

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 24
- Checklist for “Post connection check” → Page 34



Note!

- The PROFIBUS-PA interface's technical data must be maintained in accordance with IEC 61158-2 (MBP) (FISCO model).
- The bus voltage of 9 ... 32 V and the current consumption of 11 mA at the device can be checked using a normal multimeter.
- Using the LED on the I/O board (s. Page 53) it is possible to carry out a simple function check on the fieldbus communication in the non-hazardous area.

Commissioning

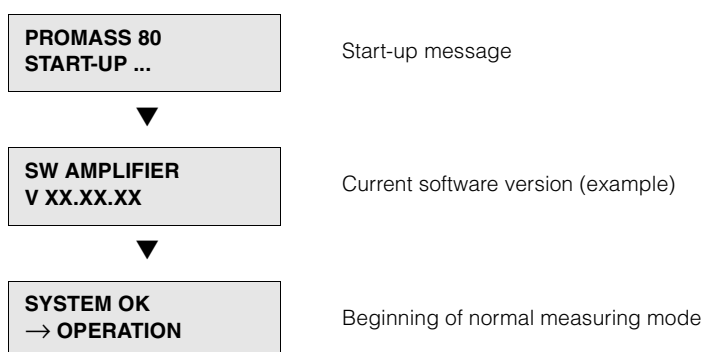
In the case of measuring devices without a local display, the individual parameters and functions must be configured via the configuration program, e.g. via PROFIBUS by means of Commuwin II, via service protocol by means of ToF Tool-FieldTool package. If the measuring device is equipped with a local 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 77

Switching on the measuring device

Once the post connection check (s. Page 34) has been successfully completed, it is time to switch on the supply voltage. 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 via the local display



Note!

You must enter a numerical code (factory setting: 80) before altering device functions, numerical values or factory settings (s. Page 38).

The following steps have to be carried out one after the other:

1. Check the hardware write protection:
COMMUNICATION → WRITE PROTECT
2. Enter the tag name:
COMMUNICATION → TAG NAME
3. Assign a bus address if this has not already been carried out via the miniature switches on the I/O board, (s. Page 54):
COMMUNICATION → BUS ADDRESS
4. Select the system unit for mass flow:
 - Via the system unit group: SYSTEM UNITS → UNIT MASS FL.
 - Once the SET UNIT TO BUS function is activated, the system unit set will become effective in the process-control system: COMMUNICATION → SET UNIT TO BUS



Note!

The measured values are transmitted in the system units - as described on Page 63 ff. - to the automation control 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 AI block and therefore will not influence the measured value which is transmitted to the automation control system.

Once the SET UNIT TO BUS function is activated in the function group COMMUNICATION → SET UNIT TO BUS, the changed system unit for the measured value will be transmitted to the automation control system.

5. Configuration of the totalizer:
 - Select the process variable, e.g. mass flow:
TOTALIZER → CHANNEL
 - Enter the totalizer units required:
TOTALIZER → UNIT TOTALIZER
 - Set the totalizer status, e.g. for totalizing:
TOTALIZER → SET TOTALIZER
 - Set the totalizer mode, e.g. for balancing:
TOTALIZER → TOTALIZER MODE
6. Select the GSD file:
COMMUNICATION → SELECT GSD



Note!

The range of options and the predefined values/parameters are described in more detail in a separate manual, namely the "Description of Device Functions" manual.

6.3 Commissioning via the Class 2 master (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 via the local display".

The configuration parameters are found in the following places in the Commuwin II operation matrix:

- in the Physical block → Page 49
- in the manufacturer-specific device matrix position V6 and V7 → Page 45
- in the Analog Input block → Page 51)
- in the Totalizer block position V1 → Page 52

1. Parametering the "Physical block":
 - Open the Physical block.
 - Software and hardware write protection is disabled in Promass 80 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 80 PBUS":
 - Open the manufacturer-specific Transducer block "PROMASS 80 PBUS".
 - Enter the desired name for the block (tag name).
Factory setting: No block name (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 other manufacturer-specific parameters.

Please note that alterations made to device parameters will only be activated once a valid access code has been entered. The access code can be entered in the matrix cell V2H0 (factory setting: 80).

3. Setting parameters for the "Analog Input function block":
Promass 80 has four Analog Input function blocks (Analog Input) to which different process variables can be assigned as required. (see Table). These are selected using the connection live list.
 - Enter the required name for the Analog Input function block 1 (factory setting: MASSFLOW BLOCK).
 - Open the Analog Input function block.
 - By means of the CHANNEL parameter (V8H5), select the process variable which should be used as the input variable for the function block algorithm (scaling and limit value monitoring functions).

The following settings are possible:

CHANNEL = 277	→ Mass flow	factory setting AI 1
CHANNEL = 273	→ Volume flow	factory setting AI 2
CHANNEL = 281	→ Density	factory setting AI 3
CHANNEL = 285	→ Temperature	factory setting AI 4
CHANNEL = 398	→ Corrected volume flow	–
CHANNEL = 402	→ Reference density	–

- In the Analog Input function block, the input value or the input range can be scaled in accordance with the requirements of the automation control system, (s. Page 59).
 - If necessary, set a limit value.
4. Setting parameters for the “Totalizer block”:
- Promass 80 has one totalizer function block. This is selected using the profile block “Totalizer block” in the connection live list.
- Enter the required name for the Totalizer function block (factory setting: TOTALIZER BLOCK).
 - Select the process variable, e.g. volume flow, via the CHANNEL V8H5 parameter.

CHANNEL = 277 → Mass flow	factory setting
CHANNEL = 273 → Volume flow	–
CHANNEL = 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 60).
 - 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 control systems and programmable logic controls.
 - The files required for commissioning and network configuration can be obtained as described on Page 60.

6.3.1 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 control 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.

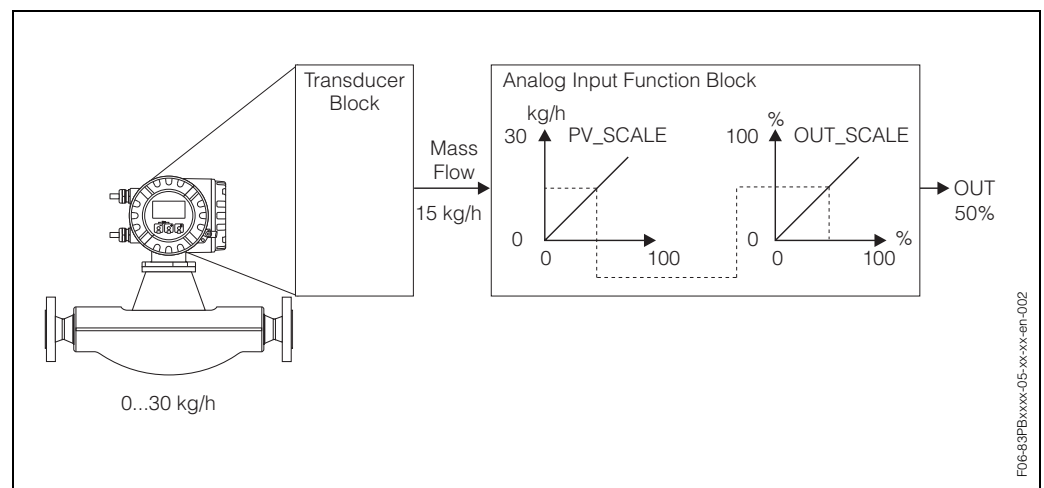


Fig. 29: Scaling the input value for the Analog Input function block



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.

6.4 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-PA 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-PA 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 manufacturers to be exchanged without having to reconfigure.

Generally, the Profile 3.0 distinguishes 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: This 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 manufacturers. It is, however, essential that the cyclic process values follow the same sequence.

Example:

The Promass 80 supports the Profile 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 = Density, AI 3 = Temperature. This guarantees that the first measured variable agrees with the field devices of other manufacturers.

Profile GSD (multivariable) with the ID number 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 changed using the local display or a Class 2 master! Configuration using the local display → page 56 ff.

Promass 80 supports the following GSD files:

Name of device	Manufacturer-specific ID No.	Profile 3.0 ID No.	Manufacturer-specific GSD
Promass 80 PA PROFIBUS-PA (IEC 61158-2 (MBP))	1528 (Hex)	9742 (Hex)	EH3_1528.gsd EH3X1528.gsd
	Profile 3.0 GSD	Type file	Bitmaps
	PA139742.gsd	EH_1528.200	EH_1528_d.bmp/.dib EH_1528_n.bmp/.dib EH_1528_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, 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 devices 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 control 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 manufacturer which directory you should use.

Compatibility of Profile 2.0 and 3.0 devices

It is possible to operate Profile 2.0 and 3.0 devices with different GSD files in one system using one DP master as the cyclic data for the automation control system in both profile versions is compatible.

**Note!**

Promass 80 differs from Promass 63 with profile version 2.0 in terms of functionality, number of process variables available and Profibus ID No. For this reason, Promass 80 does not support any compatibility to Promass 63 with profile version if the device is replaced. A Promass 63 device with profile version 2.0 can only be replaced by a Promass 80 if the planning of the PROFIBUS network is adapted, i.e. use the device data base (GSD) for Promass 80.

6.4.1 Cyclic data exchange

In the case of PROFIBUS-PA, the cyclic transmission of analog values to the automation control 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 60). The status will be indicated on the display of the device (if existing).



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 transferred to 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		Mantissa			Mantissa			Mantissa

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

Example:

40 F0 00 00 hex = 0100 0000 1111 0000 0000 0000 0000 0000 binary
 Value = $(-1)^0 * 2^{(129-127)} * (1 + 2^{-1} + 2^{-2} + 2^{-3})$
 = $1 * 2^2 * (1 + 0.5 + 0.25 + 0.125)$
 = $1 * 4 * 1.875 = 7.5$

Block model

The analog values transmitted by Promass 80 during the cyclic data exchange are:

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



Note!

- Promass 80 has four Analog Input function blocks to which different process variables can be assigned as required.
- Totalizer 1 can be configured in various combinations with the totalizer controls. It is possible to configure totalizer 1 only, or additionally integrate one or two control blocks in order to reset totalizer 1 or stop totalizing, for example. The configuration is explained in detail on Page 68.

The block model (Fig. 30) shows which input and output data Promass 80 provides for cyclic data exchange.

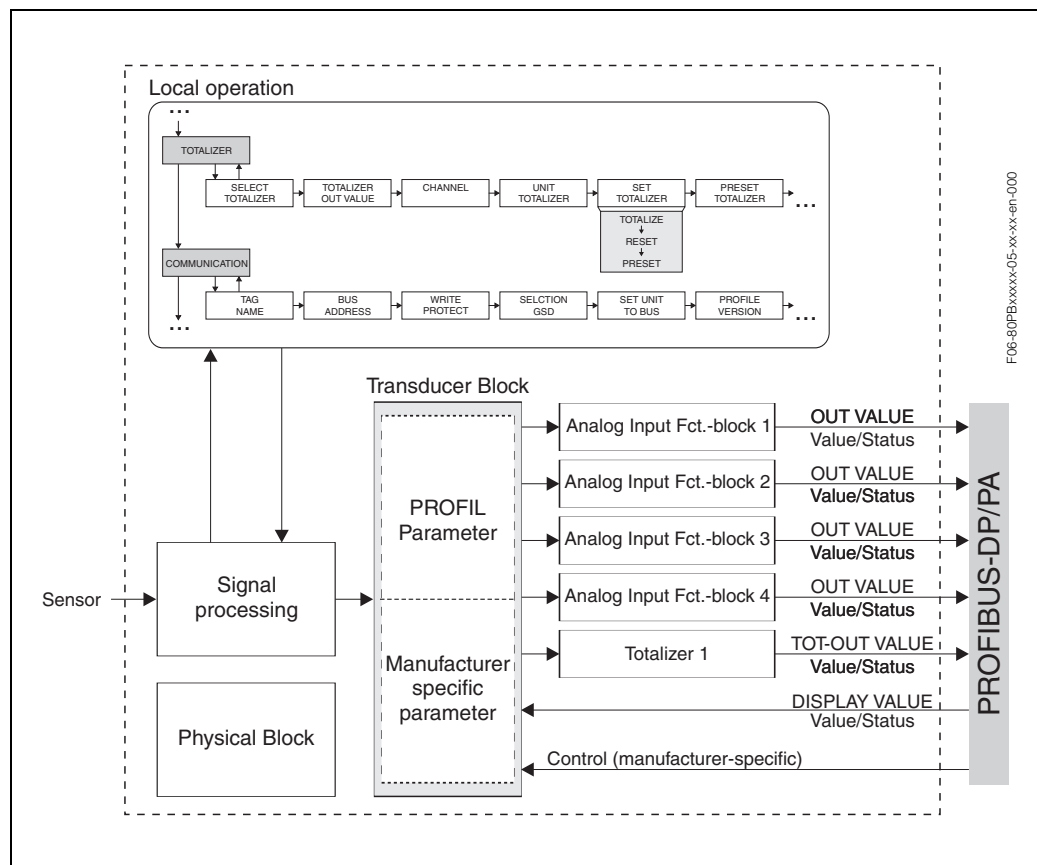


Fig. 30: Block model Promass 80 PROFIBUS-PA Profile 3.0

Input data

The input data are:

Mass flow, volume flow, density, corrected volume flow, reference density, temperature and totalizer 1.

The current measured value can be transmitted to the automation control system using these measured variables.

Data transfer from Promass to the automation control system

The assignment of the process variables to the Analog Input function blocks can be configured as required. 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 configuration in the following table is the factory configuration which can be changed, depending on the process conditions.
- The relevant process variables can be assigned to the Analog Input function blocks in question by means of a configuration program (Class 2 Master), namely by means of the "Channel" parameter V8H5 in the "ANALOG INPUT 1...4" matrix.
- The following settings are possible:

CHANNEL = 277	→ Mass flow	factory setting AI 1
CHANNEL = 273	→ Volume flow	factory setting AI 2
CHANNEL = 281	→ Density	factory setting AI 3
CHANNEL = 285	→ Temperature	factory setting AI 4
CHANNEL = 398	→ Corrected volume flow	—
CHANNEL = 402	→ Reference density	—

- The system units in the table correspond to the predefined scales which are transmitted during the cyclic data exchange.
- The measured variable can be assigned to the totalizer using the "Channel" parameter, the local display or a Class 2 master.
- The following settings are possible for the totalizer:

CHANNEL = 0	→ OFF	—
CHANNEL = 277	→ Mass flow	factory setting
CHANNEL = 273	→ Volume flow	—
CHANNEL = 398	→ Corrected volume flow	—

The parameter "Channel" is described in more detail in the separate "Description of Device Functions" manual.

Overview of input data:

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 63	kg/s
4	Mass flow status	read	Status code → Page 74	–
5, 6, 7, 8	Volume flow	read	32-bit floating point number (IEEE-754) Illustrated → Page 63	m ³ /h
9	Volume flow status	read	Status code → Page 74	–
10, 11, 12, 13	Density	read	32-bit floating point number (IEEE-754) Illustrated → Page 63	kg/l
14	Density status	read	Status code → Page 74	–
15, 16, 17, 18	Temperature	read	32-bit floating point number (IEEE-754) Illustrated → Page 63	K
19	Temperature status	read	Status code → Page 74	–
20, 21, 22, 23	Totalizer 1	read	32-bit floating point number (IEEE-754) Illustrated → Page 63	m ³ , kg or Nm ³
24	Totalizer 1 status	read	Status code → Page 74	–

Output data display value

The display value allows you to transmit a measured value which has been calculated in the automation control system directly to the Promass. This measured value is a display value which can be assigned to line 1 and line 2 of the display. The display value contains 4 bytes measured value and 1 byte status.

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

Output byte	Process parameter	Access type	Comment/Data format	Factory setting unit
3, 4, 5, 6	Display value	write	32-bit floating point number (IEEE-754) Illustrated → Page 63	ao
7	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 control 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 80 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 80.

Data transfer from the automation control system to Promass 80 (Control block)

Output byte	Process parameter	Access type	Comment/Control variable	Factory setting unit
8	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 totalizer 1 (output data)

These functions allow totalizer 1 to be controlled from the automation control system. The following control variables are possible: totalizing, resetting, activation of a predefined value, balancing, totalisation of positive flow, totalisation of negative flow and stopping of totalizing.

*Data transfer from the automation control system to the Promass 80
(Control variables of totalizer)*

Output byte	Process parameter	Access type	Comment/Control variable	Factory setting unit
0	SET_TOT 1	write write write	The following control variables can be entered for the totalizer 1 using these parameters. Control variable for SET_TOT: 0: Totalizing 1: Reset totalizer 2: Preset totalizer	–
1	MODE_TOT 1	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 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 control variable SET_TOT can be set to “1” at a later point in time (1 = Reset the totalizer).

Factory settings for the cyclic measured variables

The following measured variables are configured in Promass 80 at the factory:

- Mass flow → AI 1
- Volume flow → AI 2
- Density → AI 3
- Temperature → AI 4
- Totalizer 1 (with control variable SET_TOT and MODE_TOT)
- Display value (input value)
- Control (manufacturer-specific control block)

If not all measured variables are 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 examples → Page 69

**Note!**

Only activate the data blocks which are to be processed in the automation control system. This will improve the data throughput rate of a PROFIBUS-PA network. A double-arrow symbol (direction alternating) will appear on the display to show that Promass 80 is communicating with the automation control system.

**Caution!**

- It is essential to adhere to the following sequence when configuring the measured variables – AI1...AI4, totalizer 1, display value and control!
- The device will have to be reset once a new measured variable configuration has been located to the automation system. This can be effected in either of two ways:
 - Via the local display: HOME → SUPERVISION → Function SYSTEM RESET
 - Switch supply voltage off and then on again.

System units

The measured values are transmitted in the system units, as described in the table on Page 65, to the automation control system during the cyclic data exchange.

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 control system.

Once the SET UNIT TO BUS function is activated in the COMMUNICATION → SET UNIT TO BUS group, the altered system unit for the measured value will be transmitted to the automation control system. This can also be activated with a Class 2 master (e.g. Commuwin II).

Examples of Configuration

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

1. The field devices (Promass 80) which are to be configured are integrated into the configuration program of the automation control system via the PROFIBUS-PA network. The GSD file is used here. Measured variables required can be configured “off-line” using the configuration software.
2. The automation control system's user program will have to be programmed now. On the one hand, the user program controls the input and output data and on the other hand defines the location of the measured variables so that they can be processed further.

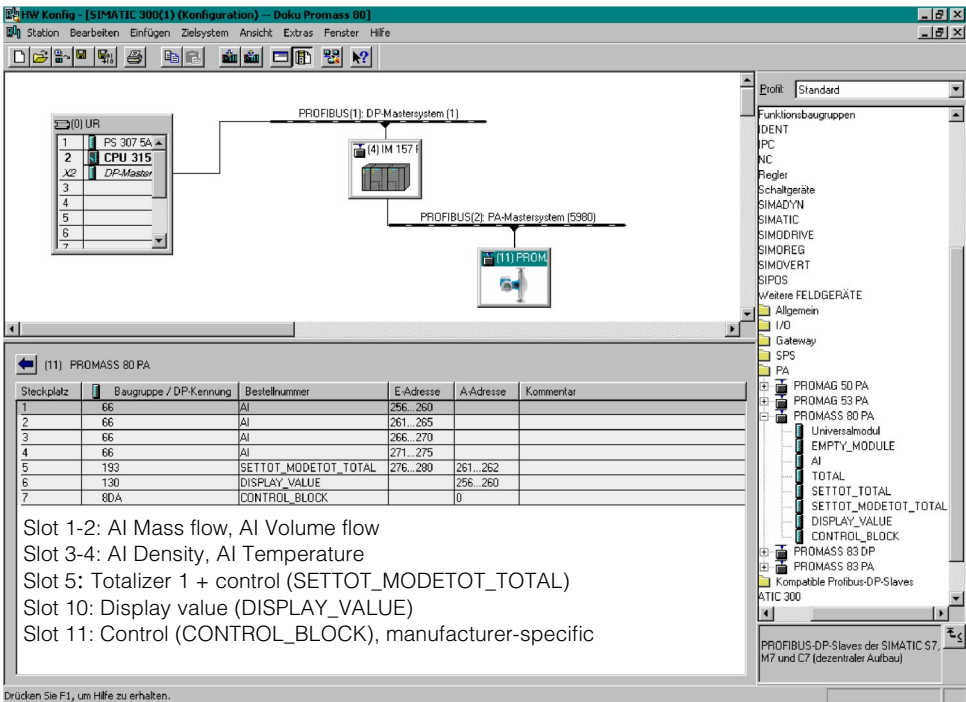
An additional measured value configuration module may have to be used in the case of automation control systems which do not support the IEEE-754 floating point format.

It may also be necessary to change the byte sequence (byte swapping) depending on the type of data management employed in the automation control system (little-endian format or big-endian format).

3. When configuration has been completed, this will be transferred to the automation control system in the form of a binary file.
4. The system can be started now. The automation control system will establish a connection to the configured devices. The device parameters which are relevant for the process can now be configured using a Class 2 master, e.g. with Commuwin II (s. Page 57).

6.4.2 Configuration examples with Simatic S7 HW-Konfig

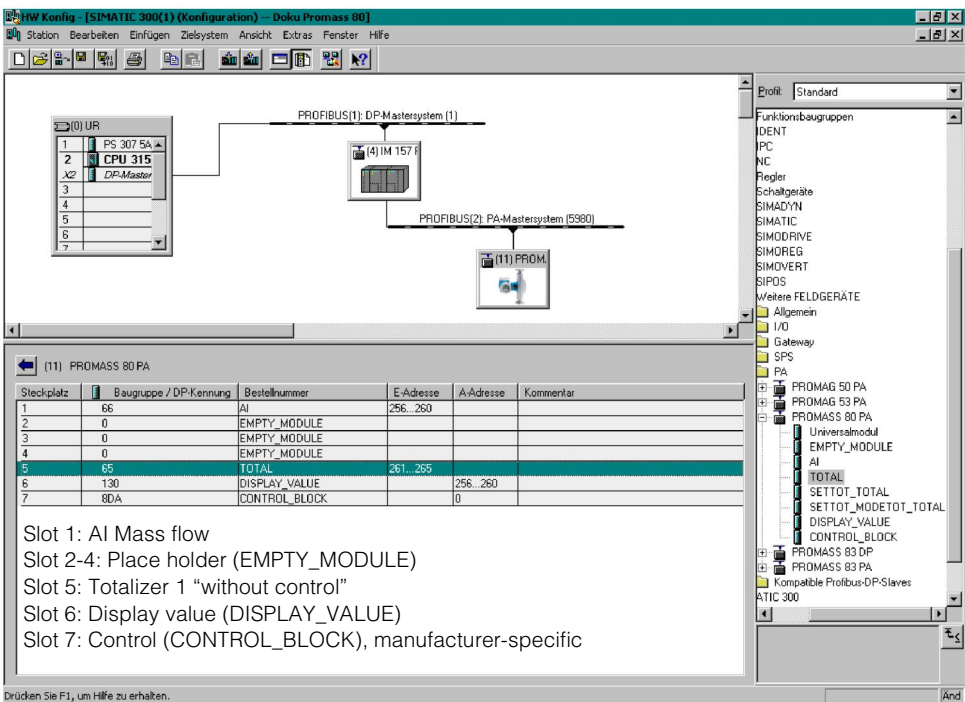
Example 1:
Full configuration using the manufacturer-specific GSD file



This form of configuration activates all data blocks which are supported by Promass 80. The significance of SET_TOT and MODE_TOT is described on Page 68.

Configuration data							
Byte length (Input)	Byte length (Output)	Data blocks	Status	Access type	GSD Block designation	GSD Extended 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	–	Density + Status	active	read	AI	0x42, 0x84, 0x08, 0x05	0x94
15...19	–	Temperature + Status	active	read	AI	0x42, 0x84, 0x08, 0x05	0x94
20...24	0 + 1	Totalizer 1 + Status + Control variable	active	read + write	SETTOT_MODETOT_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	0x20	0x20

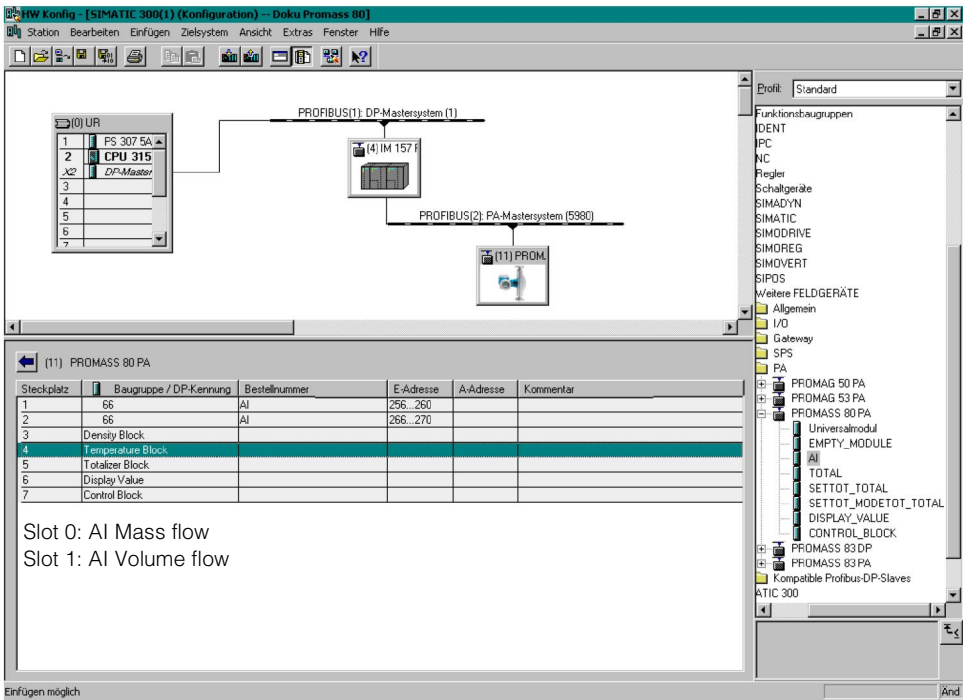
Example 2:
Replacing measured variables with placeholders (EMPTY_MODULE) using the manufacturer-specific GSD file:



This form of configuration activates the mass flow, totalizer 1, display value and the manufacturer-specific control.
The totalizer is configured “without control variable”. In this example it provides a measured value and cannot be controlled. It is not possible to reset or stop the totalizer.

Configuration data							
Byte length (Input)	Byte length (Output)	Data blocks	Status	Access type	GSD Block designation	GSD Extended block identification	GSD Standard block identification
0...4	–	Mass flow + Status	active	read	AI	0x42, 0x84, 0x08, 0x05	0x94
–	–	Placeholder	inactive	–	EMPTY_MODULE	0x00	0x00
–	–	Placeholder	inactive	–	EMPTY_MODULE	0x00	0x00
–	–	Placeholder	inactive	–	EMPTY_MODULE	0x00	0x00
5...9	–	Totalizer 1 + status	active	read	TOTAL	0x41, 0x84, 0x85	0x41, 0x84, 0x85
–	0...4	Display value + status	active	write	DISPLAY_VALUE	0x82, 0x84, 0x08, 0x05	0xA4
–	5	Control variable	active	write	CONTROL_BLOCK	0x20	0x20

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



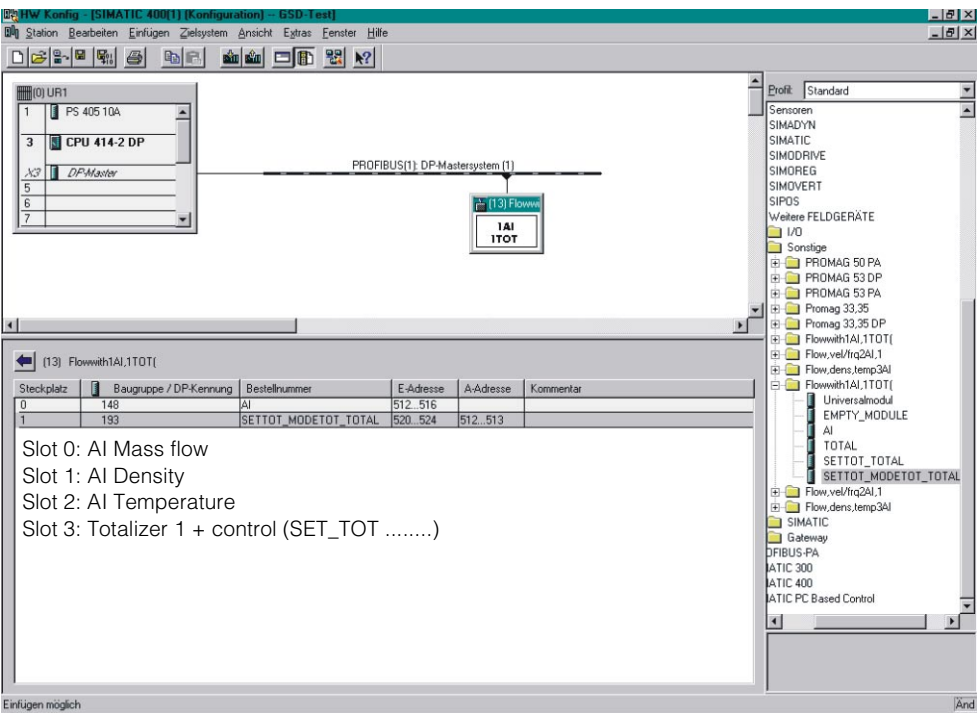
This form of configuration transmits the mass flow and the volume flow.



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

Configuration data							
Byte length (Input)	Byte length (Output)	Data blocks	Status	Access type	GSD Block designation	GSD Extended 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

Example 4:
Full configuration via the profile GSD file PA139740.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 Extended block identification	GSD Standard block identification
0...4	–	Mass flow + Status	active	read	AI	–	0x94
5...9	–	Density + Status	active	read + write	AI	–	0x94
10...14	–	Temperature + Status	active	read	AI	–	0x94
15...19	0..1	Totalizer 1 + Status + Control	active	read + write	SETTOT_ MODETOT_ TOTAL	–	0xC1, 0x81, 0x84, 0x85

Status code

The status codes which are supported by the blocks AI (Analog Input), TOT (Totalizer) 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
0x10 0x11 0x12	sensor error below sensor limit sensor limit exceeded	bad	NO_LIMIT LOW_LIM HIG_LIM
0x0C 0x0D 0x0E 0x0F	device failure	bad	OK LOW_LIM HIG_LIM CONST
0x18	no communication	bad	NO_LIMIT
0x08 0x09 0x0A 0x0B	function block not available	bad	OK LOW_LIM HIG_LIM CONST
0x40 0x41 0x42 0x43	non-specific	uncertain	OK LOW_LIM HIG_LIM CONST
0x44 0x45 0x46 0x47	last useable value	uncertain	OK LOW_LIM HIG_LIM CONST
0x48 0x49 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
0x50 0x51 0x52 0x53	measured value of sensor inaccurate	uncertain	OK LOW_LIM HIG_LIM CONST
0x60 0x61 0x62 0x63	simulated value	uncertain	OK LOW_LIM HIG_LIM CONST
0x80 0x81 0x82 0x83	measuring system OK	good	OK LOW_LIM HIG_LIM CONST
0x84 0x85 0x86 0x87	change of parameters	good	OK LOW_LIM HIG_LIM CONST
0x8C 0x8D 0x8E 0x8F	critical alarm: alarm limits exceeded	good	OK LOW_LIM HIG_LIM CONST
0x88 0x89 0x8A 0x8B	warning: early warning limit exceeded	good	OK LOW_LIM HIG_LIM CONST

6.4.3 Cycle times

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

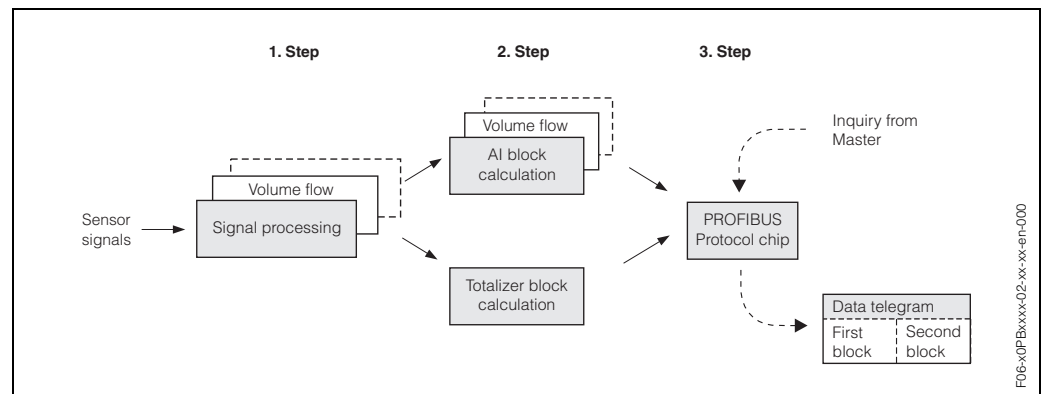


Fig. 31: Measured value processing with Promass PROFIBUS

1st step: Data processing

During data processing, the measured variables - mass flow, volume flow, 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 measured 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 68). 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. 32).

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.

Error message type "Fault message":

- If this message occurs, measuring operation is immediately interrupted or stopped!
- Presentation on the PROFIBUS → Fault signals will be reported to the downline function block or the control system by setting the status of the corresponding process value to "BAD".
- Local display → A blinking lightning bolt (⚡) will appear.

Error message type "Notice message":

- Normal measuring operation continues despite this message!
- Presentation on the PROFIBUS → Notice messages will be reported to the next function block or the control system by setting the status of the corresponding process value to "UNCERTAIN".
- Local display → A blinking exclamation point (!) will appear.

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 80 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 102
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 102

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 102 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 104, 106
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 104/106 - Replace the S-DAT if it is defective. Spare parts → Page 102 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 102

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 102 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 104, 106
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 104, 106 2. Replace the T-DAT if it is defective. Spare parts → Page 102 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 102
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 → Page 102 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 102
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 102
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 104, 106 2. Replace the T-DAT if it is defective. Spare parts → Page 102 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 102

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 104, 106 2. Replace the T-DAT if it is defective. Spare parts → Page 102 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 102
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 104, 106
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 104, 106. – Remote version: Check sensor and transmitter terminal contacts No. 9 and 10 → Page 28.

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 104, 106. – Remote version: Check sensor and transmitter terminal contacts No. 9 and 10 → Page 28.
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 104, 106 – Remote version: Check sensor and transmitter terminal contacts No. 11 and 12 → Page 28.
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 104, 106 – Remote version: Check sensor and transmitter terminal contacts No. 11 and 12 → Page 28.

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 104, 106. – Remote version: Check sensor and transmitter terminal contacts No. 4, 5, 6 and 7 → Page 28.
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 104, 106. – Remote version: Check sensor and transmitter terminal contacts No. 4, 5, 6 and 7 → Page 28.
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 104, 106. – Remote version: Check sensor and transmitter terminal contacts No. 4, 5, 6 and 7 → Page 28.

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 m/s) → Page 78.
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 104, 106

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	none
V 1.04.00 / 07.2002	Software adaptation: Expansion of the functionality	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 • Flow direction pulse output selectable • 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-field-tool.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:	• "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 • 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) • Support for the process variables corrected volume flow and reference density Commuwin II, version 2.08-1 and higher (update C)