time span for which the criteria for an empty pipe have to be satisfied without interruption before a notice message or fault message is generated. **User input:** fixed-point number: 1.0...60.0 s **Factory setting:** 1.0 s
I/O Module - Type	**read only**	Use this parameter to view the FOUNDATION Fieldbus module type.
I/O Module - HW-Revision	**read only**	Use this parameter to view the hardware revision number of the I/O module.
I/O Module - HW-Identification	**read only**	Use this parameter to view the hardware ID number of the I/O module.
I/O Module - SW-Revision	**read only**	Use this parameter to view the software revision number of the I/O module.
I/O Module - SW-Identification	**read only**	Use this parameter to view the software ID number of the I/O module.
I/O Module - Production-No.	**read only**	Use this parameter to view the production number of the I/O module.
Low Flow Cut Off - Assign	**AUTO - MAN - OOS**	Use this parameter to assign the switching point for Low flow cut off rate suppression. **Options:** OFF MASS FLOW VOLUME FLOW COR. VOLUME FLOW **Factory setting:** MASS FLOW
Low Flow Cut Off - On-Value	**AUTO - MAN - OOS**	Use this parameter to assign a value to the switch-on point for Low flow cut off. Low flow cut off is active if the setting is a value not equal to 0. The sign of the flow value is highlighted on the display to indicate that Low flow cut off is active. **User input:** depends on nominal diameter **Factory setting:** 0.0000 ✎ Note! With low flow cut off active, the status condition of the process variable changes to UNCERTAIN.

Transducer block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
Low Flow Cut Off - Off-Value	**AUTO - MAN - OOS**	Use this parameter to assign a value to the switch-off point for Low flow cut off. Enter the OFF-VALUE as a positive hysteresis from the ON-VALUE. **User input:** 0...100% **Factory setting:** 50% Example: Low Flow Cut Off - Assign = VOLUME FLOW Low Flow Cut Off - Off-Value = 50% Low Flow Cut Off - On-Value = 10 Low Flow Cut Off - Unit = l/s This results in a Low Flow Cut Off - Off Value of 15 l/s 10 l/s + (10 l/s x 0,5) = 15 l/s  F06-53xFFxxx-05-xx-xx-en-000
Low Flow Cut Off - Unit	**AUTO - MAN - OOS**	Displays the unit of the Low flow cut off. ✎ Note! The appropriate unit is taken from the corresponding parameter "System Unit - Mass Flow", "System Unit - Volume Flow" or "System Unit - Cor. Volume Flow"
Mass Flow	**read only**	Displays the current measured value and the status of the first process variable (Mass Flow) made available to the Analog Input Function Block as an input value.
Mass Flow Unit	**read only**	Displays the unit of the mass flow. ✎ Note! The unit is set in the associated Analog Input Function Block via the parameter group "XD_SCALE" (see Seite 150).
MODE_BLK	**AUTO - OOS**	Displays the current (Actual) and desired (Target) operating mode of the Transducer block, the permitted modes (Permitted) supported by the Resource Block and the normal operating mode (Normal). **Display:** AUTO - MAN - OOS ✎ Note! The Transducer block supports the following operating modes: • AUTO (automatic operation) The block is executed. • MAN (manual intervention by the operator) • OOS (Out Of Service) The block has the status "Out Of Service". The process variables are updated, but the status of the process variables changes to BAD.

Transducer block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
Reference Density	**read only**	Displays the current measured value and the status of the fifth process variable (Reference Density) made available to the Analog Input Function Block as an input value.
Reference Density - Unit	**read only**	Displays the unit of the reference density. ✎ Note! The unit is set in the associated Analog Input Function Block via the parameter group "XD_SCALE" (see Seite 150).
Reference Param. - Cor. Volume Calc.	**AUTO - MAN - OOS**	This parameter is used to set the reference density for calculating the corrected volume flow. **Options:** CALC. REF. DENSITY FIX REF. DENSITY **Factory setting:** CALC. REF. DENSITY
Reference Param. - Fixed Ref. Density	**AUTO - MAN - OOS**	✎ Note! This input is not active unless the FIX REF. DENSITY setting was selected in the parameter "Reference Param. - Cor. Volume Calc.". In this parameter, 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
Reference Param. - Fixed Ref. Density Unit	**read only**	Display of the unit used for the standard density in the calculation of corrected volume flow. ✎ Note! The appropriate unit is taken from the corresponding parameter "System Unit - Reference Density" (see Seite 107).
Reference Param. - Expansion Coefficient	**AUTO - MAN - OOS**	✎ Note! This input is not active unless the CALC. REF. DENSITY setting was selected in the parameter "Reference Param. - Cor. Volume Calc.". For temperature compensated calculations of the reference density an expansion coefficient specific to the fluid is required and can be entered in this parameter. **User input:** 5-digit floating-point number **Factory setting:** 0.5000 e-3 [1/K]

Transducer block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
Reference Param. - Expasion Coefficient Squarely	**AUTO - MAN - OOS**	Use this parameter to enter a squarely expansion coefficient, if the temperature compensation follows a non-linear behaviour. **User input:** 5-digit floating-point number **Factory setting:** 0 e-6 [1/K^2]
Reference Param. - Reference Temperature	**AUTO - MAN - OOS**	✎ Note! This input is not active unless the CALC. REF. DENSITY setting was selected in the parameter "Reference Param. - Cor. Volume Calc.". Input of the reference temperature for calculation corrected volume flow, corrected volume and reference density. **User input:** 5-digit floating-point number **Factory setting:** 20.000 The reference density is calculated as follows: $\rho_N = \rho \cdot (1 + \alpha \Delta t + \beta \Delta t^2)$; where $\Delta t = t - t_N$ ρ_N = Reference density ρ = Actual measured density of fluid (measured value Promass) t = Actual measured temperature of fluid (measured value Promass) t_N = Ref. temperature for calculating reference density (e.g. 20 °C) α = Vol. expansion coefficient of the fluid. Unit = [1/K]; K = Kelvin β = Square vol. expansion coefficient of the fluid. Unit = [1/K^2]
Reference Param. - Ref. Temperature Unit	**read only**	Display of the unit used for the temperature in the calculation of corrected volume flow. ✎ Note! The appropriate unit is taken from the corresponding parameter "System Unit - Temperature" (see Seite 107).
Sensor - Serial Number	**read only**	Use this parameter to view the serial number of the sensor.
Sensor - Type	**read only**	Use this parameter to view the sensor type (e.g. Promass F).
Sensor - HW-Revision	**read only**	Use this parameter to view the hardware revision number of the sensor.
Sensor - HW-Identification	**read only**	Use this parameter to view the hardware ID number of the sensor.
Sensor - Production-No.	**read only**	Use this parameter to view the production number of the sensor.
Sensor - SW-Rev. S-DAT	**read only**	Use this parameter to view the software revision number of the software used to create the content of the S-DAT™.

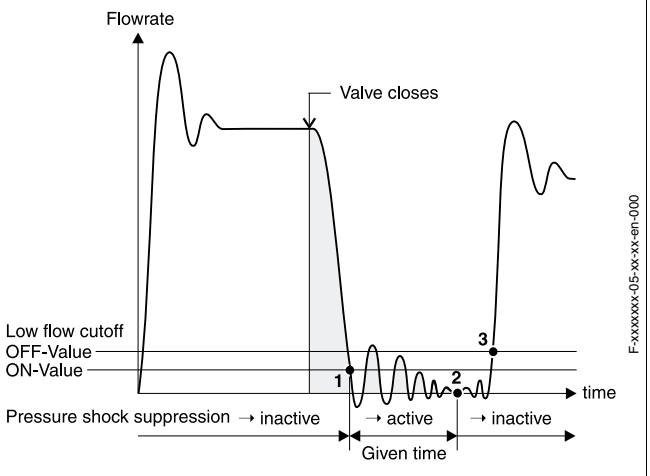
Transducer block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
Sensor Data - K-Factor	**AUTO - MAN - OOS**	This parameter shows the current calibration factor for the sensor. **Factory setting:** depends on nominal diameter and calibration ✎ Note! If the service code is used to call this parameter, this value can be edited.
Sensor Data - Zeropoint	**AUTO - MAN - OOS**	This parameter shows the current zero-point correction value for the sensor. **User input:** max. 5-digit number: -99999 ...+99999 **Factory setting:** depends on calibration
Sensor Data - Nominal Diameter	**AUTO - MAN - OOS**	This parameter shows the nominal diameter for the sensor. **Factory setting:** depends on the size of the sensor ✎ Note! If the service code is used to call this parameter, this value can be edited.
Sensor Data - Min. Temp. Meas.	**read only**	Display of the lowest fluid temperature measured.
Sensor Data - Max. Temp. Meas.	**read only**	Display of the highest fluid temperature measured.
Sensor Data - Min. Temp. Carr.	**read only**	Display of the lowest carrier tube temperature measured.
Sensor Data - Max. Temp. Carr.	**read only**	Display of the highest carrier tube temperature measured.
Sensor Data - Temperature Unit	**read only**	Displays the unit of the Temperature. ✎ Note! The appropriate unit is taken from the corresponding parameter "System Unit - Temperature" (see Seite 107).
Sensor Data - Temp. Coeff. KM	**read only**	This parameter shows the temperatur coefficient KM.
Sensor Data - Temp. Coeff. KM 2	**read only**	This parameter shows the temperatur coefficient KM 2.
Sensor Data - Temp. Coeff. KT	**read only**	This parameter shows the temperatur coefficient KT.
Sensor Data - Cal. Coeff. KD 1	**read only**	This parameter shows the calibration coefficient KD 1.
Sensor Data - Cal. Coeff. KD 2	**read only**	This parameter shows the calibration coefficient KD 2.

Transducer block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
Sensor Data - Density Coeff. C 0	**AUTO - MAN - OOS**	This parameter shows the actual density coefficient C 0. ✎ Note! If the service code is used to call this parameter, this value can be edited. ☝ Caution! A density adjustment can alter the calibration value of this coefficient.
Sensor Data - Density Coeff. C 1	**AUTO - MAN - OOS**	This parameter shows the actual density coefficient C 1. ✎ Note! If the service code is used to call this parameter, this value can be edited. ☝ Caution! A density adjustment can alter the calibration value of this coefficient.
Sensor Data - Density Coeff. C 2	**AUTO - MAN - OOS**	This parameter shows the actual density coefficient C 2. ✎ Note! If the service code is used to call this parameter, this value can be edited. ☝ Caution! A density adjustment can alter the calibration value of this coefficient.
Sensor Data - Density Coeff. C 3	**AUTO - MAN - OOS**	This parameter shows the actual density coefficient C 3. ✎ Note! If the service code is used to call this parameter, this value can be edited. ☝ Caution! A density adjustment can alter the calibration value of this coefficient.
Sensor Data - Density Coeff. C 4	**AUTO - MAN - OOS**	This parameter shows the actual density coefficient C 4. ✎ Note! If the service code is used to call this parameter, this value can be edited. ☝ Caution! A density adjustment can alter the calibration value of this coefficient.
Sensor Data - Density Coeff. C 5	**AUTO - MAN - OOS**	This parameter shows the actual density coefficient C 5. ✎ Note! If the service code is used to call this parameter, this value can be edited. ☝ Caution! A density adjustment can alter the calibration value of this coefficient.

Transducer block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
Service/Analys. - Osc. Frequency	**AUTO - MAN - OOS**	This parameter is only used for service purpose. ✎ Note! If the service code is used to call this function, this value is editable.
Service/Analys. - Exciter Current	**AUTO - MAN - OOS**	This parameter is only used for service purpose. ✎ Note! If the service code is used to call this function, this value is editable.
Service/Analys. - Monitoring Mode	**AUTO - MAN - OOS**	This parameter is only used for service purpose. ✎ Note! If the service code is used to call this function, this value is editable.
Service/Analys. - Monitoring Osc. Amplitude	**AUTO - MAN - OOS**	This parameter is only used for service purpose. ✎ Note! If the service code is used to call this function, this value is editable.
Service/Analys. - Monitoring Gain Amplifier	**AUTO - MAN - OOS**	This parameter is only used for service purpose. ✎ Note! If the service code is used to call this function, this value is editable.
Service/Analys. - Gas Mode	**AUTO - MAN - OOS**	This parameter is only used for service purpose. ✎ Note! If the service code is used to call this function, this value is editable.
Service/Analys. - Gas Type	**AUTO - MAN - OOS**	This parameter is only used for service purpose. ✎ Note! If the service code is used to call this function, this value is editable.
Service/Analys. - Sonic Velocity	**AUTO - MAN - OOS**	This parameter is only used for service purpose. ✎ Note! If the service code is used to call this function, this value is editable.
Service/Analys. - T. Coeff. Sonic Velocity	**AUTO - MAN - OOS**	This parameter is only used for service purpose. ✎ Note! If the service code is used to call this function, this value is editable.

Transducer block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
Simulation - Measurand	**AUTO - MAN - OOS**	Use this parameter to set all inputs, outputs and totalizers to their defined flow-response modes, in order to check whether they respond correctly. During this time, the words "SIMULATION MEASURAND" appear on the display. **Options:** OFF MASS FLOW VOLUME FLOW COR. VOLUME FLOW DENSITY REFERENCE DENSITY TEMPERATURE **Factory setting:** OFF ✎ Note! The active simulation mode is passed on to subsequent function blocks via the status condition (UNCERTAIN) of the process variable. ☝ Caution! • The measuring device cannot be used for measuring while this simulation is in progress. • The setting is not saved if the power supply fails.
Simulation - Value Measurand	**AUTO - MAN - OOS**	✎ Note! The parameter is not visible unless the parameter "Simulation - Measurand" is active. Use this parameter to define a selectable value (e.g. 12 m^3/s). This is used to test the associated parameters in the flowmeter itself and downstream function blocks. **User input:** 5-digit floating-point number **Factory setting:** 0 ☝ Caution! The setting is not saved if the power supply fails.
Simulation - Unit	**read only**	Displays the unit used for the simulation. ✎ Note! Depending on the selection in the parameter "Simulation - Measurand", the unit is taken over from the corresponding parameter "System Unit -"
ST_REV	**read only**	Displays the revision status of the static data. ✎ Note! The revision status parameter is incremented on each modification of static data.

Transducer block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
System - Reset	**AUTO - MAN - OOS**	Use this parameter to perform a reset of the measuring system. **Options:** NO RESTART SYSTEM (restart without interrupting power supply) ORIGINAL TRANSMITTER DATA **Factory setting:** NO
System - T-DAT Save/Load	**AUTO - MAN - OOS**	Use this parameter to save the parameter settings / configuration of the **transmitter** in a transmitter DAT (T-DAT), or to load the parameter settings from the T-DAT into the internal EEPROM. Application examples: • After commissioning, the current measuring-point parameters can be saved to the T-DAT as a backup. • If the transmitter is replaced for some reason, the data from the T-DAT can be loaded into the new transmitter (EEPROM). **Options:** CANCEL SAVE (from EEPROM to T-DAT) LOAD (from T-DAT to EEPROM) **Factory setting:** CANCEL ✎ Note! If the power supply fails, the totalizer readings are automatically saved to the EEPROM.
System - Install. Direction Sensor	**AUTO - MAN - OOS**	Use this parameter to reverse the sign of the flow quantity, if necessary. **Options:** NORMAL (flow as indicated by the arrow) INVERSE (flow opposite to direction indicated by the arrow) **Factory setting:** NORMAL ✎ Note! Ascertain the actual direction of fluid flow with reference to the direction indicated by the arrow on the sensor (nameplate).

Transducer block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
System - Pressure Shock Suppression	**AUTO - MAN - OOS**	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 filling 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 parameter "Low Flow Cut Off - On-Value on Seite 93). Use this parameter to define the time span for active pressure shock suppression. **Activation of the Pressure shock suppression** Pressure pulse suppression is activated after the flow falls below the ON_Value of the Low flow cut off (see point **1** in grafic). While Pressure shock suppression is active, the following conditions apply: • Flow reading on display → 0 • Totalizer reading → the totalizers are pegged at the last correct value. **Deactivation of the Pressure shock suppression** The Pressure shock suppression is deactivated after the time interval, set in this parameter, has passed (see point **2** in grafic). ✎ Note! The actual flow value is displayed and output, when the time interval for the Pressure shock suppression has passed and the flow exceeds the OFF-VALUE of the Low flow cut off (see point **3** in grafic).  **User input:** max. 4-digit number, incl. unit: 0.00...100.00 s **Factory setting:** 0.00 s

Transducer block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
System - Density Damping	**AUTO - MAN - OOS**	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 parameters and outputs of the measuring device. **User input:** max. 5-digit number, including unit: 0.00...100.00 s **Factory setting:** 0.00 s
System - Flow Damping	**AUTO - MAN - OOS**	Using the interference blanking (= time constant for exponential filter) the sensitivity of the flow measurement signal can be reduced with respect to transient flows and interference peaks; e.g. with fluid containing solids or gas bubbles, etc. The damping acts on all parameters and outputs of the measuring device. **User input:** 0...100 s **Factory setting:** 0 s
System - Positive Zero Return	**AUTO - MAN - OOS**	Use this parameter to interrupt evaluation of measured variables. This is necessary when a piping system is being cleaned, for example. This setting acts on all parameter and outputs of the measuring device. **Options:** OFF ON (signal output is set to the zero flow value, temperature and density are output normally) **Factory setting:** OFF ✎ Note! • The active Positive Zero Return is passed on to subsequent function blocks via the status condition (UNCERTAIN) of the process variable. • Interruption of the processing of measured values can, also using cyclic scheduled data transmission, be controlled or initiated via the Discrete Output function block.

Transducer block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
System Value Mass Flow	**read only**	The currently measured mass flow appears on the display. **Display shows:** 5-digit floating-point number, including unit and sign (e.g. 462.87 kg/h; -731.63 lb/min; etc.)
System Unit Mass Flow	**AUTO - MAN - OOS**	Use this parameter to select the unit for the mass flow (mass/time). The unit you select here is also valid for: • Simulation • Low flow cut off **Options:** Metric: gram → g/s; g/min; g/h; g/day kilogram → kg/s; kg/min; kg/h; kg/day ton → t/s; t/min; t/h; t/day US: ounce → oz/s; oz/min; oz/h; oz/day pound → lb/s; lb/min; lb/h; lb/day ton → ton/s; ton/min; ton/h; ton/day **Factory setting:** kg/h ✎ Note! The unit selected here has no influence on the transmitted process variable to the Analog Input Function block.

Transducer block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
System Value Volume Flow	**read only**	The volume flow appears on the display. The volume flow is derived from the measured mass flow and the measured density of the fluid. **Display shows:** 5-digit floating-point number, including unit and sign (e.g. 5.5445 dm^3/min; 1.4359 m^3/h; -731.63 us gal/d; etc.)
System Unit Volume Flow	**AUTO - MAN - OOS**	Use this parameter to select the unit for the volume flow (volume/time). The unit you select here is also valid for: • Simulation • Low flow cut off **Options:** Metric: – Kubikzentimeter → cm^3/s; cm^3/min; cm^3/h; cm^3/day – Kubikdezimeter → dm^3/s; dm^3/min; dm^3/h; dm^3/day – Kubikmeter → m^3/s; m^3/min; m^3/h; m^3/day – Milliliter → ml/s; ml/min; ml/h; ml/day – Liter → l/s; l/min; l/h; l/day – Hektoliter → hl/s; hl/min; hl/h; hl/day – Megaliter → Ml/s MEGA; Ml/min MEGA; Ml/h MEGA; Ml/day MEGA US: – Cubic centimeter → cc/s; cc/min; cc/h; cc/day – Acre foot → af/s; af/min; af/h; af/day – Cubic foot → ft^3/s; ft^3/min; ft^3/h; ft^3/day – Fluid ounce → fl. oz/s; fl. oz/min; fl. oz/h; fl. oz/day – Gallon → us gal/s; us gal/min; us gal/h; us gal/day – Million gallon → us Mgal/s; us Mgal/min; us Mgal/h; us Mgal/day – Barrel (normal fluids: 31,5 gal/bbl) → us bbl/s NORM.; us bbl/min NORM.; us bbl/h NORM.; us bbl/day NORM. – Barrel (beer: 31,0 gal/bbl) → us bbl/s BEER; us bbl/min BEER; us bbl/h BEER; us bbl/day BEER – Barrel (petrochemicals: 42,0 gal/bbl) → us bbl/s PETR.; us bbl/min PETR.; us bbl/h PETR.; us bbl/day PETR. – Barrel (filling tanks: 55,0 gal/bbl) → us bbl/s TANK; us bbl/min TANK; us bbl/h TANK; us bbl/day TANK Imperial: – Gallon → imp. gal/s; imp. gal/min; imp. gal/h; imp. gal/day – Mega gallon → imp. Mgal/s; imp. Mgal/min; imp. Mgal/h; imp. Mgal/day – Barrel (beer: 36,0 gal/bbl) → imp. bbl/s BEER; imp. bbl/min BEER; imp. bbl/h BEER; imp. bbl/day BEER – Barrel (petrochemicals: 42,0 gal/bbl) → imp. bbl/s PETR.; imp. bbl/min PETR.; imp. bbl/h PETR.; imp. bbl/day PETR. **Factory setting:** m^3/h ✎ Note! The unit selected here has no influence on the transmitted process variable to the Analog Input Function block.

Transducer block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
System Value Cor. Volume Flow	**read only**	The corrected volume flow appears on the display. The corrected volume flow is derived from the measured mass flow and the reference density (density at reference temperature, measured or fixed entry) of the fluid. **Display shows:** 5-digit floating-point number, including unit and sign (e.g. 1.3549 Nm^3/h; 7.9846 scm/day; etc.)
System Unit Corrected Volume Flow	**AUTO - MAN - OOS**	Use this parameter to select the unit for the corrected volume flow (corrected volume/time). The unit you select here is also valid for: • Simulation • Low flow cut off **Options:** Metric: Normliter → Nl/s; Nl/min; Nl/h; Nl/day Normkubikmeter → Nm^3/s; Nm^3/min; Nm^3/h; Nm^3/day US: Standard cubic meter → Sm^3/s; Sm^3/min; Sm^3/h; Sm^3/day Standard cubic foot → Scf^3/s; Scf^3/min; Scf^3/h; Scf^3/day **Factory setting:** Nm^3/h ✎ Note! The unit selected here has no influence on the transmitted process variable to the Analog Input Function block.
System Value Density	**read only**	The currently measured density or its specific gravity appears on the display. **Display shows:** 5-digit floating-point number, including unit corresponding to 0.100000...6.00000 kg/dm^3 (e.g. 1.2345 kg/dm^3; 993.5 kg/dm^3; 1.0015 SG_20 °C; etc.)
System Unit Density	**AUTO - MAN - OOS**	Use this parameter to select the unit for the fluid density. The unit you select here is also valid for: • Simulation • Density adjustment value • Density responce value for EPD **Options:** Metric → g/cm^3; g/cc; kg/dm^3; kg/l; kg/m^3; SD 4 °C, SD 15 °C, SD 20 °C; SG 4 °C, SG 15 °C, SG 20 °C US → lb/cft; lb/gal; us lb/bbl (NORM.); us lb/bbl (BEER); us lb/bbl (PETR.); us lb/bbl (TANKS) Imperial → imp. lb/gal; imp. lb/bbl (BEER); imp. lb/bbl (PETR.) **Factory setting:** kg/l SD = Specific Density, SG = Specific Gravity The specific density is the ratio of fluid density to water (at water temperature = 4, 15, 20 °C) ✎ Note! The unit selected here has no influence on the transmitted process variable to the Analog Input Function block.

Transducer block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
System Value Reference Density	**read only**	The density of the fluid, at reference temperature, appears on the display. The reference density can either be measured or entered as a fixed value (see parameter "Reference Param. - Fixed Ref. Density" on Seite 95). **Display shows:** 5-digit floating-point number, including unit corresponding to 0.100000...6.00000 kg/dm^3 (e.g. 1.2345 kg/dm^3; 993.5 kg/dm^3; 1.0015 SG 20 °C; etc.)
System Unit Reference Density	**AUTO - MAN - OOS**	Use this parameter to select the unit for the reference density. The unit you select here is also valid for: • Simulation • Fixed reference density (for calculation of corrected volume flow) **Options:** Metric → kg/Nm^3; kg/Nl US → g/Scc; kg/Sm; lb/Scf **Factory setting:** kg/Nl ✎ Note! The unit selected here has no influence on the transmitted process variable to the Analog Input Function block.
System Value Temperature	**read only**	The currently measured temperature appears on the display. **Display shows:** max. 4-digit fixed-point number, including unit and sign (e.g. -23.4 °C; 160.0 °F; 295.4 K; etc.)
System Unit Temperature	**AUTO - MAN - OOS**	Use this parameter to select the unit for the temperature. The unit you select here is also valid for: • Simulation • Reference temperature (for corrected volume measurement with measured reference density) **Options:** °C (Celsius) K (Kelvin) °F (Fahrenheit) R (Rankine) **Factory setting:** °C ✎ Note! The unit selected here has no influence on the transmitted process variable to the Analog Input Function block.

Transducer block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
STRATEGY	**AUTO - OOS**	Parameter for grouping and thus faster evaluation of blocks. Grouping is carried out by entering the same numerical value in the parameter "STRATEGY" for each individual block. **Factory setting:** 0 ✎ Note! This data is neither checked nor processed by the Transducer block.
TAG_DESC	**AUTO - OOS**	Entry of a user-specific text of max. 32 characters for unique identification and assignment of the block. **Factory setting:** (_ _ _ _ _ _) without text
Temperature	**read only**	Displays the current measured value and the status of the sixth process variable (Temperature) made available to the Analog Input Function Block as an input value.
Temperature Unit	**read only**	Displays the unit of the temperature. ✎ Note! The unit is set in the associated Analog Input Function Block via the parameter group "XD_SCALE" (see Seite 150).
Totalizer 1	**read only**	Displays the current measured value and the status of the seventh process variable (Totalizer 1) made available to the Analog Input Function Block as an input value.
Totalizer 1 - Unit	**read only**	Displays the unit of the totalizer 1. ✎ Note! The unit is set in the associated Analog Input Function Block via the parameter group "XD_SCALE" (see Seite 150).
Totalizer 1 - System Value	**AUTO - MAN - OOS**	Use this parameter to view the total for the totalizer's measured variable aggregated since measuring commenced. The value can be positive or negative, depending on the setting selected in the parameter "Totalizer 1 - Mode", and the direction of flow. **Display shows:** max. 7-digit floating-point number, including sign and unit (e.g. 15467.04 m^3; -4925.631 kg) ✎ Note! • The effect of the setting in the parameter "Totalizer 1 - Mode" 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 parameter "Totalizers - Failsafe All".

Transducer block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
Totalizer 1 - System Unit	**AUTO - MAN - OOS**	Use this parameter to define the unit for the totalizer's measured variable, as selected beforehand. **Options:** Metric – Massefluss → g; kg; t – Volumenfluss → cm^3; dm^3; m^3; ml; l; hl; Ml – Normvolumenfluss → Nl; Nm^3 US – Massefluss → oz; lb; ton – Volumenfluss → cc; af; ft^3; oz f; gal; Mgal; bbl (NORM.); bbl (BEER); bbl (PETR.); bbl (TANKS) – Normvolumenfluss → Sm^3; Scf Imperial – Normvolumenfluss → imp. gal; imp. Mgal; bbl (BEER); imp. bbl (PETR.) **Factory setting:** kg ✎ Note! The unit selected here has no influence on the transmitted process variable.
Totalizer 1 - Assign	**AUTO - MAN - OOS**	Use this parameter to assign a measured variable to the totalizer. **Options:** OFF MASS FLOW VOLUME FLOW CORRECTED VOLUME FLOW **Factory setting:** MASS FLOW ✎ Note! The totalizer is reset to "0" as soon as the selection is changed.
Totalizer 1 - Mode	**AUTO - MAN - OOS**	Use this parameter to define how the flow components are to be totaled by the totalizer. **Options:** BALANCE (positive and negative flow components) The positive and negative flow components are balanced. In other words, net flow in the flow direction is registered. FORWARD Positive flow components only REVERSE Negative flow components only **Factory setting:** BALANCE

Transducer block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
Totalizer 1 - Reset	**AUTO - MAN - OOS**	Reset the parameter "Totalizer 1 - System Value" and the current measured value "Totalizer 1" to zero. **Options:** NO YES **Factory setting:** NO ✎ Note! Resetting of the totalizer can, also using cyclic scheduled data transmission, be controlled or initiated via the Discrete Output function block.
Totalizer 2	**read only**	Displays the current measured value and the status of the eighth process variable (Totalizer 2) made available to the Analog Input Function Block as an input value.
Totalizer 2 - Unit	**read only**	Displays the unit of the totalizer 2. ✎ Note! The unit is set in the associated Analog Input Function Block via the parameter group "XD_SCALE" (see Seite 150).
Totalizer 2 - System Value	**AUTO - MAN - OOS**	Use this parameter to view the total for the totalizer's measured variable aggregated since measuring commenced. The value can be positive or negative, depending on the setting selected in the parameter "Totalizer 2 - Mode", and the direction of flow. **Display shows:** max. 7-digit floating-point number, including sign and unit (e.g. 15467.04 m^3; -4925.631 kg) ✎ Note! • The effect of the setting in the parameter "Totalizer 2 - Mode" 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 parameter "Totalizers - Failsafe All".

Transducer block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
Totalizer 2 - System Unit	**AUTO - MAN - OOS**	Use this parameter to define the unit for the totalizer's measured variable, as selected beforehand. **Options:** Metric – Massefluss → g; kg; t – Volumenfluss → cm^3; dm^3; m^3; ml; l; hl; Ml – Normvolumenfluss → Nl; Nm^3 US – Massefluss → oz; lb; ton – Volumenfluss → cc; af; ft^3; oz f; gal; Mgal; bbl (NORM.); bbl (BEER); bbl (PETR.); bbl (TANKS) – Normvolumenfluss → Sm^3; Scf Imperial – Normvolumenfluss → imp. gal; imp. Mgal; bbl (BEER); imp. bbl (PETR.) **Factory setting:** m^3 ✎ Note! The unit selected here has no influence on the transmitted process variable.
Totalizer 2 - Assign	**AUTO - MAN - OOS**	Use this parameter to assign a measured variable to the totalizer. **Options:** OFF MASS FLOW VOLUME FLOW CORRECTED VOLUME FLOW **Factory setting:** VOLUME FLOW ✎ Note! The totalizer is reset to "0" as soon as the selection is changed.
Totalizer 2 - Mode	**AUTO - MAN - OOS**	Use this parameter to define how the flow components are to be totaled by the totalizer. **Options:** BALANCE (positive and negative flow components) The positive and negative flow components are balanced. In other words, net flow in the flow direction is registered. FORWARD Positive flow components only REVERSE Negative flow components only **Factory setting:** FORWARD

Transducer block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
Totalizer 2 - Reset	**AUTO - MAN - OOS**	Reset the parameter "Totalizer 2 - System Value" and the current measured value "Totalizer 2" to zero. **Options:** NO YES **Factory setting:** NO ✎ Note! Resetting of the totalizer can, also using cyclic scheduled data transmission, be controlled or initiated via the Discrete Output function block.
Totalizer 3	**read only**	Displays the current measured value and the status of the ninth process variable (Totalizer 3) made available to the Analog Input Function Block as an input value.
Totalizer 3 - Unit	**read only**	Displays the unit of the totalizer 3. ✎ Note! The unit is set in the associated Analog Input Function Block via the parameter group "XD_SCALE" (see Seite 150).
Totalizer 3 - System Value	**AUTO - MAN - OOS**	Use this parameter to view the total for the totalizer's measured variable aggregated since measuring commenced. The value can be positive or negative, depending on the setting selected in the parameter "Totalizer 3 - Mode", and the direction of flow. **Display shows:** max. 7-digit floating-point number, including sign and unit (e.g. 15467.04 m^3; -4925.631 kg) ✎ Note! • The effect of the setting in the parameter "Totalizer 3 - Mode" 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 parameter "Totalizers - Failsafe All".

Transducer block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
Totalizer 3 - System Unit	**AUTO - MAN - OOS**	Use this parameter to define the unit for the totalizer's measured variable, as selected beforehand. **Options:** Metric – Massefluss → g; kg; t – Volumenfluss → cm^3; dm^3; m^3; ml; l; hl; Ml – Normvolumenfluss → Nl; Nm^3 US – Massefluss → oz; lb; ton – Volumenfluss → cc; af; ft^3; oz f; gal; Mgal; bbl (NORM.); bbl (BEER); bbl (PETR.); bbl (TANKS) – Normvolumenfluss → Sm^3; Scf Imperial – Normvolumenfluss → imp. gal; imp. Mgal; bbl (BEER); imp. bbl (PETR.) **Factory setting:** Nm^3 ✎ Note! The unit selected here has no influence on the transmitted process variable.
Totalizer 3 - Assign	**AUTO - MAN - OOS**	Use this parameter to assign a measured variable to the totalizer. **Options:** OFF MASS FLOW VOLUME FLOW CORRECTED VOLUME FLOW **Factory setting:** CORRECTED VOLUME FLOW ✎ Note! The totalizer is reset to "0" as soon as the selection is changed.
Totalizer 3 - Mode	**AUTO - MAN - OOS**	Use this parameter to define how the flow components are to be totaled by the totalizer. **Options:** BALANCE (positive and negative flow components) The positive and negative flow components are balanced. In other words, net flow in the flow direction is registered. FORWARD Positive flow components only REVERSE Negative flow components only **Factory setting:** REVERSE

Transducer block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
Totalizer 3 - Reset	**AUTO - MAN - OOS**	Reset the parameter "Totalizer 3 - System Value" and the current measured value "Totalizer 3" to zero. **Options:** NO YES **Factory setting:** NO ✎ Note! Resetting of the totalizer can, also using cyclic scheduled data transmission, be controlled or initiated via the Discrete Output function block.
Totalizers - Reset All	**AUTO - MAN - OOS**	Reset the parameters "Totalizer 1 - System Value", "Totalizer 2 - System Value" , "Totalizer 3 - System Value" and the current measured values "Totalizer 1", "Totalizer 2", "Totalizer 3" to zero. **Options:** NO YES **Factory setting:** NO ✎ Note! Resetting of the totalizer can, also using cyclic scheduled data transmission, be controlled or initiated via the Discrete Output function block.
Totalizers - Failsafe All	**AUTO - MAN - OOS**	Use this parameter to define the common response of all totalizers (1...3) to error. **Options:** STOP The totalizer is paused until the fault is rectified. The totalizer stops at the last value prior to the occurrence of the error. ACTUAL VALUE The totalizer continues to count is based on the current flow measured value. The fault is ignored. HOLD VALUE The totalizer continues to count the flow is based on the last valid flow value (before the fault occurred). **Factory setting:** STOP

Transducer block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
Transducer Error	**read only**	Displays the active device error. **Options:** • No Error (normal state) • Electronic Failure • Data Integrity Error • Mechanical Error • I/O Failure • General Error ✎ Note! • Display of the device error is standardized. A precise statement concerning the pending error is available via the device-specific error display, which can be read off in the parameter "Diagnosis - Actual System Condition". • A precise error description as well as notes on remedying errors can be found in the Operating Instructions Promass 83 FF BA065D/06/en.
Transducer Type	**read only**	Displays the Transducer block type. **Display:** Standard flow with calibration
Un/Locking - Access code	**AUTO - MAN - OOS**	All the measuring system data is protected from accidental modification. Only when the code has been entered in this parameter can the manufacturer-specific parameters be programmed and the device configuration modified. You can enable programming by entering: • Code 83 (factory setting) • Personal code (parameter "Define Private Code") **User input:** max. 4-digit number: 0...9999 ✎ Note! • If the hardware write protection is enabled then access to the manufacturer-specific parameters is blocked even if the right code is entered. • You can disable programming again by entering any number (other than the access code) in this parameter. • The Endress+Hauser service organization can be of assistance if you mislay your personal code. • Certain parameters are not accessible unless a special service code is entered. This service code is known only to the Endress+Hauser service organization. Please contact your Endress+Hauser service center if you require clarification.

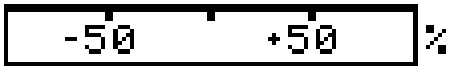
Transducer block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
Un/Locking - Define Private code	**AUTO - MAN - OOS**	For entry of the personal code used to access the manufacturer-specific parameters in the Transducer block. **User input:** 0...9999 (max. 4-digit number) **Factory setting:** 83 ✎ Note! • If the code number is "0", programming is always enabled. • Parameter configuration has to be enabled before this code can be changed. When parameter configuration is disabled this parameter is not available; this precaution prevents others from changing your personal code without your knowledge and consent.
Un-/Locking - Access Status	**read only**	Use this parameter to check the access status for the parameter matrix. **Display shows:** LOCKED (Parameterization disabled) ACCESS CUSTOMER (Parameterization enabled) ACCESS SERVICE (Parameterization enabled)
UPDATE_EVT	**AUTO - MAN- OOS**	Displays whether static block data has been modified, including date and time.
User Interface - Language	**AUTO - MAN - OOS**	Use this parameter to select the language for all texts, parameters and messages shown on the local display. **Options:** ENGLISH DEUTSCH FRANCAIS ESPANOL ITALIANO NEDERLANDS DANSK NORSK SVENSKA SUOMI BAHASA INDONESIA JAPANESE (syllabary)
User Interface - Damping	**AUTO - MAN - OOS**	Use this parameter to enter a time constant defining how the display reacts to severely fluctuating flow variables, either very quickly (enter a low time constant) or with damping (enter a high time constant). **User input:** 0...100 seconds **Factory setting:** 1 s ✎ Note! Setting the time constant to zero seconds switches off damping.

Transducer block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
User Interface - Contrast LCD	**AUTO - MAN - OOS**	Use this parameter to optimize display contrast to suit local operating conditions. **User input:** 10...100% **Factory setting:** 50%
User Interface Main Line - Assign	**AUTO - MAN - OOS**	Use this parameter to define the display value assigned to the main line (the top line of the local display) during normal measuring operation. **Options:** OFF MASS FLOW MASS FLOW IN % VOLUME FLOW VOLUME FLOW IN % CORRECTED VOLUME FLOW CORRECTED VOLUME FLOW IN % DENSITY REFERENCE DENSITY TEMPERATURE TOTALIZER 1 TOTALIZER 2 TOTALIZER 3 AI 1 - OUT VALUE AI 2 - OUT VALUE AI 3 - OUT VALUE AI 4 - OUT VALUE AI 5 - OUT VALUE AI 6 - OUT VALUE AI 7 - OUT VALUE PID - IN VALUE (manipulated variable) PID - CAS_IN VALUE (external set point) PID - OUT VALUE (controlled variable) **Factory setting:** MASS FLOW
User Interface Main Line - 100% Value	**AUTO - MAN - OOS**	✎ Note! The input is not active unless one of the following was selected in the parameter "User Interface Main Line - Assign": • MASS FLOW IN % • VOLUME FLOW IN % • CORRECTED VOLUME FLOW IN % Use this parameter to define the flow value to be shown on the display as the 100% value. **User input:** 5-digit floating-point number **Factory setting:** 10 ✎ Note! The appropriate unit is taken from the corresponding parameter ("System Unit - Mass Flow", "System Unit - Volume Flow", or "System Unit - Corrected Volume Flow").

Transducer block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
User Interface Main Line - Format	**AUTO - MAN - OOS**	Use this parameter to define the maximum number of places after the decimal point displayed for the reading in the main line. **Options:** XXXXX. - XXXX.X - XXX.XX - XX.XXX -X.XXXX **Factory setting:** X.XXXX ✎ Note! • Note that this setting only affects the reading as it appears on the display, it has no influence on the accuracy of the system's calculations. • The places after the decimal point as computed by the measuring device cannot always be displayed, depending on this setting and the engineering unit. In these instances an arrow appears on the display between the measured value and the engineering unit (e.g. 1.2→ kg/h), indicating that the measuring system is computing with more decimal places than can be shown on the display.
User Interface Main Line - Multiplex Assign	**AUTO - MAN - OOS**	Use this parameter to define the second reading to be displayed in the main line alternately (every 10 seconds) with the value defined in the parameter "User Interface Main Line - Assign". **Options:** OFF MASS FLOW MASS FLOW IN % VOLUME FLOW VOLUME FLOW IN % CORRECTED VOLUME FLOW CORRECTED VOLUME FLOW IN % DENSITY REFERENCE DENSITY TEMPERATURE TOTALIZER 1 TOTALIZER 2 TOTALIZER 3 AI 1 - OUT VALUE AI 2 - OUT VALUE AI 3 - OUT VALUE AI 4 - OUT VALUE AI 5 - OUT VALUE AI 6 - OUT VALUE AI 7 - OUT VALUE PID - IN VALUE (manipulated variable) PID - CAS_IN VALUE (external set point) PID - OUT VALUE (controlled variable) **Factory setting:** OFF

Transducer block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
User Interface Main Line - Multiplex 100% Value	**AUTO - MAN - OOS**	✎ Note! The input is not active unless one of the following was selected in the parameter "User Interface Main Line - Multiplex Assign": • MASS FLOW IN % • VOLUME FLOW IN % • CORRECTED VOLUME FLOW IN % Use this parameter to define the flow value to be shown on the display as the 100% value. **User input:** 5-digit floating-point number **Factory setting:** 10 ✎ Note! The appropriate unit is taken from the corresponding parameter ("System Unit - Mass Flow", "System Unit - Volume Flow", or "System Unit - Corrected Volume Flow").
User Interface Main Line - Multiplex Format	**AUTO - MAN - OOS**	Use this parameter to define the maximum number of places after the decimal point displayed for the reading in the main line. **Options:** XXXXX. - XXXX.X - XXX.XX - XX.XXX -X.XXXX **Factory setting:** X.XXXX ✎ Note! • Note that this setting only affects the reading as it appears on the display, it has no influence on the accuracy of the system's calculations. • The places after the decimal point as computed by the measuring device cannot always be displayed, depending on this setting and the engineering unit. In these instances an arrow appears on the display between the measured value and the engineering unit (e.g. 1.2→ kg/h), indicating that the measuring system is computing with more decimal places than can be shown on the display.

Transducer block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
User Interface Add. Line - Assign	**AUTO - MAN - OOS**	Use this parameter to define the display value assigned to the additional line (the middle line of the local display) during normal measuring operation. **Options:** OFF MASS FLOW MASS FLOW IN % VOLUME FLOW VOLUME FLOW IN % CORRECTED VOLUME FLOW CORRECTED VOLUME FLOW IN % DENSITY REFERENCE DENSITY TEMPERATURE MASS FLOW BARGRAPH IN % VOLUME FLOW BARGRAPH IN % CORRECTED VOLUME FLOW BARGRAPH IN % TOTALIZER 1 TOTALIZER 2 TOTALIZER 3 AI 1 - OUT VALUE AI 2 - OUT VALUE AI 3 - OUT VALUE AI 4 - OUT VALUE AI 5 - OUT VALUE AI 6 - OUT VALUE AI 7 - OUT VALUE PID - IN VALUE (manipulated variable) PID - CAS_IN VALUE (external set point) PID - OUT VALUE (controlled variable) DEVICE PD-TAG BLANK LINE **Factory setting:** TOTALIZER 1
User Interface Add. Line - 100% Value	**AUTO - MAN - OOS**	✎ Note! The input is not active unless one of the following was selected in the parameter "User Interface Add. Line - Assign": • MASS FLOW IN % • VOLUME FLOW IN % • CORRECTED VOLUME FLOW IN % • MASS FLOW BARGRAPH IN % • VOLUME FLOW BARGRAPH IN % • CORRECTED VOLUME FLOW BARGRAPH IN % Use this parameter to define the flow value to be shown on the display as the 100% value. **User input:** 5-digit floating-point number **Factory setting:** 10 ✎ Note! The appropriate unit is taken from the corresponding parameter ("System Unit - Mass Flow", "System Unit - Volume Flow", or "System Unit - Corrected Volume Flow").

Transducer block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
User Interface Add. Line - Format	**AUTO - MAN - OOS**	✎ Note! The option is not active unless a number was selected in the parameter "User Interface Add. Line - Assign". Use this parameter to define the maximum number of places after the decimal point displayed for the reading in the additional line. **Options:** XXXXX. - XXXX.X - XXX.XX - XX.XXX -X.XXXX **Factory setting:** X.XXXX ✎ Note! • Note that this setting only affects the reading as it appears on the display, it has no influence on the accuracy of the system's calculations. • The places after the decimal point as computed by the measuring device cannot always be displayed, depending on this setting and the engineering unit. In these instances an arrow appears on the display between the measured value and the engineering unit (e.g. 1.2 → kg/h), indicating that the measuring system is computing with more decimal places than can be shown on the display.
User Interface Add. Line - Display Mode	**AUTO - MAN - OOS**	✎ Note! The option is not active unless one of the following was selected in the parameter "User Interface Add. Line - Assign": • MASS FLOW BARGRAPH IN % • VOLUME FLOW BARGRAPH IN % • CORRECTED VOLUME FLOW BARGRAPH IN % Use this parameter to define the format of the bar graph. **Options:** STANDARD Simple bar graph with 25 / 50 / 75% gradations and integrated sign.  F-x3xxxxx-20-xx-xx-xx-000 SYMMETRY Symmetrical bar graph for positive and negative directions of flow, with -50 / 0 / +50% gradations and integrated sign.  F-x3xxxxx-20-xx-xx-xx-001 **Factory setting:** STANDARD

Transducer block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
User Interface Add. Line - Multiplex Assign	**AUTO - MAN - OOS**	Use this parameter to define the second reading to be displayed in the additional line alternately (every 10 seconds) with the value defined in the parameter "User Interface Add. Line - Assign". **Options:** OFF MASS FLOW MASS FLOW IN % VOLUME FLOW VOLUME FLOW IN % CORRECTED VOLUME FLOW CORRECTED VOLUME FLOW IN % DENSITY REFERENCE DENSITY TEMPERATURE MASS FLOW BARGRAPH IN % VOLUME FLOW BARGRAPH IN % CORRECTED VOLUME FLOW BARGRAPH IN % TOTALIZER 1 TOTALIZER 2 TOTALIZER 3 AI 1 - OUT VALUE AI 2 - OUT VALUE AI 3 - OUT VALUE AI 4 - OUT VALUE AI 5 - OUT VALUE AI 6 - OUT VALUE AI 7 - OUT VALUE PID - IN VALUE (manipulated variable) PID - CAS_IN VALUE (external set point) PID - OUT VALUE (controlled variable) DEVICE PD-TAG BLANK LINE **Factory setting:** OFF ✎ Note! Multiplex mode is suspended as soon as a fault / notice message is generated. The message in question appears on the display. • Fault message (identified by a lightning icon): Multiplex mode is resumed as soon as the fault is no longer active. • Notice message (identified by an exclamation mark): Multiplex mode is resumed as soon as the notice message is no longer active.

Transducer block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
User Interface Add. Line - Multiplex 100% Value	**AUTO - MAN - OOS**	✎ Note! The input is not active unless one of the following was selected in the parameter "User Interface Add. Line - Multiplex Assign": • MASS FLOW IN % • VOLUME FLOW IN % • CORRECTED VOLUME FLOW IN % • MASS FLOW BARGRAPH IN % • VOLUME FLOW BARGRAPH IN % • CORRECTED VOLUME FLOW BARGRAPH IN % Use this parameter to define the flow value to be shown on the display as the 100% value. **User input:** 5-digit floating-point number **Factory setting:** 10 ✎ Note! The appropriate unit is taken from the corresponding parameter ("System Unit - Mass Flow", "System Unit - Volume Flow", or "System Unit - Corrected Volume Flow").
User Interface Add. Line - Multiplex Format	**AUTO - MAN - OOS**	✎ Note! The option is not active unless a number was selected in the parameter "User Interface Add. Line - Multiplex Assign". Use this parameter to define the maximum number of places after the decimal point for the second value displayed in the additional line. **Options:** XXXXX. - XXXX.X - XXX.XX - XX.XXX -X.XXXX **Factory setting:** X.XXXX ✎ Note! • Note that this setting only affects the reading as it appears on the display, it has no influence on the accuracy of the system's calculations. • The places after the decimal point as computed by the measuring device cannot always be displayed, depending on this setting and the engineering unit. In these instances an arrow appears on the display between the measured value and the engineering unit (e.g. 1.2 → kg/h), indicating that the measuring system is computing with more decimal places than can be shown on the display.

Transducer block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
User Interface Add. Line - Multiplex Display Mode	**AUTO - MAN - OOS**	✎ Note! The option is not active unless one of the following was selected in the parameter "User Interface Add. Line - Multiplex Assign": • MASS FLOW BARGRAPH IN % • VOLUME FLOW BARGRAPH IN % • CORRECTED VOLUME FLOW BARGRAPH IN % Use this parameter to define the format of the bar graph. **Options:** STANDARD Simple bar graph with 25 / 50 / 75% gradations and integrated sign.  F-x3xxxxx-20-xx-xx-xx-000 SYMMETRY Symmetrical bar graph for positive and negative directions of flow, with -50 / 0 / +50% gradations and integrated sign.  F-x3xxxxx-20-xx-xx-xx-001 **Factory setting:** STANDARD

Transducer block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
User Interface Info. Line - Assign	**AUTO - MAN - OOS**	Use this parameter to define the display value assigned to the information line (the bottom line of the local display) during normal measuring operation. **Options:** OFF MASS FLOW MASS FLOW IN % VOLUME FLOW VOLUME FLOW IN % CORRECTED VOLUME FLOW CORRECTED VOLUME FLOW IN % DENSITY REFERENCE DENSITY TEMPERATURE MASS FLOW BARGRAPH IN % VOLUME FLOW BARGRAPH IN % CORRECTED VOLUME FLOW BARGRAPH IN % TOTALIZER 1 TOTALIZER 2 TOTALIZER 3 AI 1 - OUT VALUE AI 2 - OUT VALUE AI 3 - OUT VALUE AI 4 - OUT VALUE AI 5 - OUT VALUE AI 6 - OUT VALUE AI 7 - OUT VALUE PID - IN VALUE (manipulated variable) PID - CAS_IN VALUE (external set point) PID - OUT VALUE (controlled variable) DEVICE PD-TAG BLANK LINE **Factory setting:** OPERATING/SYSTEM CONDITIONS
User Interface Info. Line - 100% Value	**AUTO - MAN - OOS**	✎ Note! The input is not active unless one of the following was selected in the parameter "User Interface Info. Line - Assign": • MASS FLOW IN % • VOLUME FLOW IN % • CORRECTED VOLUME FLOW IN % • MASS FLOW BARGRAPH IN % • VOLUME FLOW BARGRAPH IN % • CORRECTED VOLUME FLOW BARGRAPH IN % Use this parameter to define the flow value to be shown on the display as the 100% value. **User input:** 5-digit floating-point number **Factory setting:** 10 ✎ Note! The appropriate unit is taken from the corresponding parameter ("System Unit - Mass Flow", "System Unit - Volume Flow", or "System Unit - Corrected Volume Flow").

Transducer block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
User Interface Info. Line - Format	**AUTO - MAN - OOS**	✎ Note! The option is not active unless a number was selected in the parameter "User Interface Info. Line - Assign". Use this parameter to define the maximum number of places after the decimal point displayed for the reading in the information line. **Options:** XXXXX. - XXXX.X - XXX.XX - XX.XXX -X.XXXX **Factory setting:** X.XXXX ✎ Note! • Note that this setting only affects the reading as it appears on the display, it has no influence on the accuracy of the system's calculations. • The places after the decimal point as computed by the measuring device cannot always be displayed, depending on this setting and the engineering unit. In these instances an arrow appears on the display between the measured value and the engineering unit (e.g. 1.2 → kg/h), indicating that the measuring system is computing with more decimal places than can be shown on the display.
User Interface Info. Line - Display Mode	**AUTO - MAN - OOS**	✎ Note! The option is not available unless one of the following was selected in the parameter "User Interface Info. Line - Assign": • MASS FLOW BARGRAPH IN % • VOLUME FLOW BARGRAPH IN % • CORRECTED VOLUME FLOW BARGRAPH IN % Use this parameter to define the format of the bar graph. **Options:** STANDARD Simple bar graph with 25 / 50 / 75% gradations and integrated sign.  F-x3xxxxx-20-xx-xx-xx-000 SYMMETRY Symmetrical bar graph for positive and negative directions of flow, with -50 / 0 / +50% gradations and integrated sign.  F-x3xxxxx-20-xx-xx-xx-001 **Factory setting:** STANDARD

Transducer block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
User Interface Info. Line - Multiplex Assign	**AUTO - MAN - OOS**	Use this parameter to define the second reading to be displayed in the information line alternately (every 10 seconds) with the value defined in the parameter "User Interface Info. Line - Assign". **Options:** OFF MASS FLOW MASS FLOW IN % VOLUME FLOW VOLUME FLOW IN % CORRECTED VOLUME FLOW CORRECTED VOLUME FLOW IN % DENSITY REFERENCE DENSITY TEMPERATURE MASS FLOW BARGRAPH IN % VOLUME FLOW BARGRAPH IN % CORRECTED VOLUME FLOW BARGRAPH IN % TOTALIZER 1 TOTALIZER 2 TOTALIZER 3 AI 1 - OUT VALUE AI 2 - OUT VALUE AI 3 - OUT VALUE AI 4 - OUT VALUE AI 5 - OUT VALUE AI 6 - OUT VALUE AI 7 - OUT VALUE PID - IN VALUE (manipulated variable) PID - CAS_IN VALUE (external set point) PID - OUT VALUE (controlled variable) DEVICE PD-TAG BLANK LINE OPERATING/SYSTEM CONDITIONS **Factory setting:** OFF ✎ Note! Multiplex mode is suspended as soon as a fault / notice message is generated. The message in question appears on the display. • Fault message (identified by a lightning icon): Multiplex mode is resumed as soon as the fault is no longer active. • Notice message (identified by an exclamation mark): Multiplex mode is resumed as soon as the notice message is no longer active.

Transducer block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
User Interface Info. Line - Multiplex 100% Value	**AUTO - MAN - OOS**	✎ Note! The input is not active unless one of the following was selected in the parameter "User Interface Info. Line - Multiplex Assign": • MASS FLOW IN % • VOLUME FLOW IN % • CORRECTED VOLUME FLOW IN % • MASS FLOW BARGRAPH IN % • VOLUME FLOW BARGRAPH IN % • CORRECTED VOLUME FLOW BARGRAPH IN % Use this parameter to define the flow value to be shown on the display as the 100% value. **User input:** 5-digit floating-point number **Factory setting:** 10 ✎ Note! The appropriate unit is taken from the corresponding parameter ("System Unit - Mass Flow", "System Unit - Volume Flow", or "System Unit - Corrected Volume Flow").
User Interface Info. Line - Multiplex Format	**AUTO - MAN - OOS**	✎ Note! The option is not active unless a number was selected in the parameter "User Interface Info. Line - Multiplex Assign". Use this parameter to define the maximum number of places after the decimal point for the second value displayed in the information line. **Options:** XXXXX. - XXXX.X - XXX.XX - XX.XXX -X.XXXX **Factory setting:** X.XXXX ✎ Note! • Note that this setting only affects the reading as it appears on the display, it has no influence on the accuracy of the system's calculations. • The places after the decimal point as computed by the measuring device cannot always be displayed, depending on this setting and the engineering unit. In these instances an arrow appears on the display between the measured value and the engineering unit (e.g. 1.2 → kg/h), indicating that the measuring system is computing with more decimal places than can be shown on the display.

Transducer block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
User Interface Info. Line - Multiplex Display Mode	**AUTO - MAN - OOS**	✎ Note! The option is not active unless one of the following was selected in the parameter "User Interface Info. Line - Multiplex Assign": • MASS FLOW BARGRAPH IN % • VOLUME FLOW BARGRAPH IN % • CORRECTED VOLUME FLOW BARGRAPH IN % Use this parameter to define the format of the bar graph. **Options:** STANDARD Simple bar graph with 25 / 50 / 75% gradations and integrated sign.  F-x3xxxxx-20-xx-xx-xx-000 SYMMETRY Symmetrical bar graph for positive and negative directions of flow, with -50 / 0 / +50% gradations and integrated sign.  F-x3xxxxx-20-xx-xx-xx-001 **Factory setting:** STANDARD

Transducer block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
Volume Flow	**AUTO - MAN - OOS**	Displays the current measured value and the status of the second process variable (Volume Flow) made available to the Analog Input Function Block as an input value.
Volume Flow Unit	**AUTO - MAN - OOS**	Displays the unit of the volume flow. ✎ Note! The unit is set in the associated Analog Input Function Block via the parameter group "XD_SCALE" (see Seite 150).
Zeropoint Adjustment	**AUTO - MAN - OOS**	This parameter enables a zero point adjustment to be automatically carried out. The new zero point determined by the measuring system is adopted by the "Sensor Data - Zeropoint" parameter. **Options:** CANCEL START **Factory setting:** CANCEL ☝ Caution! Before carrying out the calibration, please refer to BA065D/06/en "Promass 83 FF Operating Instructions" where a detailed description of the zero point adjustment is given. ✎ Note! • Programming is locked during zero point adjustment. • If the zero point adjustment is not possible, e.g. with a flow velocity > 0.1 m/s, or has been cancelled, then the message "Zeropoint Adjustment failure - Error No. 731" is shown in the parameter "Diagnosis - Actual System Condition". • The zeropoint adjustment can, also using cyclic scheduled data transmission, be controlled or initiated via the Discrete Output function block.

4 Function blocks – general

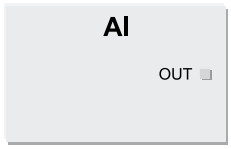
The function blocks contain the basic automation functions of the field device.
We distinguish between different function blocks, e.g. Analog Input Function Block, PID function block (PID controller), etc.

Each of these function blocks is used to execute different application functions. This means that local control functions, for example, can be carried out directly in the field, and device errors such as amplifier errors are reported to the automation system automatically.

The function blocks process the input values in accordance with their specific algorithm and their internally available parameters. They generate output values that are made available to other function blocks for further processing by linking the individual function blocks with each other.

5 Analog Input Function Block

In the Analog Input Function Block (AI) the process variables are prepared by the Transducer Block for the subsequent automation functions (e.g. scaling, limit value processing). The automation function is defined by the connections of the outputs.

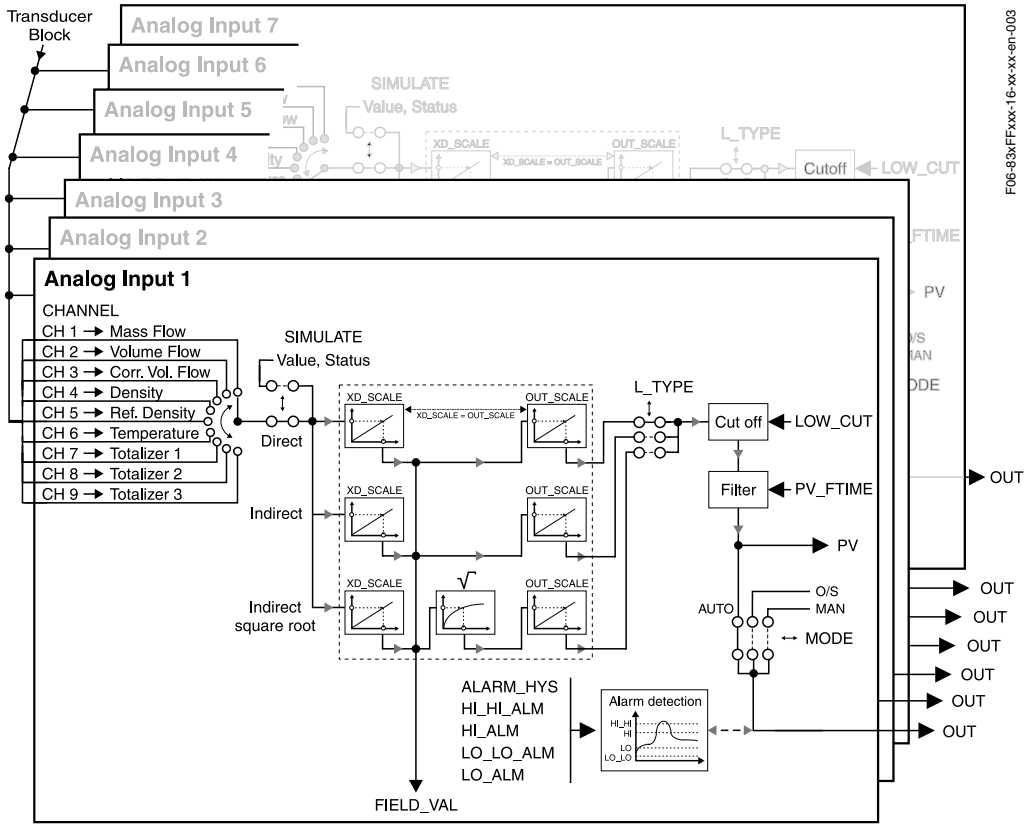


F06-53xFFxxx-16-xx-xx-en-001

OUT = output value and output status of the Analog Input Function Block

5.1 Signal processing

The figure shows the internal structure of the Analog Input Function Blocks:



F06-83xFFxxx-16-xx-xx-en-003

The Analog Input Function Block receives its input value from the Transducer Block. The parameter CHANNEL (see Page 141) is used to select which input value is to be processed by the Analog Input Function Block.

- Parameter CHANNEL = 1 → Mass Flow
- Parameter CHANNEL = 2 → Volume Flow
- Parameter CHANNEL = 3 → Corrected Volume Flow
- Parameter CHANNEL = 4 → Density
- Parameter CHANNEL = 5 → Reference Density
- Parameter CHANNEL = 6 → Temperature
- Parameter CHANNEL = 7 → Totalizer 1
- Parameter CHANNEL = 8 → Totalizer 2
- Parameter CHANNEL = 9 → Totalizer 3
- Parameter CHANNEL = 16 → Discrete Output, for AI Function block not relevant

The parameter group SIMULATE (see Page 149) allows you to replace the input value with a simulation value and to activate simulation. By specifying the status and the simulation value the reaction of the complete Analog Input Function Block can be tested.

The parameter L_TYPE is used to select the linearisation type of the input or simulation value (see Page 144):

- Direct signal conversion
  The value is forwarded without conversion (XD_SCALE = OUT_SCALE).
  Select this option if the input value is already in the physical unit you want.

- Indirect signal conversion
  With this setting the measured value from the Transducer Block (input value) is re-scaled linearly via the input scaling XD_SCALE to the desired output range OUT_SCALE (further information on rescaling of the input value can be found on Page 136).

- Indirect signal conversion with square root
  With this setting the measured value from the Transducer Block (input value) is re-scaled via the parameter group XD_SCALE and recalculated using a square root function. It is then rescaled again to the desired output range via the parameter group OUT_SCALE.

The parameter LOW_CUT (see Page 147) allows a limit value to be specified for the Low Flow Cut Off. The Low Flow Cut Off is activated via the parameter IO_OPTS (see Page 144). If the converted primary value (PV) is below the limit value then it is set to a value of "Zero".

In the parameter PV_FTIME (see Page 148) a filter time can be specified for filtering the converted primary value (PV). If a time of 0 seconds is specified then no filtration takes place.

The parameter group MODE_BLK (see Page 147) is used to select the operating mode of the Analog Input Function Block. If the operating mode MAN (manual) is selected then the output value OUT (see Page 147) can be specified directly.

The output value OUT is compared with warning and alarm limits (e.g. HI_LIM, LO_LO_LIM, etc.) that can be entered via various parameters. If one of these limit values is violated then a limit value process alarm (e.g. HI_ALM, LO_LO_ALM, etc.) is triggered.

The major functions and parameters of the Analog Input Function Block are listed below; you will find an overview of all the available parameters starting on Seite 138.

5.2 Selecting the operating mode

The operating mode is set via the parameter group MODE_BLK (see Page 147). The Analog Input Function Block supports the following operating modes:
– AUTO
– MAN
– OOS

Note!
The block status OOS is also shown via the parameter BLOCK_ERR (see Page 141). In operating mode OOS, if write protection is not enabled, you can access all the write parameters without restriction.

5.3 Selection of the process variable

The Promass 83 FF has seven Analog Input Function Blocks. The process variables of the Transducer Block that are to be processed are assigned via the parameter CHANNEL (see Page 141).
The Promass 83 FF is configured in the factory as follows:
- Function block 1, Parameter CHANNEL = 1 → Mass Flow
- Function block 2, Parameter CHANNEL = 2 → Volume Flow
- Function block 3, Parameter CHANNEL = 3 → Corr. Volume Flow
- Function block 4, Parameter CHANNEL = 4 → Density
- Function block 5, Parameter CHANNEL = 5 → Reference Density
- Function block 6, Parameter CHANNEL = 6 → Temperature
- Function block 7, Parameter CHANNEL = 7 → Totalizer 1

5.4 Linearisation types

In the Analog Input Function Block the input value can be linearised by the Transducer Block using the parameter L_TYPE (see Page 144). The following types of linearisation are available:

- Direct
  With this setting the measured value from the Transducer Block (input value) avoids the Linearisation function and is looped unchanged with the same unit by the Analog Input Function Block.

- Indirect
  With this setting the measured value from the Transducer Block (input value) is re-scaled linearly via the input scaling XD_SCALE to the desired output range OUT_SCALE.

- Indirect Square Root
  With this setting the measured value from the Transducer Block (input value) is re-scaled via the parameter group XD_SCALE and recalculated using an evolution function. It is then rescaled again to the desired output range via the parameter group OUT_SCALE.

5.5 Selection of units

A change in the unit for the volume flow or totalizer is defined in the relevant Analog Input Function Block, in the parameter group XD_SCALE (see Page 150) via the element UNIT. The unit set here is copied from the Transducer Block.

Note!
The selecion of the unit in the Transducer Block has no effect on the unit selected in the Analog Input Function Block with which the field device works. The unit selection in the Transducer block only effect to the display, the density adjust and the simulation.

5.6 Status of the output value OUT

The status of the parameter group OUT communicates to the subsequent function blocks the status of the Analog Input Function Block and the validity of the output value OUT. The following status values can be displayed:

- GOOD_NON_CASCADE
  The output value OUT is valid and can be used for further processing.

- Uncertain
  The output value OUT can only be used for further processing to a limited extent. This status of the process variable in the Transducer Block is forwarded via the status of the output parameter OUT.

- BAD
  The output value OUT is invalid. Occurs when the Analog Input Function Block is switched to operating mode OOS (Out Of Service). Brought about if the status of the process variable from the Transducer Block is the same, since this status is similarly forwarded to the status of OUT. The status is shown via the parameter BLOCK_ERR = Input Failure.

5.7 Simulation of input/output

Parameters of the Analog Input Function Block allow simulation of the input and output of the function block:

1. Simulation of the input of the Analog Input Function Block:
   The parameter group SIMULATE (see Page 149) can be used to specify the input value (measured value and status). Since the simulation value runs through the entire function block, all the parameter settings of the block can be checked.

   Note!
   If simulation is blocked by the jumper on the I/O board then simulation mode cannot be activated in the parameter SIMULATE (see Page 149). In the Resource Block, the parameter BLOCK_ERROR (see Page 80) shows whether simulation of the Analog Input Function Block is possible.

2. Simulation of the output of the Analog Input Function Block:
   Set the operating mode in the parameter group MODE_BLK (see Page 147) to MAN and specify the desired output value directly in the parameter OUT (see Page 147).

5.8 Diagnosis

The parameter BLOCK_ERR shows the current block status and in the event of an error, the cause of this (see Page 141).

5.9 Rescaling the input value

In the Analog Input Function Block the input value or input range can be scaled in accordance with the automation requirements.

Example:
- The system unit in the Transducer Block is kg/h.
- The measurement range of the sensor is 0...30 kg/h.
- The output range to the process control system should be 0...100%.

The Analog Input Function Block must be configured as as follows:
- Parameter CHANNEL (see Page 141)
  Option: Channel = 1 → mass flow

- Parameter L_TYPE (see Page 144)
  Option: L_TYPE = Indirect
  The measured value from the Transducer Block (input value) is rescaled linearly via the input scaling XD_SCALE to the desired output range OUT_SCALE.

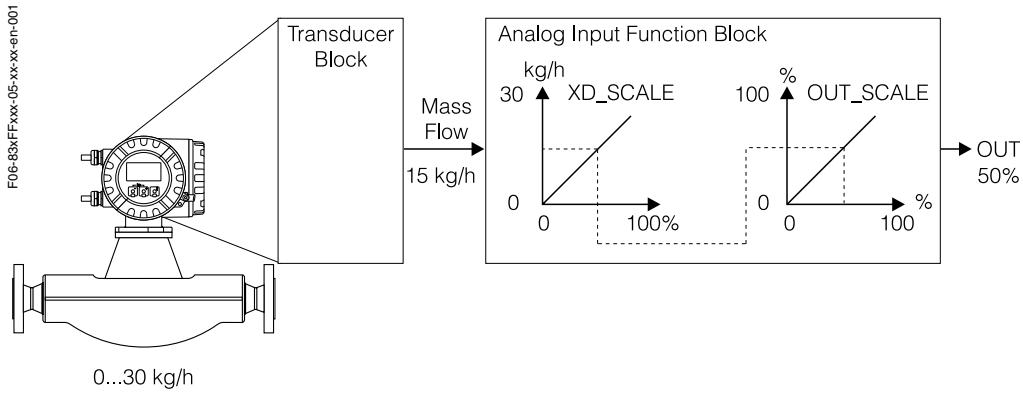
- Parameter group XD_SCALE (see Page 150)

XD_SCALE 0 %	= 0
XD_SCALE 100 %	= 30
XD_SCALE UNIT	= kg/h

- Parameter group OUT_SCALE (see Page 148)

OUT_SCALE 0 %	= 0
OUT_SCALE 100 %	= 100
OUT_SCALE UNIT	= %

The result is that with an input value of, for example, 15 m^3/h a value of 50% is output via the parameter OUT.



5.10 Limit values

The limit values are based on the output value OUT. If the output value OUT exceeds or does not reach the defined limit values then an alarm is sent to the fieldbus host system via the limit value process alarms.
The following limit values can be defined:

- HI_HI_LIM (see Page 142)
- HI_LIM (see Page 143)
- LO_LO_LIM (see Page 145)
- LO_LIM (see Page 145)

5.11 Alarm detection and processing

Process alarms provide information on particular block statuses and block events. The status of the process alarms is communicated to the fieldbus host system via the parameter BLOCK_ALM (see Page 140). The parameter ACK_OPTION (see Page 138) specifies whether an alarm must be confirmed via the fieldbus host system.

The following process alarms are generated by the Analog Input Function Block:

- **Block process alarms**
  A block process alarm is triggered via the parameter BLOCK_ERR (see Page 141). The parameter BLOCK_ALM (see Page 140) is used to show the block process alarms and communicate them to the fieldbus host system. The following process alarms can be generated by the Analog Input Function Block:
  - SIMULATE ACTIVE
  - INPUT FAILURE
  - OUT OF SERVICE
  - BLOCK CONFIG ERROR

  If the option of the process alarm (BLOCK ALM) has **not** been enabled in the parameter ACK_OPTION (see Page 138), the process alarms must be acknowledged in the parameter BLOCK_ALM (see Page 140).

- **Limit value process alarms**
  If a limit value is infringed then the priority specified for the limit value alarm will be checked before the limit value violation is communicated to the fieldbus host system. The priority that specifies the action in the event of an active limit value violation is determined by the following parameters:

  - HI_HI_PRI (see Page 143)
  - HI_PRI (see Page 143)
  - LO_LO_PRI (see Page 146)
  - LO_PRI (see Page 146)

  The status of the limit value process alarms is communicated to the fieldbus host system via the following parameters:

  - HI_HI_ALM (see Page 142)
  - HI_ALM (see Page 142)
  - LO_LO_ALM (see Page 145)
  - LO_ALM (see Page 145)

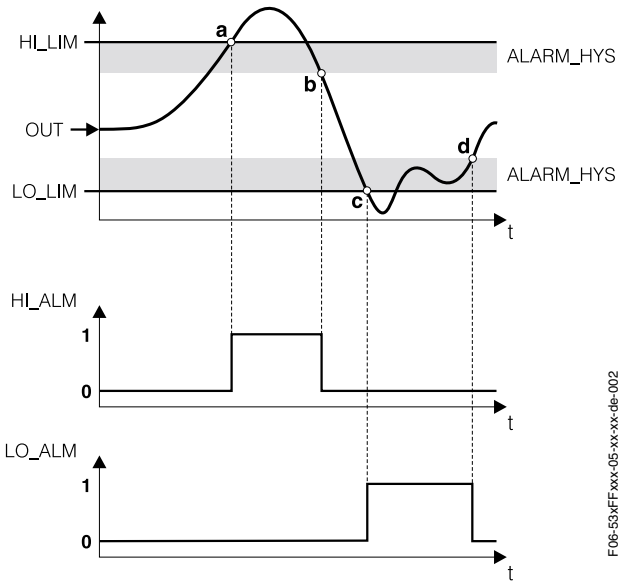
  If the option of a limit value process alarm has **not** been enabled in the parameter ACK_OPTION (see Page 138) then this must be acknowledged directly in its parameter (see list).

Note!
The parameter ALARM_SUM (see Page 140) shows the current status of all the process alarms.

5.12 Parameters of the Analog Input Function Block

The following table shows all the available parameters of the Analog Input function block.

Analog Input Function Block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
ACK_OPTION	**AUTO - MAN - OOS**	This parameter is used to specify whether a process alarm must be acknowledged at the time of alarm recognition by the fieldbus host system. If this option is enabled the process alarm is acknowledged automatically. **Options:** HI_HI_ALM Upper limit value alarm HI_ALM Upper limit value warning LO_LO_ALM Lower limit value alarm LO_ALM Lower limit value warning BLOCK ALM Block alarm **Factory setting:** The option is not enabled for any alarm, the alarms must be acknowledged
ALARM_HYS	**AUTO - MAN - OOS**	For entry of the hysteresis value for the upper and lower warning or alarm limit values. The alarm conditions remain active so long as the measured value is within the hysteresis. The hysteresis value affects the following warning and alarm limit values of the Analog Input Function Block: • HI_HI_ALM (Upper limit value alarm) • HI_ALM (Upper limit value warning) • LO_LO_ALM (Lower limit value alarm) • LO_ALM (Lower limit value warning) **User input:** 0...50% **Factory setting:** 0.5% ✎ Note! The hysteresis value relates to a percentage of the range of the parameter group OUT_SCALE in the Analog Input Function Block (see Page 148). (Continued on next Page)

Analog Input Function Block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
ALARM_HYS (Continuation)	**AUTO - MAN - OOS**	**Example:** The top diagram shows the limit values defined for the warnings LO_LIM and HI_LIM with their respective hystereses (gray background) and the signal curve of the output value OUT. The bottom two diagrams show the behaviour of the associated alarms HI_ALM and LO_ALM in relation to the changing signal curve (0 = no alarm, 1 = alarm output). **a** = The block output value OUT exceeds the limit value HI_LIM, HI_ALM is activated. **b** = The block output value OUT is below the hysteresis value of HI_LIM, HI_ALM is deactivated. **c** = The block output value OUT is below the limit value LO_LIM, LO_ALM is activated. **d** = The block output value OUT exceeds the hysteresis value of LO_LIM, LO_ALM is deactivated. 

Analog Input Function Block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
ALARM_SUM	**AUTO - MAN - OOS**	Displays the current status of the process alarms in the Analog Input Function Block. **Display:** HI_HI_ALM Violation of the upper limit value alarm HI_ALM Violation of the upper limit value warning LO_LO_ALM Violation of the lower limit value alarm LO_ALM Violation of the lower limit value warning BLOCK ALM Block alarm ✎ Note! In addition the process alarms can also be disabled in this parameter group.
ALERT_KEY	**AUTO - MAN - OOS**	For entry of the identification number of the plant unit. This information can be used by the fieldbus host system for sorting alarms and events. **User input:** 1...255 **Factory setting:** 0
BLOCK_ALM	**AUTO - MAN - OOS**	Displays the current block status with information on pending configuration, hardware or system errors, including details of the alarm time (date, time) when the error occurred. The block alarm is triggered in the event of the following block errors: • SIMULATE ACTIVE • INPUT FAILURE • OUT OF SERVICE • BLOCK CONFIG ERROR ✎ Note! If the option of the alarm has **not** been enabled in the parameter ACK_OPTION, the alarm can only be acknowledged via this parameter.

Analog Input Function Block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
BLOCK_ERR	**read only**	Displays the active block error. **Display:** SIMULATE ACTIVE Simulation in the parameter group "Simulate" of the Analog Input Function Block is active. INPUT FAILURE Input fault, the input value of the Transducer Block has a status of BAD. OUT OF SERVICE The block has the status "Out Of Service". BLOCK CONFIG ERROR The unit selected via the parameter group XD_SCALE does not match the measured variable of the selected process variable. If linearisation type "Direct" is selected in the parameter L_TYPE, the scalings of the parameter groups XD_SCALE and OUT_SCALE do not match.
CHANNEL	**OOS**	Assignment between the logical hardware channels of the Transducer Block and the input of the relevant Analog Input Function Block. The Transducer Block of the Promass 83 FF provides two process variables for the following input channels of the Analog Input Function Blocks: **Options:** 0 = Initialized 1 = Mass Flow 2 = Volume Flow 3 = Corrected Volume Flow 4 = Density 5 = Reference Density 6 = Temperature 7 = Totalizer 1 8 = Totalizer 2 9 = Totalizer 3 16 = Discrete Output (this option has no effect) **Factory setting:** AI function block 1: CHANNEL = 1 (Mass Flow) AI function block 2: CHANNEL = 2 (Volume Flow) AI function block 3: CHANNEL = 3 (Corrected Volume Flow) AI function block 4: CHANNEL = 4 (Density) AI function block 5: CHANNEL = 5 (Reference Density) AI function block 6: CHANNEL = 6 (Temperature) AI function block 7: CHANNEL = 7 (Totalizer 1) ✎ Note! With option 0 = Initialized, the operating mode of the function block does not switch to the status AUTO.

Analog Input Function Block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
FIELD_VAL	**read only**	Displays the process variable with the associated status from the Transducer block. The value relates to a percentage of the input range XD_SCALE and when simulation is active is replaced by the simulation value. $FIELD\_VAL = \frac{100 \times (\text{process variable PV} - XD\_SCALE\_0\%)}{(XD\_SCALE\_100\% - XD\_SCALE\_0\%)}$ ✎ Note! The desired process variables from the Transducer block and the input value of the Analog Input Function Block are matched via the parameter CHANNEL.
GRANT_DENY	**AUTO - MAN - OOS**	Locks or unlocks the access authorisation of a fieldbus host system on the field device. ✎ Note! This parameter is not evaluated by the Promass 83 FF.
HI_ALM	**AUTO - MAN - OOS**	Alarm status display for the upper warning limit value (HI_LIM), including details of the time of the alarm (date, time) and the value that triggered the alarm. ✎ Note! • In addition the active block alarm can be acknowledged in this parameter group. • If the option of the alarm has **not** been enabled in the parameter ACK_OPTION, the alarm can only be acknowledged via this parameter.
HI_HI_ALM	**AUTO - MAN - OOS**	Alarm status display for the upper alarm limit value (HI_HI_LIM), including details of the time of the alarm (date, time) and the value that triggered the alarm. ✎ Note! • In addition the active block alarm can be acknowledged in this parameter group. • If the option of the alarm has **not** been enabled in the parameter ACK_OPTION, the alarm can only be acknowledged via this parameter.
HI_HI_LIM	**AUTO - MAN - OOS**	Entry of the alarm limit value for the upper alarm (HI_HI_ALM). If the output value OUT exceeds this limit value then the alarm status parameter HI_HI_ALM is output. **User input:** Range and unit of OUT_SCALE **Factory setting:** $3402823466 \times 10^{38}$

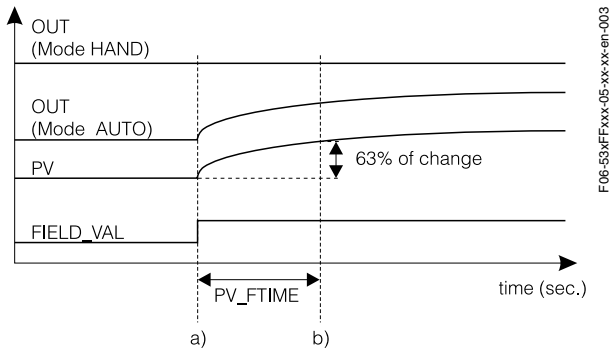
Analog Input Function Block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
HI_HI_PRI	**AUTO - MAN - OOS**	Specifies the action taken when the upper alarm limit value (HI_HI_LIM) is exceeded. **User input:** 0 The violation of the upper alarm limit is not evaluated. 1 No notification if the upper alarm limit is infringed. 2 Reserved for block alarms. 3-7 The violation of the upper alarm limit is output as a user notice with the appropriate priority (3 = low priority, 7 = high priority). 8-15 The violation of the upper alarm limit is output as a critical alarm with the appropriate priority (8 = low priority, 15 = high priority). **Factory setting:** 0
HI_LIM	**AUTO - MAN - OOS**	Entry of the alarm limit value for the upper warning (HI_ALM). If the output value OUT exceeds this limit value then the alarm status parameter HI_ALM is output. **User input:** Range and unit of OUT_SCALE **Factory setting:** $3402823466 \times 10^{38}$
HI_PRI	**AUTO - MAN - OOS**	Specifies the action taken when the upper warning limit value (HI_LIM) is exceeded. **User input:** 0 The violation of the upper warning limit is not evaluated. 1 No notification if the upper warning limit is infringed. 2 Reserved for block alarms. 3-7 The violation of the upper warning limit is output as a user notice with the appropriate priority (3 = low priority, 7 = high priority). 8-15 The violation of the upper warning limit is output as a critical alarm with the appropriate priority (8 = low priority, 15 = high priority). **Factory setting:** 0

Analog Input Function Block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
IO_OPTS	**OOS**	Activates the options for processing the input and output values of the function block (I/O options). The Analog Input Function Block supports the following options: **Options:** Low Cut Off (low flow cut off) **Factory setting:** not enabled ✎ Note! The activation point of the low flow cut off can be entered via the parameter LOW-CUT (see Page 147).
L_TYPE	**MAN**	Selects the type of linearisation for the input value. **Options:** Uninitialized Direct With this setting the measured value from the Transducer Block (input value) avoids the linearisation function and is looped unchanged with the same unit by the Analog Input Function Block. With this option the scaling and unit of the parameter groups XD_SCALE and OUT_SCALE must be identical. If this is not the case, the function block switches to operating mode OOS. $PV = \text{Input value}$ Indirect (linear conversion) With this setting the measured value from the Transducer Block (input value) is rescaled linearly via the input scaling XD_SCALE to the desired output range OUT_SCALE. $PV = \frac{X}{100} \cdot (Y - Z) - Z$ X = FIELD_VAL Y = OUTSCALE_100% Z = OUTSCALE_0% Indirect Square Root With this setting the measured value from the Transducer Block (input value) is rescaled via the parameter group XD_SCALE and recalculated using a square root function. It is then rescaled again to the desired output range via the parameter group OUT_SCALE. $PV = \sqrt{\frac{X}{100}} \cdot (Y - Z) - Z$ X = FIELD_VAL Y = OUTSCALE_100% Z = OUTSCALE_0% **Factory setting:** Uninitialized ✎ Note! With option Uninitialized, the operating mode of the function block does not switch to the status AUTO.

Analog Input Function Block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
LO_ALM	**AUTO - MAN - OOS**	Alarm status display for the lower warning limit value (LO_LIM), including details of the time of the alarm (date, time) and the value that triggered the alarm. ✎ Note! • In addition the active block alarm can be acknowledged in this parameter group. • If the option of the alarm has **not** been enabled in the parameter ACK_OPTION, the alarm can only be acknowledged via this parameter.
LO_LIM	**AUTO - MAN - OOS**	Entry of the alarm limit value for the lower warning (LO_ALM). If the output value OUT is below this limit value then the alarm status parameter LO_ALM is output. **User input:** Range and unit of OUT_SCALE **Factory setting:** $-3402823466 \times 10^{38}$
LO_LO_ALM	**read only**	Alarm status display for the lower alarm limit value (LO_LO_LIM), including details of the time of the alarm (date, time) and the value that triggered the alarm. ✎ Note! • In addition the active block alarm can be acknowledged in this parameter group. • If the option of the alarm has **not** been enabled in the parameter ACK_OPTION, the alarm can only be acknowledged via this parameter.
LO_LO_LIM	**AUTO - MAN - OOS**	Entry of the alarm limit value for the lower alarm (LO_LO_ALM). If the output value OUT is below this limit value then the alarm status parameter LO_LO_ALM is output. **User input:** Range and unit of OUT_SCALE **Factory setting:** $-3402823466 \times 10^{38}$

Analog Input Function Block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
LO_LO_PRI	**AUTO - MAN - OOS**	Specifies the action taken when the lower alarm limit value (LO_LO_LIM) is not reached. **User input:** 0 The violation of the lower alarm limit is not evaluated. 1 No notification to master if the lower alarm limit is infringed. 2 Reserved for block alarms. 3-7 The violation of the lower alarm limit is output as a user notice with the appropriate priority (3 = low priority, 7 = high priority). 8-15 The violation of the lower alarm limit is output as a critical alarm with the appropriate priority (8 = low priority, 15 = high priority). **Factory setting:** 0
LO_PRI	**AUTO - MAN - OOS**	Specifies the action taken when the lower warning limit value (LO_LIM) is exceeded. **User input:** 0 The violation of the lower warning limit is not evaluated. 1 No notification to master if the lower warning limit is infringed. 2 Reserved for block alarms. 3-7 The violation of the lower warning limit is output as a user notice with the appropriate priority (3 = low priority, 7 = high priority). 8-15 The violation of the lower warning limit is output as a critical alarm with the appropriate priority (8 = low priority, 15 = high priority). **Factory setting:** 0

Analog Input Function Block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
LOW_CUT	**AUTO - MAN - OOS**	For entry of a limit value for the Low Flow Cut Off. If the converted measured value is below this limit value then PV is shown as zero. **User input:** Range and unit of OUT_SCALE **Factory setting:** 0 ✎ Note! • This parameter is only active if the I/O option Low Flow Cut Off has been selected in the parameter IO_OPTS (see Page 144). • The unit used is copied from the parameter group OUT_SCALE.
MODE_BLK	**AUTO - MAN - OOS**	Displays the current (Actual) and desired (Target) operating mode of the Analog Input Function Block, the permitted modes (Permitted) supported by the Resource Block and the normal operating mode (Normal). **Display:** AUTO MAN OOS ✎ Note! The Analog Input Function Block supports the following operating modes: • AUTO (automatic operation) The block is executed. • MAN (manual intervention by the operator) The output value OUT can be specified. • OOS (Out Of Service) The block has the status "Out Of Service". With the output value OUT the last valid value is output. The status of the output value OUT switches to BAD.
OUT	**MAN - OOS**	Displays the output value with alarm evaluation and the status of the Analog Input Function Block. ✎ Note! • If MAN (manual) is selected for the operating mode in the parameter MODE_BLK then the output value OUT can be specified manually here. • The unit used is copied from the parameter group OUT_SCALE.

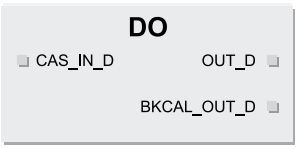
Analog Input Function Block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
OUT_SCALE	**MAN - OOS**	Definition of the output range (lower and upper limit), the physical unit and the number of decimal places for the output value (OUT). **Factory setting:** Analog Input Function Block 1 = 0...100 kg/h Analog Input Function Block 2 = 0...100 m^3/h Analog Input Function Block 3 = 0...100 Nm^3/h Analog Input Function Block 4 = 0...100 kg/l Analog Input Function Block 5 = 0...100 kg/Nl Analog Input Function Block 6 = 0...100 °C Analog Input Function Block 7 = 0...100 kg ✎ Note! Defining the measurement range in this parameter group does not restrict the output value OUT. If the output value OUT is outside the measurement range, this value is transferred nonetheless.
PV	**read only**	Displays the process variable used for the block execution, including the status of the process variable. ✎ Note! The unit used is copied from the parameter group OUT_SCALE.
PV_FTIME	**AUTO - MAN - OOS**	Entry of the filter time constant (in seconds) of the digital filter of the 1st order. This time is required in order for 63% of a change in the parameter FIELD_VAL to have an effect on the value of PV. The diagram shows the signal curves of the Analog Input Function Block over time:  a) The parameter FIELD_VAL changes. b) The parameter PV has reacted 63% to the change in the parameter FIELD_VAL. **Factory setting:** 0 s

Analog Input Function Block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
SIMULATE	**AUTO - MAN - OOS**	Simulation of the input value and input status. Since this value runs through the entire algorithm, the behaviour of the Analog Input Function Block can be checked. **Factory setting:** Simulation Disabled ✎ Note! The parameter BLOCK_ERROR of the Resource Block shows whether simulation is possible.
ST_REV	**read only**	Displays the revision status of the static data. ✎ Note! The revision status parameter is incremented on each modification of static data.
STATUS_ OPTS	**OOS**	Specifies the options for status processing and processing of the output parameter OUT. The following options will be supported: **Options:** Uncertain if MAN mode The status of the output value OUT changes to UNCERTAIN if the operating mode is set to "MAN" Propagate Fault Forward Fault is forwarded on. The status of the Transducer block is passed on to succeeding function blocks via the parameter BKCAL_OUT. **Factory setting:** no options active
STRATEGY	**AUTO - MAN - OOS**	Parameter for grouping and thus faster evaluation of blocks. Grouping is carried out by entering the same numerical value in the parameter STRATEGY for each individual block. **Factory setting:** 0 ✎ Note! This data is neither checked nor processed by the Analog Input Function Block.
TAG_DESC	**AUTO - MAN - OOS**	Entry of a user-specific text of max. 32 characters for unique identification and assignment of the block. **Factory setting:** "_ _ _ _ _ _ _ _" without text
UPDATE_EVT	**read only**	Displays whether static block data has been modified, including date and time.

Analog Input Function Block		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
XD_SCALE	**MAN - OOS**	In this parameter group, the corresponding process variable from the Transducer block is scaled and the unit is determined. **User input:** Process variable of the sensor. **Factory setting:** Analog Input Function Block 1 = 0...100 kg/h Analog Input Function Block 2 = 0...100 m^3/h Analog Input Function Block 3 = 0...100 Nm^3/h Analog Input Function Block 4 = 0...100 kg/l Analog Input Function Block 5 = 0...100 kg/Nl Analog Input Function Block 6 = 0...100 °C Analog Input Function Block 7 = 0...100 kg ✎ Note! • Defining the measurement range in this parameter group does not represent a restriction. If the value is outside the measurement range, it is transferred nonetheless. • The unit options depend on the corresponding channel: Channel = 1, only units for the mass flow are valid Channel = 2, only units for the volume flow are valid Channel = 3, only units for the corrected volume floware valid Channel = 4, only units for the density are valid Channel = 5, only units for the reference density are valid Channel = 6, only units for the temperature are valid Channel = 7, only units for the totalizer 1 are valid Channel = 8, only units for the totalizer 2 are valid Channel = 9, only units for the totalizer 3 are valid If a unit that does not match is selected, the function block switches to operating mode OOS (Out Of Service). • The unit selected in this parameter group is also valid for the Transducer Block. • Entry of the measurement range via the parameter XD_SCALE does not restrict the output. • A description of the rescaling of an input value via the parameter XD_SCALE can be found on Page 136.

6 Discrete Output Function block

The Discrete Output function block (DO, Discrete Output) processes a discrete setpoint value received from an upstream function block or higher level process control system, with which various instrument functions (e.g. zero point adjustment or totalizer reset) can be initiated in the subsequent Transducer block.



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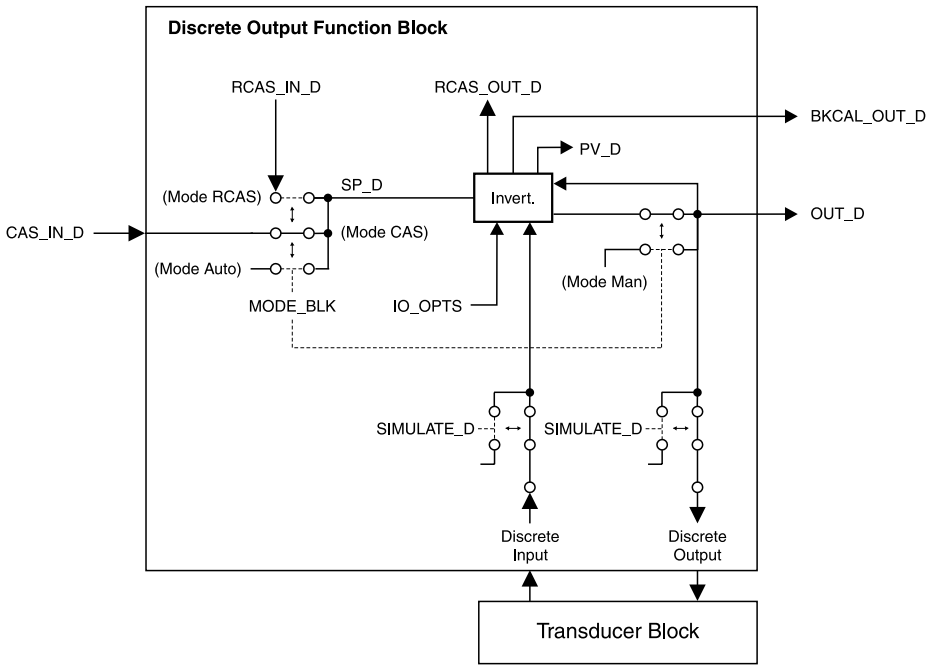
CAS_IN _D = Remote setpoint value from another function block
OUT_D = Discrete output value and status
BKCAL_OUT_D = Discrete output value and status required by BKCAL_IN_D input of another block for output tracking.

6.1 Signal processing

The figure shows the internal structure of the Discrete Output function blocks:



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In the CAS operating mode (cascade operation), the Discrete Output function block receives, via the function block input CAS_IN_D, a discrete signal from an upstream function block. This signal controls the setpoint value (parameter SP_D) of the function block, and after internal calculation is sent as an output signal (parameter OUT_D) to the Transducer block for control of instrument functions (e.g. zero point adjustment). The output value and status of the Discrete Output function block is communicated to the upstream block via the output BKCAL_OUT_D.
Signal processing in the RCAS operating mode (remote cascade operation) is largely identical to the CAS operating mode. However, in this operating mode, control of the parameter SP_D does not take place via an upstream function block but through a process control system. The output value and status of the Discrete Output function block is communicated to the process control system as an answer message via parameter RCAS_OUT_D.

In the AUTO operating mode (automatic operation), the set point value (parameter SP_D) is prescribed directly in the Discrete Output function block. In this case, the parameter CAS_IN_D is not taken into consideration in the internal calculation.

In the MAN operating mode (HAND), the output value (parameter OUT_D) can be prescribed directly in the Discrete Output function block. No internal calculation takes place.

The major functions and parameters of the Discrete Output Function Block are listed below; you will find an overview of all the available parameters starting on Seite 154.

6.2 Selection of the process variable

The operating mode is set via the parameter group MODE_BLKK (see Seite 157). The Discrete Output Function Block supports the following operating modes:
- AUTO
- MAN
- CAS
- RCAS
- OOS

6.3 Saftey behavior

There is a safety default available (fault state)for the Discrete Output function block. This is activated when a fault condition (of the corresponding valid set point value) exists longer than defined in the parameter FSTATE_TIME, or when the parameter SET_FSTATE in the Resource block is activated. The safety operation is determined via the parameters FSTATE_TIME, FSTATE_VAL_D, and IO_OPTS.

6.4 Assignment between the Discrete Output Function block and the Transducer block

The assignment or connection between the Discrete Output function block and the Transducer block takes place in the Discrete Output function block via the parameter CHANNEL. Since in Promass 83 only one Transducer block exists, the value must be set to 16.

Parameter CHANNEL = 16 → Discrete Output Function block

6.5 Values for the parameters CAS_IN_D, RCAS_IN_D, OUT_D, and SP_D

Via the Discrete Output function block, different instrument functions in the Transducer block can be initiated via manufacturer-specific, fixed set point values from an upstream function block.

Here it must be observed that the desired function is only then executed when a status change from the value 0 (Discrete state 0) to the corresponding function value (following table) takes place. The value 0 always serves as the starting point for the corresponding control of instrument functions. A status change from a value not equal to zero to another value has no effect.

Input allocation of the parameter CAS_IN_D, RCAS_IN_D, OUT_D, SP_D

Status changes			Action
Discrete state 0	→	Discrete state 1	reserved
Discrete state 0	→	Discrete state 2	Positive Zero Return ON
Discrete state 0	→	Discrete state 3	Positive Zero Return OFF
Discrete state 0	→	Discrete state 4	Zero Point Adjustment
Discrete state 0	→	Discrete state 5	reserved
Discrete state 0	→	Discrete state 6	reserved
Discrete state 0	→	Discrete state 7	Reset Totalizers 1, 2, 3
Discrete state 0	→	Discrete state 8	Reset Totalizer 1
Discrete state 0	→	Discrete state 9	Reset Totalizer 2
Discrete state 0	→	Discrete state 10	Reset Totalizer 3

Example for the control of creep suppression via the Discrete Output function block.
The following example shows how the creep suppression can be activated or deactivated via the Discrete Output function block during a cleaning procedure.

1. In the first step, the connection between the Discrete Output function block and the Transducer block must be established. Here, the value 16 must be assigned to the parameter CHANNEL in the Discrete Output function block.

   Parameter CHANNEL = 16 → Discrete Output

2. In the CAS operating mode, the Discrete Output function block processes the set point value prescribed at the input CAS_IN_D from the upstream function block and transfers it to the Transducer block.

   Activating the creep suppression
   With a starting value of 0 (Discrete state 0), the creep suppression is activated by a status change from 0 to 2 at input CAS_IN_D.

   Deactivating the creep suppression
   The creep suppression can only then be deactivated when the input value at CAS_IN_D has first been set to output value 0 (Discrete state 0). Only then can the creep suppression be deactivated through a status change from 0 to 2 at input CAS_IN_D.

6.6 Parameter Discrete Output Funktionsblock

The following table shows all the available parameters of the Discrete Output function block.

Discrete Output Funktionsblock		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
ALERT_KEY	**AUTO - MAN - OOS - CAS - RCAS**	For entry of the identification number of the plant unit. This information can be used by the fieldbus host system for sorting alarms and events. **User input:** 1...255 **Factory setting:** 0
BLOCK_ALM	**AUTO - MAN - OOS - CAS - RCAS**	Displays the current block status with information on pending configuration, hardware or system errors, including details of the alarm time (date, time) when the error occurred. The block alarm is triggered in the event of the following block errors: • SIMULATE ACTIVE • INPUT FAILURE • OUTPUT FAILURE • READBACK FAILURE • OUT OF SERVICE • BLOCK CONFIG ERROR
BKCAL_OUT_D	**read only**	Displays the discrete output value and output status transferred in the case of cascade control to the input BKCAL_IN_D of the preceding function block.
BLOCK_ERR	**read only**	Displays the active block error. **Display:** SIMULATE ACTIVE Simulation in the parameter group "SIMULATE_D" of the Discrete Output Function Block is active. INPUT FAILURE Input fault, the input value of the Transducer Block has a status of BAD. OUTPUT FAILURE Fault in Transducer block. OUT OF SERVICE The block has the status "Out Of Service". BLOCK CONFIG ERROR • An operating switchover is not possible, since the value of the Period of Execution time = 0. • A switchover to the RCAS operating mode is not possible, since the selection Uninitialized in the parameter SHED_OPT was made.

Discrete Output Funktionsblock		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
CAS_IN_D	**AUTO - MAN - OOS - CAS - RCAS**	Displays the discrete setpoint value and status copied from an external function block in operating mode CAS. Discrete state 0 = Starting point, no effect Discrete state 1 = reserved Discrete state 2 = Positive Zero Return ON Discrete state 3 = Positive Zero Return OFF Discrete state 4 = Zero Point Adjustment Discrete state 5 = reserved Discrete state 6 = reserved Discrete state 7 = Reset Totalizers 1, 2, 3 Discrete state 8 = Reset Totalizer 1 Discrete state 9 = Reset Totalizer 2 Discrete state 10 = Reset Totalizer 3 ✎ Note! • The desired function will only then be carried out when a status change from 0 (Discrete state 0) to the corresponding function value (e.g. Discrete state 2 = Positive Zero Return ON) takes place. • The remote setpoint value read in via the parameter CAS_IN_D is only used if the Discrete Output Function Block is in operating mode CAS. In operating mode AUTO the value of parameter SP_D is used as a setpoint value.
CHANNEL	**OOS**	✎ Note! With Promass 83, this parameter is fixed at the selection 16. Assignment between the logical hardware channels of the Transducer Block and the input of the Discrete Output Function Blocks. **Options:** 0 = initialized 1 = Mass Flow (this option is not supported) 2 = Volume Flow (this option is not supported) 3 = Corrected Volume Flow (this option is not supported) 4 = Density (this option is not supported) 5 = Reference Density (this option is not supported) 6 = Temperature (this option is not supported) 7 = Totalizer 1 (this option is not supported) 8 = Totalizer 2 (this option is not supported) 9 = Totalizer 3 (this option is not supported) 16 = Discrete Output
FSTATE_TIME	**AUTO - MAN - OOS - CAS - RCAS**	Input of the delay time which must expire with a fault of the external lead value (parameter RCAS_IN_D), before the defined fault operation is initiated. **Factory setting:** 0 s ✎ Note! After expiry of the delay time and a still active fault, the following values are used for further processing: • If in the parameter IO_OPTS the option Fault State to value was selected, the value of the parameter FSATE_VAL_D (fault replacement value) will be used. • If in the parameter IO_OPTS the option Fault State to value was not selected, the value of the parameter RCAS_IN_D will continue to be used.

Discrete Output Funktionsblock		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
FSTATE_ VAL_D	**AUTO - MAN - OOS - CAS - RCAS**	Entry of a fault condition replacement value for the parameter RCAS_IN_D. This value will be used for further processing instead of the parameter RCAS_IN_D when the following conditions are fulfilled: • An active fault of the parameter RCAS_IN_D exists. • The delay time FSTATE_TIME has expired. • The option Fault State to value has been selected in the parameter IO_OPTS. **Options:** 0 = Starting point, no effect 1 = reserved 2 = Positive Zero Return ON 3 = Positive Zero Return OFF 4 = Zero Point Adjustment 5 = reserved 6 = reserved 7 = Reset Totalizer 1, 2, 3 8 = Reset Totalizer 1 9 = Reset Totalizer 2 10 = Reset Totalizer 3 **Factory setting:** 0
GRANT_DENY	**AUTO - MAN - OOS - CAS - RCAS**	Locks or unlocks the access authorisation of a fieldbus host system on the field device. ✎ Note! This parameter is not evaluated by the Promass 83 FF.
IO_OPTS	**OOS**	Activates the options for processing the input and output values of the function block (I/O options). **Options:** • PV for BKCAL_OUT For BKCAL_OUT_D, the value of parameter PV_D is used instead of the parameter SP_D. • SP-PV Track in MAN SP_D follows PV_D in the MAN operating mode. • SP-PV Track in LO SP_D follows PV_D in the LO operating mode. • Invert Inverting of the output value OUT_D to the Transducer block. • Fault State to value When fault operation is initiated, FSTATE_VAL_D is used as set point value. • Use Fault State Value on restart During instrument startup, FSTATE_VAL_D is used as set point value until a valid value is available. • Target to MAN if Fault State activated When fault operation is initiated, the requested (Target) operating mode of the parameter group MODE_BLK is set to MAN, and the original target operating mode is lost. After leaving the fault operation, the block remains in MAN and must be set to the desired operating mode by the user. **Factory setting:** not enabled

Discrete Output Funktionsblock		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
MODE_BLK	**AUTO - MAN - OOS - CAS - RCAS**	Displays the current (Actual) and desired (Target) operating mode of the Discrete Output Function Block, the permitted modes (Permitted) supported by the Resource Block, and the normal operating mode (Normal). **Display:** AUTO - MAN - OOS - CAS - RCAS The Discrete Output Function Block supports the following operating modes: • AUTO (Automatic Operation) The setpoint value specified by the user via the parameter SP_D is used in the execution of the internal Discrete Output algorithm. • MAN (Manual Intervention by the Operator) The parameter OUT_D can be specified directly by the user. • OOS (Out Of Service) The block has the status "Out Of Service". The Discrete Output algorithm of the block is not executed. The last valid value is output at the parameter OUT_D and the status changes to BAD. • CAS (Cascade Mode) Via the input or parameter CAS_IN_D, the Discrete Output Function Block receives the setpoint value for internal calculation of the actuating variable directly from another function block. The internal Discrete Output algorithm is executed. • RCAS (External Cascade) Via the parameter RCAS_IN_D, the Discrete Output Function Block receives the setpoint value for internal calculation of the actuating variable directly from the fieldbus host system. The internal Discrete Output algorithm is executed.
OUT_D	**MAN - OOS**	Displays the discrete output value and the status of the Discrete Output Funktionsblocks. ✎ Note! If MAN (manual) is selected for the operating mode in the parameter MODE_BLK then the output value OUT_D can be specified manually here.
PV_D	**read only**	Display of the discrete process variable value and status determined in the parameter READBACK_D.
PV_STATE	**AUTO - MAN - OOS - CAS - RCAS**	In this parameter, the Fieldbus host system can store a reference to a description of the possible conditions of the parameter PV_D. ✎ Note! This parameter is not evaluated by the Promass 83 FF..
RCAS_IN_D	**AUTO - MAN - OOS - CAS - RCAS**	In this parameter the analog actuating variable provided by the fieldbus host system (value and status) is read in for internal calculation of the actuating variable and displayed. ✎ Note! This parameter is only active in operating mode RCAS.

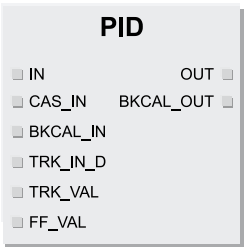
Discrete Output Funktionsblock		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
RCAS_OUT_D	**read only**	Displays the analog output value and output status of the specified setpoint value transferred to the fieldbus host system in the course of cascade control. ✎ Note! This parameter is only active in operating mode RCAS.
READBACK_D	**read only**	Display of the input signal condition and status of the answer message input.
SHED_OPT	**AUTO - MAN - OOS - CAS - RCAS**	Selects the action taken if the monitoring time is exceeded (see parameter SHED_RCAS on Seite 84) in operating mode RCAS. During the monitoring time parameter updating between the fieldbus host system and the Discrete Output Function Block is chekked. If the parameters are not being updated then on expiry of the monitoring time the Discrete Output Function Block switches from operating mode RCAS to the mode selected here. **Options:** Uninitialized NormalShed_NormalReturn NormalShed_NoReturn ShedToAuto_NormalReturn ShedToAuto_NoReturn ShedToManual_NormalReturn ShedToManual_NoReturn ShedToRetainedTarget_NormalReturn ShedToRetainedTarget_NoReturn **Factory setting:** Uninitialized
SIMULATE_D	**AUTO - MAN - OOS - CAS - RCAS**	Simulation of the value and status of the process variable PV_D. **Factory setting:** Simulation Disabled (Simulation not active) ✎ Note! • During the simulation, the value of OUT_D is not passed on to the Transducer block. The Transducer block keeps the last valid value from before the simulation was activated. • The parameter BLOCK_ERROR of the Resource block shows whether a simulation is possible.
SP_D	**AUTO - MAN - OOS**	Entry of the discrete setpoint value. **User input:** 0 = Starting point, no effect 1 = reserved 2 = Positive Zero Return ON 3 = Positive Zero Return OFF 4 = Zero Point Adjustment 5 = reserved 6 = reserved 7 = Reset Totalizer 1, 2, 3 8 = Reset Totalizer 1 9 = Reset Totalizer 2 10 = Reset Totalizer 3

Discrete Output Funktionsblock		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
ST_REV	**read only**	Displays the revision status of the static data. ✎ Note! The revision status parameter is incremented on each modification of static data.
STATUS_OPTS	**OOS**	Selects the available status options for specifying the status processing and processing of the output parameter OUT_D. **Options:** Propagate Fault Backward Pass on fault operation to upstream blocks. **Factory setting:** no option active
STRATEGY	**AUTO - MAN - OOS - CAS - RCAS**	Parameter for grouping and thus faster evaluation of blocks. Grouping is carried out by entering the same numerical value in the parameter STRATEGY for each individual block. **Factory setting:** 0 ✎ Note! This data is neither checked nor processed by the Discrete Output Function Block.
TAG_DESC	**AUTO - MAN - OOS - CAS - RCAS**	Entry of a user-specific text of max. 32 characters for unique identification and assignment of the block. **Factory setting:** "_ _ _ _ _ _ _ _" without text
UPDATE_EVT	**read only**	Displays whether static block data has been modified, including date and time.
XD_STATE	**AUTO - MAN - OOS - CAS - RCAS**	In this parameter, the Fieldbus host system can store a reference to a description of the possible conditions of the parameter PV_D. ✎ Note! This parameter is not evaluated by the Promass 83 FF.

7 PID Function Block (PID controller)

A PID Function Block contains the input channel processing, the proportional integral-differential control (PID) and the analog output channel processing. The configuration of the PID Function Block depends on the automation task. The following can be realized: basic controls, feedforward control rejection, cascade control, cascade control with limiting.

The possibilities available for processing measured values within the PID Function Block include: signal scaling and limiting, operating mode control, actuating, limiting control, limit detection, signal status propagation.



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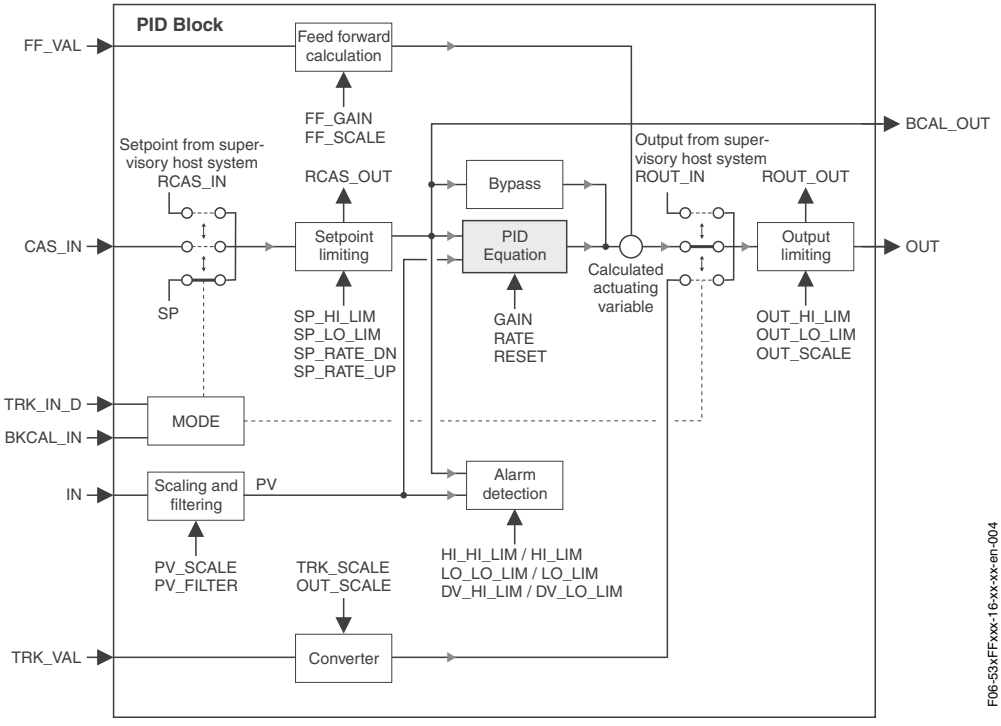
- IN = Input of the controlled variable from another function block.
- CAS_IN = Input of the remote setpoint value from another function block.
- BKCAL_IN = Input of the feedback value and status from the output BKCAL_OUT of the subsequent function block, to prevent reset window and to initialise the control loop.
- TRK_IN_D = Discrete input for activating the external output tracking function.
- TRK_VAL = Input for the external value for tracking from another function block.
- FF_VAL = Input for the disturbance variable from another function block. (Feedforward control)
- OUT = Output value and status (actuating variable) of the PID Function Block.
- BKCAL_OUT = Output for the feedback value and status transferred to the input BKCAL_IN of the upstream function block to prevent reset window and to provide bumpless transfer to closed loop control.

7.1 Signal processing in the PID Function Block

The diagram shows the internal structure of the PID Function Block:



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7.2 PID Function Block equation

The PID Function Block (PID controller) can be used for various automation strategies. The function block has a flexible control algorithm that can be configured differently depending on the application.

$$y = GAIN \cdot \left(e + \frac{1}{RESET} \cdot \int e \cdot \Delta t + RATE \cdot \frac{\Delta e}{\Delta t} \right) + F$$

- y = Actuating variable calculated from the PID algorithm.
- GAIN = Proportional gain factor (P-term)
- RESET = Time constant for the integral action in seconds (I-term)
- RATE = Time constant for the derivative action in seconds (D-term)
- e = Control deviation (e = setpoint value - PV)
- F = Disturbance variable (F = FF_VAL • FF_GAIN)

The output variable OUT results following checking of the range limits OUT_HI_LIM and OUT_LO_LIM (see Page 178).

The PID Function Block consists of a proportional term, an integral term and a derivative term. The actuating variable is calculated on the basis of the control deviation between the setpoint value SP and the process variable PV (controlled variable).

The individual PID actions are used in the calculation of the actuating variable as follows:

- Proportional term - GAIN- :
  The proportional term reacts directly and immediately to a change in the setpoint value SP or the process variable PV (controlled variable). The actuating variable is modified by the proportional factor GAIN, which corresponds to the control deviation multiplied by the gain factor. If a controller works only with the proportional term, then the control has a remaining control deviation.

- Integral term - RESET - :
  The control deviation arising from the calculation of the actuating variable using the proportional term is integrated via the integral term of the controller until this control deviation is negligible. The integral function RESET corrects the actuating variable depending on the size and duration of the control deviation. If the value for the integral function RESET is set to zero then the controller works with pure I-control. The influence of the integral term on the control is greater if the value of the integral function RESET is reduced.

- Derivative term - RATE - :
  In the case of control sections with long delays, e.g. temperature controls, it is useful to use the derivative term RATE of the controller. Using the derivative term RATE the actuating variable is calculated as a function of the change in the control deviation.

7.3 Selecting the operating mode

The operating mode is set via the parameter group MODE_BLK (see Page 177).
The PID Function Block supports the following operating modes:
- AUTO
- MAN
- OOS
- CAS
- RCAS
- ROUT

Note!
The block status OOS is also shown via the parameter BLOCK_ERR (see Page 170). In operating mode OOS, if write protection is not enabled, you can access all the write parameters without restriction.

7.4 Setpoint selection

The PID Function Block works with different setpoint values (reference inputs) depending on the active operating mode:

- The PID Function Block is in operating mode AUTO:
  The setpoint value of the parameter SP (see Page 181) is used to calculate the actuating variable. This setpoint value is entered manually by the operator in the parameter SP.

- The PID Function Block is in operating mode CAS:
  The setpoint value of the parameter CAS_IN (see Page 170) is used to calculate the actuating variable. This setpoint value is copied from an external function block or a host computer and read in via the input parameter CAS_IN in the PID Function Block.

- The PID Function Block is in operating mode RCAS:
  The setpoint value of the parameter RCAS_IN (see Page 180) is used to calculate the actuating variable. This setpoint value is copied from the fieldbus host system and read in via the input parameter RCAS_IN in the PID Function Block.

Note!
The range of setpoint value input can be restricted via the parameters SP_HI_LIM and SP_LO_LIM (see Page 181).

7.5 Damping

Specifying a time in the parameter PV_FTIME (see Page 179) slows down the reaction of the internal process variables to changes in the input value IN (controlled variable). This output filter is useful where the input value fluctuates greatly. Where a time of 0 seconds is specified, the output value is not filtered.

7.6 Limit Values

The limit values are based on the value of the process variable PV (see Page 179). If the process variable PV exceeds or does not reach the defined limit values then an alarm is sent to the fieldbus host system via the limit value process alarms.
The following limit values can be defined:

- HI_HI_LIM (see Page 174)
- HI_LIM (see Page 175)
- LO_LO_LIM (see Page 176)
- LO_LIM (see Page 176)
- DV_HI_ALM (see Page 171)
- DV_LO_ALM (see Page 172)

7.7 Alarm detection and processing

Process alarms provide information on particular block statuses and block events. The status of the process alarms is communicated to the fieldbus host system via the parameter BLOCK_ALM (see Page 170). The parameter ACK_OPTION (see Page 138) specifies whether an alarm must be acknowledged via the fieldbus host system.

The following process alarms are generated by the PID Function Block:

- Block process alarms
  A block process alarm is triggered via the parameter BLOCK_ERR (see Page 170). The parameter BLOCK_ALM (see Page 170) is used to show the block process alarms and communicate them to the fieldbus host system. The following block process alarm can be generated by the PID Function Block:

  - OUT OF SERVICE

  If the option of the process alarm (BLOCK ALM) has **not** been enabled in the parameter ACK_OPTION (see Page 166), the process alarms can only be acknowledged in the parameter BLOCK_ALM (see Page 170).

- Limit value process alarms
  If a limit value is violated then the priority specified for the limit value alarm will be checked before the limit value violation is communicated to the fieldbus host system. The priority that specifies the action in the event of an active limit value violation is determined by the following parameters:

  - HI_HI_PRI (see Page 174)
  - HI_PRI (see Page 175)
  - LO_LO_PRI (see Page 176)
  - LO_PRI (see Page 177)
  - DV_HI_PRI (see Page 172)
  - DV_LO_PRI (see Page 173)

  The status of the limit value process alarms is communicated to the fieldbus host system via the following parameters:

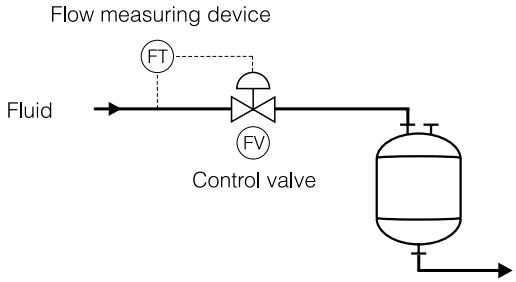
  - HI_HI_ALM (see Page 174)
  - HI_ALM (see Page 174)
  - LO_LO_ALM (see Page 176)
  - LO_ALM (see Page 175)
  - DV_HI_ALM (see Page 171)
  - DV_LO_ALM (see Page 172)

  If the option of a limit value process alarm has **not** been enabled in the parameter ACK_OPTION (see Page 166) then this must be acknowledged directly in its parameter (see list).

Note!
The parameter ALARM_SUM (see Page 168) shows the current status of all the process alarms.

7.8 Example: Basic PID control strategy

The continual flow into a container is to be controlled.
The volume flow of the medium is captured via a flow transmitter (FT) and made available to the PID Function Block via an Analog Input Function Block. The PID Function Block may be either in the flowmeter or in the control valve. The actuating variable that is forwarded to the control valve (FV) is calculated in the PID Function Block using the deviation between the measured volume flow and the specified setpoint value (desired volume flow).



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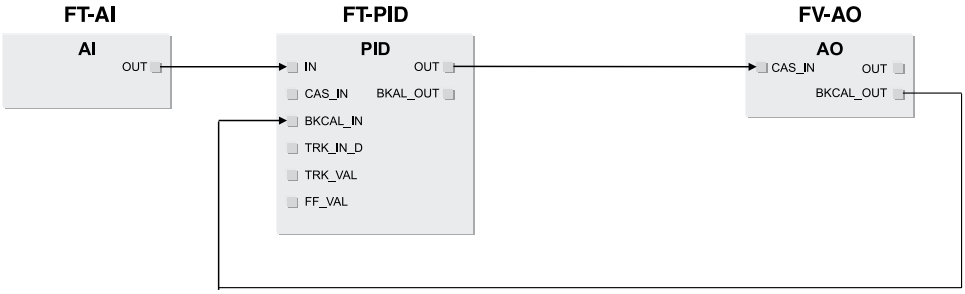
Connecting blocks
The PID Function Block receives its input value (controlled variable) from an Analog Input Function Block (output parameter OUT). This input value, which corresponds to the measured volume flow of the flowmeter, is read in via the parameter IN (see Page 175) in the PID Function Block.

In operating mode AUTO the setpoint value is specified manually via the parameter SP (see Page 181).

The actuating variable calculated in the PID Function Block is connected to the input parameter CAS_IN of the Analog Output Function Block via the output parameter OUT (see Page 178). The Analog Output Function Block forwards this actuating variable to the control valve.

In addition, the output parameter BKCAL_OUT of the Analog Output Function Block is read into the PID Function Block via the input parameter BKCAL_IN (see Page 170) in order to provide bumpless transfer to closed loop control.



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7.9 PID Function Block configuration

The measurement range of the flowmeter (controlled variable) is 0 ... 30 m^3/h.
The desired flow value (setpoint value) is specified manually via the parameter SP and should be 15 m^3/h. The Analog Output Function Block is actuated over an output range of 0 ... 100%.

Configuration:

- Setting the input range and input unit of the controlled variable at input IN:

  PV_SCALE 0 % = 0
  PV_SCALE 100% = 30
  PV_SCALE UNIT = m^3/h

- Setting the output range and output unit of the actuating variable at output OUT:

  OUT_SCALE 0 % = 0
  OUT_SCALE 100% = 100
  OUT_SCALE UNIT = %

- Defining the input limits for the setpoint value range:

  SP_LO_LIM = 0
  SP_HI_LIM = 30

- Defining the output limits for the actuating variable at output OUT:

  OUT_LO_LIM = 0
  OUT_HI_LIM = 100

- Setting the bypass function:
  In order to be able to deactivate the bypass function via the parameter BYPASS, the option Bypass Enable must first be activated via the parameter CONTROL_OPTS.

- Setting the control parameter (depending on the controlled system):
  GAIN - proportional gain factor (P-term)
  RESET- time constant for the integral action in seconds (I-term)
  RATE- time constant for the derivative action in seconds (D-term)

- Specifying the setpoint value via parameter SP:
  SP = 15

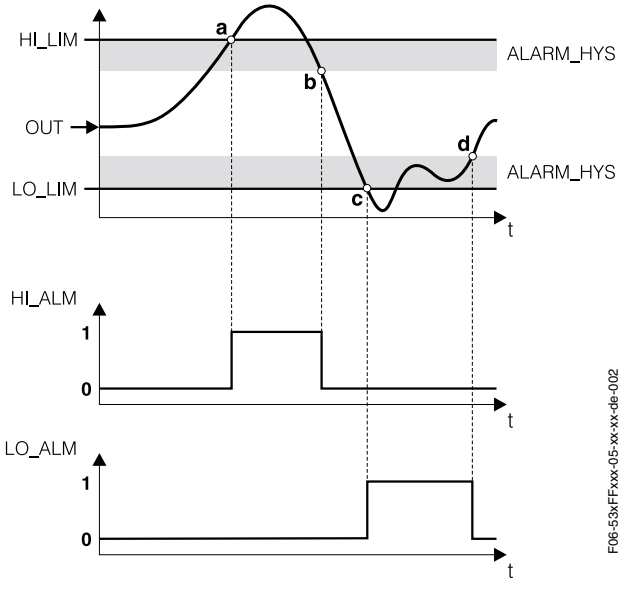
- Configuration of the limit value and control deviation alarms and associated priorities, if required.

- In order for the PID Function Block to be executed the operating mode must be set to AUTO.

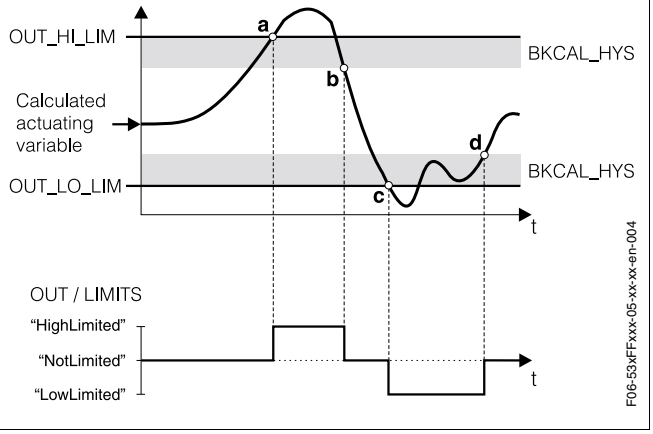
7.10 Parameters of the PID Function Block

The following table shows all the available parameters of the PID Function Block:

PID Function Block (PID controller)		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
ACK_OPTION	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	This parameter is used to specify whether a process alarm must be acknowledged at the time of alarm recognition by the fieldbus host system. If this option is enabled the process alarm is acknowledged automatically. **Options:** HI_HI_ALM Upper limit value alarm HI_ALM Upper limit value warning LO_LO_ALM Lower limit value alarm LO_ALM Lower limit value warning DV_HI_ALM Limit value alarm for upper control deviation (SP-PV) DV_LO_ALM Limit value alarm for lower control deviation (SP-PV) BLOCK ALM Block alarm **Factory setting:** The option is not enabled for any alarm, the alarms must be acknowledged

PID Function Block (PID controller)		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
ALARM_HYS	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	For entry of the hysteresis value for the upper and lower warning or alarm limit values. The alarm conditions remain active as long as the measured value is within the hysteresis. The hysteresis value affects the following warning and alarm limit values of the PID Function Block: • HI_HI_ALM (Upper limit value alarm) • HI_ALM (Upper limit value warning) • LO_LO_ALM (Lower limit value alarm) • LO_ALM (Lower limit value warning) • DV_HI_ALM (Limit value for upper control deviation) • DV_LO_ALM (Limit value for lower control deviation) **User input:** 0...50% **Factory setting:** 0.5 ✎ Note! The hysteresis value relates to a percentage of the range of the parameter group PV_SCALE in the PID Function Block (see Page 180). Example: The top diagram shows the alarm limit values defined LO_LIM and HI_LIM with their respective hystereses (gray background) and the signal curve of the process variable PV. The bottom two diagrams show the behaviour of the associated alarms HI_ALM and LO_ALM in relation to the changing signal curve (0 = no alarm, 1 = alarm output). **a** = Process variable PV exceeds the limit value HI_LIM, HI_ALM is activated. **b** = Process variable PV is below the hysteresis value of HI_LIM, HI_ALM is deactivated. **c** = Process variable PV is below the limit value LO_LIM, LO_ALM is activated. **d** = Process variable PV exceeds the hysteresis value of LO_LIM, LO_ALM is deactivated. 

PID Function Block (PID controller)		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
ALARM_SUM	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	Displays the current status of the process alarms. **Display:** HI_HI_ALM Violation of the upper limit value alarm. HI_ALM Violation of the upper limit value warning. LO_LO_ALM Violation of the lower limit value alarm. LO_ALM Violation of the lower limit value warning. DV_HI_ALM Violation of the limit value alarm for the upper control deviation. DV_LO_ALM Violation of the limit value alarm for the lower control deviation. BLOCK ALM Block alarm ✎ Note! In addition the process alarms can also be disabled in this parameter group.
ALERT_KEY	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	For entry of the indentification number of the plant unit. This information can be used by the fieldbus host system for sorting alarms and events. **User input:** 1...255 **Factory setting:** 0
BAL_TIME	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	This parameter is used to enter the time for which the weighting factor counteracts the integral term of the saturation (calculated actuating variable > OUT_HI_LIM). **Factory setting:** 0 s

PID Function Block (PID controller)		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
BKCAL_HYS	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	For entry of the hysteresis value for the upper and lower actuating variable range limit value OUT_HI_LIM and OUT_LO_LIM. The hysteresis value relates to a percentage of the value in the parameter group OUT_SCALE (see Page 179). If the calculated actuating variable is outside the range defined by the range limit values then this range violation is shown in the monitoring parameter LIMITS in the parameter group OUT and communicated to the subsequent blocks. The range violation remains active whilst the value of the calculated actuating variable is outside the hysteresis value. **User input:** 0...50% **Factory setting:** 0.5% Example: The top diagram shows the defined actuating variable range limit values OUT_HI_LIM and OUT_LO_LIM with the hysteresis BKCAL_HYS (gray background) and the signal curve of the calculated actuating variable. The bottom diagram shows the behaviour of the range limit value monitor LIMITS in the parameter group OUT to the changing signal curve of the calculated actuating variable. "NotLimited" = No range limit value violation "HighLimited" = Range limit value violation is output "LowLimited" = Range limit value violation is output **a** = The calculated actuating variable exceeds the upper actuating variable range limit value OUT_HI_LIM. In the parameter group OUT the status "HighLimited" is output via LIMITS. **b** = The calculated actuating variable is below the hysteresis value BKCAL_HYS of the upper actuating variable range limit value OUT_HI_LIM. In the parameter group OUT the status "NotLimited" is output via LIMITS. **c** = The calculated actuating variable is below the lower actuating variable range limit value OUT_LO_LIM. In the parameter group OUT the status "LowLimited" is output via LIMITS. **d** = The calculated actuating variable exceeds the hysteresis value BKCAL_HYS of the lower actuating variable range limit value OUT_LO_LIM. In the parameter group OUT the status "NotLimited" is output via LIMITS. 

PID Function Block (PID controller)		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
BKCAL_IN	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	Displays the analog input value and status copied in the case of cascade control from the output BKCAL_OUT of the subsequent function block. The cascade control is initialised with this value to prevent reset window.
BKCAL_OUT	**read only**	Displays the analog output value and output status transferred in the case of cascade control to the input BKCAL_IN of the preceding function block. The cascade control is initialised with this value to provide bumpless transfer.
BLOCK_ALM	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	Displays the current block status with information on pending configuration, hardware or system errors, including details of the alarm time (date, time) when the error occurred. ✎ Note! If the option of the alarm has **not** been enabled in the parameter ACK_OPTION, the alarm can only be acknowledged via this parameter.
BLOCK_ERR	**read only**	Displays the active block error. **Display:** OUT OF SERVICE (The block has the status "Out Of Service".)
BYPASS	**MAN - OOS**	This parameter can be used to activate and deactivate calculation of the actuating variable by the PID control algorithm. **Options:** Uninitialized OFF Bypass deactivated: the actuating variable determined by the PID control algorithm is output via the parameter OUT. ON BYPASS activated: the value of the setpoint value SP is output directly via the parameter OUT. ☝ Caution! The parameter BYPASS is enabled in the controller options (parameter CONTROL_OPTS). This must be set before commissioning.
CAS_IN	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	Displays the remote setpoint value and status copied from an external function block in operating mode CAS. This value is shown in the unit of the parameter group PV_SCALE. ✎ Note! The remote setpoint value read in via the parameter CAS_IN is only used if the PID Function Block is in operating mode CAS. In operating mode AUTO the value of parameter SP is used as a setpoint value.

PID Function Block (PID controller)		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
CONTROL_ OPTS	**OOS**	Selects the available controller options for specifying the automation strategy. **Options:** Bypass Enable Activates the parameter BYPASS Direct Acting Direct effect Track Enable Activates tracking Track in Manual Operating mode MAN with active tracking PV for BKCAL_OUT Use value and status of the parameter PV for the parameter BKCAL_OUT No OUT Limits in Manual No output restriction in operating mode MAN. If the range limit value OUT_HI_LIM or OUT_LO_LIM is exceeded or not reached, this has no effect on the parameter OUT. **Factory setting:** no option activated
DV_HI_ALM	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	Status display of the alarm for the upper control deviation, including details of the time of the alarm (date, time) and the value that triggered the alarm. The controlled variable exceeds the setpoint value by more than the value specified in the parameter DV_HI_LIM. ✎ Note! In addition the active block alarm can be acknowledged in this parameter group.
DV_HI_LIM	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	Entry of the limit value for the upper control deviation. If the controlled variable exceeds the setpoint value by this value, then the warning DV_HI_ALM is output. **User input:** Range and unit of PV_SCALE **Factory setting:** $3402823466 \times 10^{38}$ ✎ Note! If the setting for the end of the scale is changed in the parameter PV_SCALE this value should be modified accordingly.

PID Function Block (PID controller)		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
DV_HI_PRI	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	Specifies the action taken when the upper control deviation (DV_HI_LIM) is exceeded. **User input:** 0 Violation of the limit value for the upper control deviation is not valuated. 1 No notification if the limit value for the upper control deviation is infringed. 2 Reserved for block alarms. 3-7 Violation of the limit value for the upper control deviation is output with the appropriate priority (3 = low priority, 7 = high priority) as a user notice. 8-15 Violation of the limit value for the upper control deviation is output as a critical alarm with the appropriate priority (8 = low priority, 15 = high priority). **Factory setting:** 0
DV_LO_ALM	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	Alarm status display for the lower control deviation, including details of the time of the alarm (date, time) and the value that triggered the alarm. The controlled variable is below the setpoint value by more than the value specified in the parameter DV_LO_LIM. ✎ Note! In addition the active block alarm can be acknowledged in this parameter group.
DV_LO_LIM	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	Entry of the limit value for the lower control deviation. If the controlled variable is below the setpoint value by this value then the warning DV_LO_ALM is output. **User input:** Range and unit of PV_SCALE **Factory setting:** $-3402823466 \times 10^{38}$ ✎ Note! If the setting for the end of the scale is changed in the parameter PV_SCALE this value should be modified accordingly.

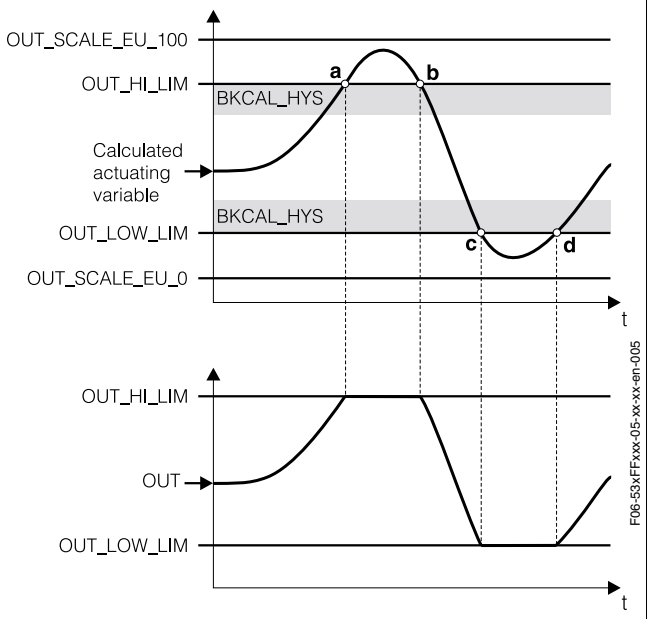
PID Function Block (PID controller)		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
DV_LO_PRI	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	Specifies the action taken if the lower control deviation (DV_LO_LIM) is not reached. **User input:** 0 Violation of the limit value for the lower control deviation is not evaluated. 1 No notification if the limit value for the lower control deviation is violated. 2 Reserved for block alarms. 3-7 Violation of the limit value for the lower control deviation is output with the appropriate priority (3 = low priority, 7 = high priority) as a user notice. 8-15 Violation of the limit value for the lower control deviation is output as a critical alarm with the appropriate priority (8 = low priority, 15 = high priority). **Factory setting:** 0
FF_GAIN	**MAN - OOS**	Entry of the disturbance gain for the feedforward control. **Factory setting:** 0 ✎ Note! The disturbance gain is multiplied by the disturbance variable (FF_VAL), the result is added to the calculated actuating variable.
FF_SCALE	**MAN - OOS**	Definition of the measurement range (lower and upper limit), the physical unit and the number of decimal places for the disturbance variable (FF_VAL). **Factory setting:** 0...100%
FF_VAL	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	Display and entry of the value and status of the disturbance variable. **User input:** Range and unit of FF_SCALE
GAIN	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	Entry of proportional gain factor. **Factory setting:** 0 ✎ Note! If the value 0 is specified for this parameter then the status of the parameter OUT changes to BAD.

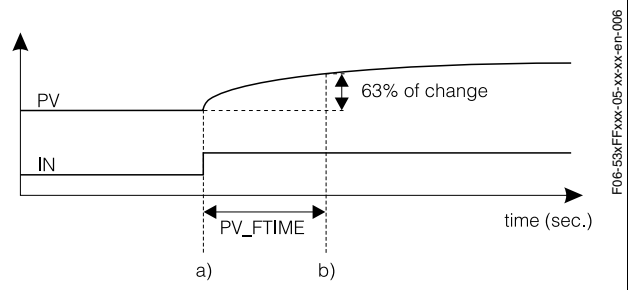
PID Function Block (PID controller)		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
GRANT_DENY	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	Releases or restricts the access authorisation of a fieldbus host system on the field device. ✎ Note! This parameter is not evaluated by the Promass 83 FF.
HI_ALM	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	Alarm status display for the upper warning limit value (HI_LIM), including details of the time of the alarm (date, time) and the value that triggered the alarm. ✎ Note! In addition the active block alarm can be acknowledged in this parameter group.
HI_HI_ALM	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	Alarm status display for the upper alarm limit value (HI_HI_LIM), including details of the time of the alarm (date, time) and the value that triggered the alarm. ✎ Note! In addition the active block alarm can be acknowledged in this parameter group.
HI_HI_LIM	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	Entry of the alarm limit value for the upper alarm (HI_HI_ALM). If the value PV exceeds this limit value then the alarm status parameter HI_HI_ALM is output. **User input:** Range and unit of PV_SCALE **Factory setting:** $3402823466 \times 10^{38}$ ✎ Note! If the setting for the end of the scale is changed in the parameter PV_SCALE this value should be modified accordingly.
HI_HI_PRI	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	Specifies the action taken when the upper alarm limit value (HI_HI_LIM) is exceeded. **User input:** 0 The violation of the upper alarm limit is not evaluated. 1 No notification if the upper alarm limit value is infringed. 2 Reserved for block alarms. 3-7 The violation of the upper alarm limit is output as a user notice with the appropriate priority (3 = low priority, 7 = high priority). 8-15 The violation of the upper alarm limit is output as a critical alarm with the appropriate priority (8 = low priority, 15 = high priority). **Factory setting:** 0

PID Function Block (PID controller)		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
HI_LIM	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	Entry of the alarm limit value for the upper warning (HI_ALM). If the value PV exceeds this limit value then the alarm status parameter HI_ALM is output. **User input:** Range and unit of PV_SCALE **Factory setting:** 3402823466 x 10^{38} ✎ Note! If the setting for the end of the scale is changed in the parameter PV_SCALE this value should be modified accordingly.
HI_PRI	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	Specifies the action taken when the upper warning limit value (HI_LIM) is exceeded. User input: 0 The violation of the upper warning limit value is not evaluated. 1 No notification if the upper warning limit value is infringed. 2 Reserved for block alarms. 3-7 The violation of the upper warning limit value is output as a user notice with the appropriate priority (3 = low priority, 7 = high priority). 8-15 The violation of the upper warning limit value is output as a critical alarm with the appropriate priority (8 = low priority, 15 = high priority). **Factory setting:** 0
IN	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	Displays the controlled variable with information on the status and value. ✎ Note! Scaling of the input range and selection of the unit of the controlled variable are carried out via the parameter group PV_SCALE.
LO_ALM	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	Alarm status display for the lower warning limit value (LO_LIM), including details of the time of the alarm (date, time) and the value that triggered the alarm. ✎ Note! In addition the active block alarm can be acknowledged in this parameter group.

PID Function Block (PID controller)		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
LO_LIM	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	Entry of the alarm limit value for the lower warning (LO_ALM). If the value PV exceeds this limit value then the alarm status parameter LO_ALM is output. **User input:** Range and unit of PV_SCALE **Factory setting:** -3402823466 x 10^{38} ✎ Note! If the setting for the end of the scale is changed in the parameter PV_SCALE this value should be modified accordingly.
LO_LO_ALM	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	Alarm status display for the lower alarm limit value (LO_LO_LIM), including details of the time of the alarm (date, time) and the value that triggered the alarm. ✎ Note! In addition the active block alarm can be acknowledged in this parameter group.
LO_LO_LIM	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	Entry of the alarm limit value for the lower alarm (LO_LO_ALM). If the value PV is below this limit value then the alarm status parameter LO_LO_ALM is output. **User input:** Range and unit of PV_SCALE **Factory setting:** -3402823466 x 10^{38} ✎ Note! If the setting for the end of the scale is changed in the parameter PV_SCALE this value should be modified accordingly.
LO_LO_PRI	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	Specifies the action taken when the lower alarm limit value (LO_LO_LIM) is not reached. User input: 0 The violation of the lower alarm limit is not evaluated. 1 No notification if the lower alarm limit value is infringed. 2 Reserved for block alarms. 3-7 The violation of the lower alarm limit is output as a user notice with the appropriate priority (3 = low priority, 7 = high priority). 8-15 The violation of the lower alarm limit is output as a critical alarm with the appropriate priority (8 = low priority, 15 = high priority). **Factory setting:** 0

PID Function Block (PID controller)		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
LO_PRI	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	Specifies the action taken when the lower warning limit value (LO_LIM) is not reached. **User input:** 0 The violation of the lower warning limit value is not evaluated. 1 No notification if the lower warning limit value is infringed. 2 Reserved for block alarms. 3-7 The violation of the lower warning limit value is output as a user notice with the appropriate priority (3 = low priority, 7 = high priority). 8-15 The violation of the lower warning limit value is output as a critical alarm with the appropriate priority (8 = low priority, 15 = high priority). **Factory setting:** 0
MODE_BLK	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	Displays the current (Actual) and desired (Target) operating mode of the PID Function Block, the permitted modes (Permitted) supported by the Resource Block, and the normal operating mode (Normal). **Display:** AUTO - MAN - OOS - CAS - RCAS The PID Function Block supports the following operating modes: • AUTO (Automatic Operation) The setpoint value specified by the user via the parameter SP is used in the execution of the internal PID algorithm. • MAN (Manual Intervention by the Operator) The parameter OUT can be specified directly by the user. • OOS (Out Of Service) The block has the status "Out Of Service". The PID algorithm of the block is not executed. The last valid value is output at the parameter OUT and the status changes to BAD. • CAS (Cascade Mode) Via the input or parameter CAS_IN, the PID Function Block receives the setpoint value for internal calculation of the actuating variable directly from another function block. The internal PID algorithm is executed. • RCAS (External Cascade) Via the parameter RCAS_IN, the PID Function Block receives the setpoint value for internal calculation of the actuating variable directly from the fieldbus host system. The internal PID algorithm is executed. • ROUT (External Output) Via the parameter ROUT_IN, the PID Function Block receives the actuating value directly from the fieldbus host system. The actuating variable is output again via the parameter OUT without the internal PID algorithm being executed.

PID Function Block (PID controller)		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
OUT	**MAN - OOS**	Displays the output value (actuating variable) of the PID Function Block. The output value contains the value, the limit value status, the status and the alarm evaluation. The output value OUT is a function of the range limit value OUT_HI_LIM and OUT_LO_LIM. If the calculated actuating variable is outside the range limit values then the value of the range limit value in question is output as the output value OUT (see diagram).  ✎ Note! If MAN (manual intervention by the operator) is selected for the operating mode in the parameter MODE_BLK then the output value OUT can be specified manually here. The unit used is copied from the parameter group OUT_SCALE, the input area corresponds to OUT_SCALE ±10%.
OUT_HI_LIM	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	Entry of the maximum permissible analog actuating variable that can be output from the PID Function Block. **User input:** Range and unit of OUT_SCALE ±10 **Factory setting:** 100
OUT_LO_LIM	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	Entry of the minimum permissible analog actuating variable that can be output from the PID Function Block. **User input:** Range and unit of OUT_SCALE ±10 **Factory setting:** 0

PID Function Block (PID controller)		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
OUT_SCALE	**OOS**	Definition of the measurement range (lower and upper limit), the physical unit and the number of decimal places for the actuating variable (OUT). **Factory setting:** 0...100% ✎ Note! The range limits are defined via the parameters OUT_HI_LIM and OU_LO_LIM.
PV	**read only**	Displays the process variable used for the block execution, including the status. ✎ Note! The unit used is copied from the parameter group PV_SCALE.
PV_FTIME	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	Entry of the filter time constant (in seconds) of the digital filter of the 1st order. This time is required in order for 63% of a change in the controlled variable at input IN to have an effect on the value of PV. The diagram shows the signal curves between the parameters IN and PV over time:  a) The parameter IN changes. b) The parameter PV has reacted 63% to the change in the parameter IN. **Factory setting:** 0 s

PID Function Block (PID controller)		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
PV_SCALE	**OOS**	Definition of the measurement range (lower and upper limit), the physical unit and the number of decimal places for the process variable (PV). **Factory setting:** 0...100% ✎ Note! If this parameter group is modified then the following parameters should be checked and modified if necessary: • DV_HI_LIM • DV_LO_LIM • HI_LIM • HI_HI_LIM • LO_LIM • LO_LO_LI • RCAS_IN • RCAS_OUT • SP_LO_LIM • SP_HI_LIM • SP
RATE	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	Entry of the time constant for the derivative action (D-term) **Factory setting:** 0 s
RCAS_IN	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	In this parameter the analog actuating variable provided by the fieldbus host system (value and status) is read in for internal calculation of the actuating variable and displayed. ✎ Note! • Value statement and unit of PV_SCALE • If the setting for the end of the scale is changed in the parameter PV_SCALE this value should be modified accordingly. • This parameter is only active in operating mode RCAS.
RCAS_OUT	**read only**	Displays the analog output value and output status of the specified setpoint value transferred to the fieldbus host system in the course of cascade control. The cascade control is initialised with this value to provide bumpless transfer. ✎ Note! • Value statement and unit of PV_SCALE • If the setting for the end of the scale is changed in the parameter PV_SCALE this value should be modified accordingly. • This parameter is only active in operating mode RCAS.
RESET	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	Entry of the time constant for the integral action (I-term) **Factory setting:** 3402823466 x 10^{38} s ✎ Note! The integral function is disabled by entering 0 seconds.

PID Function Block (PID controller)		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
ROUT_IN	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	In this parameter the actuating variable provided by the fieldbus host system (value and status) is read in and displayed. ✎ Note! • Value statement and unit of OUT_SCALE • This parameter is only active in operating mode ROUT. • The PID algorithm is no longer executed.
ROUT_OUT	**read only**	Displays the analog output value and output status of the actuating variable transferred to the fieldbus host system in the course of cascade control. The cascade control is initialised with this value to provide bumpless transfer. ✎ Note! • Value statement and unit of OUT_SCALE • This parameter is only active in operating mode ROUT.
SHED_OPT		Selects the action taken if the monitoring time is exceeded (see parameter SHED_RCAS, SHED_ROUT on Page 84) in operating mode RCAS or ROUT. During the monitoring time parameter updating between the fieldbus host system and the PID Function Block is checked. If the parameters are not being updated then on expiry of the monitoring time the PID Function Block switches from operating mode RCAS or ROUT to the mode selected here. **Options:** Uninitialized NormalShed_NormalReturn NormalShed_NoReturn ShedToAuto_NormalReturn ShedToAuto_NoReturn ShedToManual_NormalReturn ShedToManual_NoReturn ShedToRetainedTarget_NormalReturn ShedToRetainedTarget_NoReturn **Factory setting:** Uninitialized
SP	**AUTO - MAN - OOS**	Entry of the analog setpoint value. **User input:** Range and unit of PV_SCALE ±10 ✎ Note! If the setting for the end of the scale is changed in the parameter PV_SCALE this value should be modified accordingly.
SP_HI_LIM	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	Entry of the upper limit of the setpoint value. **User input:** Range and unit of PV_SCALE ±10 **Factory setting:** 100 ✎ Note! If the setting for the end of the scale is changed in the parameter PV_SCALE this value should be modified accordingly.

PID Function Block (PID controller)		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
SP_LO_LIM	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	Entry of the lower limit of the setpoint value. **User input:** Value and range of PV_SCALE ±10 **Factory setting:** 100 ✎ Note! If the setting for the end of the scale is changed in the parameter PV_SCALE this value should be modified accordingly.
SP_RATE_DN	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	Entry of the ramping rate of a diminishing setpoint value in operating mode AUTO. **Factory setting:** $3402823466 \times 10^{38}$ PV per second ✎ Note! • If the value "0" is entered then this parameter is deactivated and the setpoint value is used directly. • The speed restriction is only active in operating mode AUTO.
SP_RATE_UP	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	Entry of the ramping rate of an increasing setpoint value in operating mode AUTO. **Factory setting:** $3402823466 \times 10^{38}$ PV per second ✎ Note! • If the value "0" is entered then this parameter is deactivated and the setpoint value is used directly. • The speed restriction is only active in operating mode AUTO.
ST_REV	**read only**	Displays the revision status of the static data. ✎ Note! The revision status parameter is incremented on each modification of static data.

PID Function Block (PID controller)		
Parameter	**Write access with operating mode (MODE_BLK)**	**Description**
STATUS_OPTS	**OOS**	Selects the available status options for specifying the status processing and processing of the output parameter OUT. The PID Function Block supports the following options: **Options:** IFS if Bad IN Trigger disturbance status of subsequent Analog Output function block if the controlled variable (IN) changes the status to BAD. IFS if Bad CAS_IN Trigger disturbance status of subsequent Analog Output Function Block if the external setpoint value (CAS_IN) changes the status to BAD. Use Uncertain as Good The status UNCERTAIN is used as GOOD. Target In Manual if Bad IN Switch to operating mode MAN if the controlled variable switches the status to BAD. **Factory setting:** no option active
STRATEGY	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	Parameter for grouping and thus faster evaluation of blocks. Grouping is carried out by entering the same numerical value in the parameter STRATEGY for each individual block. **Factory setting:** 0 ✎ Note! This data is neither checked nor processed by the PID Function Block.
TAG_DESC	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	Entry of a user-specific text of max. 32 characters for unique identification and assignment of the block. **Factory setting:** "_ _ _ _ _ _ _ _" without text
TRK_IN_D	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	Displays the discrete input (value and status) that initiate the external tracking function. On activation of tracking the operating mode switches to LO (Local Compulsory Tracking). In so doing the actuating variable at the output OUT adopts the value specified at input TRK_VAL.
TRK_SCALE	**MAN - OOS**	Definition of the measurement range (lower and upper limit), the physical unit and the number of decimal places for the external tracking variable (TRK_VAL). **Factory setting:** 0...100%
TRK_VAL	**ROUT - RCAS - CAS - AUTO - MAN - OOS**	Displays the analog input value and input status read in from another function block for the external tracking function in the unit of parameter group TRK_SCALE.
UPDATE_EVT	**read only**	Displays whether static block data has been modified, including date and time.

8 Index key words FOUNDATION Fieldbus

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