ABB MEASUREMENT & ANALYTICS | INTERFACE DESCRIPTION | COM/FEP630/FEH630/PB-EN REV. B

Processmaster FEP630, HygienicMaster FEH630

Electromagnetic flowmeter

PROFIBUS DP protocol
PROFIBUS PA protocol
Valid from software version:
01.11.00

Measurement made easy

—
FEP630
FEH630
FET630

Additional Information

Additional documentation on Processmaster FEP630, HygienicMaster FEH630 is available for download free of charge at www.abb.com/flow. Alternatively simply scan this code:

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1 Introduction

The following interface description is a supplement to the operating instruction of the Processmaster FEP630, HygienicMaster FEH630.
The safety instructions it includes are valid and must be observed.

These instructions offer additional information about the supported PROFIBUS functionalities and gives information about the configuration.

This description applies to the entire ProcessMaster / HygienicMaster series FEP630 / FEH630.
All device versions have this same ID number and refer to the same GSD file (equipment master data).

The transmitter FET630 corresponds to the PROFIBUS DP/PA profiles DPV0 / DPV1.
The PROFIBUS DP/PA application layer corresponds to the profile PA Devices 3.02.

2 Specification

PROFIBUS DP® communication

PROFIBUS DP interface	
Terminals	V1 / V2
Configuration	Via the PROFIBUS DP interface or via the local operating interface in connection with a corresponding Device Type Manager (DTM)
Transmission	Based on IEC 61158-2
Baud rate	9.6 kbps, 19.2 kbps, 45.45 kbps, 93.75 kbps, 187.5 kbps, 500 kbps, 1.5 Mbps The baud rate is automatically detected and does not need to be configured manually
Device profile	PA Profile 3.02
Bus address	Address range 0 to 126 Factory setting: 126
Number of DP nodes	≤ 32, Node = Devices with / without PROFIBUS address
Bus termination	Bus termination required at the beginning and end of each DP segment!

For commissioning purposes, you will need a device driver in EDD (Electronic Device Description) or DTM (Device Type Manager) format plus a GSD file.

You can download EDD, DTM and GSD from www.abb.com/flow.

The files required for operation can also be downloaded from www.profibus.com.

ABB provides three different GSD files which can be integrated in the system.

ID number	**GSD file name**	
0x9740	PA139740.gsd	1xAI, 1xTOT
0x9700	PA139700.gsd	1AI
0x3432	ABB_3432.gsd	6xAI, 2xTOT, 1xAO, 1xDI, 1xDO

Users decide at system integration whether to install the full range of functions or only part. Switching is made using the 'Ident Nr. Selector' parameter.

See also **IDENT_NUMBER_SELECTOR** on page.16

General Information

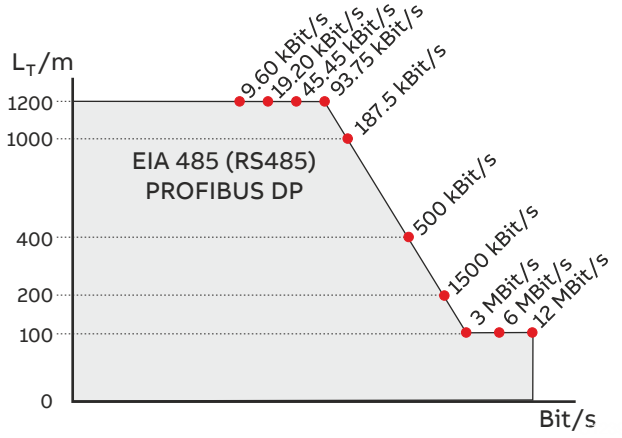

Figure 1: Bus cable length depends on the transmission rate

Pro PROFIBUS Line

(Line = Starts at DP Master and goes to last DP/PA Slave)

- Approximately 4 to 8 DP segments through the repeater (see repeater data sheets)
- Recommended DP transfer rate 500 to 1500 kBit/s
- The slowest DP node determines the transfer rate of the DP line
- Number of PROFIBUS DP and PA nodes ≤ 126 (addresses 0 to 125)

Per PROFIBUS DP segment

- Number of DP nodes ≤ 32
  (Node = Devices with / without PROFIBUS address)
- Bus termination required at the beginning and end of each DP segment!
- Trunk cable length (L_T) see diagram (length dependent on transfer rate)
- Cable length of at least 1 m between two DP nodes at ≥ 1500 kBit/s!
- Spur cable length (L_S), at ≤ 1500 kBit/s: LS ≤ 0.25 m, at > 1500 kBit/s: LS = 0.00 m!
- At 1500 kBit/s and ABB DP cable type A:
  - Sum of all spur cable lengths (L_S) ≤ 6.60 m, trunk cable length (L_T) > 6.60 m, total length = L_T+ (Σ L_S) ≤ 200 m, maximum 22 DP nodes (= 6.60 m / (0.25 m + 0.05 m spare))

PROFIBUS PA® communication

PROFIBUS PA interface	
Terminals	V1 (PA+) / V2 (PA–)
Configuration	Via Device HMI or PROFIBUS PA-DTM or FDI package
Transmission	Based on IEC 61158-2
Device profile	The interface conforms to profile 3.02 (PROFIBUS standard, EN 50170, DIN 19245 [PRO 91])
PROFIBUS PA ID no	0x3438
Alternative standard ID no	0x9700 or 0x9740
Bus cable	Shielded, twisted cable (acc. to IEC 61158-2, types A or B are preferred)

Bus topology

- Tree and/or line structure
- Bus termination: passive at both ends of the main bus line (RC element R = 100 Ω, C = 1 µF)

Voltage / current consumption

- Average current consumption: 10 mA
- In the event of an error, the integrated FDE function (=Fault Disconnection Electronic) integrated in the device is ensures that the current consumption can rise to a maximum of 13 mA.
- The upper current limit is restricted electronically.
- The voltage on the bus line must be within 9 to 32 V DC

Short circuit protection / reverse polarity protection

The Device Terminals V1 and V2, Profibus connects to, are short-circuit protected and have a reverse polarity protection.

System integration

ABB provides three different GSD files which can be integrated in the system.

ID number	**GSD file name**
0x9700	PA139700.gsd
0x9740	PA139740.gsd
0x3438	ABB_3438.gsd

Users decide at system integration whether to install the full range of functions or only part. Switching is made using the ‘Ident Nr. Selector’ parameter.

See also **IDENT_NUMBER_SELECTOR** on page 16.

You can download the GSD files from www.abb.com/flow.

For additional information, see separate interface documentation.

… 2 Specification

ID number

Every PROFIBUS device has been assigned a unique ident number by the PNO.

Device-specific profile

The device-specific profile is connected with the ident number 0x3432.
The associated device master file (GSD) ABB_3432.gsd is delivered with the device.

Applying the device-specific profile number enables the entire scope of functions offered by the device to be used.

The device-specific profile contains six AI blocks, two totalizer blocks, one AO block, one DI block as well as one DO block.

Parameter	Quantity	Description
Max_Module	11	6xAI, 2xTOT, 1xAO, 1xDI, 1xDO
Max_Input_Len	42	6x5(AI) + 2x5(TOT) +1x2(DI)
Max_Output_Len	11	2x2(TOT) +1x5(AO) +1x2(DO)
Max_Data_Len	53	MaxInput + MaxOutput

Table 1: Parameter of the device-specific profile

General Profiles

The PNO has set general profiles with their own ident numbers.
The FET632 supports the following general profiles:

- Profile 0x9740 (one AI block and one totalizer block)
- Profile 0x9700 (one AI block)

The associated device master files (GSD) PA139740.gsd and PA139700.gsd can be downloaded under www.abb.com/flow.

The advantage of these profiles is the cross-manufacturer interchangeability if the devices support these general profiles. The disadvantage is the restricted functionality. This is due to the fact that not all special capabilities of a device can fit into a general profile.

Profile selection via ID Number

The parameter IDENT_NUMBER_SELECTOR (index 24) in the physical block can be used to select the corresponding ident number and thus the profile.

Value	Ident. no.	Description / functions
0	0x9740	Profile-specific / 1AI + 1TOT PA139740.GSD
1	DP: 0x3432	Manufacturer-specific / 6AI+2TOT+1AO+1DI+1DO ABB_3432.GSD
	PA: 0x343	Manufacturer-specific / 6AI+2TOT+1AO+1DI+1DO ABB_3438.GSD
127	–	Adaptation mode (obligatory) for PA3.02. The device can communicate with several ID numbers in adaptation mode.
128	0x9700	Profile-specific / 1AI PA139700.GSD

Table 2: Available ident numbers

Parameterize

Before a master can go into the cyclical data exchange with a slave, the device must be parameterized.

For this purpose, the master transmits a ‘Set_Parameter Telegram’ that can be used to transmit standard and device-specific parameters to the device.

The ‘Set_Parameter Telegram’ is made up of at least 7 and a maximum of 244 bytes of user data.

- The first seven bytes of the parameter are prescribed in the standard. They transmit information, such as watchdog activation, identification number, etc.
- Extensions for DPV1 are transmitted in the bytes 8 to 10.
- All other bytes are device-specific.

In the GSD file, the transmitter defines a manufacturer-specific parameter that makes it possible to choose between the Classic Status and the Condensed Status during parameterization.

Parameter	Description
Condensed Status	0 Disabled: Classic status byte encoded in accordance with PA profile 3.0
	1 Enabled, condensed status byte encoded in accordance with PA Profile 3.02, Amendment 2

Table 3: Parameter ‘Condensed Status’

Detailed information regarding Condensed Status can be found in the PA-profile 3.02.

… 2 Specification

Configuration string - Modules and slots

During configuration, a configuration string is sent to the PROFIBUS DP/PA slave. It defines the data for the cyclic data exchange. The configuration strings are described with the help of various modules.
Accordingly, each module has a configuration string. This says in coded form how many bytes are cyclically transferred from the master to the slave, and vice versa from the slave to the master.

0x94 means, for example, 5 bytes slave→master, 0 bytes master→slave. What is transported in this data is given by the function block specification.

No.	Module designation	Configuration string	Module description
1	Not used (Empty Module)	0x00	This module does not transmit any data.
2	Analog input (AI)	0x42, 0x84, 0x08, 0x05	The OUT parameter of the AI Block is cyclically transmitted from the slave to the master. These are 5 bytes: Value = Float = 4 bytes + status = 1 byte
3	Totalizer (TOTAL)	0x41, 0x84, 0x85	The TOTAL parameter of the totalizer block is cyclically transmitted from the slave to the master. These are 5 bytes: Value = Float = 4 bytes + status = 1 byte
4	Totalizer (TOTAL, SET)	0xC1, 0x80, 0x84, 0x85	The TOTAL parameter of the totalizer block is cyclically transmitted from the slave to the master (5 bytes) and the SET_TOT parameters of the totalizer block (1 byte) are cyclically transmitted from the master to the slave.
5	Totalizer (TOTAL, SET, MODE)	0xC1, 0x81, 0x84, 0x85	The TOTAL parameter of the totalizer block is cyclically transmitted from the slave to the master (5 bytes) and the SET_TOT and MODE_TOT parameters of the totalizer block (together 2 bytes) are cyclically transmitted from the master to the slave.
6	Analog output (AO)	0x82, 0x84, 0x08, 0x05	The SP parameter of the AI block is cyclically transmitted from the master to the slave. These are 5 bytes: Value = Float = 4 bytes + status = 1 byte
7	Discrete input (DI)	0x91	The OUT_D parameter of the AI block is cyclically transmitted from the slave to the master. These are 2 bytes: Value = 1 byte + status = 1 byte
8	Discrete Output (D0)	0xA1	The OUT_D parameter of the DO block is cyclically transmitted from the master to the slave. These are 2 bytes: Value = 1 byte + status = 1 byte

Table 4: Modules defined in the gsd file

The supported modules are assigned to specific slots, i.e. the order in which specific data are transmitted is fixed. One slot can support several modules.
The FEx630 transmitter with ID number DP: 0x3432 / PA: 0x3438 supports 11 communications slots.

Slot no.	Slot designation	Default modules no.	Supported modules no.
1	AI1	2	1, 2
2	AI2	3	1, 2
3	AI3	3	1, 2
4	AI4	2	1, 2
5	AI5	2	1, 2
6	AI6	2	1, 2
7	TOT1	3	1, 3, 4, 5
8	TOT2	3	1, 3, 4, 5
9	AO1	2	1, 6
10	DI	8	1, 7
11	DO1	8	1, 8

Table 5: Slots defined in the gsd file

If configuration data should be transmitted that does not comply with the supported module order, the device returns a 'Cgf_Fault' to the control system (for example, slot 1 is configured with the totalizer module (TOTAL)).

Additional configuration strings

In accordance with the PROFIBUS PA Profile, a short configuration string and a long configuration string (Extended Identifier Format) are available for the AI and AO function blocks. The FEx630 transmitter accepts both versions.

… 2 Specification

Address setting

The PROFIBUS DP/PA address can be set via the bus or at the transmitter, but only when no cyclical communication is running (as specified with PA).

Setting the address via the LCD display on the transmitter

In the sub-menu '**… / Communication / …Profibus**', there is the parameter 'Address'.
The current address is shown here. The address can be adjusted if no cyclical communication is running.

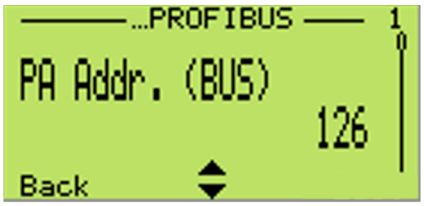

Figure 2: Parameter 'PA address'

Adjusting the address via the fieldbus

In accordance with the PA specifications, only addresses between 0 and 125 can be set via the bus.
It is not permissible to reset the address to its default value 126 with the „Set_Slave_Addresstelegram'.

Adjusting the address via the fieldbus is **not** possible if one or both of the following conditions apply:

- When cyclic communication is running.
- NO_ADDRESS_CHANGE When is TRUE

Resetting the address to the default value

It is possible to reset the address to 126 as follows:

- By writing 'Reset Bus Adresse' (2712 decimal / 0A98 hex) in Factory_Reset (physical block rel. index 19).
- On the transmitter with no running cyclical communication.

NO_ADDRESS_CHANGE (NO_ADD_CHG)

Address setting via the bus is done by means of the Set_Slave_Addresstelegram.
It contains the Boolean variable NO_ADDRESS_CHANGE. It this variable is TRUE, no further address changes can be made with the Set_Slave_Addresstelegram.

Changing the address via the fieldbus is then only possible by writing 2712 decimal (= 0A98 hex) into Factory Reset (physical block, rel. index 19).
In the process, the address is reset to the default value of 126 and the variable NO_ADDRESS_CHANGE it set to FALSE.
Then the address can be freely set again.

3 Block overview

The FEx630 transmitter contains the following blocks, depending on the ID number:

Block	Supported PA ID ident. number		
	DP: 0x3432 / PA: 0x3438	**0x9740**	**0x9700**
	FEx630	**Profile Specific**	**Profile Specific**
	PA 3.02	**(1AI + 1TOT)**	**(1AI)**
Physical Block	Slot 0	Slot 0	Slot 0
Analog Input Block	Slot 1	Slot 1	Slot 1
Analog Input Block	Slot 2	–	–
Analog Input Block	Slot 3	–	–
Analog Input Block	Slot 4	–	–
Analog Input Block	Slot 5	–	–
Analog Input Block	Slot 6	–	–
Totalizer Block	Slot 7	Slot 2	–
Totalizer Block	Slot 8	–	–
Analog output block	Slot 9	–	–
Discrete Input Block	Slot 10	–	–
Discrete output block	Slot 11	–	–
Transducer Block – Flow	Slot 12	Slot 3	Slot 2
Transducer Block – DeviceInfo	Slot 13	Slot 4	Slot 3
Transducer Block – Special Function	Slot 14	Slot 5	Slot 4
Transducer Block – Display	Slot 15	Slot 6	Slot 5
Transducer Block – Diagnostics	Slot 16	Slot 7	Slot 6

Table 6: Available blocks

The physical block, the transducer block – flow as well as all integrated functional blocks correspond to the PROFIBUS PA profile 3.02. Manufacturer-specific expansions have been made on the physical block and on the transducer block – flow.
The following table provides a short description of the supported manufacturer-specific transducer blocks.

Block	Description
Transducer Block – Flow	Up to index 52 a 'Flow transducer block' in accordance with PA profile 3.02. The parameters comply with the profile of the Coriolis flowmeter. From index 53 on the manufacturer-specific parameters are added.
Transducer Block – DeviceInfo	Provides detailed information about the device.
Transducer Block – Special Function	Contains parameters for configuring the switch / pulse output and the internal device counter.
Transducer Block – Display	Contains parameters for configuring the device display.
Transducer Block – Diagnostics	Contains parameters for configuring and recording process and device diagnoses.

Table 7: Description of the manufacturer-specific transducer blocks

… 3 Block overview

Block Table Legend

The following tables list, among other things, the following attributes:

Rel. Index / Abs. Slot Index
Relative index of the parameter within the block and absolute slot index.
In accordance with the PA profile, all blocks begin with the absolute index 16.
BLOCK_OBJECT, for example, is on the relative index 0 in every block and, thus, on the slot index 16.

Data Type
Data type of the parameter. Some parameters are structures (DS-xx). The structures are described under **Data structures** on page 63. For detailed information on the standard data types, refer to the PA Profile.

Bytes
Size of the parameter in bytes.

Storage Type
- **Cst**: Constant Parameter. The parameter never changes.
- **S**: Static parameters are stored permanently (in the non-volatile memory). When writing a static parameter, the Static Revision Counter ST_REV of the corresponding block (index 1 in each block) is incremented by one.
- **N**: Non-volatile parameters are stored permanently (in the non-volatile memory). When writing a non-volatile parameter, ST_REV remains unchanged.
- **D**: Dynamic parameters are lost when the device is switched off.

Access
- **r:** The parameter can be read.
- **w:** The parameter can be written.

Default Values
Default settings of the parameters.
The parameter FACTORY_RESET (index 19 in the physical block), selection ‘Restart with defaults’, can be used to reset the physical block, the function blocks and some of the transducer block parameters to their default settings.

Standard block parameter

The following section describes the standard block parameters. Every block, whether physical, transducer or functional block, must contain the following parameters. For a detailed description of the standard block parameters, refer to the PROFIBUS PA profile 3.02.

Relative index	Parameter Name	Object type	Data Type	Store	Bytes	Access	Default Values
0	BLOCK_OBJECT	Record	DS-32	Cst	20	r	-
1	ST_REV	Simple	Unsigned16	N	2	r	0
2	TAG_DESC	Simple	OctetString	S	32	r,w	’’
3	STRATEGY	Simple	Unsigned16	S	2	r,w	0
4	ALERT_KEY	Simple	Unsigned8	S	1	r,w	0
5	TARGET_MODE	Simple	Unsigned8	S	1	r,w	Auto
6	MODE_BLK	Record	DS-37	D	3	r	8, 8, 8
7	ALARM_SUM	Record	DS-42	D	8	r	0, 0, 0, 0

Parameter	Description
BLOCK_OBJECT	This structure contains general information about the block, for example, the block type, profile number, and so on.
ST_REV	Revision counter for static variables. Each time when a static variable changes, the revision counter is incremented by one.
TAG_DESC	A text description of this block. It must be unique within a fieldbus.
STRATEGY	This parameter can be used to group blocks by assigning the same code number to each block of the group.
ALERT_KEY	This parameter is used as an identification number for a plant part.
TARGET_MODE	The wanted operating mode of the block. 0x08: Auto 0x10: Man 0x80: Out Of Service
MODE_BLK	The current, allowed and normal operating modes of the block.
ALARM_SUM	This parameter contains a summary of the block alarms.

… 3 Block overview

Physical Block – Slot 0

The physical block contains general specifications of the fieldbus device, for example, the manufacturer, device type, version number and information about manufacturer-specific enhancements regarding other devices.

Physical Block – Parameters

Relative index	Parameter Name	Object type	Data Type	Store	Bytes	Access	Default Values
0 to 7	Standard block parameter						
8	SOFTWARE_REVISION	Simple	VisibleString	Cst	16	r	–
9	HARDWARE_REVISION	Simple	VisibleString	Cst	16	r	–
10	DEVICE_MAN_ID	Simple	Unsigned16	Cst	2	r	26 (ABB)
11	DEVICE_ID	Simple	VisibleString	Cst	16	r	0x3432
12	DEVICE_SER_NUM	Simple	VisibleString	Cst	16	r	–
13	DIAGNOSIS	Simple	OctetString	D	4	r	0; 0; 0; 0
14	DIAGNOSIS_EXTENSION	Simple	OctetString	D	6	r	0; 0; 0;0; 0; 0
15	DIAGNOSIS_MASK	Simple	OctetString	Cst	4	r	–
16	DIAGNOSIS_MASK_EXTENSION	Simple	OctetString	Cst	6	r	0xFF; 0xFF; 0xFF; 0xE7; 0xFF; 0x03
17	DEVICE_CERTIFICATION	Simple	VisibleString	Cst	32	r	‘see Nameplate’
18	WRITE_LOCKING	Simple	Unsigned16	N	2	r, w	–
19	FACTORY_RESET	Simple	Unsigned16	S	2	r, w	–
20	DESCRIPTOR	Simple	OctetString	S	32	r, w	–
21	DEVICE_MESSAGE	Simple	OctetString	S	32	r, w	–
22	DEVICE_INSTAL_DATE	Simple	OctetString	S	16	r, w	–
23	LOCAL_OP_ENA	Simple	Unsigned8	N	1	r, w	1
24	IDENT_NUMBER_SELECTOR	Simple	Unsigned8	S	1	r, w	127
25	HW_WRITE_PROTECTION	Simple	Unsigned8	D	1	r	–
26	FEATURE	Record	DS-68	N	8	r	–
27	COND_STATUS_DIAG	Simple	Unsigned8	S	1	r, w	1
28	DIAG_EVENT_SWITCH	Record	Diag_Event_Switch	S	50	r, w	–
29 to 32	Reserved by the PNO						
33	DIAG_ALARM_HISTORY	Simple	Unsigned8	D	6	r	–
34	DIAG_CLEAR_ALARM_HISTORY	Simple	Unsigned8	D	1	r, w	–
35	DIAG_ALARM_SIMULATION	Simple	Unsigned8	D	1	r, w	–
36	DIAG_MASK_MAINTENANCE	Simple	Unsigned8	S	1	r, w	–
37	DIAG_MASK_CHECK_FUNCTION	Simple	Unsigned8	S	1	r, w	–
38	DIAG_MASK_OFF_SPECIFICATION	Simple	Unsigned8	S	1	r, w	–
39	DIAG_MASK_INDIVIDUAL_ALARM	Simple	Unsigned8	S	6	r, w	–
40	DIAG_CONDITION_IDX	Simple	Unsigned8	D	1	r, w	–

Relative index	Parameter Name	Object type	Data Type	Store	Bytes	Access	Default Values
41	DIAG_IDX_DETAILS_CLASS	Simple	Unsigned8	D	1	r	–
42	DIAG_IDX_DETAILS_GROUP	Simple	Unsigned8	D	1	r	–
43	DIAG_IDX_DETAILS_PRIORITY	Simple	Unsigned8	D	1	r	–
44	DIAG_IDX_DETAILS_HISTORY	Record	Diag_Detail_History	D	14	r	–
45	DIAG_CONDITION_ALARM_VALID	Simple	Unsigned8	D	1	r	–
46	DIAG_ALARM_NAMUR_ CONFIGURATION	Array	Unsigned8	S	48	r, w	–
47	DIAG_ALARM_NAMUR_STATUS	Simple	Unsigned8	D	1	r	–
48 to 77	Reserved for future use						

Physical Block – Parameter description

Parameter	Description
SOFTWARE_REVISION	Software revision of the device.
HARDWARE_REVISION	Hardware revision of the device.
DEVICE_MAN_ID	Identification code for the device manufacturer. (26 = ABB)
DEVICE_ID	Manufacturer designation for the device (DP: 0x3432 / PA: 0x3438)
DEVICE_SER_NUM	Serial number of the device as a string.
DIAGNOSIS	Current alarm information for the device, coded bitwise.
DIAGNOSIS_EXTENSION	Additional manufacturer-specific alarm information for the device.
DIAGNOSIS_MASK	Mask with the supported DIAGNOSIS bits: 0: Bit is not used. 1: Bit is used.
DIAGNOSIS_MASK_EXTENSION	Mask with the supported DIAGNOSIS)EXTENSION bits: 0: Bit is not used. 1: Bit is used.
DEVICE_CERTIFICATION	Certifications, etc.
WRITE_LOCKING	Software write protection 0: No acyclic writing allowed, except on WRITE_LOCKING. 2457: All writable parameters can be written.
FACTORY_RESET	Reset command: 1: Reset to default values. The address is not changed. 2506: Warm start. 2712: Reset the bus address, only.
DESCRIPTOR	A user-definable description of the application.

… 3 Block overview

… Physical Block – Slot 0

Parameter	Description
DEVICE_MESSAGE	A user-definable message.
DEVICE_INSTAL_DATE	Installation date of the device.
LOCAL_OP_ENA	Local operation enable.
IDENT_NUMBER_SELECTOR	The supported PROFIBUS ident. numbers: 0: 0x9740 Profile-specific 1: DP: 0x3432 / PA: 0x3438 Manufacturer-specific FEx630 127: Adaptation mode (obligatory) for PA3.02. 128: 0x9700 Profile-specific
HW_WRITE_PROTECTION	Status of the hardware write protection switch. When the switch is set, no write access is possible via the bus.
FEATURE	Output of optionally supported device properties.
COND_STATUS_DIAG	Mode of the status and diagnostic output of the device: 0: Extended diagnosis status is used 1: Condensed status is used
DIAG_EVENT_SWITCH	Indicates / controls the reaction of the device on device specific diagnostic events if FEATURE.Enabled. Condensed_Status = 1.
DIAG_ALARM_HISTORY	Provides the alarm history.
DIAG_CLEAR_ALARM_HISTORY	Deletes the alarm history information.
DIAG_ALARM_SIMULATION	A variety of alarm messages and output conditions can be simulated. Refer to **Alarm Overview** on page 68.
DIAG_MASK_MAINTENANCE DIAG_MASK_CHECK_FUNCTION DIAG_MASK_OFF_SPECIFICATION	Masking of the alarm groups: • Maintenance • Check Function • Out Off Specification With active masking there is no alarm signaling from the corresponding group. Alarms from the ‘Failure’ group cannot be masked.
DIAG_MASK_INDIVIDUAL_ALARM	Single alarm masking
DIAG_CONDITION_IDX DIAG_IDX_DETAILS_CLASS DIAG_IDX_DETAILS_GROUP DIAG_IDX_DETAILS_PRIORITY	With activated masking there is no alarm signaling. Refer to **DIAG_MASK_INDIVIDUAL_ALARM object** on page 72.
DIAG_IDX_DETAILS_HISTORY	Provides additional alarm information about the selected DIAG_CONDITION_IDX.
DIAG_CONDITION_ALARM_VALID	Indicates whether a time stamp was set in the device.
DIAG_ALARM_NAMUR_ CONFIGURATION	Alarm configuration in accordance with NAMUR.
DIAG_ALARM_NAMUR_STATUS	Alarm status in accordance with NAMUR

Analog Input Function Block – Slot 1, 2, 3, 4, 5, 6

Measured value calculation is done in the transducer block.
The transducer block internally provides the measured values.
Cyclic outward of the measured value output is realized via the analog input block (AI block).
The transmitter FEx630 supports 6 AI blocks.

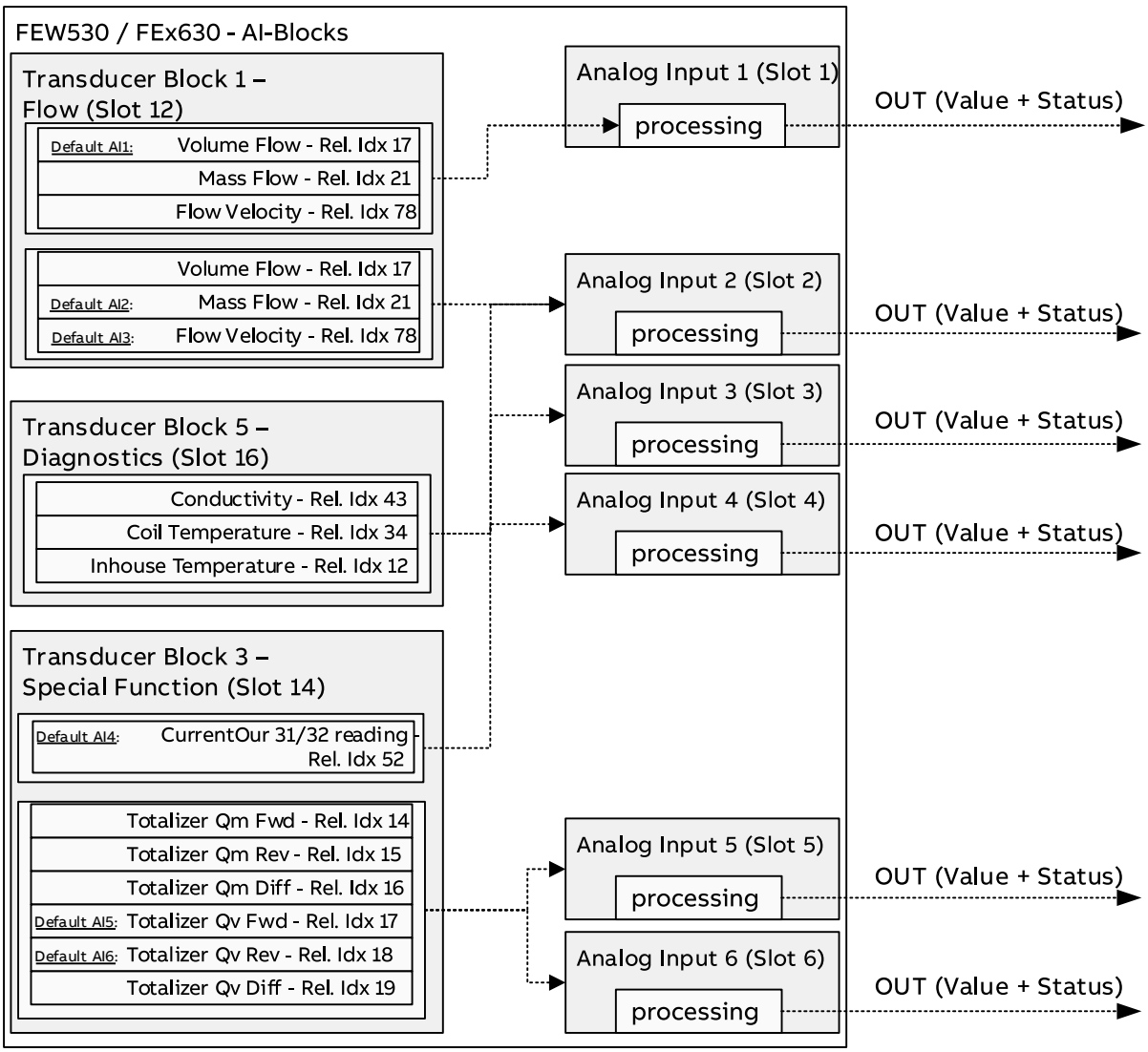

Figure 3: Overview – AI Blocks

… 3 Block overview

… Analog Input Function Block – Slot 1, 2, 3, 4, 5, 6

It is possible for all AI blocks to output different measured values via the channel parameter.
The default values are marked in the overview **Figure 3: Overview – AI Blocks** on page 17.
The channel is selected via the bus.

For AI1, the channel (index30) is selected via the bus by:

Channel	HEX	DEC
VOLUME_FLOW	0x0111	273
MASS_FLOW	0x0115	277
FLOW_VELOCITY	0x014E	334

For AI2 to AI4, the channel (index30) is selected via the bus by:

Channel	HEX	DEC
VOLUME_FLOW	0x0111	273
MASS_FLOW	0x0115	277
FLOW_VELOCITY	0x014E	334
CONDUCTIVITY	0x052B	1323
COIL_TEMPERATURE	0x0522	1314
INHOUSE_TEMPERATURE	0x050C	1292
CURR_OUT_31_32_OUTPUT_READING	0x0334	820

For AI5 / AI6, the channel (index30) is selected via the bus by:

Channel	HEX	DEC
TOTALIZER_QM_FWD	0x030E	782
TOTALIZER_QM_REV	0x030F	783
TOTALIZER_QM_DIFF	0x0310	784
TOTALIZER_QV_FWD	0x0311	785
TOTALIZER_QV_REV	0x0312	786
TOTALIZER_QV_DIFF	0x0313	787

All AI blocks receive their measured values from the above-shown transducer block objects. It is possible to select different units for the mass and volume flow, density, and for the internal forward / reverse totalizer (see the description of the transducer blocks). If the unit is changed, the AI blocks receive the measured value in the selected unit.

The unit conversion can also take place in the AI block itself. This is done via the input and output scaling (PV_SCALE & OUT_SCALE).

Analog Input Block Diagram

An AI block performs various tasks, such as rescaling, alarm handling, simulation, and so on.

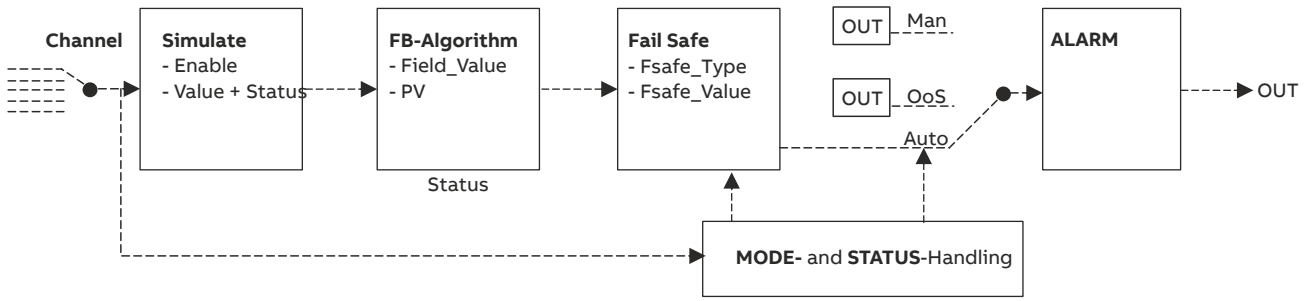

Figure 4: Setup of the AI-block

Task	Description
Channel	The channel parameter (index 14) is used to select which measured value is to be transmitted from the transducer block. See **Analog Input Function Block – Slot 1, 2, 3, 4, 5, 6** on page 17.
Simulate	The Simulate Parameter is a structure. The 'Simulate Enable' sub-parameter can be used to activate the simulation. The 'Simulate Value' sub-parameter will then generate the simulation value that will be processed instead of the channel value.
FB-Algorithm	The input value is scaled to a percentage using the PV_SCALE structure. This percentage is called the FIELD VALUE and only exists internally within the block. It cannot be accessed by communication: FIELD_VALUE = 100 * (Channel-Value – PV_SCALE.EU0%) / (PV_SCALE.EU100% - PV_SCALE.EU0%)
	This percentage is scaled to the PV value by the OUT_SCALE structure: PV = (FIELD_VAL / 100) * (OUT_SCALE.EU100% - OUT_SCALE.EU0%) + OUT_SCALE.EU0%
	The PV_FTIME parameter (index 16) permits to define a damping time in seconds. The filtered measured value is called OUT. OUT = Filter (PV)
Fail-Safe	FSAFE_TYPE (index 17) defines the behavior in the event of a fault. If FSAFE_TYPE=0, FSAVE_VALUE (index 18) is output in the event of a fault. If = 1, the last 'usable' value is output. If = 2, the faulty values are output.
Mode	If Mode = Auto, the value determined so far is output. If Mode = Man, the OUT parameter is output. The OUT parameter can be written cyclically in Man mode. If Mode = Out of Service, the OUT parameter is output.
Alarm	There are four alarm thresholds (index 21, 23, 25, 27) • High-High-Limit • High-Limit • Low-Limit • Low-Low-Limit There are alarm messages (index 30 ... 33) available for each of these alarm thresholds and will be tripped when the alarm threshold is exceeded or undershot. • High-High-Alarm • High-Alarm • Low-Alarm • Low-Low-Alarm ALARM_HYS (index 19) can be used to define a hysteresis for the alarm thresholds.

For a detailed description of the functions and parameters of an analog input block, refer to the PA Profile 3.02.

… 3 Block overview

Totalizer Function Block – Slot 7, 8

In the totalizer block, the measured flow values are totalized (integrated) in order to determine the flow rate (counter reading).
The totalizer block receives the measured value from the transducer block.
Both totalizer blocks are firmly connected to the volume flow parameter in the transducer block.

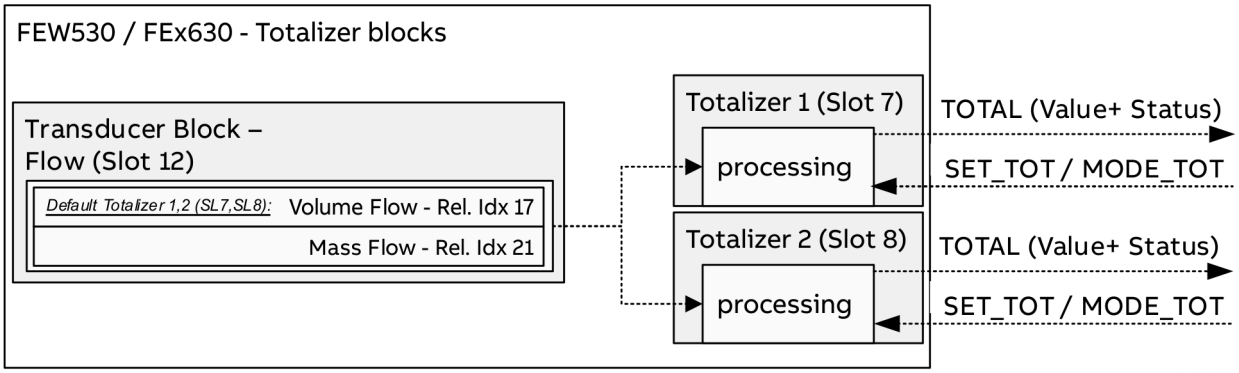

Figure 5: Overview – Totalizer Blocks

The totalizers integrate the value delivered by the transducer block, depending on the block configuration. The flow rate is unit-weighted by the transducer. If the flow unit of the volume flow is changed in the transducer, the totalizer blocks receive the measured value in the newly set unit.
As both totalizers can integrate the same measured value, a forward / reverse flow totalizer can be realized, for example by using the MODE_TOT parameter.

Depending on the configuration string, the totalizer can cyclically communicate the following parameters:

- TOTAL
- SET_TOT
- MODE_TOT

Totalizer blocks and internal totalizers of the transmitter

The FEx630 transmitter has no PROFIBUS DP/PA communication as a standard device.
For this reason, the transmitter contains its own internal totalizers which have nothing to do with the PROFIBUS DP/PA totalizer blocks. These internal totalizers are also included in the PROFIBUS DP/PA device and can, for example, be read on the LCD display on the device in the 'Totalizer' sub-menu.

The internal totalizers are firmly connected to the AI blocks 7 and 8 and can also be read out cyclically (see **Analog Input Function Block – Slot 1, 2, 3, 4, 5, 6** on page 17).
Only the flow rate (volume or mass flow) (index 17, 21) can be used as a channel for the totalizer blocks, not the internal totalizers! The totalizer totalize the volume flow to obtain the totalizer status. It would not make sense to totalize the internal totalizer again.

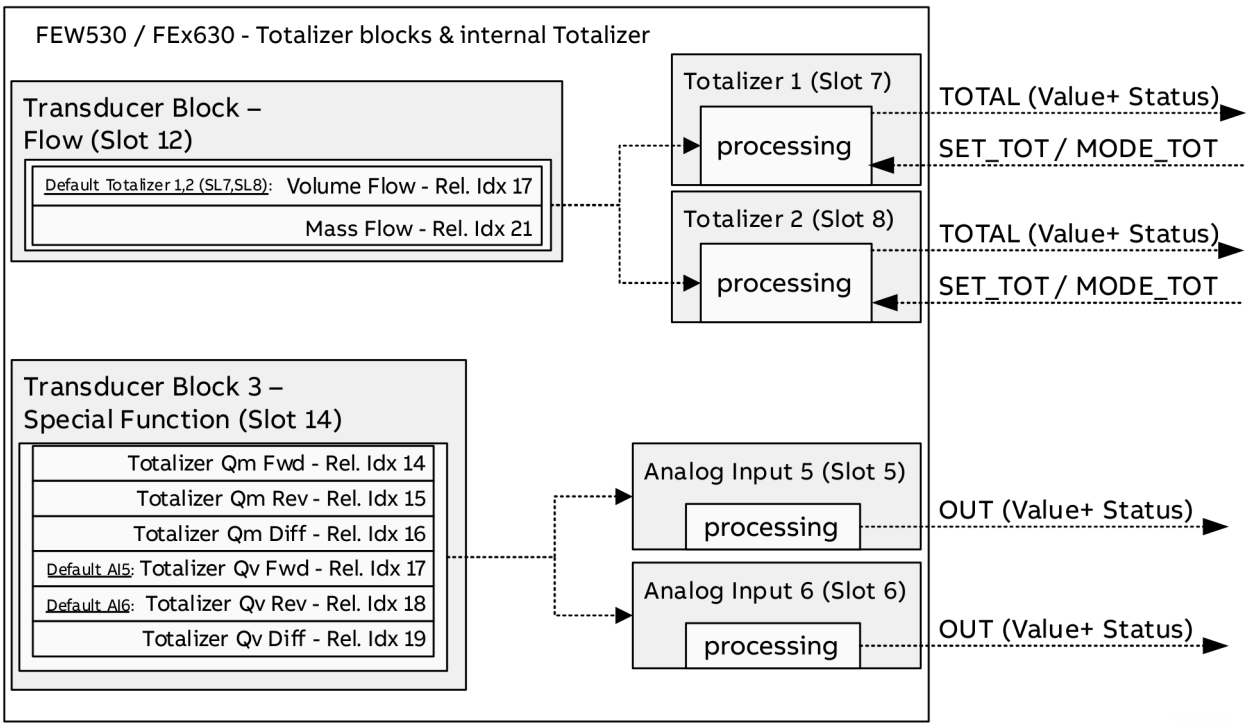

Figure 6: Overview - Internal totalizer

The internal totalizers and the totalizer blocks are independent of each other, can be set differently (regarding units, mode, etc.) and can also be reset at different times. As a result, the totalizer values may differ.

As the Totalizer Block totalizes the volume flow, the totalizer unit corresponds to the flow unit, but without the time.
Example: Flow rate m^3/h → totalizer m^3.
The FEx630 does not automatically set the totalizer unit UNIT_TOT (Index 11) to the corresponding unit value, if, for example, the flow rate unit is changed.

… 3 Block overview

… Totalizer Function Block – Slot 7, 8

Totalizer Block Diagram

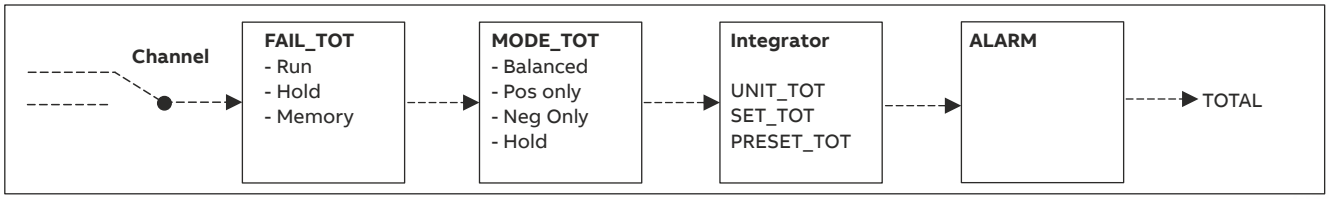

Figure 7: Setup of Totalizer-Block

Task	Description
Channel	The Channel Parameter (index 12) is used to select the measured value to be processed from the Transducer Block.
FAIL_TOT	(Index 15) determines the behavior in the event of channel values with the 'BAD' status. In this case, it is possible to let the totalizer continue to Run and ignore the bad values, to stop the totalizer or to add the last good value (from memory).
MODE_TOT	(Index 14) determines, whether both flow directions, only positive or only negative flow values are to be totalized. With 'Hold' the totalizer can be stopped.
Integrator	The flow values are continuously added to the TOTAL value (index 10) to calculate the totalizer status. UNIT_TOT (index 11) specifies the unit. It is not checked, and UNIT_TOT is not considered for the calculation. SET_TOT (index 13) allows for resetting or presetting of the TOTAL value: 0: **Totalize** means that the totalizer is operating 'normally' and totalizes values. 1: **Reset** Resets the totalizer to 0. 2: **Preset** Sets the totalizer to PRESET_TOT (index 16). As long as SET_TOT is set to 1 or 2, the reset or preset status is maintained. Only when SET_TOT is reset to 0, 'normal' totalizing starts again.
Alarm	There are four alarm thresholds (index 18 … 21) • High-High-Limit • High-Limit • Low-Limit • Low-Low-Limit There are alarm messages (index 22 … 25) available for each of these alarm thresholds and will be tripped when the alarm threshold is exceeded or undershot. • High-High-Alarm • High-Alarm • Low-Alarm • Low-Low-Alarm ALARM_HYS (index 17) can be used to define a hysteresis for the alarm thresholds.

Analog Output Function Block – Slot 9

In the manufacturer-specific profile, the FEx630 transmitter supports an Analog Output Function Block.
Therefore, it is possible to cyclically feed a value to an external variable in the transmitter, which can be shown on the display.
No conversion of this external input variable exists and the input variable also does not affect the function of the measured value transmitter.

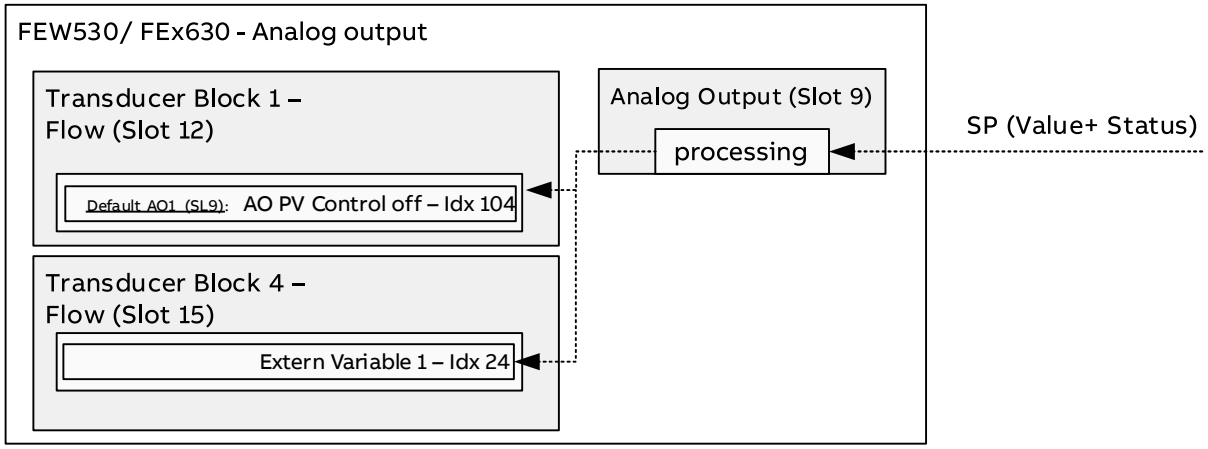

Figure 8: Overview – Analog Output

The channel selection for the corresponding AO block occurs via OUT_CHANNEL, Index 22.

Channel – Analog Output 1 (Slot 9)	HEX	DEC
External variable 1	0x0418	1048
AO_PV_CONTROL_OFF	0x0168	360

'Extern Variable 1' channel
An external value can be issued via this channel in the transmitter display, which is supplied via the AO block.
No conversion of this input variable exists and the input variable also does not affect the function of the measured value transmitter.

'AO_PV_CONTROL_OFF' channel
With this channel selection, all of the values sent to the transmitter will not be processed and will be discarded. The AO block is switched off, so to speak.

Note
It is not necessary to select an IN_CHANNEL IN_CHANNEL (Index 21) for the AO channel.
A read-back function via the IN_CHANNEL in relation to the available OUT_CHANNEL is not necessary for the device and has not been implemented.

… 3 Block overview

Discrete Input Function Block – Slot 10

A discrete input (DI) function block is considered as a switch by the control system. Binary signals are cyclically transmitted to the control system here.
The DI block in the FEx630 transmitter allows for the cyclical transfer of device-specific alarm information to the control system. This is done in addition to the alarm output options already specified in the PROFIBUS, such as Get_Diag or the status messages.

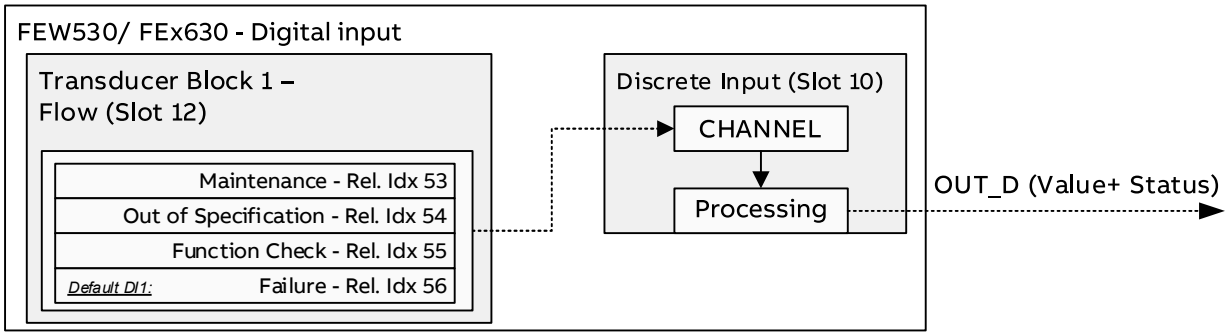

Figure 9: Overview – Digital Input

The channel is selected via the bus.
The following parameters are available to select the channel for DI:

Channel	Value
Maintenance (Maintenance required)	0x0135 (decimal: 309)
Out of Specification (out of the specifications)	0x0136 (decimal: 310)
Function Check (Function check)	0x0137 (decimal: 311)
Failure (Error / failure)	0x0138 (decimal: 312)

Every device-specific alarm of the FEx630 transmitter is allocated to an alarm group. This means that each channel represents one alarm group. If an alarm is set in one of the groups, cyclic signaling to the control system occurs when the corresponding channel is selected.

The following table lists the output value of the DI Block (OUT_D.value) as a function of the selected channel and an alarm set in the alarm groups:

Channel	Alarm in group			
	Maintenance	Out of Spec.	Function Check	Failure
DI_PV_DIAG_MAINTENANCE	1	1	1	1
DI_PV_DIAG_OUT_SPEC	0	1	1	1
DI_PV_DIAG_FUNC_CHECK	0	0	1	1
DI_PV_DIAG_FAILURE	0	0	0	1

As can be seen, there is a hierarchy within the groups.
An alarm set in the Failure group is signaled outside when any channel is selected, whereas a Maintenance Alarm reaches the control system only when a Maintenance channel is selected.
See **Alarm Overview** on page 68 for a detailed description of the existing alarm of the transmitter.

Note
Independent of any alarm messages existing in the transmitter, the status message of the above-shown channel parameters always returns the value ‘Good.’

… 3 Block overview

Discrete Output Function Block – Slot 11

In the manufacturer-specific profile, the FEx630 transmitter supports three discreet output function blocks.
These blocks are used for cyclic transfer of binary switching operations from the control system to the transmitter. These start / stop specific transmitter actions like adjustment and others.
The transducer block verifies whether the status of the value is (good) or higher. Should the status of the DI switch be (bad) or (uncertain), the transducer will discard it.

The following channel selection for the DO blocks occurs via (OUT_CHANNEL, index 35):

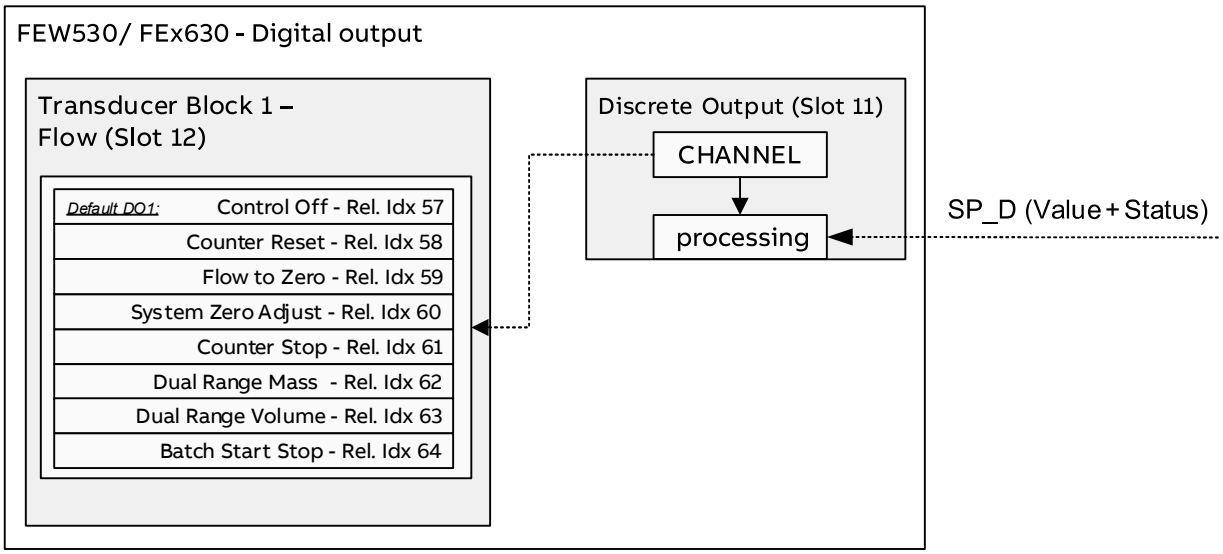

Figure 10: Overview – Digital Output

The selection of the operating mode of the DO Blocks is made via the bus:

Channel	Hexadecimal value	Decimal value
Control Off	0x0139	313
Counter Reset	0x013A	314
Flow to Zero	0x013B	315
System Zero Adjust	0x013C	316
Counter Stop	0x013D	317
Dual Range Mass	0x013E	318
Dual Range Volume	0x013F	319
Batch Start	0x0140	320

Table 8: Selection of the operating mode

The transducer in the transmitter expects to receive a binary signal from the control system as an input variable:

1 Starts device functionalities.
0 Stops device functionalities or prevents another execution.

The following table describes the functions of the selectable DO block channels.

Channel	Description
DO_PV_CONTROL_OFF	No function.
DO_PV_COUNTER_RESET	Reset of all internal totalizers to zero. This does not reset the totalizer blocks to zero.
DO_PV_FLOW_TO_ZERO	The flow signal is set to zero.
DO_PV_SYSTEM_ZERO_ADJUST	Starts the system zero point.
DO_PV_COUNTER_STOP	Stops the integration of the internal totalizers. This does not stop the totalizer blocks.
DO_PV_DUAL_RANGE MASS	Change over between two measuring ranges (Q_mMax and Q_mMax2).
DO_PV_DUAL_RANGE VOLUME	Change over between two measuring ranges (Q_vMax and Q_vMax2).
DO_PV_BATCH_START	Starts a fill operation.

Table 9: Functions of the DO block channel

Note

It is not necessary to choose an IN_CHANNEL (index 17) for the DO channel
A read-back function via the IN_CHANNEL in relation to the available OUT_CHANNEL is not necessary for the device and has not been implemented.

… 3 Block overview

Transducer Block 1 – Flow – Slot 12

The Transducer Block 1 – Flow contains all device-specific parameters and functions that are required for flow measurement and flow calculation. The values that are measured and calculated are available as transducer block output values, and are called by the function blocks. It is only possible to read out measured values cyclically via function blocks. It is, however, also possible to read the transducer block values acyclically from the corresponding index.

Up to index 52, the Transducer Block 1 – Flow is a 'Flow Transducer Block'.
The parameters correspond to the electromagnetic profile.

From the index 53 on, the manufacturer-specific parameters are added to the transducer block. The manufacturer-specific parameters apply to standard measurement operation.

Transducer Block 1 – Flow – parameters

Parameter Name	Slot no.	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
BLOCK_OBJECT	12	0	16	Record	DS-32	Cst	20	r	–
ST_REV	12	1	17	Simple	Unsigned16	N	2	r	–
TAG_DESC	12	2	18	Simple	Octet string	S	32	r,w	–
STRATEGY	12	3	19	Simple	Unsigned16	S	2	r,w	–
ALERT_KEY	12	4	20	Simple	Unsigned8	S	1	r,w	–
TARGET_MODE	12	5	21	Simple	Unsigned8	S	1	r,w	–
MODE_BLK	12	6	22	Record	DS-37	D	3	r	–
ALARM_SUM	12	7	23	Record	DS-42	D	8	r	–
CALIBR_FACTOR	12	8	24	Simple	Float	S	4	r,w	Setting the sensor span in % in accordance with the value provided on the name plate of the flowmeter sensor.
LOW_FLOW_CUTOFF	12	9	25	Simple	Float	S	4	r,w	Sets the switching threshold for the low flow cut-off. If the flow rate is below the switching threshold, there is no flow measurement. The setting of 0 % deactivates the low flow cut-off. Setting range: 0.0 to 10.0 %
MEASUREMENT_MODE	12	10	26	Simple	Unsigned8	S	1	r,w	Set the measuring direction for the sensor. 0: Forward and Reverse: The device measures in both flow directions. 1: Only forward flow: The device measures only forward flow direction. 2: Only reverse flow: The device measures only reverse flow direction.
FLOW_DIRECTION	12	11	27	Simple	Unsigned8	S	1	r,w	Inversion of the displayed flow direction. 0: Normal 1: Inverted
ZERO_POINT	12	12	28	Simple	Float	S	4	r,w	Set the value for zero point adjustment in % of Q_{max}DN Manual adjustment -50 to +50 mm/s

Parameter Name	Slot no.	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
ZERO_POINT_ADJUST	12	13	29	Simple	Unsigned8	N	1	r,w	Starts the automatic zero point balancing. The result can be read out via ZERO_POINT. 0: Cancel 1: Start (starts the automatic adjustment) 2: Execute (read only) 3: Ready (Automatic adjustment successfully completed) 4: Failed (Automatic adjustment has failed)
ZERO_POINT_UNIT	12	14	30	Simple	Unsigned16	S	2	r,w	Selects the unit for the parameter ZERO_POINT. 1342: %
NOMINAL_SIZE	12	15	31	Simple	Float	S	4	r,w	Nominal diameter of sensor.
NOMINAL_SIZE_UNITS	12	16	32	Simple	Unsigned16	S	2	r,w	Selects the unit for the parameter NOMINAL_SIZE. 1013: mm 1019: in.
VOLUME_FLOW	12	17	33	Record	DS-101	D	5	r	Process variable - volume flow Qv.
VOLUME_FLOW_UNITS	12	18	34	Simple	Unsigned16	S	2	r,w	Selects the unit for the parameter VOLUME_FLOW. Refer to **Table 1: Units for the volume flow** on page 64.
VOLUME_FLOW_LO_LIMIT	12	19	35	Simple	Float	S	4	r,w	Minimal volume flow (lower range value). Standard value: 0
VOLUME_FLOW_HI_LIMIT	12	20	36	Simple	Float	S	4	r,w	Maximum volume flow ($Qv_{Max}DN$) for the selected nominal diameter.
MASS_FLOW	12	21	37	Record	DS-101	D	5	r	Process variable – mass flow Qm.
MASS_FLOW_UNITS	12	22	38	Simple	Unsigned16	S	2	r,w	Selects the unit for the parameter MASS_FLOW. Refer to **Table 2: Units for the mass flow** on page 64.
MASS_FLOW_LO_LIMIT	12	23	39	Simple	Float	S	4	r,w	Minimal mass flow (lower range value). Standard value: 0
MASS_FLOW_HI_LIMIT	12	24	40	Simple	Float	S	4	r,w	Maximum mass flow ($Qm_{Max}DN$) for the selected nominal diameter.
–	12	25 to 42	41 to 58	–	–	–	–		Not supported.
–	12	43 to 52	59 to 68	–	–	–	–	–	Reserved by the PNO.

… 3 Block overview

… Transducer Block 1 – Flow – Slot 12

Parameter Name	Slot no.	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
DI_PV_DIAG_ MAINTENANCE	12	53	69	Record	DS-102	D	2	r	Alarms from the transmitter. See **Discrete Input Function Block – Slot 10** on page 24 and **Diagnosis / error messages** on page 66 for additional information.
DI_PV_DIAG_OUT_SPEC	12	54	70	Record	DS-102	D	2	r	
DI_PV_DIAG_FUNC_CHECK	12	55	71	Record	DS-102	D	2	r	
DI_PV_DIAG_FAILURE	12	56	72	Record	DS-102	D	2	r	
DO_PV_CONTROL_OFF	12	57	73	Record	DS-102	D	2	r	DO channel: No function
DO_PV_COUNTER_RESET	12	58	74	Record	DS-102	D	2	r	DO channel: Reset all totalizers in the transmitter to zero (forward flow, reverse flow and difference totalizer).
DO_PV_FLOW_TO_ZERO	12	59	75	Record	DS-102	D	2	r	DO channel: Output shutdown; sets the flow measurement to zero.
DO_PV_SYSTEM_ZERO_ADJ UST	12	60	76	Record	DS-102	D	2	r	DO channel: start external zero point balancing.
DO_PV_COUNTER_STOP	12	61	77	Record	DS-102	D	2	r	DO channel: external totalizer stop for all totalizers (forward, reverse and difference totalizer).
DO_PV_DUAL_RANGE_ MASS	12	62	78	Record	DS-102	D	2	r	Two measuring ranges Qm: change over Qm Max / Qm Max 2.
DO_PV_DUAL_RANGE_ VOLUME	12	63	79	Record	DS-102	D	2	r	Two measuring ranges Qv: change over Qv Max / Qv Max 2
DO_PV_BATCH_START_ STOP	12	64	80	Record	DS-102	D	2	r	Filler on / off: Start / stop filling (only with activated FillMass function).
RANGE_MODE_CONFIG	12	65	81	Simple	Unsigned8	S	1	r,w	Activation of the second measuring range for the mass and volume flow. The setting can be performed separately for the mass flow rate (Qm) and volume flow (Qv). Thus you have the possibility to quickly switch between two measuring ranges (e.g. Qm Max and Qm Max2). Switching is performed via the parameters 'DO_PV_DUAL_RANGE_MASS','DO_PV_DUAL_RANGE_VOLUME' or via the correspondingly configured digital input. 0x00: Deactivated – Second measuring range for mass and volume flow rate deactivated. 0x01: Qm and Qv – Second measuring range for mass and volume flow rate activated. 0x02: Only Qm – Second measuring range for mass flow activated. 0x03: Only Qv – Second measuring range for volume flow activated.

Parameter Name	Slot no.	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
MASS_FLOW_QM_MAX	12	66	82	Simple	Float	S	4	r,w	Setting the upper measuring range value 1 (Measuring range = 0 to Qm Max 1) for the mass flow for forward flow (direction) and reverse flow (direction). Default setting: 1 x QmaxDN.
MASS_FLOW_QM_MAX2	12	67	83	Simple	Float	S	1	r,w	Setting the upper measuring range value 2 (Measuring range = 0 to Qm Max 1) for the mass flow for forward flow (direction) and reverse flow (direction). Default setting: 1 x QmaxDN. This parameter is only available if the value 'Qm Max 2' has been selected for the parameter 'DO_PV_DUAL_RANGE_MASS'.
MASS_FLOW_QM_ RANGE_MODE	12	68	84	Array	Unsigned8	S	4	r,w	Manual switchover between the measuring ranges (Qm Max / Qm Max 2) for the mass flow measurement. This parameter is only available if the value 0x01 or 0x02 as been selected for the parameter 'RANGE_MODE_CONFIG'.
MASS_FLOW_RATIO	12	69	85	Simple	Float	D	4	r	Process variable – Mass flow in %
MASS_FLOW_QM_ RANGE_MAX	12	70	86	Simple	Float	N	4	r	Output of measuring range (maximum / minimum) for the mass flow Qm.
MASS_FLOW_QM_ RANGE_MIN	12	71	87	Simple	Float	N	4	r	
VOLUME_FLOW_QV_MAX	12	72	88	Simple	Float	S	4	r,w	Setting the upper range value 1 (Measuring range = 0 to Qv Max 1) for the volume flow for forward flow (direction) and reverse flow (direction). Default setting: 1 x QmaxDN.
VOLUME_FLOW_QV_MAX2	12	73	89	Simple	Float	S	4	r,w	Setting the upper range value 1 (Measuring range = 0 to Qv Max 1) for the volume flow for forward flow (direction) and reverse flow (direction). Default setting: 1 x QmaxDN. This parameter is only available if the value 'Qv Max 2' has been selected for the parameter 'DO_PV_DUAL_RANGE_VOLUME'.
VOLUME_FLOW_QV_ RANGE_MODE	12	74	90	Simple	Unsigned8	S	1	r,w	Manual switchover between the measuring ranges (Qm Max / Qm Max 2) for the volume flow measurement. This parameter is only available if the value 0x01 or 0x03 as been selected for the parameter 'RANGE_MODE_CONFIG.'
VOLUME_FLOW_RATIO	12	75	91	Simple	Float	D	4	r	Process variable – Volume flow in %
VOLUME_FLOW_QV_ RANGE_MAX	12	76	92	Simple	Float	N	4	r	Output of measuring range (maximum / minimum) for the volume flow Qv.
VOLUME_FLOW_QV_ RANGE_MIN	12	77	93	Simple	Float	N	4	r	
FLOW_VELOCITY	12	78	94	Record	DS-101	D	5	r	Process variable – flow velocity

… 3 Block overview

… Transducer Block 1 – Flow – Slot 12

Parameter Name	Slot no.	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
SENSOR_LOCATION_TAG	12	79	95	Simple	VisibleString	S	20	r,w	Enter the measuring point tagging for the sensor. Alphanumeric, max. 20 characters
SENSOR_TAG	12	80	96	Simple	VisibleString	S	20	r,w	Enter the TAG number for the measuring sensor. Alphanumeric, max. 20 characters.
DAMPING_ON_OFF	12	81	97	Simple	Unsigned8	S	1	r,w	Switches the damping on or off. 0x00: Damping switched off 0x01: Damping switched on.
DAMPING_QM	12	82	98	Simple	Float	S	4	r,w	Setting the damping for measuring mass flow. The value set here (0.2 to 60 s) refers to 1 τ (Tau). The value refers to the response time for a stepwise mass flow change.
DENSITY_FIXED_VALUE	12	83	99	Simple	Float	S	4	r,w	If the flow count and display are performed using mass flow units, a fixed density value must be included in the calculations. To convert to mass flow, a density value in the range of 0.01 to 5.0 g/cm^3 can be set.
LOW_FLOW_HYSTERESIS	12	84	100	Simple	Float	S	4	r,w	Sets the hysteresis for the low flow cut-off as defined in the parameter 'DENSITY_CUT_OFF.' Factory setting: 20 %
TX_LOCATION_TAG	12	85	101	Simple	Visible String	S	20	r,w	Enter the measuring point tagging for the transmitter. Alphanumeric, max. 20 characters
TX_TAG	12	86	102	Simple	Visible String	S	20	r,w	Entry of the TAG number for the transmitter. Alphanumeric, max. 20 characters
PLANT_DATA_SYNC	12	87	103	Simple	Unsigned8	S	1	r,w	The transmitter saves its configuration in the 'SensorMemory'. The data is stored redundantly on the motherboard (MB) of the transmitter and on the frontend board (FEB) of the sensor. This means the configuration can be restored quickly if any components are replaced. 0x02: FEB > MB – Loading the configuration from the frontend board (FEB) of the sensor. 0x01: MB > FEB – Loads the configuration from the motherboard (MB) in the transmitter.
DEVICE_RESET	12	88	104	Simple	Unsigned8	S	1	w	Restarts the device. Compensates for a short interruption of the power supply.
RESTORE_FACTORY_ DEFAULTS	12	89	105	Simple	Unsigned8	S	1	w	All user-accessible parameters will be reset to the factory default settings.
BACKWARDS_COMP_ ON_OFF	12	90	106	Simple	Unsigned8	S	1	r	Output on whether the backward compatibility function has been activated.
BACKWARDS_COMP_ CODE	12	91	107	Simple	Unsigned16	S	2	r,w	Set the device-specific code for activating the function. To use this function subsequently, contact the ABB service team or sales organization. After entering the code, restart the device (for example using the parameter 'DEVICE_RESET' or by briefly switching off the power supply).

Parameter Name	Slot no.	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
VERIFYING_CAPAB_ON_OFF	12	92	108	Simple	Unsigned8	S	1	r	Output on whether the verification function has been activated.
VERIFYING_CAPAB_CODE	12	93	109	Simple	Unsigned16	S	2	r,w	Set the device-specific code for activating the verification function. To use this function subsequently, contact the ABB service team or sales organization. After entering the code, restart the device (for example using the parameter 'DEVICE_RESET' or by briefly switching off the power supply).
BATCHMODE_ON_OFF	12	94	110	Simple	Unsigned8	S	1	r	Output on whether the filling function is active.
BATCHMODE_CODE	12	95	111	Simple	Unsigned16	S	2	r,w	Set the device-specific code for activating the filling function. To use this function subsequently, contact the ABB service team or sales organization. After entering the code, restart the device (for example using the parameter 'DEVICE_RESET' or by briefly switching off the power supply).
EXPERT_DIAGN_ON_OFF	12	96	112	Simple	Unsigned8	S	1	r	Output on whether advanced diagnosis functions such as gas bubble or conductivity have been activated.
EXPERT_DIAGN_CODE	12	97	113	Simple	Unsigned16	S	2	r,w	Set the device-specific code for activating the advanced diagnosis function. To use this function subsequently, contact the ABB service team or sales organization. After entering the code, restart the device (for example using the parameter 'DEVICE_RESET' or by briefly switching off the power supply).
SIL_COMP_ON_OFF	12	98	114	Simple	Unsigned8	S	1	r	Output on whether the SIL function is active.
SIL_COMP_CODE	12	99	115	Simple	Unsigned16	S	2	r,w	Set the device-specific code for activating the SIL function. To use this function subsequently, contact the ABB service team or sales organization. After entering the code, restart the device (for example using the parameter 'DEVICE_RESET' or by briefly switching off the power supply).
USER_UNIT_MASSFLOW_QM_NAME	12	100	116	Simple	VisibleString	S	8	r,w	Sets the name or abbreviation of the user-defined unit for mass flow.
USER_UNIT_MASSFLOW_QM_FACTOR	12	101	117	Simple	Float	S	4	r,w	Sets the factor of the user-defined unit for mass flow in kg / seconds.
USER_UNIT_VOLUMEFLOW_QV_NAME	12	102	118	Simple	VisibleString	S	8	r,w	Sets the name or abbreviation of the user-defined unit for volume flow.
USER_UNIT_VOLUMEFLOW_QV_FACTOR	12	103	119	Simple	Float	S	4	r,w	Sets the factor of the user-defined unit for volume flow in liters/seconds.

… 3 Block overview

… Transducer Block 1 – Flow – Slot 12

Parameter Name	Slot no.	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
AO_PV_CONTROL_OFF	12	104	120	Record	DS-101	S	5	r	OFF function for AO function blocks
ARBITRARY_OBJ_ACCESS_SPEC	12	105	121	Record	Idx_Config	S	7	r	Reserved by ABB
ARBITRARY_OBJ_ACCESS_RW	12	106	122	Array	Unsigned8	S	32	r	Reserved by ABB
SENSOR_SERIES_HASH_TYPE	12	107	123	Simple	Unsigned8	S	1	r	Output of the sensor types 0x00: ProcessMaster FEP610 0x01: ProcessMaster FEP630 0x02: WaterMaster FEW610 0x03: WaterMaster FEW630 0x04: HygienicMaster FEH610 0x05: HygienicMaster FEH630
USER_SYS_ZERO_VELOCITY_RES_TIMER	12	108	124	Simple	Unsigned8	D	1	r	This object contains the return values of the automatic zero point correction (progresstimer, diagnosevalue, mean value, max and min value).
USER_SYS_ZERO_VELOCITY_RES_AVE_CALC	12	109	125	Simple	Unsigned8	D	1	r	
USER_SYS_ZERO_VELOCITY_RES_MEAN	12	110	126	Simple	Float	D	4	r	
USER_SYS_ZERO_VELOCITY_RES_STD	12	111	127	Simple	Float	D	4	r	
USER_SYS_ZERO_VELOCITY_RES_MAX	12	112	128	Simple	Float	D	4	r	
USER_SYS_ZERO_VELOCITY_RES_MIN	12	113	129	Simple	Float	D	4	r	
CALIBRATED_FLAG	12	114	130	Simple	Unsigned8	D	1	r	Device return value calibrated
–	12	115 to 119	131 to 135	–	–	–	–	–	Reserved for later use

Transducer Block 2 – DeviceInfo – Slot 13

The transducer block - device info is a manufacturer-specific transducer block.
It contains additional information about the transmitter. All parameters in this block are read-only.

Transducer Block 2 - DeviceInfo – Parameters

Parameter Name	Slot no.	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
BLOCK_OBJECT	13	0	16	Record	DS-32	Cst	20	r	–
ST_REV	13	1	17	Simple	Unsigned16	N	2	r	–
TAG_DESC	13	2	18	Simple	OctetString	S	32	r,w	–
STRATEGY	13	3	19	Simple	Unsigned16	S	2	r,w	–
ALERT_KEY	13	4	20	Simple	Unsigned8	S	1	r,w	–
TARGET_MODE	13	5	21	Simple	Unsigned8	S	1	r,w	–
MODE_BLK	13	6	22	Record	DS-37	D	3	r	–
ALARM_SUM	13	7	23	Record	DS-42	D	8	r	–
SENSOR_TYPE	13	8	24	Simple	Unsigned8	N	1	r	Sensor type output
METER_SIZE	13	9	25	Simple	Unsigned8	N	1	r	Nominal diameter of sensor.
QM_MAX_DN	13	10	26	Simple	Float	N	4	r	The value is the maximum mass flow rate at a flow velocity of 10 m/s. The value is automatically set through the selected nominal diameter, multiplied by the set density.
QV_MAX_DN	13	11	27	Simple	Float	N	4	r	The value provides the maximum volume flow at a flow velocity of 10 m/s. The value is set automatically via the selected nominal diameter.
SENSOR_SPAN	13	12	28	Simple	Float	N	4	r	Calibration value in the forward flow (direction) and reverse flow
SENSOR_ZERO	13	13	29	Simple	Float	N	4	r	(direction) of the sensor.
TRANSMITTER_SPAN	13	14	30	Simple	Float	N	4	r	Calibration value of the transmitter.
TRANSMITTER_ZERO	13	15	31	Simple	Float	N	4	r	
RAYNOLDS_SV	13	16	32	Simple	Float	N	4	r	Calibration values S_V and S_C. only on ‘AquaProbe’ sensor type.
RAYNOLDS_SC	13	17	33	Simple	Float	N	4	r	
PROBE_BORE	13	18	34	Simple	Float	N	4	r	Meter tube diameter. For ‘AquaProbe’ sensor type only
INSERTION_FACTOR	13	19	35	Simple	Float	N	4	r	Input factor F_i. For ‘AquaProbe’ sensor type only.
PROFILE_FACTOR	13	20	36	Simple	Float	N	4	r	Profile factor F_P. For ‘AquaProbe’ sensor type only.
PROBE_VMAX_DN	13	21	37	Simple	Float	N	4	r	Maximum flow velocity V_{max} at Q_{max}DN. For ‘AquaProbe’ sensor type only
MAINS_FREQUENCY	13	22	38	Simple	Unsigned8	N	1	r	Mains frequency for the supply power.
EXITATION_FREQ	13	23	39	Simple	Unsigned8	N	1	r	Frequency used to operate the magnetic coils of the flowmeter sensor.

… 3 Block overview

… Transducer Block 2 – DeviceInfo – Slot 13

Parameter Name	Slot no.	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
COIL_CURRENT_ REGULATION	13	24	40	Simple	Unsigned8	N	1	r	For service information only.
SET_POINT_CURRENT	13	25	41	Simple	Float	N	4	r	Current used to operate the magnetic coils of the flowmeter sensor.
DC_FEEDBACK_ REGULATION	13	26	42	Simple	Unsigned8	N	1	r	For service information only.
SENSOR_ID	13	27	43	Simple	Unsigned32	N	4	r	ID number of the sensor.
SENSOR_SERIAL_NR	13	28	44	Simple	Visible String	N	20	r	Serial number of the sensor.
SENSOR_RUN_HOURS	13	29	45	Simple	Unsigned32	N	4	r	Operating hours of the sensor.
SENSOR_FIRST_CAL_DATE	13	30	46	Array	Unsigned8	N	3	r	Date of first calibration of sensor (calibration of new device).
SENSOR_LAST_CAL_DATE	13	31	47	Array	Unsigned8	N	3	r	Date of last calibration of sensor.
SENSOR_CAL_CERT_NR	13	32	48	Simple	Visible String	N	20	r	Identification (number) of the relevant calibration certificate.
SENSOR_FIRST_CAL_ LOCATION	13	33	49	Simple	Visible String	N	20	r	Place of first calibration of the sensor.
SENSOR_LAST_CAL_ LOCATION	13	34	50	Simple	Visible String	N	20	r	Place of last calibration of sensor.
SENSOR_TFE_FUNCTION	13	35	51	Simple	Unsigned8	N	1	r	Shows if the total filling electrode (TFE) has been activated or deactivated.
TRANSM_TYPE	13	36	52	Simple	Unsigned8	N	1	r	Transmitter type, for example FEx630.
TRANSM_ID	13	37	53	Simple	Unsigned32	N	4	r	ID number of transmitter.
TRANSM_SERIAL_NR	13	38	54	Simple	Visible String	N	20	r	Serial number of transmitter.
TRANSM_RUN_HOURS	13	39	55	Simple	Unsigned32	N	4	r	Run hours of the transmitter.
TRANSM_RESTART_ COUNTER	13	40	56	Simple	Unsigned16	N	2	r	Number of device restarts (cyclically switching the power supply off and on).
TIME_SINCE_RESTART	13	41	57	Simple	Unsigned32	N	4	r	Device operating hours since the last restart.
TRANSM_FIRST_CAL_DATE	13	42	58	Array	Unsigned8	N	3	r	Date of first calibration of transmitter (calibration of new device).
TRANSM_LAST_CAL_DATE	13	43	59	Array	Unsigned8	N	3	r	Date of last calibration of transmitter.
TRANSM_CAL_CERT_NR	13	44	60	Simple	Visible String	N	20	r	Identification (number) of the relevant calibration certificate.
TRANSM_FIRST_CAL_ LOCATION	13	45	61	Simple	Visible String	N	20	r	Place of first calibration of transmitter.
TRANSM_LAST_CAL_ LOCATION	13	46	62	Simple	Visible String	N	20	r	Place of last calibration of transmitter.

Parameter Name	Slot no.	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
MANUFACTURER	13	47	63	Simple	Visible String	N	20	r	Name of manufacturer.
STREET	13	48	64	Simple	Visible String	N	20	r	Manufacturer's address (street).
CITY	13	49	65	Simple	Visible String	N	20	r	Manufacturer's address (city).
PHONE	13	50	66	Simple	Visible String	N	20	r	Manufacturer's address (phone number).
FW_VERSION_DEVICE	13	51	67	Array	Visible String	N	8	r	Version and item number of device software package.
FW_PART_NR_DEVICE	13	52	68	Simple	Visible String	N	20	r	
FW_VERSION_MOTHERBOARD	13	53	69	Simple	Visible String	N	8	r	Version and checksum (CRC) of motherboard (MB) software.
FW_CRC_MOTHERBOARD	13	54	70	Simple	Unsigned16	N	2	r	
FW_VERSION_FRONTEND	13	55	71	Simple	Visible String	N	8	r	Version and checksum (CRC) of the frontend board (FEB) software.
FW_CRC_FRONTEND	13	56	72	Simple	Unsigned16	N	2	r	
HW_VERSION_MOTHERBOARD	13	57	73	Simple	Visible String	N	20	r	Hardware version of the motherboard (MB).
HW_VERSION_FRONTEND	13	58	74	Simple	Visible String	N	20	r	Hardware version of the frontend board (FEB).
BOOTLOADER_VERSION_MOTHERBOARD	13	59	75	Simple	Visible String	N	8	r	Version of motherboard (MB) bootloader.
BOOTLOADER_VERSION_FRONTEND	13	60	76	Simple	Visible String	N	8	r	Version of frontend board (FEB) bootloader.
FW_VERSION_CURR_OUT_31_32	13	61	77	Simple	Visible String	N	8	r	Current output module software version and checksum (CRC).
FW_CRC_CURR_OUT_ 31_32	13	62	78	Simple	Unsigned16	N	2	r	
OPTION_CARD_1_TYPE	13	63	79	Simple	Unsigned8	N	1	r	Type of plug-in card present in the slot OC1. 0x0A: Profibus DP (white)
OPTION_CARD_2_TYPE	13	64	80	Simple	Unsigned8	N	1	r	Type of plug-in card present in the slot OC2. 0x02: Digital input, passive (yellow) 0x03: Digital output, passive (green) 0x0D: Slot not occupied 0x0E: Card error 0x81: Current output 4 to 20 mA passive (red), not usable

… 3 Block overview

… Transducer Block 2 – DeviceInfo – Slot 13

Parameter Name	Slot no.	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
FW_VERSION_ FIELDBUSCARD	13	65	81	Simple	VisibleString	N	8	r	Firmware version of the fieldbus plug-in card.
FW_CRC_FIELDBUSCARD	13	66	82	Simple	Unsigned16	N	1	r	Checksum of the fieldbus plug-in card.
BOOTLOADER_VERSION_ FIELDBUSCARD	13	67	83	Simple	VisibleString	N	8	r	Bootloader version of the fieldbus plug-in card.
TRANSM_TYPE_1	13	68	84	Simple	Unsigned8	N	1	r	Transmitter housing design. 0x00 Detection is running 0x01 Dual-compartment housing 0x02 Single-compartment housing 0x0A Detection has failed.
–	13	69 to 82	84 to 98	–	–	–	–	–	Reserved for later use

Transducer Block 3 – Special Function – Slot 20

The transducer block - special function is a manufacturer-specific transducer block.
It contains parameters for configuring the pulse output or switch output and the internal totalizers.

Transducer Block 3 – Special Function – parameters

Parameter Name	Slot no.	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
BLOCK_OBJECT	20	0	16	Record	DS-32	Cst	20	r	–
ST_REV	20	1	17	Simple	Unsigned16	N	2	r	–
TAG_DESC	20	2	18	Simple	OctetString	S	32	r,w	–
STRATEGY	20	3	19	Simple	Unsigned16	S	2	r,w	–
ALERT_KEY	20	4	20	Simple	Unsigned8	S	1	r,w	–
TARGET_MODE	20	5	21	Simple	Unsigned8	S	1	r,w	–
MODE_BLK	20	6	22	Record	DS-37	D	3	r	–
ALARM_SUM	20	7	23	Record	DS-42	D	8	r	–
TOTALIZER_MASS_UNIT	14	8	24	Simple	Unsigned16	S	1	r,w	Selection of unit for the mass counters. See **Table 4: Units for the mass totalizer** on page 64.
TOTALIZER_VOLUME_ UNIT	14	9	25	Simple	Unsigned16	S	1	r,w	Selection of unit for the volume totalizers. See **Table 3: Units for the volume totalizer** on page 64.
USER_UNIT_MASS_TOTAL_ NAME	14	10	26	Simple	Visible String	S	8	r,w	Sets the name or abbreviation of the user-defined unit for the mass counter.
USER_UNIT_MASS_TOTAL_F ACTOR	14	11	27	Simple	Float	S	4	r,w	Sets the factor of the user-defined unit for the mass counter in kg.
USER_UNIT_VOLUME_ TOTAL_NAME	14	12	28	Simple	VisibleStrin g	S	8	r,w	Sets the name or abbreviation of the user-defined unit for the volume totalizer.
USER_UNIT_VOLUME_ TOTAL_FACTOR	14	13	29	Simple	Float	S	4	r,w	Sets the factor of the user-defined unit for the volume totalizer in liters.
TOTALIZER_QM_FWD	14	14	30	Record	DS-101	D	5	r	Process variable – Mass flow counter reading in the forward flow direction.
TOTALIZER_QM_REV	14	15	31	Record	DS-101	D	5	r	Process variable – Mass flow counter reading in the reverse flow direction.
TOTALIZER_QM_DIFF	14	16	32	Record	DS-101	D	5	r	Process variable – Mass flow counter reading for forward flow / reverse flow difference.
TOTALIZER_QV_FWD	14	17	33	Record	DS-101	D	5	r	Process variable – Volume flow counter reading in the forward flow direction.
TOTALIZER_QV_REV	14	18	34	Record	DS-101	D	5	r	Process variable – Volume flow counter reading in the reverse flow direction
TOTALIZER_QV_DIFF	14	19	35	Record	DS-101	D	5	r	Process variable – Volume flow counter reading for forward flow / reverse flow difference

… 3 Block overview

… Transducer Block 3 – Special Function – Slot 20

Parameter Name	Slot no.	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
TOTALIZER_START_ALL	14	20	36	Simple	Unsigned8	S	1	r,w	Starts all counters.
TOTALIZER_STOP_ALL	14	21	37	Simple	Unsigned8	S	1	r,w	Stops all totalizers.
TOTALIZER_RESET_ALL	14	22	38	Simple	Unsigned8	S	1	r,w	Resets all totalizers to zero.
TOTALIZER_RESET_ QM_FWD	14	23	39	Simple	Unsigned8	S	1	r,w	Reset mass forward flow totalizer to zero.
TOTALIZER_RESET_ QM_REV	14	24	40	Simple	Unsigned8	S	1	r,w	Reset mass reverse flow totalizer to zero.
TOTALIZER_RESET_ QV_FWD	14	25	41	Simple	Unsigned8	S	1	r,w	Reset volume forward flow totalizer to zero.
TOTALIZER_RESET_ QV_REV	14	26	42	Simple	Unsigned8	S	1	r,w	Reset volume reverse flow totalizer to zero.
TOTALIZER_PRESET_ QM_FWD	14	27	43	Simple	Float	S	4	r,w	Input from meter readings (for example when replacing the transmitter).
TOTALIZER_PRESET_ QM_REV	14	28	44	Simple	Float	S	4	r,w	
TOTALIZER_PRESET_ QV_FWD	14	29	45	Simple	Float	S	4	r,w	
TOTALIZER_PRESET_ QV_REV	14	30	46	Simple	Float	S	4	r,w	
BATCH_PROCESS_VALUE	14	31	47	Simple	Unsigned8	S	1	r,w	Selection of process variable used during the filling process. 0x00: Off – Filler disabled. 0x40: Volume forward flow (direction) – Volume flow in forward flow (direction) 0x41: Standard volume forward flow (direction) – Standard volume flow in forward flow (direction). 0x42: Mass forward flow (direction): Mass flow in forward flow (direction). 0x43: Net Qv forward: Net volume flow in forward flow (direction). 0x44: Net Qm forward: Net mass flow in forward flow (direction).
PRESET_BATCH_ TOTALIZER	14	32	48	Simple	Float	S	4	r,w	Sets the fill quantity using the selected unit. When the defined fill quantity is reached, the configured binary output is activated. **Note** Before setting the fill quantity, the corresponding process value must be selected with the parameter 'FILLMASS_BATCH_PROCESS_VALUE.'
RESET_CURRENT_ BATCH_TOT	14	33	49	Simple	Unsigned8	S	1	r,w	Resets the current fill quantity.
START_BATCHING	14	34	50	Simple	Unsigned8	S	1	r,w	Manual start of the filling function. Alternatively, the digital input can be configured for starting / stopping the fill operation.

Parameter Name	Slot no.	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
BATCH_TOTALIZER	14	35	51	Record	DS-101	D	5	r	Process variable - Current fill quantity. Once a fill operation has been started, the quantity already filled is shown here. The counter restarts at zero for each fill operation initiated and then counts up to the set fill quantity.
STOP_BATCHING	14	36	52	Simple	Unsigned8	S	1	r,w	Manual stop of the filling function. Alternatively, the digital input can be configured for starting / stopping the fill operation.
BATCH_COUNTS	14	37	53	Simple	Unsigned32	D	4	r	Process variable – Display of the number of fill operations since the last reset.
RESET_BATCH_COUNTS	14	38	54	Simple	Unsigned8	S	1	r,w	Sets the parameter FILLMASS_BATCH_ COUNTS to zero.
LAG_ADJ_MODE	14	39	55	Simple	Unsigned8	S	1	r,w	Selection of overrun correction. Closing the fill valve takes some time and as a consequence more liquid is added, even though the fill quantity is reached and the contact for closing the valve is actuated. 0x01: Automatic – The overrun quantity is calculated by the transmitter automatically. 0x00: Manual – The overrun quantity must be determined manually and entered in the selected unit via the parameter 'FILLMASS_LAG_ADJ_QUANTITY.'
LAG_ADJ_QUANTITY	14	40	56	Simple	Float	S	4	r,w	Manual entry of the overrun quantity.
LAG_ADJ_AUTO_ QUANTITY	14	41	57	Simple	Float	S	4	r	Process variable – Overrun quantity automatically calculated by the transmitter.
LAG_ADJ_FACTOR	14	42	58	Simple	Float	S	4	r,w	Sets the weighting of the last filling process during automatic calculation of the overrun quantity. The calculation is based on the following formula: New correction value = last correction value + (BatchAuto.Lag Corr.Factor x correction value at the last filling) 0,0: No change to correction value. 1,0: The correction value is immediately adjusted to the overrun quantity calculated during the last fill operation.
LAG_ADJ_TIME	14	43	59	Simple	Float	S	4	r,w	Sets the time for the overrun quantity correction after the fill valve is closed.

… 3 Block overview

… Transducer Block 3 – Special Function – Slot 20

Parameter Name	Slot no.	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
CURR_OUT_31_32_MODE	14	44	60	Simple	Unsigned8	S	1	r,w	Selection of the flow direction for the current output. 0x00: 4 to 20 mA forward – Output of flow in the forward flow (direction). 0x01: 4 … 12 … 20 mA – Output flow rate in forward and reverse flow (direction): 4 mA = maximum flow rate in the reverse flow (direction) 12 mA = no flow rate 20 mA = maximum flow rate in the forward flow (direction) 0x02: 4 to 20 mA forward / reverse flow – Output of flow rate in the forward and reverse flow (direction) without a distinction of the flow rate
CURR_OUT_31_32_ ALARM_BEHAVIOUR	14	45	61	Simple	Unsigned8	S	1	r,w	Selection of status of the current output in error condition. 0x00: High_Alarm 0x01: Low_Alarm
CURR_OUT_31_32_ LOW_ALARM	14	46	62	Simple	Float	S	4	r,w	Sets the current for Low Alarm.
CURR_OUT_31_32_ HIGH_ALARM	14	47	63	Simple	Float	S	4	r,w	Sets the current for High Alarm.
CURR_OUT_31_32_ LOW_BEHAVIOUR	14	48	64	Simple	Unsigned8	S	1	r,w	Behavior of the current output if 3.8 mA is not reached. 0x00: Hold last value – The last measured value is retained and issued. 0x01: High alarm – The high alarm current is issued. 0x02: Low alarm – The low alarm current is issued. The parameter is not available ‘0x02’ was selected for the parameter CURR_OUT_31_32_MODE.
CURR_OUT_31_32_ HIGH_BEHAVIOUR	14	49	65	Simple	Unsigned8	S	1	r,w	Behavior of current output if 20.5 mA is exceeded. 0x00: Hold last value – The last measured value is retained and issued. 0x01: High alarm – The high alarm current is issued. 0x02: Low alarm – The low alarm current is issued.
CURR_OUT_AT_ EDP_ALARM	14	50	66	Simple	Unsigned8	S	1	r,w	Behavior of the current output with an empty meter tube. 0x00: Hold last value – The last measured value is retained and issued. 0x01: Current output is set to 4 mA, ‘no flow’. 0x02: High alarm – The high alarm current is issued. 0x03: Low alarm – The low alarm current is issued.

Parameter Name	Slot no.	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
CURR_OUT_AT_ TFE_ALARM	14	51	67	Simple	Unsigned8	S	1	r,w	TFE alarm (partial filling alarm) is issued when the meter tube is partially filled. 0x00: Hold last value – The last measured value is retained and issued. 0x01: Current output is set to 4 mA, 'no flow'. 0x02: High alarm – The high alarm current is issued. 0x03: Low alarm – The low alarm current is issued.
CURR_OUT_31_32_ OUTPUT_READING	14	52	68	Record	DS-101	D	5	r	Output for current output 1
CURR_OUT_OUTPUT_ VALUE	14	53	69	Simple	Unsigned8	D	1	r,w	Selection of the process variable issued at current output 31 / 32. 0x00: Qm [%]: The current output provides the mass flow in percent. 0x01: Qv [%]: The current output provides the volume flow in percent. 0x02: Conductivity [µS/cm]: the current output provides the conductivity in µS/cm.
CURR_OUT_31_32_ SCALE_4_MA	14	54	70	Simple	Float	N	4	r,w	Calibration value of current output 1 for 4 mA
CURR_OUT_31_32_ SCALE_20_MA	14	55	71	Simple	Float	N	4	r,w	Calibration value of current output 1 for 20 mA
DIG_OUT_41_42_MODE	14	56	72	Simple	Unsigned8	S	1	r,w	Selection of the operating mode for the digital output 41 / 42. 0x00: Off – Digital output 41 / 42 deactivated. 0x01: Binary – digital output 41 / 42 as a binary output (for example as an alarm output). 0x02: Frequency – Digital output 41 / 42 as a frequency output. In frequency mode, a frequency is issued that is proportional to the flow rate. The maximum frequency can be configured in accordance with the upper range value. 0x03: Pulse – Digital output 41 / 42 as a pulse output. In pulse mode, pulses are output per unit (for example 1 pulse per m3).

… 3 Block overview

… Transducer Block 3 – Special Function – Slot 20

Parameter Name	Slot no.	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
DIG_OUT_41_42_OUT_FLOW_DIRECTION	14	57	73	Simple	Unsigned8	S	1	r,w	Selection of flow direction in which the pulse / frequency output issues the selected process value. The parameter is only available if the digital output has been configured as a pulse or frequency output. 0x00: Forward and reverse flow – Pulses for both flow directions are output via digital output 41 / 42. 0x01: Forward flow (direction) – Only pulses in the forward flow (direction) (flow in direction of arrow) are output via digital output 41 / 42. 0x02: Reverse flow – Only pulses (in the) reverse flow (direction) (flow in opposite direction to arrow) are output via digital output 41 / 42.
DIG_OUT_41_42_PULSE_VALUE	14	58	74	Simple	Unsigned8	D	1	r,w	Selection of process variable that is issued via the pulse output. 0x00: None 0x01: Mass flow in the selected mass flow unit 0x02: Standard volume flow in the selected volume unit
DIG_OUT_41_42_PULSE_PER_UNIT	14	59	75	Simple	Float	S	4	r,w	Sets the pulses per mass unit or volume unit (see **Available units** on page 64) and the pulse width for the pulse output.
DIG_OUT_41_42_PULSE_WIDTH	14	60	76	Simple	Float	S	4	r,w	The potential pulse width depends on the configured pulse value and is calculated dynamically.
DIG_OUT_41_42_PULSE_PER_UNIT_MAX	14	61	77	Simple	Float	N	4	r	Maximum possible pulses per mass or volume unit for pulse output 41 / 42.
DIG_OUT_41_42_PULSE_PER_UNIT_MIN	14	62	78	Simple	Float	N	4	r	Minimum possible pulses per mass or volume unit for pulse output 41 / 42.
DIG_OUT_41_42_PULSE_WIDTH_MAX	14	63	79	Simple	Float	N	4	r	Maximum possible pulse width for pulse width 41 / 42.
DIG_OUT_41_42_PULSE_WIDTH_MIN	14	64	80	Simple	Float	N	4	r	Minimum possible pulse width for pulse width 41 / 42.

Parameter Name	Slot no.	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
DIG_OUT_41_42_FREQ_VALUE	14	65	81	Simple	Unsigned8	S	1	r,w	Selection of process variable that is issued via the frequency output. 0x00: None 0x01: Net mass flow in percent 0x02: Standard volume flow in percent 0x03: Conductivity
DIG_OUT_41_42_FREQ_UPPER_VALUE	14	66	82	Simple	Float	S	4	r,w	Sets the frequency for the upper range value. The entered value corresponds to 100 % flow.
DIG_OUT_41_42_LOGIC_ACTION	14	67	83	Simple	Unsigned8	S	1	r,w	Selection of binary output function. 0x00: No function 0x01: Forward/reverse flow signal – The binary output signals the flow direction. 0x02: Alarm signal – The binary output indicates an active alarm. 0x03: Two measuring ranges – The binary output is activated when measuring range 2 (QmMax 2 / QvMax 2) is selected. This selection is only available if the parameter 'Two measuring ranges' has been configured to Qm or Qv. 0x04: End contact fill – the binary output is activated when the set fill quantity is reached (only if the FillMass function is activated). 0x05: Concentration matrix selection – the binary output signals the selected concentration matrix (only with the DensiMass function activated and if the variable matrix has been selected).
DIG_OUT_41_42_LOGIC_ACTIVE_MODE	14	68	84	Simple	Unsigned8	S	1	r,w	Select switching properties for the binary output. 0x00: Opener 0x01: Closer
DIG_OUT_41_42_ALARM_GENERAL	14	69	85	Simple	Unsigned8	S	1	r,w	Collective alarm via binary output 41 / 42 0x00: Alarm behavior OK 0x00: Alarm behavior FAIL
DIG_OUT_41_42_ALARM_QV_MAX	14	70	86	Simple	Unsigned8	S	1	r,w	Maximum alarm volume flow via binary output 41 / 42. 0x00: Alarm behavior OK 0x00: Alarm behavior FAIL
DIG_OUT_41_42_ALARM_QV_MIN	14	71	87	Simple	Unsigned8	S	1	r,w	Minimum alarm volume flow via binary output 41 / 42. 0x00: Alarm behavior OK 0x00: Alarm behavior FAIL

… 3 Block overview

… Transducer Block 3 – Special Function – Slot 20

Parameter Name	Slot no.	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
DIG_OUT_41_42_ ALARM_EPD	14	72	88	Simple	Unsigned8	S	1	r,w	Alarm empty tube detection via binary output 41 / 42. 0x00: Alarm behavior OK 0x00: Alarm behavior FAIL
DIG_OUT_41_42_ ALARM_TFE	14	73	89	Simple	Unsigned8	S	1	r,w	Alarm partial filling via binary output 41 / 42. 0x00: Alarm behavior OK 0x00: Alarm behavior FAIL
DIG_OUT_41_42_ ALARM_GAS_BUBBLE	14	74	90	Simple	Unsigned8	S	1	r,w	Alarm gas bubble detection via binary output 41 / 42. 0x00: Alarm behavior OK 0x00: Alarm behavior FAIL
DIG_OUT_41_42_ ALARM_CONDUCTIVITY	14	75	91	Simple	Unsigned8	S	1	r,w	Alarm conductivity binary output 41 / 42. 0x00: Alarm behavior OK 0x00: Alarm behavior FAIL
DIG_OUT_41_42_ ALARM_SENSOR_TEMP	14	76	92	Simple	Unsigned8	S	1	r,w	Alarm sensor temperature via binary output 41 / 42. 0x00: Alarm behavior OK 0x00: Alarm behavior FAIL
DIG_OUT_41_42_ ALARM_INHOUSE_TEMP	14	77	93	Simple	Unsigned8	S	1	r,w	Alarm measured value transmitter temperature via binary output 41 / 42. 0x00: Alarm behavior OK 0x00: Alarm behavior FAIL
DIG_OUT_41_42_FREQ_ OUTPUT_VALUE	14	78	94	Simple	Float	D	4	r	Starting value for frequency DO 41 / 42
DIG_OUT_41_42_STATE_ OUTPUT_VALUE	14	79	95	Simple	Unsigned8	D	1	r	Starting value for state DO 41 / 42 (binary)
DIG_OUT_51_52_MODE	14	80	96	Simple	Unsigned8	S	1	r,w	Selection of the operating mode for the digital output 51 / 52. The operating modes ‘Follow DO 41 / 42, 90° offset, 180° offset’ are only available if digital output 51 / 52 has been configured as a pulse output. 0x00: Off – Digital output deactivated. 0x01: Binary – Digital output works as a binary output 0x04: Follow DO 41 / 42 – The digital output 51 / 52 follows the pulses from the digital output 41 / 42. The function depends on the setting of the parameter DIG_OUT_51_52_OUT_FLOW_DIRECTION. 0x05: 90° offset – 90° phase rotation of output of the same pulses as for digital output 41 / 42. 0x06: 180° offset – 180° phase rotation of output of the same pulses as for digital output 41 / 42.

Parameter Name	Slot no.	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
DIG_OUT_51_52_OUT_ FLOW_DIRECTION	14	81	97	Simple	Unsigned8	S	1	r,w	Selection of flow direction in which the pulse / frequency output issues the selected process value. The parameter is only available if the digital output has been configured as a pulse or frequency output. 0x00: Forward and reverse flow – Pulses for both flow directions are output via digital output 51 / 52. 0x01: Forward flow (direction) – Only pulses in the forward flow (direction) (flow in direction of arrow) are output via digital output 51 / 52. 0x02: Reverse flow – Only pulses (in the) reverse flow (direction) (flow in opposite direction to arrow) are output via digital output 41 / 42.
DIG_OUT_51_52_LOGIC_ ACTION	14	82	98	Simple	Unsigned8	S	1	r,w	Selection of binary output function. See description DIG_OUT_41_42_LOGIC_ ACTION on page 45.
DIG_OUT_51_52_LOGIC_ ACTIVE_MODE	14	83	99	Simple	Unsigned8	S	1	r,w	Select switching properties for the binary output. 0x00: Opener 0x01: Closer
DIG_OUT_51_52_ ALARM_GENERAL	14	84	100	Simple	Unsigned8	S	1	r,w	Collective alarm via binary output 51 / 52 0x00: Alarm behavior OK 0x00: Alarm behavior FAIL
DIG_OUT_51_52_ ALARM_QV_MAX	14	85	101	Simple	Unsigned8	S	1	r,w	Maximum alarm volume flow via binary output 51 / 52. 0x00: Alarm behavior OK 0x00: Alarm behavior FAIL
DIG_OUT_51_52_ ALARM_QV_MIN	14	86	102	Simple	Unsigned8	S	1	r,w	Minimum alarm volume flow via binary output 51 / 52. 0x00: Alarm behavior OK 0x00: Alarm behavior FAIL
DIG_OUT_51_52_ ALARM_EPD	14	87	103	Simple	Unsigned8	S	1	r,w	Alarm empty tube detection via binary output 51 / 52. 0x00: Alarm behavior OK 0x00: Alarm behavior FAIL
DIG_OUT_51_52_ ALARM_TFE	14	88	104	Simple	Unsigned8	S	1	r,w	Alarm partial filling via binary output 51 / 52. 0x00: Alarm behavior OK 0x00: Alarm behavior FAIL
DIG_OUT_51_52_ ALARM_GAS_BUBBLE	14	89	105	Simple	Unsigned8	S	1	r,w	Alarm gas bubble detection via binary output 51 / 52. 0x00: Alarm behavior OK 0x00: Alarm behavior FAIL

… 3 Block overview

… Transducer Block 3 – Special Function – Slot 20

Parameter Name	Slot no.	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
DIG_OUT_51_52_ ALARM_CONDUCTIVITY	14	90	106	Simple	Unsigned8	S	1	r,w	Alarm conductivity binary output 51 / 52. 0x00: Alarm behavior OK 0x00: Alarm behavior FAIL
DIG_OUT_51_52_ ALARM_SENSOR_TEMP	14	91	107	Simple	Unsigned8	S	1	r,w	Alarm sensor temperature via binary output 51 / 52. 0x00: Alarm behavior OK 0x00: Alarm behavior FAIL
DIG_OUT_51_52_ ALARM_INHOUSE_TEMP	14	92	108	Simple	Unsigned8	S	1	r,w	Alarm measured value transmitter temperature via binary output 51 / 52. 0x00: Alarm behavior OK 0x00: Alarm behavior FAIL
DIG_OUT_51_52_FREQ_ OUTPUT_VALUE	14	93	109	Simple	Float	D	4	r	Starting value for frequency DO 51 / 52
DIG_OUT_51_52_STATE_ OUTPUT_VALUE	14	94	110	Simple	Unsigned8	D	1	r	Starting value for state DO 51 / 52 (binary)
DIG_OUT_V3_V4_MODE	14	95	111	Simple	Unsigned8	S	1	r,w	Selection of the operating mode for digital output V3 / V4. 0x00: Off – Digital output deactivated. 0x01: Binary – Digital output works as a binary output The digital outputs V3 / V4 are only available if the corresponding plug-in cards are present!
DIG_OUT_V3_V4_LOGIC_ ACTION	14	96	112	Simple	Unsigned8	S	1	r,w	Selection of binary output function. See description DIG_OUT_41_42_LOGIC_ ACTION on page 45.
DIG_OUT_V3_V4_LOGIC_ ACTIVE_MODE	14	97	113	Simple	Unsigned8	S	1	r,w	Select switching properties for the binary output. 0x00: Opener 0x01: Closer
DIG_OUT_V3_V4_ ALARM_GENERAL	14	98	114	Simple	Unsigned8	S	1	r,w	Collective alarm via binary output V3 / V4 0x00: Alarm behavior OK 0x00: Alarm behavior FAIL
DIG_OUT_V3_V4_ ALARM_QV_MAX	14	99	115	Simple	Unsigned8	S	1	r,w	Maximum alarm volume flow via binary output V3 / V4 0x00: Alarm behavior OK 0x00: Alarm behavior FAIL
DIG_OUT_V3_V4_ ALARM_QV_MIN	14	100	116	Simple	Unsigned8	S	1	r,w	Minimum alarm volume flow via binary output V3 / V4 0x00: Alarm behavior OK 0x00: Alarm behavior FAIL
DIG_OUT_V3_V4_ ALARM_EPD	14	98	114	Simple	Unsigned8	S	1	r,w	Alarm empty tube detection via binary output V3 / V4 0x00: Alarm behavior OK 0x00: Alarm behavior FAIL
DIG_OUT_V3_V4_ ALARM_TFE	14	99	115	Simple	Unsigned8	S	1	r,w	Alarm partial filling via binary output V3 / V4 0x00: Alarm behavior OK 0x00: Alarm behavior FAIL

Parameter Name	Slot no.	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
DIG_OUT_V3_V4_ ALARM_GAS_BUBBLE	14	103	119	Simple	Unsigned8	S	1	r,w	Alarm gas bubble detection via binary output V3 / V4 0x00: Alarm behavior OK 0x00: Alarm behavior FAIL
DIG_OUT_V3_V4_ ALARM_CONDUCTIVITY	14	104	120	Simple	Unsigned8	S	1	r,w	Alarm conductivity binary output V3 / V4 0x00: Alarm behavior OK 0x00: Alarm behavior FAIL
DIG_OUT_V3_V4_ ALARM_SENSOR_TEMP	14	105	121	Simple	Unsigned8	S	1	r,w	Alarm sensor temperature via binary output V3 / V4 0x00: Alarm behavior OK 0x00: Alarm behavior FAIL
DIG_OUT_V3_V4_ ALARM_INHOUSE_TEMP	14	106	122	Simple	Unsigned8	S	1	r,w	Alarm transmitter temperature via binary output V3 / V4 0x00: Alarm behavior OK 0x00: Alarm behavior FAIL
DIG_OUT_V3_V4_STATE_ OUTPUT_VALUE	14	107	123	Simple	Unsigned8	D	1	r	Starting value for state DO V3 / V4 (binary)
DIG_IN_V3_V4_FUNCTION	14	108	124	Simple	Unsigned8	S	1	r,w	Select a function for the digital input. 0x00: Off – no function. 0x01: Totalizer reset (all) – Totalizer reset for all totalizers (forward, reverse and difference totalizer) 0x04: Totalizer stop (all) – External totalizer stop for all totalizers (forward, reverse and difference totalizer) 0x02: Ext. Zero point balancing. - Start external zero point balancing. 0x03: Ext. Shutdown - Sets flow measurement to 0. 0x05: Filler on / off – Start / stop fill operation (only when FillMass function is activated). 0x06: Two measuring ranges Qm – change over Qm Max / Qm Max 2. 0x07: Two measuring ranges Qv – change over Qv Max / Qv Max 2

… 3 Block overview

… Transducer Block 3 – Special Function – Slot 20

Parameter Name	Slot no.	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
DIG_IN_V3_V4_ ACTIVE_MODE	14	109	125	Simple	Unsigned8	S	1	r,w	Select switching properties for the binary input. 0x00: Opener 0x01: Closer
DIG_IN_V3_V4_ DELAY_TIME	14	110	126	Simple	Unsigned8	S	1	r,w	Selection of delay time for suppressing EMC faults on the digital input. **Note** If the digital input has been configured with the function 'Filler on / off,' the pulse for starting the filling process must fit at least for the set delay time!
DIG_IN_V3_V4_ STATE_INPUT_READING	14	111	127	Simple	Unsigned8	D	1	r	Input value for state DI V3 / V4 (binary)
CURR_OUT_31_32_ OUTPUT_VALUE	14	112	128	Simple	Unsigned8	S	1	r,w	Selection of process variable issued at the corresponding current output. 0x00: Mass flow 0x02: Volume flow 0x04: Conductivity
–	20	113 to 134	129 to 150	–	–	–	–	–	Reserved for future use.

Transducer Block 4 – Display – Slot 21

The 'Display' Transducer Block is a manufacturer-specific Transducer Block.
It contains the parameters related to the configuration of the transmitter display.

Transducer Block 4 – Display parameters

Parameter Name	Slot no.	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
BLOCK_OBJECT	15	0	16	Record	DS-32	Cst	20	r	–
ST_REV	15	1	17	Simple	Unsigned16	N	2	r	–
TAG_DESC	15	2	18	Simple	OctetString	S	32	r,w	–
STRATEGY	15	3	19	Simple	Unsigned16	S	2	r,w	–
ALERT_KEY	15	4	20	Simple	Unsigned8	S	1	r,w	–
TARGET_MODE	15	5	21	Simple	Unsigned8	S	1	r,w	–
MODE_BLK	15	6	22	Record	DS-37	D	3	r	–
ALARM_SUM	15	7	23	Record	DS-42	D	8	r	–
LANGUAGE	15	8	24	Simple	Unsigned8	S	1	r,w	Selection of menu language. Available languages: 0x00: English 0x01: Deutsch 0x02: Français 0x03: Español 0x0E: Português 0x04: Italiano 0x0B: Chinese
CONTRAST	15	9	25	Simple	Unsigned8	S	1	r,w	Contrast setting for the LCD display.
PAGE_1_DISPLAY_MODE	15	10	26	Simple	Unsigned8	S	1	r,w	Configuration of Operator Page 1 The following versions can be selected: 0x00: Off, 0x01: Graphic view, 0x02: 1x4, 0x03: 1x6A, 0x04: 1x6A bar, 0x07: 1x9, 0x08: 1x9 bar, 0x09: 2x9, 0x0A: 2x9 bar, 0x0B: 3x9. Selecting 'Off' deactivates the corresponding operator page.

… 3 Block overview

… Transducer Block 4 – Display – Slot 21

Parameter Name	Slot no.	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
PAGE_1_LINE_1	15	11	27	Simple	Unsigned8	S	1	r,w	Selection of process variable displayed in the respective row. 0x00: Qv [unit]: Volume flow in the selected unit. 0x01: Qv [%]: Volume flow in %. 0x02: ΣV+: Volume totalizer forward flow 0x03: ΣV-: Volume totalizer reverse flow 0x04: ΣVn: Volume totalizer net 0x06: Output current in mA 0x07: Qm [unit]: Mass flow in the selected unit. 0x08: Qm [%]: Mass flow in %. 0x09: ΣM+: Mass totalizer forward flow 0x0A: ΣM-:Mass totalizer reverse flow 0x0B: ΣMn: Mass totalizer net 0x05: Flow velocity
PAGE_1_LINE_2	15	12	28	Simple	Unsigned8	S	1	r,w	
PAGE_1_LINE_3	15	13	29	Simple	Unsigned8	S	1	r,w	
PAGE_1_BARGRAPH	15	14	30	Simple	Unsigned8	S	1	r,w	Selection of process variable displayed as a bar graph. 0x01: Qm [%]: Mass flow in %. 0x02: Qv [%]: Volume flow in %. 0x03: CO1: Output current in mA
PAGE_2_DISPLAY_MODE	15	15	31	Simple	Unsigned8	S	1	r,w	Configuration of Operator Page 2 See description of parameter **PAGE_1_DISPLAY_MODE**.
PAGE_2_LINE_1	15	16	32	Simple	Unsigned8	S	1	r,w	Selection of process variable displayed in the respective row.
PAGE_2_LINE_2	15	17	33	Simple	Unsigned8	S	1	r,w	See description of parameter **PAGE_1_LINE_1, 2, 3**.
PAGE_2_LINE_3	15	18	34	Simple	Unsigned8	S	1	r,w	
PAGE_2_BARGRAPH	15	19	35	Simple	Unsigned8	S	1	r,w	Selection of process variable displayed as a bar graph. See description of parameter **PAGE_1_BARGRAPH**.
PAGE_3_DISPLAY_MODE	15	20	36	Simple	Unsigned8	S	1	r,w	Configuration of Operator Page 3 See description of parameter **PAGE_1_DISPLAY_MODE**.
PAGE_3_LINE_1	15	21	37	Simple	Unsigned8	S	1	r,w	Selection of process variable displayed in the respective row.
PAGE_3_LINE_2	15	22	38	Simple	Unsigned8	S	1	r,w	See description of parameter **PAGE_1_LINE_1, 2, 3**.
PAGE_3_LINE_3	15	23	39	Simple	Unsigned8	S	1	r,w	
PAGE_3_BARGRAPH	15	24	40	Simple	Unsigned8	S	1	r,w	Selection of process variable displayed as a bar graph. See description of parameter **PAGE_1_BARGRAPH**.
PAGE_4_DISPLAY_MODE	15	25	41	Simple	Unsigned8	S	1	r,w	Configuration of Operator Page 4 See description of parameter **PAGE_1_DISPLAY_MODE**.
PAGE_4_LINE_1	15	26	42	Simple	Unsigned8	S	1	r,w	Selection of process variable displayed in the respective row.
PAGE_4_LINE_2	15	27	43	Simple	Unsigned8	S	1	r,w	See description of parameter **PAGE_1_LINE_1, 2, 3**.
PAGE_4_LINE_3	15	28	44	Simple	Unsigned8	S	1	r,w	
PAGE_4_BARGRAPH	15	29	45	Simple	Unsigned8	S	1	r,w	Selection of process variable displayed as a bar graph. See description of parameter **PAGE_1_BARGRAPH**.

Parameter Name	Slot no.	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
AUTOSCROLL	15	30	46	Simple	Unsigned8	S	1	r,w	If Multiplex operation is enabled, you can also activate the 'Autoscroll' function on the information level of the operator menu. In this function, operator pages are automatically displayed in succession on the process screen, changing every 10 seconds. Manual scrolling through pre-configured operator pages as described above is no longer necessary. When Auto scroll mode is enabled, the icon ↻ is displayed in the lower left corner of the screen. Default setting: disabled.
DECIMAL_PLACES_ MASSFLOW	15	31	47	Simple	Unsigned8	S	1	r,w	Selection of number of decimal places (maximum 12) used to display the corresponding process variables.
DECIMAL_PLACES_ MASS	15	32	48	Simple	Unsigned8	S	1	r,w	
DECIMAL_PLACES_ VOLUMEFLOW	15	33	49	Simple	Unsigned8	S	1	r,w	
DECIMAL_PLACES_ VOLUME	15	34	50	Simple	Unsigned8	S	1	r,w	
DECIMAL_PLACES_ TEMPERATURE	15	35	51	Simple	Unsigned8	S	1	r,w	
DECIMAL_PLACES_ DENSITY	15	36	52	Simple	Unsigned8	S	1	r,w	
DECIMAL_PLACES_ CONCENTRATION	15	37	53	Simple	Unsigned8	S	1	r,w	
DATE_FORMAT	15	38	54	Simple	Unsigned8	S	1	r,w	Set the display format for the date and time. 0x00: DD_MM_YYYY 0x01: MM_DD_YYYY 0x02: YYYY_MM_DD
EXTERN_VARIABLE_1	15	39	55	Simple	DS-101	S	5	r,w	Value of the external variable 1, can be read via AO1, slot 12
CUSTOM_NAME_ VARIABLE_1	15	40	56	Simple	Visible String	S	8	r,w	Selection of the unit for external process variables. The transmitter can show two external process variables in the display. The process variables can be transferred from the fieldbus master to the transmitter via the HART, Modbus or PROFIBUS DP protocol. You can configure the indicator through the 'Indicator' menu.
EXTERN_VARIABLE_2	15	41	57	Simple	DS-101	S	5	r,w	Value of the external variable 2, can be read via AO2, slot 13
CUSTOM_NAME_ VARIABLE_2	15	42	58	Simple	Visible String	S	8	r,w	Selection of the unit for external process variables.
–	15	43 to 49	59 to 65	–	–	–	–	–	Reserved for future use.

… 3 Block overview

Transducer Block 5 – Diagnostics – Slot 22

The FEx630 transmitter has functions for process diagnosis.
The functions are incorporated in the Transducer Block – Diagnostics.

Transducer Block 5 - Diagnostics – parameters

Parameter Name	Slot no.	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
BLOCK_OBJECT	16	0	16	Record	DS-32	Cst	20	r	–
ST_REV	16	1	17	Simple	Unsigned16	N	2	r	–
TAG_DESC	16	2	18	Simple	OctetString	S	32	r,w	–
STRATEGY	16	3	19	Simple	Unsigned16	S	2	r,w	–
ALERT_KEY	16	4	20	Simple	Unsigned8	S	1	r,w	–
TARGET_MODE	16	5	21	Simple	Unsigned8	S	1	r,w	–
MODE_BLK	16	6	22	Record	DS-37	D	3	r	–
ALARM_SUM	16	7	23	Record	DS-42	D	8	r	–
DRIVER_CURRENT	16	8	24	Record	Float	D	5	r	Process variable – Present coil current in mA.
SIGNAL_REGION_ON_ADC	16	9	25	Record	Float	D	5	r	Process variable – current measurement signal on the AD-converter input.
COIL_DAC_PRESET	16	10	26	Simple	Float	D	4	r	Process variable – current set point of the DA-converter for the drive current.
ADC_ERRORS	16	11	27	Simple	Unsigned32	D	4	r	AD-converter error
INHOUSE_TEMPERATURE	16	12	28	Simple	DS-101	D	5	r	Process variable – temperature within the transmitter housing.
INHOUSE_TEMPERATURE_MAX_PEAK	16	13	29	Simple	Float	D	4	r	Maximum temperature value within the transmitter housing.
INHOUSE_TEMPERATURE_MIN_PEAK	16	14	30	Simple	Float	D	4	r	Minimum temperature value within the transmitter housing.
QM_MASSFLOW_MIN_ALARM	16	15	31	Simple	Float	S	4	r,w	Set the minimum / maximum limit value (0 to 110 %) for mass measurement.
QM_MASSFLOW_MAX_ALARM	16	16	32	Simple	Float	S	4	r,w	If the process value ‘Qm [unit]’ exceeds or falls below the limit value, an alarm is triggered.
QV_VOLUMEFLOW_MIN_ALARM	16	17	33	Simple	Float	S	4	r,w	Set the minimum / maximum limit value (0 to 110 %) for volume measurement. If the process value ‘Qv [unit]’ up-scales or down-scales the limit value, an alarm is triggered.
QV_VOLUMEFLOW_MAX_ALARM	16	18	34	Simple	Float	S	4	r,w	
DIAG_INTERVAL_IN_SEC	16	19	35	Simple	Unsigned16	D	2	r,w	Time remaining in the maintenance interval until the error message ‘M026.004 – Flowrate to zero. Check digital in terminals.’ is set.
TFE_ON_OFF	16	20	36	Simple	Unsigned8	D	1	r,w	Activate the Partial Filling Detection function. 0x00: Partial filling detection switched off 0x01: Partial filling detection switched on.
START_TFE_ADJUST	16	21	37	Simple	Unsigned8	S	1	r,w	Start the automatic adjustment of the Partial Filling Detection function. 0x01: Start automatic adjustment

Parameter Name	Slot no.	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
MANUAL_TEF_ADJUST	16	22	38	Simple	Unsigned8	S	1	r,w	Manual setting of the Partial Filling Detection function.
TFE_THRESHOLD	16	23	39	Simple	Unsigned16	S	2	r,w	Manual fine adjustment of the switching threshold. The switching threshold is set automatically during automatic adjustment. If the current value should exceed the defined switching threshold, a message will appear on the display and an alarm will be triggered through the digital output, if appropriately configured.
ACTUAL_TFE_VALUE	16	24	40	Simple	Unsigned16	D	2	r	Output of the TFE detection value. If the value should exceed the switching threshold, a message will appear on the display and an alarm will be triggered through the digital output, if appropriately configured.
EMPTY_PIPE_DETECTOR_ON_OFF	16	25	41	Simple	Unsigned8	S	1	r,w	Activate the 'Empty Tube Detection' function (only for nominal diameters ≥ DN 10). 0x00: Empty tube detection switched off 0x01: Empty tube detection switched on
START_ADJUST_EP	16	26	42	Simple	Unsigned8	S	1	r,w	Start the automatic adjustment of the Empty Tube Detection function. 0x01: Start automatic adjustment
MANUAL_ADJUST_ EMPTY_PIPE	16	27	43	Simple	Unsigned8	S	1	r,w	Manual set the empty tube detection function. The value must be adapted such that the frequency for the empty tube detection is almost 2000 Hz.
THRESHOLD_EMPTY_ PIPE	16	28	44	Simple	Unsigned16	S	2	r,w	Set the switching threshold for the empty tube detection. The switching threshold is set automatically during automatic adjustment. The switching threshold can be changed for manual fine adjustment.
DETECTOR_EMPTY_PIPE_ VALUE	16	29	45	Simple	Unsigned16	D	2	r	Frequency display for empty tube detection. If the current value should exceed the defined switching threshold, a message will appear on the display and an alarm will be triggered through the digital output, if appropriately configured.
COIL_DIAG_ON_OFF	16	30	46	Simple	Unsigned8	S	1	r,w	Activate the coil diagnosis function. 0x00: Coil diagnosis switched off 0x01: Coil diagnosis switched on
COIL_RESISTOR	16	31	47	Simple	Float	D	4	r	Output of the coil resistance.
COIL_CURRENT	16	32	48	Simple	Float	D	4	r	Output of the coil current.
COIL_INDUCTANCE	16	33	49	Simple	Float	D	4	r	Output of the coil inductance.
COIL_TEMPERATURE	16	34	50	Simple	DS-101	D	5	r	Output of the coil temperature within the sensor.
COIL_TEMPERATURE_ ADJUST	16	35	51	Simple	Float	D	4	r,w	Measurement of coil temperature must be set in accordance with the conditions on-site. Temperature measured with a separate thermometer can be entered here.

… 3 Block overview

… Transducer Block 5 – Diagnostics – Slot 22

Parameter Name	Slot no.	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
GAS_BUBBLE_ON_OFF	16	36	52	Simple	Unsigned8	S	1	r,w	Activate the 'Gas Bubble Detection' function. 0x00: Gas bubble detection switched off 0x01: Gas bubble detection switched on
GAS_BUBBLE_VALUE	16	37	53	Simple	Float	D	4	r	Output of the gas bubble value.
START_ADJUST_ GAS_BUBBLE	16	38	54	Simple	Unsigned8	S	1	r,w	Start the automatic adjustment of the gas bubble detection. 0x01: Start automatic adjustment
GAS_BUBBLE_ THRESHOLD	16	39	55	Simple	Float	S	4	r,w	Set the switching threshold. If the current value should exceed the defined switching threshold, a message will appear on the display and an alarm will be triggered through the digital output, if appropriately configured
CONDUCTIVITY_ON_OFF	16	40	56	Simple	Unsigned8	S	1	r,w	Activate the 'Conductivity Monitoring' function. 0x00: Conductivity monitoring switched off 0x01: Conductivity monitoring switched on
DC_VOLTAGE_E1	16	41	57	Record	Float	D	5	r	Current voltage on the E1 electrode in mV.
DC_VOLTAGE_E2	16	42	58	Record	Float	D	5	r	Current voltage on the E2 electrode in mV.
CONDUCTIVITY_US_CM	16	43	59	Simple	DS-101	D	5	r	Output of the measured conductivity in µS/cm.
ADJUST_CONDUCTIVITY_ VALUE	16	44	60	Simple	Float	D	4	r,w	Enter the conductivity of the measuring medium. Measure the conductivity using a conductivity meter on-site and enter the measured value here. Setting range: 5 to 20000 µS/cm
CONDUCTIVITY_IOUT_ MIN_VALUE	16	45	61	Simple	Float	S	4	r,w	The conductivity value is also available on the current output (option card). Set the 4 mA and 20 mA value which correspond to the upper and lower range of the conductivity value.
CONDUCTIVITY_IOUT_ MAX_VALUE	16	46	62	Simple	Float	S	4	r,w	
CONDUCTIVITY_MIN_ ALARM_VALUE	16	47	63	Simple	Float	S	4	r,w	Set the alarm for minimum and maximum conductivity. In the case of down-scale or up-scale, an alarm is triggered.
CONDUCTIVITY_MAX_ ALARM_VALUE	16	48	64	Simple	Float	S	4	r,w	Setting range: 5 to 20000 µS/cm
ELEC_IMP_E1_GND	16	49	65	Simple	Float	D	4	r	Current impedance between electrode E1 and GND (ground potential).
ELEC_IMP_E2_GND	16	50	66	Simple	Float	D	4	r	Current impedance between electrode E2 and GND (ground potential).
SIL_ON_OFF	16	51	67	Simple	Unsigned8	S	1	r	Activate the 'SIL Monitoring' function. 0x00: SIL monitoring switched off 0x01: SIL monitoring switched on

Parameter Name	Slot no.	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
START_NOISE_CHECK	16	52	68	Simple	Unsigned8	S	1	r,w	Start the grounding check function (Noise check). 0x01: Start grounding check
RESULT_NOISE_CHECK	16	53	69	Simple	Unsigned8	D	1	r	Result of the grounding check. 0x00: Grounding check was not successful 0x01: Grounding check as successful 0x02: Grounding check was incorrect
POWER_SPECTRUM	16	54	70	Simple	Float	D	4	r	Current power spectrum.
AMPLITUDE_1_VALUE	16	55	71	Simple	Float	D	4	r	Output the four highest amplitudes in the power spectrum.
AMPLITUDE_2_VALUE	16	56	72	Simple	Float	D	4	r	
AMPLITUDE_3_VALUE	16	57	73	Simple	Float	D	4	r	
AMPLITUDE_4_VALUE	16	58	74	Simple	Float	D	4	r	
FREQUENCY_1	16	59	75	Simple	Float	D	4	r	Output of the four highest amplitudes in the power spectrum
FREQUENCY_2	16	60	76	Simple	Float	D	4	r	with the appropriate frequency.
FREQUENCY_3	16	61	77	Simple	Float	D	4	r	
FREQUENCY_4	16	62	78	Simple	Float	D	4	r	
NOISE_REDUCTION	16	63	79	Simple	Unsigned8	D	1	r,w	Activate the 'Noise Reduction' function. The filter setting has an effect on the current output (damping, 15: low filtering, 60: high filtering). 0x00: Noise reduction switched off 0x01: Filter 15 0x02: Filter 30 0x03: Filter 60
PISTON_PUMP_FILTER_ ON_OFF	16	64	80	Simple	Unsigned8	S	1	r,w	Activate the 'Filter Piston Pump' function. Improves measuring accuracy in applications with piston pumps. 0x00: Filter piston pump switched off 0x01: Filter piston pump switched on
PISTON_PUMP_FILTER_ LENGTH	16	65	81	Simple	Unsigned8	D	1	r,w	Set filter length. Setting range: 3 to 30 sec
PISTON_PUMP_FILTER_ ST_PER_MIN	16	66	82	Simple	Float	D	4	r	Output of the pump strokes per minute.
TX_FACTORY_CMR	16	67	83	Simple	Float	D	4	r	The 'fingerprint database' allows for a comparison of the values
TX_FACTORY_1M_S	16	68	84	Simple	Float	D	4	r	at the time of factory calibration with the currently recorded
TX_FACTORY_10M_S	16	69	85	Simple	Float	D	4	r	values.
SE_FACTORY_COIL_IND	16	70	86	Simple	Float	D	4	r	Errors in the integrity of the 'Tx Fabrik 1m/s' device can already be
SE_FACTOTY_IMP_E1	16	71	87	Simple	Float	D	4	r	detected early on that way.
SE_FACTOTY_IMP_E2	16	72	88	Simple	Float	D	4	r	Corrective measures can be taken.

… 3 Block overview

… Transducer Block 5 – Diagnostics – Slot 22

Parameter Name	Slot no.	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
START_FP_VERIFICATION	16	73	89	Simple	Unsigned8	S	1	r,w	Create a fingerprint and perform verification. 0x01: Create fingerprint
RESULT_FP_VERIFICATION	16	74	90	Simple	Unsigned8	S	1	r	Output of the verification result. 0x00: FP Verificat. passed 0x01: CMR failed 0x02: 1m/s failed 0x03: CMR, 1m/s failed 0x04: 10m/s failed 0x05: CMR, 10m/s failed 0x06: 1m/s, 10m/s failed 0x07: All Fingerp. failed 0x08: Coil Fingerp. Failed 0x09: CMR, Coil failed 0x0A: 1m/s, Coil failed 0x0B: CMR,1m/s,Coil failed 0x0C: 10m/s, Coil failed 0x0D: CMR, 10m/s failed 0x0E: 1, 10m/s,Coil failed 0x0F: All Fingerp. failed 0x10: No Verific.performed
MAINTENANCE_TIMER_ UPCOUNT	16	75	91	Simple	Unsigned32	D	4	r	Forward totalizer maintenance interval.
PRESET_MAINTENANCE_ CYCLE	16	76	92	Simple	Unsigned32	S	4	r,w	Sets the service interval. After the service interval has expired, the corresponding error message ‘Service interval has been reached’ is set. The setting ‘0’ deactivates the maintenance interval
MAINTENANCE_REMAIN_ TIME	16	77	93	Simple	Unsigned32	D	4	r	Remaining service interval time until setting of error message ‘Service interval has been reached.’
START_NEW_ MAINTENANCE_CYCLE	16	78	94	Simple	Unsigned8	S	1	r,w	Resetting of the maintenance interval. The service interval is reset to the value set in PRESET_MAINTENANCE_ CYCLE.

Parameter Name	Slot no.	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
SIMULATION_SWITCH	16	79	95	Simple	Unsigned8	D	1	r,w	Manual simulation of measured values. After a measured value is selected, the value can be written to the next appropriate parameter object subsequently described. 0x00: Simulation switched off 0X01: Qm [unit] – Mass flow in [unit] 0x02: Qm [%] – Mass flow in % 0x03: Qv [unit] – Volume flow in [unit] 0x04: Qv [%] – Volume flow in % 0x05: Conductivity[µS/cm] – Conductivity 0x06: Curr.Out 31/32 – Current output value 31 / 32 / Uco 0x08: Curr.Out V3/V3 – Current output value V3 / V4 0x09: Dig.Out 41/41 0x0A: Dig.Out 51/51 0x0B: Dig.Out V3/V4 State 0x0C: Dig.In V3/V4 State 0x0D: Hart Frequency
SIM_CURR_OUT_31_32_ UCO	16	80	96	Simple	Float	D	4	r,w	Simulation value current output 31 / 32 / Uco. Setting range: 3.5 to 22.6 mA
SIM_DIG_OUT_41_42_ STATE	16	81	97	Simple	Unsigned8	D	1	r,w	Simulation value digital output 41 / 42 (binary). 0x00: Logically low 0x01: Logically high
SIM_DIG_OUT_41_42_ FREQ_PULSE	16	82	98	Simple	Float	D	4	r,w	Simulation value digital output 41 / 42 (frequency). Setting range: 0 to 10500 mA
SIM_DIG_OUT_51_52_ STATE	16	83	99	Simple	Unsigned8	D	1	r,w	Simulation value digital output 51 / 52 (binary). 0x00: Logically low 0x01: Logically high
SIM_DIG_OUT_51_52_ PULSE	16	84	100	Simple	Float	D	4	r,w	Simulation value digital output 51 / 52 (pulse). Setting range: 0 to 10500 mA
SIM_DIG_OUT_V3_V4_ STATE	16	85	101	Simple	Unsigned8	D	1	r,w	Simulation value digital output V3 / V4 (binary). 0x00: Logically low 0x01: Logically high
SIM_DIG_IN_V3_V4_STATE	16	86	102	Simple	Unsigned8	D	1	r,w	Simulation value digital input V3 / V4 (binary). 0x00: Logically low 0x01: Logically high
SIM_QM_MASSFLOW_UNIT	16	87	103	Simple	Float	D	4	r,w	Simulation value process variable mass flow [unit]. Setting range: 0 to 2xQ_{max}DN
SIM_QM_MASSFLOW_ RATIO	16	88	104	Simple	Float	D	4	r,w	Simulation value process variable mass flow [%]. Setting range: 0 to 2xQ_{max}DN

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… Transducer Block 5 – Diagnostics – Slot 22

Parameter Name	Slot no.	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
SIM_QM_MASSFLOW_ RANGE_MIN	16	89	105	Simple	Float	N	4	r	Simulation value measuring range limits mass flow [%].
SIM_QM_MASSFLOW_ RANGE_MAX	16	90	106	Simple	Float	N	4	r	
SIM_QV_VOLUMEFLOW_ UNIT	16	91	107	Simple	Float	D	4	r,w	Simulation value process variable volume flow [unit]. Setting range: 0 to 2xQ_{max}DN
SIM_QV_VOLUMEFLOW_ RATIO	16	92	108	Simple	Float	D	4	r,w	Simulation value process variable volume flow [%]. Setting range: 0 to 2xQ_{max}DN
SIM_QV_VOLUMEFLOW_ RANGE_MIN	16	93	109	Simple	Float	N	4	r	Simulation value measuring range limits volume flow [%].
SIM_QV_VOLUMEFLOW_ RANGE_MAX	16	94	110	Simple	Float	N	4	r	
SIM_CONDUCTIVITY_US_ CM	16	95	111	Simple	Float	D	4	r,w	Simulation value process variable conductivity.
DIAG_DIAGNOSIS_ SIMULATION	16	96	112	Array	Unsigned8	D	6	r	Output of the simulated alarm bits
DIAG_SIMULATION_ STATUS	16	97	113	Simple	Unsigned8	D	1	r	Simulations status. 0x00: Simulation switched on 0x01: Simulation switched off
DIAG_REF_TIME_SETUP	16	98	114	Simple	Unsigned32	D	4	r	Output of the reference diagnosis: time
DIAG_REF_DAY_SETUP	16	99	115	Simple	Unsigned8	D	1	r	Output of the reference diagnosis: day
DIAG_REF_MONTH_SETUP	16	100	116	Simple	Unsigned8	D	1	r	Output of the reference diagnosis: month
DIAG_REF_YEAR_SETUP	16	101	117	Simple	Unsigned8	D	1	r	Output of the reference diagnosis: year
SETUP_REF_TIME_SETUP	16	102	118	Simple	Unsigned32	D	4	r,w	Sets the reference diagnosis: time
SETUP_REF_DAY_SETUP	16	103	119	Simple	Unsigned8	D	1	r,w	Sets the reference diagnosis: day
SETUP_REF_MONTH_ SETUP	16	104	120	Simple	Unsigned8	D	1	r,w	Sets the reference diagnosis: month
SETUP_REF_YEAR_SETUP	16	105	121	Simple	Unsigned8	D	1	r,w	Sets the reference diagnosis: year
TX_CUSTOMER_CMR	16	106	122	Simple	Float	D	4	r	Saved fingerprint values.
TX_CUSTOMER_1M_S	16	107	123	Simple	Float	D	4	r	
TX_CUSTOMER_10M_S	16	108	124	Simple	Float	D	4	r	
SE_CUSTOMER_COIL_IND	16	109	125	Simple	Float	D	4	r	
SE_CUSTOMER_IMP_E1	16	110	126	Simple	Float	D	4	r	
SE_CUSTOMER_IMP_E2	16	111	127	Simple	Float	D	4	r	
COIL_CURRENT_ REGULATING_DAC	16	112	128	Simple	Unsigned16	D	2	r	Value of the DA-converter.
CONDUCTIVITY_PERCENT	16	113	129	Simple	Float	D	4	r	Conductivity in %.

Parameter Name	Slot no.	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
IMPEDANCE_HIGH_E1_1	16	114	130	Simple	Float	D	4	r	Electrode impedance for electrode E1 [absolute value (1), real part
IMPEDANCE_HIGH_E1_2	16	115	131	Simple	Float	D	4	r	(2), imaginary part (3)] for higher frequency.
IMPEDANCE_HIGH_E1_3	16	116	132	Simple	Float	D	4	r	
IMPEDANCE_HIGH_E2_1	16	117	133	Simple	Float	D	4	r	Electrode impedance for electrode E2 [absolute value (1), real part
IMPEDANCE_HIGH_E2_2	16	118	134	Simple	Float	D	4	r	(2), imaginary part (3)] for higher frequency.
IMPEDANCE_HIGH_E2_3	16	119	135	Simple	Float	D	4	r	
GAS_BUBBLE_CALIB_ RESULT_TIMER	16	120	136	Simple	Unsigned8	D	1	r	Results of the automatic calibration of the ‘Gas Bubble Detection’ function.
GAS_BUBBLE_CALIB_ RESULT_AVE_CALC	16	121	137	Simple	Unsigned8	D	1	r	
GAS_BUBBLE_CALIB_ RESULT_MEAN	16	122	138	Simple	Float	D	4	r	
GAS_BUBBLE_CALIB_ RESULT_STD	16	123	139	Simple	Float	D	4	r	
GAS_BUBBLE_CALIB_ RESULT_MAX	16	124	140	Simple	Float	D	4	r	
GAS_BUBBLE_CALIB_ RESULT_MIN	16	125	141	Simple	Float	D	4	r	
TFE_ADJUST_RESULT_ RESULT_TIMER	16	126	142	Simple	Unsigned8	D	1	r	Results of the automatic calibration of the ‘Partial Filling Detection’ function.
TFE_ADJUST_RESULT_ AVE_CALC	16	127	143	Simple	Unsigned8	D	1	r	
TFE_ADJUST_RESULT_ RESULT_MEAN	16	128	144	Simple	Float	D	4	r	
TFE_ADJUST_RESULT_ RESULT_STD	16	129	145	Simple	Float	D	4	r	
TFE_ADJUST_RESULT_ RESULT_MAX	16	130	146	Simple	Float	D	4	r	
TFE_ADJUST_RESULT_ RESULT_MIN	16	131	147	Simple	Float	D	4	r	
EP_ADJUST_RESULT_ RESULT_TIMER	16	132	148	Simple	Unsigned8	D	1	r	Results of the automatic calibration of the ‘Partial Filling Detection’ function.
EP_ADJUST_RESULT_ AVE_CALC	16	133	149	Simple	Unsigned8	D	1	r	
EP_ADJUST_RESULT_ RESULT_MEAN	16	134	150	Simple	Float	D	4	r	
EP_ADJUST_RESULT_ RESULT_STD	16	135	151	Simple	Float	D	4	r	
EP_ADJUST_RESULT_ RESULT_MAX	16	136	152	Simple	Float	D	4	r	
EP_ADJUST_RESULT_ RESULT_MIN	16	137	153	Simple	Float	D	4	r	

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… Transducer Block 5 – Diagnostics – Slot 22

Parameter Name	Slot no.	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
GROUNDING_CHK_ RESULT_TIMER	16	138	154	Simple	Unsigned8	D	1	r	Result of the 'Grounding Check function (Noise check)'.
GROUNDING_CHK_ RESULT_AVE_CALC	16	139	155	Simple	Unsigned8	D	1	r	
GROUNDING_CHK_ RESULT_MEAN	16	140	156	Simple	Float	D	4	r	
GROUNDING_CHK_ RESULT_STD	16	141	157	Simple	Float	D	4	r	
GROUNDING_CHK_ RESULT_MAX	16	142	158	Simple	Float	D	4	r	
GROUNDING_CHK_ RESULT_MIN	16	143	159	Simple	Float	D	4	r	
CUSTOM_FINGERPR_ RESULT_TIMER	16	144	160	Simple	Unsigned8	D	1	r	Results of the fingerprints created by the user.
CUSTOM_FINGERPR_ RESULT_AVE_CALC	16	145	161	Simple	Unsigned8	D	1	r	
CUSTOM_FINGERPR_ RESULT_MEAN	16	146	162	Simple	Float	D	4	r	
CUSTOM_FINGERPR_ RESULT_STD	16	147	163	Simple	Float	D	4	r	
CUSTOM_FINGERPR_ RESULT_MAX	16	148	164	Simple	Float	D	4	r	
CUSTOM_FINGERPR_ RESULT_MIN	16	149	165	Simple	Float	D	4	r	
HBRIDGE_BALANCE	16	150	166	Simple	Float	D	4	r	Difference between positive and negative coil excitation. Normally, the value should be 1.0.
LONG_TERM_COIL_ CURR_BEHAVIOR	16	151	167	Simple	Float	D	4	r	The drift of the driver current is contained within the measurement window.
COIL_TEMPERATURE_ MAX_LIMIT	16	152	168	Simple	Float	D	4	r,w	Set the minimum / maximum limit value for coil temperature. If the coil temperature up-scales or down-scales the limit values, an alarm is triggered.
COIL_TEMPERATURE_ MIN_LIMIT	16	153	169	Simple	Float	D	4	r,w	
–	16	154 to 157	170 to 173	–	–	–	–	–	Reserved for future use

Data structures

In the following, the used internal data structures are listed.
For a detailed description of the PROFIBUS data structures, refer to the PROFIBUS PA Profile 3.02.

Type: Record
Size: 14 bytes
Name: Diag_Detail_History
Number of elements: 5
Structure: See the following table

Element No.	Element name	Data type	Store	Size	Access	Description
1	Alarm Counter	Unsigned16	N	2	r	Number of occurred alarms
2	alarmTimeCounterMsec	Unsigned32	N	4	r	Information about how long the alarm was active in total.
3	alarmTimeCounterDay	Unsigned16	N	2	r	
4	timeStampLastAlarmMsec	Unsigned32	N	4	r	Information about the last occurrence of the alarm.
5	timeStampLastAlarmDay	Unsigned16	N	2	r	

… 3 Block overview

Available units

For certain parameters it is possible to choose among the following units.
The 'code' column indicates which value the corresponding parameter must be set to using the PROFIBUS DP interface.

Table 1: Units for the volume flow

Selection	Code [hex]	Description
m^3/s	543	Cubic meters per second
m^3/min	544	Cubic meters per minute
m^3/h	545	Cubic meters per hour
m^3/d	546	Cubic meters per day
ft^3/s	54C	Cubic feet per second
ft^3/min	54D	Cubic feet per minute
ft^3/h	54E	Cubic feet per hour
ft^3/d	54F	Cubic feet per day
ml/s	629	Milliliters per second
ml/min	61B	Milliliters per minute
l/s	547	Liters per second
l/min	548	Liters per minute
l/h	549	Liters per hour
l/d	54A	Liters per day
hl/h	663	Hectoliters per hour
Ml/d	54B	Megaliters per day
ugal/s	552	US gallons per second
ugal/min	553	US gallons per minute
ugal/h	554	US gallons per hour
ugal/d	555	US gallons per day
Mugal/d	556	Mega US gallons per day
igal/s	557	Imperial gallons per second
igal/min	558	Imperial gallons per minute
igal/h	559	Imperial gallons per hour
Igal/d	55A	Imperial gallons per day
bbl/s	55B	Oil barrels per second
bbl/min	55C	Oil barrels per minute
bbl/h	55D	Oil barrels per hour
bbl/d	55E	Oil barrels per day
bls/s	665	Brew barrels per second
bls/min	666	Brew barrels per minute
bls/h	667	Brew barrels per hour
bls/d	668	Brew barrels per day
xx/yy	5F2	User-defined unit

Table 2: Units for the mass flow

Selection	Code [hex]	Description
g/s	526	Grams per second
g/min	527	Grams per minute
g/h	528	Grams per hour
g/d	529	Grams per day
kg/s	52A	Kilograms per second
kg/min	52B	Kilograms per minute
kg/h	52C	Kilograms per hour
kg/d	52D	Kilograms per day
lb/s	532	Pounds (avdp) per second
lb/min	533	Pounds (avdp) per minute
lb/h	534	Pounds (avdp) per hour
lb/d	535	Pounds (avdp) per day
t/min	52F	Metric tons per minute
t/h	530	Metric tons per hour
t/d	531	Metric tons per day
xx/yy	5F1	User-definable unit

Table 3: Units for the volume totalizer

Selection	Code [hex]	Description
m^3	40A	Cubic meters
ft^3	413	Cubic feet
ml	410	Milliliters
l	40E	Liters
hl	411	Hectoliters
ugal	418	US gallons
igal	419	Imperial gallons
bbl	41B	Barrels (petroleum, USA)
bls	41C	Barrels (beer, USA)
xx/yy	5F6	User-definable unit

Table 4: Units for the mass totalizer

Selection	Code [hex]	Description
kg	440	Kilograms
g	441	Grams
t	444	Tons (metric)
Pounds	446	Pounds (advp)
xx/yy	5F5	User-definable unit

Table 5: Density units

Selection	Code [hex]	Description
g/cm^3	44C	Grams per cubic centimeter

Table 6: Temperature units

Selection	Code [hex]	Description
°C	3E9	Celsius

Table 7: Flow velocity units

Selection	Code [hex]	Description
m/s	425	Meters per second
mm/s	426	Millimeters per second

Table 8: Pressure units

Selection	Code [hex]	Description
Bar	471	Bar

Table 9: Various units

Selection	Code [hex]	Description
mm	3F5	Millimeters
inch	3FB	Inches (in.)
Hz	435	Frequency Hertz

4 Diagnosis / error messages

The FEx630 transmitter has several error registers and parameters for configuring the alarm handling.
All registers and parameters are included in the Physical Block. For test purposes, you can simulate all existing device errors and the corresponding reactions.
It is also possible to mask specific alarms or alarm groups.

The following physical block parameters describe the alarm processing of the FEx630:

Rel. Index	Parameter Name	Object Type	Data type	Store	Bytes	Access
13	DIAGNOSIS	Simple	OctetString	D	4	r
14	DIAGNOSIS_EXTENSION	Simple	OctetString	D	6	r
15	DIAGNOSIS_MASK	Simple	OctetString	Cst	4	r
16	DIAGNOSIS_MASK_EXTENSION	Simple	OctetString	Cst	6	r
33	DIAG_ALARM_HISTORY	Simple	Unsigned8	D	6	r
34	DIAG_CLEAR_ALARM_HISTORY	Simple	Unsigned8	D	1	r,w
35	DIAG_ALARM_SIMULATION	Simple	Unsigned8	D	1	r,w
36	DIAG_MASK_MAINTENANCE	Simple	Unsigned8	S	1	r,w
37	DIAG_MASK_CHECK_FUNCTION	Simple	Unsigned8	S	1	r,w
38	DIAG_CLEAR_ALARM_HISTORY	Simple	Unsigned8	S	1	r,w
39	DIAG_MASK_INDIVIDUAL_ALARM	Simple	Unsigned8	S	6	r,w
40	DIAG_CONDITION_IDX	Simple	Unsigned8	D	1	r,w
41	DIAG_IDX_DETAILS_CLASS	Simple	Unsigned8	D	1	r
42	DIAG_IDX_DETAILS_GROUP	Simple	Unsigned8	D	1	r
43	DIAG_IDX_DETAILS_PRIORITY	Simple	Unsigned8	D	1	r
44	DIAG_IDX_DETAILS_HISTORY	Record	Diag_Detail_History	D	14	r
45	DIAG_CONDITION_ALARM_VALID	Simple	Unsigned8	D	1	r

The meaning of all bits in the DIAGNOSIS has already been defined in the PROFIBUS PA3.02 profile and the bits are reserved accordingly. It depends on the used status (Extended or Condensed). The eighth bit in the fourth byte indicates whether manufacturer-specific alarm information is present. This information is provided in the DIAGNOSIS_EXTENSION parameter.

DIAGNOSIS_MASK and DIAGNOSIS_MASK_EXTENSION specify, which bits in DIAGNOSIS and DIAGNOSIS_EXTENSION are used (0 = not used, 1 = used). In accordance with the PROFIBUS PA specification, this mask is a constant and read only.

DIAG_ALARM_HISTORY contains all history information of the manufacturer-specific alarms. The bit size and arrangement exactly correspond to the DIAGNOSIS_EXTENSION parameters (0 = alarm has never been active, 1 = alarm has been active).
With the DIAG_CONDITION_IDX parameter, you can call up additional history information for an alarm. Every manufacturer-specific alarm has a unique alarm ID (see **Alarm Overview** on page 68). The alarm ID is written in the DIAG_CONDITION_IDX parameter, thus allowing you to retrieve additional information like the number of occurrences, alarm duration and last occurrence of the alarm with the DIAG_DETAILS.

All history information can be deleted using the DIAG_CLEAR_ALARM_HISTORY parameter.

The DIAG_ALARM_SIMULATION parameter is used to specify which manufacturer-specific alarm is to be simulated. The system will react on this simulated alarm in the same way as on a real alarm, with the difference that simulated alarms are not logged in the alarm history.

In order to enable the user to decide which alarm bits are used or not, dedicated parameters for masking single alarms or alarm groups were created in the physical block (rel. indices 36 to 39).

Note
The 0x9740 and 0x9700 profiles do not transfer the DIAGNOSIS_EXTENSION to the GetDiag telegram. As a result, the master cannot read from the GetDiag telegram whether a simulation is running in the transmitter or not. This information can be read, for example, through acyclic reading of the DIAGNOSIS_EXTENSION from the physical block.
DIAG_CONDITION_ALARM_VALID is read only and indicates whether a time stamp was set in the device.

… 4 Diagnosis / error messages

Alarm Overview

The following tables list the device-specific alarms of the FEx630.
Every alarm is assigned to an alarm group (in accordance with Namur) and to a priority.
The simulation value (SV) specifies which value must be written to the DIAG_ALARM_SIMULATION parameter in order to simulate an alarm.

Alarm Mapping	Description	NAMUR Group	NAMUR class	Prio	WS
FLOW_MASS_REACHED	Mass flowrate exceeds limits. Check flowrate and alarm limits.	OPERATING_CONDITION_PROCESS	OFF_SPECIFICATION	46	0x1
FLOW_VOLUME_REACHED	Volume flowrate exceeds limits. Check flowrate and alarm limits.	OPERATING_CONDITION_PROCESS	OFF_SPECIFICATION	44	0x2
SIMUALTION_ALARM	Simulation is on. Simulated values. Switch off Simulation Mode.	CONFIG_STATUS	CHECK_FUNCTION	72	0x3
FLOWRATE_TO_ZERO	Flowrate to zero. Check digital in terminals.	CONFIG_STATUS	CHECK_FUNCTION	78	0x4
ALARM_MAINTENANCE_CYCLE_ TIME_EXEED	Maintenance interval is reached. Perform maintenance.	OPERATING_CONDITION_PROCESS	MAINTENANCE	26	0x5
TOTALIZER_STOP_ALARM	All totalizer stopp. Check digital in terminals.	CONFIG_STATUS	CHECK_FUNCTION	76	0x6
TOTALIZER_RESET_ALARM	Totalizer reset. Reset of one or more Totalizers.	CONFIG_STATUS	CHECK_FUNCTION	74	0x7
DISPLAY_TOTALIZER_ROLLOVER	Display value is < 1600 h at Qmax. Change mass Unit or vol. Unit for Totalizer.	CONFIG_STATUS	MAINTENANCE	28	0x8
DEVICE_NOT_CALIBRATED_ALARM	Device not calibrated. Call Service.	CONFIG_STATUS	MAINTENANCE	24	0x9
NV_CHIPS_DEFECT_FEB	Sensor memory defective. Mem. or connect. defective. Replace memory.	HW_STATUS_ELECTRONICS	MAINTENANCE	38	0xA
NV_DATA_DEFECT	NV data defect. Data storage irreparable. Call Service.	HW_STATUS_ELECTRONICS	FAILURE	84	0xB
FE_BOARD_NOT_DETECTED	No Frontend Board detected. Wrong connection. Defect Frontend. Check wiring.	HW_STATUS_ELECTRONICS	FAILURE	98	0xC
FE_BOARD_COMM_ERROR	FEB communication error. EMC disturbance. Call Service.	HW_STATUS_ELECTRONICS	FAILURE	88	0XD
INCOMPATIBLE_FE_BOARD	Incompatible Frontend Board. Frontend not fit to Motherboard. Call Service.	HW_STATUS_ELECTRONICS	FAILURE	82	0xE
NV_CHIP_DEFECT_MB	NV chips defect on Motherboard. Defective MB. Replace MB. Call Service.	HW_STATUS_ELECTRONICS	MAINTENANCE	37	0xF
DO1_PULSENUMMAXALARM	Pulse output is cut off. Wrong config. Check pulse out configuration.	OPERATING_CONDITION_PROCESS	OFF_SPECIFICATION	47	0x10

Alarm Mapping	Description	NAMUR Group	NAMUR class	Prio	WS
CO1_SATURATED_ALARM	Curr.Out 31 / 32 is saturated. CO process value out of range. Adapt Qmax.	OPERATING_CONDITION_PROCESS	OFF_SPECIFICATION	52	0x11
CO2_3_SATURATED_ALARM	Curr.Out V1 / V2, V3 / V4 saturated. CO process value out of range. Adapt Qmax.	OPERATING_CONDITION_PROCESS	OFF_SPECIFICATION	51	0x12
CO1_COM_ERROR	Curr.Out 31 / 32 com error. Defective Board. EMC disturbance. Call Service.	HW_STATUS_ELECTRONICS	FAILURE	86	0x13
OPTION_MODULE_1 _COM_ ERROR	Option Card 1 com error. Defective Card. Check Card 1. Call Service.	HW_STATUS_ELECTRONICS	OFF_SPECIFICATION	49	0x14
OPTION_MODULE_2 _COM_ ERROR	Option Card 2 com error. Defective Card. Check Card 2. Call Service.	HW_STATUS_ELECTRONICS	OFF_SPECIFICATION	48	0x15
CO1_SAFETY_ALARM	Safety Alarm Curr. Out 31 / 32 SIL function detects error. Call Service.	HW_STATUS_ELECTRONICS	FAILURE	94	0x16
CO1_NOT_CALIBRATED_ALARM	Curr.Out 31 / 32 not calibrated. Call Service.	CONFIG_STATUS	MAINTENANCE	32	0x17
CO2_NOT_CALIBRATED_ALARM	Curr.Out V1 / V2 not calibrated. Replace Current Option Card. Call Service.	CONFIG_STATUS	MAINTENANCE	31	0x18
CO3_NOT_CALIBRATED_ALARM	Curr.Out V3 / V4 not calibrated. Replace Current Option Card. Call Service.	CONFIG_STATUS	MAINTENANCE	30	0x19
VOLTAGE_MONITORING_ALARM_MB	MB voltages outside range. Defective Motherboard HW. Call Service.	HW_STATUS_ELECTRONICS	FAILURE	53	0x1A
ALARM_SIMULATION	An alarm is simulated. Switch off alarm simulation.	CONFIG_STATUS	CHECK_FUNCTION	70	Not supported
FIELDBUS_BOARD_IN_RESET	DUMMY_ALARM_1_27	HW_STATUS_ELECTRONICS	MAINTENANCE	20	Not supported
CO1_READBACK_ALARM	DUMMY_ALARM_2_28	HW_STATUS_ELECTRONICS	OFF_SPECIFICATION	65	Not supported
COIL_REGULATION_ALARM	Coil regulation error. Check wiring of sensor coils. Call service	HW_STATUS_ELECTRONICS	FAILURE	96	0x1B

… 4 Diagnosis / error messages

… Alarm Overview

Alarm Mapping	Description	NAMUR Group	NAMUR class	Prio	WS
COIL_WIRING_ALARM	Coil wiring error. Check wiring of sensor coils. Call service.	HW_STATUS_ELECTRONICS	FAILURE	80	0x1C
COIL_IMPEDANCE_ALARM	Coil Inductance alarm. Call service.	HW_STATUS_ELECTRONICS	OFF_SPECIFICATION	57	0x1D
ELECTRODE_SHORT_CUIRCIT_ALARM	Electrode short cuircit. Check wiring of sensor electrode. Call service.	HW_STATUS_ELECTRONICS	FAILURE	90	0x1E
ELECTRODE_OPEN_CUIRCIT_ALARM	Electrode open cuircit. Check wiring of sensor electrode. Call service.	HW_STATUS_ELECTRONICS	FAILURE	93	0x1F
DC_FEEDBACK_REG_ALARM	DC feedback regulation. Check conditions of application. Call service.	HW_STATUS_ELECTRONICS	OFF_SPECIFICATION	60	0x20
COMMUNICATION_ADC_RX210_ALARM	ADC RX210 com. error. Call service.	HW_STATUS_ELECTRONICS	FAILURE	59	0x21
COIL_ISOLATION_ALARM	Coil isolation alarm. Call service.	HW_STATUS_ELECTRONICS	FAILURE	43	0x22
GAS_BUBBLE_ALARM	Gas bubble alarm. Check conditions of application.	OPERATING_CONDITION_PROCESS	OFF_SPECIFICATION	42	0x23
CONDUCTIVITY_LIMITS_ALARM	Conductivity limits alarm. Change limits or Check application.	OPERATING_CONDITION_PROCESS	OFF_SPECIFICATION	58	0x24
SENSOR_TEMP_LIMITS_ALARM	Sensor temp. limits alarm. Change limits or change fluid temperature.	OPERATING_CONDITION_PROCESS	OFF_SPECIFICATION	41	0x25
TFE_ALARM	TFE alarm. Secure pipe is completely filled.	OPERATING_CONDITION_PROCESS	OFF_SPECIFICATION	40	0x26
EPD_ALARM	EPD alarm. Secure pipe is completely filled.	OPERATING_CONDITION_PROCESS	OFF_SPECIFICATION	54	0x27
ADC_OVERGANGE_ALARM	ADC overrange alarm. Noise too high. Check applicati. Call service.	HW_STATUS_ELECTRONICS	FAILURE		0x28
SIL_SELF_CHECK_ALARM	SIL self check alarm. Call service.	HW_STATUS_ELECTRONICS	FAILURE		0x29
INHOUSE_TEMP_LIMITS_ALARM	Inhouse temp. alarm. Reduce ambient temperature.	OPERATING_CONDITION_PROCESS	OFF_SPECIFICATION		0x2A

Get Diag

The DIAGNOSIS and DIAGNOSIS_EXTENSION parameters can be used to poll the transmitter status.
These parameters are located on the relative indices 13 and 14 in the Physical Block where they can be read acyclically. Cyclic reading via the DDLM_SLAVE_DIAG service is also possible.

The DDLM_SLAVE_DIAG service provides for the general PA profiles 0x9740 and 0x9700 only the DIAGNOSIS, as this parameter is defined in the PA profile, but the DIAGNOSIS_EXTENSION is manufacturer-specific.
With the FEx630-specific profile 0x3432, the service DDLM_SLAVE_DIAG has been expanded and also transmits the parameter DIAGNOSIS_EXTENSION in byte 15 to 20.

Procedure:

During cyclic communication, the master regularly requests data from the slave via ‘Request Data Exchange.’ The slave responds with ‘Response Data Exchange.’ The slave's response contains a bit (diagnostic flag) which states whether new diagnostics information is available in the slave.

If something changes in Diagnosis or Diagnosis Extension in the slave (one or more bits set/deleted), then the slave sets the ‘Diagnostic Flag’ to ‘true’ once in ‘Response Data Exchange.’ Following this, the master requests diagnostics data from the slave using ‘Request Get Diag.’
This responds with ‘Response Get Diag.’ Therefore, the ‘Get Diag’ service only takes place when the diagnostics data in the slave changes.

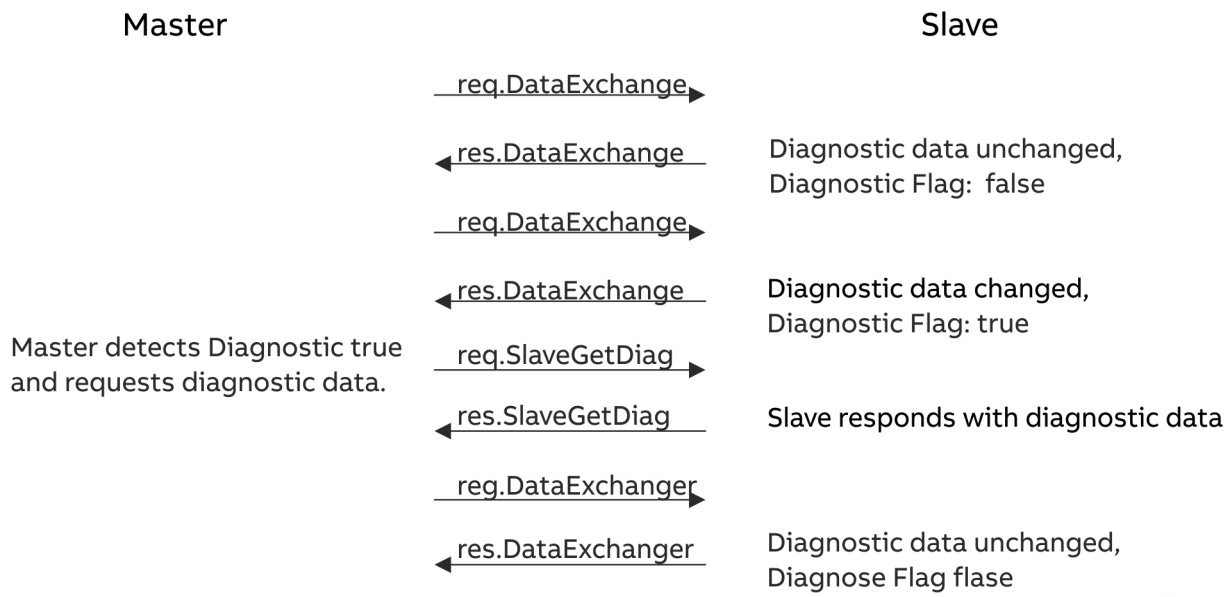

Figure 11: Sequence of the diagnostic query

… 4 Diagnosis / error messages

… Get Diag

DIAG_MASK_INDIVIDUAL_ALARM object

The alarm configuration can be individually masked with the DIAG_MASK_INDIVIDUAL_ALARM object (see **Physical Block – Parameters** on page 14).

1 bit is available for configuration for every alarm. In total, the object is correspondingly 6 bytes long.

The sequence of the alarms in the DIAG_MASK_INDIVIDUAL_ALARM object corresponds to the sequence of DIAGNOSIS_EXTENSION.

Example of masking of 'FLOWRATE_TO_ZERO' and 'NV_CHIP_DEFECT_MB'

FLOWRATE_TO_ZERO: Byte 1, Bit 3

NV_CHIP_DEFECT_MB: Byte 2, Bit 6

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6
0x08	0x40	0x00	0x00	0x00	0x00

Note

Alarms with the 'Failure' NAMUR class cannot be masked.

Transducer Block Status

The transducer blocks of the FEx630 provide the measured values for the function blocks.
They consist of a data structure with value and status. The status reaches the function blocks (AI or totalizer blocks) which react according to their settings and PROFIBUS PA specifications and calculate their value and status and cyclically communicate them outside.
The status calculation depends on whether the Condensed Status has been activated or not.

The following FEx630 alarms are shown on the status of all slots of the AI blocks:

Alarm Mapping	Description	Condensed Status	Classic Status
FLOW_MASS_REACHED	Mass flowrate exceeds limits. Check flowrate and alarm limits.	Good-advisory alarm, high limit (0x89)	Good-high limited (0x82)
FLOW_VOLUME_REACHED	Volume flowrate exceeds limits. Check flowrate and alarm limits.	Good-advisory alarm, high limit (0x89)	Good-high limited (0x82)
SIMUALTION_ALARM	Simulation is on. Simulated values. Switch off Simulation Mode.	Check (0x3C)	Uncertain-simulated value (0x60)
FLOWRATE_TO_ZERO	Flowrate to zero. Check digital in terminals.	Check (0x3C)	Uncertain-simulated value (0x60)
ALARM_MAINTENANCE_CYCLE_TIME_EXEED	Maintenance interval is reached. Perform maintenance.	Maintenance (0xA4)	Maintenance (0xA4)
TOTALIZER_STOP_ALARM	All totalizer stopp. Check digital in terminals.	Check (0x3C)	Uncertain (0x40)
TOTALIZER_RESET_ALARM	Totalizer reset. Reset of one or more Totalizers.	Check (0x3C)	Uncertain (0x40)
DISPLAY_TOTALIZER_ROLLOVER	Display value is < 1600 h at Qmax. Change mass Unit or vol. Unit for Totalizer.	Maintenance (0xA4)	Maintenance (0xA4)
DEVICE_NOT_CALIBRATED_ALARM	Device not calibrated. Call Service.	Maintenance (0xA4)	Maintenance (0xA4)
NV_CHIPS_DEFECT_FEB	Sensor memory defective. Mem. or connect. defective. Replace memory.	Maintenance (0xA4)	Maintenance (0xA4)
NV_DATA_DEFECT	NV data defect. Data storage irreparable. Call Service.	Failure (0x24)	Bad-device failure (0x12)
FE_BOARD_NOT_DETECTED	No Frontend Board detected. Wrong connection. Defect Frontend. Check wiring.	Failure (0x24)	Bad-device failure (0x12)
FE_BOARD_COMM_ERROR	FEB communication error. EMC disturbance. Call Service.	Failure (0x24)	Bad-device failure (0x12)
INCOMPATIBLE_FE_BOARD	Incompatible Frontend Board. Frontend not fit to Motherboard. Call Service.	Failure (0x24)	Bad-device failure (0x12)
NV_CHIP_DEFECT_MB	NV chips defect on Motherboard. Defective MB. Replace MB. Call Service.	Maintenance (0xA4)	Maintenance (0xA4)
DO1_PULSENUMMAXALARM	Pulse output is cut off. Wrong config. Check pulse out configuration.	Out of Specification (0x78)	Uncertain (0x40)

… 4 Diagnosis / error messages

… Transducer Block Status

Alarm Mapping	Description	Condensed status	Classic status
CO1_SATURATED_ALARM	Curr.Out 31 / 32 is saturated. CO process value out of range. Adapt Qmax.	Out of Specification (0x78)	Uncertain (0x40)
CO2_3_SATURATED_ALARM	Curr.Out V1 / V2, V3 / V4 saturated. CO process value out of range. Adapt Qmax.	Out of Specification (0x78)	Uncertain (0x40)
CO1_COM_ERROR	Curr.Out 31 / 32 com error. Defective Board. EMC disturbance. Call Service.	Failure (0x24)	Bad-device failure (0x12)
OPTION_MODULE_1 _COM_ ERROR	Option Card 1 com error. Defective Card. Check Card 1. Call Service.	Out of Specification (0x78)	Uncertain (0x40)
OPTION_MODULE_2 _COM_ ERROR	Option Card 2 com error. Defective Card. Check Card 2. Call Service.	Out of Specification (0x78)	Uncertain (0x40)
CO1_SAFETY_ALARM	Safety Alarm Curr. Out 31 / 32 SIL function detects error. Call Service.	Failure (0x24)	Bad-device failure (0x12)
CO1_NOT_CALIBRATED_ALARM	Curr.Out 31 / 32 not calibrated. Call Service.	Maintenance (0xA4)	Maintenance (0xA4)
CO2_NOT_CALIBRATED_ALARM	Curr.Out V1 / V2 not calibrated. Replace Current Option Card. Call Service.	Maintenance (0xA4)	Maintenance (0xA4)
CO3_NOT_CALIBRATED_ALARM	Curr.Out V3 / V4 not calibrated. Replace Current Option Card. Call Service.	Maintenance (0xA4)	Maintenance (0xA4)
VOLTAGE_MONITORING_ALARM_MB	MB voltages outside range. Defective Motherboard HW. Call Service.	Failure (0x24)	Bad-device failure (0x12)
ALARM_SIMULATION	An alarm is simulated. Switch off alarm simulation.	Check (0x3C)	Uncertain (0x40)
FIELDBUS_BOARD_IN_RESET	DUMMY_ALARM_1_27	Maintenance (0xA4)	Maintenance (0xA4)
CO1_READBACK_ALARM	DUMMY_ALARM_2_28	Out of Specification (0x78)	Uncertain (0x40)
COIL_REGULATION_ALARM	Coil regulation error. Check wiring of sensor coils. Call service	Failure (0x24)	Bad-device failure (0x12)

Alarm Mapping	Description	Condensed status	Classic status
COIL_WIRING_ALARM	Coil wiring error. Check wiring of sensor coils. Call service.	Failure (0x24)	Bad-device failure (0x12)
COIL_IMPEDANCE_ALARM	Coil Inductance alarm. Call service.	Out of Specification (0x78)	Uncertain (0x40)
ELECTRODE_SHORT_CUIRCIT_ALARM	Electrode short cuircit. Check wiring of sensor electrode. Call service.	Failure (0x24)	Bad-device failure (0x12)
ELECTRODE_OPEN_CUIRCIT_ALARM	Electrode open cuircit. Check wiring of sensor electrode. Call service.	Failure (0x24)	Bad-device failure (0x12)
DC_FEEDBACK_REG_ALARM	DC feedback regulation. Check conditions of application. Call service.	Out of Specification (0x78)	Uncertain (0x40)
COMMUNICATION_ADC_RX210_ALARM	ADC RX210 com. error. Call service.	Failure (0x24)	Bad-device failure (0x12))
COIL_ISOLATION_ALARM	Coil isolation alarm. Call service.	Failure (0x24)	Bad-device failure (0x12)
GAS_BUBBLE_ALARM	Gas bubble alarm. Check conditions of application.	Out of Specification (0x78)	Uncertain (0x40)
CONDUCTIVITY_LIMITS_ALARM	Conductivity limits alarm. Change limits or Check application.	Out of Specification (0x78)	Uncertain (0x40)
SENSOR_TEMP_LIMITS_ALARM	Sensor temp. limits alarm. Change limits or change fluid temperature.	Out of Specification (0x78)	Uncertain (0x40)
TFE_ALARM	TFE alarm. Secure pipe is completely filled.	Out of Specification (0x78)	Uncertain (0x40)
EPD_ALARM	EPD alarm. Secure pipe is completely filled.	Out of Specification (0x78)	Uncertain (0x40)
ADC_OVERGANGE_ALARM	ADC overrange alarm. Noise too high. Check applicati. Call service.	Failure (0x24)	Bad-device failure (0x12)
SIL_SELF_CHECK_ALARM	SIL self check alarm. Call service.	Failure (0x24)	Bad-device failure (0x12)
INHOUSE_TEMP_LIMITS_ALARM	Inhouse temp. alarm. Reduce ambient temperature.	Out of Specification (0x78)	Uncertain (0x40)
	Reserved		
	Reserved		
	Reserved		

Valid for:

TB1 Rel. Idx: 17, 21, 78, 53, 54, 55, 56

TB3 Rel. Idx: 14 to 19

TB5 Rel. Idx: 43, 34, 12, 52

5 Indicators on the transmitter

Under the main menu item ‘Communication’ you can find, among others, the ‘...Profibus’ menu item.

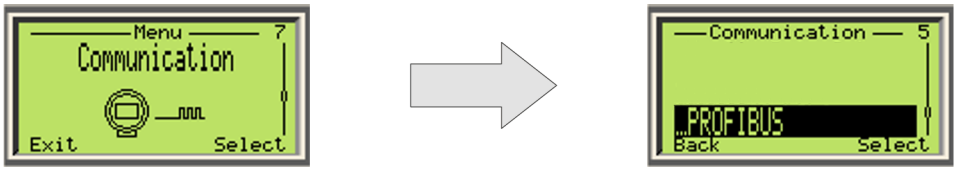

Figure 12: Menu ‘Communication / ...Profibus’

Here you can find some important PROFIBUS parameters.
All parameters except the slave address can only be read via the transmitter menu.
The slave address can only be changed under certain conditions via the HMI menu (see **Address setting** on page 10).
The configuration of only the readable parameters occurs via the bus or automatically.

The following section is a detailed description of all the setting options provided under the ‘...Profibus’ menu.

... / Communication / ...Profibus	
Address	Set the PROFIBUS DP device address (1 to 126).
Ident Nr. Selector	Display the PROFIBUS DP identification number For selection of the ID number see **Profile selection via ID Number** on page 7.
Comm State	Display the PROFIBUS communication status. • Offline: No PROFIBUS communication. • Stop: Bus active, device not active. • Clear: Device is being initialized. • Operate: Cyclic communication is active.
Baud Rate	Display the transmission speed (baud rate) for the PROFIBUS communication. The baud rate is automatically detected and does not need to be configured manually.
PB Manufacturer ID	Display the PROFIBUS DP manufacturer ID

6 Revision history

Revision	Date	Changes
0.1	2/12/2018	First edition

Trademarks

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Notes

ABB Measurement & Analytics

For your local ABB contact, visit:
www.abb.com/contacts

For more product information, visit:
www.abb.com/flow

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