ABB MEASUREMENT & ANALYTICS | INTERFACE DESCRIPTION

SensyMaster FMT430, FMT450

Thermal Mass Flowmeter

PROFIBUS DP protocol
Valid as of software version 01.01.00

Measurement made easy

SensyMaster FMT430
SensyMaster FMT450

Introduction

The SensyMaster FMT430 is a top-quality cost-effective solution for the precise and direct dynamic mass flow measurement of gases at low and medium operating pressure levels, which fulfills the requirements of any industrial application.

In addition, the FMT450 offers the highest level of accuracy and extended functionality for demanding industrial applications.

Additional Information

Additional documentation on SensyMaster FMT430, FMT450 is available for download free of charge at www.abb.com/flow.
Alternatively simply scan this code:

Table of contents

1 Introduction

The following interface description is a supplement to the operating instruction of the SensyMaster FMT430, FMT450. 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 FMT4xx series.
All device versions have this same ID number and refer to the same GSD file (equipment master data).

The FMT4xx transmitter corresponds to the PROFIBUS DP profiles DPV0 / DPV1.
The PROFIBUS DP application layer corresponds to the profile PA Devices 3.02.

2 Specification

PROFIBUS DP interface	
Terminals	V1 / V2
Configuration	Via the PROFIBUS DP interface or via the local operating interface in connection with Asset Vision Basic (DAT200) and a corresponding Device Type Manager (DTM)
Transmission	In accordance with 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

Only one of the three different GSD files provided by ABB is needed for commissioning.

Parameterization of the device can be performed via the display, or through a device driver in the form of an EDD (Electronic Device Description) or DTM (Device Type Manager).

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
0x3435	ABB_3435.gsd	6xAI, 2xTOT, 1xDI, 2xDO
0x9700	PA139700.gsd	1xAI

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.

Refer to **ID number** on page 4.

… 2 Specification

Limits and rules when using ABB fieldbus accessories

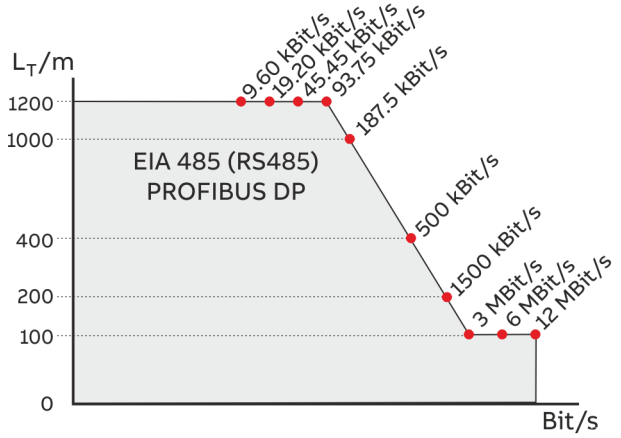

Figure 1: Bus cable length depends on the transmission rate

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))

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 0x3435.
You can download EDD, DTM and GSD from www.abb.com/flow.

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 DI block as well as two DO blocks.

Parameter	Quantity	Description
Max_Module	11	6xAI, 2xTOT, 1xDI, 2xDO
Max_Input_Len	42	6x5(AI) + 2x5(TOT) + 1x2(DI)
Max_Output_Len	8	2x2(TOT) + 2x2(DO)
Max_Data_Len	50	MaxInput + MaxOutput

Table 1: Parameter of the device-specific profile

General Profiles

The PNO has set general profiles with their own ident numbers.
The FMT4xx supports the following general profiles:

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

The manufacturer-specific device master file (GSD) ABB_3435.gsd can be downloaded at 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.

The ident number can be set via the fieldbus or on the transmitter, but only when no cyclical communication is running.

Changing the ident number in the transmitter

The Ident Number menu is in the Communication→ PROFIBUS submenu. The ident number is displayed here. The ident number can be set only when no cyclical communication is running or if the configuration data do not match the supported sequence of the respective ident number.

Ident. no.	Description / functions
0x9740	Profile-specific / 1AI + 1TOT PA139740.GSD
0x3435	Manufacturer-specific FMT4xx / 6AI+2TOT+1DI+2DO ABB_3435.GSD
Adaption Mode	Adaptation mode (obligatory) for PA3.02. The device can communicate with several ID numbers in adaptation mode.
0x9700	Profile-specific / 1AI PA139700.GSD

Table 2: Available ident numbers

Profile selection via ident 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	0x3435	Manufacturer-specific FMT4xx / 6AI+2TOT+1DI+2DO ABB_3435.GSD
127	–	Adaptation mode (obligatory) for PA3.02. The device can communicate with several ident numbers in adaptation mode.
128	0x9700	Profile-specific / 1AI PA139700.GSD

Table 3: 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 4: 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 DP 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.

The following supported modules with their configuration strings are defined in the GSD file:

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	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
7	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 5: 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 FMT4xx with the ident number 0x3435 supports 11 communications slots. They are defined in the GSD as follows.

Slot no.	Slot designation	Default modules no.	Supported modules no.
1	AI1	2	1, 2
2	AI2	2	1, 2
3	AI3	2	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	DI	6	1, 6
10	DO1	7	1, 7
11	DO2	7	1, 7

Table 6: 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 PA Profile, a short configuration string and a long configuration string (Extended Identifier Format) are available for the AI and AO function blocks. The FMT4xx transmitter accepts both versions.

… 2 Specification

Address setting

The PROFIBUS DP 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.

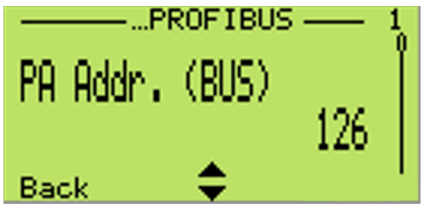

Figure 2: Parameter 'PA address'

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.

Available units

For certain parameters it is possible to choose among the following units.

Note

The 'Code' column indicates the value to which the corresponding parameter must be set, e.g. using the communications interface.

Table 1: Units for the standard volume flow

Selection	Code [hex]	Description
m^3/s	0x0543	Cubic meters per second
m^3/min	0x0544	Cubic meters per minute
m^3/h	0x0545	Cubic meters per hour
m^3/d	0x0546	Cubic meters per day
ft^3/s	0x054C	Cubic feet per second
ft^3/min	0x054D	Cubic feet per minute
ft^3/h	0x054E	Cubic feet per hour
ft^3/d	0x054F	Cubic feet per day
l/s	0x0547	Liters per second
l/min	0x0548	Liters per minute
l/h	0x0549	Liters per hour
l/d	0x054A	Liters per day
xx/yy	0x05F2	User-defined unit

Table 2: Units for the mass flow

Selection	Code [hex]	Description
g/s	0x0526	Grams per second
g/min	0x0527	Grams per minute
g/h	0x0528	Grams per hour
kg/s	0x052A	Kilograms per second
kg/min	0x052B	Kilograms per minute
kg/h	0x052C	Kilograms per hour
kg/d	0x052D	Kilograms per day
lb/s	0x0532	Pounds (avdp) per second
lb/min	0x0533	Pounds (avdp) per minute
lb/h	0x0534	Pounds (avdp) per hour
lb/d	0x0535	Pounds (avdp) per day
t/min	0x052F	Metric tons per minute
t/h	0x0530	Metric tons per hour
t/d	0x0531	Metric tons per day
xx/yy	0x05F1	User-definable unit

Table 3: Standard density units

Selection	Code [hex]	Description
g/cm^3	0x044C	Grams per cubic centimeter
g/m^3	0x044D	Grams per cubic meter
kg/m^3	0x0449	Kilograms per cubic meter
g/l	0x044F	Grams per liter
kg/l	0x0453	Kilograms per liter
lb/ft^3	0x05F3	Pounds (avdp) per cubic foot

Table 4: Standard conditions

Code [hex]	Description
0x01	Temperature = 0 °C, pressure = 1.01325 bar
0x02	Temperature = 20 °C, pressure = 1.01325 bar
0x03	Temperature = 60°F, pressure = 1.01325 bar
0x04	Temperature = 70°F, pressure = 1.01325 bar
0x05	Temperature = 15°C, pressure = 1.01325 bar
0x06	Temperature = 20°C, pressure = 1.00000 bar
0x07	Temperature = 25°C, pressure = 1.00000 bar
0x08	Temperature = 25°C, pressure = 1.01325 bar
0x09	Temperature = 15°C, pressure = 1.00000 bar
0xFE	User-defined standard conditions

Table 5: Temperature units

Selection	Code [hex]	Description
K	0x03E8	Kelvin
°C	0x03E9	Celsius
°F	0x03EA	Fahrenheit

Table 6: Length units

Selection	Code [hex]	Description
mm	0x03F5	Millimeters
inch	0x03FB	in.

Table 7: Units for the mass totalizer

Selection	Code [hex]	Description
kg	0x0441	Kilograms
g	0x0440	Grams
t	0x0446	Tons (metric)
lb	0x0444	Pounds (advp)
xx	0x05F5	User-definable unit

… 2 Specification

… Available units

Table 8: Units for the standard volume totalizer

Selection	Code [hex]	Description
m^3	0x040A	Cubic meters
ft^3	0x0413	Cubic feet
l	0x040E	Liters
xx	0x05F6	User-definable unit

Table 9: Pressure units

Selection	Code [hex]	Description
Pa	0x064A	Pascals
kPa	0x0650	Kilopascals
Bar	0x0471	Bar
mBar	0x0472	Millibar
inH^2O@4C	0x047B	Inches water column at 4 °C
mmH^2O@4C	0x047E	mm water column at 4 °C
atm	0x0474	Atmospheric gauge pressure
psi	0x0475	Pounds per square inch
kp/cm^2	0x0479	Kilogram-force per cm^2

Available gas types

For certain parameters it is possible to choose among the following gas types.

Note
The ‘Code’ column indicates the value to which the corresponding parameter must be set, e.g. using the communications interface.

Table: Gas types for the ApplicationSelector

Formula	Code [hex]	Description
–	0x00	No selection
N_2O_2Ar	0x01	Air* (only for gas type 1 of one application)
CH_4	0x90	Methane
N_2	0xB5	Nitrogen
H_2	0x84	Hydrogen
CO_2	0x48	Carbon dioxide
O_2	0xBB	Oxygen
NH_3	0x27	Ammonia
He	0x78	Helium
Ar	0x2A	Argon
C_3H_8	0xCD	Propane
C_2H_6	0x6C	Ethane
C_4H_{10}	0x45	Butane
C_5H_{12}	0xC1	Pentane
C_6H_{14}	0x7B	Hexane
O_3	0xBE	Ozone
C_2H_4	0x72	Ethene
C_2H_5OH	0x6F	Ethanol

Table: Gas types for the ApplicationSelector

Formula	Code [hex]	Description
C_3H_6	0xD0	Propene/Propylene
CO	0x4B	Carbon monoxide
H_2S	0x87	Hydrogen sulfide
C_2H_2	0x1E	Acetylene
C_3H_6O	0x24	Acetone
CH_2CO	0x51	Ketene
$C_4H_4O_2$	0x66	Diketene
CH_3OH	0x93	Methanol
Ne	0xAF	Neon
NO	0xB2	Nitrogen monoxide
C_3H_4	0xCA	Propadiene
H_2O	0xE8	Water vapor
C_4H_6	0x3C	1.2 Butadiene
C_4H_6	0x3F	1.3 Butadiene
C_4H_8	0x42	1 Butene
CH_2O	0x75	Formaldehyde
H_2O	0xE8	Water vapor

* Gas type available in ApplicationSelector (preconfigured applications) and for three configurable applications.

** Gas type available only for preconfigured applications.

3 Block overview

The FMT4xx transmitter contains the following blocks, depending on the ident number:

Block	Supported PA ID ident. number		
	0x3435 **FMT4xx** **PA 3.02**	**0x9700** **PA 3.02** **(1AI)**	**0x9740** **PA 3.02** **(1AI + 1TOT)**
Physical Block	Slot 0	Slot 0	Slot 0
Analog Input Block1	Slot 1	Slot 1	Slot 1
Analog Input Block2	Slot 2	—	—
Analog Input Block3	Slot 3	—	—
Analog Input Block4	Slot 4	—	—
Analog Input Block5	Slot 5	—	—
Analog Input Block6	Slot 6	—	—
Totalizer Block1	Slot 7	—	Slot 2
Totalizer Block2	Slot 8	—	—
Discrete Input Block1	Slot 9	—	—
Discrete Output Block1	Slot 10	—	—
Discrete Output Block2	Slot 11	—	—
Transducer Block - Flow	Slot 12	Slot 2	Slot 3
Transducer Block - Flow_AppSpecific	Slot 13	Slot 3	Slot 4
Transducer Block - DeviceInfo	Slot 14	Slot 4	Slot 5
Transducer Block - Special Function	Slot 15	Slot 5	Slot 6
Transducer Block - Display	Slot 16	Slot 6	Slot 7
Transducer Block - Diagnostics	Slot 17	Slot 7	Slot 8

Table 7: 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 thermal mass flowmeter. From index 53 on the manufacturer-specific parameters are added.
Transducer Block - Flow_AppSpecific	Parameters for application 1-8
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 8: 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 . 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	Visible String	Cst	16	r	-
9	HARDWARE_REVISION	Simple	Visible String	Cst	16	r	-
10	DEVICE_MAN_ID	Simple	Unsigned16	Cst	2	r	26 (ABB)
11	DEVICE_ID	Simple	Visible String	Cst	16	r	0x3435
12	DEVICE_SER_NUM	Simple	Visible String	Cst	16	r	-
13	DIAGNOSIS	Simple	Octet String	D	4	r	0;0;0;0
14	DIAGNOSIS_EXTENSION	Simple	Octet String	D	6	r	0;0;0;0;0;0
15	DIAGNOSIS_MASK	Simple	Octet String	Cst	4	r	-
16	DIAGNOSIS_MASK_EXTENSION	Simple	Octet String	Cst	6	r	0xFF; 0xFF; 0xFF; 0xFF; 0xE7; 0x07
17	DEVICE_CERTIFICATION	Simple	Visible String	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	Octet String	S	32	r,w	-
21	DEVICE_MESSAGE	Simple	Octet String	S	32	r,w	-
22	DEVICE_INSTAL_DATE	Simple	Octet String	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	-
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 (0x3435)
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.
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, see **ID number** on page 4. 0: 0x9740 Profile-specific 1: 0x3435 manufacturer-specific FMT4xx 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	Indication 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	Reaction of the device to device-specific diagnostic events, if the FEATURE parameter has been set to 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 of the FMT4xx** on page 64.

… 3 Block overview

… Physical Block – Slot 0

Parameter	Description
DIAG_MASK_MAINTENANCE	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_CHECK_FUNCTION	
DIAG_MASK_OFF_SPECIFICATION	
DIAG_MASK_INDIVIDUAL_ALARM	Single alarm masking With activated masking there is no alarm signaling. Refer to **DIAG_MASK_INDIVIDUAL_ALARM object** on page 69.
DIAG_CONDITION_IDX	
DIAG_IDX_DETAILS_CLASS	
DIAG_IDX_DETAILS_GROUP	
DIAG_IDX_DETAILS_PRIORITY	
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 FNT4xx transmitter supports 6 AI blocks.

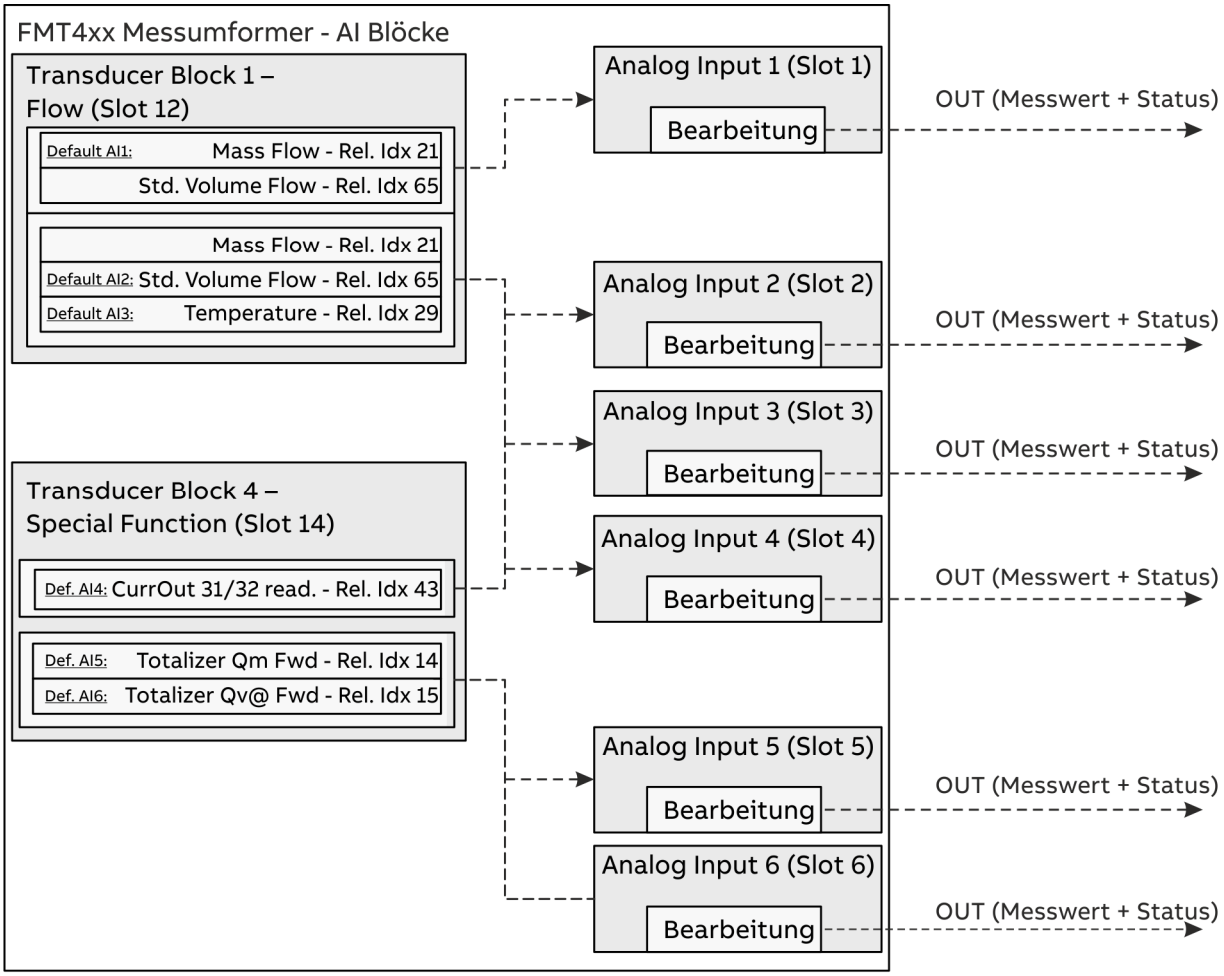

Figure 3: Overview – AI Blocks

… 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
MASS_FLOW	0x0115	277
STANDARD_VOLUME_FLOW	0x0141	321

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

Channel	HEX	DEC
MASS_FLOW	0x0115	277
STANDARD_VOLUME_FLOW	0x0141	321
TEMPERATURE	0x011D	285
CURR_OUT_31_32_OUTPUT_READING	0x042B	1067

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

Channel	HEX	DEC
TOTALIZER_QM_FWD	0x040E	1038
TOTALIZER_QV@_FWD	0x040F	1039

All AI blocks receive their measured values from the transducer block objects shown above.

It is possible to select different units for the mass and standard volume flow and for the internal 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). By default, no conversion is made and the respective unit of the AI Block is set to ‘None’.

Analog Input Block Diagram

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

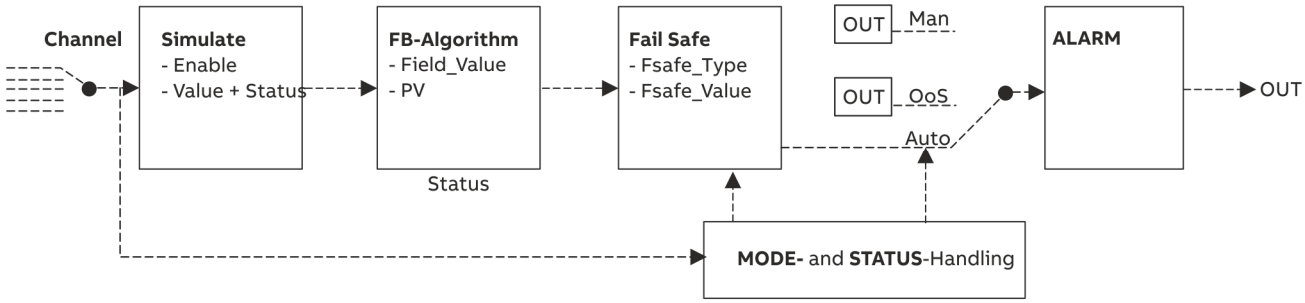

Figure 4: Setup of the AI-block

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 (totalizer reading).
The Totalizer Block receives the measured value from the Transducer Block.
The first totalizer block is by default linked to the parameter mass flow, transducer block 1 – flow.
The second totalizer block is linked to the parameter standard volume flow, transducer block 1 – flow.

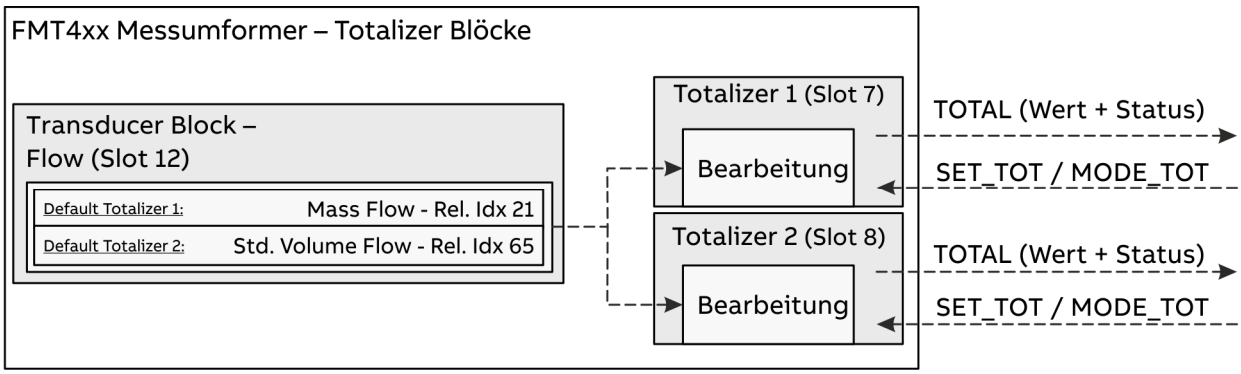

Figure 5: Overview – Totalizer Blocks

The totalizer blocks integrate the value delivered by the transducer block, depending on the block configuration.
The flow rate is **unit-weighted** by the transducer. If the unit is changed in the transducer block, the totalizer blocks receive the measured value in the newly set unit.

The totalizer unit must be adjusted to make sure the totalizer blocks count correctly.
As the totalizer block totalizes the flow rate, the totalizer unit corresponds to the flow unit, but without the time (for example, flow rate m^3/h -> totalizer m^3).

Example of a correct configuration:
Flow rate: **kg/h** -> Totalizer unit UNIT_TOT: **kg**.
Example of an incorrect configuration:
Flow rate: **t/h** -> Totalizer unit UNIT_TOT: **kg**.

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 FMT4xx transmitter has no DP communication as a standard device. For this reason, the transmitter has its own internal totalizers that have nothing to do with the DP totalizer blocks. These internal totalizers are also included in the DP device and can, for example, be read off on the LCD display of the device in the ‘totalizer’ submenu.

The internal totalizers are connected to the AI blocks 5 and 6 and can therefore be read out cyclically (see **Analog Input Function Block – Slot 1, 2, 3, 4, 5, 6** on page 17).

Only the flow rate (standard volume or mass flow) (index 21, 65) can be used as a channel for the totalizer blocks, not the internal totalizers! The totalizer blocks totalize the flow rate to obtain the totalizer status. It would not make sense to totalize the internal totalizer again.

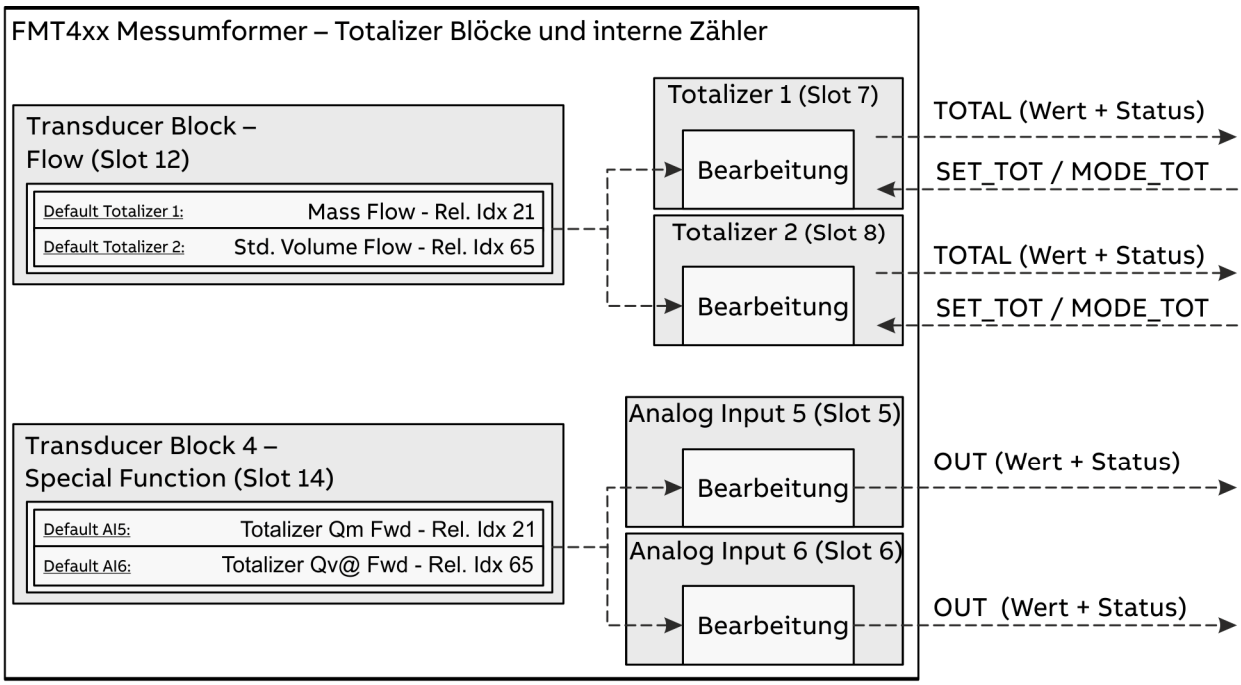

Figure 6: Overview - Internal totalizer

The internal totalizers and 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.

Selection of the channels (Index 28) of the totalizer blocks (slot 7,8) is made from the bus level via:

Channel	HEX	DEC
MASS_FLOW	0x0115	277
QV@VOLUME_FLOW	0x0141	321

… 3 Block overview

… Totalizer Function Block – Slot 7, 8

Totalizer Block Diagram

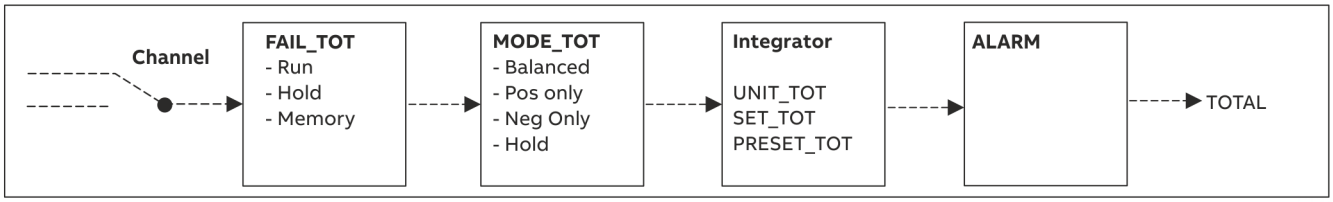

Figure 7: Setup of Totalizer-Block

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.

Discrete Input Function Block – Slot 9

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 FMT4xx transmitter allows for cyclical transfer of device-specific alarm information to the control system.
This is done in addition to the alarm outputs already specified in the Profibus® protocol, such as Get_Diag or the status messages.

The following choice of channels is available for the DI Block:

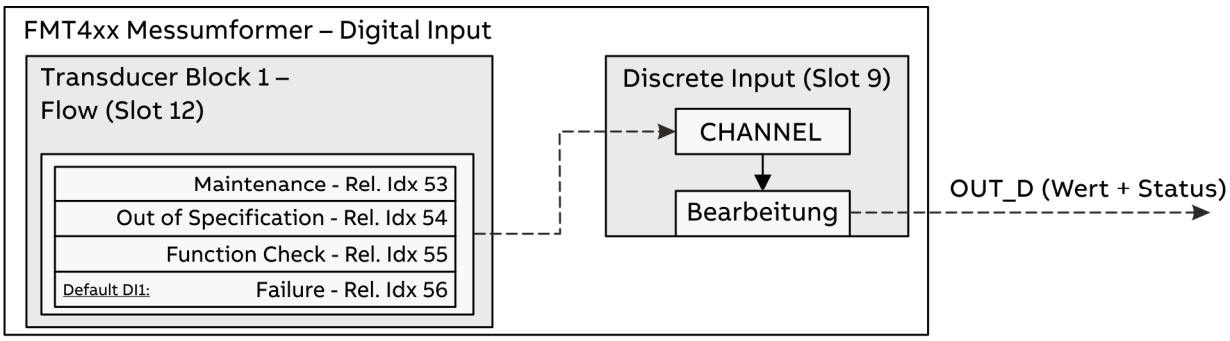

Figure 8: Overview – Digital Input

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

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

Every device-specific alarm of the FMT4xx 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.

… 3 Block overview

… Discrete Input Function Block – Slot 9

The following table lists the output value of the DI Block (OUT_D.value) depending on the selected channel, and a set alarm 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.
A set alarm in the Failure group is signaled externally when any channel is selected, whereas a Maintenance alarm reaches the control system only when a maintenance channel is selected.
See **Alarm overview of the FMT4xx** on page 64 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.’

Discrete Output Function Block – Slot 10, 11

In the manufacturer-specific profile, the FMT4xx transmitter supports two discrete output function blocks. These blocks are used for cyclical transfer of binary switching operations from the control system to the transmitter. These start/ stop specific actions in the transmitter, such as totalizer reset, application selection, and others.
The transducer block verifies whether the status of the value is good (good) or higher. Should the status of the DI switch be (bad) or (uncertain), the transducer will reject it.

The following channel selection for the DO blocks occurs via (OUT_CHANNEL, index 51):

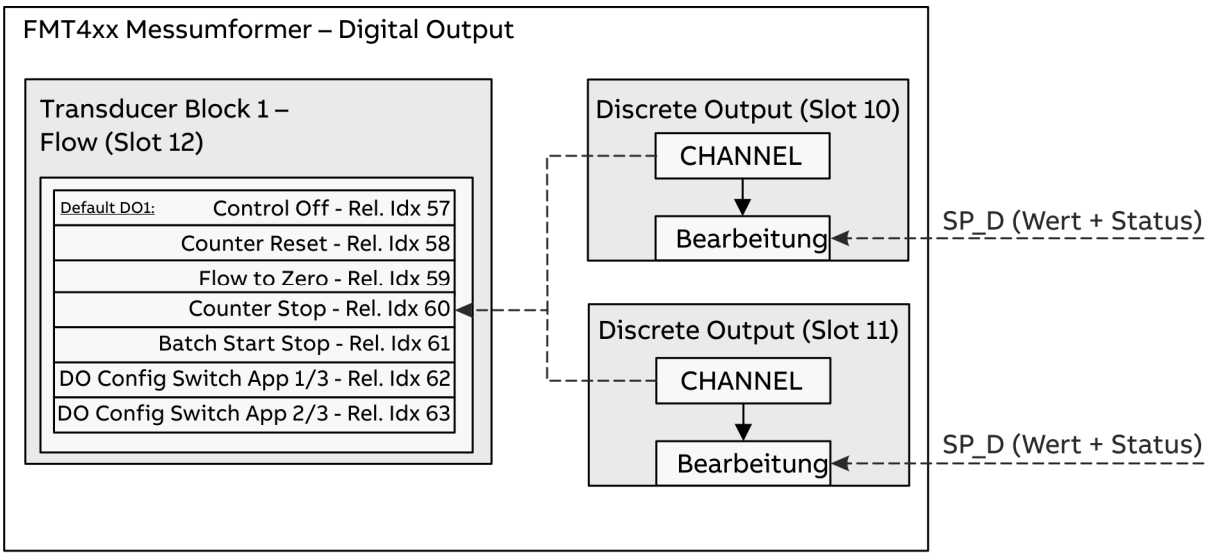

Figure 9: Overview – Digital Output

Selection of the operating mode of the DO Blocks is made via the bus:

Channel	HEX	DEZ
Control Off	0x0139	313
Counter Reset	0x013A	314
Flow to Zero	0x013B	315
Counter Stop	0x013C	316
Batch Start-Stop	0x013D	317
DO Config Switch App 1/3	0x013E	318
DO Config Switch App 2/3	0x013F	319

Table 9: Selection of the operating mode

The transducer block in the transmitter awaits a binary signal from the control system as an input variable:

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

… 3 Block overview

… Discrete Output Function Block – Slot 10, 11

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_ COUNTER_STOP	Stops the integration of the internal totalizers. This does not stop the Totalizer Blocks.
DO_PV_ BATCH_START_STOP	Starts or stops a filling operation.
DO_PV_CONFIG_SWITCH_APP_1_3	GAS_SELECTION_2 is selected if the input variable is ’1’
DO_PV_CONFIG_SWITCH_APP_2_3	GAS_SELECTION_3 is selected if the input variable is ’1’

Table 10: Functions of the DO block channel

Input variable DO_PV_CONFIG_SWITCH_APP_1_3	Input variable DO_PV_CONFIG_SWITCH_APP_2_3	Activation the application of the following objects
0	0	GAS_SELECTION_1
0	1	GAS_SELECTION_2
1	0	GAS_SELECTION_3
1	1	GAS_SELECTION_4

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.

Transducer-Block 1 – Flow (Slot 12)

The transducer block 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 can be called out 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 – flow is a 'Flow transducer block.' The parameters correspond to the 'thermal mass 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.

Parameter TB1 – Flow

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
BLOCK_OBJECT	0	16	Record	DS-32	Cst	20	r	0
ST_REV	1	17	Simple	Unsigned16	N	2	r	0
TAG_DESC	2	18	Simple	OctetString	S	32	r,w	0
STRATEGY	3	19	Simple	Unsigned16	S	2	r,w	0
ALERT_KEY	4	20	Simple	Unsigned8	S	1	r,w	0
TARGET_MODE	5	21	Simple	Unsigned8	S	1	r,w	0
MODE_BLK	6	22	Record	DS-37	D	3	r	0
ALARM_SUM	7	23	Record	DS-42	D	8	r	0
CALIBR_FACTOR	8	24	Simple	Float	S	4	r,w	Correction factor for the flow measured value.
LOW_FLOW_CUTOFF	9	25	Simple	Float	S	4	r,w	Set the switching threshold (0 to 10 %) 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. Preset: 0 %
—	10 to 13	26 to29	0	0	0	0	0	Not used.
ZERO_POINT_UNITS	14	30	Simple	Unsigned16	S	2	r,w	Select a unit for ZERO_POINT_UNIT. Refer to **Table 2: Units for the mass flow** on page 9.
NOMINAL_SIZE	15	31	Simple	Float	S	4	r,w	Set the inside diameter of the piping.
NOMINAL_SIZE_UNITS	16	32	Simple	Unsigned16	S	2	r,w	Select a unit for length information. Refer to **Table 6: Length units** on page 9.
—	17 to 20	33 to 36	0	0	0	0	0	Not used.
MASS_FLOW	21	37	Record	DS_101	D	5	r	Mass flow process variables in the selected mass flow unit.

… 3 Block overview

… Transducer-Block 1 – Flow (Slot 12)

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
MASS_FLOW_UNITS	22	38	Simple	Unsigned16	S	2	r,w	Selection of unit for mass flow. Refer to **Table 2: Units for the mass flow** on page 9.
MASS_FLOW_LO_LIMIT	23	39	Simple	Float	S	4	r,w	Sets the minimum / maximum limit value for mass measurement. If the process value 'MASS_FLOW' up-scales or down-scales the limit value, an alarm is triggered.
MASS_FLOW_HI_LIMIT	24	40	Simple	Float	S	4	r,w	
—	25 bis 28	41 bis 44	0	0	0		0	Not used.
TEMPERATURE	29	45	Record	DS_101	D	5	r	Measuring medium temperature process variable
TEMPERATURE_UNITS	30	46	Simple	Unsigned16	S	2	r,w	Selection of unit for temperature. Refer to **Table 5: Temperature units** on page 9.
TEMPERATURE_LO_LIMT	31	47	Simple	Float	S	4	r,w	Sets the minimum / maximum limit value for sensor temperature. If the process value 'TEMPERATURE' up-scales or down-scales the limit value, an alarm is triggered.
TEMPERATURE_HI_LIMT	32	48	Simple	Float	S	4	r,w	
—	33 to 42	49 to 58	0	0	0	0	0	Not used.

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
Reserved by PNO	43 to 52	59 to 68	0	0	0	0	0	0
DI_PV_DIAG_ MAINTENANCE	53	69	Record	DS_102	D	2	r	Alarms from the transmitter. See **Discrete Input Function Block – Slot 9** on page 23 and **Diagnosis / error messages** on page 62 for additional information.
DI_PV_DIAG_OUT_SPEC	54	70	Record	DS_102	D	2	r	
DI_PV_DIAG_ FUNC_CHECK	55	71	Record	DS_102	D	2	r	
DI_PV_DIAG_FAILURE	56	72	Record	DS_102	D	2	r	
DO_PV_CONTROL_OFF	57	73	Record	DS_102	D	2	r	DO Channel of the transmitter. See **Discrete Output Function Block – Slot 10, 11** on page 25 for further information.
DO_PV_COUNTER_RESET	58	74	Record	DS_102	D	2	r	
DO_PV_FLOW_TO_ZERO	59	75	Record	DS_102	D	2	r	
DO_PV_COUNTER_STOP	60	76	Record	DS_102	D	2	r	
DO_PV_BATCH_ START_STOP	61	77	Record	DS_102	D	2	r	
DO_PV_CONFIG_ SWITCH_APP_1_3	62	78	Record	DS_102	D	2	r	
DO_PV_CONFIG_ SWITCH_APP_2_3	63	79	Record	DS_102	D	2	r	
ACTIVE_CURVE	64	80	Simple	Unsigned8	S	1	r	Application selection (type of measuring medium)
STANDARD_VOLUME_ FLOW	65	81	Record	DS_101	D	5	r	Process variable: standard volume flow in the selected volume unit
STANDARD_VOLUME_ UNITS	66	82	Simple	Unsigned16	S	2	r,w	Selection of unit for the standard volume flow. Refer to **Table 1: Units for the standard volume flow** on page 9.
ST_VOLFLOW_ QV_RANGE_MAX	67	83	Simple	Float	N	4	r,w	Set the upper range value for standard volume flow.
ST_VOLFLOW_ QV_RANGE_MIN	68	84	Simple	Float	N	4	r,w	Set the lower range value for standard volume flow.
ST_VOLFLOW_RATIO	69	85	Simple	Float	D	4	r	Process variable: standard volume flow in percent
ST_DENSITY	70	86	Record	DS_101	D	5	r	Process variable: standard density in the selected density unit
ST_DENSITY_UNITS	71	87	Simple	Unsigned16	S	2	r,w	Select a unit for standard density. Refer to **Table 3: Standard density units** on page 9.
TEMPERATURE_ RANGE_MAX	72	88	Simple	Float	N	4	r,w	Set the upper range value for the measuring medium temperature.
TEMPERATURE_ RANGE_MIN	73	89	Simple	Float	N	4	r,w	Set the lower range value for the measuring medium temperature.
TEMPERATURE_RATIO	74	90	Simple	Float	D	4	r	Process variable: temperature in percent
MASS_FLOW_ QM_RANGE_MAX	75	91	Simple	Float	N	4	r,w	Set the upper range value for the mass flow.
MASS_FLOW_ QM_RANGE_MIN	76	92	Simple	Float	N	4	r,w	Set the lower range value for the mass flow.
MASS_FLOW_RATIO	77	93	Simple	Float	D	4	r	Process variable: mass flow in percent

… 3 Block overview

… Transducer-Block 1 – Flow (Slot 12)

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
LENGTH_UNITS	78	94	Simple	Unsigned16	S	2	r,w	Select a unit for length information. Refer to **Table 6: Length units** on page 9.
PRESSURE_UNITS	79	95	Simple	Unsigned16	S	2	r,w	Select a unit for pressure. Refer to **Table 9: Pressure units** on page 10.
SENSOR_LOCATION_TAG	80	96	Simple	Visible_String	S	20	r,w	Enter the measuring point tagging for the sensor. The measuring point tagging is shown in the header of the process display. Alphanumeric, max. 20 characters
SENSOR_TAG	81	97	Simple	Visible_String	S	20	r,w	Enter the tag number for the sensor. Alphanumeric, max. 20 characters
TX_LOCATION_TAG	82	98	Simple	Visible_String	S	20	r,w	Entry of the measuring point tag for the transmitter. Alphanumeric, max. 20 characters
TX_TAG	83	99	Simple	Visible_String	S	20	r,w	Entry of the TAG number for the transmitter. Alphanumeric, max. 20 characters
PLANT_DATA_SYNC	84	100	Simple	Unsigned8	S	1	r	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. 0x01: MB > FEB – Loads the configuration from the motherboard (MB) in the transmitter. 0x02: FEB > MB – Loading the configuration from the frontend board (FEB) of the sensor.
DEVICE_RESET	85	101	Simple	Unsigned8	S	1	r,w	Restarts the device. Compensates for a short interruption of the power supply.
RESTORE_ FACTORY_DEFAULTS	86	102	Simple	Unsigned8	S	1	r,w	All user-accessible parameters will be reset to the factory default settings.
VERIMASS_ON_OFF	87	103	Simple	Unsigned8	S	1	r	Indicates whether the VeriMass function is active. 0x00: VeriMass deactivated. 0x01: VeriMass activated.
VERIMASS_FEATURE_ CODE	88	104	Simple	Unsigned16	S	2	r,w	Sets the device-specific code for activating the VeriMass function.
FILLMASS_ON_OFF	89	105	Simple	Unsigned8	S	1	r	Indicates whether the FillMass function is active. 0x00: FillMass deactivated. 0x01: FillMass activated.
FILLMASS_FEATURE_ CODE	90	106	Simple	Unsigned16	S	2	r,w	Sets the device-specific code for activating the FillMass function.

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
USER_UNIT_MASSFLOW_QM_NAME	91	107	Simple	Visible_String	S	8	r,w	Enter the name of the user-defined unit for mass flow. Alphanumeric, maximum 7 characters.
USER_UNIT_MASSFLOW_QM_FACTOR	92	108	Simple	Float	S	4	r,w	Enter the factor for the user-defined unit for mass flow. Setting range: 0.0001 ... 100000 kg/h
USER_UNIT_ST_VOLFLOW_QV_NAME	93	109	Simple	Visible_String	S	8	r,w	Enter the name of the user-defined unit for standard volume flow. Alphanumeric, maximum 7 characters.
USER_UNIT_ST_VOLFLOW_QV_FACTOR	94	110	Simple	Float	S	4	r,w	Enter the factor for the user-defined unit for standard volume flow. Setting range: 0.0001 ... 100000 m3/hour in standard conditions.
CALIBRATED_FLAG	95	111	Simple	Unsigned8	D	1	r	Calibration status of the device.
USER_UNIT_ST_DENSITY_NAME	96	112	Simple	Visible_String	S	8	r,w	Enter the name of the user-defined unit for standard density. Alphanumeric, maximum 7 characters.
USER_UNIT_ST_DENSITY_FACTOR	97	113	Simple	Float	S	4	r,w	Enter the factor of the user-defined unit for standard density. Setting range: 0.0001 ... 100000 kg/m3 in standard conditions.
ST_CONDITION_FACTOR	98	114	Simple	Float	S	4	r,w	Enter the factor of the user-defined unit for standard conditions. The factor can be calculated using the following formula: factor = (temperature[K] * 1013.25hPa) / (273.15K * pressure[hPa]) The default value is 1.000 (corresponds to 0°C, 1 atm)
CURVE_NAME_1	99	115	Simple	Visible_String	S	32	r,w	Enter the description for the Application 1 to 8. Alphanumeric, max. 32 characters
CURVE_NAME_2	100	116	Simple	Visible_String	S	32	r,w	
CURVE_NAME_3	101	117	Simple	Visible_String	S	32	r,w	
CURVE_NAME_4	102	118	Simple	Visible_String	S	32	r,w	
CURVE_NAME_5	103	119	Simple	Visible_String	S	32	r,w	
CURVE_NAME_6	104	120	Simple	Visible_String	S	32	r,w	
CURVE_NAME_7	105	121	Simple	Visible_String	S	32	r,w	
CURVE_NAME_8	106	122	Simple	Visible_String	S	32	r,w	
GAS_SELECTION_1	107	123	Simple	Unsigned8	S	1	r,w	Application selection 1 to 8 via GAS_SELECTION_1 (type of measuring medium). When using the optional digital inputs for application switchover, you can switch between four applications using GAS_SELECTION_1, 2, 3, 4. The individual applications are configured in the 'Device Setup / ...Sensor / ...Application 1 ... 8' menu.
GAS_SELECTION_2	108	124	Simple	Unsigned8	S	1	r,w	
GAS_SELECTION_3	109	125	Simple	Unsigned8	S	1	r,w	
GAS_SELECTION_4	110	126	Simple	Unsigned8	S	1	r,w	

… 3 Block overview

… Transducer-Block 1 – Flow (Slot 12)

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
GAS_CONDITION_ UNITS_CODE	111	127	Simple	Unsigned8	S	1	r,w	Selection for gas condition: 0x01: Normal TP 0°C, 1ATM 0x02: Normal TP 20°C, 1ATM 0x03: Normal TP 60F, 1ATM 0x04: Normal TP 70F, 1ATM 0x05: Normal TP 15°C, 1ATM 0x06: Normal TP 20°C, 1BAR 0x07: Normal TP 25°C, 1BAR 0x08: Normal TP 25°C, 1ATM 0x09: Normal TP 15°C, 1BAR 0xFE: Normal TP CUSTOM
GAS_MIX_ COMPONENTS_1	112	128	Array	Unsigned8	S	10	r,w	Select gas type for gas components 1 to 10 of a gas mix.
GAS_MIX_ COMPONENTS_2	113	129	Array	Unsigned8	S	10	r,w	Refer to **Available gas types** on page 10.
GAS_MIX_ COMPONENTS_3	114	130	Array	Unsigned8	S	10	r,w	
GAS_MIX_ COMPONENTS_4	115	131	Array	Unsigned8	S	10	r,w	
GAS_MIX_ COMPONENTS_5	116	132	Array	Unsigned8	S	10	r,w	
GAS_MIX_ COMPONENTS_6	117	133	Array	Unsigned8	S	10	r,w	
GAS_MIX_ COMPONENTS_7	118	134	Array	Unsigned8	S	10	r,w	
GAS_MIX_ COMPONENTS_8	119	135	Array	Unsigned8	S	10	r,w	
GAS_MIX_1_ COMPONENT_AMOUNTS	120	136	Array	Float	S	40	r,w	Set concentration in % for gas components 1 to 10 of a gas mix.
GAS_MIX_2_COMPONENT_A MOUNTS	121	137	Array	Float	S	40	r,w	
GAS_MIX_3_COMPONENT_A MOUNTS	122	138	Array	Float	S	40	r,w	
GAS_MIX_4_COMPONENT_A MOUNTS	123	139	Array	Float	S	40	r,w	
GAS_MIX_5_COMPONENT_A MOUNTS	124	140	Array	Float	S	40	r,w	
GAS_MIX_6_ COMPONENT_AMOUNTS	125	141	Array	Float	S	40	r,w	
GAS_MIX_7_ COMPONENT_AMOUNTS	126	142	Array	Float	S	40	r,w	
GAS_MIX_8_ COMPONENT_AMOUNTS	127	143	Array	Float	S	40	r,w	
ARBITRARY_ OBJ_ACCESS_SPEC	128	144	Record	Idx_Config	S	7	r	Reserved by ABB
ARBITRARY_ OBJ_ACCESS_RW	129	145	Array	Unsigned8	S	32	r	Reserved by ABB
—	130 to 136	146 to 152	0	0	0	0	0	Reserved for later use

Transducer-Block 2 – Flow_AppSpecific (Slot 13)

Transducer-Block – Flow_AppSpecific contains all the application-specific parameters of the maximu possible applications 1 to 8.

Parameter TB2 – Flow_AppSpecific

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
BLOCK_OBJECT	0	16	Record	DS-32	Cst	20	r	—
ST_REV	1	17	Simple	Unsigned16	N	2	r	—
TAG_DESC	2	18	Simple	OctetString	S	32	r,w	—
STRATEGY	3	19	Simple	Unsigned16	S	2	r,w	—
ALERT_KEY	4	20	Simple	Unsigned8	S	1	r,w	—
TARGET_MODE	5	21	Simple	Unsigned8	S	1	r,w	—
MODE_BLK	6	22	Record	DS-37	D	3	r	—
ALARM_SUM	7	23	Record	DS-42	D	8	r	—
DAMPING_QM_VALUE_APP_1	8	24	Simple	Float	S	4	r,w	Select the damping for flow measurement. The value set here relates to 1 τ (Tau). The value refers to the response time for a step flowrate change. It affects the instantaneous value in the display and at the current output. Default setting: 0.2 seconds
DAMPING_QM_VALUE_APP_2	9	25	Simple	Float	S	4	r,w	
DAMPING_QM_VALUE_APP_3	10	26	Simple	Float	S	4	r,w	
DAMPING_QM_VALUE_APP_4	11	27	Simple	Float	S	4	r,w	
DAMPING_QM_VALUE_APP_5	12	28	Simple	Float	S	4	r,w	
DAMPING_QM_VALUE_APP_6	13	29	Simple	Float	S	4	r,w	
DAMPING_QM_VALUE_APP_7	14	30	Simple	Float	S	4	r,w	
DAMPING_QM_VALUE_APP_8	15	31	Simple	Float	S	4	r,w	
TEMPERATURE_DAMPING_APP1	16	32	Simple	Float	S	4	r,w	Select the damping for temperature measurement. The value set here relates to 1 τ (Tau). The data refers to the response time for an abrupt change in temperature. It affects the instantaneous value in the display and at the current output. Default setting: 0.2 seconds
TEMPERATURE_DAMPING_APP2	17	33	Simple	Float	S	4	r,w	
TEMPERATURE_DAMPING_APP3	18	34	Simple	Float	S	4	r,w	
TEMPERATURE_DAMPING_APP4	19	35	Simple	Float	S	4	r,w	
TEMPERATURE_DAMPING_APP5	20	36	Simple	Float	S	4	r,w	
TEMPERATURE_DAMPING_APP6	21	37	Simple	Float	S	4	r,w	
TEMPERATURE_DAMPING_APP7	22	38	Simple	Float	S	4	r,w	
TEMPERATURE_DAMPING_APP8	23	39	Simple	Float	S	4	r,w	

… 3 Block overview

… Transducer-Block 2 – Flow_AppSpecific (Slot 13)

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
MASS_FLOW_QM_MAX_APP_1	24	40	Simple	Float	S	4	r,w	Set the upper range value for the mass flow.
MASS_FLOW_QM_MAX_APP_2	25	41	Simple	Float	S	4	r,w	
MASS_FLOW_QM_MAX_APP_3	26	42	Simple	Float	S	4	r,w	
MASS_FLOW_QM_MAX_APP_4	27	43	Simple	Float	S	4	r,w	
MASS_FLOW_QM_MAX_APP_5	28	44	Simple	Float	S	4	r,w	
MASS_FLOW_QM_MAX_APP_6	29	45	Simple	Float	S	4	r,w	
MASS_FLOW_QM_MAX_APP_7	30	46	Simple	Float	S	4	r,w	
MASS_FLOW_QM_MAX_APP_8	31	47	Simple	Float	S	4	r,w	
MASS_FLOW_QM_MIN_APP_1	32	48	Simple	Float	S	4	r,w	Set the lower range value for the mass flow.
MASS_FLOW_QM_MIN_APP_2	33	49	Simple	Float	S	4	r,w	
MASS_FLOW_QM_MIN_APP_3	34	50	Simple	Float	S	4	r,w	
MASS_FLOW_QM_MIN_APP_4	35	51	Simple	Float	S	4	r,w	
MASS_FLOW_QM_MIN_APP_5	36	52	Simple	Float	S	4	r,w	
MASS_FLOW_QM_MIN_APP_6	37	53	Simple	Float	S	4	r,w	
MASS_FLOW_QM_MIN_APP_7	38	54	Simple	Float	S	4	r,w	
MASS_FLOW_QM_MIN_APP_8	39	55	Simple	Float	S	4	r,w	
LOW_FLOW_RATIO_VALUE_APP_1	40	56	Simple	Float	S	4	r,w	Set the switching threshold (0 to 10 %) for the low flow cut-off.
LOW_FLOW_RATIO_VALUE_APP_2	41	57	Simple	Float	S	4	r,w	If the flow rate is below the switching threshold, there is no flow measurement. The setting of 0 % deactivates the low flow cut-off. Preset: 0 %
LOW_FLOW_RATIO_VALUE_APP_3	42	58	Simple	Float	S	4	r,w	
LOW_FLOW_RATIO_VALUE_APP_4	43	59	Simple	Float	S	4	r,w	
LOW_FLOW_RATIO_VALUE_APP_5	44	60	Simple	Float	S	4	r,w	
LOW_FLOW_RATIO_VALUE_APP_6	45	61	Simple	Float	S	4	r,w	
LOW_FLOW_RATIO_VALUE_APP_7	46	62	Simple	Float	S	4	r,w	
LOW_FLOW_RATIO_VALUE_APP_8	47	63	Simple	Float	S	4	r,w	

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
LOW_FLOW_HYSTERESIS_APP_1	48	64	Simple	Float	S	4	r,w	Set the hysteresis (0 to 50 %) for the low flow cut-off as it is defined in the parameter 'Low Flow Cut Off'. Preset: 0 %
LOW_FLOW_HYSTERESIS_APP_2	49	65	Simple	Float	S	4	r,w	
LOW_FLOW_HYSTERESIS_APP_3	50	66	Simple	Float	S	4	r,w	
LOW_FLOW_HYSTERESIS_APP_4	51	67	Simple	Float	S	4	r,w	
LOW_FLOW_HYSTERESIS_APP_5	52	68	Simple	Float	S	4	r,w	
LOW_FLOW_HYSTERESIS_APP_6	53	69	Simple	Float	S	4	r,w	
LOW_FLOW_HYSTERESIS_APP_7	54	70	Simple	Float	S	4	r,w	
LOW_FLOW_HYSTERESIS_APP_8	55	71	Simple	Float	S	4	r,w	
ST_VOLFLOW_MAX_APP_1	56	72	Simple	Float	S	4	r,w	Set the upper range value for standard volume flow.
ST_VOLFLOW_MAX_APP_2	57	73	Simple	Float	S	4	r,w	
ST_VOLFLOW_MAX_APP_3	58	74	Simple	Float	S	4	r,w	
ST_VOLFLOW_MAX_APP_4	59	75	Simple	Float	S	4	r,w	
ST_VOLFLOW_MAX_APP_5	60	76	Simple	Float	S	4	r,w	
ST_VOLFLOW_MAX_APP_6	61	77	Simple	Float	S	4	r,w	
ST_VOLFLOW_MAX_APP_7	62	78	Simple	Float	S	4	r,w	
ST_VOLFLOW_MAX_APP_8	63	79	Simple	Float	S	4	r,w	
ST_VOLFLOW_MIN_APP_1	64	80	Simple	Float	S	4	r,w	Set the lower range value for standard volume flow.
ST_VOLFLOW_MIN_APP_2	65	81	Simple	Float	S	4	r,w	
ST_VOLFLOW_MIN_APP_3	66	82	Simple	Float	S	4	r,w	
ST_VOLFLOW_MIN_APP_4	67	83	Simple	Float	S	4	r,w	
ST_VOLFLOW_MIN_APP_5	68	84	Simple	Float	S	4	r,w	
ST_VOLFLOW_MIN_APP_6	69	85	Simple	Float	S	4	r,w	
ST_VOLFLOW_MIN_APP_7	70	86	Simple	Float	S	4	r,w	
ST_VOLFLOW_MIN_APP_8	71	87	Simple	Float	S	4	r,w	
TEMPERATURE_UPPER_RANGE_APP_1	72	88	Simple	Float	S	4	r,w	Set the upper range value for the measuring medium temperature.
TEMPERATURE_UPPER_RANGE_APP_2	73	89	Simple	Float	S	4	r,w	
TEMPERATURE_UPPER_RANGE_APP_3	74	90	Simple	Float	S	4	r,w	
TEMPERATURE_UPPER_RANGE_APP_4	75	91	Simple	Float	S	4	r,w	
TEMPERATURE_UPPER_RANGE_APP_5	76	92	Simple	Float	S	4	r,w	
TEMPERATURE_UPPER_RANGE_APP_6	77	93	Simple	Float	S	4	r,w	
TEMPERATURE_UPPER_RANGE_APP_7	78	94	Simple	Float	S	4	r,w	
TEMPERATURE_UPPER_RANGE_APP_8	79	95	Simple	Float	S	4	r,w	

… 3 Block overview

… Transducer-Block 2 – Flow_AppSpecific (Slot 13)

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
TEMPERATURE_LOWER_RANGE_APP_1	80	96	Simple	Float	S	4	r,w	Set the lower range value for the measuring medium temperature.
TEMPERATURE_LOWER_RANGE_APP_2	81	97	Simple	Float	S	4	r,w	
TEMPERATURE_LOWER_RANGE_APP_3	82	98	Simple	Float	S	4	r,w	
TEMPERATURE_LOWER_RANGE_APP_4	83	99	Simple	Float	S	4	r,w	
TEMPERATURE_LOWER_RANGE_APP_5	84	100	Simple	Float	S	4	r,w	
TEMPERATURE_LOWER_RANGE_APP_6	85	101	Simple	Float	S	4	r,w	
TEMPERATURE_LOWER_RANGE_APP_7	86	102	Simple	Float	S	4	r,w	
TEMPERATURE_LOWER_RANGE_APP_8	87	103	Simple	Float	S	4	r,w	
MASS_FLOW_MAX_ALARM_APP_1	88	104	Simple	Float	S	4	r,w	Set the maximum limit value for mass flow of application 1 to 8. If the process value 'Mass Flow [unit]' up-scales the limit value, an alarm is triggered.
MASS_FLOW_MAX_ALARM_APP_2	89	105	Simple	Float	S	4	r,w	
MASS_FLOW_MAX_ALARM_APP_3	90	106	Simple	Float	S	4	r,w	
MASS_FLOW_MAX_ALARM_APP_4	91	107	Simple	Float	S	4	r,w	
MASS_FLOW_MAX_ALARM_APP_5	92	108	Simple	Float	S	4	r,w	
MASS_FLOW_MAX_ALARM_APP_6	93	109	Simple	Float	S	4	r,w	
MASS_FLOW_MAX_ALARM_APP_7	94	110	Simple	Float	S	4	r,w	
MASS_FLOW_MAX_ALARM_APP_8	95	111	Simple	Float	S	4	r,w	
MASS_FLOW_MIN_ALARM_APP_1	96	112	Simple	Float	S	4	r,w	Set the minimum limit value for mass flow of application 1 to 8. If the process value 'Mass Flow [unit]' down-scales the limit value, an alarm is triggered.
MASS_FLOW_MIN_ALARM_APP_2	97	113	Simple	Float	S	4	r,w	
MASS_FLOW_MIN_ALARM_APP_3	98	114	Simple	Float	S	4	r,w	
MASS_FLOW_MIN_ALARM_APP_4	99	115	Simple	Float	S	4	r,w	
MASS_FLOW_MIN_ALARM_APP_5	100	116	Simple	Float	S	4	r,w	
MASS_FLOW_MIN_ALARM_APP_6	101	117	Simple	Float	S	4	r,w	
MASS_FLOW_MIN_ALARM_APP_7	102	118	Simple	Float	S	4	r,w	
MASS_FLOW_MIN_ALARM_APP_8	103	119	Simple	Float	S	4	r,w	

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
ST_VOLFLOW_MAX_ALARM_APP_1	104	120	Simple	Float	S	4	r,w	Set the maximum limit value for the standard volume flow of application 1 to 8. If the process value 'Qv@ [Unit]' up-scales the limit value, an alarm is triggered.
ST_VOLFLOW_MAX_ALARM_APP_2	105	121	Simple	Float	S	4	r,w	
ST_VOLFLOW_MAX_ALARM_APP_3	106	122	Simple	Float	S	4	r,w	
ST_VOLFLOW_MAX_ALARM_APP_4	107	123	Simple	Float	S	4	r,w	
ST_VOLFLOW_MAX_ALARM_APP_5	108	124	Simple	Float	S	4	r,w	
ST_VOLFLOW_MAX_ALARM_APP_6	109	125	Simple	Float	S	4	r,w	
ST_VOLFLOW_MAX_ALARM_APP_7	110	126	Simple	Float	S	4	r,w	
ST_VOLFLOW_MAX_ALARM_APP_8	111	127	Simple	Float	S	4	r,w	
ST_VOLFLOW_MIN_ALARM_APP_1	112	128	Simple	Float	S	4	r,w	Set the minimum limit value for the standard volume flow of application 1 to 8. If the process value 'Qv@ [Unit]' up-scales the limit value, an alarm is triggered.
ST_VOLFLOW_MIN_ALARM_APP_2	113	129	Simple	Float	S	4	r,w	
ST_VOLFLOW_MIN_ALARM_APP_3	114	130	Simple	Float	S	4	r,w	
ST_VOLFLOW_MIN_ALARM_APP_4	115	131	Simple	Float	S	4	r,w	
ST_VOLFLOW_MIN_ALARM_APP_5	116	132	Simple	Float	S	4	r,w	
ST_VOLFLOW_MIN_ALARM_APP_6	117	133	Simple	Float	S	4	r,w	
ST_VOLFLOW_MIN_ALARM_APP_7	118	134	Simple	Float	S	4	r,w	
ST_VOLFLOW_MIN_ALARM_APP_8	119	135	Simple	Float	S	4	r,w	
TEMPERATURE_MAX_ALARM_APP_1	120	136	Simple	Float	S	4	r,w	Set the maximum limit value for the sensor temperature of application 1 to 8. If the process value 'Temperature [unit]' up-scales the limit value, an alarm is triggered.
TEMPERATURE_MAX_ALARM_APP_2	121	137	Simple	Float	S	4	r,w	
TEMPERATURE_MAX_ALARM_APP_3	122	138	Simple	Float	S	4	r,w	
TEMPERATURE_MAX_ALARM_APP_4	123	139	Simple	Float	S	4	r,w	
TEMPERATURE_MAX_ALARM_APP_5	124	140	Simple	Float	S	4	r,w	
TEMPERATURE_MAX_ALARM_APP_6	125	141	Simple	Float	S	4	r,w	
TEMPERATURE_MAX_ALARM_APP_7	126	142	Simple	Float	S	4	r,w	
TEMPERATURE_MAX_ALARM_APP_8	127	143	Simple	Float	S	4	r,w	

… 3 Block overview

… Transducer-Block 2 – Flow_AppSpecific (Slot 13)

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
TEMPERATURE_MIN_ALARM_APP_1	128	144	Simple	Float	S	4	r,w	Set the minimum limit value for the sensor temperature of application 1 to 8. If the process value 'Temperature [unit]' down-scales the limit value, an alarm is triggered.
TEMPERATURE_MIN_ALARM_APP_2	129	145	Simple	Float	S	4	r,w	
TEMPERATURE_MIN_ALARM_APP_3	130	146	Simple	Float	S	4	r,w	
TEMPERATURE_MIN_ALARM_APP_4	131	147	Simple	Float	S	4	r,w	
TEMPERATURE_MIN_ALARM_APP_5	132	148	Simple	Float	S	4	r,w	
TEMPERATURE_MIN_ALARM_APP_6	133	149	Simple	Float	S	4	r,w	
TEMPERATURE_MIN_ALARM_APP_7	134	150	Simple	Float	S	4	r,w	
TEMPERATURE_MIN_ALARM_APP_8	135	151	Simple	Float	S	4	r,w	
QM_USER_TRIM_OFFSET_APP_1	136	152	Simple	Float	S	4	r,w	Offset correction of the flow rate measured value.
QM_USER_TRIM_OFFSET_APP_2	137	153	Simple	Float	S	4	r,w	
QM_USER_TRIM_OFFSET_APP_3	138	154	Simple	Float	S	4	r,w	
QM_USER_TRIM_OFFSET_APP_4	139	155	Simple	Float	S	4	r,w	
QM_USER_TRIM_OFFSET_APP_5	140	156	Simple	Float	S	4	r,w	
QM_USER_TRIM_OFFSET_APP_6	141	157	Simple	Float	S	4	r,w	
QM_USER_TRIM_OFFSET_APP_7	142	158	Simple	Float	S	4	r,w	
QM_USER_TRIM_OFFSET_APP_8	143	159	Simple	Float	S	4	r,w	
QM_USER_TRIM_FACTOR_APP_1	144	160	Simple	Float	S	4	r,w	Correction factor for the flow measured value.
QM_USER_TRIM_FACTOR_APP_2	145	161	Simple	Float	S	4	r,w	
QM_USER_TRIM_FACTOR_APP_3	146	162	Simple	Float	S	4	r,w	
QM_USER_TRIM_FACTOR_APP_4	147	163	Simple	Float	S	4	r,w	
QM_USER_TRIM_FACTOR_APP_5	148	164	Simple	Float	S	4	r,w	
QM_USER_TRIM_FACTOR_APP_6	149	165	Simple	Float	S	4	r,w	
QM_USER_TRIM_FACTOR_APP_7	150	166	Simple	Float	S	4	r,w	
QM_USER_TRIM_FACTOR_APP_8	151	167	Simple	Float	S	4	r,w	

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
GAS_PRESSURE_APP_1	152	168	Simple	Float	S	4	r,w	Set the average measuring medium pressure.
GAS_PRESSURE_APP_2	153	169	Simple	Float	S	4	r,w	
GAS_PRESSURE_APP_3	154	170	Simple	Float	S	4	r,w	
GAS_PRESSURE_APP_4	155	171	Simple	Float	S	4	r,w	
GAS_PRESSURE_APP_5	156	172	Simple	Float	S	4	r,w	
GAS_PRESSURE_APP_6	157	173	Simple	Float	S	4	r,w	
GAS_PRESSURE_APP_7	158	174	Simple	Float	S	4	r,w	
GAS_PRESSURE_APP_8	159	175	Simple	Float	S	4	r,w	
GAS_APPLICATION_TEMP_APP_1	160	176	Simple	Float	S	4	r,w	Set the average measuring medium temperature.
GAS_APPLICATION_TEMP_APP_2	161	177	Simple	Float	S	4	r,w	
GAS_APPLICATION_TEMP_APP_3	162	178	Simple	Float	S	4	r,w	
GAS_APPLICATION_TEMP_APP_4	163	179	Simple	Float	S	4	r,w	
GAS_APPLICATION_TEMP_APP_5	164	180	Simple	Float	S	4	r,w	
GAS_APPLICATION_TEMP_APP_6	165	181	Simple	Float	S	4	r,w	
GAS_APPLICATION_TEMP_APP_7	166	182	Simple	Float	S	4	r,w	
GAS_APPLICATION_TEMP_APP_8	167	183	Simple	Float	S	4	r,w	
PIPE_SHAPE_TYPE_APP_1	168	184	Array	Unsigned8	S	1	r,w	Select the piping form and sensor position.
PIPE_SHAPE_TYPE_APP_2	169	185	Array	Unsigned8	S	1	r,w	0xDC: Circular and centered
PIPE_SHAPE_TYPE_APP_3	170	186	Array	Unsigned8	S	1	r,w	0xEB: Circular
PIPE_SHAPE_TYPE_APP_4	171	187	Array	Unsigned8	S	1	r,w	0xF5: Rectangular
PIPE_SHAPE_TYPE_APP_5	172	188	Array	Unsigned8	S	1	r,w	
PIPE_SHAPE_TYPE_APP_6	173	189	Array	Unsigned8	S	1	r,w	
PIPE_SHAPE_TYPE_APP_7	174	190	Array	Unsigned8	S	1	r,w	
PIPE_SHAPE_TYPE_APP_8	175	191	Array	Unsigned8	S	1	r,w	
PIPE_DIAMETER_TOWARDS_APP_1	176	192	Simple	Float	S	4	r,w	Set the inside diameter of the piping if the value ‘0xDC’ or ‘0xEB’ has been selected for the parameter ‘PIPE_SHAPE_TYPE_APP_x’.
PIPE_DIAMETER_TOWARDS_APP_2	177	193	Simple	Float	S	4	r,w	
PIPE_DIAMETER_TOWARDS_APP_3	178	194	Simple	Float	S	4	r,w	Set the inside height of the channel with a rectangular cross-section if the value ‘0xF5’ has been selected for parameter ‘PIPE_SHAPE_TYPE_APP_x’.
PIPE_DIAMETER_TOWARDS_APP_4	179	195	Simple	Float	S	4	r,w	
PIPE_DIAMETER_TOWARDS_APP_5	180	196	Simple	Float	S	4	r,w	
PIPE_DIAMETER_TOWARDS_APP_6	181	197	Simple	Float	S	4	r,w	
PIPE_DIAMETER_TOWARDS_APP_7	182	198	Simple	Float	S	4	r,w	
PIPE_DIAMETER_TOWARDS_APP_8	183	199	Simple	Float	S	4	r,w	

… 3 Block overview

… Transducer-Block 2 – Flow_AppSpecific (Slot 13)

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
PIPE_DIAMETER_ PERPENTICU_APP_1	184	200	Simple	Float	S	4	r,w	Set the inside width of the channel with rectangular cross-section.
PIPE_DIAMETER_ PERPENTICU_APP_2	185	201	Simple	Float	S	4	r,w	This parameter is only available if the value ‘0xF5’ has been selected for the parameter ‘PIPE_SHAPE_TYPE_APP_x’.
PIPE_DIAMETER_ PERPENTICU_APP_3	186	202	Simple	Float	S	4	r,w	
PIPE_DIAMETER_ PERPENTICU_APP_4	187	203	Simple	Float	S	4	r,w	
PIPE_DIAMETER_ PERPENTICU_APP_5	188	204	Simple	Float	S	4	r,w	
PIPE_DIAMETER_ PERPENTICU_APP_6	189	205	Simple	Float	S	4	r,w	
PIPE_DIAMETER_ PERPENTICU_APP_7	190	206	Simple	Float	S	4	r,w	
PIPE_DIAMETER_ PERPENTICU_APP_8	191	207	Simple	Float	S	4	r,w	
PIPE_INSERTION_ DEPTH_APP_1	192	208	Simple	Float	S	4	r,w	Set the insertion depth of the sensor. This parameter is only available if the value ‘0xEB’ or ‘0xF5’ has been selected for the parameter ‘PIPE_SHAPE_TYPE_APP_x’.
PIPE_INSERTION_ DEPTH_APP_2	193	209	Simple	Float	S	4	r,w	
PIPE_INSERTION_ DEPTH_APP_3	194	210	Simple	Float	S	4	r,w	
PIPE_INSERTION_ DEPTH_APP_4	195	211	Simple	Float	S	4	r,w	
PIPE_INSERTION_ DEPTH_APP_5	196	212	Simple	Float	S	4	r,w	
PIPE_INSERTION_ DEPTH_APP_6	197	213	Simple	Float	S	4	r,w	
PIPE_INSERTION_ DEPTH_APP_7	198	214	Simple	Float	S	4	r,w	
PIPE_INSERTION_ DEPTH_APP_8	199	215	Simple	Float	S	4	r,w	
—	200 to 205	216 to 221	0	0	0	0	0	Reserved for later use

Transducer-Block 3 – DeviceInfo (Slot 14)

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.

Parameter TB3 – DeviceInfo

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
BLOCK_OBJECT	0	16	Record	DS-32	Cst	20	r	0
ST_REV	1	17	Simple	Unsigned16	N	2	r	0
TAG_DESC	2	18	Simple	OctetString	S	32	r,w	0
STRATEGY	3	19	Simple	Unsigned16	S	2	r,w	0
ALERT_KEY	4	20	Simple	Unsigned8	S	1	r,w	0
TARGET_MODE	5	21	Simple	Unsigned8	S	1	r,w	0
MODE_BLK	6	22	Record	DS-37	D	3	r	0
ALARM_SUM	7	23	Record	DS-42	D	8	r	0
DEVICE_SERIES	8	24	Simple	Unsigned8	N	1	r	Output of the device range. 0x00: Unknown 0x32: FMT230 0x3C: FMT250 0x5A: FMT410 0x64: FMT430 0x6E: FMT450
SENSOR_ELEMET	9	25	Simple	Unsigned8	N	1	r	Output of the design of the thermal sensor elements. 0x00: Unknown 0x01: Ceramic standard 0x02: Ceramic high temp 0x03: Stainless steel standard 0x04: Stainless steel hygienic 0x05: Special
SENSOR_INSERT	10	26	Simple	Unsigned8	N	1	r	Output of the design of the sensor link. 0x00: Unknown 0x01: Flange design 0x02: Compression fitting 0x03: Threaded connection
QM_MAX_DN	11	27	Simple	Float	S	4	r	Output of the maximum mass flow for the selected nominal diameter.
QV_MAX_DN	12	28	Simple	Float	S	4	r	Output of the maximum standard volume flow for the selected nominal diameter.
SENSOR_INSERT_LENGTH	13	29	Simple	Float	N	4	r	Output of the insertion length of the sensor.
VERIMASS_STATE	14	30	Simple	Unsigned8	N	1	r	VeriMass function active? 0x00: Off 0x01: On
SENSOR_ID	15	31	Simple	Unsigned32	N	4	r	Output of the sensor ID.
SENSOR_SERIAL_NR	16	32	Simple	Visible_String	N	20	r	Outout of the sensor serial number.
SENSOR_RUN_HOURS	17	33	Simple	Unsigned32	N	4	r	Output of the operating hours of the sensor.

… 3 Block overview

… Transducer-Block 3 – DeviceInfo (Slot 14)

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
SENSOR_FIRST_CAL_DATE	18	34	Array	Unsigned8	N	3	r	Output of the calibration data of the sensor.
SENSOR_LAST_CAL_DATE	19	35	Array	Unsigned8	N	3	r	
SENSOR_CAL_CERT_NR	20	36	Simple	Visible_String	N	20	r	
SENSOR_FIRST_CAL_ LOCATION	21	37	Simple	Visible_String	N	20	r	
SENSOR_LAST_CAL_ LOCATION	22	38	Simple	Visible_String	N	20	r	
TRANSM_TYPE	23	39	Simple	Unsigned8	N	1	r	Output of the transmitter design. 0x00: Pending 0x03: FMT4xx remote mount design 0x07: FMT4xx integral mount design 0x0A: Error
TRANSM_ID	24	40	Simple	Unsigned32	N	4	r	Output of the transmitter ID.
TRANSM_SERIAL_NR	25	41	Simple	Visible_String	N	20	r	Output of the transmitter serial number.
TRANSM_RUN_HOURS	26	42	Simple	Unsigned32	N	4	r	Output of the operating hours of the transmitter.
TRANSM_RESTART_ COUNTER	27	43	Simple	Unsigned16	N	2	r	Number of device restarts (switching the power supply off and on).
TIME_SINCE_RESTART	28	44	Simple	Unsigned32	N	4	r	Device operating hours since the last restart.
TRANSM_FIRST_CAL_DATE	29	45	Array	Unsigned8	N	3	r	Output of the calibration data of the transmitter.
TRANSM_LAST_CAL_DATE	30	46	Array	Unsigned8	N	3	r	
TRANSM_CAL_CERT_NR	31	47	Simple	Visible_String	N	20	r	
TRANSM_FIRST_CAL_ LOCATION	32	48	Simple	Visible_String	N	20	r	
TRANSM_LAST_CAL_ LOCATION	33	49	Simple	Visible_String	N	20	r	
MANUFACTURER	34	50	Simple	Visible_String	N	20	r	Output of the manufacturer address and telephone
STREET	35	51	Simple	Visible_String	N	20	r	number.
CITY	36	52	Simple	Visible_String	N	20	r	
PHONE	37	53	Simple	Visible_String	N	20	r	
FW_VERSION_DEVICE	38	54	Simple	Visible_String	N	8	r	Version and item number of device software package.
FW_PART_NR_DEVICE	39	55	Simple	Visible_String	N	20	r	
FW_VERSION_ MOTHERBOARD	40	56	Simple	Visible_String	N	8	r	Version and checksum (CRC) of the motherboard software (MB) in the transmitter.
FW_CRC_MOTHERBOARD	41	57	Simple	Unsigned16	N	2	r	
FW_VERSION_FRONTEND	42	58	Simple	Visible_String	N	8	r	Version and checksum (CRC) of the frontend board (FEB)
FW_CRC_FRONTEND	43	59	Simple	Unsigned16	N	2	r	software in the sensor.
HW_VERSION_ MOTHERBOARD	44	60	Simple	Visible_String	N	20	r	Hardware version of the motherboard (MB) in the transmitter.
HW_VERSION_FRONTEND	45	61	Simple	Visible_String	N	20	r	Hardware version of the frontend board (FEB) in the sensor.
BOOTLOADER_VERSION_M OTHERBOARD	46	62	Simple	Visible_String	N	8	r	Version of the motherboard bootloader in the transmitter.
BOOTLOADER_VERSION_ FRONTEND	47	63	Simple	Visible_String	N	8	r	Version of the frontend board bootloader in the sensor.

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
FW_VERSION_CURR_OUT_31_32	48	64	Simple	Visible_String	N	8	r	Current output module software version and checksum (CRC).
FW_CRC_CURR_OUT_ 31_32	49	65	Simple	Unsigned16	N	2	r	
OPTION_CARD_1_TYPE	50	66	Simple	Unsigned8	N	1	r	Type of plug-in card present in the slot OC1. 0x0A: Profibus DP (white)
OPTION_CARD_2_TYPE	51	67	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
FW_VERSION_ FIELDBUSCARD	52	68	Simple	Visible_String	N	8	r	Firmware version of the fieldbus plug-in card.
FW_CRC_FIELDBUSCARD	53	69	Simple	Unsigned16	N	1	r	Checksum of the fieldbus plug-in card.
BOOTLOADER_VERSION_ FIELDBUSCARD	54	70	Simple	Visible_String	N	8	r	Bootloader version of the fieldbus plug-in card.
Reserved for future use	55 to 59	71 to 75	—	—	—	—	0	Reserved for later use

… 3 Block overview

Transducer-Block 4 – Special Function (Slot 15)

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.

Parameter TB4 – Special Function

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
BLOCK_OBJECT	0	16	Record	DS-32	Cst	20	r	0
ST_REV	1	17	Simple	Unsigned16	N	2	r	0
TAG_DESC	2	18	Simple	OctetString	S	32	r,w	0
STRATEGY	3	19	Simple	Unsigned16	S	2	r,w	0
ALERT_KEY	4	20	Simple	Unsigned8	S	1	r,w	0
TARGET_MODE	5	21	Simple	Unsigned8	S	1	r,w	0
MODE_BLK	6	22	Record	DS-37	D	3	r	0
ALARM_SUM	7	23	Record	DS-42	D	8	r	0
TOTALIZER_MASS_UNIT	8	24	Simple	Unsigned16	S	1	r,w	Select the unit for the mass totalizer. Refer to **Table 7: Units for the mass totalizer** on page 9.
TOTALIZER_STANDARD_ VOLUME_UNIT	9	25	Simple	Unsigned16	S	1	r,w	Select the unit for the standard volume totalizer. Refer to **Table 8: Units for the standard volume totalizer** on page 10.
USER_UNIT_MASS_ TOTAL_NAME	10	26	Simple	Visible_String	S	8	r,w	Enter the name of the user-defined totalizer unit for mass flow. Alphanumeric, maximum 7 characters.
USER_UNIT_MASS_ TOTAL_FACTOR	11	27	Simple	Float	S	4	r,w	Enter the factor for a user-defined totalizer unit. Setting range: 0.0001 to 100000 kg
USER_UNIT_ST_VOLUME_T OTAL_NAME	12	28	Simple	Visible_String	S	8	r,w	Enter the name of the user-defined unit for standard volume flow. Alphanumeric, maximum 7 characters.
USER_UNIT_ST_VOLUME_T OTAL_FACTOR	13	29	Simple	Float	S	4	r,w	Enter the factor for the user-defined unit for standard volume flow. Setting range: 0.0001 to 100000 m3/hour in standard conditions.
TOTALIZER_QM	14	30	Record	DS_101	D	5	r,w	Process variable: Standard mass flow counter reading in the selected unit.
TOTALIZER_ST_QV	15	31	Record	DS_101	D	5	r,w	Process variable: Standard volume flow counter reading in the selected unit.
TOTALIZER_START_ALL	16	32	Simple	Unsigned8	S	1	r,w	Starts all counters. 0x01: Activate function
TOTALIZER_STARTFLAG_ QM	17	33	Simple	Unsigned8	S	1	r,w	Mass totalizer active?
TOTALIZER_STARTFLAG_ ST_QV	18	34	Simple	Unsigned8	S	1	r,w	Standard volume totalizer active?

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
TOTALIZER_STOP_ALL	19	35	Simple	Unsigned8	S	1	r,w	Stops all counters. 0x01: Activate function
TOTALIZER_RESET_ALL	20	36	Simple	Unsigned8	S	1	r,w	Resets all counters. 0x01: Activate function
TOTALIZER_RESET_QM	21	37	Simple	Unsigned8	S	1	r,w	Resets all mass totalizers. 0x01: Activate function
TOTALIZER_RESET_ ST_QV	22	38	Simple	Unsigned8	S	1	r,w	Resets all standard volume totalizers. 0x01: Activate function
TOTALIZER_PRESET_ QM_FWD	23	39	Simple	Float	S	4	r,w	Input from meter readings (e.g. when replacing the transmitter).
TOTALIZER_PRESET_ ST_QV_FWD	24	40	Simple	Float	S	4	r,w	
BATCH_PROCESS_VALUE	25	41	Simple	Unsigned8	S	1	r,w	Selection of process variable used during the filling process. 0x00: Filler deactivated. 0x41: Standard volume flow. 0x42: Mass flow.
PRESET_BATCH_ TOTALIZER	26	42	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 'BATCH_PROCESS_VALUE'.
RESET_CURRENT_ BATCH_TOT	27	43	Simple	Unsigned8	S	1	r,w	Resets the current fill quantity. 0x01: Activate function
START_BATCHING	28	44	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. 0x01: Activate function
BATCH_TOTALIZER	29	45	Record	DS_101	D	5	r,w	Display of the current fill quantity. Once a fill operation has been started, the quantity already filled is shown here. The totalizer restarts at zero for each fill operation initiated and then counts up to the set fill quantity.
STOP_BATCHING	30	46	Simple	Unsigned8	S	1	r,w	Manual stop of the filling function. Alternatively, the digital input can be configured to stop the fill operation. 0x01: Activate function
BATCH_COUNTS	31	47	Simple	Unsigned32	D	4	r,w	Display of the number of fill operations since the last reset.
RESET_BATCH_COUNTS	32	48	Simple	Unsigned8	S	1	r,w	Reset the 'BATCH_COUNTS' counter. 0x01: Activate function

… 3 Block overview

… Transducer-Block 4 – Special Function (Slot 15)

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
LAG_ADJ_MODE	33	49	Simple	Unsigned8	S	1	r,w	Selection of overrun correction. Closing the fill valve takes some time and as a consequence the measuring medium is 'overrun', even though the fill quantity has been reached and the contact for closing the valve 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 'LAG_ADJ_QUANTITY.'
LAG_ADJ_QUANTITY	34	50	Simple	Float	S	4	r,w	Manual entry of the overrun quantity.
LAG_ADJ_AUTO_ QUANTITY	35	51	Simple	Float	S	4	r,w	Display of the overrun quantity automatically determined by the transmitter .
LAG_ADJ_FACTOR	36	52	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 + (factor x correction value during the last fill operation) 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	37	53	Simple	Float	S	4	r,w	Sets the time for the overrun quantity correction after the fill valve is closed.
CURR_OUT_31_32_ ALARM_BEHAVIOUR	38	54	Simple	Unsigned8	S	1	r,w	Selection of status of the current output in error condition. 0x00: High_Alarm 0x01: Low_Alarm Factory setting: High Alarm
CURR_OUT_31_32_ LOW_ALARM	39	55	Simple	Float	S	4	r,w	Sets the current for Low Alarm.
CURR_OUT_31_32_ HIGH_ALARM	40	56	Simple	Float	S	4	r,w	Sets the current for High Alarm.
CURR_OUT_31_32_ LOW_BEHAVIOUR	41	57	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 output. 0x01: High alarm – The high alarm current is output. 0x02: Low alarm – The low alarm current is output. Factory setting: Low Alarm

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
CURR_OUT_31_32_ HIGH_BEHAVIOUR	42	58	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 output. 0x01: High alarm – The high alarm current is output. 0x02: Low alarm – The low alarm current is output. Factory setting: hold last value
CURR_OUT_31_32_ OUTPUT_READING	43	59	Record	DS_101	D	5	r,w	Actual current output value in mA.
CURR_OUT_31_32_ OUTPUT_VALUE	44	60	Simple	Unsigned8	S	1	r,w	Selection of the process variable issued at the corresponding current output. 0x00: Mass flow in percent 0x01: Standard volume flow in percent 0x03: Temperature in percent
CURR_OUT_31_32_ SCALE_4_MA	45	61	Simple	Float	N	4	r,w	Comparison of the 4 mA or 20 mA values of the current output.
CURR_OUT_31_32_ SCALE_20_MA	46	62	Simple	Float	N	4	r,w	
DIG_OUT_41_42_MODE	47	63	Simple	Unsigned8	S	1	r,w	Selection of the operating mode for the digital output 41 / 42. 0x00: Digital output 41 / 42 deactivated. 0x01: Digital output 41 / 42 as a binary output (for example as an alarm output). 0x03: Digital output 41 / 42 as a pulse output. In pulse mode, pulses per unit are output (for example, 1 pulse per kg). 0x02: Digital output 41 / 42 as a frequency output. In frequency mode, a frequency proportional to the selected process variable is output.
DIG_OUT_41_42_PULSE_VA LUE	48	64	Simple	Unsigned8	D	1	r,w	Select process variable that is issued via the pulse output. 0x00: Pulse output deactivated. 0x01: Mass flow in the selected mass flow unit 0x02: Standard volume flow in the selected volume unit
DIG_OUT_41_42_ PULSE_WIDTH	49	65	Simple	Float	S	4	r,w	Set the pulse width (low signal) for the pulse output. The parameter directly limits the maximum possible output rate of pulses, for example max. 500 pulses/sec at 1 ms. If the calculation of the current output rate leads to an up-scale, the pulses are buffered and output with a delay. Setting range: 0.05 to 2000 ms

… 3 Block overview

… Transducer-Block 4 – Special Function (Slot 15)

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
DIG_OUT_41_42_ PULSE_NO_OF_PULSE	50	66	Simple	Float	S	5	r,w	Set the pulse per mass or volume unit.
DIG_OUT_41_42_TOT_ PER_PULSE_VAL	51	67	Simple	Float	S	5	r,w	Set the mass or volumes per pulse.
DIG_OUT_41_42_PULSE_WI DTH_MAX	52	68	Simple	Float	N	4	r	Output of the maximum pulse width (read only).
DIG_OUT_41_42_PULSE_WI DTH_MIN	53	69	Simple	Float	N	4	r	Output of the minimum pulse width (read only).
DIG_OUT_41_42_FREQ_VAL UE	54	70	Simple	Unsigned8	S	1	r,w	Selection of process variable that is issued via the frequency output. 0x00: Frequency output deactivated. 0x01: Net mass flow in percent 0x02: Standard volume flow in percent 0x03: Temperature in percent
DIG_OUT_41_42_FREQ_ UPPER_VALUE	55	71	Simple	Float	S	4	r,w	Set the frequency for 100 % of the process variable.
DIG_OUT_41_42_FREQ_ LOWER_VALUE	56	72	Simple	Float	S	4	r,w	Set the frequency for 0 % of the process variable.
DIG_OUT_41_42_LOGIC_ ACTION	57	73	Simple	Unsigned8	S	1	r,w	Selection of binary output function. 0x00: The binary output is deactivated 0x02: The binary output indicates an active alarm. The alarm is selected via the parameters ‘DIG_OUT_41_42_ALARM_xxx’. 0x04: The binary output is activated when the set fill quantity has been reached (only if the FillMass function is activated).
DIG_OUT_41_42_LOGIC_ ACTIVE_MODE	58	74	Simple	Unsigned8	S	1	r,w	Select switching properties for the binary output. 0x00: Closer 0x01: Opener Factory setting: closer
DIG_OUT_41_42_ ALARM_GENERAL	59	75	Simple	Unsigned8	S	1	r,w	Select error messages signaled via the binary output 41 / 42.
DIG_OUT_41_42_ ALARM_QM_MAX	60	76	Simple	Unsigned8	S	1	r,w	Only if the parameter ‘DIG_OUT_41_42_LOGIC_ ACTION’ has been set to ‘0x02’.
DIG_OUT_41_42_ ALARM_QM_MIN	61	77	Simple	Unsigned8	S	1	r,w	0x00: Alarm behavior OK 0x01: Alam behavior FAIL
DIG_OUT_41_42_ ALARM_ST_QV_MAX	62	78	Simple	Unsigned8	S	1	r,w	
DIG_OUT_41_42_ ALARM_ST_QV_MIN	63	79	Simple	Unsigned8	S	1	r,w	
DIG_OUT_41_42_ ALARM_FL_TEMP_MAX	64	80	Simple	Unsigned8	S	1	r,w	
DIG_OUT_41_42_ ALARM_FL_TEMP_MIN	65	81	Simple	Unsigned8	S	1	r,w	
DIG_OUT_41_42_ ALARM_SEN_SOILING	66	82	Simple	Unsigned8	S	1	r,w	

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
DIG_OUT_41_42_ FREQ_OUTPUT_VALUE	67	83	Simple	Float	D	4	r,w	Output value frequency DO 41 / 42
DIG_OUT_41_42_ STATE_OUTPUT_VALUE	68	84	Simple	Unsigned8	D	1	r,w	Output value for state DO 41 / 42 (binary)
DIG_OUT_51_52_MODE	69	85	Simple	Unsigned8	S	1	r,w	Selection of the operating mode for the digital output 51 / 52. The operating modes '0x05' and '0x06' are only available if the digital output 41 / 42 has been configured as a pulse output. 0x00: Digital output deactivated. 0x01: Digital output as binary output (for function see parameter 'DIG_OUT_51_52_LOGIC_ACTION'). 0x02: Digital output 51 / 52 as a frequency output. In frequency mode, a proportional frequency is issued. 0x05: Output of the same pulses as for digital output 41 / 42, phase shifted by 90°. 0x06: Output of the same pulses as for digital output 41 / 42, phase shifted by 180°.
DIG_OUT_51_52_FREQ_VAL UE	70	86	Simple	Unsigned8	S	1	r,w	Selection of process variable that is issued via the frequency output. 0x00: Frequency output deactivated. 0x01: Net mass flow in percent 0x02: Standard volume flow in percent 0x03: Temperature in percent
DIG_OUT_51_52_ FREQ_UPPER_VALUE	71	87	Simple	Float	S	4	r,w	Set the frequency for 100 % of the process variable.
DIG_OUT_51_52_ FREQ_LOWER_VALUE	72	88	Simple	Float	S	4	r,w	Set the frequency for 0 % of the process variable.
DIG_OUT_51_52_ LOGIC_ACTION	73	89	Simple	Unsigned8	S	1	r,w	Selection of binary output function. 0x00: The binary output is deactivated 0x02: The binary output indicates an active alarm. The alarm is selected via the parameters 'DIG_OUT_51_52_ALARM_xxx'. 0x04: The binary output is activated when the set fill quantity has been reached (only if the FillMass function is activated).
DIG_OUT_51_52_LOGIC_ ACTIVE_MODE	74	90	Simple	Unsigned8	S	1	r,w	Select switching properties for the binary output. 0x00: Closer 0x01: Opener Factory setting: closer

… 3 Block overview

… Transducer-Block 4 – Special Function (Slot 15)

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
DIG_OUT_51_52_ ALARM_GENERAL	75	91	Simple	Unsigned8	S	1	r,w	Selection of error messages signaled via the binary output 51 / 52.
DIG_OUT_51_52_ ALARM_QM_MAX	76	92	Simple	Unsigned8	S	1	r,w	Only if the parameter 'DIG_OUT_51_52_LOGIC_ ACTION' has been set to '0x02'.
DIG_OUT_51_52_ALARM_Q M_MIN	77	93	Simple	Unsigned8	S	1	r,w	0x00: Alarm behavior OK 0x01: Alam behavior FAIL
DIG_OUT_51_52_ALARM_ST _QV_MAX	78	94	Simple	Unsigned8	S	1	r,w	
DIG_OUT_51_52_ALARM_ST _QV_MIN	79	95	Simple	Unsigned8	S	1	r,w	
DIG_OUT_51_52_ALARM_FL _TEMP_MAX	80	96	Simple	Unsigned8	S	1	r,w	
DIG_OUT_51_52_ALARM_FL _TEMP_MIN	81	97	Simple	Unsigned8	S	1	r,w	
DIG_OUT_51_52_ALARM_SE N_SOILING	82	98	Simple	Unsigned8	S	1	r,w	
DIG_OUT_51_52_FREQ_OUT PUT_VALUE	83	99	Simple	Float	D	4	r,w	Output value frequency DO 51 / 52
DIG_OUT_51_52_STATE_OU TPUT_VALUE	84	100	Simple	Unsigned8	D	1	r,w	Output value for state DO 51 / 52 (binary)
DIG_OUT_V3_V4_MODE	85	101	Simple	Unsigned8	S	1	r,w	Selection of the operating mode for digital output V3 / V4. 0x00: Digital output deactivated. 0x01: Digital output as binary output (for function see parameter 'DIG_OUT_V3_V4_LOGIC_ACTION').
DIG_OUT_V3_V4_LOGIC_AC TION	86	102	Simple	Unsigned8	S	1	r,w	Selection of binary output function. 0x00: The binary output is deactivated 0x02: The binary output indicates an active alarm. The alarm is selected via the parameters 'DIG_OUT_V3_V4_ALARM_xxx'. 0x04: The binary output is activated when the set fill quantity has been reached (only if the FillMass function is activated).
DIG_OUT_V3_V4_LOGIC_ ACTIVE_MODE	87	103	Simple	Unsigned8	S	1	r,w	Select switching properties for the binary output. 0x00: Closer 0x01: Opener Factory setting: closer
DIG_OUT_V3_V4_ ALARM_GENERAL	88	104	Simple	Unsigned8	S	1	r,w	Select error messages signaled via the binary output V3 / V4.
DIG_OUT_V3_V4_ ALARM_QM_MAX	89	105	Simple	Unsigned8	S	1	r,w	Only if the parameter 'DIG_OUT_V3_V4_LOGIC_ ACTION' has been set to '0x02'.
DIG_OUT_V3_V4_ ALARM_QM_MIN	90	106	Simple	Unsigned8	S	1	r,w	0x00: Alarm behavior OK 0x01: Alam behavior FAIL
DIG_OUT_V3_V4_ ALARM_ST_QV_MAX	91	107	Simple	Unsigned8	S	1	r,w	

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
DIG_OUT_V3_V4_ ALARM_ST_QV_MIN	92	108	Simple	Unsigned8	S	1	r,w	Select error messages signaled via the binary output V3 / V4.
DIG_OUT_V3_V4_ ALARM_FL_TEMP_MAX	93	109	Simple	Unsigned8	S	1	r,w	Only if the parameter 'DIG_OUT_V3_V4_LOGIC_ ACTION' has been set to '0x02'.
DIG_OUT_V3_V4_ ALARM_FL_TEMP_MIN	94	110	Simple	Unsigned8	S	1	r,w	0x00: Alarm behavior OK 0x01: Alam behavior FAIL
DIG_OUT_V3_V4_ ALARM_SEN_SOILING	95	111	Simple	Unsigned8	S	1	r,w	
DIG_OUT_V3_V4_ STATE_OUTPUT_VALUE	96	112	Simple	Unsigned8	D	1	r,w	Output value for state DO V3 / V4 (binary)
DIG_IN_V3_V4_FUNCTION	97	113	Simple	Unsigned8	S	1	r,w	Select a function for the digital input. 0x00: No function. 0x01: Counter reset for all counters 0x04: External counter stop for all counters 0x03: sets flow measurement to 0. Heating of the thermal measuring element is also switched off here 0x05: Start / stop fill operation (only when FillMass function is activated). 0x07: Application selection via the digital input (with digital input V1 / V2). 0x08: Application selection via the digital input (with digital input V3 / V4).
DIG_IN_V3_V4_ ACTIVE_MODE	98	114	Simple	Unsigned8	S	1	r,w	Select switching properties for the digital input. 0x00: Closer 0x01: Opener Factory setting: closer
DIG_IN_V3_V4_ DELAY_TIME	99	115	Simple	Unsigned8	S	1	r,w	Selection of delay time for suppressing EMC faults on the digital input. 0x01: 100ms 0x05: 500ms 0x0A: 1000ms
DIG_IN_V3_V4_STATE_ INPUT_READING	100	116	Simple	Unsigned8	D	1	r,w	Input value for state DI V3 / V4 (binary)

… 3 Block overview

… Transducer-Block 4 – Special Function (Slot 15)

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
CURR_OUT_31_32_ LOOP_CURRENT_MODE	101	117	Simple	Unsigned8	S	1	r,w	Select the HART operating mode (only for 31 / 32 / Uco current output). 0x00: Multi-drop fixed value – the current output supports the HART multi-drop mode, the current output is fixed to 3.6 mA and no longer follows the selected process variable. The process variables can be transferred via the HART protocol. 0x01: Standard signaling – the current output transfers the selected process variables. In addition, the process variables can be transferred via the HART protocol. 0x02: Power mode: the current output 31 / 32 / Uco is set permanently to 22.6 mA and no longer follows the selected process variable. HART communication is deactivated. The current output 31 / 32 / Uco works as a power supply unit for the operation of the digital output 41 / 42 as an active output.
CURR_OUT_31_32_ FREQENCY_TYPE	102	118	Simple	Unsigned8	S	1	r,w	Reserved by ABB
CURR_OUT_31_32_ SCALING_STATE	103	119	Simple	Unsigned8	S	1	r,w	Reserved by ABB
CURR_OUT_31_32_ BASE_CALIB_OFFSET	104	120	Simple	Float	D	4	r,w	Reserved by ABB
CURR_OUT_31_32_ BASE_CALIB_GAIN	105	121	Simple	Float	D	4	r,w	Reserved by ABB
Reserved for future use	106 to 113	122 to 129	0	0	0	0	r,w	Reserved for later use

Transducer-Block 5 – Display (Slot 16)

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

Parameter TB5 – Display

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
BLOCK_OBJECT	0	16	Record	DS-32	Cst	20	r	0
ST_REV	1	17	Simple	Unsigned16	N	2	r	0
TAG_DESC	2	18	Simple	OctetString	S	32	r,w	0
STRATEGY	3	19	Simple	Unsigned16	S	2	r,w	0
ALERT_KEY	4	20	Simple	Unsigned8	S	1	r,w	0
TARGET_MODE	5	21	Simple	Unsigned8	S	1	r,w	0
MODE_BLK	6	22	Record	DS-37	D	3	r	0
ALARM_SUM	7	23	Record	DS-42	D	8	r	0
LANGUAGE	8	24	Simple	Unsigned8	S	1	r,w	Selection of menu language. Available languages: 0x00: English 0x01: Deutsch 0x02: Français 0x03: Español 0x04: Italiano 0x09: Polski 0x0B: Chinese 0x0D: Turkish
CONTRAST	9	25	Simple	Unsigned8	S	1	r,w	Contrast setting for the LCD display.
PAGE_1_DISPLAY_MODE	10	26	Simple	Unsigned8	S	1	r,w	Configure each operator page. 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 5 – Display (Slot 16)

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
PAGE_1_LINE_1	11	27	Simple	Unsigned8	S	1	r,w	Selection of process variable displayed in the respective row. 0x00: Mass flow in the selected unit 0x01: Mass flow in %. 0x04: Temperature in the selected unit. 0x05: Temperature in %. 0x0C: Standard volume flow in unit. 0x0D: Standard volume flow in %. 0x0E: Standard density in unit. 0x15: Mass totalizer 0x21: Standard volume totalizer. 0x22: Current batch total. 0x23: Current batch counts. 0x0D: Standard volume flow in %. 0x28: Mass totalizer sum 0x2C: Standard volume totalizer sum.
PAGE_1_BARGRAPH	14	30	Simple	Unsigned8	S	1	r,w	Selection of process variable displayed as a bar graph. 0x01: Mass flow in %. 0x05: Temperature in %. 0x0D: Standard volume flow in %.
PAGE_2_DISPLAY_MODE	15	31	Simple	Unsigned8	S	1	r,w	See parameter ‘PAGE_1_DISPLAY_MODE’.
PAGE_2_LINE_1	16	32	Simple	Unsigned8	S	1	r,w	See parameter ‘PAGE_1_LINE_1 … 4’.
PAGE_2_LINE_2	17	33	Simple	Unsigned8	S	1	r,w	
PAGE_2_LINE_3	18	34	Simple	Unsigned8	S	1	r,w	
PAGE_2_BARGRAPH	19	35	Simple	Unsigned8	S	1	r,w	See parameter ‘PAGE_1_BARGRAPH’.
PAGE_3_DISPLAY_MODE	20	36	Simple	Unsigned8	S	1	r,w	See parameter ‘PAGE_1_DISPLAY_MODE’.
PAGE_3_LINE_1	21	37	Simple	Unsigned8	S	1	r,w	See parameter ‘PAGE_1_LINE_1 … 4’.
PAGE_3_LINE_2	22	38	Simple	Unsigned8	S	1	r,w	
PAGE_3_LINE_3	23	39	Simple	Unsigned8	S	1	r,w	
PAGE_3_BARGRAPH	24	40	Simple	Unsigned8	S	1	r,w	See parameter ‘PAGE_1_BARGRAPH’.
PAGE_4_DISPLAY_MODE	25	41	Simple	Unsigned8	S	1	r,w	See parameter ‘PAGE_1_DISPLAY_MODE’.
PAGE_4_LINE_1	26	42	Simple	Unsigned8	S	1	r,w	See parameter ‘PAGE_1_LINE_1 … 4’.
PAGE_4_LINE_2	27	43	Simple	Unsigned8	S	1	r,w	
PAGE_4_LINE_3	28	44	Simple	Unsigned8	S	1	r,w	
PAGE_4_BARGRAPH	29	45	Simple	Unsigned8	S	1	r,w	See parameter ‘PAGE_1_BARGRAPH’.
AUTOSCROLL	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: deactivated

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
DECIMAL_PLACES_ MASSFLOW	31	47	Simple	Unsigned8	S	1	r,w	Selection of number of decimal places (maximum 6) used to display the corresponding process variables. 0x00: X 0x01: X.X 0x02: X.XX 0x03: X.XXX 0x04: X.XXXX 0x05: X.XXXXX Default setting: X.XX
DECIMAL_PLACES_ VOLUME_FLOW	32	48	Simple	Unsigned8	S	1	r,w	
DECIMAL_PLACES_ TEMPERATURE	33	49	Simple	Unsigned8	S	1	r,w	
DECIMAL_PLACES_ DENSITY	34	50	Simple	Unsigned8	S	1	r,w	
DECIMAL_PLACES_ RESERVED1	35	51	Simple	Unsigned8	S	1	r,w	
DECIMAL_PLACES_MASS	36	52	Simple	Unsigned8	S	1	r,w	
DECIMAL_PLACES_ VOLUME	37	53	Simple	Unsigned8	S	1	r,w	
DECIMAL_PLACES_ ST_VOLUME_FLOW	38	54	Simple	Unsigned8	S	2	r,w	
DECIMAL_PLACES_ ST_VOLUME	39	55	Simple	Unsigned8	S	3	r,w	
DECIMAL_PLACES_ RESERVED2	40	56	Simple	Unsigned8	S	4	r,w	
DECIMAL_PLACES_ STANDARD_DENSITY	41	57	Simple	Unsigned8	S	5	r,w	
DATE_FORMAT	42	58	Simple	Unsigned8	S	1	r,w	Select the display format for the date. 0x00: DD_MM_YYYY 0x01: MM_DD_YYYY 0x02: YYYY_MM_DD
OPERATOR_PAGE_ TAG_SELECTOR	43	59	Simple	Unsigned8	S	1	r,w	Selection of the information displayed in the process display in measuring point tagging 0x00: Deactivated 0x01: Sensor Location Tag 0x02: PROFIBUS® address 0x03: Hart® address 0x04: Active application
—	44 to 50	60 to 66	0	0	0	0	0	Reserved for later use

… 3 Block overview

Transducer-Block 6 – Diagnostics (Slot 17)

The FMT4xx transmitter has functions for process diagnosis. The functions are incorporated in the Transducer-Block – Diagnostics.

Note
All parameters in this block are read-only.

Parameter TB6 – Diagnostics

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
BLOCK_OBJECT	0	16	Record	DS-32	Cst	20	r	0
ST_REV	1	17	Simple	Unsigned16	N	2	r	0
TAG_DESC	2	18	Simple	OctetString	S	32	r,w	0
STRATEGY	3	19	Simple	Unsigned16	S	2	r,w	0
ALERT_KEY	4	20	Simple	Unsigned8	S	1	r,w	0
TARGET_MODE	5	21	Simple	Unsigned8	S	1	r,w	0
MODE_BLK	6	22	Record	DS-37	D	3	r	0
ALARM_SUM	7	23	Record	DS-42	D	8	r	0
VOLTAGE_HEAT_DRIVER	8	24	Simple	Float	D	4	r	Output of the driver voltage.
TEMPERATURE_MEDIUM	9	25	Simple	Float	D	4	r	Output of the measuring medium temperature.
INHOUSE_TEMPERATURE	10	26	Simple	Float	D	4	r	Output of the transmitter temperature.
VERIMASS_RESULT	11	27	Simple	Unsigned8	D	1	r	Output of the fingerprint status. 0x00: VERIMASS_RESULT_UNKNOWN 0x01: VERIMASS_RESULT_PROCESSING1 0x02: VERIMASS_RESULT_PROCESSING2 0x03: VERIMASS_RESULT_DONE 0x80: VERIMASS_RESULT_ERROR 0x81: VERIMASS_RESULT_ERROR_TEMPERATUR 0x82: VERIMASS_RESULT_ERROR_BUSY 0x83: VERIMASS_RESULT_ERROR_PUT_GET
VERIMASS_CUSTOM_ RESULT_TDC1	12	28	Simple	Float	S	4	r	Output of the VeriMass variables. Value TDC1: Temperature change TDC1
VERIMASS_CUSTOM_ RESULT_TDC2	13	29	Simple	Float	S	4	r	Value TDC2: Temperature change TDC2 Value HDC1: Heat emission change HDC1
VERIMASS_CUSTOM_ RESULT_HDC1	14	30	Simple	Float	S	4	r	Value HDC2: Heat emission change HDC2
VERIMASS_CUSTOM_ RESULT_HDC2	15	31	Simple	Float	S	4	r	
VERIMASS_CUSTOM_ FINGERPR_DELETE	16	32	Simple	Unsigned8	D	1	r	Delete the commissioning fingerprint. The commissioning fingerprint is deleted by writing ‘0x00’.

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
VERIMASS_CUST_ FINGERP_START	17	33	Simple	Unsigned8	D	1	r	Create the commissioning fingerprint. The process takes approx. 12 minutes. Make sure that during this time there is no flow through the sensor (e.g. by shutting or sealing it off). 0x01: Activate function
VERIMASS_CUST_ FINGERP_START_VERI	18	34	Simple	Unsigned8	D	1	r	Fingerprint testing manual start. The process takes approx. 12 minutes. Make sure that during this time there is no flow through the sensor (e.g. by shutting or sealing it off). 0x01: Activate function
VERIMASS_STATE	19	35	Simple	Unsigned8	D	1	r	VeriMass function active?
VERIMASS_PROGRESS_ TIMER	20	36	Simple	Float	S	4	r	Output of the running time of fingerprint testing.
MAINTENANCE_TIMER_ UPCOUNT	21	37	Simple	Unsigned32	D	4	r	Current counter state of the service interval.
PRESET_MAINTENANCE_ CYCLE	22	38	Simple	Unsigned32	S	4	r	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	23	39	Simple	Unsigned32	D	4	r	Remaining service interval time until setting of error message ‘Service interval has been reached.’
START_NEW_ MAINTENANCE_CYCLE	24	40	Simple	Unsigned8	S	1	r	Resetting of the maintenance interval. The service interval is reset to the value set in ‘PRESET_MAINTENANCE_CYCLE’. 0x01: Reset
SIMULATION_SWITCH	25	41	Simple	Unsigned8	D	1	r	Manual simulation of measured values. The output values correspond to the simulated flowrate entered. The ‘Configuration’ information is displayed in the lower line of the display. Only one measured value / output can be selected for simulation. After power-up / restart of the device, the simulation is switched off. 0x00: Off 0x01: Qm Massflow [unit] 0x02: Temperature [unit] 0x03: Qv@ Volumeflow [unit] 0x04: Density@ [unit] 0x32: Qm Massflow [%] 0x33: Temperature [%] 0x34: Qv@ Volumeflow [%] 0x34: Curr.Out 31/32/Uco 0x78: Dig.Out 41 / 42 0x79: Dig.Out 51 / 52 0x7A: Dig.Out V3/V4 0x8C: Dig.In V3/V4 State

… 3 Block overview

… Transducer-Block 6 – Diagnostics (Slot 17)

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
SIM_SWITCH_CURR_OUT_31_32_UCO	26	42	Simple	Unsigned8	D	1	r	Simulation current output 31 / 32 / Uco. 0x00: Off 0x01: On
SIM_CURR_OUT_31_32_UCO	27	43	Simple	Float	D	4	r	Simulated output current (3.5 to 22.6 mA)
SIM_DIG_OUT_41_42_STATE	28	44	Simple	Unsigned8	D	1	r	Simulated state for binary output 41 / 42 0x00: logic low 0x01: logic high
SIM_DIG_OUT_41_42_FREQ_PULSE	29	45	Simple	Float	D	4	r	Simulated output frequency (0 to 10500 Hz) for frequency output 41 / 42.
SIM_DIG_OUT_51_52_STATE	30	46	Simple	Unsigned8	D	1	r	Simulated state for binary output 51 / 52 0x00: logic low 0x01: logic high
SIM_DIG_OUT_51_52_PULSE	31	47	Simple	Float	D	4	r	Simulated output frequency (0 to 10500 Hz) for frequency output 51 / 52.
SIM_DIG_OUT_V3_V4_STATE	32	48	Simple	Unsigned8	D	1	r	Simulated state for binary output V3 / V4 0x00: logic low 0x01: logic high
SIM_DIG_IN_V3_V4_STATE	33	49	Simple	Unsigned8	D	1	r	Simulated state for digital input V3 / V4 0x00: logic low 0x01: logic high
SIM_QM_MASSFLOW_ UNIT	34	50	Simple	Float	D	4	r	Simulated mass flow in the selected unit.
SIM_QM_MASSFLOW_RATIO	35	51	Simple	Float	D	4	r	Simulated mass flow in %.
SIM_QM_MASSFLOW_RANGE_MIN	36	52	Simple	Float	N	4	r	Lower limit for possible simulation value.
SIM_QM_MASSFLOW_RANGE_MAX	37	53	Simple	Float	N	4	r	Upper limit for possible simulation value.
SIM_QM_ST_DENSITY_ UNIT	38	54	Simple	Float	D	4	r	Simulated standard density in the selected unit.
—	39	55	0	0	0	0	0	Not supported.
SIM_QM_ST_DENSITY_RANGE_MIN	40	56	Simple	Float	N	4	r	Lower limit for possible simulation value.
SIM_QM_ST_DENSITY_RANGE_MAX	41	57	Simple	Float	N	4	r	Upper limit for possible simulation value.
SIM_QV_ST_VOLUMEFLOW_UNIT	42	58	Simple	Float	D	4	r	Simulated standard volume flow in the selected unit.
SIM_QV_STVOLUMEFLOW_RATIO	43	59	Simple	Float	D	4	r	Simulated standard volume flow in %.
SIM_QV_STVOLUMEFLOW_RANGE_MIN	44	60	Simple	Float	N	4	r	Lower limit for possible simulation value.
SIM_QV_STVOLUMEFLOW_RANGE_MAX	45	61	Simple	Float	N	4	r	Upper limit for possible simulation value.

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
SIM_TEMPERATURE_UNIT	46	62	Simple	Float	D	4	r	Simulated temperature in the selected unit.
SIM_TEMPERATURE_ RATIO	47	63	Simple	Float	D	4	r	Simulated temperature in %.
SIM_TEMPERATURE_ RANGE_MIN	48	64	Simple	Float	N	4	r	Lower limit for possible simulation value.
SIM_TEMPERATURE_ RANGE_MAX	49	65	Simple	Float	N	4	r	Upper limit for possible simulation value.
DIAG_DIAGNOSIS_ SIMULATION	50	66	Array	Unsigned8	D	6	r	Bit-wise output of the simulated alarms.
DIAG_SIMULATION_ STATUS	51	67	Simple	Unsigned8	D	1	r	Simulation status 0x00: Simulation switched off 0x01: Simulation active
DIAG_REF_TIME_SETUP	52	68	Simple	Unsigned32	D	4	r	Output of the diagnosis reference time
DIAG_REF_DAY_SETUP	53	69	Simple	Unsigned8	D	1	r	(time, day, month, year).
DIAG_REF_MONTH_SETUP	54	70	Simple	Unsigned8	D	1	r	
DIAG_REF_YEAR_SETUP	55	71	Simple	Unsigned8	D	1	r	
SETUP_REF_TIME_SETUP	56	72	Simple	Unsigned32	D	4	r,w	Set the diagnosis reference time
SETUP_REF_DAY_SETUP	57	73	Simple	Unsigned8	D	1	r,w	(time, day, month, year).
SETUP_REF_MONTH_ SETUP	58	74	Simple	Unsigned8	D	1	r,w	
SETUP_REF_YEAR_SETUP	59	75	Simple	Unsigned8	D	1	r,w	
DIAG_ALARM_TIME_ DATE_TIME	60	76	Simple	Unsigned32	S	4	r	Output of the specific alarm reference time for the alarm history (time, day, month, year).
DIAG_ALARM_TIME_ DATE_DAY	61	77	Simple	Unsigned8	S	1	r	
DIAG_ALARM_TIME_ DATE_MONTH	62	78	Simple	Unsigned8	S	1	r	
DIAG_ALARM_TIME_ DATE_YEAR	63	79	Simple	Unsigned8	S	1	r	
DEVICE_STATUS	64	80	Array	Unsigned8	S	6	r	Output of the internal device status.
STATUS_OUT_VAR_ TEMPERATURE	65	81	Simple	Unsigned8	D	1	r	
STATUS_OUT_VAR_ MASS_FLOW	66	82	Simple	Unsigned8	D	1	r	
STATUS_OUT_VAR_ ST_DENISTY	67	83	Simple	Unsigned8	D	1	r	
STATUS_OUT_VAR_ ST_VOLUME_FLOW	68	84	Simple	Unsigned8	D	1	r	
STATUS_OUT_VAR_ TEMP_RATIO	69	85	Simple	Unsigned8	D	1	r	
STATUS_OUT_VAR_ MASS_FLOW_RATIO	70	86	Simple	Unsigned8	D	1	r	
STATUS_OUT_VAR_ ST_VOLFLOW_RATIO	71	87	Simple	Unsigned8	D	1	r	

… 3 Block overview

… Transducer-Block 6 – Diagnostics (Slot 17)

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Description
CO1_FEEDBACK_VALUE_ READ_UA	72	88	Simple	Unsigned16	D	2	r	CO1 readback value in ua
READBACK_ALARM	73	89	Simple	Unsigned8	D	1	r	Current loop error current output 31 / 32. 0x00: No error 0x01: Error active
READBACK_AUTO_ RESET_10MIN	74	90	Simple	Unsigned8	D	1	r	Automatic reset of the 'power circuit disrupted' error message. 0x00: The error is permanently saved and must be reset manually. After the reset, the current output 31 / 32 is retested. 0x01: The error is automatically reset after 10 minutes. After the reset, the current output 31 / 32 is retested.
READBACK_AUTO_ RESET_OPEN_LOOP	75	91	Simple	Unsigned8	D	1	r	Behavior in the case of an open current output 31 / 32 (interruption of the current loop). 0x00: If the current loop is interrupted, the 'power circuit disrupted' error is generated. The reset of the error then depends on the setting of the 'READBACK_AUTO_ RESET_10MIN' parameter. 0x01: If the current loop is closed again, the error will be automatically reset.
READBACK_ALARM_ CLEAR	76	92	Simple	Unsigned8	D	1	r	Reset of the 'power circuit disrupted' error message. 0x01: Reset
—	77 bis 79	93 bis 95	0	0	0	0	r	Reserved for later 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 3.01.

Type: Block
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	

4 Diagnosis / error messages

The FMT4xx 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 FMT4xx:

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 PA3.02 profile or 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 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 of the FMT4xx** on page 64). 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.

To enable the user to decide which alarm bits are to be 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 of the FMT4xx

The following table lists the device-specific alarms of the FMT4xx. 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	Priority	SV
FLOW_MASS_REACHED	Mass flowrate exceeds limits.	OPERATING_CONDITION_ PROCESS	OFF_SPECIFICATION	46	0x1
FLOW_VOLUME_REACHED	Volume flowrate exceeds limits.	OPERATING_CONDITION_ PROCESS	OFF_SPECIFICATION	44	0x2
SIMUALTION_ALARM	Simulation is on! Simulating process/output value	CONFIG_STATUS	CHECK_FUNCTION	72	0x3
FLOWRATE_TO_ZERO	Flowrate to zero	CONFIG_STATUS	CHECK_FUNCTION	78	0x4
ALARM_MAINTENANCE_ CYCLE_TIME_EXEED	Maintenance interval is reached	OPERATING_CONDITION_ PROCESS	MAINTENANCE	26	0x5
TOTALIZER_STOP_ALARM	All totalizer stopp.	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<1600h at Qmax.	CONFIG_STATUS	MAINTENANCE	28	0x8
DEVICE_NOT_CALIBRATED_ ALARM	Device not calibrated.	CONFIG_STATUS	MAINTENANCE	24	0x9
NV_CHIPS_DEFECT_FEB	Sensor memory defective.	HW_STATUS_ELECTRONICS	MAINTENANCE	38	0xA
NV_DATA_DEFECT	NV data defect. Data storage irreparable.	HW_STATUS_ELECTRONICS	FAILURE	84	0xB
FE_BOARD_NOT_DETECTED	No Frontend Board detected. Wrong connection. Defect Frontend.	HW_STATUS_ELECTRONICS	FAILURE	98	0xC
FE_BOARD_COMM_ERROR	FEB communication error.	HW_STATUS_ELECTRONICS	FAILURE	88	0xD
INCOMPATIBLE_FE_BOARD	Incompatible Frontend Board.	HW_STATUS_ELECTRONICS	FAILURE	82	0xE
NV_CHIP_DEFECT_MB	NV chips defect on Motherboard.	HW_STATUS_ELECTRONICS	MAINTENANCE	37	0xF
DO1_PULSENUMMAXALARM	Dig.Out 41/42 is saturated.	OPERATING_CONDITION_ PROCESS	OFF_SPECIFICATION	47	0x10
CO1_SATURATED_ALARM	Curr.Out 31/32 is saturated.	OPERATING_CONDITION_ PROCESS	OFF_SPECIFICATION	52	0x11
CO2_3_SATURATED_ALARM	Curr.Out V1/V2, V3/V4 saturated	OPERATING_CONDITION_ PROCESS	OFF_SPECIFICATION	51	0x12
CO1_COM_ERROR	Curr.Out 31/32 com error.	HW_STATUS_ELECTRONICS	FAILURE	86	0x13
OPTION_MODULE_1 _COM_ ERROR	Option Card 1 com error.	HW_STATUS_ELECTRONICS	OFF_SPECIFICATION	49	0x14
OPTION_MODULE_2 _COM_ ERROR	Option Card 2 com error.	HW_STATUS_ELECTRONICS	OFF_SPECIFICATION	48	0x15
CO1_SAFETY_ALARM	Safety Alarm Curr.Out 31/32	HW_STATUS_ELECTRONICS	FAILURE	94	0x16
CO1_NOT_CALIBRATED_ ALARM	Curr.Out 31/32 not calibrated.	CONFIG_STATUS	MAINTENANCE	32	0x17
CO2_NOT_CALIBRATED_ ALARM	Curr.Out V1/V2 not calibrated.	CONFIG_STATUS	MAINTENANCE	31	0x18
CO3_NOT_CALIBRATED_ ALARM	Curr.Out V3/V4 not calibrated.	CONFIG_STATUS	MAINTENANCE	30	0x19

Alarm Mapping	Description	NAMUR Group	NAMUR class	Priority	SV
VOLTAGE_MONITORING_ ALARM_MB	MB voltages outside range.	HW_STATUS_ELECTRONICS	FAILURE	53	0x1A
ALARM_SIMULATION	An alarm is simulated.	CONFIG_STATUS	CHECK_FUNCTION	70	Not supported
FIELDBUS_BOARD_IN_RESET	Communicat. card not responding	HW_STATUS_ELECTRONICS	MAINTENANCE	20	0x27
CO1_READBACK_ALARM	CO31/32 readbackcurrent deviates	HW_STATUS_ELECTRONICS	OFF_SPECIFICATION	65	0x28
PRIMARY_ADC_FAILURE	ADC Failure on Frontend Board.	HW_STATUS_ELECTRONICS	FAILURE		0x1B
SENSOR_ ELECTRONICS_FAILED	Electronics failFrontend Board.	HW_STATUS_SENSOR	FAILURE	96	0x1C
TEMPERATURE_SENSOR_ EXCEEDS_LIMITS	Sensor temperature out of range.	HW_STATUS_ELECTRONICS	OFF_SPECIFICATION	92	0x1D
SENSOR_ELECTRONICS_ TEMP_REACHED	Frontend temp. out of range.	HW_STATUS_SENSOR	OFF_SPECIFICATION	55	0x1E
SENSOR_MEASURING_FAILED	Sensor failure or disconnected.	HW_STATUS_ELECTRONICS	FAILURE	93	0x1F
SENSOR_POWER_LIMIT_ REACHED	Sensor heat emission limit.	OPERATING_CONDITION_ PROCESS	OFF_SPECIFICATION	45	0x20
RESERVED_36	Reserved 36			59	Not supported
RESERVED_37	Reserved 37			53	Not supported
FLOW_TEMP_REACHED	Medium temperat exceeds limits.	OPERATING_CONDITION_ PROCESS	OFF_SPECIFICATION	52	0x21
SENSOR_CONFIGURATION_ FAILED	Invalid Sensor configuration	CONFIG_STATUS	MAINTENANCE	59	0x22
FLOW_NORMVOLUME_ REACHED	Std.Volume flow exceeds limits.	OPERATING_CONDITION_ PROCESS	OFF_SPECIFICATION	41	0x23
SENSOR_SOILING_ALARM	Sensor soiling detected.	HW_STATUS_SENSOR	MAINTENANCE	58	0x24
VOLTAGE_MONITORING_ ALARM_FEB	FEB voltages outside range.	HW_STATUS_ELECTRONICS	FAILURE	81	0x25
DO2_PULSENUMMAXALARM DIGITALOUTPUT_DIAG_ FREQ_MAX	Dig.Out 51/52 is saturated.	OPERATING_CONDITION_ PROCESS	OFF_SPECIFICATION	46	0x26

… 4 Diagnosis / error messages

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. Cyclical reading via the DDLM_SLAVE_DIAG service is also possible.

The DDLM_SLAVE_DIAG service provides for the general PA profiles 9740 and 9700 only the DIAGNOSIS, as this parameter is defined in the PA profile, but the DIAGNOSIS_EXTENSION is manufacturer-specific.
With the FCx4xx-specific profile 0x3434, the DDLM_SLAVE_DIAG service has been expanded and also transmits the DIAGNOSIS_EXTENSION parameter in byte 15 to 20.

Procedure:

During ongoing cyclical communication, the master regularly requests input data from the slave via 'Request Data Exchange'. The slave responds with 'Response Data Exchange'. The response of the slave 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 in the 'Response Data Exchange' to True on a one-time basis. Then the master requests diagnostics data from the slave with 'Request Get Diag'.
The slave responds with 'Response Get Diag'. Therefore, the 'Get Diag' service only takes place when the diagnostics data in the slave changes.

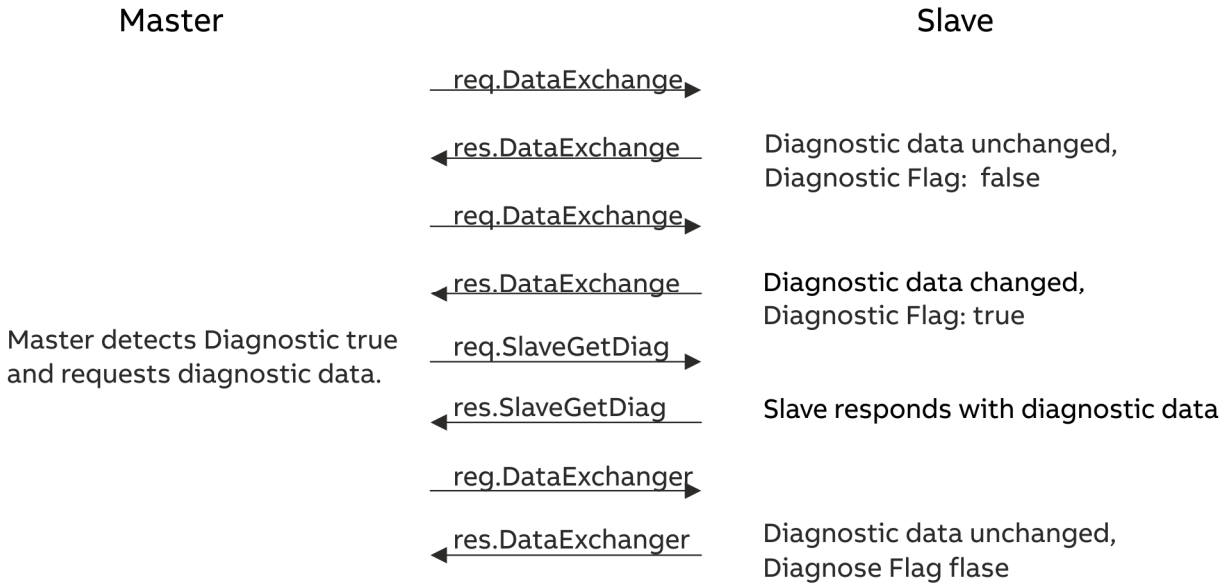

Figure 10: Sequence of the diagnostic query

Get Diag Telegram

Byte No.	DPV1 name	Bit No.	Value	'long' telegram 9740 or 9700	'long' telegram 0x3432	'short' telegram 0x3432
1	Station Status 1	Bit 7	Diag Master Lock	0	0	0
		Bit 6	Diag Frame Fault	0	0	0
		Bit 5	Diag Invalid Slave Response	0	0	0
		Bit 4	Diag not supported	0	0	0
		Bit 3	Diag Ext Diag	1	1	0
		Bit 2	Diag Config Fault	0	0	0
		Bit 1	Diag Station Not Ready	0	0	0
		Bit 0	Diag Station Non Existent	0	0	0
2	Station Status 2	Bit 7	Diag deactivated	0	0	0
		Bit 6	Reserved	0	0	0
		Bit 5	Diag Sync Mode	0	0	0
		Bit 4	Diag Freeze Mode	0	0	0
		Bit 3	Diag Watchdog on	x	x	x
		Bit 2	Set to 1 by DP slave	1	1	1
		Bit 1	Diag static Diagnostics	0	0	0
		Bit 0	Diag parameterization request	0	0	0
3	Station Status 3	Bit 7	Ext. Diag Overflow	0	0	0
		Bit 6	Reserved	0	0	0
		Bit 5	Reserved	0	0	0
		Bit 4	Reserved	0	0	0
		Bit 3	Reserved	0	0	0
		Bit 2	Reserved	0	0	0
		Bit 1	Reserved	0	0	0
		Bit 0	Reserved	0	0	0
4	Master Address			0x00	0x00	0x00
5 - 6	Ident Number			0x9740/ 0x9700	0x3435	0x3435
7	Header	Bit 7-6	fixed to 0	0x08	0x0E	
		Bit 5-0	Block length			
8	Status_Type	Bit 7	Status	0xFE	0xFE	
		Bit 6-0	Not used			
9	Slot Nr. of PB			0x00	0x00	
10	Specifier	Bit 2-7	Reserved	0x01	0x01	
		Bit 0+1	1 = Status appears			
			2 = Status disappears			
11-14			DIAGNOSIS	0x20	0x00	
				0x00	0x00	
				0x00	0x00	
				0x00	0x80	
15-20			DIAGNOSIS_EXTENSION		0x80	
					0x00	
					0x00	
					0x00	
					0x00	
					0x00	

… 4 Diagnosis / error messages

… Get Diag

If no errors or warnings are present, the transmitter responds with a 'short' telegram (only bytes 1 to 6). Otherwise, the transmitter responds with a 'long' telegram (14 bytes for 0x9740 and 0x9700, 20 bytes for 0x3432).

The example shows a telegram for 0x3435 with errors/warnings:

Byte 1 to 6:	0x08, 0x0C, 0x00, 0x01, 0x34, 0x35	
Byte 7 to 10:	0x0E, 0xFE, 0x00, 0x01	
Byte 11 to 14:	0x00, 0x20, 0x00, 0x80	(Diagnosis)
Byte 15 to 20:	0x80, 0x00, 0x00, 0x00, 0x00, 0x00	(DiagnosisExtension)

Bit 7 in octet 1 of the Diagnosis Extension (=byte 15) indicates an alarm.
Bit 7 in octet 4 of the Diagnosis (byte 14), indicates that the Diagnosis Extension exists.
Bit 3 in byte 1 indicates that diagnostics data exist.

This example shows the 'short' telegram that comes when the last error/warning disappears:

Byte 1 to 6: 0x00, 0x0C, 0x00, 0x01, 0x34, 0x35

Bit 3 in byte 1 is 0, as no further diagnostics data are available.

The following table provides an overview of the manufacturer-specific alarms and how they can be masked. When masking is active, the corresponding bits are not set in the DIAGNOSIS_EXTENSION and have no effect on the status information of the cyclical output values of the AI and TOT blocks.
The structure of the DIAG_EXT_HISTORY parameter is the same as that of the DIAGNOSIS_EXTENSION.

Octet	Bit	Alarm Mapping	ID	Masked with	Rel. Idx. PB
0	0	FLOW_MASS_REACHED	0	DIAG_MASK_OFF_SPECIFICATION	38
	1	FLOW_VOLUME_REACHED	1	DIAG_MASK_OFF_SPECIFICATION	38
	2	SIMUALTION_ALARM	2	DIAG_MASK_CHECK_FUNCTION	37
	3	FLOWRATE_TO_ZERO	3	DIAG_MASK_CHECK_FUNCTION	37
	4	ALARM_MAINTENANCE_CYCLE_TIME_EXEED	4	DIAG_MASK_MAINTENANCE	36
	5	TOTALIZER_STOP_ALARM	5	DIAG_MASK_CHECK_FUNCTION	37
	6	TOTALIZER_RESET_ALARM	6	DIAG_MASK_CHECK_FUNCTION	37
	7	DISPLAY_TOTALIZER_ROLLOVER	7	DIAG_MASK_MAINTENANCE	36
1	0	DEVICE_NOT_CALIBRATED_ALARM	8	DIAG_MASK_MAINTENANCE	36
	1	NV_CHIPS_DEFECT_FEB	9	DIAG_MASK_MAINTENANCE	36
	2	NV_DATA_DEFECT	10	Not maskable	X
	3	FE_BOARD_NOT_DETECTED	11	Not maskable	X
	4	FE_BOARD_COMM_ERROR	12	Not maskable	X
	5	INCOMPATIBLE_FE_BOARD	13	Not maskable	X
	6	NV_CHIP_DEFECT_MB	14	DIAG_MASK_MAINTENANCE	36
	7	DO1_PULSENUMMAXALARM	15	DIAG_MASK_OFF_SPECIFICATION	38

Octet	Bit	Alarm Mapping	ID	Masked with	Rel. Idx. PB
2	0	CO1_SATURATED_ALARM	16	DIAG_MASK_OFF_SPECIFICATION	38
	1	CO2_3_SATURATED_ALARM	17	DIAG_MASK_OFF_SPECIFICATION	38
	2	CO1_COM_ERROR	18	Not maskable	X
	3	OPTION_MODULE_1 _COM_ ERROR	19	DIAG_MASK_OFF_SPECIFICATION	38
	4	OPTION_MODULE_2 _COM_ ERROR	20	DIAG_MASK_OFF_SPECIFICATION	38
	5	CO1_SAFETY_ALARM	21	Not maskable	X
	6	CO1_NOT_CALIBRATED_ALARM	22	DIAG_MASK_MAINTENANCE	36
	7	CO2_NOT_CALIBRATED_ALARM	23	DIAG_MASK_MAINTENANCE	36
3	0	CO3_NOT_CALIBRATED_ALARM	24	DIAG_MASK_MAINTENANCE	36
	1	VOLTAGE_MONITORING_ALARM_MB	25	Not maskable	X
	2	ALARM_SIMULATION	26	DIAG_MASK_CHECK_FUNCTION	37
	3	FIELDBUS_BOARD_IN_RESET	27	DIAG_MASK_MAINTENANCE	36
	4	CO1_READBACK_ALARM	28	DIAG_MASK_OFF_SPECIFICATION	38
	5	PRIMARY_ADC_FAILURE	29	Not maskable	X
	6	SENSOR_ELECTRONICS_FAILED	30	Not maskable	X
	7	TEMPERATURE_SENSOR_EXCEEDS_LIMITS	31	DIAG_MASK_OFF_SPECIFICATION	38
4	0	SENSOR_ELECTRONICS_TEMP_REACHED	32	DIAG_MASK_OFF_SPECIFICATION	38
	1	SENSOR_MEASURING_FAILED	33	Not maskable	X
	2	SENSOR_POWER_LIMIT_REACHED	34	DIAG_MASK_OFF_SPECIFICATION	38
	3	RESERVED	35	Not maskable	X
	4	RESERVED	36	Not maskable	X
	5	FLOW_TEMP_REACHED	37	DIAG_MASK_OFF_SPECIFICATION	38
	6	SENSOR_CONFIGURATION_FAILED	38	DIAG_MASK_MAINTENANCE	36
	7	FLOW_NORMVOLUME_REACHED	39	DIAG_MASK_OFF_SPECIFICATION	38
5	0	SENSOR_SOILING_ALARM	40	DIAG_MASK_MAINTENANCE	36
	1	VOLTAGE_MONITORING_ALARM_FEB	41	Not maskable	X
	2	DO2_PULSENUMMAXALARM DIGITALOUTPUT_DIAG_FREQ_MAX	42	DIAG_MASK_OFF_SPECIFICATION	38
	3			Reserved	
	4			Reserved	
	5			Reserved	
	6			Reserved	
	7			Reserved	

DIAG_MASK_INDIVIDUAL_ALARM object

The alarm configuration can be individually masked with the DIAG_MASK_INDIVIDUAL_ALARM object (see **Physical Block – Slot 0** 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.

… 4 Diagnosis / error messages

Transducer block status

The transducer blocks of the FMT4xx 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 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 FMT4xx 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.	Good-advisory alarm, high limit (0x89)	Good-high limited (0x82)
FLOW_VOLUME_REACHED	Volume flowrate exceeds limits.	Good-advisory alarm, high limit (0x89)	Good-high limited (0x82)
SIMUALTION_ALARM	Simulation is on! Simulating process/output value	Check (0x3C)	Uncertain-simulated value (0x60)
FLOWRATE_TO_ZERO	Flowrate to zero	Check (0x3C)	Uncertain-simulated value (0x60)
ALARM_MAINTENANCE_ CYCLE_TIME_EXEED	Maintenance interval is reached	Maintenance (0xA4)	Maintenance (0xA4)
TOTALIZER_STOP_ALARM	All totalizer stopp.	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<1600h at Qmax.	Maintenance (0xA4)	Maintenance (0xA4)
DEVICE_NOT_CALIBRATED_ALARM	Device not calibrated.	Maintenance (0xA4)	Maintenance (0xA4)
NV_CHIPS_DEFECT_FEB	Sensor memory defective.	Maintenance (0xA4)	Maintenance (0xA4)
NV_DATA_DEFECT	NV data defect. Data storage irreparable.	Failure (0x24)	Bad-device failure (0x12)
FE_BOARD_NOT_DETECTED	No Frontend Board detected. Wrong connection. Defect Frontend.	Failure (0x24)	Bad-device failure (0x12)
FE_BOARD_COMM_ERROR	FEB communication error.	Failure (0x24)	Bad-device failure (0x12)
INCOMPATIBLE_FE_BOARD	Incompatible Frontend Board.	Failure (0x24)	Bad-device failure (0x12)
NV_CHIP_DEFECT_MB	NV chips defect on Motherboard.	Maintenance (0xA4)	Maintenance (0xA4)
DO1_PULSENUMMAXALARM	Dig.Out 41/42 is saturated.	Out of Specification (0x78)	Uncertain (0x40)
CO1_SATURATED_ALARM	Curr.Out 31/32 is saturated.	Out of Specification (0x78)	Uncertain (0x40)
CO2_3_SATURATED_ALARM	Curr.Out V1/V2, V3/V4 saturated	Out of Specification (0x78)	Uncertain (0x40)
CO1_COM_ERROR	Curr.Out 31/32 com error.	Failure (0x24)	Bad-device failure (0x12)
OPTION_MODULE_1 _COM_ ERROR	Option Card 1 com error.	Out of Specification (0x78)	Uncertain (0x40)
OPTION_MODULE_2 _COM_ ERROR	Option Card 2 com error.	Out of Specification (0x78)	Uncertain (0x40)
CO1_SAFETY_ALARM	Safety Alarm Curr.Out 31/32	Failure (0x24)	Bad-device failure (0x12)
CO1_NOT_CALIBRATED_ALARM	Curr.Out 31/32 not calibrated.	Maintenance (0xA4)	Maintenance (0xA4)
CO2_NOT_CALIBRATED_ALARM	Curr.Out V1/V2 not calibrated.	Maintenance (0xA4)	Maintenance (0xA4)
CO3_NOT_CALIBRATED_ALARM	Curr.Out V3/V4 not calibrated.	Maintenance (0xA4)	Maintenance (0xA4)
VOLTAGE_MONITORING_ALARM_MB	MB voltages outside range.	Failure (0x24)	Bad-device failure (0x12)

Alarm Mapping	Description	Condensed Status	Classic Status
ALARM_SIMULATION	An alarm is simulated.	Check (0x3C)	Uncertain (0x40)
FIELDBUS_BOARD_IN_RESET	Communicat. card not responding	Maintenance (0xA4)	Maintenance (0xA4)
CO1_READBACK_ALARM	CO31/32 readbackcurrent deviates	Out of Specification (0x78)	Uncertain (0x40)
PRIMARY_ADC_FAILURE	ADC Failure on Frontend Board.	Failure (0x24)	Bad-device failure (0x12)
SENSOR_ELECTRONICS_FAILED	Electronics failFrontend Board.	Failure (0x24)	Bad-device failure (0x12)
TEMPERATURE_SENSOR_EXCEEDS_LIMITS	Sensor temperature out of range.	Out of Specification (0x78)	Uncertain (0x40)
SENSOR_ELECTRONICS_TEMP_REACHED	Frontend temp. out of range.	Out of Specification (0x78)	Uncertain (0x40)
SENSOR_MEASURING_FAILED	Sensor failure or disconnected.	Failure (0x24)	Bad-device failure (0x12)
SENSOR_POWER_LIMIT_REACHED	Sensor heat emission limit.	Out of Specification (0x78)	Uncertain (0x40)
RESERVED_36	Reserved 36	Maintenance (0xA4)	Maintenance (0xA4)
RESERVED_37	Reserved 37	Maintenance (0xA4)	Maintenance (0xA4)
FLOW_TEMP_REACHED	Medium temperat exceeds limits.	Out of Specification (0x78)	Uncertain (0x40)
SENSOR_CONFIGURATION_FAILED	Invalid Sensor configuration	Maintenance (0xA4)	Maintenance (0xA4)
FLOW_NORMVOLUME_REACHED	Std.Volume flow exceeds limits.	Out of Specification (0x78)	Uncertain (0x40)
SENSOR_SOILING_ALARM	Sensor soiling detected.	Maintenance (0xA4)	Maintenance (0xA4)
VOLTAGE_MONITORING_ALARM_FEB	FEB voltages outside range.	Failure (0x24)	Bad-device failure (0x12)
DO2_PULSENUMMAXALARM DIGITALOUTPUT_DIAG_FREQ_MAX	Dig.Out 51/52 is saturated.	Out of Specification (0x78)	Uncertain (0x40)

Valid for:
TB1 Rel. Idx: 21, 29, 65, 70, 55, 56
TB3 Rel. Idx: 14, 15, 29, 43

5 Indicators on the transmitter

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

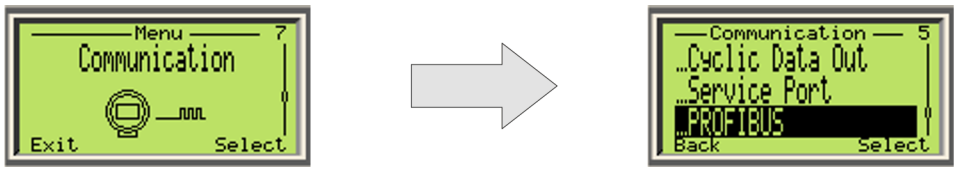

Figure 11: Menu ‘Communication / ...Profibus’

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 8).
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 **ID number** on page 4.
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	17.09.2018	First edition

Trademarks

PROFIBUS and PROFIBUS PA are registered trademarks of PROFIBUS & PROFINET International (PI)

Notes

Notes

ABB Limited
Measurement & Analytics
Howard Road, St. Neots
Cambridgeshire, PE19 8EU
UK
Tel: +44 (0)870 600 6122
Fax: +44 (0)1480 213 339
Email: enquiries.mp.uk@gb.abb.com

ABB Inc.
Measurement & Analytics
125 E. County Line Road
Warminster, PA 18974
USA
Tel: +1 215 674 6000
Fax: +1 215 674 7183

ABB Automation Products GmbH
Measurement & Analytics
Schillerstr. 72
32425 Minden
Germany
Tel: +49 571 830-0
Fax: +49 571 830-1806

abb.com/flow

3KXF421015R4001

COM/FMT430/450/PB-EN Rev. A 05.2019