

6 Commissioning

6.1 Function check

Make sure that all final checks have been completed before you start up your measuring point:

- Checklist for “Post installation check” → page 23
- Checklist for “Post connection check” → page 36



Note!

- The technical function data of the PROFIBUS interface in acc. with IEC 61158-2 (MBP) must be observed (FISCO model).
- The bus voltage of 9 ... 32 V and the current consumption of 11 mA at the flowmeter can be checked using a normal multimeter.
- Using the LED on the I/O board (s. page 99) it is possible to carry out a simple function check on the field bus communication in the non-hazardous area.

Commissioning

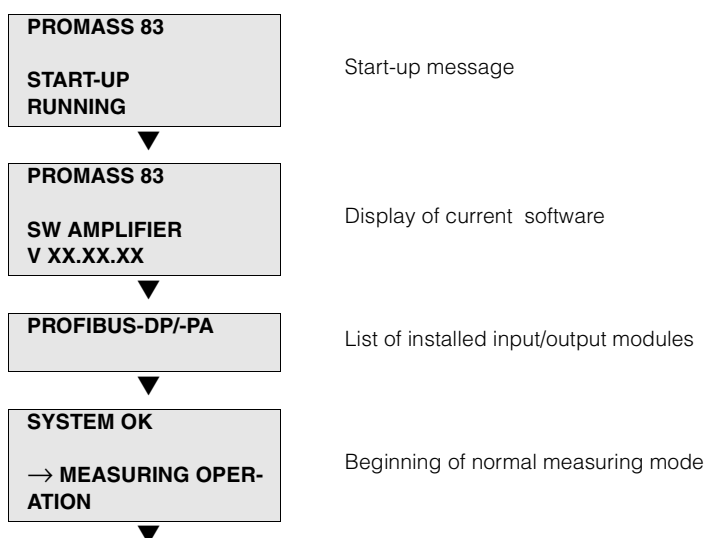
In the case of measuring devices without a local display, the individual parameters and functions must be configured via the configuration program, e.g. via PROFIBUS by means of Commuwin II, via service protocol by means of ToF Tool-FieldTool package. If the measuring device is equipped with a local display, all the important device parameters for standard operation can be configured quickly and easily by means of the “Commissioning” Quick Setup menu.

- Quick Setup “Commissioning”, → page 83
- Quick Setup “Gas measurement”, → page 85

Switching on the measuring device

Once the function checks have been successfully completed, it is time to switch on the power supply. The device is now operational.

The measuring device performs a number of power on self-tests. As this procedure progresses the following sequence of messages appears on the local display:



Normal measuring mode commences as soon as start-up completes. Various measured value and/or status variables appear on the display (HOME position).



Note!

If start-up fails, an error message indicating the cause is displayed.

6.2 Commissioning the PROFIBUS interface



Note!

All functions needed for commissioning are described in detail in the "Description of Device Functions" manual, which is a separate part of these Operating Instructions.

6.2.1 Commissioning with local display



Note!

You must enter the numerical code (factory setting: 83) before altering device functions, numerical values or factory settings → page 42.

The following steps must be taken in the sequence listed:

1. Check the hardware write protection:
BASIC FUNCTION (G) → PROFIBUS-DP/-PA (GBA/GCA) →
CONFIGURATION (610) → WRITE PROTECT (write protection, 6102)
2. Enter the tag name:
BASIC FUNCTION (G) → PROFIBUS-DP/-PA (GBA/GCA) →
CONFIGURATION (610) → TAG NAME (6100)
3. Assign a bus address if this has not already been effected via the corresponding miniature switches (s. page 60):
BASIC FUNCTION (G) → PROFIBUS-DP/-PA (GBA/GCA) →
CONFIGURATION (610) → BUS ADDRESS (6101)
4. Select the system unit:
 - Via the system unit group: MEASURED VARIABLES (A) → SYSTEM UNITS (ACA) → CONFIGURATION (040) → UNIT MASS FLOW (0400) → UNIT MASS (0401) → UNIT VOL....
 - The system unit set becomes effective in the process control system once the SET UNIT TO BUS function has been activated: BASIC FUNCTION (G) → PROFIBUS-DP/-PA (GCA) → OPERATION (614) → SET UNIT TO BUS (6141)



Caution:

- Engineering units for the totalizers must be configured separately as explained in Point 5.
- The measured values are transmitted in system units - as described on page 70 ff. - to the automation system during the cyclic data exchange. If the system unit of a measured value is changed using the local display, this will not have an immediate effect on the output of the Analog Input block and therefore will not influence the measured value which is transmitted to the automation system.
The altered system unit of the measured value will only be transmitted to the automation system once the "SET UNIT TO BUS" function in the BASIC FUNCTION (G) block → PROFIBUS-DP/-PA (GCA) → OPERATION (614) → SET UNIT TO BUS (6141) has been activated.

5. Configuring totalizers 1-3:
Promass 83 has 3 totalizers. The following description provides an example for totalizer 1.
 - Select the process variable, e.g. mass flow: BASIC FUNCTION (G) → PROFIBUS-DP/-PA (GCA) → TOTALIZER (613) → CHANNEL (6133)
 - Enter the required totalizer units:
BASIC FUNCTION (G) → PROFIBUS-DP/-PA (GCA) → TOTALIZER (613) → UNIT TOTALIZER (6134)
 - Configure totalizer status, e.g. totalize:
BASIC FUNCTION (G) → PROFIBUS-DP/-PA (GCA) → TOTALIZER (613) → SET TOTALIZER (6135)
 - Configure totalizer mode, e.g. for balancing:
BASIC FUNCTION (G) → PROFIBUS-DP/-PA (GCA) → TOTALIZER (613) → TOTALIZER MODE (6137)
6. Select the GSD file:
BASIC FUNCTION (G) → PROFIBUS-DP/-PA (GCA) → OPERATION (614)
→ SELECT GSD (6140)

6.2.2 Commissioning with configuration program (Commuwin II)

Operation with Commuwin II is described in the E+H documentation BA 124F/00/a2. Steps 1-5 can be dealt with in the same order as described in Chap. 6.2 “Commissioning with local display”.

The configuration parameters can be found in the Commuwin II operating matrix in the manufacturer-specific matrix or in the individual profile blocks:

- in the Physical block → page 55
- in the manufacturer-specific device matrix (lines V6 and V7) → page 51
- in the Analog Input block → page 57
- in the Totalizer block (line V1) → page 58

1. Parametering the “Physical block”:
 - Open the Physical block.
 - Software and hardware write protection is disabled in Promass 83 so that you can access all the write parameters. Check this status with the parameters WRITE LOCKING (V3H0, software write protection) and HW WRITE PROTECT. (V3H1, hardware write protection).
 - Enter the tag name.
2. Parametering the manufacturer-specific device parameters of the Transducer block “PROMASS 83 PBUS”:
 - Open the manufacturer-specific Transducer block “PROMASS 83 PBUS”
 - Enter the desired name for the block (tag name). Factory setting: No block designation (tag name)
 - Now configure the device-specific parameters for flow measurement.



Note:

Other matrixes can be selected in the matrix cell VAH5 if you wish to configure further manufacturer-specific parameters.

Please note that alterations made to device parameters will only be activated once a valid release code has been entered. The release code can be entered in the matrix cell V2H0 (factory setting: 83).

3. Setting parameters for “Analog Input function block”:
Promass 83 has six Analog Input function blocks (AI 1 = Mass flow, AI 2 = Volume flow, AI 3 = Corrected volume flow, AI 4 = Density, AI 5 = Reference density, AI 6 = Temperature). These are selected using the connection clearance list. The following description provides an example for Analog Input function block No. 1.
 - Enter the required block name for Analog Input function block 1 (factory setting: MASS FLOW BLOCK).
 - Open the Analog Input function block.
 - In the Analog Input function block, the input value or the input range can be scaled in accordance with the requirements of the automation system (s. page 65).
 - If necessary, set a limit value.
4. Setting parameters for the “Totalizer block”:
Promass 83 has three Totalizer function blocks. These are selected using the “Totalizer Block” profile blocks in the connection clearance list.
 - Enter the required block name for Totalizer function block (factory setting: TOTALIZER BLOCK).
 - Select the process variable, e.g. volume flow, via the CHANNEL (V8H5) parameter. User input: 277 = Mass flow, 273 = Volume flow, 398 = Corrected volume flow
 - Enter the required units for the totalizer (UNIT TOTALIZER, V1H0).
 - Configure the totalizer status (SET TOT , V1H1), e.g. for totalizing.
 - Configure the totalizer mode (TOTALIZER MODE , V1H3), e.g. for balancing.
5. Configuration of the cyclic data traffic:
All the relevant data are described in the “System Integration” Chapter (s. page 66). We recommend that the “Coupling Documentation” be used for step-by-step configuration. This can be obtained from Endress+Hauser Process Solutions for various automation systems and programmable logic controls. The files required for commissioning and network configuration can be obtained as described on page 66.

6.2.3 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 automation system should be 0 ... 100%.
- The measured value from the Transducer Block (input value) is rescaled linearly via the input scaling PV_SCALE to the desired output range OUT_SCALE.

Parameter group PV_SCALE (see "Description of device functions" manual)

PV_SCALE_MIN (V1H0) → 0

PV_SCALE_MAX (V1H1) → 30

Parameter group OUT_SCALE (see "Description of Device Functions" manual)

OUT_SCALE_MIN (V1H3) → 0

OUT_SCALE_MAX (V1H4) → 100

OUT_UNIT (V1H5) → [%]

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

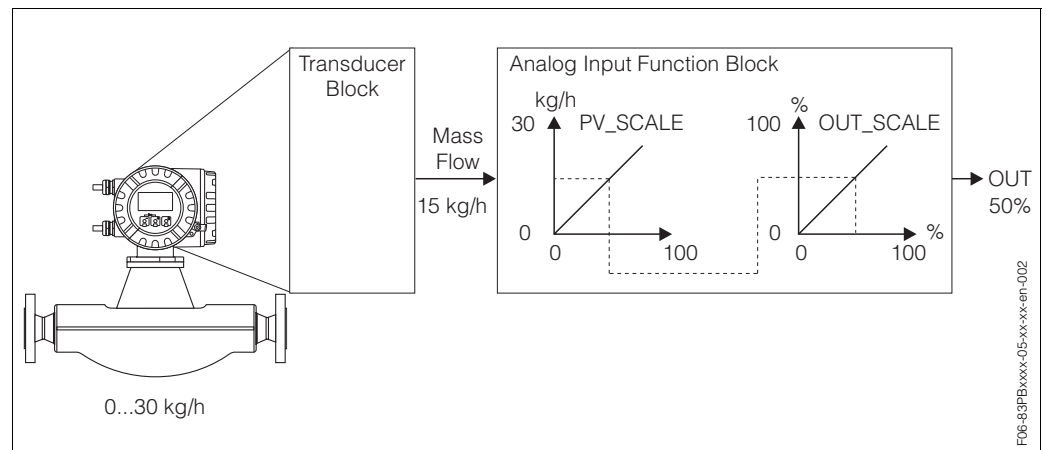


Fig. 32: Scaling the input value for the Analog Input function block



Note!

The "OUT_UNIT" does not have any effect on the scaling. It should be set nevertheless for the purposes of viewing on the local display, for example.

6.3 System integration

The device will be ready for system integration once commissioning has been effected via the local display or the class 2 master (Commuwin II). The PROFIBUS-DP system will require a description of the device parameters, e.g. output data, input data, data format and supported transmission rate so that it can integrate the field devices into the bus system.

This data is contained in a Device Master File (GSD file) which will be placed at the disposal of the PROFIBUS-DP master while the communication system is being commissioned.

Device bitmaps, which appear as symbols in the network tree, can also be integrated. The Profile 3.0 Device Master File (GSD) allows field devices from various producers to be exchanged without having to reconfigure.

Generally, a distinction can be made between three different types of GSD (factory setting: manufacturer-specific GSD):

Manufacturer-specific GSD: This GSD guarantees the unlimited functionality of the field device. Device-specific process parameters and functions are therefore available.

Profile GSD: Is different in terms of the number of Analog Input blocks (AI) and the measuring principles. If a system is configured with profile GSDs, it will be possible to exchange devices that are supplied by various producers. It is, however, essential that the cyclic process values follow the same sequence.

Example:

Promass 83 supports Profile GSD PA039742.gsd (RS 485) or PA139742.gsd (IEC 61158-2 (MBP)). This GSD contains three AI blocks and one totalizer block. The AI blocks are always assigned to the following measured variables: AI 1 = Mass flow, AI 2 = Volume flow, AI 3 = Corrected volume flow, AI 4 = Density, AI 5 = Reference density, AI 6 = Temperature.

This guarantees that the measured variables agree with the field equipment of other producers.

Profile GSD (multi-variable) with the ID No. 9760_{Hex}: This GSD contains all function blocks such as AI, DO, DI.... This GSD is not supported by Promass.



Note!

- A decision should be made with respect to which GSD is to be used before configuration takes place.
- The configuration can be altered using the local display or a class 2 master! Configuration using the local display → page 62 ff.

Promass 83 supports the following GSD files:

Name of device	Manufacturer-specific ID No.	Profile 3.0 ID No.	Manufacturer-specific GSD
Promass 83 PA PROFIBUS-PA (IEC 61158-2 (MBP))	152A (Hex)	9742 (Hex)	EH3_152A.gsd EH3X152A.gsd
	Profile 3.0 GSD	Type file	Bitmaps
	PA139742.gsd	EH_152A.200	EH_152A_d.bmp/.dib EH_152A_n.bmp/.dib EH_152A_s.bmp/.dib
Promass 83 DP PROFIBUS-DP (RS 485)	Manufacturer-specific ID No.	Profile 3.0 ID No.	Manufacturer-specific GSD
	1529 (Hex)	9742 (Hex)	EH3_1529.gsd EH3X1529.gsd
	Profile 3.0 GSD	Type file	Bitmaps
	PA039742.gsd	EH_1529.200	EH_1529_d.bmp/.dib EH_1529_n.bmp/.dib EH_1529_s.bmp/.dib

Each device is assigned an identification number by the Profibus User Organisation (PNO). The name of the Device Master File (GSD) is derived from this. At Endress+Hauser, this ID No. starts with the manufacturer ID 15xx. In order to ensure clarity and make assignment easier, the GSD names (with the exception of type files) at Endress+Hauser are as follows:

EH3_15xx	EH = Endress + Hauser 3 = Profile 3.0 _ = standard identification 15xx = ID No.
EH3x15xx	EH = Endress + Hauser 3 = Profile 3.0 x = extended identification 15xx = ID No.

The GSD files for all Endress+Hauser devices can be acquired in the following manner:

- Internet (Endress+Hauser) → <http://www.endress.com> (Products → Process Solutions → PROFIBUS → GSD files)
- Internet (PNO) → <http://www.profibus.com> (GSD library)
- On CD-ROM from Endress+Hauser: Order Number 50097200

Structure of GSD files from Endress+Hauser

In the case of the Endress+Hauser field transmitter with PROFIBUS interface, all the files which are needed for configuration are contained in one file. Once unpacked, the file will create the following structure:

- Version #xx stands for the corresponding device version. Device-specific bitmaps can be found in the directories "BMP" and "DIB". The utilisation of these will depend on the configuration software that is being used.
- The GSD files are saved in the subdirectories "Extended" and "Standard" which can be found in the "GSD" folder. Information relating to the implementation of the field transmitter and any dependencies in the device software can be found in the "Info" folder. Please read this carefully before configuration takes place. The files with the extension *.200 have been saved in the "TypDat" folder.

Standard and extended formats

The modules of some GSD files are transmitted with an extended identification (e.g. 0x42, 0x84, 0x08, 0x05). These GSD files can be found in the "Extended" folder. All GSD files that have a standard identification (e.g. 0x94) can be found in the "Standard" folder.

When integrating field transmitters, the GSD files with the extended identification should be used first. If, however, the integration is not successful, the standard GSD should be used. This differentiation is the result of a specific implementation in the master systems.

Contents of the download file from the Internet and the CD-ROM:

- All Endress+Hauser GSD files
- Endress+Hauser type files
- Endress+Hauser bitmap files
- Useful information relating to the devices

Working with GSD / type files

The GSD files must be integrated into the automation system.

Depending on the software that is being used, the GSD files can be copied to the program-specific directory or can be read into the database using the import function within the configuration software.

Example 1:

In the case of the configuration software Siemens STEP 7 (Siemens PLC S7-300 / 400) the files are copied to the subdirectory ...\\siemens\\step7\\s7data\\gsd.

The GSD files also contain bitmap files. These bitmap files are used to display the measuring points in image form. The bitmap files will have to be saved to the directory ...\\siemens\\step7\\s7data\\nsbmp.

Example 2:

If you have a PLC Siemens S5 where the PROFIBUS-DP network is configured with the configuration software COM ET 200, you will have to use the type files (x.200 files).

If you are using configuration software other than that referred to above, ask your PLC producer which directory you should use.

Compatibility with PROFIBUS predecessor model PROMASS 63 with profile 2.0

In the event of device replacement, PROline Promass 83 supports the compatibility of cyclic data with the forerunner model Promass 63 with profile versions 2.0 as follows:

- The output data is completely compatible.
- All process variables except target medium flow, carrier medium flow and calculated density are available in the input data. The Promass 83 outputs the measured value status BAD, substatus 0x08 (function block not available) for these process variables via the corresponding analog input function block.

The measuring devices can be replaced as follows:

available measuring device:	→	can be replaced with:
Promass 63 PROFIBUS-PA (ID-Nr. 1506)	→	Promass 83 PROFIBUS-PA
Promass 63 PROFIBUS-DP (ID-Nr. 1512)	→	Promass 83 PROFIBUS-DP

The Promass 83 is accepted as a replacement device if the option to “MANUFACT V2.0” is activated in the E+H device matrix (Commuwin II) in the parameter “SELECTION GSD” (V6H1) or in the function “SELECTION GSD” via the local display (see below).

The Promass 83 automatically detects if a Promass 63 has been configured in the control system and provides the appropriate input data, output data and measured value status information, although the measuring devices have different names and identification numbers. It is therefore not necessary to adjust the configuration of the PROFIBUS network in the control system.

Procedure after replacing the measuring devices:

1. Set the same (old) device address → Function BUS ADDRESS (6101)
2. In the function SELECTION GSD (6140) → select MANUFACT V2.0
3. Restart the measuring device → Function SYSTEM RESET (8046)



Note!

If necessary, the following settings must be made after the replacement:

- Configuration of the application-specific parameters
- Setting the units for the process variables

6.3.1 Cyclic data exchange

In the case of PROFIBUS-DP/-PA, the cyclic transmission of analog values to the automation system is effected in data blocks of 5 bytes. The measured value is portrayed in the first 4 bytes in the form of floating point numbers in acc. with IEEE 754 standard (see IEEE floating point number). The 5th byte contains status information pertaining to the measured value which is implemented in accordance with the Profile 3.0 specifications (s. page 66). The status will be indicated on the display of the device (s. page 40).



Note!

An exact description of the data types can be found in the slot/index lists in the "Description of device functions" manual.

IEEE floating point number

Conversion of a hexadecimal value into an IEEE floating point number for measured value detection.

The measured values are shown in numerical format IEEE-754 in the following manner and are transmitted to the class 1 master:

Byte n			Byte n+1			Byte n+2			Byte n+3	
Bit 7	Bit 6	Bit 0	Bit 7	Bit 6	Bit 0	Bit 7		Bit 0	Bit 7	Bit 0
Sign	2^7	2^6 2^5 2^4 2^3 2^2 2^1	2^0	2^{-1} 2^{-2} 2^{-3} 2^{-4} 2^{-5} 2^{-6} 2^{-7}		2^{-8} 2^{-9} 2^{-10} 2^{-11} 2^{-12} 2^{-13} 2^{-14} 2^{-15}		2^{-16} ... 2^{-23}		
	Exponents			Mantisse			Mantisse			Mantisse

Formula value = $(-1)^{\text{Sign}} * 2^{(\text{exponent} - 127)} * (1 + \text{Mantisse})$

Example: 40 F0 00 00 hex= 0100 0000 1111 0000 0000 0000 0000 0000 binary

$$\begin{aligned}
 \text{Value} &= (-1)^0 * 2^{(129-127)} * (1 + 2^{-1} + 2^{-2} + 2^{-3}) \\
 &= 1 * 2^2 * (1 + 0.5 + 0.25 + 0.125) \\
 &= 1 * 4 * 1.875 = 7.5
 \end{aligned}$$

Block model

The analog values transmitted by Promass 83 during the cyclic data exchange are:

- Mass flow
- Volume flow
- Corrected volume flow
- Density
- Reference density
- Temperature
- Totalizers 1-3 and the corresponding control parameters
- Display value
- Control blocks for manufacturer-specific functions



Note:

Totalizers 1-3 can be configured in various combinations with the totalizer controls. It is possible to configure totalizers 1-3 only, or additionally integrate one or two control blocks in order to reset totalizer 1 or stop totalizing, for example. Configuration is explained in detail on page 74.

The block model (Fig. 33) shows which input and output data Promass 83 provides for cyclic data exchange.

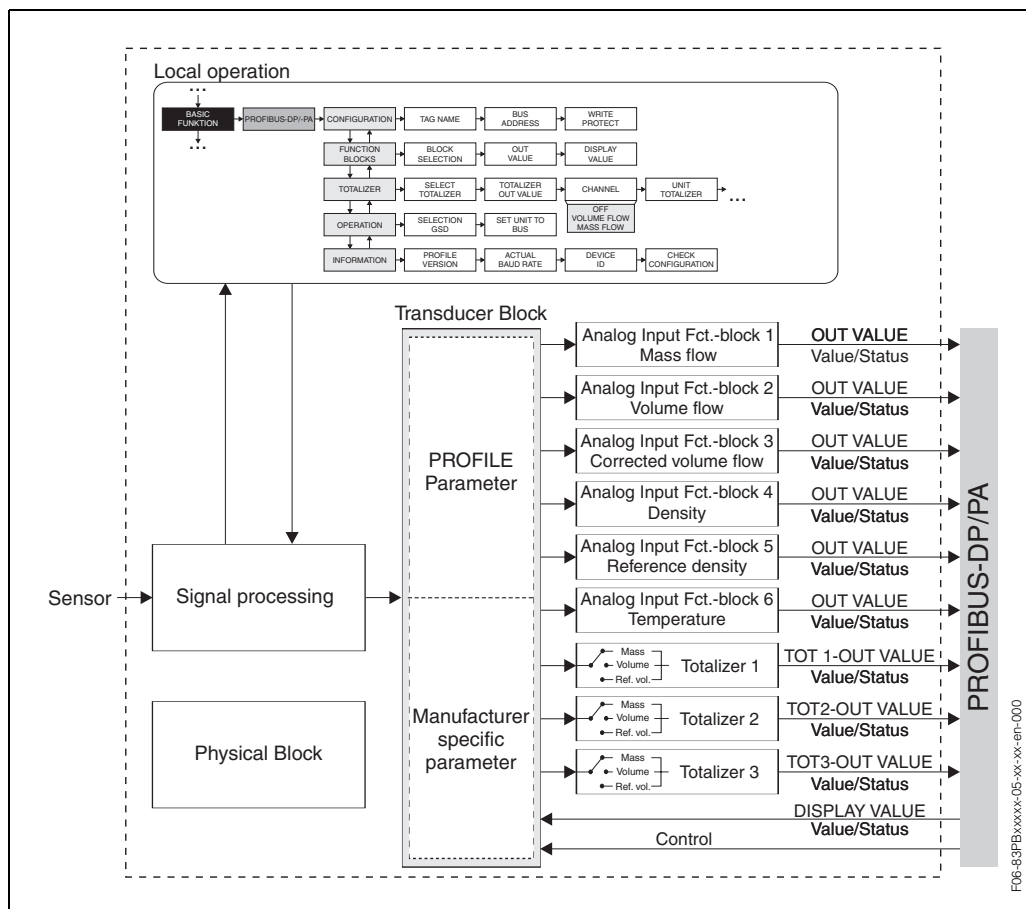


Fig. 33: Block model Promass 83 PROFIBUS-DP/PA Profile 3.0

Input data

Input data are: Mass flow, volume flow, corrected volume flow, density, reference density, temperature and totalizers 1-3. The current measured value can be transmitted by the automation system using these process variables.

Data transfer from Promass to the automation system

The input and output bytes are structured in a fixed sequence. If addressing is effected automatically using the configuration program, the numerical values of the input and output bytes may deviate from the values in the following table.



Note:

- The system units in the following table correspond to the predefined scales which are transmitted during cyclic data exchange.
- The measured variables can be assigned to the respective totalizer using the “Channel” parameter, the local display or the configuration program (class 2 master).
- Totalizers 1-3 can be configured individually. The following settings are possible (factory setting: volume flow in m³/h):
 - OFF
 - Mass flow [kg/s]
 - Volume flow [m³/h]
 - Corrected volume flow [Nm³/h]

The parameter “Channel” is described in more detail in a separate manual, namely the “Description of Device Functions” manual.

Input byte	Process parameter	Access type	Comment/Data format	Factory setting unit
0, 1, 2, 3	Mass flow	read	32-bit floating point number (IEEE-754) Illustrated → page 70	kg/s
4	Status mass flow	read	Status code → page 80	–
5, 6, 7, 8	Volume flow	read	32-bit floating point number (IEEE-754) Illustrated → page 70	m ³ /h
9	Status Volume flow	read	Status code → page 80	–
10, 11, 12, 13	Corrected volume flow	read	32-bit floating point number (IEEE-754) Illustrated → page 70	Nm ³ /h
14	Corrected volume flow status	read	Status code → page 80	–
15, 16, 17, 18	Density	read	32-bit floating point number (IEEE-754) Illustrated → page 70	kg/l
19	Density status	read	Status code → page 80	–
20, 21, 22, 23	Reference density	read	32-bit floating point number (IEEE-754) Illustrated → page 70	kg/Nl
24	Reference density status	read	Status code → page 80	–
25, 26, 27, 28	Temperature	read	32-bit floating point number (IEEE-754) Illustrated → page 70	K
29	Temperature status	read	Status code → page 80	–
30, 31, 32, 33	Totalizer 1	read	32-bit floating point number (IEEE-754) Illustrated → page 70	m ³ , kg or Nm ³
34	Status totalizer 1	read	Status code → page 80	–
35, 36, 37, 38	Totalizer 2	read	32-bit floating point number (IEEE-754) Illustrated → page 70	m ³ , kg or Nm ³
39	Status totalizer 2	read	Status code → page 80	–
40, 41, 42, 43	Totalizer 3	read	32-bit floating point number (IEEE-754) Illustrated → page 70	m ³ , kg or Nm ³
44	Status totalizer 3	read	Status code → page 80	–

Output data display value

The display value allows you to transmit a measured value which has been calculated in the automation system directly to the Promass. This measured value is a display value which can be assigned to the main line, the secondary line and the info line of the display. The display value contains 4 bytes measured value and 1 byte status. The status is displayed as being OK, UNCERTAIN or BAD (s. page 40 ff.).

Data transfer from the automation system to Promass 83 (display value)

Output byte	Process parameter	Access type	Comment/Data format	Factory setting unit
6, 7, 8, 9	Display value	write	32-bit floating point number (IEEE-754) Illustrated → page 70	ao
10	Display value status	write	–	–

**Note!**

The status can be entered manually and is interpreted in accordance with the status coding in Profile Specification 3.0.

Example:

The concentration is calculated in % $f_{(\text{temperature/density})}$ in the automation system. The temperature and density status is transmitted with the two cyclic measured values and can therefore be shown directly in the automation system together with the calculated concentration.

Control variables (output data) manufacturer-specific

Promass is capable of processing control variables (output data) during the cyclic data exchange e.g. the switching on of positive zero return.

The following table shows the control variables (output data) that can be transmitted to Promass 83.

Data transfer from the automation system to Promass 83 (Control block)

Output byte	Process parameter	Access type	Comment/Control variable	Factory setting unit
11	Control variable	write	This parameter is manufacturer-specific and can process the following control variables: 0 → 1: Reserved 0 → 2: Positive zero return ON 0 → 3: Positive zero return OFF 0 → 4: Zero point adjustment 0 → 5-7: Reserved 0 → 8: Unidirectional (Measuring mode) 0 → 9: Bidirectional (Measuring mode)	–

**Note!**

A control variable can be executed via the cyclic data exchange each time the output byte changes from “0” to another bit pattern. It will then be necessary to reset to “0” before a further control variable can be executed. The transition from any bit pattern to “0” will not have any effect.

Control variables for totalizers 1-3 (output data)

These functions allow totalizers 1-3 to be controlled from the automation system.

The following controls are possible: Totalizing, resetting, activation of a predefined value, balancing, positive flow detection, negative flow detection and stopping of totalizing.

Data transfer from the automation system to Promass 83 (Control variables of totalizers)

Output byte	Process parameter	Access type	Comment/Control variable	Factory setting unit
0 2 4	SET_TOT 1 SET_TOT 2 SET_TOT 3	write write write	The following control variables can be entered for totalizers 1-3 using these parameters. Control variable for SET_TOT: 0: Totalizing 1: Reset totalizer 2: Preset totalizer	–
1 3 5	MODE_TOT 1 MODE_TOT 2 MODE_TOT 3	write write write	Control variable for MODE_TOT: 0: Balancing 1: Only positive flow detection 2: Only negative flow detection 3: Stop totalizing	–

**Note!**

- A control variable can be executed through the cyclic data exchange each time the output byte changes from one bit pattern to any other bit pattern. It will not be necessary to reset to “0” to execute a control variable.
- It is only possible to preset a predefined totalizer value via the local controls or the configuration program (class 2 master)!

Example of SET_TOT and MODE_TOT:

If the control variable SET_TOT is set to “1” (1 = Reset the totalizer), the value of the totalizer will be set to “0”. The value of the totalizer will now be added up starting from “0”. If the totalizer is to retain the value “0”, it will be necessary to set the control variable MODE_TOT to “3” (3 = STOP totalizing). The totalizer will now stop adding up. The totalizer can be reset to “1” using control variable SET_TOT (1 = Reset the totalizer).

Factory settings for cyclic measured variables

The following measured variables are configured in Promass 83 at the factory:

- Mass flow
- Volume flow
- Corrected volume flow
- Density
- Reference density
- Temperature
- Totalizer 1 (with control variable SET_TOT and MODE_TOT)
- Totalizer 2 (with control variable SET_TOT and MODE_TOT)
- Totalizer 3 (with control variable SET_TOT and MODE_TOT)
- Display value (input value)
- Control (manufacturer-specific control unit)

If all measured variables are not required, you can use the placeholder "EMPTY_MODULE" (0x00) - which can be found in the GSD file - to deactivate individual measured variables using the configuration software of the class 1 master. Configuration example → page 75 ff.



Note!

Only activate the data blocks which are to be processed in the automation system. This will improve the data throughput rate of a PROFIBUS-DP/-PA network. A double-arrow symbol (direction alternating) will appear on the display to show that Promass 83 is communicating with the automation system.



Caution!

- It is essential to adhere to the following sequence when configuring the measured variables – mass flow, volume flow, corrected volume flow, density, reference density, temperature, totalizers 1...3, display value and control –!
- The device will have to be reset once a new measured variable configuration has been loaded to the automation system. This can be effected in either of two ways:
 - Via the display: HOME → Block J (SUPERVISION) → Group JAA (SYSTEM) → Function group 804 (OPERATION) → Function 8046 (SYSTEM RESET)
 - Switch supply voltage OFF and then ON.

System units

The measured values are transmitted in system units - as described in the table on - to the automation system during the cyclic data exchange page 71.

If the system unit of a measured value is changed using the local controls, this will not have an immediate effect on the output of the AI block (Analog Input Block) and therefore will not influence the measured value which is transmitted to the automation system. The altered system unit of the measured value will only be transmitted to the automation system once the "SET UNIT TO BUS" function in block G (BASIC FUNCTIONS) → Group GCA (PROFIBUS-DP/-PA) → Function group 614 (OPERATION) → Function 6141 (SET UNIT TO BUS) has been activated. This can also be activated with a class 2 master (e.g. Commuwin II).

Examples of configuration

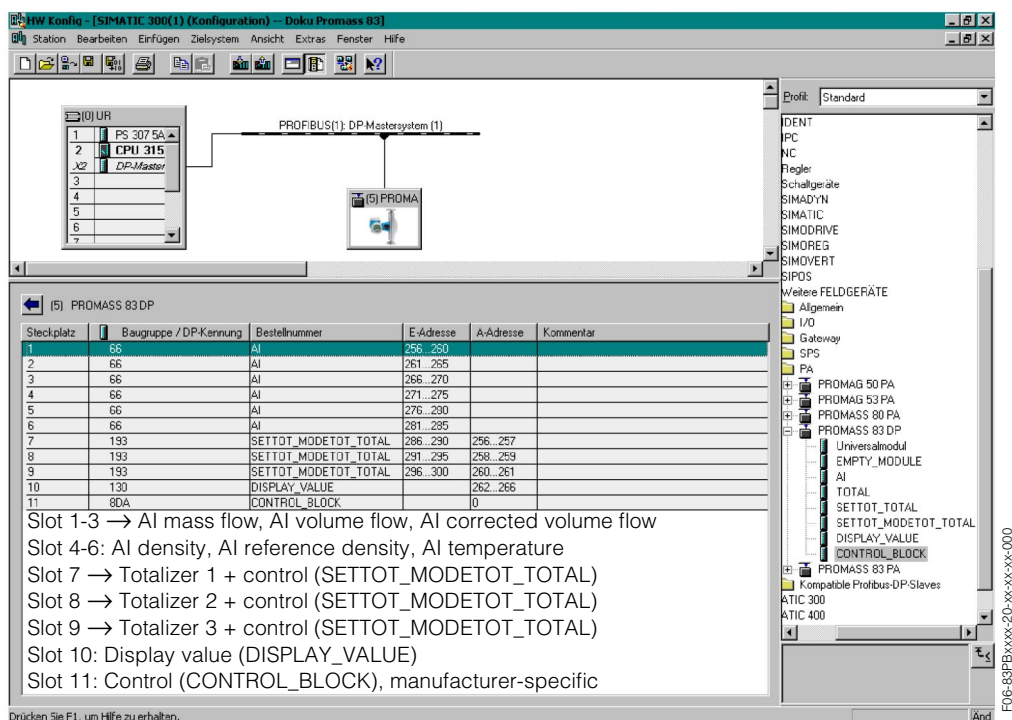
The configuration of a PROFIBUS-DP system is normally effected in the following manner:

1. The field devices (Promass 83) which are to be configured are integrated into the configuration program of the automation system via the PROFIBUS-DP network. The GSD file is used here. Measured variables required can be configured "off-line" using the configuration software.
2. The automation system's user program will have to be programmed now. On the one hand, the input and output data are controlled in the user program and on the other hand the location of the measured variables is defined so that they can be processed further.
An additional measured value configuration module may have to be used in the case of automation systems which do not support the IEEE-754 floating point format.
It may also be necessary to change the byte sequence (byte swapping) depending on the type of data management employed in the automation system (little-endian format or big-endian format).
3. When configuration has been completed, this will be transferred to the automation system in the form of a binary file.
4. The system can be started now. The automation system will establish a connection to the configured devices. The device parameters which are relevant for the process can now be set using a class 2 master, e.g. with Commuwin II (s. page 63).

6.3.2 Configuration examples with Simatic S7 HW-Konfig

Example 1:

Full configuration using the manufacturer-specific GSD file

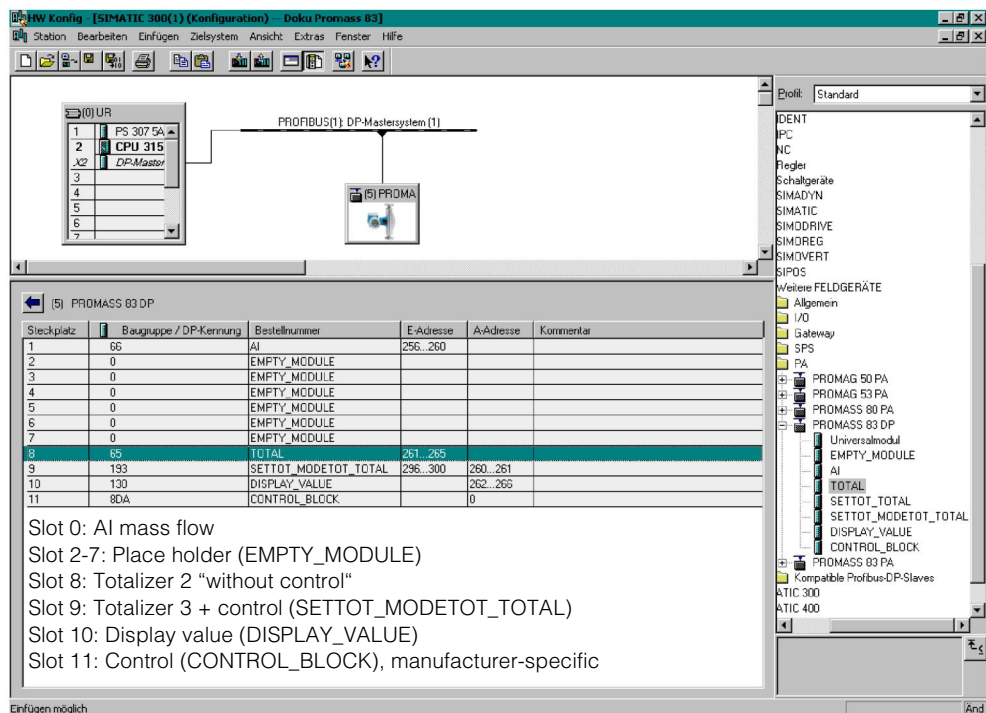


This form of configuration activates all data blocks which are supported by Promass 83. The significance of SET_TOT and MODE_TOT is described on page 74.

Configuration data							
Byte length (Input)	Byte length (Output)	Data blocks	Status	Access type	GSD Block designation	GSD Advanced block identification	GSD Standard block identification
0...4	–	Mass flow + status	active	read	AI	0x42, 0x84, 0x08, 0x05	0x94
5...9	–	Volume flow + status	active	read	AI	0x42, 0x84, 0x08, 0x05	0x94
10...14	–	Corrected volume flow + status	active	read	AI	0x42, 0x84, 0x08, 0x05	0x94
15...19	–	Density + status	active	read	AI	0x42, 0x84, 0x08, 0x05	0x94
20...24	–	Reference density + status	active	read	AI	0x42, 0x84, 0x08, 0x05	0x94
25...29	–	Temperature + status	active	read	AI	0x42, 0x84, 0x08, 0x05	0x94
30...34	0 + 1	Totalizer 1 + status + control	active	read + write	SETTOT_MODETOT_TOTAL	0xC1, 0x81, 0x84, 0x85	0xC1, 0x81, 0x84, 0x85
35...39	2 + 3	Totalizer 2 + status + control	active	read + write	SETTOT_MODETOT_TOTAL	0xC1, 0x81, 0x84, 0x85	0xC1, 0x81, 0x84, 0x85
40...44	4 + 5	Totalizer 3 + status + control	active	read + write	SETTOT_MODETOT_TOTAL	0xC1, 0x81, 0x84, 0x85	0xC1, 0x81, 0x84, 0x85
–	6...10	Display value + status	active	write	DISPLAY_VALUE	0x82, 0x84, 0x08, 0x05	0xA4
–	11	Control variable	active	write	CONTROL_BLOCK	0x20	0x20

Example 2:

Replacing measured variables with placeholders (EMPTY_MODULE) using the manufacturer-specific GSD file:

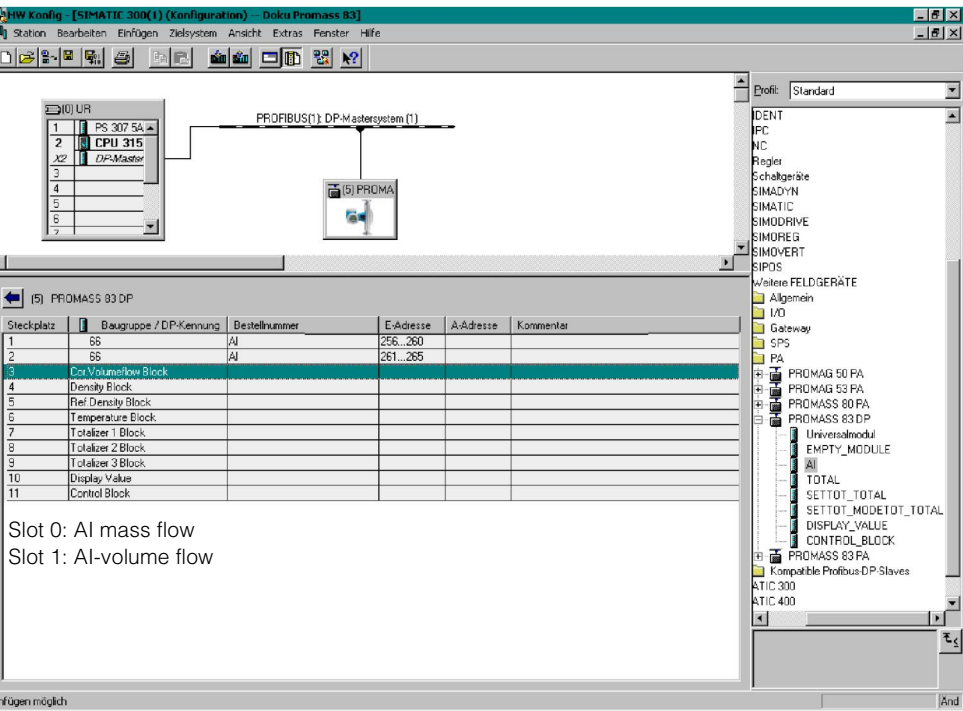


This form of configuration activates the mass flow, totalizer 2 without control, totalizer 3 with control, display value and the manufacturer-specific control.

In this example, totalizer 2 (without control) only provides the measured value and cannot be controlled. It is not possible to reset or stop the totalizer 3 (with control).

Configuration data							
Byte length (Input)	Byte length (Output)	Data blocks	Status	Access type	GSD block designation	GSD Advanced block identification	GSD Standard block identification
0...4	–	Mass flow + Status	active	read	AI	0x42, 0x84, 0x08, 0x05	0 x 94
–	–	Placeholder	disabled	–	EMPTY_MODULE	0 x 00	0 x 00
–	–	Placeholder	disabled	–	EMPTY_MODULE	0 x 00	0 x 00
–	–	Placeholder	disabled	–	EMPTY_MODULE	0 x 00	0 x 00
–	–	Placeholder	disabled	–	EMPTY_MODULE	0 x 00	0 x 00
–	–	Placeholder	disabled	–	EMPTY_MODULE	0 x 00	0 x 00
–	–	Placeholder	disabled	–	EMPTY_MODULE	0 x 00	0 x 00
5...9	–	Totalizer 2 + status	active	read	TOTAL.	0x41, 0x84, 0x85	0x41, 0x84, 0x85
10...14	0 + 1	Totalizer 3 + Status + Control	active	read + write	SETTOT_MDETOT_TOTAL	0xC1, 0x81, 0x84, 0x85	0xC1, 0x81, 0x84, 0x85
–	2...6	Display value + status	active	write	DISPLAY_VALUE	0x82, 0x84, 0x08, 0x05	0xA4
–	7	Control variable	active	write	CONTROL_BLOCK	0 x 20	0 x 20

Example 3:
Configuration of the measured variables without placeholders (EMPTY_MODULE) using the manufacturer-specific GSD file.



This form of configuration transmits the mass flow and the volume flow.

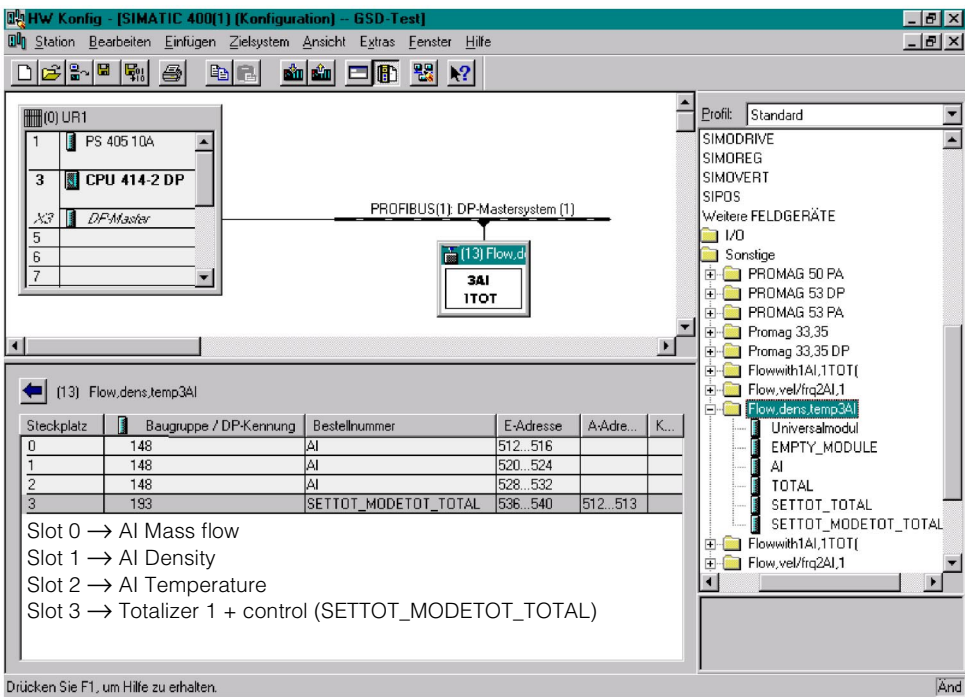


Note!
If no further measured variables are required, the placeholders have to be cancelled.
This only applies if no manufacturer-specific control is used.

Configuration data							
Byte length (Input)	Byte length (Output)	Data blocks	Status	Access type	GSD Block-designation	GSD Advanced block identification	GSD Standard Block identification
0...4	–	Mass flow + Status	active	read	AI	0x42, 0x84, 0x08, 0x05	0 x 94
5...9	–	Volume flow + Status	active	read	AI	0x42, 0x84, 0x08, 0x05	0 x 94

Example 4:

Full configuration using the Profile GSD files PA039742.gsd (RS 485) and PA139742.gsd (IEC 61158-2 (MBP)):



This form of configuration transmits the mass flow, density, temperature and totalizer 1 + control.



Note!

This GSD file contains three AI blocks and one Totalizer block. The AI blocks are always assigned to the following measured variables: AI 1 = Mass flow, AI 2 = Density, AI 3 = Temperature. This guarantees that the measured variables agree with the field devices of other manufacturers.

Configuration data							
Byte length (Input)	Byte length (Output)	Data blocks	Status	Access type	GSD Block designation	GSD Advanced block identification	GSD Standard block identification
0...4	–	Mass flow + status	active	read	AI	–	0 x 94
5...9	–	Density + status	active	read + write	AI	–	0 x 94
10...14	–	Temperature + status	active	read	AI	–	0 x 94
15...19	0..1	Totalizer 1 + status + control	active	read + write	SETTOT_MODETOT_TOTAL	–	0xC1, 0x81, 0x84, 0x85



Note!

There is no difference between the block ID's of the two Profile GSD files PA039742.gsd (RS 485) and PA139742.gsd (IEC 61158-2 (MBP)). There is, however, a difference in the baud rates that are supported and the Min_Slave_Interval.

Status code

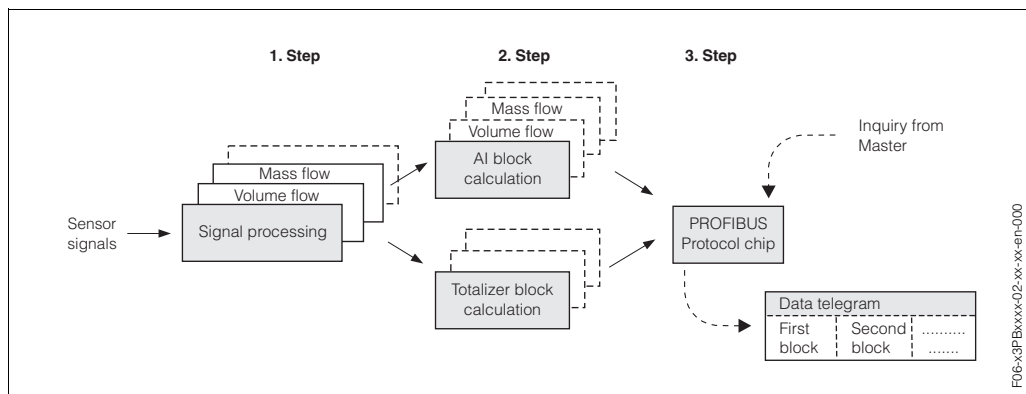
The status codes which are supported by the AI blocks (Analog Input), TOT (Totalizers 1...3) and display value are listed in the following table.

The coding of the status corresponds to the "PROFIBUS-PA Profile for Process Control Devices - General Requirements" V 3.0:

Status Code	Meaning	Device status	Limits
0x1C 0x1D 0x1E 0x1F	out of operation	bad	OK LOW_LIM HIG_LIM CONST
0 x 10 0 x 11 0 x 12	Sensor error below sensor limit sensor limit exceeded	bad	NO_LIMIT LOW_LIM HIG_LIM
0x0C 0x0D 0x0E 0x0F	device error	bad	OK LOW_LIM HIG_LIM CONST
0 x 18	No communication	bad	NO_LIMIT
0 x 08 0 x 09 0x0A 0x0B	function block not available	bad	OK LOW_LIM HIG_LIM CONST
0 x 40 0 x 41 0 x 42 0 x 43	non-specific	uncertain	OK LOW_LIM HIG_LIM CONST
0 x 44 0 x 45 0 x 46 0 x 47	last useable value	uncertain	OK LOW_LIM HIG_LIM CONST
0 x 48 0 x 49 0x4A 0x4B	substitute set	uncertain	OK LOW_LIM HIG_LIM CONST
0x4C 0x4D 0x4E 0x4F	values which are not saved after the device or parameters have been reset	uncertain	OK LOW_LIM HIG_LIM CONST
0 x 50 0 x 51 0 x 52 0 x 53	measured value of sensor inaccu- rate	uncertain	OK LOW_LIM HIG_LIM CONST
0 x 60 0 x 61 0 x 62 0 x 63	simulated value	uncertain	OK LOW_LIM HIG_LIM CONST
0 x 80 0 x 81 0 x 82 0 x 83	measuring system OK	good	OK LOW_LIM HIG_LIM CONST
0 x 84 0 x 85 0 x 86 0 x 87	change of parameters	good	OK LOW_LIM HIG_LIM CONST
0x8C 0x8D 0x8E 0x8F	critical alarm: alarm limit exceeded	good	OK LOW_LIM HIG_LIM CONST
0 x 88 0 x 89 0x8A 0x8B	Warning: Early warning limit exceeded	good	OK LOW_LIM HIG_LIM CONST

6.3.3 Cycle times

Measurement value processing and data communication is effected by Promass in three steps:



1st step: Data processing

During data processing, the measured variables - mass flow, volume flow, corrected volume flow, density, reference density and temperature - are calculated from the sensor signals. These measured variables are transmitted to the I/O module equidistantly in time every 20 ms.

2nd step: AI block calculation

The output values of the AI block and the totalizer are calculated on the basis of the measured variable ascertained while processing the measurement values (mass flow etc.) and are then copied to a cyclic data telegram. The AI block calculation is effected within a period of max. 50 ms per block.



Note!

Each measurement only involves the calculation of one AI block or one totalizer block. The AI block or totalizer is only calculated if it has been activated using the configuration software (s. page 74). The deactivation of parameters which are not required in the cyclic data telegram will improve the real time performance of the flowmeter.

3rd step: PROFIBUS protocol chip

The cyclic data telegram is transmitted to the protocol chip and, following an inquiry from the master, is sent to the master corresponding to the data transfer rate (Fig. 34).

Example for the timing of the block calculation and the signal processing

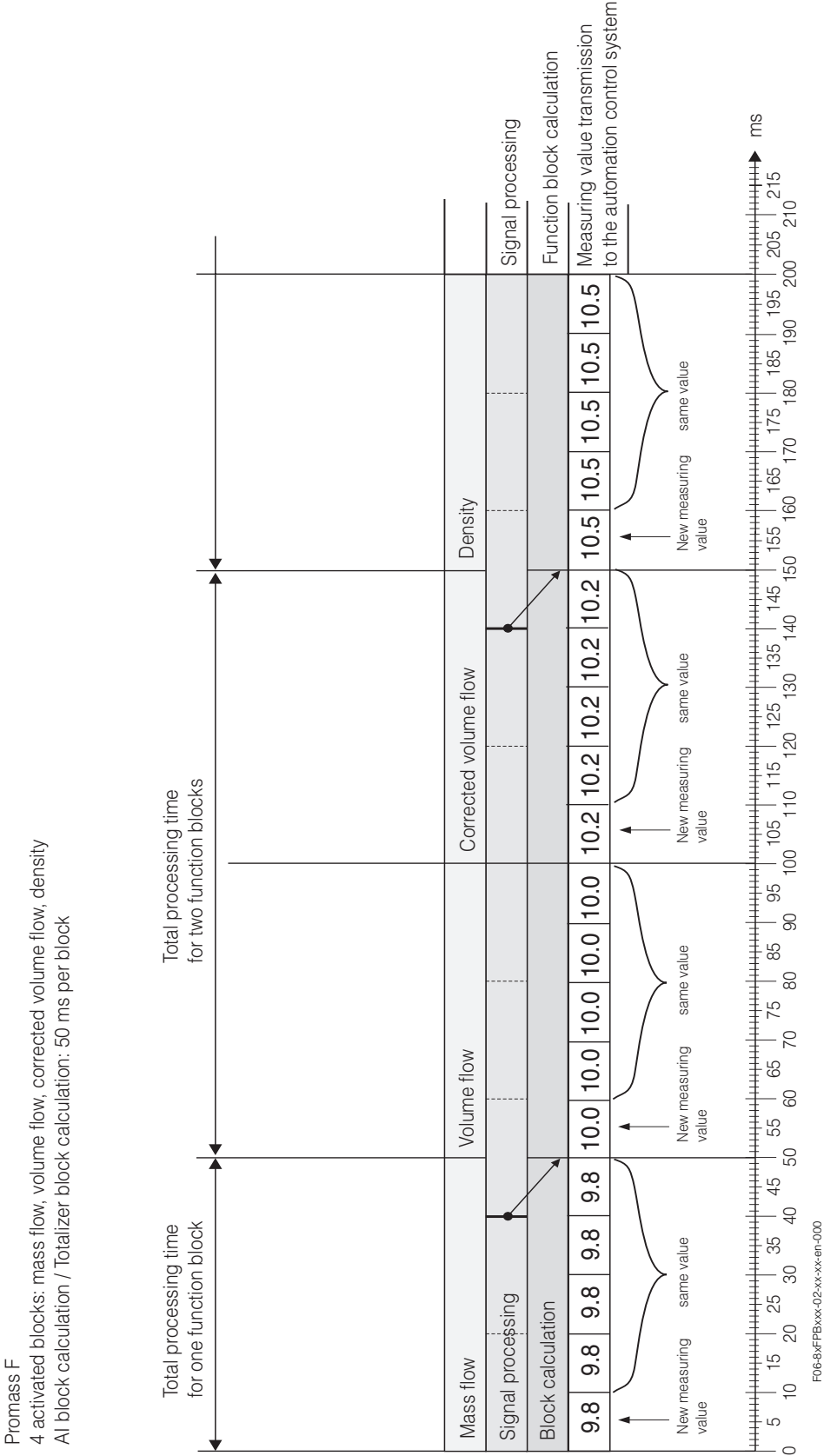


Fig. 34: Sequence during block calculation and measured value processing

9.2 System and Process error messages

General notes

The measuring device always assigns system and process errors which occur to two types of error messages and have different weightings.

“Fault message” error message type:

- If this message occurs, measuring operation is immediately interrupted or stopped!
- Display on the PROFIBUS → Fault messages are relayed to downstream function blocks or higher-level process control systems with the status “BAD” of the corresponding process variable.
- Local display → A lightning flash (⚡) flashes on the display.

“Notice message” error message type:

- Normal measuring operation continues despite this message!
- Display on the PROFIBUS → Notice messages are relayed to downstream function blocks or higher-level process control systems with the status “UNCERTAIN” of the corresponding process variable.
- Local display → An exclamation mark (!) flashes on the display.

Serious system errors, e.g. electronic module defects, are always categorised and displayed as “Fault messages” by the measuring device. Simulations and positive zero return, on the other hand, are classed as “Notice messages”.

Error messages in the configuration program (class 2 Master) → see table

In the Promass 83 system/process errors are recognised and reported in the Transducer and Analog Input block. The following table contains a list of device status messages pertaining to the Analog Input blocks (PROFIBUS Profile 3.0) as well as a description of the possible device status messages on the display (measured value Q = measured value quality).

Error messages on the local display → see table

Device status message Diagnosis message (Control system)	Device status message (Display)	No.	Initial status Analog Input Block/ Totalizer Block	Measured value Q/ Substatus/ alarm limit	Cause/remedy
ROM / RAM failure	S CRITICAL FAILURE ⚡ # 001	1	device failure	BAD 0x0F constant	<i>Cause:</i> System error. ROM / RAM error. Error when accessing the program memory (ROM) or random access memory (RAM) of the processor. <i>Remedy:</i> Replace the amplifier board. Spare parts → page 114
Amplifier EEPROM failure	S AMP HW EEPROM ⚡ # 011	11	device failure	BAD 0x0F constant	<i>Cause:</i> System error. Measuring amplifier has faulty EEPROM <i>Remedy:</i> Replace the amplifier board. Spare parts → page 114

Device status message Diagnosis message (Control system)	Device status message (Display)	No.	Initial status Analog Input Block/ Totalizer Block	Measured value Q/ Substatus/ alarm limit	Cause/remedy
Amplifier EEPROM data inconsistent	S AMP SW-EEPROM ⚡ # 012	12	device failure	BAD 0x0F constant	<i>Cause:</i> System error. Error when accessing data of the measuring amplifier EEPROM <i>Remedy:</i> Execute a warm start (= start up the measuring system without network interruption). - PROFIBUS (Commuwin II): Manufacturer-specific transducer block → Service & Analysis (V0H2) - Local display: SUPERVISION → SYSTEM → OPERATION → SYSTEM RESET (→ RESTART SYSTEM)
S-DAT failure / S-DAT not inserted	S SENSOR HW-DAT ⚡ # 031	31	sensor failure	BAD 0 x 10 no limits	<i>Cause:</i> System error - S-DAT is defective. - S-DAT is not plugged into the amplifier board or is missing. <i>Remedy:</i> - Replace the S-DAT. Spare parts → page 114 Check the spare part set number to ensure that the new, replacement DAT is compatible with the measuring electronics. - Plug S-DAT into the amplifier board → page 116, 118
S-DAT data inconsistent	S SENSOR SW-DAT ⚡ # 032	32	sensor failure	BAD 0 x 10 no limits	<i>Cause:</i> System error. Error accessing the calibration values stored in the S-DAT. <i>Remedy:</i> - Check whether the S-DAT is correctly plugged into the amplifier board , → page 116/118 - Replace the S-DAT if it is defective. Spare parts → page 114 Check the spare part set number to ensure that the new, replacement DAT is compatible with the measuring electronics. - Replace measuring electronics boards if necessary. Spare parts → page 114

Device status message Diagnosis message (Control system)	Device status message (Display)	No.	Initial status Analog Input Block/ Totalizer Block	Measured value Q/ Substatus/ alarm limit	Cause/remedy
T-DAT failure	S TRANSM. HW DAT ⚡ # 041	41	device failure	BAD 0x0F constant	<i>Cause:</i> System error 1. T-DAT is defective. 2. T-DAT is not plugged into the amplifier board (missing). <i>Remedy:</i> 1. Replace the T-DAT. Spare parts → page 114 Check the spare part set number to ensure that the new, replacement DAT is compatible with the measuring electronics. 2. Plug T-DAT into the amplifier board → page 116, 118
T-DAT data inconsistent	S TRANSM. SW-DAT ⚡ # 042	42	device failure	BAD 0x0F constant	<i>Cause:</i> System error. Error accessing the calibration values stored in the T-DAT. <i>Remedy:</i> 1. Check whether the T-DAT is correctly plugged into the amplifier board → page 116, 118 2. Replace the T-DAT if it is defective. Spare parts → page 114 Check the spare part set number to ensure that the new, replacement DAT is compatible with the measuring electronics. 3. Replace measuring electronics board if necessary. Spare parts → page 114
Compatibility Amp. I/O Mod.	S V / K COMPATIB. ⚡ # 051	51	device failure	BAD 0x0F constant	<i>Cause:</i> The I/O board and the amplifier board are not compatible. <i>Remedy</i> Use only compatible assemblies and boards. Check the compatibility of the assemblies used. Check the: – Spare part set number – Hardware revision code
F-CHIP failure	S HW F-CHIP ⚡ # 061	61	device failure	BAD 0x0F constant	<i>Cause:</i> F-Chip amplifier 1. F-Chip defective 2. F-Chip is not plugged into the I/O board (missing). <i>Behebung</i> 1. Replace the F-Chip . Spare parts 2. Plug F-Chip into the I/O board

Device status message Diagnosis message (Control system)	Device status message (Display)	No.	Initial status Analog Input Block/ Totalizer Block	Measured value Q/ Substatus/ alarm limit	Cause/remedy
TOT could not be restarted	S CHECKSUM TOTAL ⚡ # 111	111	device failure	BAD 0x0F constant	<i>Cause:</i> System error. Totalizer checksum error <i>Remedy:</i> 1. Restart the measuring device 2. Replace the amplifier board if necessary. Spare parts → page 114
Amplifier and I/O board only partially compatible	S A / C COMPATIB. ! # 121	121	device failure	BAD 0x0F constant	<i>Cause:</i> System error. Due to different software versions, I/O board and amplifier board are only partially compatible (possibly restricted functionality).  Note! – This message is only listed in the error history. – Nothing is displayed on the display. <i>Remedy:</i> Module with lower software version has either to be actualized by ToF Tool-FieldTool Package with the required software version or the module has to be replaced. Spare parts → page 114
Save to T-DAT failed	S LOAD T-DAT ! # 205	205	device failure	BAD 0x0F constant	<i>Cause:</i> System error. Data backup to T-DAT failed, or error when accessing the calibration values stored in the T-DAT. <i>Remedy:</i> 1. Check whether the T-DAT is correctly plugged into the amplifier board → page 116, 118 2. Replace the T-DAT if it is defective. Spare parts → page 114 Check the spare part set number to ensure that the new, replacement DAT is compatible with the measuring electronics. 3. Replace measuring electronics boards if necessary. Spare parts → page 114

Device status message Diagnosis message (Control system)	Device status message (Display)	No.	Initial status Analog Input Block/ Totalizer Block	Measured value Q/ Substatus/ alarm limit	Cause/remedy
Restore from T-DAT failed	S SAVE T-DAT ! # 206	206	device failure	BAD 0x0F constant	<i>Cause:</i> System error. Data backup to T-DAT failed, or error when accessing the calibration values stored in the T-DAT. <i>Remedy:</i> 1. Check whether the T-DAT is correctly plugged into the amplifier board → page 116, 118 2. Replace the T-DAT if it is defective. Spare parts → page 114 Check the spare part set number to ensure that the new, replacement DAT is compatible with the measuring electronics. 3. Replace measuring electronics boards if necessary. Spare parts → page 114
Communication failure	S COMMUNICAT. I/O ⚡ # 261	261	no communication	BAD 0 x 18 no limits	<i>Cause:</i> System error. Communication error. No data reception between amplifier and I/O board or faulty internal data transfer. <i>Remedy:</i> Check, whether the electronics boards are correctly inserted in their holders, → page 116, 118
Frequence limit 1 Frequence limit 2	S FREQ. LIM ⚡ # 379 / 380	379 380	device failure	BAD 0x0F constant	<i>Cause:</i> The measuring tube oscillation frequency is outside the permitted range. <i>Causes:</i> – Damaged measuring tube – Sensor defective or damaged <i>Remedy:</i> Contact your E+H service organisation.
Fluid Temperature Min.	S FLUIDTEMP. MIN. ⚡ # 381	381	sensor failure	BAD 0 x 10 no limits	<i>Cause:</i> The temperature sensor on the measuring tube is likely defective. <i>Remedy:</i> Check the following electrical connections before you contact your E+H service organisation: – Verify that the sensor signal cable connector is correctly plugged into the amplifier board → page 116, 118. – Remote version: Check sensor and transmitter terminal contacts No. 9 and 10 → page 30.

Device status message Diagnosis message (Control system)	Device status message (Display)	No.	Initial status Analog Input Block/ Totalizer Block	Measured value Q/ Substatus/ alarm limit	Cause/remedy
Fluid Temperature Max.	S FLUIDTEMP. MAX. ⚡ # 382	382	sensor failure	BAD 0 x 10 no limits	<i>Cause:</i> The temperature sensor on the measuring tube is likely defective. <i>Remedy:</i> Check the following electrical connections before you contact your E+H service organisation: – Verify that the sensor signal cable connector is correctly plugged into the amplifier board → page 116, 118. – Remote version: Check sensor and transmitter terminal contacts No. 9 and 10 → page 30.
Carrier Temperature Min.	S CARR. TEMP. MIN ⚡ # 383	383	sensor failure	BAD 0 x 10 no limits	<i>Cause:</i> The temperature sensor on the carrier tube is probably defective. <i>Remedy:</i> Check the following electrical connections before you contact your E+H service organisation: – Verify that the sensor signal cable connector is correctly plugged into the amplifier board → page 116, 118 – Remote version: Check sensor and transmitter terminal contacts No. 11 and 12 → page 30.
Carrier Temperature Max.	S CARR. TEMP. MAX ⚡ # 384	384	sensor failure	BAD 0 x 10 no limits	<i>Cause:</i> The temperature sensor on the carrier tube is probably defective. <i>Remedy:</i> Check the following electrical connections before you contact your E+H service organisation: – Verify that the sensor signal cable connector is correctly plugged into the amplifier board → page 116, 118 – Remote version: Check sensor and transmitter terminal contacts No. 11 and 12 → page 30.

Device status message Diagnosis message (Control system)	Device status message (Display)	No.	Initial status Analog Input Block/ Totalizer Block	Measured value Q/ Substatus/ alarm limit	Cause/remedy
Inlet Sensor Defekt	S INL. SENS. DEF. ⚡ # 385	385	sensor failure	BAD 0 x 10 no limits	<i>Cause:</i> One of the measuring tube exciter coils (inlet or outlet) is likely defective. <i>Remedy:</i> Check the following electrical connections before you contact your E+H service organisation: – Verify that the sensor signal cable connector is correctly plugged into the amplifier board → page 116, 118. – Remote version: Check sensor and transmitter terminal contacts No. 4, 5, 6 and 7 → page 30.
Outlet Sensor Defekt	S OUTL. SENS. DEF. ⚡ # 386	386	sensor failure	BAD 0 x 10 no limits	<i>Cause:</i> One of the measuring tube exciter coils (inlet or outlet) is likely defective. <i>Remedy:</i> Check the following electrical connections before you contact your E+H service organisation: – Verify that the sensor signal cable connector is correctly plugged into the amplifier board → page 116, 118. – Remote version: Check sensor and transmitter terminal contacts No. 4, 5, 6 and 7 → page 30.
Sensor Asymmetry Exceeded	S SEN. ASY. EXCEED ⚡ # 387	387	sensor failure	BAD 0 x 10 no limits	<i>Cause:</i> One of the measuring tube exciter coils (inlet or outlet) is likely defective. <i>Remedy:</i> Check the following electrical connections before you contact your E+H service organisation: – Verify that the sensor signal cable connector is correctly plugged into the amplifier board → page 116, 118. – Remote version: Check sensor and transmitter terminal contacts No. 4, 5, 6 and 7 → page 30.

Device status message Diagnosis message (Control system)	Device status message (Display)	No.	Initial status Analog Input Block/ Totalizer Block	Measured value Q/ Substatus/ alarm limit	Cause/remedy
Amplifier failure	S AMP. FAULT ⚡ # 388 / 389 / 390	388 389 390	device failure	BAD 0x0F constant	<i>Cause:</i> One of the measuring tube exciter coils (inlet or outlet) is probably defective. <i>Remedy:</i> Contact your E+H service organisation.
New amplifier software loaded	S SW.-UPDATE ACT. ! # 501	501	substitute set (Replacement value of the Failsafe status)	UNCERTAIN 0x48 no limits	<i>Cause:</i> New amplifier or communication (I/O module) software version is loaded. Currently no other functions are possible. <i>Remedy:</i> Wait until procedure is finished. The device will restart automatically.
Up-/Download device data active	S UP-/DOWNLO. ACT. ! # 502	502	substitute set (Replacement value of the Failsafe status)	UNCERTAIN 0x48 no limits	<i>Cause:</i> Up- or downloading the device data via configuration program. Currently no other functions are possible. <i>Remedy:</i> Wait until procedure is finished.
Oscillation amplitude too low	S UP-/DOWNLO. AKT. ! # 502	586	sensor failure	BAD 0 x 10 no limit	<i>Cause:</i> The fluid properties do not allow a continuation of the measurement. <i>Causes:</i> – Extremely high viscosity – Process fluid is very inhomogeneous (gas or solid content) <i>Remedy:</i> Change or improve process conditions.
No oscillation possible	P TUBE NOT OSC ⚡ # 587	587	sensor failure	BAD 0 x 10 no limit	<i>Cause:</i> Extreme process conditions exist. The measuring system can therefore not be started. <i>Remedy:</i> Change or improve process conditions.

Device status message Diagnosis message (Control system)	Device status message (Display)	No.	Initial status Analog Input Block/ Totalizer Block	Measured value Q/ Substatus/ alarm limit	Cause/remedy
Gain reduction impossible	P GAIN RED. IMPOS ⚡ # 588	588	sensor failure	BAD 0x10 no limits	<i>Cause:</i> Overdriving of the internal analog to digital converter. A continuation of the measurement is no longer possible! <i>Causes:</i> – Cavitation – Extreme pressure pulses – High gas flow velocity <i>Remedy:</i> Improve process conditions, e.g. by reducing the flow velocity.
Positive zero return active	S POSITIVE ZERO RETURN ! # 601	601	sensor conversion not accurate (measured value from sensor not accurate)	UNCERTAIN 0 x 53 constant	<i>Cause:</i> System error Positive zero return is activated <i>Remedy:</i> Switch off positive zero return • PROFIBUS (Commuwin II): Manufacturer-specific Transducer block → Device matrix (V8H3) • Local display: BASIC FUNCTIONS → SYSTEM PARAMETER → CONFIGURATION → POSITIVE ZERO RETURN (→ OFF)
Simulation failsafe active	S SIM. FAILSAFE ! # 691	691	substitute set	UNCERTAIN 0x48...0x4B low/high constant	<i>Cause:</i> System error Simulation of response to error is active <i>Remedy:</i> Switch off simulation • PROFIBUS (Commuwin II): Manufacturer-specific Transducer block → Service & Analysis (V4H2) • Local display: SUPERVISION → SYSTEM → OPERATION → SIM. FAILSAFE (→ OFF)
Simulation measured value active	S SIM. MEASURAND ! # 692	692	simulated value (manually defined value)	UNCERTAIN 0x60...0x63 low/high constant	<i>Cause:</i> System error Simulation is active <i>Remedy:</i> Switch off simulation • PROFIBUS (Commuwin II): Manufacturer-specific Transducer block → Service & Analyse (V4H0) • Local display: SUPERVISION → SYSTEM → OPERATION → SIM. MEASURAND (→ OFF)

Device status message Diagnosis message (Control system)	Device status message (Display)	No.	Initial status Analog Input Block/ Totalizer Block	Measured value Q/ Substatus/ alarm limit	Cause/remedy
Device test via FieldCheck active	S DEV. TEST AKT. ! # 698	698	simulated value	UNCERTAIN 0x60...0x63 low/high constant	<i>Cause:</i> The measuring device is being checked on site via the test and simulation device. <i>Remedy:</i> -
Empty pipe detected	P EMPTY PIPE ! # 700	700	Sensor conversion not accurate (sensor measured value not accurate)	UNCERTAIN 0x53 constant	<i>Cause:</i> The fluid density is outside the lower or upper limit value set for empty pipe detection. <i>Causes:</i> – Air in the measuring tube – Partly filled measuring tube <i>Remedy:</i> 1. Ensure that there is no gas content in the process liquid. 2. Adjust the lower or upper limit value of the empty pipe detection to the current process conditions. – PROFIBUS (Commwin II): Manufacturer-specific Transducer block → Device matrix (V3H5) EPD LOW VALUE (V3H6) EPD HIGH VALUE – Local display: BASIC FUNCTIONS → PROCESS PARAMETER → EPD PARAMETER → EPD LOW VALUE or EPD HIGH VALUE
Excitation too high	P EXC. CURR. LIM ! # 701	701	non specific	UNCERTAIN 0x40...0x43 low / high constant	<i>Cause:</i> The maximum current value for the measuring tube exciter coils has been reached, since certain process fluid characteristics are extreme, e.g. high gas or solid content. The instrument continues to work correctly. <i>Remedy:</i> In particular with outgassing fluids and/or increased gas content, the following measures are recommended to increase system pressure: 1. Install the instrument at the outlet side of a pump. 2. Install the instrument at the lowest point of an ascending pipeline. 3. Install a flow restriction, e.g. reducer or orifice, downstream from the instrument.

Device status message Diagnosis message (Control system)	Device status message (Display)	No.	Initial status Analog Input Block/ Totalizer Block	Measured value Q/ Substatus/ alarm limit	Cause/remedy
Fluid inhomogenous	P FLUID INHOM. ! # 702	702	non specific	UNCERTAIN 0x43 constant	<i>Cause:</i> Frequency control is not stable, due to inhomogeneous process fluid, e.g. gas or solid content. <i>Remedy:</i> In particular with outgassing fluids and/or increased gas content, the following measures are recommended to increase system pressure: 1. Install the instrument at the outlet side of a pump. 2. Install the instrument at the lowest point of an ascending pipeline. 3. Install a flow restriction, e.g. reducer or orifice, downstream from the instrument.
Noise Limit Channel 0	P NOISE LIM. CH0 ! # 703	703	non specific	UNCERTAIN 0x40...0x43 low / high constant	<i>Cause:</i> Overdriving of the internal analog to digital converter. <i>Causes:</i> – Cavitation – Extreme pressure pulses – High gas flow velocity A continuation of the measurement is still possible! <i>Remedy:</i> Change or improve process conditions, e.g. by reducing the flow velocity.
Noise Limit Channel 1	P NOISE LIM. CH1 ! # 704	704	non specific	UNCERTAIN 0x40...0x43 low / high constant	<i>Cause:</i> Overdriving of the internal analog to digital converter. <i>Causes:</i> – Cavitation – Extreme pressure pulses – High gas flow velocity A continuation of the measurement is still possible! <i>Remedy:</i> Change or improve process conditions, e.g. by reducing the flow velocity.
Flow limit	P FLOW LIM. ⚡ # 705	705	non specific	UNCERTAIN 0x42 high	<i>Cause:</i> The mass flow is too high. The electronics measuring range will be exceeded. <i>Remedy:</i> Reduce flow

Device status message Diagnosis message (Control system)	Device status message (Display)	No.	Initial status Analog Input Block/ Totalizer Block	Measured value Q/ Substatus/ alarm limit	Cause/remedy
Zeropoint adjustment failure	P ADJ. ZERO FAIL ⚡ # 731	731	non specific	UNCERTAIN 0x43 constant	<i>Cause:</i> The zero point adjustment is not possible or has been cancelled. <i>Remedy:</i> Make sure that zero point adjustment is carried out at "zero flow" only ($v = 0 \text{ m/s}$) → page 89.
No communication to amplifier	–	–	device failure	BAD 0x0F constant	<i>Cause:</i> Communication error. No communication to the amplifier. <i>Remedy:</i> 1. Switch power supply off and then on again 2. Check, whether the electronics boards are correctly inserted in their holders, → page 116, 118

9.7 Software history

Software version / date	Changes to software	Changes to documentation
Amplifier		
V 1.02.00 / 07.2001	Original software	–
V 1.02.01 / 11.2001	Software adaptation	–
V 1.02.02 / 04.2002	Software adaptation	Promass H
v 1.04.xx / 08.2002	Software expansion	Promass E
V 1.05.xx / 03.2003	Software adaptation	–
V 1.06.xx / 10.2003	Software expansion: New functionalities: Can be operated via service protocol:	• Language groups • Adjustments to FieldCheck and Simubox • Operation hours counter • Intensity of background illumination adjustable • Counter for access code • Upload /Download with ToF Tool-FieldTool Package • ToF Tool-FieldTool package – valid as of software version 1.03.00 (the latest SW version can be downloaded under: www.tof-fieldtool.endress.com)
I/O board, communication module (inputs/outputs)		
V 1.01.00 / 07.2001	Original software	–
V 2.00.01 / 03.2002	Software expansion:	• New error messages: 061, 121, 501 • Expansion of the control variables during the cyclic data exchange Control variables (Measuring mode): – 0 → 8: Unidirectional – 0 → 9: Bidirectional • The communication software can be updated via the service protocol
V 2.01.00 / 09.2002	Software expansion:	• Support for 2-point density calibration • "Measuring mode" function can be operated via the local display • Data length of advanced diagnostics adapted in cyclic data exchange Note for replacing device: From this software version onwards, a new device data base (GSD) must be used when replacing the device.
V 2.02.xx / 12.2002	Software adaptation	

Software version / date	Changes to software	Changes to documentation
V 2.03.xx / 10.2002	Software expansion: PROFIBUS operation via:	• New error messages • Support for compatibility with PROFIBUS forerunner model Promass 63 with profile version 2.0 • SIL2 supported • The totalizer values are also updated without integration in cyclic data exchange • Functions of measured value data (software version 1.06.xx and higher) Commuwin II, version 2.08-1 and higher (update C)