

WaterMaster

Electromagnetic flowmeter



PROFIBUS FEX100-DP

Parameter Tables

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1 Introduction

This user guide identifies PROFIBUS® slot and index parameter tables for WaterMaster FEX100-DP series flowmeters that are defined in accordance with structure formats specified by PROFIBUS-PA version 3.01.

FEX100-DP is the PROFIBUS International registered model name registered for WaterMaster flowmeters supporting PROFIBUS communications over RS485 physical layer and covers several variants of the flowmeter system (FEV1xx, FEF1xx, FET1xx etc). Refer to the data sheet DS/WM-EN for details of applicable models and order codes.

Refer to PROFIBUS supplement IM/WMPBS-EN for details of parameter block context, diagnostic errors / warnings, Identification and Maintenance (I&M) functions and all other PROFIBUS-related information for this model series of WaterMaster flowmeters.

1.1 Acronyms and Abbreviations

AI	Analog Input Function Block
AO	Analog Output Function Block
FB	PROFIBUS-PA Function Block
Input	Data passed into a Master device (for example, from a Slave device)
I&M	PROFIBUS Identification and Maintenance function
MS1	Class 1 Master-Slave acyclic transaction
MS2	Class 2 Master-Slave acyclic transaction
Output	Data passed out of a Master device (for example, to a Slave device)
PB	PROFIBUS-PA Physical Block
PI/PNO	PROFIBUS International / PROFIBUS User Organisation (www.profibus.com).
TB	PROFIBUS-PA Transducer Block
TOT	Totalizer Function Block

Table 1.1 Acronyms and Abbreviations

2 Parameter Tables

Table 2.1 contains a description for the legends in tables 2.2 to 2.14.

Tables 2.2 to 2.14 (Slot 0 to Slot 12) contain descriptions for the parameters of each block

Legend	Description
Abs. Idx / Rel. Idx	Relative index of parameters within the block and the absolute index of the parameters within the slot. In accordance with the PROFIBUS PA Profile, all blocks start on absolute index 16 with the BLOCK_OBJECT structure parameter.
Data Type	Data type of the parameter. Some parameters consist of structures (refer to Appendix B, page 64 for details).
Size	Size of the parameter in bytes.
Store (Storage Type)	Cst = Constant parameter – not subject to any changes. S = Static parameter. Stored permanently in non-volatile memory. Changes to this parameter increment the ST_REV counter of the block and the REV_COUNTER parameter of the Identification and Maintenance Block 0 (I&M0) structure. N = Non-volatile parameters that are saved permanently. Writing to these parameters does not affect the ST_REV counter of the block or the REV_COUNTER parameter of the I&M0 structure. D = Dynamic parameters that are lost during power down.
Access	r = Parameter can be read. w = Parameter can be written to.
Usage	C = Contained. Parameter is for internal use only. Cannot be accessed cyclically. I = Input parameter that can be accessed cyclically. O = Output parameter that can be accessed cyclically.
Transport (Data Transport)	a = Parameter can be accessed acyclically only. cyc = Parameter can be accessed cyclically and acyclically.
Default	Specifies the parameter value after parameter FACTORY_RESET (PB.19) is triggered with the 'Reset ROM defaults' option. Note that the WaterMaster's Station Address and parameter IDENT_NUMBER_SELECTION (PB.24) do not get changed in this condition.

Table 2.1 Block Table Legends

2.1 Slot 0 – Physical Block

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
16 / 0	BLOCK_OBJECT This object contains the characteristics of the blocks.	DS-32	20	Cst	r / C / a	-
17 / 1	ST_REV Revision counter for static variables. If a static variable changes its value, this counter is incremented by one.	Unsigned 16	2	N	r / C / a	0
18 / 2	TAG_DESC Every block can be assigned a textual TAG description. The TAG_DESC must be unambiguous and unique in the Fieldbus system.	OctetString	32	S	r,w / C / a	' '
19 / 3	STRATEGY The STRATEGY parameter has a user-specified value. This assigned value can be used in configuration or diagnostics as a key in sorting block information.	Unsigned 16	2	S	r,w / C / a	0
20 / 4	ALERT_KEY The ALERT_KEY parameter has a user-assigned value that can be used for sorting alarms or events generated by a block.	Unsigned 8	1	S	r,w / C / a	0
21 / 5	TARGET_MODE The TARGET_MODE indicates what mode of operation is required for the block. It is normally set by a control application or by an operator through a human interface application. The input parameters are used by the algorithm in conjunction with the state of the Function Block application containing the block to determine if the algorithm can achieve the target mode of operation established for it. See parameter 'MODE_BLK', 'Permitted' element for possible values.	Unsigned 8	1	S	r,w / C / a	Auto
22 / 6	MODE_BLK The MODE_BLK is a structured parameter composed of the actual mode, the normal mode and the permitted mode of the block. The actual mode is set (calculated) by the block during its execution to reflect the mode used during execution. Normal mode is the required operating mode of the block. The permitted mode shows which changes of the target mode are valid for the specific block to the remote user of the MODE_BLK parameter. 8: Auto 128: Out Of Service	DS-37	3	D	r / C / a	Actual: Auto Permitted: Auto Out Of Service Normal: Auto
23 / 7	ALARM_SUM The ALARM_SUM parameter summarizes the status of up to 16 block alarms. For each alarm, the current states, unacknowledged states, unreported states and disabled states are maintained. 0: None 1: Discrete Alarm 2: Hi Hi Alarm 4: Hi Alarm 8: Lo Lo Alarm 16: Lo Alarm 32: PI Reserved 64: PI Reserved 128: Update Event 256: PI Reserved 512: PI Reserved 1024: PI Reserved 2048: PI Reserved 4096: PI Reserved 8192: PI Reserved 16384: PI Reserved 32768: PI Reserved	DS-42	8	D	r / C / a	None

Table 2.2 Slot 0 – Physical Block

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
24 / 8	SOFTWARE_REVISION Revision number of the device firmware.	VisibleString	16	Cst	r / C / a	'? '
25 / 9	HARDWARE_REVISION Revision number of the device hardware.	VisibleString	16	Cst	r / C / a	'? '
26 / 10	DEVICE_MAN_ID Unique identifier of the device manufacturer.	Unsigned 16	2	Cst	r / C / a	26
27 / 11	DEVICE_ID Manufacturer specific identification of the device.	VisibleString	16	Cst	r / C / a	'FEX100-DP'
28 / 12	DEVICE_SER_NUM Unique transmitter identification number.	VisibleString	16	Cst	r / C / a	1
29 / 13	DIAGNOSIS Standard diagnostic information for the device.	OctetString	4	D	r / C / a	0
30 / 14	DIAGNOSIS_EXTENSION Extended diagnostic information for the device.	OctetString	6	D	r / C / a	0
31 / 15	DIAGNOSIS_MASK Mask for Diagnostic information bytes.	OctetString	4	Cst	r / C / a	0
32 / 16	DIAGNOSIS_MASK_EXTENSION Mask for Extended Diagnostic information bytes.	OctetString	6	Cst	r / C / a	0xFE,0xBF,0x67,0xFF,0xBD,0x01
33 / 17	DEVICE_CERTIFICATION Available certifications for the device.	VisibleString	32	Cst	r / C / a	' '
34 / 18	WRITE_LOCKING Software write locking for the PROFIBUS interface. 0: Write Locking Enabled 2457: Write Locking Disabled	Unsigned 16	2	N	r,w / C / a	Write Locking Disabled
35 / 19	FACTORY_RESET Reset functions to the device EEPROM Device and Bus Address Changes to this parameter cause the instrument to reboot. 1: Reset ROM Defaults 2506: Soft Reset 2712: Default Station Address	Unsigned 16	2	S	r,w / C / a	-
36 / 20	DESCRIPTOR Device descriptive text.	OctetString	32	S	r,w / C / a	' '
37 / 21	DEVICE_MESSAGE Device message text.	OctetString	32	S	r,w / C / a	' '

Table 2.2 Slot 0 – Physical Block (Continued)

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
38 / 22	DEVICE_INSTAL_DATE Device installation date text.	OctetString	16	S	r,w / C / a	' '
39 / 23	LOCAL_OP_ENA Blocks editing of values via the local device display, fixed to enabled. 1: Local Operation Enabled	Unsigned 8	1	N	r,w / C / a	Local Operation Enabled
40 / 24	IDENT_NUMBER_SELECTOR Profile ident currently in use by the device. Changes to this parameter cause the instrument to reboot. 0: Profile Specific – 0x9700 1: Manufacturer Specific – 0x3431 128: Manufacturer Specific – 0x9740 129: Manufacturer Specific – 0x9741	Unsigned 8	1	S	r,w / C / a	Manufacturer Specific – 0x3431
41 / 25	HW_WRITE_PROTECTION State of the hardware write protect switch. Enabling the switch disables writing from all user interfaces. 0: HW Write Protection Disabled 2: HW Write Protection Enabled	Unsigned 8	1	D	r / C / a	HW Write Protection Disabled
42 / 26	FEATURE Feature information for the device.	OctetString	8	N	r / C / a	0
43 / 27	COND_STATUS_DIAG Enables/disables condensed diagnosis. 0: Condensed Diagnosis Disabled 1: Condensed Diagnosis Enabled	Unsigned 8	1	S	r,w / C / a	Condensed Diagnosis Enabled
44 / 28	PI RESERVED Parameter reserved for future use.	-	-	-	-	-
45 / 29	PI RESERVED Parameter reserved for future use.	-	-	-	-	-
46 / 30	PI RESERVED Parameter reserved for future use.	-	-	-	-	-
47 / 31	PI RESERVED Parameter reserved for future use.	-	-	-	-	-
48 / 32	PI RESERVED Parameter reserved for future use.	-	-	-	-	-
49 / 33	DIAG_WORST_COND Worst case active diagnostic class.	Unsigned 16	2	D	r / C / a	0x3FFF
50 / 34	DIAG_EXT_HISTORY The device diagnostic history.	OctetString	6	D	r / C / a	0x0,0x0,0x0,0x0,0x0,0x0
51 / 35	UNUSED Unused parameter.	-	-	-	-	-

Table 2.2 Slot 0 – Physical Block (Continued)

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
52 / 36	DIAG_SIMUL_STATUS Enables / Disables diagnosis simulation. 0: Disabled 1: Enabled	Unsigned 8	1	D	r,w / C / a	Disabled
53 / 37	DP_ENABLED_FEAT_PROT Extended PROFIBUS features to be supported. 1: ChkCfg 2: SetPrm	Unsigned 8	1	N	r,w / C / a	ChkCfg SetPrm
54 / 38	DIAG_CONDITION_IDX Index of the alarm history item to be read back via the DIAG_DETAILS item. 0: None 1: Logic simulation selected on OP1 2: Pulse simulation selected on OP1 3: Logic simulation selected on OP1 4: Pulse simulation selected on OP2 5: Logic simulation selected on OP3 6: Low flow alarm 7: High flow alarm 8: Q > 103% Qmax 9: Simulation mode on 10: Tx. simulator / calibrator mode 11: At Qmax, volume display overrun <1600hrs 12: Totalizer reset 13: Intermittent sensor comms 15: Tx. memory fault detected 16: Sensor memory not detected 17: Tx. measurement suspended 18: Empty pipe 21: Open circuit electrode 22: Short circuit electrode 24: Installation fault/condition 25: Open circuit coil/wiring 26: Short circuit coil/wiring 27: Check cable+coil resistance 28: Transmitter hardware fault 29: Bad flow data 30: Accuracy warning? 31: OIML self-check limits exceeded 32: Measurement starting 34: Sensor setup not complete 35: Incompatible sensor 36: Tx. code memory fault 37: Tx. data memory fault 39: Alarm simulation active 40: Non-volatile summary alarm	Unsigned 8	1	D	r,w / C / a	None
55 / 39	DIAG_DETAILS Alarm history of the alarm selected by the DIAG_CONDITION_IDX parameter.	Diagnosis Information	14	D	r / C / a	-

Table 2.2 Slot 0 – Physical Block (Continued)

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
56 / 40	DIAG_ALARM_SIMULATION Selects the device alarm to simulate. 0: Off 2: Logic simulation selected on OP1 3: Pulse simulation selected on OP1 4: Logic simulation selected on OP1 5: Pulse simulation selected on OP2 6: Logic simulation selected on OP3 7: Low flow alarm 8: High flow alarm 9: Q > 103% Qmax 10: Simulation mode on 11: Tx. simulator / calibrator mode 12: At Qmax, volume display overrun <1600hrs 13: Totalizer reset 14: Intermittent sensor comms 16: Tx. memory fault detected 17: Sensor memory not detected 18: Tx. measurement suspended 19: Empty pipe 20: Open circuit electrode 21: Short circuit electrode 22: Installation fault/condition 23: Open circuit coil/wiring 24: Short circuit coil/wiring 25: Check cable+coil resistance 26: Transmitter hardware fault 27: Bad flow data 28: Accuracy warning? 29: OIML self-check limits exceeded 30: Measurement starting 32: Sensor setup not complete 33: Incompatible sensor 34: Tx. code memory fault 35: Tx. data memory fault 37: Non-volatile summary alarm	Unsigned 8	1	D	r,w / C / a	Off
57 / 41	CLEAR_ALARM_HISTORY Clears the alarm history in the device.	Unsigned 8	1	S	r,w / C / a	-
58 / 42	MASK_MAINTENANCE_REQUIRED Mask for the Maintenance group alarms. 0: Disabled 1: Enabled	Unsigned 8	1	S	r,w / C / a	Disabled
59 / 43	MASK_CHECK_FUNCTION Mask for the Function Check group alarms. 0: Disabled 1: Enabled	Unsigned 8	1	S	r,w / C / a	Disabled
60 / 44	MASK_OFF_SPECIFICATION Mask for the Off Specification group alarms. 0: Disabled 1: Enabled	Unsigned 8	1	S	r,w / C / a	Disabled
61 / 45	MASK_MIN_ALARM Mask for the Min. Flow alarm. 0: Disabled 1: Enabled	Unsigned 8	1	S	r,w / C / a	Enabled
62 / 46	MASK_MAX_ALARM Mask for the Max. Flow alarm. 0: Disabled 1: Enabled	Unsigned 8	1	S	r,w / C / a	Enabled

Table 2.2 Slot 0 – Physical Block (Continued)

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
63 / 47	MASK_OVERRANGE_103 Mask for the Overflow 103% alarm. 0: Disabled 1: Enabled	Unsigned 8	1	S	r,w / C / a	Enabled
64 / 48	UNUSED Unused parameter.	-	-	-	-	-
65 / 49	UNUSED Unused parameter.	-	-	-	-	-
66 / 50	FLOWRATE_LIMIT_MIN_ALARM Flowrate for min. flow alarm. Min: 0 Max: 130 Unit: %	Float	4	S	r,w / C / a	0
67 / 51	FLOWRATE_LIMIT_MAX_ALARM Flowrate for max. flow alarm. Min: 0 Max: 130 Unit: %	Float	4	S	r,w / C / a	110
68 / 52	DATA_EXCHANGE_ACTIVE Flag set when the device is cyclically exchanging data with a master. 0: Inactive 1: Active	Unsigned 8	1	D	r / C / a	Inactive

Table 2.2 Slot 0 – Physical Block (Continued)

2.2 Slot 1 – Analog Input 1 – Volume Flow

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
16 / 0	BLOCK_OBJECT This object contains the characteristics of the blocks.	DS-32	20	Cst	r / C / a	–
17 / 1	ST_REV Revision counter for static variables. If a static variable changes its value, this counter is incremented by one.	Unsigned 16	2	N	r / C / a	0
18 / 2	TAG_DESC Every block can be assigned a textual TAG description. The TAG_DESC must be unambiguous and unique in the Fieldbus system.	OctetString	32	S	r,w / C / a	' , '
19 / 3	STRATEGY The STRATEGY parameter has a user-specified value. This assigned value can be used in configuration or diagnostics as a key in sorting block information.	Unsigned 16	2	S	r,w / C / a	0
20 / 4	ALERT_KEY The ALERT_KEY parameter has a user-assigned value that can be used for sorting alarms or events generated by a block.	Unsigned 8	1	S	r,w / C / a	0
21 / 5	TARGET_MODE The TARGET_MODE indicates what mode of operation is required for the block. It is normally set by a control application or by an operator through a human interface application. The input parameters are used by the algorithm in conjunction with the state of the Function Block application containing the block to determine if the algorithm can achieve the target mode of operation established for it. See parameter 'MODE_BLK', 'Permitted' element for possible values.	Unsigned 8	1	S	r,w / C / a	Auto
22 / 6	MODE_BLK The MODE_BLK is a structured parameter composed of the actual mode, the normal mode and the permitted mode of the block. The actual mode is set (calculated) by the block during its execution to reflect the mode used during execution. Normal mode is the required operating mode of the block. The permitted mode shows which changes of the target mode are valid for the specific block to the remote user of the MODE_BLK parameter. 8: Auto 16: Manual 128: Out Of Service	DS-37	3	D	r / C / a	Actual: Out Of Service Permitted: Auto Manual Out Of Service Normal: Auto
23 / 7	ALARM_SUM The ALARM_SUM parameter summarizes the status of up to 16 block alarms. For each alarm, the current states, unacknowledged states, unreported states and disabled states are maintained.	DS-42	8	D	r / C / a	–
24 / 8	BATCH The Batch parameter is necessary in a distributed Fieldbus system to identify used and available channels, in addition to identify the current batch in case of alerts.	DS-67	10	S	r,w / C / a	–

Table 2.3 Slot 1 – Analog Input 1 – Volume Flow

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
25 / 9	UNUSED Unused parameter.	-	-	-	-	-
26 / 10	OUT The Function Block parameter OUT contains the current measurement value in a vendor-specific or configuration-adjusted engineering unit and the belonging state in AUTO MODE. The Function Block parameter OUT contains the value and status set by an operator in MAN MODE.	101	5	D	r,w / O / cyc	0
27 / 11	PV_SCALE Conversion of the Process Variable into percent using the high and low scale values. The engineering unit of PV_SCALE high and low scale values are related directly to the PV_UNIT of the configured Transducer Block (configured via Channel parameter). The PV_SCALE high and low scale values follow the changes of the PV_UNIT of the related Transducer Block automatically – a change of the Transducer Block PV_Unit causes no bump at OUT from AI.	Float	8	S	r,w / C / a	-
28 / 12	OUT_SCALE Scale of the Process Variable. The Function Block parameter OUT_SCALE contains the values of the lower limit and upper limit effective range, the code number of the engineering unit of Process Variable and the number of digits on the right hand side of the decimal point.	DS-36	11	S	r,w / C / a	-
29 / 13	LIN_TYPE Linearization type (not used, fixed to NO_LINEARISATION). 0: No Linearization	Unsigned 8	1	S	r,w / C / a	No Linearization
30 / 14	CHANNEL Reference to the active Transducer Block that provides the measurement value to the Function Block. 0x0111: TB1.VOLUME_FLOW	Unsigned 16	2	S	r,w / C / a	TB1.VOLUME_FLOW
31 / 15	UNUSED Unused parameter.	-	-	-	-	-
32 / 16	PV_FTIME Filter time of the Process Variable. The Function Block parameter PV_FTIME contains the time constant for the rise time of the FB output up to a value of 63,21 % resulted from a jump on the input (PT1 filter). The engineering unit of the parameter is second.	Float	4	S	r,w / C / a	0
33 / 17	FSAFE_TYPE Defines the reaction of device, if a fault is detected. The calculated ACTUAL MODE remains in AUTO. For mode FSafe Value, the block parameter FSAFE_VALUE is used as OUT and the status is set to UNCERTAIN_Substitute Value, In mode Last Stored, the last stored valid OUT value is used as OUT and the status is set to UNCERTAIN_LastUsableValue. If there is no valid value available, the status is set to UNCERTAINInitial_Value and the OUT value is set to its initial value. In the mode Out Status Bad, OUT has the wrong calculated value and status is set to BAD_* (with * as calculated). 0: Fsafe Value 1: Last Stored 2: Out Status Bad	Unsigned 8	1	S	r,w / C / a	Last Stored

Table 2.3 Slot 1 – Analog Input 1 – Volume Flow (Continued)

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
34 / 18	FSAFE_VALUE Default value for the OUT parameter, if a sensor or sensor electronic fault is detected. The unit of this parameter is the same as that for OUT.	Float	4	S	r,w / C / a	-
35 / 19	ALARM_HYS Hysteresis value applied to block parameters HI_HI_LIM, HI_LIM, LO_LIM and LO_LO_LIM. The hysteresis is expressed as value below high limit and above low limit in the engineering unit of xx_LIM.	Float	4	S	r,w / C / a	-
36 / 20	UNUSED Unused parameter.	-	-	-	-	-
37 / 21	HI_HI_LIM Upper limit value for alarms with the same engineering unit as that of the OUT parameter. If the measured variable is equal to or higher than the upper limit value, the State Bits in the Status Byte of OUT and in the FB parameter ALARM_SUM change to 1.	Float	4	S	r,w / C / a	-
38 / 22	UNUSED Unused parameter.	-	-	-	-	-
39 / 23	HI_LIM Upper limit value for alarms with the same engineering unit as that of the OUT parameter. If the measured variable is equal to or higher than the upper limit value, the State Bits in the Status Byte of OUT and in the FB parameter ALARM_SUM are set to 1.	Float	4	S	r,w / C / a	-
40 / 24	UNUSED Unused parameter.	-	-	-	-	-
41 / 25	LO_LIM Lower limit value for alarms with the same engineering unit as that of the OUT parameter. If the measured variable is equal to or lower than the lower limit value, the State Bits in the Status Byte of OUT and in the FB parameter ALARM_SUM are set to 1.	Float	4	S	r,w / C / a	-
42 / 26	UNUSED Unused parameter.	-	-	-	-	-
43 / 27	LO_LO_LIM Lower limit value for alarms with the same engineering unit as that of the OUT parameter. If the measured variable is equal to or lower than the lower limit value, the State Bits in the Status Byte of OUT and in the FB parameter ALARM_SUM are set to 1.	Float	4	S	r,w / C / a	-
44 / 28	UNUSED Unused parameter.	-	-	-	-	-
45 / 29	UNUSED Unused parameter.	-	-	-	-	-
46 / 30	HI_HI_ALM The state of the upper limit of an alarm and the related time stamp. The time stamp expresses the time the measured variable has been equal or higher than the upper limit of the alarm.	DS-39	16	D	r / C / a	-

Table 2.3 Slot 1 – Analog Input 1 – Volume Flow (Continued)

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
47 / 31	HI_ALM The state of the upper limit of an alarm and the related time stamp. The time stamp expresses the time the measured variable has been equal or higher than the upper limit of the alarm.	DS-39	16	D	r / C / a	-
48 / 32	LO_ALM The state of the lower limit of an alarm and the related time stamp. The time stamp expresses the time at which the measured variable has been equal to or lower than the lower limit of the alarm.	DS-39	16	D	r / C / a	-
49 / 33	LO_LO_ALM The state of the lower limit of an alarm and the related time stamp. The time stamp expresses the time at which the measured variable has been equal to or lower than the lower limit of the alarm.	DS-39	16	D	r / C / a	-
50 / 34	SIMULATE For commissioning and test purposes the input value from the Transducer Block to the block can be simulated. Note that the Transducer block is disconnected from the block when the SIMULATE parameter is in use.	DS-50	6	S	r,w / C / a	-
51 / 35	OUT_UNIT_TEXT If the unit of the OUT parameter is not available in the list of PROFIBUS Unit Codes, the user can write the specific text in this parameter. The unit code is then set to 'textual unit definition'.	OctetString	16	S	r,w / C / a	-

Table 2.3 Slot 1 – Analog Input 1 – Volume Flow (Continued)

2.3 Slot 2 – Totalizer 1 – Volume Flow

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
16 / 0	BLOCK_OBJECT Contains the characteristics of the blocks.	DS-32	20	Cst	r / C / a	-
17 / 1	ST_REV Revision counter for static variables. If a static variable changes its value, this counter is incremented by one.	Unsigned 16	2	N	r / C / a	0
18 / 2	TAG_DESC Every block can be assigned a textual TAG description. The TAG_DESC must be unambiguous and unique in the Fieldbus system.	OctetString	32	S	r,w / C / a	' '
19 / 3	STRATEGY The STRATEGY parameter has a user-specified value. This assigned value can be used in configuration or diagnostics as a key in sorting block information.	Unsigned 16	2	S	r,w / C / a	0
20 / 4	ALERT_KEY The ALERT_KEY parameter has a user-assigned value that can be used for sorting alarms or events generated by a block.	Unsigned 8	1	S	r,w / C / a	0
21 / 5	TARGET_MODE The TARGET_MODE indicates what mode of operation is required for the block. It is normally set by a control application or by an operator through a human interface application. The input parameters are used by the algorithm in conjunction with the state of the Function Block application containing the block to determine if the algorithm can achieve the target mode of operation established for it. See parameter 'MODE_BLK', 'Permitted' element for possible values.	Unsigned 8	1	S	r,w / C / a	Auto
22 / 6	MODE_BLK The MODE_BLK is a structured parameter composed of the actual mode, the normal mode and the permitted mode of the block. The actual mode is set (calculated) by the block during its execution to reflect the mode used during execution. Normal mode is the required operating mode of the block. The permitted mode shows which changes of the target mode are valid for the specific block to the remote user of the MODE_BLK parameter. 8: Auto 16: Manual 128: Out Of Service	DS-37	3	D	r / C / a	Actual: Out Of Service Permitted: Auto Manual Out Of Service Normal: Auto
23 / 7	ALARM_SUM The ALARM_SUM parameter summarizes the status of up to 16 block alarms. For each alarm, the current states, unacknowledged states, unreported states and disabled states are maintained.	DS-42	8	D	r / C / a	-
24 / 8	BATCH The Batch parameter is necessary in a distributed Fieldbus system to identify used and available channels, in addition to identify the current batch in case of alerts.	DS-67	10	S	r,w / C / a	-
25 / 9	UNUSED Unused parameter.	-	-	-	-	-
26 / 10	TOTAL The Function Block parameter TOTAL contains the integrated quantity of the rate parameter provided by CHANNEL and the associated status.	101	5	N	r,w / O / cyc	-
27 / 11	UNIT_TOT Unit of the totalized quantity.	Unsigned 16	2	S	r,w / C / a	-
28 / 12	CHANNEL Reference to the active Transducer Block that provides the measurement value to the Function Block. 0x0111: TB1.VOLUME_FLOW	Unsigned 16	2	S	r,w / C / a	TB1.VOLUME_FLOW

Table 2.4 Slot 2 – Totalizer 1 – Volume Flow

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
29 / 13	<p>SET_TOT</p> <p>Setting this parameter to Reset assigns a value of 0 to the totalizer.</p> <p>When set to Preset, the value of parameter PRESET_TOT is assigned to the totalizer.</p> <p>While SET_TOT is set to Reset or Preset, the status of the totalized value is set to UNCERTAIN-initial value.</p> <p>0: Totalize 1: Reset 2: Preset</p>	Unsigned 8	1	N	r,w / l / cyc	Totalize
30 / 14	<p>MODE_TOT</p> <p>Governs the behavior of the totalizer.</p> <p>In Balanced mode, totalization occurs for all incoming rate values.</p> <p>In Positive Only mode, totalization occurs for positive incoming rate values only.</p> <p>For Negative Only mode, totalization occurs for negative incoming rate values only.</p> <p>In Hold mode, totalization is stopped.</p> <p>0: Balanced 1: Positive Only 2: Negative Only 3: Hold</p>	Unsigned 8	1	N	r,w / l / cyc	Balanced
31 / 15	<p>FAIL_TOT</p> <p>Governs the behavior of the Function Block during the occurrence of input values with BAD status.</p> <p>In Run mode, totalization is continued using the input values despite the BAD status. The status is ignored.</p> <p>For Hold mode, totalization is stopped during occurrence of BAD status of incoming values.</p> <p>In Memory mode, totalization is continued based on the last incoming value with GOOD status before the first occurrence of BAD status.</p> <p>0: Run 1: Hold 2: Memory</p>	Unsigned 8	1	S	r,w / C / a	Run
32 / 16	<p>PRESET_TOT</p> <p>This value is used as a preset for the internal value of the FB algorithm. The value is assigned using the SET_TOT parameter.</p>	Float	4	S	r,w / C / a	0
33 / 17	<p>ALARM_HYS</p> <p>Hysteresis value applied to block parameters HI_HI_LIM, HI_LIM, LO_LIM and LO_LO_LIM. The hysteresis is expressed as value below high limit and above low limit in the engineering unit of xx_LIM.</p>	Float	4	S	r,w / C / a	-
34 / 18	<p>HI_HI_LIM</p> <p>Upper limit value for alarms with the same engineering unit as that of the OUT parameter. If the measured variable is equal to or higher than the upper limit value, the State Bits in the Status Byte of OUT and in the FB parameter ALARM_SUM change to 1.</p>	Float	4	S	r,w / C / a	-
35 / 19	<p>HI_LIM</p> <p>Upper limit value for alarms with the same engineering unit as that of the OUT parameter. If the measured variable is equal to or higher than the upper limit value, the State Bits in the Status Byte of OUT and in the FB parameter ALARM_SUM are set to 1.</p>	Float	4	S	r,w / C / a	-
36 / 20	<p>LO_LIM</p> <p>Lower limit value for alarms with the same engineering unit as that of the OUT parameter. If the measured variable is equal to or lower than the lower limit value, the State Bits in the Status Byte of OUT and in the FB parameter ALARM_SUM are set to 1.</p>	Float	4	S	r,w / C / a	-
37 / 21	<p>LO_LO_LIM</p> <p>Lower limit value for alarms with the same engineering unit as that of the OUT parameter. If the measured variable is equal to or lower than the lower limit value, the State Bits in the Status Byte of OUT and in the FB parameter ALARM_SUM are set to 1.</p>	Float	4	S	r,w / C / a	-

Table 2.4 Slot 2 – Totalizer 1 – Volume Flow (Continued)

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
38 / 22	HI_HI_ALM The state of the upper limit of an alarm and the related time stamp. The time stamp expresses the time the measured variable has been equal or higher than the upper limit of the alarm.	DS-39	16	D	r / C / a	-
39 / 23	HI_ALM The state of the upper limit of an alarm and the related time stamp. The time stamp expresses the time the measured variable has been equal or higher than the upper limit of the alarm.	DS-39	16	D	r / C / a	-
40 / 24	LO_ALM The state of the lower limit of an alarm and the related time stamp. The time stamp expresses the time at which the measured variable has been equal to or lower than the lower limit of the alarm.	DS-39	16	D	r / C / a	-
41 / 25	LO_LO_ALM The state of the lower limit of an alarm and the related time stamp. The time stamp expresses the time at which the measured variable has been equal to or lower than the lower limit of the alarm.	DS-39	16	D	r / C / a	-

Table 2.4 Slot 2 – Totalizer 1 – Volume Flow (Continued)

2.4 Slot 3 – Totalizer 2 – Volume Flow

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
16 / 0	BLOCK_OBJECT This object contains the characteristics of the blocks.	DS-32	20	Cst	r / C / a	–
17 / 1	ST_REV Revision counter for static variables. If a static variable changes its value, this counter is incremented by one.	Unsigned 16	2	N	r / C / a	0
18 / 2	TAG_DESC Every block can be assigned a textual TAG description. The TAG_DESC must be unambiguous and unique in the Fieldbus system.	OctetString	32	S	r,w / C / a	' ,
19 / 3	STRATEGY The STRATEGY parameter has a user-specified value. This assigned value can be used in configuration or diagnostics as a key in sorting block information.	Unsigned 16	2	S	r,w / C / a	0
20 / 4	ALERT_KEY The ALERT_KEY parameter has a user-assigned value that can be used for sorting alarms or events generated by a block.	Unsigned 8	1	S	r,w / C / a	0
21 / 5	TARGET_MODE The TARGET_MODE indicates what mode of operation is required for the block. It is normally set by a control application or by an operator through a human interface application. The input parameters are used by the algorithm in conjunction with the state of the Function Block application containing the block to determine if the algorithm can achieve the target mode of operation established for it. See parameter 'MODE_BLK', 'Permitted' element for possible values.	Unsigned 8	1	S	r,w / C / a	Auto
22 / 6	MODE_BLK The MODE_BLK is a structured parameter composed of the actual mode, the normal mode and the permitted mode of the block. The actual mode is set (calculated) by the block during its execution to reflect the mode used during execution. Normal mode is the required operating mode of the block. The permitted mode shows which changes of the target mode are valid for the specific block to the remote user of the MODE_BLK parameter. 8: Auto 16: Manual 128: Out Of Service	DS-37	3	D	r / C / a	Actual: Out Of Service Permitted: Auto Manual Out Of Service Normal: Auto
23 / 7	ALARM_SUM The ALARM_SUM parameter summarizes the status of up to 16 block alarms. For each alarm, the current states, unacknowledged states, unreported states and disabled states are maintained.	DS-42	8	D	r / C / a	–
24 / 8	BATCH The Batch parameter is necessary in a distributed Fieldbus system to identify used and available channels, in addition to identify the current batch in case of alerts.	DS-67	10	S	r,w / C / a	–
25 / 9	UNUSED Unused parameter.	–	–	–	–	–
26 / 10	TOTAL The Function Block parameter TOTAL contains the integrated quantity of the rate parameter provided by CHANNEL and the associated status.	101	5	N	r,w / O / cyc	–
27 / 11	UNIT_TOT Unit of the totalized quantity.	Unsigned 16	2	S	r,w / C / a	–
28 / 12	CHANNEL Reference to the active Transducer Block that provides the measurement value to the Function Block. 0x0111: TB1.VOLUME_FLOW	Unsigned 16	2	S	r,w / C / a	TB1.VOLUME_FLOW W

Table 2.5 Slot 3 – Totalizer 2 – Volume Flow

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
29 / 13	<p>SET_TOT</p> <p>Setting this parameter to Reset assigns a value of 0 to the totalizer.</p> <p>When set to Preset, the value of parameter PRESET_TOT is assigned to the totalizer.</p> <p>While SET_TOT is set to Reset or Preset, the status of the totalized value is set to UNCERTAIN-initial value.</p> <p>0: Totalize 1: Reset 2: Preset</p>	Unsigned 8	1	N	r,w / I / cyc	Totalize
30 / 14	<p>MODE_TOT</p> <p>Governs the behavior of the totalizer.</p> <p>In Balanced mode, totalization occurs for all incoming rate values.</p> <p>In Positive Only mode, totalization occurs for positive incoming rate values only.</p> <p>For Negative only mode, totalization occurs for negative incoming rate values only.</p> <p>In Hold mode, totalization is stopped.</p> <p>0: Balanced 1: Positive Only 2: Negative Only 3: Hold</p>	Unsigned 8	1	N	r,w / I / cyc	Balanced
31 / 15	<p>FAIL_TOT</p> <p>Governs the behavior of the Function Block during the occurrence of input values with BAD status.</p> <p>In Run mode, totalization is continued using the input values despite the BAD status. The status is ignored.</p> <p>For Hold mode, totalization is stopped during occurrence of BAD status of incoming values.</p> <p>In Memory mode, totalization is continued based on the last incoming value with GOOD status before the first occurrence of BAD status.</p> <p>0: Run 1: Hold 2: Memory</p>	Unsigned 8	1	S	r,w / C / a	Run
32 / 16	<p>PRESET_TOT</p> <p>This value is used as a preset for the internal value of the FB algorithm. The value is assigned using the SET_TOT parameter.</p>	Float	4	S	r,w / C / a	0
33 / 17	<p>ALARM_HYS</p> <p>Hysteresis value applied to block parameters HI_HI_LIM, HI_LIM, LO_LIM and LO_LO_LIM. The hysteresis is expressed as value below high limit and above low limit in the engineering unit of xx_LIM.</p>	Float	4	S	r,w / C / a	-
34 / 18	<p>HI_HI_LIM</p> <p>Upper limit value for alarms with the same engineering unit as that of the OUT parameter. If the measured variable is equal to or higher than the upper limit value, the State Bits in the Status Byte of OUT and in the FB parameter ALARM_SUM change to 1.</p>	Float	4	S	r,w / C / a	-
35 / 19	<p>HI_LIM</p> <p>Upper limit value for alarms with the same engineering unit as that of the OUT parameter. If the measured variable is equal to or higher than the upper limit value, the State Bits in the Status Byte of OUT and in the FB parameter ALARM_SUM are set to 1.</p>	Float	4	S	r,w / C / a	-
36 / 20	<p>LO_LIM</p> <p>Lower limit value for alarms with the same engineering unit as that of the OUT parameter. If the measured variable is equal to or lower than the lower limit value, the State Bits in the Status Byte of OUT and in the FB parameter ALARM_SUM are set to 1.</p>	Float	4	S	r,w / C / a	-
37 / 21	<p>LO_LO_LIM</p> <p>Lower limit value for alarms with the same engineering unit as that of the OUT parameter. If the measured variable is equal to or lower than the lower limit value, the State Bits in the Status Byte of OUT and in the FB parameter ALARM_SUM are set to 1.</p>	Float	4	S	r,w / C / a	-

Table 2.5 Slot 3 – Totalizer 2 – Volume Flow (Continued)

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
38 / 22	HI_HI_ALM The state of the upper limit of an alarm and the related time stamp. The time stamp expresses the time the measured variable has been equal or higher than the upper limit of the alarm.	DS-39	16	D	r / C / a	-
39 / 23	HI_ALM The state of the upper limit of an alarm and the related time stamp. The time stamp expresses the time the measured variable has been equal or higher than the upper limit of the alarm.	DS-39	16	D	r / C / a	-
40 / 24	LO_ALM The state of the lower limit of an alarm and the related time stamp. The time stamp expresses the time at which the measured variable has been equal to or lower than the lower limit of the alarm.	DS-39	16	D	r / C / a	-
41 / 25	LO_LO_ALM The state of the lower limit of an alarm and the related time stamp. The time stamp expresses the time at which the measured variable has been equal to or lower than the lower limit of the alarm.	DS-39	16	D	r / C / a	-

Table 2.5 Slot 3 – Totalizer 2 – Volume Flow (Continued)

2.5 Slot 4 – Analog Input 2 – Internal Volume Forward Totalizer

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
16 / 0	BLOCK_OBJECT This object contains the characteristics of the blocks.	DS-32	20	Cst	r / C / a	–
17 / 1	ST_REV Revision counter for static variables. If a static variable changes its value, this counter is incremented by one.	Unsigned 16	2	N	r / C / a	0
18 / 2	TAG_DESC Every block can be assigned a textual TAG description. The TAG_DESC must be unambiguous and unique in the Fieldbus system.	OctetString	32	S	r,w / C / a	‘ ’
19 / 3	STRATEGY The STRATEGY parameter has a user-specified value. This assigned value can be used in configuration or diagnostics as a key in sorting block information.	Unsigned 16	2	S	r,w / C / a	0
20 / 4	ALERT_KEY The ALERT_KEY parameter has a user-assigned value that can be used for sorting alarms or events generated by a block.	Unsigned 8	1	S	r,w / C / a	0
21 / 5	TARGET_MODE The TARGET_MODE indicates what mode of operation is required for the block. It is normally set by a control application or by an operator through a human interface application. The input parameters are used by the algorithm in conjunction with the state of the Function Block application containing the block to determine if the algorithm can achieve the target mode of operation established for it. See parameter 'MODE_BLK', 'Permitted' element for possible values.	Unsigned 8	1	S	r,w / C / a	Auto
22 / 6	MODE_BLK The MODE_BLK is a structured parameter composed of the actual mode, the normal mode and the permitted mode of the block. The actual mode is set (calculated) by the block during its execution to reflect the mode used during execution. The normal mode is the required operating mode of the block. The permitted mode shows which changes of the target mode are valid for the specific block to the remote user of the MODE_BLK parameter. 8: Auto 16: Manual 128: Out Of Service	DS-37	3	D	r / C / a	Actual: Out Of Service Permitted: Auto Manual Out Of Service Normal: Auto
23 / 7	ALARM_SUM The ALARM_SUM parameter summarizes the status of up to 16 block alarms. For each alarm, the current states, unacknowledged states, unreported states and disabled states are maintained.	DS-42	8	D	r / C / a	–
24 / 8	BATCH The Batch parameter is necessary in a distributed Fieldbus system to identify used and available channels, in addition to identify the current batch in case of alerts.	DS-67	10	S	r,w / C / a	–
25 / 9	UNUSED Unused parameter.	–	–	–	–	–
26 / 10	OUT The Function Block parameter OUT contains the current measurement value in a vendor-specific or configuration-adjusted engineering unit and the belonging state in AUTO MODE. The Function Block parameter OUT contains the value and status set by an operator in MAN MODE.	101	5	D	r,w / O / cyc	–
27 / 11	PV_SCALE Conversion of the Process Variable into percent using the high and low scale values. The engineering unit of PV_SCALE high and low scale values are related directly to the PV_UNIT of the configured Transducer Block (configured via Channel parameter). The PV_SCALE high and low scale values follow the changes of the PV_UNIT of the related Transducer Block automatically – a change of the Transducer Block PV_Unit causes no bump at OUT from AI.	Float	8	S	r,w / C / a	–

Table 2.6 Slot 4 – Analog Input 2 – Internal Volume Forward Totalizer

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
28 / 12	OUT_SCALE Scale of the Process Variable. The Function Block parameter OUT_SCALE contains the values of the lower limit and upper limit effective range, the code number of the engineering unit of Process Variable and the number of digits on the right hand side of the decimal point.	DS-36	11	S	r,w / C / a	-
29 / 13	LIN_TYPE Not used, fixed to NO_LINEARISATION. 0: No Linearization	Unsigned 8	1	S	r,w / C / a	No Linearization
30 / 14	CHANNEL Reference to the active Transducer Block that provides the measurement value to the Function Block. 0x0308: TB3.VOLUME_FORWARD	Unsigned 16	2	S	r,w / C / a	TB3.VOLUME_FORWARD
31 / 15	UNUSED Unused parameter.	-	-	-	-	-
32 / 16	PV_FTIME Filter time of the Process Variable. The Function Block parameter PV_FTIME contains the time constant for the rise time of the FB output up to a value of 63.21 % resulted from a jump on the input (PT1 filter). The engineering unit of the parameter is second.	Float	4	S	r,w / C / a	0
33 / 17	FSAFE_TYPE Defines the reaction of device, if a fault is detected. The calculated ACTUAL MODE remains in AUTO. For mode FSafe Value, the block parameter FSAFE_VALUE is used as OUT and the status is set to UNCERTAIN_Substitute Value, In mode Last Stored, the last stored valid OUT value is used as OUT and the status is set to UNCERTAIN_LastUsableValue. If there is no valid value available, the status is set to UNCERTAINInitial_Value and the OUT value is set to its initial value. In the mode Out Status Bad, OUT has the wrong calculated value and status is set to BAD_* (with * as calculated). 0: Fsafe Value 1: Last Stored 2: Out Status Bad	Unsigned 8	1	S	r,w / C / a	Last Stored
34 / 18	FSAFE_VALUE Default value for the OUT parameter, if a sensor or sensor electronic fault is detected. The unit of this parameter is the same as that for OUT.	Float	4	S	r,w / C / a	-
35 / 19	ALARM_HYS Hysteresis value applied to block parameters HI_HI_LIM, HI_LIM, LO_LIM and LO_LO_LIM. The hysteresis is expressed as value below high limit and above low limit in the engineering unit of xx_LIM.	Float	4	S	r,w / C / a	-
36 / 20	UNUSED Unused parameter.	-	-	-	-	-
37 / 21	HI_HI_LIM Upper limit value for alarms with the same engineering unit as that of the OUT parameter. If the measured variable is equal to or higher than the upper limit value, the State Bits in the Status Byte of OUT and in the FB parameter ALARM_SUM change to 1.	Float	4	S	r,w / C / a	-
38 / 22	UNUSED Unused parameter.	-	-	-	-	-
39 / 23	HI_LIM Upper limit value for alarms with the same engineering unit as that of the OUT parameter. If the measured variable is equal to or higher than the upper limit value, the State Bits in the Status Byte of OUT and in the FB parameter ALARM_SUM are set to 1.	Float	4	S	r,w / C / a	-

Table 2.6 Slot 4 – Analog Input 2 – Internal Volume Forward Totalizer (Continued)

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
40 / 24	UNUSED Unused parameter.	-	-	-	-	-
41 / 25	LO_LIM Lower limit value for alarms with the same engineering unit as that of the OUT parameter. If the measured variable is equal to or lower than the lower limit value, the State Bits in the Status Byte of OUT and in the FB parameter ALARM_SUM are set to 1.	Float	4	S	r,w / C / a	-
42 / 26	UNUSED Unused parameter.	-	-	-	-	-
43 / 27	LO_LO_LIM Lower limit value for alarms with the same engineering unit as that of the OUT parameter. If the measured variable is equal to or lower than the lower limit value, the State Bits in the Status Byte of OUT and in the FB parameter ALARM_SUM are set to 1.	Float	4	S	r,w / C / a	-
44 / 28	UNUSED Unused parameter.	-	-	-	-	-
45 / 29	UNUSED Unused parameter.	-	-	-	-	-
46 / 30	HI_HI_ALM The state of the upper limit of an alarm and the related time stamp. The time stamp expresses the time the measured variable has been equal or higher than the upper limit of the alarm.	DS-39	16	D	r / C / a	-
47 / 31	HI_ALM The state of the upper limit of an alarm and the related time stamp. The time stamp expresses the time the measured variable has been equal or higher than the upper limit of the alarm.	DS-39	16	D	r / C / a	-
48 / 32	LO_ALM The state of the lower limit of an alarm and the related time stamp. The time stamp expresses the time at which the measured variable has been equal to or lower than the lower limit of the alarm.	DS-39	16	D	r / C / a	-
49 / 33	LO_LO_ALM The state of the lower limit of an alarm and the related time stamp. The time stamp expresses the time at which the measured variable has been equal to or lower than the lower limit of the alarm.	DS-39	16	D	r / C / a	-
50 / 34	SIMULATE For commissioning and test purposes the input value from the Transducer Block to the block can be simulated. Note that the Transducer block is disconnected from the block when the SIMULATE parameter is in use.	DS-50	6	S	r,w / C / a	-
51 / 35	OUT_UNIT_TEXT If the unit of the OUT parameter is not available in the list of PROFIBUS Unit Codes, the user can write the specific text in this parameter. The unit code is then set to 'textual unit definition'.	OctetString	16	S	r,w / C / a	-

Table 2.6 Slot 4 – Analog Input 2 – Internal Volume Forward Totalizer (Continued)

2.6 Slot 5 – Analog Input 3 – Internal Volume Reverse Totalizer

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
16 / 0	BLOCK_OBJECT This object contains the characteristics of the blocks.	DS-32	20	Cst	r / C / a	-
17 / 1	ST_REV Revision counter for static variables. If a static variable changes its value, this counter is incremented by one.	Unsigned 16	2	N	r / C / a	0
18 / 2	TAG_DESC Every block can be assigned a textual TAG description. The TAG_DESC must be unambiguous and unique in the Fieldbus system.	OctetString	32	S	r,w / C / a	' '
19 / 3	STRATEGY The STRATEGY parameter has a user-specified value. This assigned value can be used in configuration or diagnostics as a key in sorting block information.	Unsigned 16	2	S	r,w / C / a	0
20 / 4	ALERT_KEY The ALERT_KEY parameter has a user-assigned value that can be used for sorting alarms or events generated by a block.	Unsigned 8	1	S	r,w / C / a	0
21 / 5	TARGET_MODE The TARGET_MODE indicates what mode of operation is required for the block. It is normally set by a control application or by an operator through a human interface application. The input parameters are used by the algorithm in conjunction with the state of the Function Block application containing the block to determine if the algorithm can achieve the target mode of operation established for it. See parameter 'MODE_BLK', 'Permitted' element for possible values.	Unsigned 8	1	S	r,w / C / a	Auto
22 / 6	MODE_BLK The MODE_BLK is a structured parameter composed of the actual mode, the normal mode and the permitted mode of the block. The actual mode is set (calculated) by the block during its execution to reflect the mode used during execution. Normal mode is the required operating mode of the block. The permitted mode shows which changes of the target mode are valid for the specific block to the remote user of the MODE_BLK parameter. 8: Auto 16: Manual 128: Out Of Service	DS-37	3	D	r / C / a	Actual: Out Of Service Permitted: Auto Manual Out Of Service Normal: Auto
23 / 7	ALARM_SUM The ALARM_SUM parameter summarizes the status of up to 16 block alarms. For each alarm, the current states, unacknowledged states, unreported states and disabled states are maintained.	DS-42	8	D	r / C / a	-
24 / 8	BATCH The Batch parameter is necessary in a distributed Fieldbus system to identify used and available channels, in addition to identify the current batch in case of alerts.	DS-67	10	S	r,w / C / a	-
25 / 9	UNUSED Unused parameter.	-	-	-	-	-
26 / 10	OUT The Function Block parameter OUT contains the current measurement value in a vendor-specific or configuration-adjusted engineering unit and the belonging state in AUTO MODE. The Function Block parameter OUT contains the value and status set by an operator in MAN MODE.	101	5	D	r,w / O / cyc	-
27 / 11	PV_SCALE Conversion of the Process Variable into percent using the high and low scale values. The engineering unit of PV_SCALE high and low scale values are related directly to the PV_UNIT of the configured Transducer Block (configured via Channel parameter). The PV_SCALE high and low scale values follow the changes of the PV_UNIT of the related Transducer Block automatically – a change of the Transducer Block PV_Unit causes no bump at OUT from AI.	Float	8	S	r,w / C / a	-

Table 2.7 Slot 5 – Analog Input 3 – Internal Volume Reverse Totalizer

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
28 / 12	OUT_SCALE Scale of the Process Variable. The Function Block parameter OUT_SCALE contains the values of the lower limit and upper limit effective range, the code number of the engineering unit of Process Variable and the number of digits on the right hand side of the decimal point.	DS-36	11	S	r,w / C / a	-
29 / 13	LIN_TYPE Unused, fixed to NO_LINEARISATION. 0: No Linearization	Unsigned 8	1	S	r,w / C / a	No Linearization
30 / 14	CHANNEL Reference to the active Transducer Block that provides the measurement value to the Function Block. 0x0309: TB3.VOLUME_REVERSE	Unsigned 16	2	S	r,w / C / a	TB3.VOLUME_REVERSE
31 / 15	UNUSED Unused parameter.	-	-	-	-	-
32 / 16	PV_FTIME Filter time of the Process Variable. The Function Block parameter PV_FTIME contains the time constant for the rise time of the FB output up to a value of 63.21 % resulted from a jump on the input (PT1 filter). The engineering unit of the parameter is second.	Float	4	S	r,w / C / a	0
33 / 17	FSAFE_TYPE Defines the reaction of device, if a fault is detected. The calculated ACTUAL MODE remains in AUTO. For mode FSafe Value, the block parameter FSAFE_VALUE is used as OUT and the status is set to UNCERTAIN_Substitute Value, In mode Last Stored, the last stored valid OUT value is used as OUT and the status is set to UNCERTAIN_LastUsableValue. If there is no valid value available, the status is set to UNCERTAINInitial_Value and the OUT value is set to its initial value. In the mode Out Status Bad, OUT has the wrong calculated value and status is set to BAD_* (with * as calculated). 0: Fsafe Value 1: Last Stored 2: Out Status Bad	Unsigned 8	1	S	r,w / C / a	Last Stored
34 / 18	FSAFE_VALUE Default value for the OUT parameter, if a sensor or sensor electronic fault is detected. The unit of this parameter is the same as that for OUT.	Float	4	S	r,w / C / a	-
35 / 19	ALARM_HYS Hysteresis value applied to block parameters HI_HI_LIM, HI_LIM, LO_LIM and LO_LO_LIM. The hysteresis is expressed as value below high limit and above low limit in the engineering unit of xx_LIM.	Float	4	S	r,w / C / a	-
36 / 20	UNUSED Unused parameter.	-	-	-	-	-
37 / 21	HI_HI_LIM Upper limit value for alarms with the same engineering unit as that of the OUT parameter. If the measured variable is equal to or higher than the upper limit value, the State Bits in the Status Byte of OUT and in the FB parameter ALARM_SUM change to 1.	Float	4	S	r,w / C / a	-
38 / 22	UNUSED Unused parameter.	-	-	-	-	-
39 / 23	HI_LIM Upper limit value for alarms with the same engineering unit as that of the OUT parameter. If the measured variable is equal to or higher than the upper limit value, the State Bits in the Status Byte of OUT and in the FB parameter ALARM_SUM are set to 1.	Float	4	S	r,w / C / a	-

Table 2.7 Slot 5 – Analog Input 3 – Internal Volume Reverse Totalizer (Continued)

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
40 / 24	UNUSED Unused parameter.	-	-	-	-	-
41 / 25	LO_LIM Lower limit value for alarms with the same engineering unit as that of the OUT parameter. If the measured variable is equal to or lower than the lower limit value, the State Bits in the Status Byte of OUT and in the FB parameter ALARM_SUM are set to 1.	Float	4	S	r,w / C / a	-
42 / 26	UNUSED Unused parameter.	-	-	-	-	-
43 / 27	LO_LO_LIM Lower limit value for alarms with the same engineering unit as that of the OUT parameter. If the measured variable is equal to or lower than the lower limit value, the State Bits in the Status Byte of OUT and in the FB parameter ALARM_SUM are set to 1.	Float	4	S	r,w / C / a	-
44 / 28	UNUSED Unused parameter.	-	-	-	-	-
45 / 29	UNUSED Unused parameter.	-	-	-	-	-
46 / 30	HI_HI_ALM The state of the upper limit of an alarm and the related time stamp. The time stamp expresses the time the measured variable has been equal or higher than the upper limit of the alarm.	DS-39	16	D	r / C / a	-
47 / 31	HI_ALM The state of the upper limit of an alarm and the related time stamp. The time stamp expresses the time the measured variable has been equal or higher than the upper limit of the alarm.	DS-39	16	D	r / C / a	-
48 / 32	LO_ALM The state of the lower limit of an alarm and the related time stamp. The time stamp expresses the time at which the measured variable has been equal to or lower than the lower limit of the alarm.	DS-39	16	D	r / C / a	-
49 / 33	LO_LO_ALM The state of the lower limit of an alarm and the related time stamp. The time stamp expresses the time at which the measured variable has been equal to or lower than the lower limit of the alarm.	DS-39	16	D	r / C / a	-
50 / 34	SIMULATE For commissioning and test purposes the input value from the Transducer Block to the block can be simulated. Note that the Transducer block is disconnected from the block when the SIMULATE parameter is in use.	DS-50	6	S	r,w / C / a	-
51 / 35	OUT_UNIT_TEXT If the unit of the OUT parameter is not available in the list of PROFIBUS Unit Codes, the user can write the specific text in this parameter. The unit code is then set to 'textual unit definition'.	OctetString	16	S	r,w / C / a	-

Table 2.7 Slot 5 – Analog Input 3 – Internal Volume Reverse Totalizer (Continued)

2.7 Slot 6 – Analog Input 4 – Diagnostic Signal

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
16 / 0	BLOCK_OBJECT This object contains the characteristics of the blocks.	DS-32	20	Cst	r / C / a	–
17 / 1	ST_REV Revision counter for static variables. If a static variable changes its value, this counter is incremented by one.	Unsigned 16	2	N	r / C / a	0
18 / 2	TAG_DESC Every block can be assigned a textual TAG description. The TAG_DESC must be unambiguous and unique in the Fieldbus system.	OctetString	32	S	r,w / C / a	,
19 / 3	STRATEGY The STRATEGY parameter has a user-specified value. This assigned value can be used in configuration or diagnostics as a key in sorting block information.	Unsigned 16	2	S	r,w / C / a	0
20 / 4	ALERT_KEY The ALERT_KEY parameter has a user-assigned value that can be used for sorting alarms or events generated by a block.	Unsigned 8	1	S	r,w / C / a	0
21 / 5	TARGET_MODE The TARGET_MODE indicates what mode of operation is required for the block. It is normally set by a control application or by an operator through a human interface application. The input parameters are used by the algorithm in conjunction with the state of the Function Block application containing the block to determine if the algorithm can achieve the target mode of operation established for it. See parameter 'MODE_BLK', 'Permitted' element for possible values.	Unsigned 8	1	S	r,w / C / a	Auto
22 / 6	MODE_BLK The MODE_BLK is a structured parameter composed of the actual mode, the normal mode and the permitted mode of the block. The actual mode is set (calculated) by the block during its execution to reflect the mode used during execution. Normal mode is the required operating mode of the block. The permitted mode shows which changes of the target mode are valid for the specific block to the remote user of the MODE_BLK parameter. 8: Auto 16: Manual 128: Out Of Service	DS-37	3	D	r / C / a	Actual: Out Of Service Permitted: Auto Manual Out Of Service Normal: Auto
23 / 7	ALARM_SUM The ALARM_SUM parameter summarizes the status of up to 16 block alarms. For each alarm, the current states, unacknowledged states, unreported states and disabled states are maintained.	DS-42	8	D	r / C / a	–
24 / 8	BATCH The Batch parameter is necessary in a distributed Fieldbus system to identify used and available channels, in addition to identify the current batch in case of alerts.	DS-67	10	S	r,w / C / a	–
25 / 9	UNUSED Unused parameter.	–	–	–	–	–
26 / 10	OUT The Function Block parameter OUT contains the current measurement value in a vendor-specific or configuration-adjusted engineering unit and the belonging state in AUTO MODE. The Function Block parameter OUT contains the value and status set by an operator in MAN MODE.	101	5	D	r,w / O / cyc	–
27 / 11	PV_SCALE Conversion of the Process Variable into percent using the high and low scale values. The engineering unit of PV_SCALE high and low scale values are related directly to the PV_UNIT of the configured Transducer Block (configured via Channel parameter). The PV_SCALE high and low scale values follow the changes of the PV_UNIT of the related Transducer Block automatically – a change of the Transducer Block PV_Unit causes no bump at OUT from AI.	Float	8	S	r,w / C / a	–

Table 2.8 Slot 6 – Analog Input 4 – Diagnostic Signal

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
28 / 12	OUT_SCALE Scale of the Process Variable. The Function Block parameter OUT_SCALE contains the values of the lower limit and upper limit effective range, the code number of the engineering unit of Process Variable and the number of digits on the right hand side of the decimal point.	DS-36	11	S	r,w / C / a	-
29 / 13	LIN_TYPE Unused, fixed to NO_LINEARISATION. 0: No Linearization	Unsigned 8	1	S	r,w / C / a	No Linearization
30 / 14	CHANNEL Reference to the active Transducer Block that provides the measurement value to the Function Block. 0x0521: TB5.ELECTRODE_1_RESISTANCE 0x0539: TB5.ELECTRODE_2_RESISTANCE 0x053A: TB5.BACK_OFF_VOLTAGE 0x053B: TB5.COIL_AND_CABLE_RESISTANCE 0x053C: TB5.COIL_INDUCTANCE 0x053D: TB5.SENSOR_INDUCTANCE_SHIFT 0x053E: TB5.TRANSMITTER_AVERAGE_GAIN_SHIFT	Unsigned 16	2	S	r,w / C / a	TB5.ELECTRODE_1_RESISTANCE
31 / 15	UNUSED Unused parameter.	-	-	-	-	-
32 / 16	PV_FTIME Filter time of the Process Variable. The Function Block parameter PV_FTIME contains the time constant for the rise time of the FB output up to a value of 63.21 % resulted from a jump on the input (PT1 filter). The engineering unit of the parameter is second.	Float	4	S	r,w / C / a	0
33 / 17	FSAFE_TYPE Defines the reaction of device, if a fault is detected. The calculated ACTUAL MODE remains in AUTO. For mode FSafe Value, the block parameter FSAFE_VALUE is used as OUT and the status is set to UNCERTAIN_Substitute Value, In mode Last Stored, the last stored valid OUT value is used as OUT and the status is set to UNCERTAIN_LastUsableValue. If there is no valid value available, the status is set to UNCERTAINInitial_Value and the OUT value is set to its initial value. In the mode Out Status Bad, OUT has the wrong calculated value and status is set to BAD_* (with * as calculated). 0: Fsafe Value 1: Last Stored 2: Out Status Bad	Unsigned 8	1	S	r,w / C / a	Last Stored
34 / 18	FSAFE_VALUE Default value for the OUT parameter, if a sensor or sensor electronic fault is detected. The unit of this parameter is the same as that for OUT.	Float	4	S	r,w / C / a	-
35 / 19	ALARM_HYS Hysteresis value applied to block parameters HI_HI_LIM, HI_LIM, LO_LIM and LO_LO_LIM. The hysteresis is expressed as value below high limit and above low limit in the engineering unit of xx_LIM.	Float	4	S	r,w / C / a	-
36 / 20	UNUSED Unused parameter.	-	-	-	-	-
37 / 21	HI_HI_LIM Upper limit value for alarms with the same engineering unit as that of the OUT parameter. If the measured variable is equal to or higher than the upper limit value, the State Bits in the Status Byte of OUT and in the FB parameter ALARM_SUM change to 1.	Float	4	S	r,w / C / a	-
38 / 22	UNUSED Unused parameter.	-	-	-	-	-

Table 2.8 Slot 6 – Analog Input 4 – Diagnostic Signal (Continued)

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
39 / 23	HI_LIM Upper limit value for alarms with the same engineering unit as that of the OUT parameter. If the measured variable is equal to or higher than the upper limit value, the State Bits in the Status Byte of OUT and in the FB parameter ALARM_SUM are set to 1.	Float	4	S	r,w / C / a	-
40 / 24	UNUSED Unused parameter.	-	-	-	-	-
41 / 25	LO_LIM Lower limit value for alarms with the same engineering unit as that of the OUT parameter. If the measured variable is equal to or lower than the lower limit value, the State Bits in the Status Byte of OUT and in the FB parameter ALARM_SUM are set to 1.	Float	4	S	r,w / C / a	-
42 / 26	UNUSED Unused parameter.	-	-	-	-	-
43 / 27	LO_LO_LIM Lower limit value for alarms with the same engineering unit as that of the OUT parameter. If the measured variable is equal to or lower than the lower limit value, the State Bits in the Status Byte of OUT and in the FB parameter ALARM_SUM are set to 1.	Float	4	S	r,w / C / a	-
44 / 28	UNUSED Unused parameter.	-	-	-	-	-
45 / 29	UNUSED Unused parameter	-	-	-	-	-
46 / 30	HI_HI_ALM The state of the upper limit of an alarm and the related time stamp. The time stamp expresses the time the measured variable has been equal or higher than the upper limit of the alarm.	DS-39	16	D	r / C / a	-
47 / 31	HI_ALM The state of the upper limit of an alarm and the related time stamp. The time stamp expresses the time the measured variable has been equal or higher than the upper limit of the alarm.	DS-39	16	D	r / C / a	-
48 / 32	LO_ALM The state of the lower limit of an alarm and the related time stamp. The time stamp expresses the time at which the measured variable has been equal to or lower than the lower limit of the alarm.	DS-39	16	D	r / C / a	-
49 / 33	LO_LO_ALM The state of the lower limit of an alarm and the related time stamp. The time stamp expresses the time at which the measured variable has been equal to or lower than the lower limit of the alarm.	DS-39	16	D	r / C / a	-
50 / 34	SIMULATE For commissioning and test purposes the input value from the Transducer Block to the block can be simulated. Note that the Transducer block is disconnected from the block when the SIMULATE parameter is in use.	DS-50	6	S	r,w / C / a	-
51 / 35	OUT_UNIT_TEXT If the unit of the OUT parameter is not available in the list of PROFIBUS Unit Codes, the user can write the specific text in this parameter. The unit code is then set to 'textual unit definition'.	OctetString	16	S	r,w / C / a	-

Table 2.8 Slot 6 – Analog Input 4 – Diagnostic Signal (Continued)

2.8 Slot 7 – Analog Output 1 – Display Value

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
16 / 0	BLOCK_OBJECT This object contains the characteristics of the blocks.	DS-32	20	Cst	r / C / a	–
17 / 1	ST_REV Revision counter for static variables. If a static variable changes its value, this counter is incremented by one.	Unsigned 16	2	N	r / C / a	0
18 / 2	TAG_DESC Every block can be assigned a textual TAG description. The TAG_DESC must be unambiguous and unique in the Fieldbus system.	OctetString	32	S	r,w / C / a	' ,
19 / 3	STRATEGY The STRATEGY parameter has a user-specified value. This assigned value can be used in configuration or diagnostics as a key in sorting block information.	Unsigned 16	2	S	r,w / C / a	0
20 / 4	ALERT_KEY The ALERT_KEY parameter has a user-assigned that can be used for sorting alarms or events generated by a block.	Unsigned 8	1	S	r,w / C / a	0
21 / 5	TARGET_MODE The TARGET_MODE indicates what mode of operation is required for the block. It is normally set by a control application or by an operator through a human interface application. The input parameters are used by the algorithm in conjunction with the state of the Function Block application containing the block to determine if the algorithm can achieve the target mode of operation established for it. See parameter 'MODE_BLK', 'Permitted' element for possible values.	Unsigned 8	1	S	r,w / C / a	Auto
22 / 6	MODE_BLK The MODE_BLK is a structured parameter composed of the actual mode, the normal mode and the permitted mode of the block. The actual mode is set (calculated) by the block during its execution to reflect the mode used during execution. Normal mode is the required operating mode of the block. The permitted mode shows which changes of the target mode are valid for the specific block to the remote user of the MODE_BLK parameter. 8: Auto 16: Manual 128: Out Of Service	DS-37	3	D	r / C / a	Actual: Out Of Service Permitted: Auto Manual Out Of Service Normal: Auto
23 / 7	ALARM_SUM The ALARM_SUM parameter summarizes the status of up to 16 block alarms. For each alarm, the current states, unacknowledged states, unreported states and disabled states are maintained.	DS-42	8	D	r / C / a	–
24 / 8	BATCH The Batch parameter is necessary in a distributed Fieldbus system to identify used and available channels, in addition to identify the current batch in case of alerts.	DS-67	10	S	r,w / C / a	–
25 / 9	SP Input value from the control system.	101	5	D	r,w / l / cyc	–
26 / 10	UNUSED Unused parameter.	–	–	–	–	–
27 / 11	PV_SCALE Conversion of the Process Variable into percent using the high and low scale values. The engineering unit of PV_SCALE high and low scale values are related directly to the PV_UNIT of the configured Transducer Block (configured via Channel parameter). The PV_SCALE high and low scale values follow the changes of the PV_UNIT of the related Transducer Block automatically – a change of the Transducer Block PV_Unit causes no bump at OUT from AI.	DS-36	11	S	r,w / C / a	–
28 / 12	READBACK The actual position of the final control element within the travel span (between OPEN and CLOSE position) in units of PV_SCALE.	101	5	D	r,w / C / a	–

Table 2.9 Slot 7 – Analog Output 1 – Display Value

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
29 / 13	UNUSED Unused parameter.	-	-	-	-	-
30 / 14	RCAS_IN Target set point in units of PV_SCALE and status provided by a supervisory host to the analog control or output block in mode RCAs.	101	2	S	r,w / C / a	-
31 / 15	UNUSED Unused parameter.	-	-	-	-	-
32 / 16	UNUSED Unused parameter.	-	-	-	-	-
33 / 17	UNUSED Unused parameter.	-	-	-	-	-
34 / 18	UNUSED Unused parameter.	-	-	-	-	-
35 / 19	UNUSED Unused parameter.	-	-	-	-	-
36 / 20	UNUSED Unused parameter.	-	-	-	-	-
37 / 21	IN_CHANNEL Reference to the active Transducer Block and its parameter that provides the actual position of the final control element.	Unsigned 16	2	S	r,w / C / a	-
38 / 22	OUT_CHANNEL Reference to the active Transducer Block and its parameter that provides the position value for the final control element. 0x014E: TB1.DISPLAY_VALUE	Unsigned 16	2	S	r,w / C / a	TB1.DISPLAY_VALUE
39 / 23	FSAFE_TIME Time in seconds from detection of failure of the actual used set point (SP = BAD or RCAS_IN <> GOOD) to the action of the block if the condition still exists. Note: A communication time out changes the status of the transmitted set point to BAD.	Float	4	S	r,w / C / a	-
40 / 24	FSAFE_TYPE Defines the reaction of the device if a failure of the actual used set point is still detected after FSAFE_TIME or if the status of actual used set point is Initiate Fail Safe. In mode FSafe Value, the value of parameter FSAFE_VALUE is used as the set point value and the status of OUT is set to UNCERTAIN – Substitute Value. In mode Use Last Valid Set Point, the last value of SP with status GOOD is used and the status of OUT is set to UNCERTAIN – Last usable Value or BAD – No communication, no LUV. In mode Actuator Action, the actuator goes to fail-safe position defined by the parameter ACTUATOR_ACTION (useful for actuators with spring return only). The status of OUT is set to BAD – non-specific. 0: Fsafe Value 1: Last Stored 2: Out Status Bad	Unsigned 8	1	S	r,w / C / a	Last Stored
41 / 25	FSAFE_VALUE Set point used if FSAFE_TYPE = 1 and FSAFE is activated.	Float	4	S	r,w / C / a	-
42 / 26	UNUSED Unused parameter.	-	-	-	-	-
43 / 27	RCAS_OUT Function Block set point in units of PV_SCALE and status. Provided to a supervisory Host for monitoring / back calculation and to allow action to be taken under limited conditions or mode change.	101	4	D	r / C / a	-

Table 2.9 Slot 7 – Analog Output 1 – Display Value (Continued)

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
44 / 28	UNUSED Unused parameter.	-	-	-	-	-
45 / 29	UNUSED Unused parameter.	-	-	-	-	-
46 / 30	UNUSED Unused parameter.	-	-	-	-	-
47 / 31	POS_D The current position of the valve (discrete).	102	2	D	r / C / a	-
48 / 32	SETP_DEVIATION Difference between set point signal and feedback position in % travel span (between OPEN and CLOSE position).	Float	4	D	r / C / a	-
49 / 33	CHECK_BACK Detailed information of the device, bitwise coded. More than one message possible at once.	OctetString	3	D	r / C / a	-
50 / 34	CHECK_BACK_MASK Definition of supported CHECK_BACK information bits.	OctetString	3	Cst	r / C / a	-
51 / 35	SIMULATE For commissioning and maintenance reasons, it is possible to simulate the READBACK by defining the value and the status. The Transducer Block and the AO-FB are disconnected when the SIMULATE parameter is in use.	DS-50	6	S	r,w / C / a	-
52 / 36	INCREASE_CLOSE Direction of positioner in mode RCAs and Auto.	Unsigned 8	1	S	r,w / C / a	-
53 / 37	OUT The process variable of the analog output block in engineering units in AUTO and RCAs mode and is the value specified by the operator/engineer in Man and LO mode.	101	5	D	r,w / C / a	-
54 / 38	OUT_SCALE Scale of the Process Variable. The Function Block parameter OUT_SCALE contains the values of the lower limit and upper limit effective range, the code number of the engineering unit of Process Variable and the number of digits on the right hand side of the decimal point.	DS-36	11	S	r,w / C / a	-

Table 2.9 Slot 7 – Analog Output 1 – Display Value (Continued)

2.9 Slot 8 – Transducer Block 1 – Flow

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
16 / 0	BLOCK_OBJECT This object contains the characteristics of the blocks.	DS-32	20	Cst	r / C / a	–
17 / 1	ST_REV Revision counter for static variables. If a static variable changes its value, this counter is incremented by one.	Unsigned 16	2	N	r / C / a	0
18 / 2	TAG_DESC Every block can be assigned a textual TAG description. The TAG_DESC must be unambiguous and unique in the Fieldbus system.	OctetString	32	S	r,w / C / a	' ,
19 / 3	STRATEGY The STRATEGY parameter has a user-specified value. This assigned value can be used in configuration or diagnostics as a key in sorting block information.	Unsigned 16	2	S	r,w / C / a	0
20 / 4	ALERT_KEY The ALERT_KEY parameter has a user-assigned value that can be used for sorting alarms or events generated by a block.	Unsigned 8	1	S	r,w / C / a	0
21 / 5	TARGET_MODE The TARGET_MODE indicates what mode of operation is required for the block. It is normally set by a control application or by an operator through a human interface application. The input parameters are used by the algorithm in conjunction with the state of the Function Block application containing the block to determine if the algorithm can achieve the target mode of operation established for it. See parameter 'MODE_BLK', 'Permitted' element for possible values.	Unsigned 8	1	S	r,w / C / a	Auto
22 / 6	MODE_BLK The MODE_BLK is a structured parameter composed of the actual mode, the normal mode and the permitted mode of the block. The actual mode is set (calculated) by the block during its execution to reflect the mode used during execution. Normal mode is the required operating mode of the block. The permitted mode shows which changes of the target mode are valid for the specific block to the remote user of the MODE_BLK parameter. 8: Auto	DS-37	3	D	r / C / a	Actual: Auto Permitted: Auto Normal: Auto
23 / 7	ALARM_SUM The ALARM_SUM parameter summarizes the status of up to 16 block alarms. For each alarm, the current states, unacknowledged states, unreported states and disabled states are maintained.	DS-42	8	D	r / C / a	0
24 / 8	CALIBR_FACTOR Unused parameter in Flow Profile.	Float	4	S	r,w / C / a	0
25 / 9	LOW_FLOW_CUTOFF User-set flow cutoff value. Min: 0 Max: 10 Unit: %	Float	4	S	r,w / C / a	0.5
26 / 10	MEASUREMENT_MODE Directions of flow over which metering occurs. 0: Unidirectional Forward 1: Bidirectional 2: Unidirectional Reverse	Unsigned 8	1	S	r,w / C / a	Bidirectional
27 / 11	FLOW_DIRECTION Sign correction applied to the flow value. 0: Positive 1: Negative	Unsigned 8	1	S	r,w / C / a	Positive

Table 2.10 Slot 8 – Transducer Block 1 – Flow

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
28 / 12	ZERO_POINT User zero velocity value. Min: -50 Max: 50 Unit: mm/s	Float	4	S	r,w / C / a	0
29 / 13	ZERO_POINT_ADJUST Starts a zero velocity adjustment.	Unsigned 8	1	N	r,w / C / a	0
30 / 14	ZERO_POINT_UNIT Units of zero velocity (fixed to mm/s). 1062: mm/s	Unsigned 16	2	S	r,w / C / a	mm/s
31 / 15	NOMINAL_SIZE Size of the sensor in use. Unit: TB1.NOMINAL_SIZE_UNITS	Float	4	S	r / C / a	20
32 / 16	NOMINAL_SIZE_UNITS Units used for pipe bore size. 1013: mm 1019: in	Unsigned 16	2	S	r,w / C / a	mm
33 / 17	VOLUME_FLOW Volume flow, primary system variable. Unit: TB1.VOLUME_FLOW_UNITS	101	5	D	r / O / a	0
34 / 18	VOLUME_FLOW_UNITS Volume flow units in use. 1347: m3/s 1348: m3/min 1349: m3/h 1350: m3/d 1351: l/s 1352: l/min 1353: l/h 1355: Ml/d 1356: ft3/s 1357: ft3/min 1358: ft3/h 1359: ft3/d 1362: ugal/s 1363: ugal/min 1364: ugal/h 1365: ugal/d 1454: kugal/min 1366: Mugal/d 1367: igoal/s 1368: igoal/min 1369: igoal/h 1370: igoal/d 1371: bbl/s 1372: bbl/min 1373: bbl/h 1374: bbl/d 1563: ml/min 1577: ml/s 1635: hl/h	Unsigned 16	2	S	r,w / C / a	m3/h
35 / 19	VOLUME_FLOW_LO_LIMIT Absolute value of the lower range value (volume flow) of the sensor. Unit: TB1.VOLUME_FLOW_UNITS	Float	4	S	r,w / C / a	0

Table 2.10 Slot 8 – Transducer Block 1 – Flow (Continued)

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
36 / 20	VOLUME_FLOW_HI_LIMIT Absolute value of the upper range value (volume flow) of the sensor. Min: TB1.VOLUME_FLOW_RANGE_LOWER Max: TB1.VOLUME_FLOW_RANGE_UPPER Unit: TB1.VOLUME_FLOW_UNITS	Float	4	S	r,w / C / a	2.5
37 / 21	UNUSED Parameter MASS_FLOW unused by WaterMaster.	-	-	-	-	-
38 / 22	UNUSED Parameter MASS_FLOW_UNITS unused by WaterMaster.	-	-	-	-	-
39 / 23	UNUSED Parameter MASS_FLOW_LO_LIMIT unused by WaterMaster.	-	-	-	-	-
40 / 24	UNUSED Parameter MASS_FLOW_HI_LIMIT unused by WaterMaster.	-	-	-	-	-
41 / 25	UNUSED Parameter DENSITY unused by WaterMaster.	-	-	-	-	-
42 / 26	UNUSED Parameter DENSITY_UNITS unused by WaterMaster.	-	-	-	-	-
43 / 27	UNUSED Parameter DENSITY_LO_LIMIT unused by WaterMaster.	-	-	-	-	-
44 / 28	UNUSED Parameter DENSITY_HI_LIMIT unused by WaterMaster.	-	-	-	-	-
45 / 29	UNUSED Parameter TEMPERATURE unused by WaterMaster.	-	-	-	-	-
46 / 30	UNUSED Parameter TEMPERATURE_UNITS unused by WaterMaster.	-	-	-	-	-
47 / 31	UNUSED Parameter TEMPERATURE_LO_LIMIT unused by WaterMaster.	-	-	-	-	-
48 / 32	UNUSED Parameter TEMPERATURE_HI_LIMIT unused by WaterMaster.	-	-	-	-	-
49 / 33	UNUSED Parameter VORTEX_FREQ unused by WaterMaster.	-	-	-	-	-
50 / 34	UNUSED Parameter VORTEX_FREQ_UNITS unused by WaterMaster.	-	-	-	-	-
51 / 35	UNUSED Parameter VORTEX_FREQ_LO_LIMIT unused by WaterMaster.	-	-	-	-	-
52 / 36	UNUSED Parameter VORTEX_FREQ_HI_LIMIT unused by WaterMaster.	-	-	-	-	-
53 / 37	UNUSED Parameter SOUND_VELOCITY unused by WaterMaster.	-	-	-	-	-
54 / 38	UNUSED Parameter SOUND_VELOCITY_UNITS unused by WaterMaster.	-	-	-	-	-
55 / 39	UNUSED Parameter SOUND_VELOCITY_LO_LIMIT unused by WaterMaster.	-	-	-	-	-
56 / 40	UNUSED Parameter SOUND_VELOCITY_HI_LIMIT unused by WaterMaster.	-	-	-	-	-

Table 2.10 Slot 8 – Transducer Block 1 – Flow (Continued)

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
57 / 41	SAMPLING_FREQ Parameter unused by WaterMaster, implemented for Profile compliance only.	101	5	D	r,w / C / a	0
58 / 42	SAMPLING_FREQ_UNITS Parameter unused by WaterMaster, implemented for Profile compliance only. Unit: Hz	Unsigned 16	2	S	r,w / C / a	0
59 / 43	PI RESERVED Unused parameter.	-	-	-	-	-
60 / 44	PI RESERVED Unused parameter.	-	-	-	-	-
61 / 45	PI RESERVED Unused parameter.	-	-	-	-	-
62 / 46	PI RESERVED Unused parameter.	-	-	-	-	-
63 / 47	PI RESERVED Unused parameter.	-	-	-	-	-
64 / 48	PI RESERVED Unused parameter.	-	-	-	-	-
65 / 49	PI RESERVED Unused parameter.	-	-	-	-	-
66 / 50	PI RESERVED Unused parameter.	-	-	-	-	-
67 / 51	PI RESERVED Unused parameter.	-	-	-	-	-
68 / 52	PI RESERVED Unused parameter.	-	-	-	-	-
69 / 53	UNUSED Unused parameter.	-	-	-	-	-
70 / 54	UNUSED Unused parameter.	-	-	-	-	-
71 / 55	UNUSED Unused parameter.	-	-	-	-	-
72 / 56	UNUSED Unused parameter.	-	-	-	-	-
73 / 57	UNUSED Unused parameter.	-	-	-	-	-
74 / 58	UNUSED Unused parameter.	-	-	-	-	-
75 / 59	UNUSED Unused parameter.	-	-	-	-	-
76 / 60	UNUSED Unused parameter.	-	-	-	-	-
77 / 61	UNUSED Unused parameter.	-	-	-	-	-
78 / 62	UNUSED Unused parameter.	-	-	-	-	-

Table 2.10 Slot 8 – Transducer Block 1 – Flow (Continued)

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
79 / 63	UNUSED Unused parameter.	-	-	-	-	-
80 / 64	UNUSED Unused parameter.	-	-	-	-	-
81 / 65	FLOW_RATIO System flow value ratio value. Unit: %	101	5	D	r / O / a	0
82 / 66	FLOW_VELOCITY System velocity value. Unit: TB1.VELLOCITY_UNIT	101	5	D	r / O / a	0
83 / 67	VELOCITY_UNIT Velocity units in use. 1061: m/s 1066: in/s 1067: ft/s 1069: in/min 1070: ft/min	Unsigned 16	2	D	r,w / C / a	m/s
84 / 68	UNUSED Unused parameter.	-	-	-	-	-
85 / 69	UNUSED Unused parameter.	-	-	-	-	-
86 / 70	UNUSED Unused parameter.	-	-	-	-	-
87 / 71	UNUSED Unused parameter.	-	-	-	-	-
88 / 72	UNUSED Unused parameter.	-	-	-	-	-
89 / 73	UNUSED Unused parameter.	-	-	-	-	-
90 / 74	Q_MAX Maximum flowrate for the sensor in use. Min: TB1.VOLUME_FLOW_RANGE_LOWER Max: TB1.VOLUME_FLOW_RANGE_UPPER Unit: TB1.VOLUME_FLOW_UNITS	Float	4	S	r,w / C / a	2.5
91 / 75	UNUSED Unused parameter.	-	-	-	-	-
92 / 76	UNUSED Unused parameter.	-	-	-	-	-
93 / 77	DAMPING System damping value. Min: 0.02 Max: 60 Unit: s	Float	4	S	r,w / C / a	1
94 / 78	DISPLAY_VALUE Process value for display on the local device display.	101	5	S	r,w / C / a	-

Table 2.10 Slot 8 – Transducer Block 1 – Flow (Continued)

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
95 / 79	LOW_FLOW_CUTOFF_HYSTERESIS Hysteresis for flow cutoff in percent. Min: 0 Max: 50 Unit: %	Float	4	S	r,w / C / a	20
96 / 80	METER_MODE Flow direction under which metering takes place. 0: Normal Operation 1: Forward Flow 2: Reverse Flow	Unsigned 8	1	S	r,w / C / a	Normal Operation
97 / 81	UNUSED Unused parameter.	-	-	-	-	-
98 / 82	UNUSED Unused parameter.	-	-	-	-	-
99 / 83	PROBE_PIPE_BORE Bore of pipe where probe type sensor is installed. Min: 1 Max: 5000 Unit: mm	Float	4	S	r,w / C / a	250
100 / 84	PROBE_INSERTION_FACTOR Insertion factor for probe type sensors. Min: 0 Max: 3	Float	4	S	r,w / C / a	1
101 / 85	PROBE_PROFILE_FACTOR Profile factor probe type sensors. Min: 0 Max: 3	Float	4	S	r,w / C / a	1
102 / 86	Q_MAX_DN_SPECIAL QMax DN value for special sensors. Min: 0 Max: 100000 Unit: TB1.VOLUME_FLOW_UNITS	Float	4	S	r,w / C / a	2.5
103 / 87	USER_SYSTEM_SPAN User span value. Min: -250 Max: 250 Unit: %	Float	4	S	r,w / C / a	100
104 / 88	MAINS_FREQUENCY Transmitter mains frequency. Changes to this parameter cause the instrument to reboot. 50: 50 60: 60 Unit: Hz	Unsigned 8	1	S	r,w / C / a	50
105 / 89	FACTORY_SENSOR_SPAN Factory-set sensor span value. Unit: %	Float	4	D	r / C / a	100

Table 2.10 Slot 8 – Transducer Block 1 – Flow (Continued)

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
106 / 90	FACTORY_SENSOR_ZERO Factory-set zero value. Unit: mm/s	Float	4	D	r / C / a	0
107 / 91	TRIM_ST Trim factor. Unit: %	Float	4	D	r / C / a	0
108 / 92	SENSOR_CALIBRATION_TYPE Sensor calibration type performed. 0: Retrofit 1: OIML Class 1 2: OIML Class 2 3: Special 4: OIML Certified Class 1 5: OIML Certified Class 2 6: Probe 7: NMI 8: Select	Unsigned 8	1	D	r / C / a	OIML Class 1
109 / 93	DRIVE_MODE Drive mode currently in use. 0: User 1: 1 2: 2 3: 3 4: 4 5: 5 6: 6 7: 7 8: 8 9: 3A 10: 4A 11: 5A 12: 5B 13: 6A 14: 6B 15: 7A 16: 7B 17: 7C 18: 7D 19: 8A 20: 8B 21: 8C	Unsigned 8	1	D	r / C / a	5A
110 / 94	EXCITATION_CURRENT Coil current value. Unit: mA	Float	4	D	r / C / a	180
111 / 95	FACTORY_CUTOFF Cutoff velocity set during calibration. Unit: mm/s	Float	4	D	r / C / a	0
112 / 96	FACTORY_CUTOFF_NUM_AVERAGING_SAMPLES Number of samples used in averaging filter.	Unsigned 8	1	D	r / C / a	4
113 / 97	CALIBRATION_STATUS Sensor calibration status. 0: Not Complete 1: Calibrated	Unsigned 8	1	D	r / C / a	Not Complete
114 / 98	VOLUME_FLOW_RANGE_LOWER Dynamic lower limit for flow values. Unit: TB1.VOLUME_FLOW_UNITS	Float	4	D	r / C / a	0.5

Table 2.10 Slot 8 – Transducer Block 1 – Flow (Continued)

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
115 / 99	VOLUME_FLOW_RANGE_UPPER Dynamic upper limit for flow values. Unit: TB1.VOLUME_FLOW_UNITS	Float	4	D	r / C / a	5
116 / 100	FLOW_VELOCITY_RANGE_LOWER Dynamic lower limit for velocity values. Unit: TB1.VELOCITY_UNIT	Float	4	D	r / C / a	0.2
117 / 101	FLOW_VELOCITY_RANGE_UPPER Dynamic upper limit for velocity values. Unit: TB1.VELOCITY_UNIT	Float	4	D	r / C / a	20a

Table 2.10 Slot 8 – Transducer Block 1 – Flow (Continued)

2.10 Slot 9 – Transducer Block 2 – Device Info

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
16 / 0	BLOCK_OBJECT This object contains the characteristics of the blocks.	DS-32	20	Cst	r / C / a	–
17 / 1	ST_REV Revision counter for static variables. If a static variable changes its value, this counter is incremented by one.	Unsigned 16	2	N	r / C / a	0
18 / 2	TAG_DESC Every block can be assigned a textual TAG description. The TAG_DESC must be unambiguous and unique in the Fieldbus system.	OctetString	32	S	r,w / C / a	' ,
19 / 3	STRATEGY The STRATEGY parameter has a user-specified value. This assigned value can be used in configuration or diagnostics as a key in sorting block information.	Unsigned 16	2	S	r,w / C / a	0
20 / 4	ALERT_KEY The ALERT_KEY parameter has a user-assigned value that can be used for sorting alarms or events generated by a block.	Unsigned 8	1	S	r,w / C / a	0
21 / 5	TARGET_MODE The TARGET_MODE indicates what mode of operation is required for the block. It is normally set by a control application or by an operator through a human interface application. The input parameters are used by the algorithm in conjunction with the state of the Function Block application containing the block to determine if the algorithm can achieve the target mode of operation established for it. See parameter 'MODE_BLK', 'Permitted' element for possible values.	Unsigned 8	1	S	r,w / C / a	Auto
22 / 6	MODE_BLK The MODE_BLK is a structured parameter composed of the actual mode, the normal mode and the permitted mode of the block. The actual mode is set (calculated) by the block during its execution to reflect the mode used during execution. Normal mode is the required operating mode of the block. The permitted mode shows which changes of the target mode are valid for the specific block to the remote user of the MODE_BLK parameter. 8: Auto	DS-37	3	D	r / C / a	Actual: Auto Permitted: Auto Normal: Auto
23 / 7	ALARM_SUM The ALARM_SUM parameter summarizes the status of up to 16 block alarms. For each alarm, the current states, unacknowledged states, unreported states and disabled states are maintained.	DS-42	8	D	r / C / a	0
24 / 8	MANUFACTURER Manufacturer name.	VisibleString	20	D	r / C / a	?
25 / 9	MANUFACTURER_ADDRESS_1 Manufacturer address line 1.	VisibleString	20	D	r / C / a	?
26 / 10	MANUFACTURER_ADDRESS_2 Manufacturer address line 2.	VisibleString	20	D	r / C / a	?
27 / 11	MANUFACTURER_CONTACT Manufacturer contact details.	VisibleString	20	D	r / C / a	?

Table 2.11 Slot 9 – Transducer Block 2 – Device Info

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
28 / 12	<p>SENSOR_TYPE</p> <p>Type of sensor in use.</p> <p>0: Probe 1: Process 2: Hygienic 3: WM Reduced Throat 4: WM Full Bore 5: DE4 6: DE2 7: Process OIML 8: Hygienic OIML 9: No Sensor</p>	Unsigned 8	1	D	r / C / a	DE4
29 / 13	<p>SENSOR_SIZE</p> <p>Bore size of sensor in use.</p> <p>0: DN1 1: DN1.5 2: DN2 3: DN3 4: DN4 5: DN6 6: DN8 7: DN10 8: DN15 9: DN20 10: DN25 11: DN32 12: DN40 13: DN50 14: DN65 15: DN80 16: DN100 17: DN125 18: DN150 19: DN200 20: DN250 21: DN300 22: DN350 23: DN400 24: DN450 25: DN500 26: DN600 27: DN700 41: DN750 28: DN760 29: DN800 30: DN900 31: DN1000 32: DN1050 33: DN1100 34: DN1200 42: DN1350 35: DN1400 36: DN1500 37: DN1600 43: DN1650 38: DN1800 44: DN1950 39: DN2000 45: DN2100 46: DN2200 47: DN2400 40: SPECIAL</p>	Unsigned 8	1	D	r / C / a	DN20
30 / 14	<p>SPECIAL_SENSOR_BORE</p> <p>Special sensor bore size.</p> <p>Unit: mm</p>	Float	4	D	r / C / a	20
31 / 15	<p>SENSOR_LOCATION_TAG</p> <p>User-defined sensor location tag.</p>	VisibleString	20	S	r,w / C / a	'? '
32 / 16	<p>SENSOR_TAG</p> <p>User-defined sensor tag.</p>	VisibleString	20	S	r,w / C / a	'? '

Table 2.11 Slot 9 – Transducer Block 2 – Device Info (Continued)

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
33 / 17	SENSOR_ID Sensor ID number.	Unsigned 32	4	D	r / C / a	1
34 / 18	SENSOR_SAP_ERP_NUMBER Sensor SAP / ERP number.	VisibleString	20	D	r / C / a	'? '
35 / 19	TERM_BOARD_SW Remote sensor memory version number.	VisibleString	20	D	r / C / a	'? '
36 / 20	SENSOR_FIRST_CAL_DATE The date of the sensor initial calibration.	VisibleString	20	D	r / C / a	'? '
37 / 21	SENSOR_LAST_CAL_DATE The date the sensor was last calibrated.	VisibleString	20	D	r / C / a	'? '
38 / 22	SENSOR_CAL_CERT_NO Factory-assigned certificate of calibration number.	VisibleString	20	D	r / C / a	'? '
39 / 23	SENSOR_FIRST_CAL_LOCATION The initial location where the sensor was calibrated. 0: Stonehouse 1: Göttingen 2: Warminster 3: Moorebank 4: Shanghai 5: Burlington 6: Not Specified	Unsigned 8	1	D	r / C / a	Stonehouse
40 / 24	SENSOR_LAST_CAL_LOCATION The last location where the sensor was calibrated. 0: Stonehouse 1: Göttingen 2: Warminster 3: Moorebank 4: Shanghai 5: Burlington 6: Not Specified	Unsigned 8	1	D	r / C / a	Stonehouse
41 / 25	SENSOR_CALIBRATION_MODE Used to distinguish the calibration type of the sensor between ProcessMaster and WaterMaster types. 0: WaterMaster 1: ProcessMaster	Unsigned 8	1	D	r / C / a	WaterMaster
42 / 26	ELECTRODE_MATERIAL Material type of the sensor electrodes. 0: Stainless Steel 1: Hastelloy C4 2: Hastelloy C276 3: Titanium 4: Tantalum 5: Hastelloy B3 6: Platinum Iridium 7: Duplex Steel 8: Nickel 9: St. Steel 316TI 10: Hastelloy C(DL) 11: Tungsten Carbide 12: Hastelloy C22 13: Super Austenitic Steel 14: Other	Unsigned 8	1	D	r / C / a	Stainless Steel

Table 2.11 Slot 9 – Transducer Block 2 – Device Info (Continued)

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
43 / 27	<p>LINING_MATERIAL</p> <p>Material type of the sensor lining.</p> <p>0: PTFE 1: Tefzel ETFE 2: PEEK 3: Hard Rubber 4: Linatex 5: Elastomer 6: Elastomer ACS 7: Elastomer NSF61 8: POMC 9: PFA 10: PPS 11: Soft Rubber 12: Polyurethane 13: Polypropylene 14: THICK PTFE 15: Ceramic Carbide 16: FEP 17: Neoprene 18: Other</p>	Unsigned 8	1	D	r / C / a	Polyurethane
44 / 28	<p>SENSOR_RUN_HOURS</p> <p>Number of hours the sensor has been in use.</p>	VisibleString	20	D	r / C / a	'? '
45 / 29	<p>TRANSMITTER_TYPE</p> <p>Used to distinguish between ProcessMaster and WaterMaster transmitter types.</p> <p>0: WaterMaster 1: ProcessMaster</p>	Unsigned 8	1	D	r / C / a	WaterMaster
46 / 30	<p>TX_TAG</p> <p>Customer-assigned textual description of the transmitter.</p>	VisibleString	20	S	r,w / C / a	'? '
47 / 31	<p>TX_ID</p> <p>Unique factory-assigned identification number of the transmitter.</p>	Unsigned 32	4	D	r / C / a	1
48 / 32	<p>TX_PIN</p> <p>PIN used in generation of service level access rights code.</p>	Unsigned 16	2	D	r / C / a	1
49 / 33	<p>TRANSMITTER_SAP_ERP_NUMBER</p> <p>Transmitter SAP / ERP number.</p>	VisibleString	20	Cst	r / C / a	'? '
50 / 34	<p>TRANSMITTER_SOFTWARE_VERSION</p> <p>Transmitter firmware version number.</p>	VisibleString	20	Cst	r / C / a	'? '
51 / 35	<p>APPLICATION_CRC</p> <p>CRC of transmitter firmware.</p>	VisibleString	20	Cst	r / C / a	'? '
52 / 36	<p>BOOTLOADER_VERSION_NUMBER</p> <p>Transmitter bootloader firmware version number.</p>	VisibleString	20	Cst	r / C / a	'? '
53 / 37	<p>TRANSMITTER_HARDWARE_VERSION_NUMBER</p> <p>Version string of the transmitter hardware.</p>	VisibleString	20	D	r / C / a	'? '
54 / 38	<p>PCB_VERSION_CODE</p> <p>Version number of the transmitter hardware.</p>	Unsigned 8	1	Cst	r / C / a	0
55 / 39	<p>TRANSMITTER_RUN_HOURS</p> <p>Number of hours the transmitter has been in use.</p>	VisibleString	20	D	r / C / a	'? '

Table 2.11 Slot 9 – Transducer Block 2 – Device Info (Continued)

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
56 / 40	TRANSMITTER_FIRST_CAL_DATE Initial date of transmitter calibration.	VisibleString	20	D	r / C / a	'? ' '
57 / 41	TRANSMITTER_LAST_CAL_DATE Most recent date of transmitter calibration.	VisibleString	20	D	r / C / a	'? ' '
58 / 42	TX_CAL_CERT_NO Transmitter calibration certificate number.	VisibleString	20	D	r / C / a	'? ' '
59 / 43	MID_STATUS The current MID status of the device. 0: Non-MID 1: Unlocked 2: Locked	Unsigned 8	1	D	r / C / a	Non-MID

Table 2.11 Slot 9 – Transducer Block 2 – Device Info (Continued)

2.11 Slot 10 – Transducer Block 3 – Special Function

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
16 / 0	BLOCK_OBJECT This object contains the characteristics of the blocks.	DS-32	20	Cst	r / C / a	–
17 / 1	ST_REV Revision counter for static variables. If a static variable changes its value, this counter is incremented by one.	Unsigned 16	2	N	r / C / a	0
18 / 2	TAG_DESC Every block can be assigned a textual TAG description. The TAG_DESC must be unambiguous and unique in the Fieldbus system.	OctetString	32	S	r,w / C / a	' ,
19 / 3	STRATEGY The STRATEGY parameter has a user-specified value. This assigned value can be used in configuration or diagnostics as a key in sorting block information.	Unsigned 16	2	S	r,w / C / a	0
20 / 4	ALERT_KEY The ALERT_KEY parameter has a user-assigned value that can be used for sorting alarms or events generated by a block.	Unsigned 8	1	S	r,w / C / a	0
21 / 5	TARGET_MODE The TARGET_MODE indicates what mode of operation is required for the block. It is normally set by a control application or by an operator through a human interface application. The input parameters are used by the algorithm in conjunction with the state of the Function Block application containing the block to determine if the algorithm can achieve the target mode of operation established for it. See parameter 'MODE_BLK', 'Permitted' element for possible values.	Unsigned 8	1	S	r,w / C / a	Auto
22 / 6	MODE_BLK The MODE_BLK is a structured parameter composed of the actual mode, the normal mode and the permitted mode of the block. The actual mode is set (calculated) by the block during its execution to reflect the mode used during execution. Normal mode is the required operating mode of the block. The permitted mode shows which changes of the target mode are valid for the specific block to the remote user of the MODE_BLK parameter. 8: Auto	DS-37	3	D	r / C / a	Actual: Auto Permitted: Auto Normal: Auto
23 / 7	ALARM_SUM The ALARM_SUM parameter summarizes the status of up to 16 block alarms. For each alarm, the current states, unacknowledged states, unreported states and disabled states are maintained.	DS-42	8	D	r / C / a	0
24 / 8	VOLUME_FORWARD Volume forward totalizer. Unit: TB3.VOLUME_AND_PULSE_UNIT	101	5	D	r / C / a	0
25 / 9	VOLUME_REVERSE Volume reverse totalizer. Unit: TB3.VOLUME_AND_PULSE_UNIT	101	5	D	r / C / a	0
26 / 10	VOLUME_NET Volume net totalizer. Unit: TB3.VOLUME_AND_PULSE_UNIT	101	5	D	r / C / a	0
27 / 11	RESET_VOLUME_FORWARD Resets the volume forward totalizer.	Unsigned 8	1	D	r,w / C / a	–
28 / 12	RESET_VOLUME_REVERSE Resets the volume reverse totalizer.	Unsigned 8	1	D	r,w / C / a	–
29 / 13	RESET_VOLUME_NET Resets the volume net totalizer.	Unsigned 8	1	D	r,w / C / a	–

Table 2.12 Slot 10 – Transducer Block 3 – Special Function

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
30 / 14	RESET_ALL_VOLUME Resets all volume totalizers.	Unsigned 8	1	D	r,w / C / a	-
31 / 15	DO1_PULSES Output frequency of Digital Output 1. Unit: Hz	Float	4	D	r / C / a	0
32 / 16	DO2_PULSES Output frequency of Digital Output 2. Unit: Hz	Float	4	D	r / C / a	0
33 / 17	DO1_STATE Output state of Logic Output 1. 0: Open 1: Closed	Unsigned 8	1	D	r / C / a	Open
34 / 18	DO2_STATE Output state of Logic Output 2. 0: Open 1: Closed	Unsigned 8	1	D	r / C / a	Open
35 / 19	DO3_STATE Output state of Logic Output 3. 0: Open 1: Closed	Unsigned 8	1	D	r / C / a	Open
36 / 20	DO1_DO2_FUNCTION Digital Outputs 1 and 2 operating mode. 0: Pulse F/Pulse R 1: Pulse F/Logic 2: Pulse FR/Logic 3: Logic / Logic	Unsigned 8	1	S	r,w / C / a	Pulse FR/Logic
37 / 21	DO1_LOGIC_SIGNAL_SOURCE Signal source for Logic Output 1. 0: No Function 1: F/R Signal 2: Digital Out Alarm	Unsigned 8	1	S	r,w / C / a	No Function
38 / 22	DO1_GENERAL_ALARM_BEHAVIOUR General alarm behavior for Logic Output 1. 0: Off 1: On	Unsigned 8	1	S	r,w / C / a	Off
39 / 23	DO1_MIN_ALARM_BEHAVIOUR Min. Flow alarm behavior for Logic Output 1. 0: Off 1: On	Unsigned 8	1	S	r,w / C / a	Off
40 / 24	DO1_MAX_ALARM_BEHAVIOUR Max. Flow alarm behavior for Logic Output 1. 0: Off 1: On	Unsigned 8	1	S	r,w / C / a	Off
41 / 25	DO1_EMPTY_PIPE_BEHAVIOUR Empty Pipe alarm behavior for Logic Output 1. 0: Off 1: On	Unsigned 8	1	S	r,w / C / a	Off

Table 2.12 Slot 10 – Transducer Block 3 – Special Function (Continued)

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
42 / 26	DO1_LOGIC_ACTION_STATE Action state for Logic Output 1. 0: Normally Open 1: Normally Closed	Unsigned 8	1	S	r,w / C / a	Normally Open
43 / 27	DO2_LOGIC_SIGNAL_SOURCE Signal source for Logic Output 2. 0: No Function 1: F/R Signal 2: Digital Out Alarm	Unsigned 8	1	S	r,w / C / a	No Function
44 / 28	DO2_GENERAL_ALARM_BEHAVIOUR General alarm behavior for Logic Output 2. 2: Off 3: On	Unsigned 8	1	S	r,w / C / a	Off
45 / 29	DO2_MIN_ALARM_BEHAVIOUR Min. Flow alarm behavior for Logic Output 2. 2: Off 3: On	Unsigned 8	1	S	r,w / C / a	Off
46 / 30	DO2_MAX_ALARM_BEHAVIOUR Max. Flow alarm behavior for Logic Output 2. 2: Off 3: On	Unsigned 8	1	S	r,w / C / a	Off
47 / 31	DO2_EMPTY_PIPE_BEHAVIOUR Empty Pipe alarm behavior for Logic Output 2. 2: Off 3: On	Unsigned 8	1	S	r,w / C / a	Off
48 / 32	DO2_LOGIC_ACTION_STATE Action state for Logic Output 2. 0: Normally Open 1: Normally Closed	Unsigned 8	1	S	r,w / C / a	Normally Open
49 / 33	DO3_LOGIC_SIGNAL_SOURCE Signal source for Logic Output 3. 0: No Function 1: F/R Signal 2: Digital Out Alarm	Unsigned 8	1	S	r,w / C / a	No Function
50 / 34	DO3_GENERAL_ALARM_BEHAVIOUR General alarm behavior for Logic Output 3. 4: Off 5: On	Unsigned 8	1	S	r,w / C / a	Off
51 / 35	DO3_MIN_ALARM_BEHAVIOUR Min. Flow alarm behavior for Logic Output 3. 4: Off 5: On	Unsigned 8	1	S	r,w / C / a	Off
52 / 36	DO3_MAX_ALARM_BEHAVIOUR Max. Flow alarm behavior for Logic Output 3. 4: Off 5: On	Unsigned 8	1	S	r,w / C / a	Off
53 / 37	DO3_EMPTY_PIPE_BEHAVIOUR Empty Pipe alarm behavior for Logic Output 3. 4: Off 5: On	Unsigned 8	1	S	r,w / C / a	Off

Table 2.12 Slot 10 – Transducer Block 3 – Special Function (Continued)

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
54 / 38	DO3_LOGIC_ACTION_STATE Action state for Logic Output 3. 0: Normally Open 1: Normally Closed	Unsigned 8	1	S	r,w / C / a	Normally Open
55 / 39	VOLUME_AND_PULSE_UNIT Units for totalizer and digital outputs. 1034: m3 1038: l 1040: ml 1041: hl 1043: ft3 1048: ugal 1049: igal	Unsigned 16	2	S	r,w / C / a	m3
56 / 40	PULSE_MODE Pulse mode of digital outputs. 0: Pulse / Unit 1: Fullscale Frequency	Unsigned 8	1	S	r,w / C / a	Pulse / Unit
57 / 41	PULSE_WIDTH Digital Output pulse width. Min: 0.09 Max: 5000 Unit: mm	Float	4	S	r,w / C / a	5
58 / 42	LIMIT_FREQUENCY Digital Output limit frequency. Min: TB3.LIMIT_FREQUENCY_RANGE_LOWER Max: TB3.LIMIT_FREQUENCY_RANGE_UPPER Unit: Hz	Float	4	S	r,w / C / a	5250
59 / 43	FULLSCALE_FREQUENCY Digital Output fullscale frequency. Min: 0.25 Max: 10000000 Unit: Hz	Float	4	S	r,w / C / a	5000
60 / 44	PULSES_PER_UNIT Digital Output pulse factor. Min: 0.00001 Max: 10000000	Float	4	S	r,w / C / a	50
61 / 45	LIMIT_FREQUENCY_RANGE_LOWER Limit frequency range lower value. Unit: Hz	Float	4	D	r / C / a	0.25
62 / 46	LIMIT_FREQUENCY_RANGE_UPPER Limit frequency range upper value. Unit: Hz	Float	4	D	r / C / a	5250

Table 2.12 Slot 10 – Transducer Block 3 – Special Function (Continued)

2.12 Slot 11 – Transducer Block 4 – Display

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
16 / 0	BLOCK_OBJECT This object contains the characteristics of the blocks.	DS-32	20	Cst	r / C / a	–
17 / 1	ST_REV Revision counter for static variables. If a static variable changes its value, this counter is incremented by one.	Unsigned 16	2	N	r / C / a	0
18 / 2	TAG_DESC Every block can be assigned a textual TAG description. The TAG_DESC must be unambiguous and unique in the Fieldbus system.	OctetString	32	S	r,w / C / a	' ,
19 / 3	STRATEGY The STRATEGY parameter has a user-specified value. This assigned value can be used in configuration or diagnostics as a key in sorting block information.	Unsigned 16	2	S	r,w / C / a	0
20 / 4	ALERT_KEY The ALERT_KEY parameter has a user-assigned value that can be used for sorting alarms or events generated by a block.	Unsigned 8	1	S	r,w / C / a	0
21 / 5	TARGET_MODE The TARGET_MODE indicates what mode of operation is required for the block. It is normally set by a control application or by an operator through a human interface application. The input parameters are used by the algorithm in conjunction with the state of the Function Block application containing the block to determine if the algorithm can achieve the target mode of operation established for it. See parameter 'MODE_BLK', 'Permitted' element for possible values.	Unsigned 8	1	S	r,w / C / a	Auto
22 / 6	MODE_BLK The MODE_BLK is a structured parameter composed of the actual mode, the normal mode and the permitted mode of the block. The actual mode is set (calculated) by the block during its execution to reflect the mode used during execution. Normal mode is the required operating mode of the block. The permitted mode shows which changes of the target mode are valid for the specific block to the remote user of the MODE_BLK parameter. 8: Auto	DS-37	3	D	r / C / a	Actual: Auto Permitted: Auto Normal: Auto
23 / 7	ALARM_SUM The ALARM_SUM parameter summarizes the status of up to 16 block alarms. For each alarm, the current states, unacknowledged states, unreported states and disabled states are maintained.	DS-42	8	D	r / C / a	0

Table 2.13 Slot 11 – Transducer Block 4 – Display

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
24 / 8	LANGUAGE Local display language. 0: English 1: German 2: French 3: Spanish 4: Italian 9: Polish	Unsigned 8	1	S	r,w / C / a	English
25 / 9	CONTRAST Local display contrast. Min: 0 Max: 100 Unit: %	Unsigned 8	1	S	r,w / C / a	50
26 / 10	MAIN_OPERATOR_VIEW_1_DISPLAY_MODE Local display Operator Page 1 mode. 5: 1 x 6 6: 1 x 6 + Bargraph 7: 1 x 9 8: 1 x 9 + Bargraph 9: 2 x 9 10: 2 x 9 + Bargraph 11: 3 x 9	Unsigned 8	1	S	r,w / C / a	1 x 6
27 / 11	MAIN_OPERATOR_VIEW_1_1 Local display Operator Page 1 1 st line. 0: Volume Flowrate 1: Q% 3: Velocity 4: Volume Forward 5: Volume Reverse 6: Volume Net 14: Display Value	Unsigned 8	1	S	r,w / C / a	Volume Flowrate
28 / 12	MAIN_OPERATOR_VIEW_1_2 Local display Operator Page 1 2 nd line. 0: Volume Flowrate 1: Q% 3: Velocity 4: Volume Forward 5: Volume Reverse 6: Volume Net 14: Display Value	Unsigned 8	1	S	r,w / C / a	Volume Flowrate

Table 2.13 Slot 11 – Transducer Block 4 – Display (Continued)

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
29 / 13	<p>MAIN_OPERATOR_VIEW_1_3</p> <p>Local display Operator Page 1 3rd line.</p> <p>0: Volume Flowrate 1: Q% 3: Velocity 4: Volume Forward 5: Volume Reverse 6: Volume Net 14: Display Value</p>	Unsigned 8	1	S	r,w / C / a	Volume Flowrate
30 / 14	<p>MAIN_OPERATOR_VIEW_2_DISPLAY_MODE</p> <p>Local display Operator Page 2 mode.</p> <p>0: Off 5: 1 x 6 6: 1 x 6 + Bargraph 7: 1 x 9 8: 1 x 9 + Bargraph 9: 2 x 9 10: 2 x 9 + Bargraph 11: 3 x 9</p>	Unsigned 8	1	S	r,w / C / a	Off
31 / 15	<p>MAIN_OPERATOR_VIEW_2_1</p> <p>Local display Operator Page 2 1st line.</p> <p>0: Volume Flowrate 1: Q% 3: Velocity 4: Volume Forward 5: Volume Reverse 6: Volume Net 14: Display Value</p>	Unsigned 8	1	S	r,w / C / a	Volume Flowrate
32 / 16	<p>MAIN_OPERATOR_VIEW_2_2</p> <p>Local display Operator Page 2 2nd line.</p> <p>0: Volume Flowrate 1: Q% 3: Velocity 4: Volume Forward 5: Volume Reverse 6: Volume Net 14: Display Value</p>	Unsigned 8	1	S	r,w / C / a	Volume Flowrate
33 / 17	<p>MAIN_OPERATOR_VIEW_2_3</p> <p>Local display Operator Page 2 3rd line.</p> <p>0: Volume Flowrate 1: Q% 3: Velocity 4: Volume Forward 5: Volume Reverse 6: Volume Net 14: Display Value</p>	Unsigned 8	1	S	r,w / C / a	Volume Flowrate

Table 2.13 Slot 11 – Transducer Block 4 – Display (Continued)

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
34 / 18	MAIN_OPERATOR_VIEW_3_DISPLAY_MODE Local display Operator Page 3 mode. 0: Off 5: 1 x 6 6: 1 x 6 + Bargraph 7: 1 x 9 8: 1 x 9 + Bargraph 9: 2 x 9 10: 2 x 9 + Bargraph 11: 3 x 9	Unsigned 8	1	S	r,w / C / a	Off
35 / 19	MAIN_OPERATOR_VIEW_3_1 Local display Operator Page 3 1 st line. 0: Volume Flowrate 1: Q% 3: Velocity 4: Volume Forward 5: Volume Reverse 6: Volume Net 14: Display Value	Unsigned 8	1	S	r,w / C / a	Volume Flowrate
36 / 20	MAIN_OPERATOR_VIEW_3_2 Local display Operator Page 3 2 nd line. 0: Volume Flowrate 1: Q% 3: Velocity 4: Volume Forward 5: Volume Reverse 6: Volume Net 14: Display Value	Unsigned 8	1	S	r,w / C / a	Volume Flowrate
37 / 21	MAIN_OPERATOR_VIEW_3_3 Local display Operator Page 3 3 rd line. 0: Volume Flowrate 1: Q% 3: Velocity 4: Volume Forward 5: Volume Reverse 6: Volume Net 14: Display Value	Unsigned 8	1	S	r,w / C / a	Volume Flowrate

Table 2.13 Slot 11 – Transducer Block 4 – Display (Continued)

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
38 / 22	DECIMAL_PLACES_FLOWRATE Local display volume flowrate decimal point format. 0: x 1: x.x 2: x.xx 3: x.xxx 4: x.xxxx 5: x.xxxxx	Unsigned 8	1	S	r,w / C / a	x.xx
39 / 23	DECIMAL_PLACES_VOLUME Local display volume totalizer decimal point format. 0: x 1: x.x 2: x.xx 3: x.xxx 4: x.xxxx 5: x.xxxxx	Unsigned 8	1	S	r,w / C / a	x
40 / 24	DATE_FORMAT Local display date format. 0: DD-MM-YYYY 1: MM-DD-YYYY 2: YYYY-MM-DD	Unsigned 8	1	S	r,w / C / a	YYYY-MM-DD
41 / 25	DISPLAY_VALUE_UNITS Custom unit string displayed for display value.	VisibleString	5	S	r,w / C / a	' '

Table 2.13 Slot 11 – Transducer Block 4 – Display (Continued)

2.13 Slot 12 – Transducer Block 5 – Diagnostics

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
16 / 0	BLOCK_OBJECT This object contains the characteristics of the blocks.	DS-32	20	Cst	r / C / a	–
17 / 1	ST_REV Revision counter for static variables. If a static variable changes its value, this counter is incremented by one.	Unsigned 16	2	N	r / C / a	0
18 / 2	TAG_DESC Every block can be assigned a textual TAG description. The TAG_DESC must be unambiguous and unique in the Fieldbus system.	OctetString	32	S	r,w / C / a	' ,
19 / 3	STRATEGY The STRATEGY parameter has a user-specified value. This assigned value can be used in configuration or diagnostics as a key in sorting block information.	Unsigned 16	2	S	r,w / C / a	0
20 / 4	ALERT_KEY The ALERT_KEY parameter has a user-assigned value that can be used for sorting alarms or events generated by a block.	Unsigned 8	1	S	r,w / C / a	0
21 / 5	TARGET_MODE The TARGET_MODE indicates what mode of operation is required for the block. It is normally set by a control application or by an operator through a human interface application. The input parameters are used by the algorithm in conjunction with the state of the Function Block application containing the block to determine if the algorithm can achieve the target mode of operation established for it. See parameter 'MODE_BLK', 'Permitted' element for possible values.	Unsigned 8	1	S	r,w / C / a	Auto
22 / 6	MODE_BLK The MODE_BLK is a structured parameter composed of the actual mode, the normal mode and the permitted mode of the block. The actual mode is set (calculated) by the block during its execution to reflect the mode used during execution. Normal mode is the required operating mode of the block. The permitted mode shows which changes of the target mode are valid for the specific block to the remote user of the MODE_BLK parameter. 8: Auto	DS-37	3	D	r / C / a	Actual: Auto Permitted: Auto Normal: Auto
23 / 7	ALARM_SUM The ALARM_SUM parameter summarizes the status of up to 16 block alarms. For each alarm, the current states, unacknowledged states, unreported states and disabled states are maintained.	DS-42	8	D	r / C / a	0

Table 2.14 Slot 12 – Transducer Block 5 – Diagnostics

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
24 / 8	<p>SIMULATION_MODE</p> <p>Internal parameter for simulation.</p> <p>0: Off 1: Flow Velocity 2: Q 3: Q% 5: Pulse 1 6: Pulse 2 7: Logic 1 8: Logic 2 9: Logic 3</p>	Unsigned 8	1	D	r,w / C / a	Off
25 / 9	<p>SIMULATION_FLOW_VELOCITY</p> <p>Internal flow velocity simulation value.</p> <p>Min: TB5.SIMULATION_FLOW_VELOCITY_RANGE_LOWER Max: TB5.SIMULATION_FLOW_VELOCITY_RANGE_UPPER</p> <p>Unit: TB1.VELOCITY_UNIT</p>	Float	4	D	r,w / C / a	0
26 / 10	<p>SIMULATION_VOLUME_FLOW</p> <p>Internal volume flowrate simulation value.</p> <p>Min: TB5.SIMULATION_VOLUME_FLOW_RANGE_LOWER Max: TB5.SIMULATION_VOLUME_FLOW_RANGE_UPPER</p> <p>Unit: TB1.VOLUME_FLOW_UNITS</p>	Float	4	D	r,w / C / a	0
27 / 11	<p>SIMULATION_FLOW_RATIO</p> <p>Internal volume flowrate percentage simulation value.</p> <p>Min: -200 Max: 200</p> <p>Unit: %</p>	Float	4	D	r,w / C / a	0
28 / 12	<p>SIMULATION_PULSE</p> <p>Frequency to simulate on Digital Outputs 1 and 2.</p> <p>Min: 0 Max: 5250</p> <p>Unit: Hz</p>	Float	4	D	r,w / C / a	0
29 / 13	<p>SIMULATION_LOGIC_1</p> <p>State to simulate on Logic Output 1.</p> <p>0: Off 1: On</p>	Unsigned 8	1	D	r,w / C / a	Off
30 / 14	<p>SIMULATION_LOGIC_2</p> <p>State to simulate on Logic Output 2.</p> <p>0: Off 1: On</p>	Unsigned 8	1	D	r,w / C / a	Off

Table 2.14 Slot 12 – Transducer Block 5 – Diagnostics (Continued)

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
31 / 15	SIMULATION_LOGIC_3 State to simulate on Logic Output 3. 0: Off 1: On	Unsigned 8	1	D	r,w / C / a	Off
32 / 16	ELECTRODE_RESISTANCE_ALARM_MAX_EP Upper limit of electrode resistance. Min: 0 Max: 1000 Unit: kOhm	Float	4	S	r,w / C / a	200
33 / 17	ELECTRODE_RESISTANCE_ALARM_MIN Lower limit of electrode resistance. Min: 0 Max: 1000 Unit: kOhm	Float	4	S	r,w / C / a	0.1
34 / 18	ELECTRODE_VOLTAGE_POSITIVE_LIMIT Upper limit of electrode voltage. Unit: V	Float	4	D	r / C / a	1.8
35 / 19	ELECTRODE_VOLTAGE_NEGATIVE_LIMIT Lower limit of electrode voltage. Unit: V	Float	4	D	r / C / a	-1.5
36 / 20	ELECTRODE_VOLTAGE_DIFFERENTIAL_LIMIT Upper limit of differential electrode voltage. Unit: V	Float	4	D	r / C / a	0.5
37 / 21	COIL_CURRENT_ALARM_BAND Percentage shift in coil current allowed before alarm. Unit: %	Float	4	D	r / C / a	1
38 / 22	COIL_OPEN_CIRCUIT_RESISTANCE_LIMIT Upper limit of coil resistance range. Unit: Ohm	Float	4	D	r / C / a	500
39 / 23	COIL_SHORT_CIRCUIT_RESISTANCE_LIMIT Lower limit of coil resistance range. Unit: Ohm	Float	4	D	r / C / a	5
40 / 24	SIMULATION_VOLUME_FLOW_RANGE_LOWER Lower limit for internal simulated volume flowrate values.	Float	4	D	r / C / a	0

Table 2.14 Slot 12 – Transducer Block 5 – Diagnostics (Continued)

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
41 / 25	SIMULATION_VOLUME_FLOW_RANGE_UPPER Upper limit for internal simulated volume flowrate values.	Float	4	D	r / C / a	0
42 / 26	SIMULATION_FLOW_VELOCITY_RANGE_LOWER Lower limit for internal simulated velocity values.	Float	4	D	r / C / a	0
43 / 27	SIMULATION_FLOW_VELOCITY_RANGE_UPPER Upper limit for internal simulated velocity values.	Float	4	D	r / C / a	0
44 / 28	LOOP_RESISTANCE_RANGE_LOWER Lower limit of loop resistance range. Unit: Ohm	Float	4	D	r / C / a	15
45 / 29	LOOP_RESISTANCE_RANGE_UPPER Upper limit of loop resistance range. Unit: Ohm	Float	4	D	r / C / a	65
46 / 30	TRANSMITTER_AVERAGE_GAIN_SHIFT_RANGE_LOWER Lower limit of transmitter average gain shift range. Unit: %	Float	4	D	r / C / a	-0.4
47 / 31	TRANSMITTER_AVERAGE_GAIN_SHIFT_RANGE_UPPER Upper limit of transmitter average gain shift range. Unit: %	Float	4	D	r / C / a	0.4
48 / 32	DIAGNOSTIC_VALUE_UNITS Units of the value currently being read by the Diagnostic Signal function block. 1281: Ohms 1284: kOhms 1240: V 1271: mH 1342: %	Unsigned 16	2	D	r / C / a	Ohms
49 / 33	ELECTRODE_1_RESISTANCE Resistance of electrode 1. Unit: kOhm	101	5	D	r / O / a	0
50 / 34	UNUSED Unused parameter.	-	-	-	-	-
51 / 35	UNUSED Unused parameter.	-	-	-	-	-
52 / 36	UNUSED Unused parameter.	-	-	-	-	-
53 / 37	UNUSED Unused parameter.	-	-	-	-	-

Table 2.14 Slot 12 – Transducer Block 5 – Diagnostics (Continued)

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
54 / 38	UNUSED Unused parameter.	-	-	-	-	-
55 / 39	UNUSED Unused parameter.	-	-	-	-	-
56 / 40	UNUSED Unused parameter.	-	-	-	-	-
57 / 41	UNUSED Unused parameter.	-	-	-	-	-
58 / 42	UNUSED Unused parameter.	-	-	-	-	-
59 / 43	UNUSED Unused parameter.	-	-	-	-	-
60 / 44	UNUSED Unused parameter.	-	-	-	-	-
61 / 45	UNUSED Unused parameter.	-	-	-	-	-
62 / 46	UNUSED Unused parameter.	-	-	-	-	-
63 / 47	UNUSED Unused parameter.	-	-	-	-	-
64 / 48	UNUSED Unused parameter.	-	-	-	-	-
65 / 49	UNUSED Unused parameter.	-	-	-	-	-
66 / 50	UNUSED Unused parameter.	-	-	-	-	-
67 / 51	UNUSED Unused parameter.	-	-	-	-	-
68 / 52	UNUSED Unused parameter.	-	-	-	-	-
69 / 53	UNUSED Unused parameter.	-	-	-	-	-
70 / 54	UNUSED Unused parameter.	-	-	-	-	-
71 / 55	UNUSED Unused parameter.	-	-	-	-	-

Table 2.14 Slot 12 – Transducer Block 5 – Diagnostics (Continued)

Abs. Idx / Rel. Idx	Variable Name / Brief Description	Data Type	Size	Store	Access / Usage / Transport	Default
72 / 56	UNUSED Unused parameter.	-	-	-	-	-
73 / 57	ELECTRODE_2_RESISTANCE Resistance of electrode 2. Unit: kOhm	101	5	D	r / O / a	0
74 / 58	BACK_OFF_VOLTAGE Transmitter internal backoff voltage. Unit: V	101	5	D	r / O / a	0
75 / 59	COIL_AND_CABLE_RESISTANCE Resistance of coil and cable. Unit: Ohm	101	5	D	r / O / a	0
76 / 60	COIL_INDUCTANCE Inductance of the sensor coil. Unit: mH	101	5	D	r / O / a	0
77 / 61	SENSOR_INDUCTANCE_SHIFT Percentage shift in coil inductance. Unit: %	101	5	D	r / O / a	0
78 / 62	TRANSMITTER_AVERAGE_GAIN_SHIFT Percentage shift in transmitter span calibration. Unit: %	101	5	D	r / O / a	0

Table 2.14 Slot 12 – Transducer Block 5 – Diagnostics (Continued)

Appendix A – PROFIBUS-PA Block Structure Diagrams

The following diagrams illustrate the relationship and data flow in PROFIBUS-PA Function Blocks and Flow Transducer Block used in WaterMaster.

A.1 Analog Input Function Block

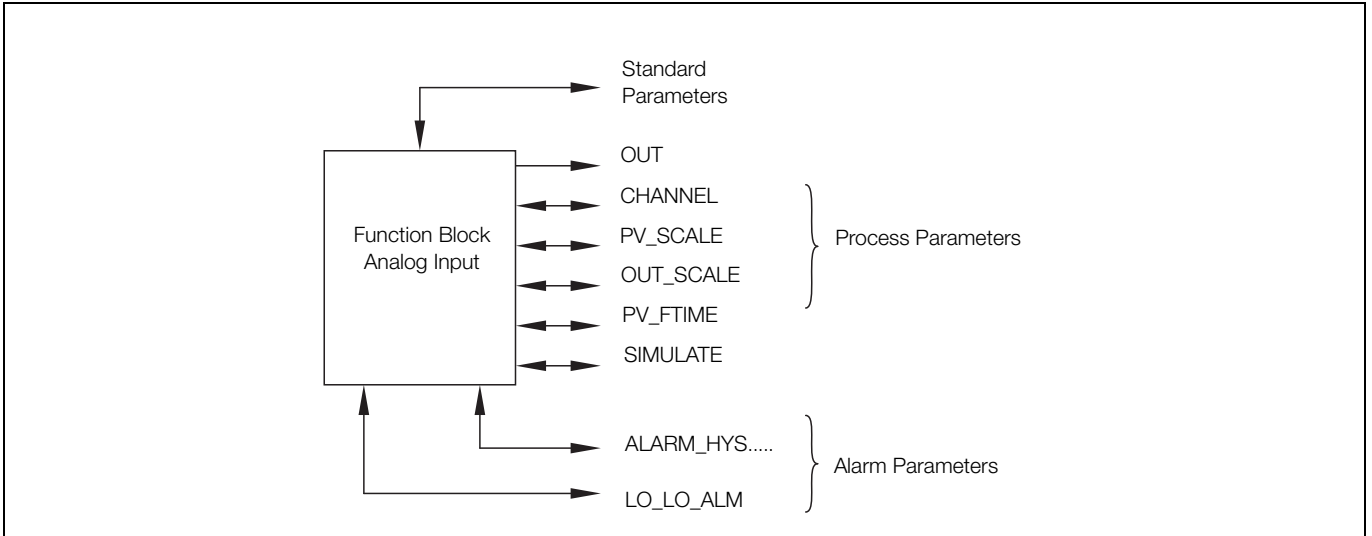


Fig. A.1 AI Block Summary

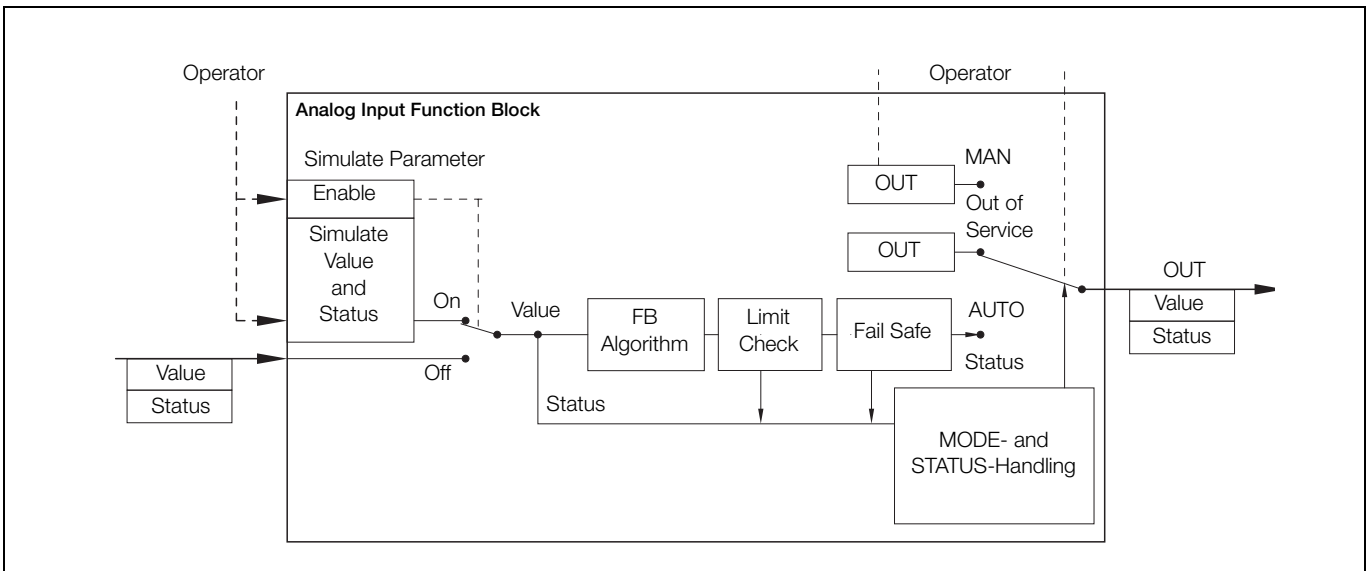


Fig. A.2 AI Block Structure

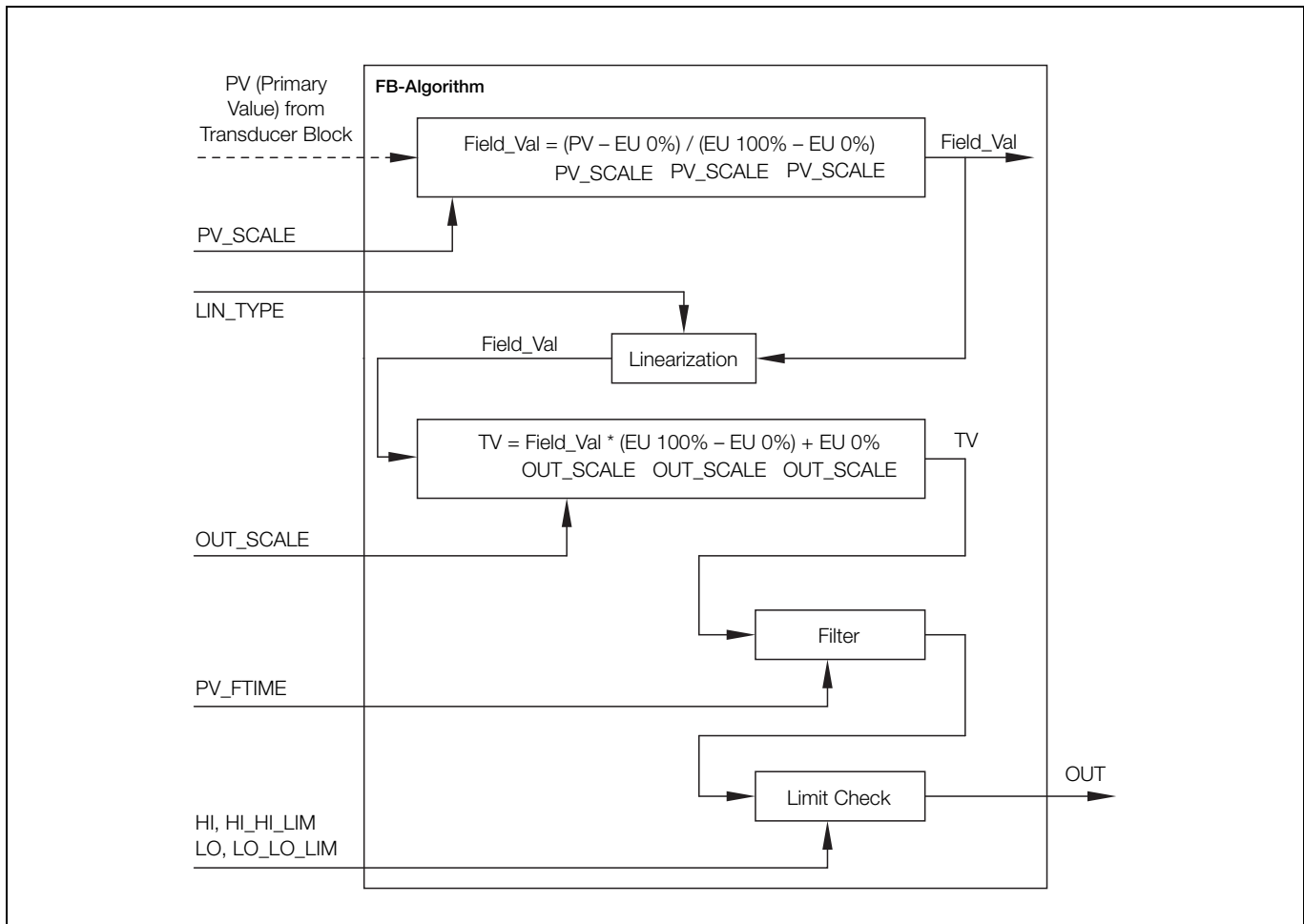


Fig. A.3 AI Block Algorithm

A.2 Totalizer Function Block

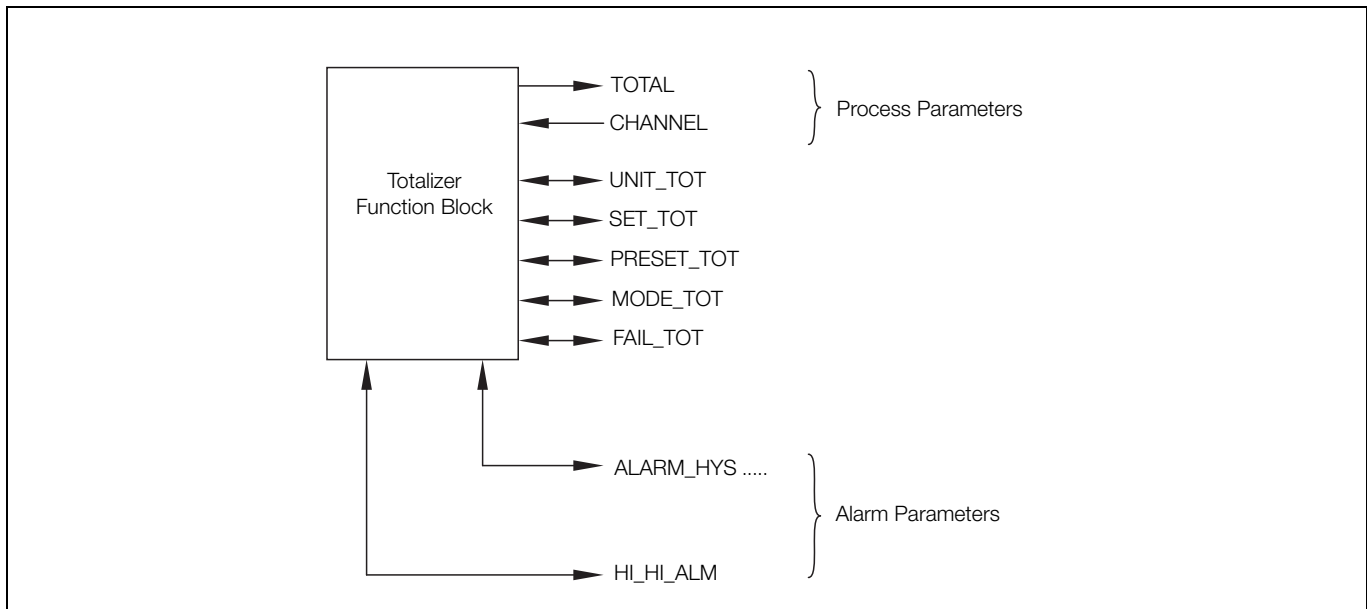


Fig. A.4 TOT Block Summary

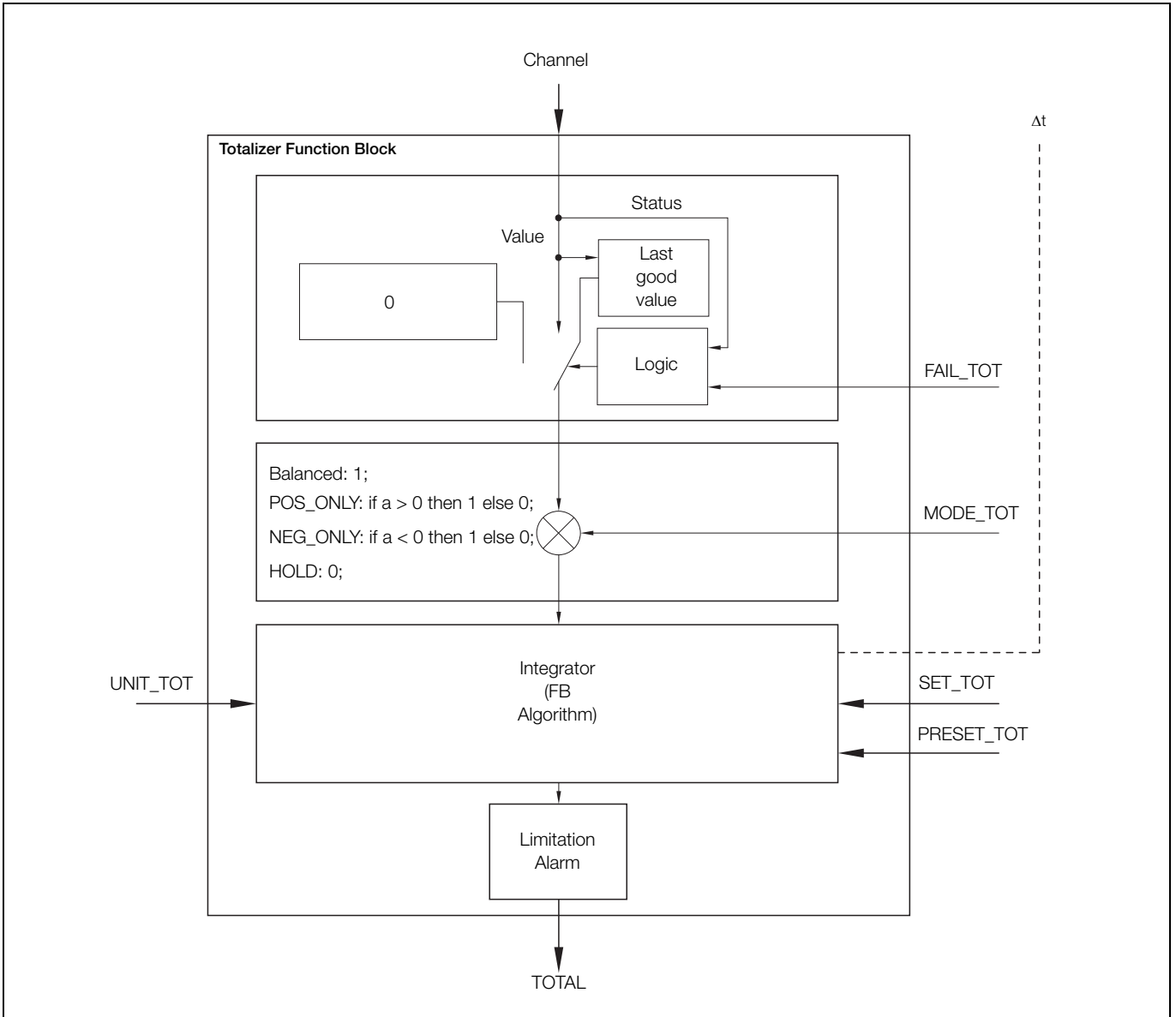


Fig. A.5 TOT Block Structure

A.3 Analog Output Function Block

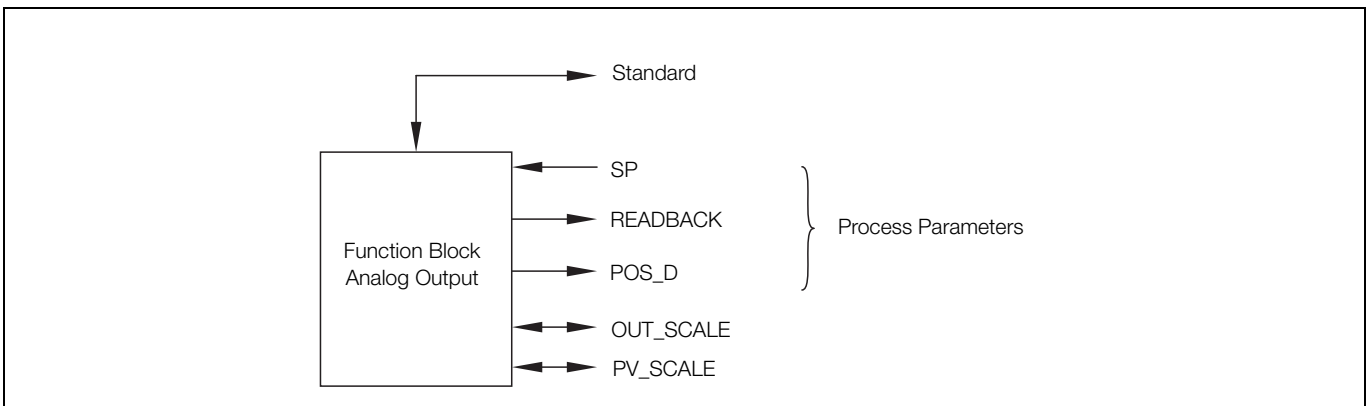


Fig. A.6 AO Block Summary

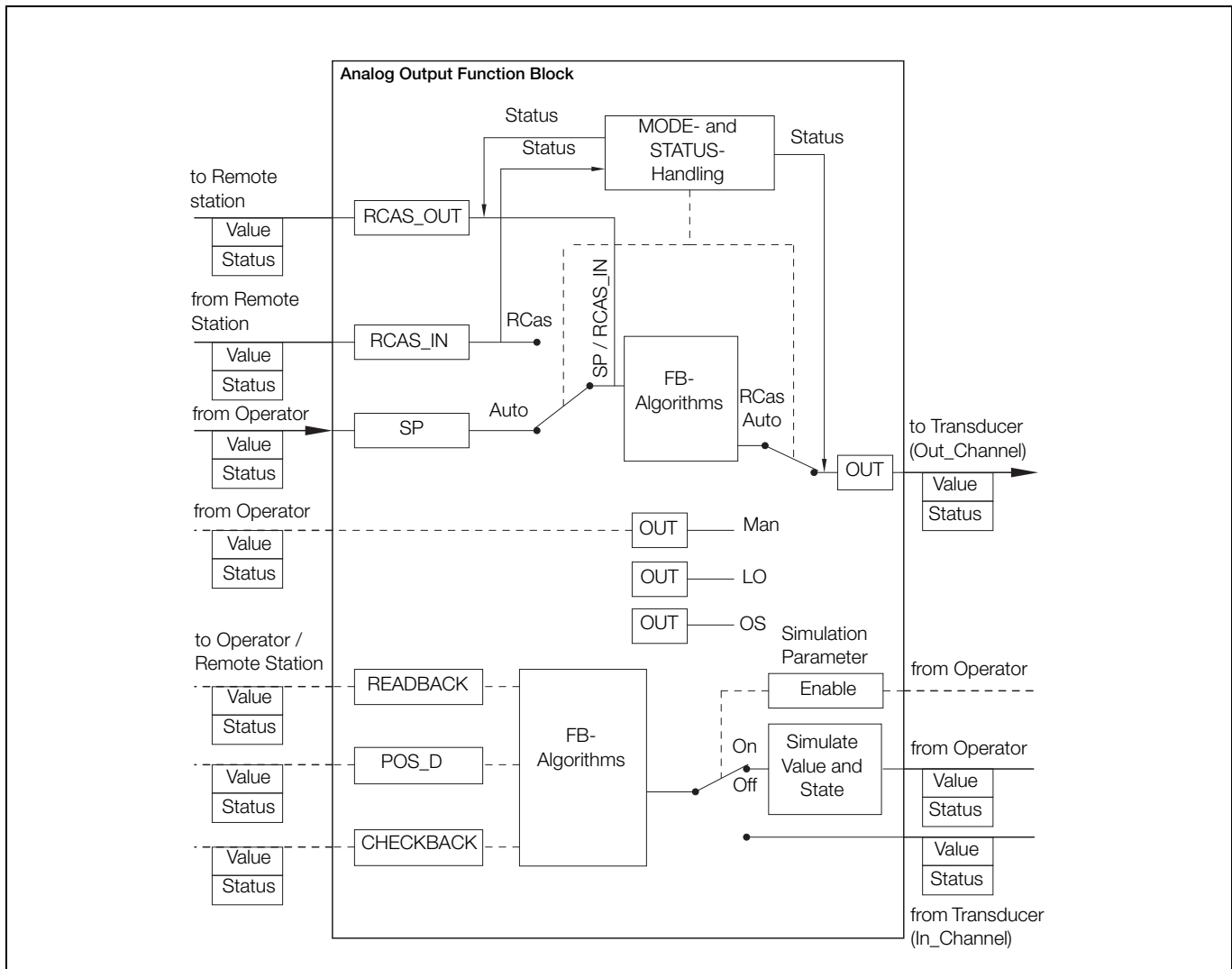


Fig. A.7 AO Block Structure

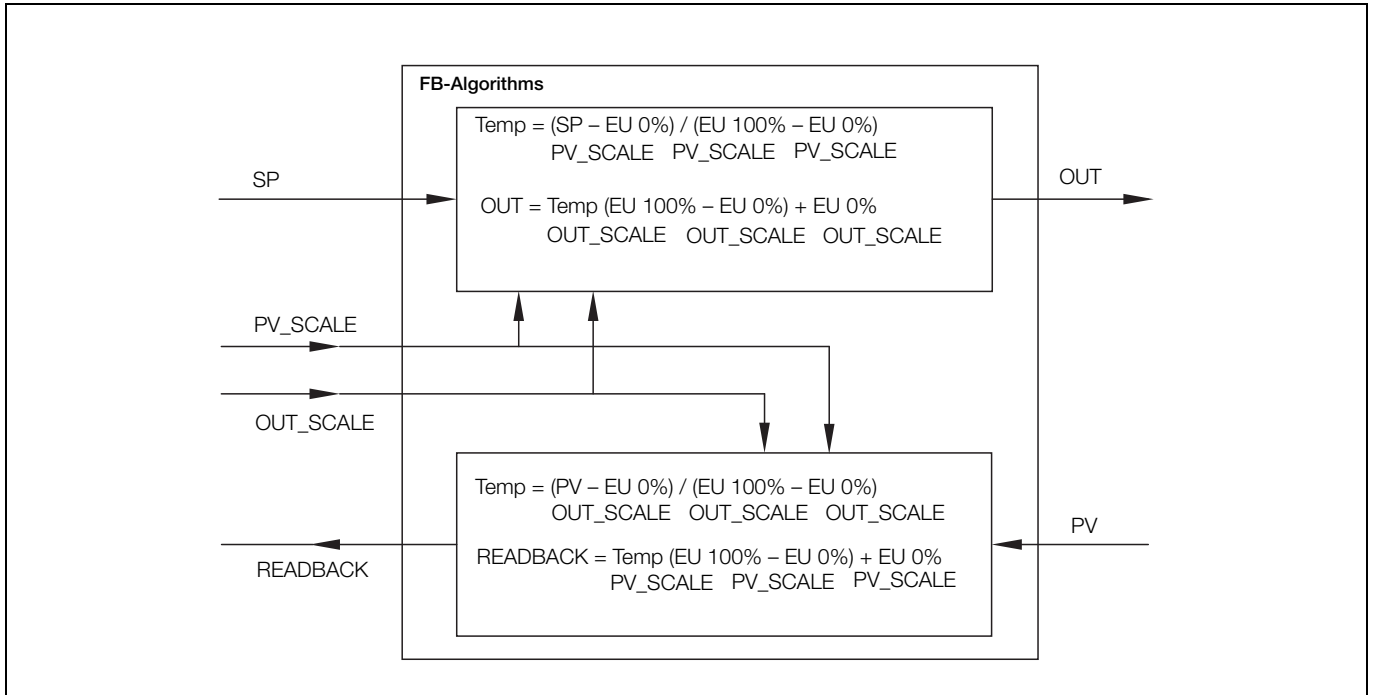


Fig. A.8 AO Block Algorithm

A.4 Flow Transducer Block

The Flow Transducer Block describes the basic set of parameters for flow devices.

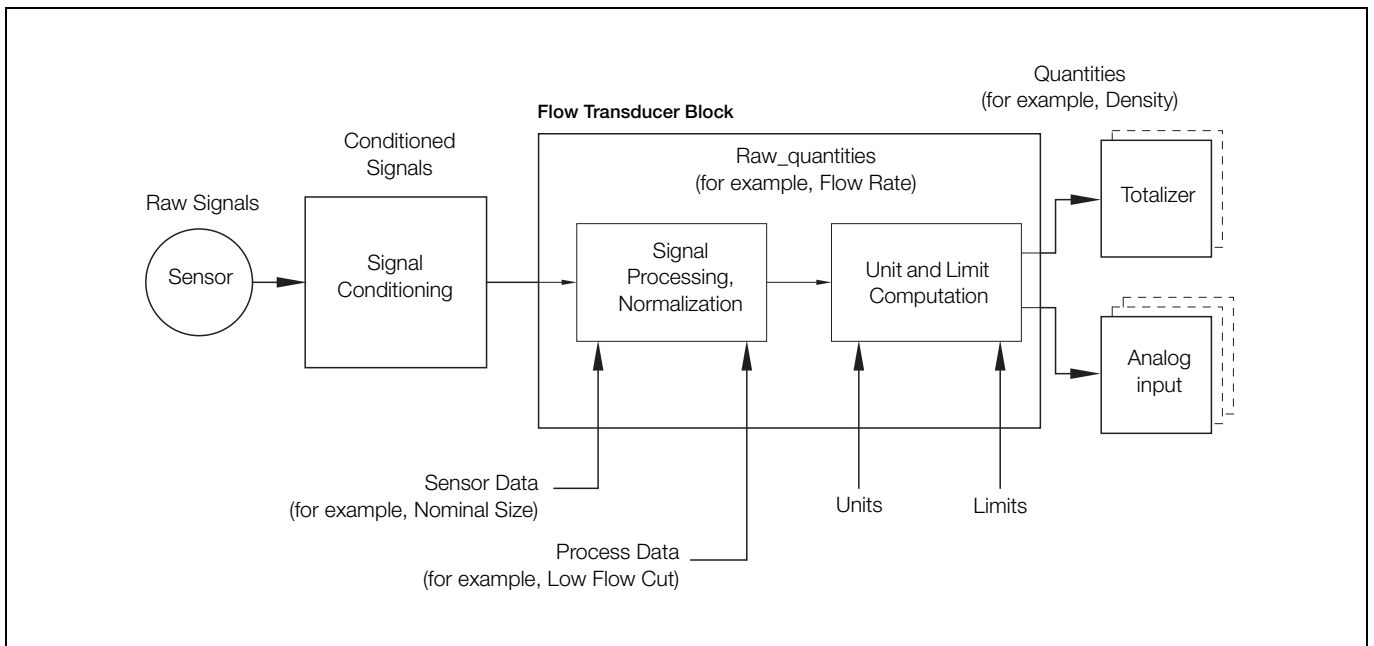


Fig. A.9 TB Flow Functional Diagram

Appendix B – PROFIBUS Data Structures

The following PROFIBUS and WaterMaster-specific data structures are used in the WaterMaster blocks.

E	Element Name	Data Type	Size
1	Reserved	Unsigned8	1
2	Block_Object	Unsigned8	1
3	Parent_Class	Unsigned8	1
4	Class	Unsigned8	1
5	DD_Reference	Unsigned32	4
6	DD_Revision	Unsigned16	2
7	Profile	OctetString	2
8	Profile_Revision	Unsigned8	1
9	Execution_Time	Unsigned16	2
10	Number_of_Parameters	Unsigned16	2
11	Address_of_View_1	Unsigned16	2
12	Number_of_Views	Unsigned8	1

Table B.1 DS-32 Block Structure

E	Element Name	Data Type	Size
1	Value	Float	4
2	Status	Unsigned8	1

Table B.2 101 (Value and Status Float Structure)

E	Element Name	Data Type	Size
1	EU_at_100%	Float	4
2	EU_at_0%	Float	4
3	Units_Index	Unsigned16	2
4	Decimal_Point	Unsigned8	1

Table B.3 DS-36 (Scaling Structure)

E	Element Name	Data Type	Size
1	Actual	Unsigned8	1
2	Permitted	Unsigned8	1
3	Normal	Unsigned8	1

Table B.4 DS-37 (Mode Structure)

E	Element Name	Data Type	Size
1	Unacknowledged	Unsigned8	1
2	Alarm_State	Unsigned8	1
3	Time_Stamp	TimeValue	8
4	Subcode	Unsigned16	1
5	Value	Float	4

Table B.5 DS-39 (Alarm Float Structure)

E	Element Name	Data Type	Size
1	Current	OctetString	2
2	Unacknowledged	OctetString	2
3	Unreported	OctetString	2
4	Disabled	OctetString	2

Table B.6 DS-42 (Alarm Summary Structure)

E	Element Name	Data Type	Size
1	Simulate_Status	Unsigned8	1
2	Simulate_Value	Float	4
3	Simulate_Enabled	Unsigned8	1

Table B.7 DS-50 (Simulation Float Structure)

E	Element Name	Data Type	Size
1	Batch_ID	Unsigned32	4
2	Rup	Unsigned16	2
3	Operation	Unsigned16	2
4	Phase	Unsigned16	2

Table B.8 DS-67 (Batch Structure)

E	Element Name	Data Type	Size
1	Supported	OctetString	4
2	Enabled	OctetString	4

Table B.9 DS-68 (Feature Structure)

E	Element Name	Data Type	Size
1	Alarm_Counter	Unsigned16	2
2	Alarm_Time_Counter_Msec	Unsigned32	4
3	Alarm_Time_Counter_Day	Unsigned16	2
4	Time_Stamp_Last_Alarm_Msec	Unsigned32	4
5	Time_Stamp_Last_Alarm_Day	Unsigned16	2

Table B.10 WaterMaster Diagnosis Information Structure

Acknowledgments

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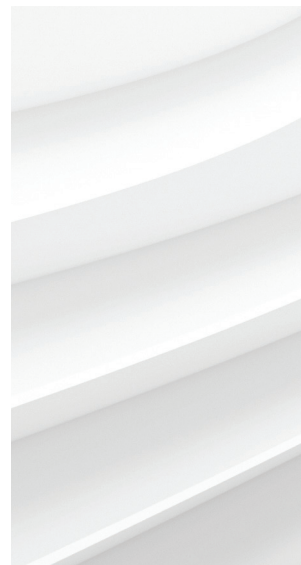
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