ABB MEASUREMENT & ANALYTICS | INTERFACE DESCRIPTION

VortexMaster FSV400, SwirlMaster FSS400

Vortex and Swirl flowmeter

PROFIBUS PA protocol
Valid from software version 01.06.00

Measurement made easy

—
VortexMaster FSV430, FSV450
SwirlMaster FSS430, FSS450

Additional Information

Additional documentation on VortexMaster FSV400, SwirlMaster FSS400 is available for download free of charge at www.abb.com/flow.
Alternatively simply scan this code:

FSV430 FSV450 FSS430 FSS450

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1 Introduction

The following interface description is a supplement to the operating instruction of the VortexMaster FSV4xx and SwirlMaster FSS4xx.
The safety instructions it includes are valid and must be observed.

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

This description applies to the entire VortexMaster and SwirlMaster series FSx4xx.
All device versions have this same ID number and refer to the same GSD file (equipment master data).

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

2 Specification

Note
The PROFIBUS PA protocol is not secure, therefore the intended application should be assessed to make sure that these protocols are suited before implementation.

PROFIBUS PA® Interface	
Terminals	BUS CONNECTION
Configuration	Via the PROFIBUS DP interface or the local operating interface in connection with Asset Vision Basic (DAT200) and a corresponding Device Type Manager (DTM)
Transmission	In accordance with IEC 61158-2
Baud rate	9.6 kbps, 19.2 kbps, 45.45 kbps, 93.75 kbps, 187.5 kbps, 500 kbps, 1.5 Mbps The baud rate is automatically detected and does not need to be configured manually
Device profile	PA Profile 3.02
Bus address	Address range 0 to 126 Factory setting: 126

A device driver in the form of a EDD (Electronic Device Description) or DTM (Device Type Manager), as well as a GSD file is required for commissioning.

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

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

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

ID number	GSD file name	Blocks
0x9700	—	1×AI
0x9740	—	1×AI, 1×TOT
0x3433	ABB_3433.gsd	4×AI, 3×AO, 1×DI, 3×TOT

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

3 Parameterization

Structure and design of the function blocks

Block structure	Supported PROFIBUS ID numbers		
	0x3433	0x9740	0x9700
Physical Block	Slot 0	Slot 0	Slot 0
Analog Input Block (AI)	Slot 1	Slot 1	Slot 1
	Slot 2	—	—
	Slot 3	—	—
	Slot 4	—	—
Analog output block (AO)	Slot 5	—	—
	Slot 6	—	—
	Slot 7	—	—
Discrete Input Block (DI)	Slot 8	—	—
Totalizer Block (TOT)	Slot 9	Slot 9	—
	Slot 10	—	—
	Slot 11	—	—
Transducer Block-HMI	Slot 12	Slot 12	Slot 12
Transducer Block-PCB	Slot 13	Slot 13	Slot 13
Transducer Block-Standard	Slot 14	Slot 14	Slot 14

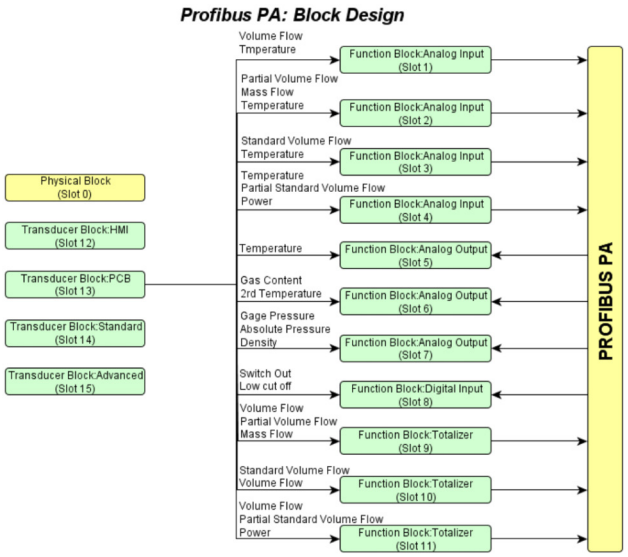

Figure 1: Design of the function blocks

Note
For additional information on the PROFIBUS PA® interface, refer to the separate COM/FSV/FSS/430/450/PB interface description!

Data structures

Diag_Detail_History
ObjectType: Record
DataSize: 14 Bytes
Number of Elements: 5
Attribute List of Elements: shown below

Nr.	Element Name	DataType	Store	Size	Access
1	alarmCounter	Unsigned16	N	2	r
2	alarmTimeCounterMsec	Unsigned32	N	4	r
3	alarmTimeCounterDay	Unsigned16	N	2	r
4	timeStampLastAlarmMsec	Unsigned32	N	4	r
5	timeStampLastAlarmDay	Unsigned16	N	2	r

Idx_Config
ObjectType: Record
DataSize: 7 Bytes
Number of Elements: 3
Attribute List of Elements: shown below

Nr.	Element Name	DataType	Store	Size	Access
1	subsystem_idx	Unsigned16	N	2	r,w
2	object_idx	Unsigned16	N	2	r,w
3	attribute_idx	Signed16	N	2	r,w
4	length	Unsigned8	N	1	r,w

4 Block overview

Available units

For certain parameters it is possible to choose among the following units.
The 'Profibus No.' column indicates which value the corresponding parameter must be set to.

Table 1: Units for the volume flow rate

Selection	Profibus No.	Description
m^3/s	1347	Cubic meter per second
m^3/min	1348	Cubic meter per minute
m^3/h	1349	Cubic meter per hour
m^3/d	1350	Cubic meter per day
ft^3/s	1356	Cubic feet per second
ft^3/min	1357	Cubic feet per minute
ft^3/h	1358	Cubic feet per hour
ft^3/d	1359	Cubic feet per day
kft^3/s	—	Cubic kilofeet per second
kft^3/min	—	Cubic kilofeet per minute
kft^3/h	—	Cubic kilofeet per hour
kft^3/d	—	Cubic kilofeet per day
l/s	1351	Liter per second
l/m	1352	Liter per minute
l/h	1353	Liter per hour
l/d	1354	Liter per day
kl/s	1517	Kilo liter per second
hl/s	1633	Hecto liter per second
hl/m	1634	Hecto liter per minute
hl/h	1635	Hecto liter per hour
hl/d	1636	Hecto liter per day
kl/m	1518	Kilo liter per minute
kl/h	1519	Kilo liter per hour
kl/d	1520	Kilo liter per day
usg/s	1362	Us gallon per second
usg/m	1363	Us gallon per minute
usg/h	1364	Us gallon per hour
usg/d	1365	Us gallon per day
igal/s	1367	Imperial gallon per second
igal/m	1368	Imperial gallon per minute
igal/h	1369	Imperial gallon per hour
igal/d	1370	Imperial gallon per day
bbl/s	1371	Barrel per second
bbl/m	1372	Barrel per minute
bbl/h	1373	Barrel per hour
bbl/d	1374	Barrel per day

Table 2: Units for mass flow

Selection	Profibus No.	Description
g/s	1318	Gram per second
g/min	1319	Gram per minute
g/h	1320	Gram per hour
g/d	1321	Gram per day
kg/s	1322	Kilogram per second
kg/min	1323	Kilogram per minute
kg/h	1324	Kilogram per hour
kg/d	1325	Kilogram per day
t/s	1326	Metric ton per second
t/min	1327	Metric ton per minute
t/h	1328	Metric ton per hour
t/d	1329	Metric ton per day
lb/s	1330	Pounds per second
lb/min	1331	Pounds per minute
lb/h	1332	Pounds per hour
lb/d	1333	Pounds per day
US t/s	1334	Short ton per second
US t/min	1335	Short ton per minute
US t/h	1336	Short ton per hour
US t/d	1337	Short ton per day

Table 3: Power units

Selection	Profibus No.	Description
W	1186	Watt
MW	1189	MegaWatt
KW	1190	KiloWatt
KJ/s	1438	Kilo Joule Per Second
KJ/min	1439	Kilo Joule Per minute
KJ/h	1440	Kilo Joule Per hour
KJ/d	1441	Kilo Joule Per day
MJ/h	1196	Mega Joule Per hour

Table 4: Density units

Selection	Profibus No.	Description
g/cm^3	1100	Gram per cubic centimeter
kg/m^3	1097	Kilogram per cubic meter
g/ml	1104	Gram per milliliter
g/l	1105	Gram per liter
kg/l	1103	Kilogram per liter
lb/ft^3	1107	Pounds per cubic feet
lb/ugal	1108	Pounds per us gallons

… 4 Block overview

… Available units

Table 5: Temperature units

Selection	Profibus No.	Description
K	1000	Kelvin
°C	1001	Celsius
°F	1002	Fahrenheit

Table 6: Pressure units

Selection	Profibus No.	Description
Pa	1610	Pascal
Mpa	1614	Mega pascal
Kpa	1616	Kilo pascal
hPa	1622	Hecto pascal
bar	1137	Bar
mbar	1138	Milli bar
psi	1141	Pound per square inch
kg/cm^2	1626	Kilo gram per square centimeter
mm H_2O	1149	Milli meter H_2O

Table 6: Units for the mass totalizer

Selection	Profibus No.	Description
kg	1088	Kilogram
g	1089	Gram
t	1092	Metric ton
Pound	1094	Pound

Table 7: Units for the volume totalizer

Selection	Profibus No.	Description
m^3	1034	Cubic meter
ft^3	1043	Cubic feet
ml	1040	Milliliter
l	1038	Liter
hl	1041	Hecto liter
ugal	1048	Us gallons
igal	1049	Imperial gallons
bbl	1051	Oil barrels
bls	1052	Brew barrels

Table 8: Concentration units

Selection	Profibus No.	Description
%	1342	% (percent)

Physical Block – Slot 0

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Default Value	Description
BLOCK_OBJECT	0	16	Record	DS-32	Cst	20	R	-	The parameter contains the characteristics of the block e.g. block type and profile number.
ST_REV	1	17	Simple	Unsigned16	N	2	SR	0	A block has static block parameters that are not changed by the process. Values are assigned to these parameters during the configuration or optimization. ST_REV shall be incremented at least by one if at least one static parameter in the corresponding block has been modified. This provides a check of the parameter revision. ST_REV shall be reset to zero or incremented at least by one to indicate the change of static parameters in case of a cold start (i.e. if FACTORY_RESET=1 is set). Additionally the ST_REV shall be increased if a change of a table is accepted. The value of the static revision parameter may be used by a configuration device to determine if a block parameter(s) stored in static memory (as defined as "S" in the parameter attribute table) has changed its value. In case of an overflow ST_REV should be set to 1.
TAG_DESC	2	18	Simple	OctetString	S	32	SRW	""	The tag description is a user-supplied description of the block. Every block can be assigned such a textual tag description.
STRATEGY	3	19	Simple	Unsigned16	S	2	SRW	0	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.
ALERT_KEY	4	20	Simple	Unsigned8	S	1	SRW	0	The ALERT_KEY parameter has a user assigned value which may be used in sorting alarms or events generated by a block (*). It can contain the identification number of the plant unit. It helps to identify the location (plant unit) of an event.

… 4 Block overview

… Physical Block – Slot 0

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Default Value	Description
TARGET_MODE	5	21	Simple	Unsigned8	S	1	SRW	-	The TARGET_MODE parameter indicates which mode is desired for the block. It is normally set by a control application or by an operator through a human interface application. The input parameters of the block in conjunction with the state of the block are used to determine if the block can achieve the requested target mode. Only one mode from those allowed by the Permitted element of the MODE_BLK parameter may be requested. A write access to this parameter with more than one mode is out of the range of this parameter and has to be refused. **Coding:** Bit 7: Out of Service (O/S) - MSB Bit 6: Initialization Manually (IMan) (not used in Class A and B) Bit 5: Local Override (LO) (not used in Class A) Bit 4: Manual (Man) Bit 3: Automatic (Auto) Bit 2: Cascade (Cas) (not used in Class A and B) Bit 1: Remote-Cascade (RCas) Bit 0: Remote-Output (ROut) - LSB (not used in Class A and B) The ”automatic” modes used in this profile are Auto and RCas. The ”manual” modes are LO and Man. In O/S mode, the normal algorithm is no longer executed.
MODE_BLK	6	22	Record	DS-37	D	3	R	8; 8; 8	The actual, target, permitted and normal operation modes of the block. OOS=0x80,AUTO=0x08,MANUAL=0x10
ALARM_SUM	7	23	Record	DS-42	D	8	R	0; 0; 0; 0	The parameter ALARM_SUM summarizes the status of up to 16 block alarms. For each alarm,The current states, unacknowledged states, unreported states and disabled states are maintained.
SOFTWARE_REVISION	8	24	Simple	Visible String	Cst	16	R	"xx.yy.zz"	Revision-number of the software of the field device.
HARDWARE_REVISION	9	25	Simple	Visible String	Cst	16	R	"xx "	Revision-number of the hardware of the field device.
DEVICE_MAN_ID	10	26	Simple	Unsigned16	Cst	2	R	26 (ABB) / 0x1A	Identification code of the manufacturer of the field device.
DEVICE_ID	11	27	Simple	Visible String	Cst	16	R	"FCx4xx"	Manufacturer specific identification of the device.
DEVICE_SER_NUM	12	28	Simple	Visible String	Cst	16	AR	-	Serial number of the field device.

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Default Value	Description
DIAGNOSIS	13	29	Simple	OctetString	D	4	R	0;0;0;0	Detailed information of the device, bitwize coded. More than one message possible at once.
DIAGNOSIS_EXT	14	30	Simple	OctetString	D	6	R	0;0;0;0;0;0	Additional manufacturer-specific information of the device, bitwize coded. More than one message possible at once.
DIAGNOSIS_MASK	15	31	Simple	OctetString	Cst	4	R	Classic Status: 0x20; 0xA0; 0x04; 0x80 Condensed: 0x00;0xB8; 0X04;0x80	Definition of supported DIAGNOSIS information-bits. 0: not supported 1: supported
DIAGNOSIS_MASK_EXT	16	32	Simple	OctetString	Cst	6	AR	0xFF; 0xFF; 0xFF; 0xE7; 0xFF; 0x03	Definition of supported DIAGNOSIS_EXTENSION information-bits. 0: not supported 1: supported
DEVICE_ CERTIFICATION	17	33	Simple	Visible String	Cst	32	R	"ATEX, IEC, cFMus"	Certifications of the field device, e.g. EX certification.
WRITE_LOCKING	18	34	Simple	Unsigned16	N	2	NRWB	-	Software write protection.
FACTORY_RESET	19	35	Simple	Unsigned16	S	2	SRWB	-	1: (mandatory) is the command for resetting a device to default values. The setting of the bus address is not affected. 2: (optional) is the command for resetting informational device parameters to default values. Parameters with Reset Class characteristic “informational” are defined within the parameter attribute table of each block. The setting of the bus address is not affected. 3: (optional) is the command for resetting device parameters with Reset Class characteristic “functional” to default values. The setting of the bus address is not affected.
DESCRIPTOR	20	36	Simple	OctetString	S	32	SRW	" "	User-definable text (a string) to describe the device within the application.
DEVICE_MESSAGE	21	37	Simple	OctetString	S	32	SRW	" "	User-definable MESSAGE (a string) to describe the device within the application or in the plant.
DEVICE_INSTAL_DATE	22	38	Simple	OctetString	S	16	SRW	" "	Date of installation of the device.
LOCAL_OP_ENA	23	39	Simple	Unsigned8	N	1	RW	1	Local operation enable. 0: disabled (Local operation not allowed, i.e. change of FB MODE from host device only) 1: enabled (Local operation is allowed) The operation of the host has higher priority than the local terminal one. If communication fails for a time greater 30 sec, local operation will be enabled automatically. Communication failure is defined here as absence of cyclic communication for the specified time period. If the LOCAL_OP_ENA parameter is equal 0 (disabled) and the communication is working again, then the device switch back to remote operation.

… 4 Block overview

… Physical Block – Slot 0

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Default Value	Description
IDENT_NUMBER_ SELECT	24	40	Simple	Unsigned8	S	1	SRW	127	Each PROFIBUS DP device according to IEC 61784-1 CP 3/1 shall have an Ident_Number provided by PI. The Ident_Number specifies the cyclic behaviour of a device which is described in the corresponding GSD file. adaptation mode: IDENT_NUMBER_SELECTOR=127 manufacturer specific Ident_Number (PA profile V3.x): IDENT_NUMBER_SELECTOR=1 manufacturer specific Ident_Number: IDENT_NUMBER_SELECTOR=128
HW_WRITE_ PROTECTION	25	41	Simple	Unsigned8	D	1	R	-	Indicates the position of a write blocking mechanism which cannot be modified by remote access.
FEATURE	26	42	Record	DS-68	N	8	R	-	Indicates optional features implemented in the device and the status of these features which indicates if the feature is supported or not supported.
COND_STATUS_DIAG	27	43	Simple	Unsigned8	S	1	SRWB	1	Indicates the mode of a device that can be configured for status and diagnostic behavior.
DIAG_EVENT_SWITCH	28	44	Record	DS_69	S	50	RW	0;0;0	Indicates / controls the reaction of the device on device specific diagnostic events if FEATURE.Enabled.Condensed_Status = 1. The reference of the entries to the diagnosis events is manufacturer / device specific.
NULL_PARAM	29 to 47	45 to 63							
CB_FW_REVISION	48	64	Simple	VISIBLE_ STRING		8	XR	" "	Communication Board Firmware Version
CB_HW_REVISION	49	65	Simple	VISIBLE_ STRING		8	XR	" "	Communication Board Hardware Version
FE_FW_REVISION	50	66	Simple	VISIBLE_ STRING		8	XR	" "	FrondEnd Board Firmware Version
FE_HW_REVISION	51	67	Simple	VISIBLE_ STRING		8	XR	" "	FrondEnd Board Hardware Version

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Default Value	Description
DIAGNOSIS_WORST_COND	52	68	Simple	UNSIGNED16		2	R	0	Diagnosis worst Condition.
DIAGNOSIS_EXT_HISTORY	53	69	Simple	OCTET_STRING		6	RA	" "	Diagnosis Extension History.
DIAGNOSIS_CONDITION_DETAILS_IDX	54	70	Simple	UNSIGNED8		1	XRW	0	Diagnosis Condition Details.
DIAGNOSIS_DETAILS	55	71	Record	DIAGNOSIS_DETAILED		22	RWA	0	Diagnosis details.
DIAGNOSIS_SIMULATION_STATUS	56	72	Simple	UNSIGNED8		1	XRW	0	Diagnosis Simulation Status.
DIAGNOSIS_EXT_SIMULATION	57	73	Simple	OCTET_STRING		16	RWAB	" "	Diagnosis Extension Simulation.
DIAGNOSIS_EXT_MASK	58	74	Simple	OCTET_STRING		6	RWAB	" "	Diagnosis Extension Mask.
ASSEMBLY_DATE	59	75	Simple	OCTET_STRING		16	R	" "	Assembly Date.It is Read only.
SAVINGS	60	76	Simple	UNSIGNED8		1	XRW	0	Savings. Value: 0x0000: Save No Action. 0x0001: Save As Default.
SERVICES	61	77	Simple	UNSIGNED8		1	XRW	0	Services: Operation Table. Value: 0: No Action. 1: Enabled.
NULL_PARAM	62	78							
NULL_PARAM	63	79							
NULL_PARAM	64	80							
PASSWORD	65	81	Simple	VISIBLE_STRING		20	RWX	"Empty"	Services Password.
ADDRESS	66	82	Record	PRIVATE_ADDRESS		8	XRW	0;0;0;0;0	Don’t find the objects in the Subsystem.
DATA	67	83	Record	PRIVATE_DATA		33	XRW	0;0	Don’t find the objects in the Subsystem.
MEMORY_ADDRESS	68	84	Record	PRIVATE_MEMORY_ADDRESS		7	XRW	0;0;0;0	Don’t find the objects in the Subsystem.
MEMORY_DATA	69	85	Record	PRIVATE_DATA		33	XRW	0;0	Don’t find the objects in the Subsystem.
TEST_RESULT	70	86	Simple	UNSIGNED8		1	RWX	0	Don’t find the objects in the Subsystem.

… 4 Block overview

TB1-HMI (Transducer Block) – Slot 12

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Default Value	Description
BLOCK_OBJECT	0	16	Record	DS-32	Cst	20	R	-	This structure contains general information about the block like block type, profil version, etc.
ST_REV	1	17	Simple	Unsigned16	N	2	NR	0	Revision counter for static variables. If a variable changes, the revison counter is incremented each time by one.
TAG_DESC	2	18	Simple	OctetString	S	32	SRW	""	A textual description of the block. This has to be unique within a fieldbus.
STRATEGY	3	19	Simple	Unsigned16	S	2	SRW	0	This parameter can be used to build groups of blocks. Each block of a group gets the same reference number.
ALERT_KEY	4	20	Simple	Unsigned8	S	1	SRW	0	This parameter is used as identification number for a part of a plant.
TARGET_MODE	5	21	Simple	Unsigned8	S	1	SRW	-	The desired operating mode of the block: 0x08: Auto 0x10: Man 0x80: Out Of Service
MODE_BLK	6	22	Record	DS-37	D	3	R	8; 8; 8	This parameter includes the actual valid and normal operating modes of the block.
ALARM_SUM	7	23	Record	DS-42	D	8	R	0; 0; 0; 0	This parameter includes a summary of the block alarms.
CONTRAST	8	24	Simple	UNSIGNED8	D	1	VXRW	0	display Contrast.
LANGUAGE	9	25	Simple	UNSIGNED8	D	1	VXRW	0	0: German 1: English
DISPLAY_MODE	10	26	Simple	UNSIGNED8	D	1	VXRW	0	Display format for operator page1.
HMI_FW_REVISION	11	27	Simple	UNSIGNED8	D	1	XR	0	Software revision of low level HMI component.
HMI_LINE_1	12	28	Simple	UNSIGNED8	D	1	RWX	1	Signal to be displayed on 1st line of 1st operator page.
HMI_LINE_2	13	29	Simple	UNSIGNED8	D	1	RWX	3	Signal to be displayed on 2nd line of 1st operator page.
HMI_LINE_BARGRAPH	14	30	Simple	UNSIGNED8	D	1	RWX	1	Signal to be displayed on bargraph of 1st operator page.
HMI_LINE_SEQUENCE	15	31	Simple	UNSIGNED8	S	1	SRW	0	
HMI_LINE_VARIABLE_1	16	32	Simple	UNSIGNED8	S	1	SRW	0	
HMI_LINE_VARIABLE_2	17	33	Simple	UNSIGNED8	S	1	SRW	1	
HMI_LINE_VARIABLE_3	18	34	Simple	UNSIGNED8	S	1	SRW	2	
HMI_LINE_VARIABLE_4	19	35	Simple	UNSIGNED8	S	1	SRW	3	

TB2-PCB (Transducer Block) – Slot 13

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Default Value	Description
BLOCK_OBJECT	0	16	Record	DS_32	Cst	20	R	-	This structure contains general information about the block like block type, profile version, etc.
ST_REV	1	17	Simple	UNSIGNED16	N	2	NR	0	Revision counter for static variables. If a variable changes, the revision counter is incremented each time by one.
TAG_DESC	2	18	Simple	OCTET_ STRING	S	32	SRW	""	A textual description of the block. This has to be unique within a fieldbus.
STRATEGY	3	19	Simple	UNSIGNED16	S	2	SRW	0	This parameter can be used to build groups of blocks. Each block of a group gets the same reference number.
ALERT_KEY	4	20	Simple	UNSIGNED8	S	1	SRW	0	This parameter is used as identification number for a part of a plant.
TARGET_MODE	5	21	Simple	UNSIGNED8	S	1	SRW	-	The desired operating mode of the block: 0x08: Auto 0x10: Man 0x80: Out Of Service
MODE_BLK	6	22	Record	DS_37	D	3	R	8; 8; 8	This parameter includes the actual valid and normal operating modes of the block.
ALARM_SUM	7	23	Record	DS_42	D	8	R	0; 0; 0; 0	This parameter includes a summary of the block alarms.
QV	8	24	Record	DS_101	D	5	R	0.0;0	Volume Flow Read only
QV_QVP_UNIT	9	25	Simple	UNSIGNED16	S	5	RWABX	1349	Volume flow Unit. For details see table **Table 1: Units for the volume flow rate** on page 5.
PARTIAL_QV	10	26	Record	DS_101	S	2	R	0.0;0	Gas Partial Volume flow
QN	11	27	Record	DS_101	S	2	R	0.0;0	Standard Volume flow
QN_QNP_UNIT	12	28	Simple	UNSIGNED16	S	5	RWABX	1349	Volume flow Unit. For details see table **Table 1: Units for the volume flow rate** on page 5.
PARTIAL_QN	13	29	Record	DS_101	D	5	R	0.0;0	Gas Partia Standard Volume flow
QM	14	30	Record	DS_101	S	2	R	0.0;0	Mass flow
QM_UNIT	15	31	Simple	UNSIGNED16	S	2	RWABX	1324	Mass Flow Units For details see table **Table 2: Units for mass flow** on page 5.
POWER	16	32	Record	DS_101	D	5	R	0.0;0	Energy Flow
POWER_UNIT	17	33	Simple	UNSIGNED16	S	2	RWABX	1190	Power Unit For details see table **Table 3: Power units** on page 5.
T	18	34	Record	DS_101	D	5	RX	0.0;0	dvInletT. Value: –200 to 500.
T_UNIT	19	35	Simple	UNSIGNED16	S	2	RWABX	1001	the Temperature unit For details see table **Table 5: Temperature units** on page 6.
T_AO_IN	20	36	Record	DS_101	D	5	R	0.0;0	The dvInletTemperature is input from AO Block.
SECOND_T_AO_IN	21	37	Record	DS_101	S	2	R	0.0;0	The dvOutletTemperature is input from AO block.
GAGE_P_AO_IN	22	38	Record	DS_101	D	5	R	0.0;0	The Gas Pressure is input from AO block.
ABS_P_AO_IN	23	39	Record	DS_101	D	2	R	0.0;0	Absolute Gas Pressure is input from AO block.
P_UNIT	24	40	Simple	UNSIGNED16	D	5	RWABX	1133	The Pressure Unit For details see table **Table 6: Pressure units** on page 6.

… 4 Block overview

… TB2-PCB (Transducer Block) – Slot 13

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Default Value	Description
GAS_CONTENT_AO_IN	25	41	Record	DS_101	D	2	R	0.0;0	Gas Content is input from AO block. Read only.
GAS_CONTENT_UNIT	26	42	Simple	UNSIGNED16	D	5	RWB	1342	Gas Content Unit.Read only. 1342 %
DENSITY_AO_IN	27	43	Record	DS_101	D	5	R	0.0;0	Density is input from AO block.Read only.
DENSITY_UNIT	28	44	Simple	UNSIGNED16	D	2	RWABX	1097	The Density Units For details see table **Table 4: Density units** on page 5.
DI_LOW_CUT_OFF	29	45	Record	DS_102	D	2	R	0.0;0	Low cut off. Read only.
DI_SWITCH_OUT	30	46	Record	DS_102	D	5	R	0.0;0	Switch out. Read only.
SIMULATION_MODE	31	47	Simple	UNSIGNED8	D	2	RWX	0	Simulation Mode: 0: SIMULATION CB OFF 1: SIMULATION CB QV VALUE 2: SIMULATION CB QM VALUE 3: SIMULATION CB MEDIUM TEMP 4: SIMULATION CB DO FREQ 5: SIMULATION CB DO LOGIC 6: SIMULATION CB DO PULSE 7: SIMULATION FE SENSOR FREQUENCY
REF_TEMPERATURE	32	48	Simple	FLOATING_ POINT	D	5	RWX	0	Reference Temperature Unit: TEMPERATURE UNIT Value: −200 to 500
TEMPERATURE_ OFFSET_CORRECTION	33	49	Simple	FLOATING_ POINT	D	2	RWX	0	RTDSensorOffsetCorrectUserDisp Value: −50 to 50
QV_MAX.DN	34	50	Simple	FLOATING_ POINT	D	2	RWX	0	QvMax.DN Unit: Volume Flow Unit Value: 0.01f to 260000f
QV_MAX.	35	51	Simple	FLOATING_ POINT	D	4	RWX	0	Qv Range Min. value: QvMin.DN Max. value: QvMax.DN
QV_SIMU_STATUS	36	52	Simple	UNSIGNED8	D	4	RWX	0	Qv Simulation Enable 1: ENABLE 0: DISABLE
QV_SIMU_VALUE	37	53	Simple	FLOATING_ POINT	D	4	RWX	0	Qv Simulation
PARTIAL_QV_MAX.	38	54	Simple	FLOATING_ POINT	D	4	RWX	0	Qv Partial Range Min. value: QMin.DN Max. value: QnMax.DN
PARTIAL_QV_ SIMU_STATUS	39	55	Simple	UNSIGNED8	D	4	RWX	0	Qv Partial Simulation Enable 1: ENABLE 0: DISABLE
PARTIAL_QV_ SIMU_VALUE	40	56	Simple	FLOATING_ POINT	D	4	RWX	0	Qv Partial Simulation
QN_MAX.	41	57	Simple	FLOATING_ POINT	D	4	RWX	0	Qn Range Min. value: QMin.DN Max. value: QnMax.DN

Parameter Name	Rel. Idx	SlotObj. Idx	Type	Data Type	Store	Bytes	Access	Default Value	Description
QN_SIMU_STATUS	42	58	Simple	UNSIGNED8	D	4	RWX	0	Qn Simulation Enable 1: ENABLE 0: DISABLE
QN_SIMU_VALUE	43	59	Simple	FLOATING_ POINT	D	4	RWX	0	Qn Simulation.
PARTIAL_QN_MAX.	44	60	Simple	FLOATING_ POINT	D	4	RWX	0	Qn Partial Range Min. value: QMin.DN Max. value: QnPartialMax.DN
PARTIAL_QN_ SIMU_STATUS	45	61	Simple	UNSIGNED8	D	4	RWX	0	Qn Partial Simulation Enable 1: ENABLE 0: DISABLE
PARTIAL_QN_ SIMU_VALUE	46	62	Simple	FLOATING_ POINT	D	4	RWX	0	Qn Partial Simulation
QM_MAX.	47	63	Simple	FLOATING_ POINT	D	4	RWX	0	Qm Range
QM_SIMU_STATUS	48	64	Simple	UNSIGNED8	D	1	RWX	0	Qm Simulation Enable 1: ENABLE 0: DISABLE
QM_SIMU_VALUE	49	65	Simple	FLOATING_ POINT	D	4	RWX	0	Qm Simulation
POWER_MAX.	50	66	Simple	FLOATING_ POINT	D	4	RWX	0	Qp Range Min. value: QMin.DN Max. value: Qp Max.DN
POWER_SIMU_STATUS	51	67	Simple	UNSIGNED8	D	4	RWX	0	Qp Simulation Enable 1: ENABLE 0: DISABLE
POWER_SIMU_VALUE	52	68	Simple	FLOATING_ POINT	D	1	RWX	0	Qp Simulation Unit: Power
T_SIM_ENABLE	53	69	Simple	UNSIGNED8	D	4	RWX	0	dvInletT Simulation Enable 0: Simulation Disable 1: Simulation Enable
T_SIMULATE	54	70	Simple	FLOATING_ POINT	D	4	RWX	0	dvInletT Simulation.
T_HI_RNG	55	71	Simple	FLOATING_ POINT	D	4	RWX	0	dvInletT High Range Min. value: dvInletTMin.DN Max. value: dvInletTMax.DN
T_LO_RNG	56	72	Simple	FLOATING_ POINT	D	1	RWX	0	dvInletT Low Range Min. value: dvInletTMin.DN Max. value: dvInletTMax.DN
SECOND_T_ SIM_ENABLE	57	73	Simple	UNSIGNED8	D	4	RWX	0	dvOutletT Simulation Enable 0: Simulation Disable 1: Simulation Enable
SECOND_T_SIMULATE	58	74	Simple	FLOATING_ POINT	D	4	RWX	0	dvOutletT Simulation Value: –200 to 500

… 4 Block overview

… TB2-PCB (Transducer Block) – Slot 13

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Default Value	Description
SECOND_T_HI_RNG	59	75	Simple	FLOATING_POINT	D	4	RWX	0	dvOutletT High Range Min. value: dvOutletT Min.DN Max. value: dvOutletT Max.DN
SECOND_T_LO_RNG	60	76	Simple	FLOATING_POINT	D	1	RWX	0	dvOutletT Low Range Min. value: dvOutletT Min.DN Max. value: dvOutletT Max.DN
SECOND_T	61	77	Simple	FLOATING_POINT	D	4	RWX	0	dvOutletT Value: −300.0f to 600.0f Unit: TEMPERATURE UNIT
ABS_P_SIM_ENABLE	62	78	Simple	UNSIGNED8	D	4	RWX	0	dvPressure Simulation Enable 0: SIMU DISABLE 1: SIMU ENABLE
ABS_P_SIMULATE	63	79	Simple	FLOATING_POINT	D	4	RWX	0	dvPressureSimulation
ABS_P_HI_RNG	64	80	Simple	FLOATING_POINT	D	1	RWX	0	dvPressureRange Max. value: dvPressureMax.DN Min. value: dvPressureMin.DN
ABS_P_LO_RNG	65	81	Simple	FLOATING_POINT	D	4	RWX	0	dvPressure Low Range Max. value: dvPressureMax.DN Min. value: dvPressureMin.DN
ABS_P	66	82	Simple	FLOATING_POINT	D	4	RWX	0	dvPressure Value: 0.0f to 40101.325f Unit: Pressure Unit
GAS_CONTENT_SIM_ENABLE	67	83	Simple	UNSIGNED8	D	4	RWX	0	dv Content Simulation Enable 0: Simulation DISABLE 1: Simulation ENABLE
GAS_CONTENT_SIMULATE	68	84	Simple	FLOATING_POINT	D	1	RWX	0	dv Content Simulation Value: 0.0f to 100.0f
GAS_CONTENT_HI_RNG	69	85	Simple	FLOATING_POINT	D	4	RWX	0	dv Content High Range
GAS_CONTENT_LO_RNG	70	86	Simple	FLOATING_POINT	D	4	RWX	0	dv Content Low Range
GAS_CONTENT	71	87	Simple	FLOATING_POINT	D	4	RWX	0	dv Content Value: 0.0f to 100.0f
DENSITY_SIM_ENABLE	72	88	Simple	UNSIGNED8	D	1	RWX	0	dvDensity Simulation Enable 0: Simualation Disable 1: Simualation enable
DENSITY_SIMULATE	73	89	Simple	FLOATING_POINT	D	4	RWX	0	dvDensitySimulation
DENSITY_HI_RNG	74	90	Simple	FLOATING_POINT	D	4	RWX	0	dvDensity High Range
DENSITY_LO_RNG	75	91	Simple	FLOATING_POINT	D	4	RWX	0	dvDensity Low Range

Parameter Name	Rel. Idx	SlotObj. Idx	Type	Data Type	Store	Bytes	Access	Default Value	Description
DENSITY	76	92	Simple	FLOATING_POINT	D	4	RWX	0	dvDensity Value: 0.01 to 3000 Unit: MASS DENSITY UNIT
STEAM_STATUS	77	93	Simple	UNSIGNED8		1	RAX	0	Steam Satus 0: WATER 1: SATURATED_STEAM 2: OVERHEAT_STEAM
DENSITY_REFERENCE	78	94	Simple	FLOATING_POINT	D	4	RWX	0	densityRef Value: 0.01 to 3000 Unit: Density Unit
DENSITY_STANDARD	79	95	Simple	FLOATING_POINT	D	4	RWX	0	densityS Value: 0.01 to 3000 Unit: Density Unit
GAS_CFG_FLAG	80	96	Simple	UNSIGNED8	D	1	RWX	0	gas ConfFlag 0: NONGONFIGED 1: GONFIGING 2: GONFIGED
CF_MATRIX_SIZE	81	97	Simple	UNSIGNED8	D	1	RWX	0	matrix Size 0: SIZE3X3,three pressure and three temperature. 1: SIZE4X3,four pressure and three temperature. 2: SIZE9X7,nine pressure and seven temperature.
COMPRESS_FACTOR_0 to 62	82 to 144	98 to 160	Simple	FLOATING_POINT	D	4	RWX	0	9*7 [0...6],[7...13]...[56...62]
CF_TEMPERATURE_0 to 6	145 to 151	161 to 167	Simple	FLOATING_POINT	D	4	RWX	0	CFTempArray0 to 6 Value: –10.5f to 64.85f Unit: Temperature Unit
CF_PRESSURE_0 to 8	152 to 160	168 to 176	Simple	FLOATING_POINT	D	4	RWX	0	CFPressArray0 to 8 Value: 0 to 12000f. Unit: Pressure Unit
CF_REFERENCE	161	177	Simple	FLOATING_POINT	D	4	RAX	0	Compress Factor at operating Status Default value: 1.0f
INLET_ENTHALPY	162	178	Simple	FLOATING_POINT	D	4	RWX	0	Hw
OUTLET_ENTHALPY	163	179	Simple	FLOATING_POINT	D	4	RWX	0	Hc
STEAM_POWER_TYPE	164	180	Simple	UNSIGNED8	D	1	RWX	0	steamPwrrFR 0: Just measure forward flow 1: Measure forward and reverse flow
SENSOR_FREQ	165	181	Simple	FLOATING_POINT	D	4	RAX	0	dv Frequency Damped. Min. value: 0.7 Max. value: 3000

… 4 Block overview

… TB2-PCB (Transducer Block) – Slot 13

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Default Value	Description
SENSOR_FREQ_SIM_ENABLE	166	182	Simple	UNSIGNED8	D	1	RWABX	0	dv Frequency Simulation Enable 0: simulation disable. 1: simulation enable.
SENSOR_FREQ_SIMULATE	167	183	Simple	FLOATING_POINT	D	4	RWABX	0	dv Frequency Simulation Min. value: 0.7 Max. value: 3000
SENSOR_FREQ_DAMPING_TIME	168	184	Simple	FLOATING_POINT	D	4	RWABX	0	dv Frequency Damping Time Min. value: 0.0 Max. value: 100
T_PRESET	169	185	Simple	FLOATING_POINT	D	4	RWX	20	Preset Temperature
SECOND_T_PRESET	170	186	Simple	FLOATING_POINT	D	4	RWX	15	Preset Second Temperature
P_PRESET	171	187	Simple	FLOATING_POINT	D	4	RWX	101,325	Preset Pressure
DENSITY_UNIT_PRESET	172	188	Simple	FLOATING_POINT	D	4	RWX	998	Preset Unit Density
GAS_CONTENT_PRESET	173	189	Simple	FLOATING_POINT	D	4	RWX	45	Preset Gas Content

TB3-Standard (Transducer Block) – Slot 14

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Default Value	Description
BLOCK_OBJECT	0	16	Record	DS-32	Cst	20	R	-	This structure contains general information about the block like block type, profile version, etc.
ST_REV	1	17	Simple	Unsigned16	N	2	NR	0	Revision counter for static variables. If a variable changes, the revision counter is incremented each time by one.
TAG_DESC	2	18	Simple	OctetString	S	32	SRW	""	A textual description of the block. This has to be unique within a fieldbus.
STRATEGY	3	19	Simple	Unsigned16	S	2	SRW	0	This parameter can be used to build groups of blocks. Each block of a group gets the same reference number.
ALERT_KEY	4	20	Simple	Unsigned8	S	1	SRW	0	This parameter is used as identification number for a part of a plant.
TARGET_MODE	5	21	Simple	Unsigned8	S	1	SRW	-	The desired operating mode of the block: 0x08: Auto 0x10: Man 0x80: Out Of Service
MODE_BLK	6	22	Record	DS-37	D	3	R	8; 8; 8	This parameter includes the actual valid and normal operating modes of the block.
ALARM_SUM	7	23	Record	DS-42	D	8	R	0; 0; 0; 0	This parameter includes a summary of the block alarms.
SENSOR_TYPE	8	24	Simple	UNSIGNED8	D	1	RAX	0	The type of Sensor. The value include SWIREL and VORTEX.
METER_SIZE_VORTEX	9	25	Simple	UNSIGNED8	D	1	RWX	0	The diameter size of Meter when select the Sensor type is Vortex. 0: DIN 15 mm 1: DIN 25 mm 2: DIN 40 mm 3: DIN 50 mm 4: DIN 80 mm 5: DIN 100 mm 6: DIN 150 mm 7: DIN 200 mm 8: DIN 250 mm 9: DIN 300 mm 10: ANSI 15 mm 11: ANSI 25 mm 12: ANSI 40 mm 13: ANSI 50 mm 14: ANSI 80 mm 15: ANSI 100 mm 16: ANSI 150 mm 17: ANSI 200 mm 18: ANSI 250 mm 19: ANSI 300 mm
METER_SIZE_SWIRLE	10	26	Simple	UNSIGNED8	D	1	RWX	0	The diameter size of Meter when select the Sensor type is SWIRLE. 0: Swirl 15mm 1: Swirl 20mm 2: Swirl 25mm 3: Swirl 32mm 4: Swirl 40mm 5: Swirl 50mm 6: Swirl 80mm 7: Swirl 100mm 8: Swirl 150mm 9: Swirl 200mm 10: Swirl 300mm 11: Swirl 400mm
SENSOR_ID	11	27	Simple	VISIBLE_STRING	D	8	RAX	0	The ID of Sensor. The default value is 'ABB'.
SENSOR_SAP_NO	12	28	Simple	VISIBLE_STRING	D	20	RAX	0	The Serial Number of Sensor.

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… TB3-Standard (Transducer Block) – Slot 14

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Default Value	Description
SENSOR_RUN_HOURS	13	29	Simple	UNSIGNED32	D	4	RAX	0	Sensor Run Hours.
SENSOR_CALI_DATE	14	30	Simple	VISIBLE_STRING	D	12	RAX	0	The calibration date of Sensor.
SENSOR_CALI_CERT_NO	15	31	Simple	VISIBLE_STRING	D	20	RAX	0	Calibration Number.
SENSOR_CALI_LOCATION	16	32	Simple	VISIBLE_STRING	D	32	RAX	0	The location of Sensor Calibration.
TRANSMITTER_TYPE	17	33	Simple	VISIBLE_STRING	D	12	RAX	0	Transmitter Type
TRANSMITTER_ID	18	34	Simple	VISIBLE_STRING	D	8	RAX	0	Transmitter ID
TRANSMITTER_SAP	19	35	Simple	VISIBLE_STRING	D	20	RAX	0	Transmitter SAP/ERP No.
BOOTLOADER_VERSION	20	36	Simple	VISIBLE_STRING	D	8	RAX	0	Bootloader Version
TRANSMITTER_RUN_HOURS	21	37	Simple	UNSIGNED32	D	32	RAX	0	Transmitter Run Hours
TRANSMITTER_CALI_DATE	22	38	Simple	VISIBLE_STRING	D	12	RAX	0	Transmitter Calibration Date
TRANSMITTER_CALI_CERT_NO	23	39	Simple	VISIBLE_STRING	D	20	RAX	0	Transmitter Calibration Certification Number
TRANSMITTER_CALI_LOCATION	24	40	Simple	VISIBLE_STRING	D	32	RAX	0	Transmitter Calibration Location
MANUFACTURER	25	41	Simple	VISIBLE_STRING	D	20	RAX	0	Manufacturer
STREET	26	42	Simple	VISIBLE_STRING	D	20	RAX	0	Street
CITY	27	43	Simple	VISIBLE_STRING	D	20	RAX	0	City
PHONE	28	44	Simple	VISIBLE_STRING	D	20	RAX	0	Phone
SENSOR_LOCATION_TAG	29	45	Simple	VISIBLE_STRING	D	20	RAX	0	Sensor Location Tag
SENSOR_TAG	30	46	Simple	VISIBLE_STRING	D	20	RAX	0	Sensor TAG
QV_DAMPING_TIME	31	47	Simple	FLOATING_POINT	D	4	RWABX	0	Qv Damping Time
PQV_DAMPING_TIME	32	48	Simple	FLOATING_POINT	D	4	RWABX	0	Qv Partial Damping Time
QN_DAMPING_TIME	33	49	Simple	FLOATING_POINT	D	4	RWABX	0	Qn Damping Time
PQN_DAMPING_TIME	34	50	Simple	FLOATING_POINT	D	4	RWABX	0	Qn Partial Damping Time

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Default Value	Description
QM_DAMPING_TIME	35	51	Simple	FLOATING_POINT	D	4	RWABX	0	Qm Damping Time
QP_DAMPING_TIME	36	52	Simple	FLOATING_POINT	D	4	RWABX	0	Qp Damping Time
T_DAMPING_TIME	37	53	Simple	FLOATING_POINT	D	4	RWABX	0	dvInlet T Damping Time
QV_LOW_CUT_OFF	38	54	Simple	FLOATING_POINT	D	4	RWABX	0	Qv Low CutOff
LIQUID_MASS_CORRECTION	39	55	Simple	FLOATING_POINT	D	4	RWABX	0	Liquid Correction It include density correction, volume correction.
VOLUME_EXPANSION_COEFFICIENTS	40	56	Simple	FLOATING_POINT	D	4	RWABX	0	Volume Expand Beta1
DENSITY_EXPANSION_COEFFICIENTS	41	57	Simple	FLOATING_POINT	D	4	RWABX	0	Density Expand Beta2
SPECIFIC_HEAT_CAPACITY	42	58	Simple	FLOATING_POINT	D	4	RWABX	0	Heat Capacity
GAS_DENSITY_SELECTION	43	59	Simple	UNSIGNED8	D	1	RWABX	0	Gas mass computation It have two selection 0: Is the Standard Density, 1: Is Preset Density.
GAS_REF_CONDITIONS	44	60	Simple	UNSIGNED8	D	1	RWABX	0	Gas_ref_conditions: 0: pressure is 14.7 psi,60 °f (15.4 °c) 1: pressure is 14.7 psi,70 °f (21.6 °c) 2: 1013.25 mbar, 0 °c. 3: 1013.25 mbar, 20 °c.
GAS_STD_MODE	45	61	Simple	UNSIGNED8	D	1	RWABX	0	Gas_computation_type 0: real gas equation 1: iso12213_2/aga8 2: iso12213_3/gerg88
GAS_ENERGY_DENSITY	46	62	Simple	FLOATING_POINT	D	4	RWABX	0	Calorific energy
WATER_STEAM_TYPE	47	63	Simple	UNSIGNED8	D	1	RWABX	0	Steam type 0: steamtype overheat 1: steamtype saturated 2: steamtype water
STEAM_DENSITY_SELECTION	48	64	Simple	UNSIGNED8	D	1	RWABX	0	Actual density selection 0: ext. Density 1: calculation from p&t 2: calculation from t 3: calculation from p
ENERGY_CALC_METHOD	49	65	Simple	UNSIGNED8	D	1	RWABX	0	Steampwr 0: Just measure forward flow. 1: measure forward and reverse flow

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… TB3-Standard (Transducer Block) – Slot 14

Parameter Name	Rel. Idx	SlotObj. Idx	Type	Data Type	Store	Bytes	Access	Default Value	Description
DYNAMIC_VISCOSITY	50	66	Simple	FLOATING_POINT	D	4	RWABX	0	Dynamic Viscosity Max. value: 2.0E+12 Min. value: 1.0E-12
AUTO_ZERO	51	67	Simple	UNSIGNED8	D	1	WBX	0	Write autozero This is an action.
AUTO_ZERO_STATUS	52	68	Simple	UNSIGNED8	D	4	RAX	0	Autozero Status 0: STATUS COMPLETED 1: STATUS UNCOMPLETED 2: STATUS FAIL 3: STATUS NOT START
LOW_FLOW_THRESHOLD	53	69	Simple	UNSIGNED8	D	1	RWABX	0	Low Flow Thresh Min. value: 7 Max. value: 2000
SENSOR_SELF_CHECK	54	70	Simple	FLOATING_POINT	D	4	RWABX	0	Autoself check Enable 0: STATUS OFF 1: STATUS ON
MAINTENANCE_CYCLE_TIME	55	71	Simple	FLOATING_POINT	D	4	RWABX	0	Transmitter maintenance cycle Min. value: 0 Max. value: 50000
REYNOLDS_NUMBER	56	72	Simple	UNSIGNED8	D	1	RAX	0	Reynolds number Default value: 10000.00f.
DO_LOGIC_STATE	57	73	Simple	UNSIGNED8	D	4	RAX	0	Hardware logic output 0: Hardware logic output is low 1: Hardware logic output is high
DO_PULSE_NUM	58	74	Simple	UNSIGNED32	D	1	RAX	0	Pulse output value (the actual number of pulse output)
DO_FREQUENCY	59	75	Simple	FLOATING_POINT	D	1	RAX	0	The actual frequency the do output.
DO_INPUT_CONFIG_FREQ	60	76	Simple	UNSIGNED8	D	1	RWX	0	Input Selection Freq 0: QV FREQ 1: PQV FREQ 2: QN FREQ 3: PQN FREQ 4: QM FREQ 5: QP FREQ 6: TEMPERATURE FREQ 255: OFF FREQ

Parameter Name	Rel. Idx	SlotObj. Idx	Type	Data Type	Store	Bytes	Access	Default Value	Description
DO_INPUT_ CONFIG_PULSE	61	77	Simple	UNSIGNED8	D	1	RWX	0	Input Selection Pulse 0: QV PULSE 1: PQV PULSE 2: QN PULSE 3: PQN PULSE 4: QM PULSE 5: QP PULSE 255: OFF PULSE
DO_OUTPUTMODE	62	78	Simple	UNSIGNED8	D	1	RWX	0	Output mode of hardware output logic/freq/pulse/none 0: Hardware output1 is disabled 1: Hardware output1 logic signal 2: Hardware output1 pulse signal 3: Hardware output1 frequency signal
DO_LOGIC_SRC	63	79	Simple	UNSIGNED8	D	1	RWX	0	Logic signal source for hardware output. None/Alarm 0: No source selected for logic output 1: Dig out alarm signal selected for logic output
DO_SIMU_MODE	64	80	Simple	FLOATING_ POINT	D	4	RWX	0	Simulation hardware output1 mode 0: hardware output1 is disabled. 1: hardware output1 logic signal. 2: hardware output1 pulse signal. 3: hardware output1 frequency signal. 4: toutputmode1formats numeric limit.
DO_LOGICSATE_SIM	65	81	Simple	UNSIGNED8	D	4	RWABX	0	Logic simulation command for hardware (On-output/Off-close) 0: Simulate logic OFF. 1: Simulate logic ON.
DO_FREQ_SIM	66	82	Simple	FLOATING_ POINT	D	4	RWABX	0	Simulation frequency for frequency outputs. The minimum fullscale frequency of real frequency is 0.25f. The maximum fullscale frequency of real frequency is 10500.0f.
DO_PULSE_SIM	67	83	Simple	FLOATING_ POINT	D	4	RWABX	0	Simulate pulse number Min. value: 0 Max. value: 10000
DO_PULSE_WIDTH	68	84	Simple	UNSIGNED8	D	1	RWABX	0	Pulse width Min. value: the minimum pulse width is 0.05ms. Max. value: the maximum pulse width is 2000ms. Unit: millisecond.
DO_PULSE_FACTOR	69	85	Simple	UNSIGNED8	D	1	RWABX	0	Pulse factor. Min. value: The minimum pulse factor is 0.001 pulses/uot. Max. value: The maximum pulse factor is 2000.0 pulses/uot.
DO_ALARM_ LOW_CUTOFF	70	86	Simple	UNSIGNED8	D	1	RWABX	0	Enable/disable low flow cut off alarm for diagnosis. 0: alarm disable 1: alarm enable

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… TB3-Standard (Transducer Block) – Slot 14

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Default Value	Description
DO_ALARM_GENERAL	71	87	Simple	UNSIGNED8	D	1	RWABX	0	Enable/disable general alarm for diagnosis. 0: alarm disable 1: alarm enable
DO_ALARM_ MINFLOWRATE	72	88	Simple	UNSIGNED8	D	1	RWABX	0	Enable/disable min flow rate alarm for diagnosis. 0: alarm disable 1: alarm enable
DO_ALARM_ MAXFLOWRATE	73	89	Simple	UNSIGNED8	D	1	RWABX	0	Enable/disable max flow rate alarm for diagnosis. 0: alarm disable 1: alarm enable
DO_ALARM_ MINTEMPERATURE	74	90	Simple	UNSIGNED8	D	2	RWABX	0	Enable/disable min Temperature Alarm for diagnosis. 0: alarm disable 1: alarm enable
DO_ALARM_ MAXTEMPERATURE	75	91	Simple	UNSIGNED8	D	2	RWABX	0	Enable/disable max Temperature Alarm for diagnosis. 0: alarm disable 1: alarm enable
DO_PULSE_UNIT_QV	76	92	Simple	UNSIGNED8	D	2	RWABX	0	Do volume 1: cubic metros 7: cubic feet 11: liters 13: milliliters 14: hectoliters 20: imp gallons 19: us gallons liquid 22: us barrels beer
DO_PULSE_UNIT_QN	77	93	Simple	UNSIGNED8	D	2	RWABX	0	The linked object is pulseunit_Qv.
DO_PULSE_UNIT_QM	78	94	Simple	UNSIGNED8	D	1	RWABX	0	Do mass 2: grams 1: kilograms 5: tons 7: pounds 6: ounces 8: short ton 9: long ton
DO_PULSE_UNIT_QP	79	95	Simple	UNSIGNED8	D	1	RWABX	0	1: joule 7: kilojoule 6: megajoule 19: kilowatt-hour
DO_MIN_FREQ	80	96	Simple	FLOATING_ POINT	D	4	RWABX	0	Frequency minimum range The minimum full-scale frequency of real frequency is 0.25f. The maximum full-scale frequency of real frequency is 10500.0f.

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Default Value	Description
DO_MAX_FREQ	81	97	Simple	FLOATING_ POINT	D	4	RWABX	0	Frequency maximum range The minimum fullscale frequency of real frequency is 0.25f. The maximum fullscale frequency of real frequency Is 10500. 0f.
DO_LOGIC_ ACTIVE_SELECTION	82	98	Simple	FLOATING_ POINT	D	4	RWABX	0	Logic output NC/NO 0: Logic output Active State is high 1: Logic output Active State is low
MEDIUM_TYPE	83	99	Simple	UNSIGNED8	D	4	RWABX	0	Medium Type 0: MEDIUM TYPE is LIQUID 1: MEDIUM TYPE is GAS 2: MEDIUM TYPE is STEAM
DIAG_MAINTAIN_MASK	84	100	Simple	UNSIGNED8	D	1	RWX	0	Diagnositic Maintain Mask 0: DISABLE 1: ENABLE
DIAG_ FUNCHECK_MASK	85	101	Simple	UNSIGNED8	D	1	RWX	0	Diagnositic Funtion Check Mask 0: DISABLE. 1: ENABLE.
DIAG_OFFSPEC_MASK	86	102	Simple	UNSIGNED8	D	4	RWX	0	Diagnostic Off Specific Mask 0: DISABLE 1: ENABLE
MIN_RE_ALM_LIMITS	87	103	Simple	FLOATING_ POINT	D	4	RWX	0	Reallimits Min. value: 0 Max. value: 40000
WRITE_SELF_ DIAGNOSIS	88	104	Simple	UNSIGNED8	D	4	RWX	0	Write selfdiagnosis

… 4 Block overview

… TB3-Standard (Transducer Block) – Slot 14

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Default Value	Description
DIAG_SIMULATION_TYPE	89	105	Simple	UNSIGNED8	D	4	RWX	0	Diagnostic Simulation Type 0: ALARM Simulation OFF 1: NO REMOVE FF CHECK Simulation 2: FE BOARD COMMUNICATION ERROR Simulation 3: FE SYNC MISSING Simulation 4: VORTEX SENSOR FAILURE Simulation 5: TEMP SENSOR FAILURE Simulation 6: VIBRAT SENSOR FAILURE Simulation 7: SNR FAILUREZ Simulation 8: NV FAILURE Simulation 9: CB NV FAILURE Simulation 10: MAPPER Alarm NO AO IN Simulation 11: DIAG Simulation Alarm Simulation 12: DATA Simulation Alarm Simulation 13: FLOWRATE REACH QMAX Simulation 14: FLOWRATE REACH QMIN Simulation 15: PROCESS TEMP REACH TMAX Simulation 16: PROCESS TEMP REACH TMIN Simulation 17: LOW FLOWRATE CUTOFF Simulation 18: RE OUT LINEAR RANGE Simulation 19: DIGITAL OUT CUTOFF Simulation 20: NV REPLACE WARN Simulation 21: MAINTENANCE WARNING Simulation 22: SENSOR CAL STATUS Simulation 23: STEAM TYPE MISMATCH Simulation 24: TOT COUNT STOP Simulation
DIAG_ALARM_LOWCUTOFF_MASK	90	106	Simple	UNSIGNED8	D	1	RWX	0	Diagnostic Low Cutoff Mask 0: DISABLE 1: ENABLE
DIAG_ALARM_MINFLOWRATE_MASK	91	107	Simple	UNSIGNED8	D	1	RWX	0	Diagnostic Min Flow Mask 0: DISABLE 1: ENABLE
DIAG_ALARM_MAXFLOWRATE_MASK	92	108	Simple	UNSIGNED8	D	1	RWX	0	Diagnostic Max Flow Mask 0: DISABLE 1: ENABLE
DIAG_ALARM_MINTEMPERATURE_MASK	93	109	Simple	UNSIGNED8	D	1	RWX	0	Diagnostic Min Temperature Mask 0: DISABLE 1: ENABLE
DIAG_ALARM_MAXTEMPERATURE_MASK	94	110	Simple	UNSIGNED8	D	1	RWX	0	Diagnostic Max Temperature Mask 0: DISABLE 1: ENABLE
DIAG_ALARM_AOINACTIVE_MASK	95	111	Simple	UNSIGNED8	D	1	RWX	0	Diagnostic AO Inactive Mask 0: DISABLE 1: ENABLE
DIAG_ALARM_TSENSOR_FAULT_MASK	96	112	Simple	UNSIGNED8	D	1	RWX	0	Diagnostic Temperature Sensor Fail Mask 0: DISABLE 1: ENABLE

TB4-Advanced (Transducer Block) – Slot 15

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Default Value	Description
BLOCK_OBJECT	0	16	Record	DS_32	Cst	20	R	0;0;0;0;0;0;0;0;0;0;0;0;	This structure contains general information about the block like block type, profile version, etc.
ST_REV	1	17	Simple	UNSIGNED16	N	2	NR	0	Revision counter for static variables. If a variable changes, the revision counter is incremented each time by one.
TAG_DESC	2	18	Simple	OCTET_STRING	S	32	SRW	" "	A textual description of the block. This has to be unique within a fieldbus.
STRATEGY	3	19	Simple	UNSIGNED16	S	2	SRW	0	This parameter can be used to build groups of blocks. Each block of a group gets the same reference number.
ALERT_KEY	4	20	Simple	UNSIGNED8	S	1	SRW	0	This parameter is used as identification number for a part of a plant.
TARGET_MODE	5	21	Simple	UNSIGNED8	S	1	SRW	8	The desired operating mode of the block: 0x08: Auto 0x10: Man 0x80: Out Of Service
MODE_BLK	6	22	Record	DS_37	D	3	R	8;8;8	This parameter includes the actual valid and normal operating modes of the block.
ALARM_SUM	7	23	Record	DS_42	D	8	R	0;0;0;0	This parameter includes a summary of the block alarms.
RESET_RUN_HOUR_TRANS	8	24	Simple	UNSIGNED8	D	1	RWX	0	Reset run hour
RUN_HOURS_TRANSMITTER	9	25	Simple	UNSIGNED32	Cst	4	RX	0	Transmitter working hour.
MAINTENANCE_CYCLE_TIME_TRANS	10	26	Simple	UNSIGNED32	Cst	4	RWX	17520	Transmitter maintenance cycle Min. value: 0 Max. value: 50000
SENSOR_TYPE	11	27	Simple	UNSIGNED8	D	1	RWX	0	Sensor converter type 0: swirl 1: vortex
METER_SIZE_VORTEX	12	28	Simple	UNSIGNED8	D	1	RWX	0	Vortex meter Size 0: DIN 15 mm 1: DIN 25 mm 2: DIN 40 mm 3: DIN 50 mm 4: DIN 80 mm 5: DIN 100 mm 6: DIN 150 mm 7: DIN 200 mm 8: DIN 250 mm 9: DIN 300 mm 10: ANSI 15 mm 11: ANSI 25 mm 12: ANSI 40 mm 13: ANSI 50 mm 14: ANSI 80 mm 15: ANSI 100 mm 16: ANSI 150 mm 17: ANSI 200 mm 18: ANSI 250 mm 19: ANSI 300 mm

… 4 Block overview

… TB4-Advanced (Transducer Block) – Slot 15

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Default Value	Description
METER_SIZE_SWIRL	13	29	Simple	UNSIGNED8	D	1	RWX	0	Swirl meter Size 0: Swirl 15mm 1: Swirl 20mm 2: Swirl 25mm 3: Swirl 32mm 4: Swirl 40mm 5: Swirl 50mm 6: Swirl 80mm 7: Swirl 100mm 8: Swirl 150mm 9: Swirl 200mm 10: Swirl 300mm 11: Swirl 400mm
QV_MAX_DN	14	30	Simple	FLOATING_POINT	D	4	RWX	80	Access Object of the maximum measurable volume flow. Value: The maximum measurable volume flow. Unitcode: Reference volume flow units of sheet "Unit".
RTD_CONNECTION	15	31	Simple	UNSIGNED8	D	1	RWX	0	Temperature sensor type. 0: temp_pt100 1: temp_pt1000 2: temp_none.
MAX_MEDIUM_TEMP	16	32	Simple	FLOATING_POINT	D	4	RWX	0	Max medium temperature. Value: −400 to 1000 °C Unit: 1: Kelvin 2: Celsius 3: Fahrenheit
RESET_RUN_HOUR_SENSOR	17	33	Simple	UNSIGNED8	D	1	RWX	0	Reset FE Run hour.
RUN_HOURS_SENSOR	18	34	Simple	UNSIGNED32	D	4	RWX	0	Frontend operation hour.
MAINTENANCE_CYCLE_TIME_SENSOR	19	35	Simple	UNSIGNED32	D	4	RWX	0	Frontend Maintenance Cycle time.
SNR	20	36	Simple	FLOATING_POINT	D	4	RX	0	The Ration of Signal /Noise
SNR_THRESHOLD	21	37	Simple	INTEGER16	D	2	RWX	−50	Sensor threshold.
AUTO_CHECK_EN	22	38	Simple	UNSIGNED8	D	1	RWX	0	Auto self check Enable. 0: STATUS OFF. 1: STATUS ON.
AUTO_CHECK_RANGE	23	39	Simple	INTEGER16	D	2	RWX	32767	Span upper range
SIG_AMPLITUDE	24	40	Simple	UNSIGNED16	D	2	RWX	0	Signal amplitude.
VBR_AMPLITUDE	25	41	Simple	UNSIGNED16	D	2	RWX	0	Vibration amplitude.
FFT_MAGNITUDE	26	42	Simple	UNSIGNED16	D	2	RWX	0	Signal magnitude.
CALIBRATION_STATUS	27	43	Simple	UNSIGNED8	D	1	RWX	0	Calibration Status.
INT_RTD_PASSWORD	28	44	Simple	VISIBLE_STRING	D	6	RWX	"******"	Internal RTD Password.

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Default Value	Description
ENERGY_PASSWORD	29	45	Simple	VISIBLE_STRING	D	6	RWX	"*******"	Energy Flow Password.
K_LINERISATION	30	46	Simple	UNSIGNED8	D	1	RWX	0	Enalbe K Linearization. 0: AVERAGE 1: 1PT 2: 2PT 3: 3PT 4: 4PT 5: 5PT 6: 6PT 7: 7PT 8: 8PT
K_SET	31	47	Simple	UNSIGNED8	D	1	RX	0	Select Gas K FACTOR OR LIquid FACTOR. 0: K FACTOR GAS 1: K FACTOR LIQUID
K_AVERAGE_LIQUID	32	48	Simple	FLOATING_POINT	D	4	RWX	7420	average Liquid K Factor. Min. value: 10.00f Max. value: 800000.00f
K_LIQUID_1 to 5	33 to 37	49 to 53	Simple	FLOATING_POINT	D	4	RWX	0	Liquid K Factor of 5 Point. Min. value: 10.00f Max. value: 800000.00f
K_LIQUID_6 to 8	38 to 40	54 to 56	Simple	FLOATING_POINT	D	1	RWX	0	Liquid K Factor of 5 Point. Min. value: 10.00f Max. value: 800000.00f
K_LIQUID_FREQ_1 to 4	41 to 44	57 to 60	Simple	FLOATING_POINT	D	1	RWX	0	5 Point Frequency relate to K Factor. Min. value: 0.30f. Max. value: 1000.00f.
K_LIQUID_FREQ_5	45	61	Simple	FLOATING_POINT	D	2	RWX	0	5 Point Frequency relate to K Factor. Min. value: 0.30f. Max. value: 1000.00f.
K_LIQUID_FREQ_6 to 8	46 to 48	62 to 64	Simple	FLOATING_POINT	D	1	RWX	0	5 Point Frequency relate to K Factor. Min. value: 0.30f. Max. value: 1000.00f.
K_AVERAGE_GAS	49	65	Simple	FLOATING_POINT	D	1	RWX	7420	Average Gas K Factor. Min. value: 10.00f Max. value: 800000.00f
K_GAS_1 to 5	50 to 54	66 to 70	Simple	FLOATING_POINT	D	1	RWX	0	Gas K Factor of 5 Point. Min. value: 10.00f Max. value: 800000.00f
K_GAS_6 to 8	55 to 57	71 to 73	Simple	FLOATING_POINT	D	2	RWX	0	Gas K Factor of 5 Point. Min. value: 10.00f Max. value: 800000.00f

… 4 Block overview

… TB4-Advanced (Transducer Block) – Slot 15

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Default Value	Description
K_GAS_FREQ_1	58	74	Simple	FLOATING_POINT	D	1	RWX	0	5 Point Frequency relate to Gas K Factor. Min. Value: 2.00f. Max. Value: 3000.00f.
K_GAS_FREQ_2	59	75	Simple	FLOATING_POINT	D	1	RWX	0	5 Point Frequency relate to Gas K Factor. Min. Value: 2.00f. Max. Value: 3000.00f.
K_GAS_FREQ_3	60	76	Simple	FLOATING_POINT	D	2	RWX	0	5 Point Frequency relate to Gas K Factor. Min. Value: 2.00f. Max. Value: 3000.00f.
K_GAS_FREQ_4	61	77	Simple	FLOATING_POINT	D	2	RWX	0	5 Point Frequency relate to Gas K Factor. Min. Value: 2.00f. Max. Value: 3000.00f.
K_GAS_FREQ_5	62	78	Simple	FLOATING_POINT	D	1	RWX	0	5 Point Frequency relate to Gas K Factor. Min. Value: 2.00f. Max. Value: 3000.00f.
K_GAS_FREQ_6	63	79	Simple	FLOATING_POINT	D	1	RWX	0	5 Point Frequency relate to Gas K Factor. Min. Value: 2.00f. Max. Value: 3000.00f.
K_GAS_FREQ_7	64	80	Simple	FLOATING_POINT	D	1	RWX	0	5 Point Frequency relate to Gas K Factor. Min. Value: 2.00f. Max. Value: 3000.00f.
K_GAS_FREQ_8	65	81	Simple	FLOATING_POINT	D	4	RWX	0	5 Point Frequency relate to Gas K Factor. Min. Value: 2.00f. Max. Value: 3000.00f.
READ_PARAMETERS	66	82	Simple	UNSIGNED8	D	4	RWX	0	Read FE Parameters.
WRITE_PARAMETERS	67	83	Simple	UNSIGNED8	D	1	RWX	0	Write Parameters to FE.
SAVE_AS_CUSTOMER_DEF	68	84	Simple	UNSIGNED8	D	1	RWX	0	Save Customer Default.
SAVE_AS_FACTORY_DEF	69	85	Simple	UNSIGNED8	D	1	RWX	0	Save Factory Default.
RESET_TO_CUSTOMER_DEF	70	86	Simple	UNSIGNED8	D	1	RWX	0	Reset Customer Default.
RESET_TO_FACTORY_DEF	71	87	Simple	UNSIGNED8	D	1	RWX	0	Reset Factory Default.
VIB_CORRECTION_ON	72	88	Simple	UNSIGNED8	D	1	RWX	0	Vibration Correction On 0: STATUS OFF 1: STATUS On
VIB_FILTER_STEP	73	89	Simple	INTEGER16	D	2	RWX	33	Vibration filter Min. Value: 33 Max. Value: 1310

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Default Value	Description
VIB_NUM_OF_COEF	74	90	Simple	UNSIGNED8	D	1	RWX	15	Vibration filnumcoef. Min. Value: 10. Max. Value: 50.
LOCK_MIN_ INTEGRATION_PERIOD	75	91	Simple	UNSIGNED8	D	1	RWX	1	Lockminintperiod. Min. Value:1. Max. Value: 4.
LOCK_MAX_ INTEGRATION_PERIOD	76	92	Simple	UNSIGNED8	D	1	RWX	4	Lockmaxintperiod. Min. Value: 4 Max. Value: 8
LOCK_ESTI_ ERROR_MARGIN	77	93	Simple	UNSIGNED8	D	1	RWX	10	Lockestimation. Min. Value: 10 Max. Value: 30
LOCK_ACCURACY_IN_ HIGH_SAMP	78	94	Simple	UNSIGNED8	D	1	RWX	1	Accuracyhigh. Min. Value: 1 Max. Value: 4
LOCK_ACCURACY_IN_ MID_SAMP	79	95	Simple	UNSIGNED8	D	1	RWX	1	Accuracymiddle. Min. Value: 1 Max. Value: 4
LOCK_ACCURACY_IN_ LOW_SAMP	80	96	Simple	UNSIGNED8	D	1	RWX	1	Accuracylow. Min. Value: 1 Max. Value: 4
ANALOGUE_GAIN	81	97	Simple	UNSIGNED8	D	1	RWX	0	Analog Gain control times. 1: GAIN_CONTROL_1TIMES 2: GAIN_CONTROL_2TIMES 4: GAIN_CONTROL_4TIMES 8: GAIN_CONTROL_8TIMES
GAIN_CTRL_ON	82	98	Simple	UNSIGNED8	D	1	RWX	0	Gain Control. 0: STATUS OFF 1: STATUS ON
GAIN_LOW_THLD	83	99	Simple	INTEGER16	D	2	RWX	2048	Gain Low Thresh. Min. Value: 2048 Max. Value: 10240
GAIN_HIGH_THLD	84	100	Simple	INTEGER16	D	2	RWX	20480	Gain High Thresh. Min. Value: 20480 Max. Value: 30720
GAIN_MARGIN_IN_ FREQ	85	101	Simple	INTEGER16	D	2	RWX	660	Gain Margin Freq. Min. Value: 660. Max. Value: 4096.
GAIN_MAX_SHIFT	86	102	Simple	UNSIGNED8	D	1	RWX	0	Gain Max Shift. Min. Value: 0 Max. Value: 2

… 4 Block overview

… TB4-Advanced (Transducer Block) – Slot 15

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Default Value	Description
LOW_FLOW_THLD_ON	87	103	Simple	UNSIGNED8	D	1	RWX	0	Low Flow threshon 0: STATUS OFF. 1: STATUS ON.
LOW_FLOW_THLD	88	104	Simple	INTEGER16	D	2	RWX	7	Low Flow Thresh. Min. Value: 7 Max. Value: 2000
COEFFICIENT	89	105	Simple	INTEGER16	D	2	RWX	5	Lowflowthreshcoef. Min. Value: −10 Max. Value:10
NOISE_SAMP_SIZE	90	106	Simple	UNSIGNED8	D	1	RWX	4	Noisesampsize. Min. Value: 4 Max. Value: 8
STATIC_DECIMATION_BITS	91	107	Simple	UNSIGNED8	D	1	RWX	0	Static Decimation. Min. Value: 0 Max. Value: 5
MIDDLE_DECIMATION_BITS	92	108	Simple	UNSIGNED8	D	1	RWX	1	Middle Buf Decimation. Min. Value: 1 Max. Value: 6
MAX_FREQ	93	109	Simple	FLOATING_POINT	D	4	RWX	3000	Max Flow Freq. Min. Value: 19.0f Max. Value: 3000.0f
MIN_FREQ	94	110	Simple	FLOATING_POINT	D	4	RWX	0	Min Flow Freq. Min. Value: 0.0f Max. Value: 1000.0f
MIN_MARGIN	95	111	Simple	UNSIGNED8	D	1	RWX	0	Frequency Min Margin Per. Min. Value: 0 Max. Value: 30
MAX_MARGIN	96	112	Simple	UNSIGNED8	D	1	RWX	0	Freq Max Margin Per. Min. Value: 0 Max. Value: 30
SAVE_ALL_AS_DEFAULT	97	113	Simple	UNSIGNED8	D	1	RWX	0	Save All As Default.
RESET_ALL_TO_DEFAULT	98	114	Simple	UNSIGNED8	D	1	RWX	0	Reset All To Default.
FORCE_REPLACE	99	115	Simple	UNSIGNED8	D	1	RWX	0	Force Replace. 0: NV replace is not enabled. 1: NV replace from FE to CB for common data. 2: NV replace from FE to CB for all data. 3: NV replace from CB to FE for all data.
FORMAT_CB_NV	100	116	Simple	UNSIGNED8	D	1	WX	0	Initialize Nv.
FORMAT_FE_NV	101	117	Simple	UNSIGNED8	D	1	WX	0	Format FE NV.

AI-General Description (Function Block) – Slot 1/2/3/4

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Default Value	Description
BLOCK_OBJECT	0	16	Record	DS-32	Cst	20	R	-	This structure contains general information about the block like block type, profile version, etc.
ST_REV	1	17	Simple	Unsigned16	S	2	SR	0	Revision counter for static variables. If a variable changes, the revision counter is incremented each time by one.
TAG_DESC	2	18	Simple	OctetString	S	32	SRW	""	A textual description of the block. This has to be unique within a fieldbus.
STRATEGY	3	19	Simple	Unsigned16	S	2	SRW	0	This parameter can be used to build groups of blocks. Each block of a group gets the same reference number.
ALERT_KEY	4	20	Simple	Unsigned8	S	1	SRW	0	This parameter is used as identification number for a part of a plant.
TARGET_MODE	5	21	Simple	Unsigned8	S	1	SRW	-	The desired operating mode of the block: 0x08: Auto 0x10: Man 0x80: Out Of Service
MODE_BLK	6	22	Record	DS-37	D	3	DR	8; 8; 8	This parameter includes the actual valid and normal operating modes of the block.
ALARM_SUM	7	23	Record	DS-42	D	8	DR	0; 0; 0; 0	This parameter includes a summary of the block alarms.
BATCH	8	24	Record	DS-67	D	10	SRW	0;0;0;0	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.
NULL_PARAM	9								
OUT	10	26	Record	DS-101	D	5	DRWO	0.0;0x4F	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.
PV_SCALE	11	27	Array	Floating_ Point	D	4	SRW	100.0,0.0	Input scaling of the block. 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 direct related 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, i.e. a change of the Transducer Block PV_Unit causes no bump at OUT from AI.
OUT_SCALE	12	28	Record	DS-36	D	11	SRW	100.0;0.0; 1342;0	Output scaling of the block. 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.
LIN_TYPE	13	29	Simple	Unsigned8	D	1	SRW	0	Type of linearisation: 0: no linearization.

… 4 Block overview

… AI-General Description (Function Block) – Slot 1/2/3/4

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Default Value	Description
CHANNEL	14	30	Simple	Unsigned16	D	2	SRW	0	Reference to the active Transducer Block and the relative index of the transducer block parameter which will be processed in the AI block. The value of channel following: Qv=0x0208, Temp=0x0212, pQV=0x020A, Qm=0x020E, Qn=0x020B, pQn=0x020D,Power=0x0210 AO: T_AO_IN=0x0214, SEC_T_AO_IN=0x0215, Gage=0x0216, Abs=0x0217, Gas=0x0219, Density=0x021B
NULL_PARAM	15								
PV_FTIME	16	32	Simple	Floating_ Point	D	4	SRW	0	Filter time of the Process Variable.
FSAFE_TYPE	17	33	Simple	Unsigned8	D	2	SRW	1	Determines the behavior values are incorrect: 0: FSAVE_VALUE is valid instead of OUT, Status is Uncertain_Substitute Value 1: Last value of OUT remains valid, Status is Uncertain_LastUsableValue 2: The incorrect value is transferred as OUT, Status is Bad.
FSAFE_VALUE	18	34	Simple	Floating_ Point	D	4	SRW	0	This value is transferred as OUT if the channel provides incorrect values and FSAVE_TYPE is 0.
ALARM_HYS	19	35	Simple	Floating_ Point	D	4	SRW	0,5	Hysteresis for all the alarm limits and warning limits.
NULL_PARAM	20								
HI_HI_LIM	21	37	Simple	Floating_ Point	D	4	SRW	100000	State of the upper limit of alarms.
NULL_PARAM	22								
HI_LIM	23	39	Simple	Floating_ Point	D	4	SRW	90000	Value for upper limit of warnings in physical units like OUT.
NULL_PARAM	24								
LO_LIM	25	41	Simple	Floating_ Point	D	4	SRW	90000	Value for lower limit of warnings in physical units like OUT.
NULL_PARAM	26								
LO_LO_LIM	27	43	Simple	Floating_ Point	D	4	SRW	-100000	Value for the lower limit of alarms in physical units like OUT.
NULL_PARAM	28								
NULL_PARAM	29								
HI_HI_ALM	30	46	Record	DS-39	D	16	DR	0;0;0,0;0;0.0	State of the upper limit of alarms.
HI_ALM	31	47	Record	DS-39	D	16	DR	0;0;0,0;0;0.0	State of the upper limit of warnings.
LO_ALM	32	48	Record	DS-39	D	16	DR	0;0;0,0;0;0.0	State of the lower limit of warnings.
LO_LO_ALM	33	49	Record	DS-39	D	16	DR	0;0;0,0;0;0.0	State of the lower limit of alarms.

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Default Value	Description
SIMULATE	34	50	Record	DS-50	S	6	SRW	0;0.0;0	For commissioning and test purposes the input value from the Transducer Block in the Analog Input Function Block AI-FB can be simulated. That means that the Transducer and AI-FB will be disconnected.
OUT_UNIT_TEXT	35	51	Simple	OCTET_ String	S	16	SRW	""	If a specific unit of OUT parameter is not in the code list (see General Requirement) the user has the possibility to write the specific text in this parameter. The unit code is then equal “textual unit definition”.
NULL_PARAM	36								

… 4 Block overview

TOT-General Description (Function Block) – Slot 9/10/11

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Default Value	Description
BLOCK_OBJECT	0	16	Record	DS-32	Cst	20	R	-	This structure contains general information about the block like block type, profile version, etc.
ST_REV	1	17	Simple	Unsigned16	N	2	SR	0	Revision counter for static variables. If a variable changes, the revision counter is incremented each time by one.
TAG_DESC	2	18	Simple	OctetString	S	32	SRW	""	A textual description of the block. This has to be unique within a fieldbus.
STRATEGY	3	19	Simple	Unsigned16	S	2	SRW	0	This parameter can be used to build groups of blocks. Each block of a group gets the same reference number.
ALERT_KEY	4	20	Simple	Unsigned8	S	1	SRW	0	This parameter is used as identification number for a part of a plant.
TARGET_MODE	5	21	Simple	Unsigned8	S	1	SRW	-	The desired operating mode of the block: 0x08: Auto 0x10: Man 0x80: Out Of Service
MODE_BLK	6	22	Record	DS-37	D	3	DR	8; 8; 8	This parameter includes the actual valid and normal operating modes of the block.
ALARM_SUM	7	23	Record	DS-42	D	8	DR	0; 0; 0; 0	This parameter includes a summary of the block alarms.
BATCH	8	24	Record	DS-67	S	10	SRW	0;0;0;0	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.
NULL_PARAM	9	25							
TOTAL	10	26	Record	DS-101	N	5	NRWO	0.0;0x4F	The function block parameter TOTAL contains the integrated quantity of the value refernced by the CHANNEL and the associated status.
UNIT_TOT	11	27	Simple	Unsigned16	S	2	SRW	0	Unit of TOTAL.
CHANNEL	12	28	Simple	Unsigned16	S	2	SRW	0	Function block. 1. Note: The channel can only be changed in mode man or out of Service. While writing to the channel parameter Automatically the physical unit of the value the channel is Related to isentered into unit_tot. This is the the unit for mass flow (kg/h) or volume flow (m3/h) 2. The value of channel: Qv=0x0208, pqv=0x020a, qm=0x020e, qn=0x020b, Pqn=0x020d, power=0x0210
SET_TOT	13	29	Simple	Unsigned8	N	1	NRWI	0	Reset of the internal value of the FB algorithm to 0 or set this value to PRESET_TOT. The function block parameter SET_TOT affects the current totalized value (TOTAL) immediately. This function is level sensitive. The following selections of this function block parameter are possible: 0: TOTALIZE; „normal“ operation of the totalizer 1: RESET; resets the TOTAL value to 0 2: PRESET; resets the TOTAL value to the value Of RESET_TO

Parameter Name	Rel. Idx	SlotObj. Idx	Type	Data Type	Store	Bytes	Access	Default Value	Description
MODE_TOT	14	30	Simple	Unsigned8	N	1	NRWI	0	This function block parameter governs the behavior of the totalization. The following selections are possible: 0: BALANCED; true arithmetic integration of the incoming rate values. 1: POS_ONLY; totalization of positive incoming rate values only. 2: NEG_ONLY; totalization of negative incoming rate values only. 3: HOLD; totalization stopped.
FAIL_TOT	15	31	Simple	Unsigned8	S	1	SRW	0	Fail-safe mode of the totalizer function block. This parameter governs the behavior of the function block during the occurrence of input values with bad status. The following selections are possible: 0: RUN ; totalization is continued using the input values despite the bad status. The status is ignored. 1: HOLD; totalization is stopped during occurrence of bad status of incoming values. 2: MEMORY; totalization is continued based on the last incoming value with good status before the first occurrence of bad status.
PRESET_TOT	16	32	Simple	Floating_ Point	S	4	SRW	0	
ALARM_HYS	17	33	Simple	Floating_ Point	S	4	SRW	0	Hysteresis Within the scope of the PROFIBUS-PA specification for transmitters there are functions for the monitoring of limit violation (off-limit conditions) of adjustable limits. Maybe the value of one process variable is just the same as the value of a limit and the variable fluctuates around the limit it will occur a lot of limit violations. That triggers a lot of messages; so it must be possible to trigger messages only after crossing an adjustable hysteresis. The sensitivity of triggering of the alarm messages is adjustable. The value of the hysteresis is fixed in ALARM_HYS and is the same for the 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.
HI_HI_LIM	18	34	Simple	Floating_ Point	S	4	SRW	FLT_MAX	Value for upper limit of alarms. Upper limit value for alarms with engineering unit of the OUT parameter. If the measured variable is equal or higher than the upper limit value the State Bits in the State Byte of OUT and in the FB parameter ALARM_SUM have to change to 1. The unit of this parameter is the same like the OUT one.

… 4 Block overview

… TOT-General Description (Function Block) – Slot 9/10/11

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Default Value	Description
HI_LIM	19	35	Simple	Floating_ Point	S	4	SRW	FLT_MAX	Value for upper limit of warnings. Upper limit value for warnings with engineering unit of the OUT parameter. If the measured variable is equal or higher than the upper limit value, the State Bits in the State Byte of OUT and in the FB parameter ALARM_SUM have to change to 1. The unit of this parameter is the same like the OUT one.
LO_LIM	20	36	Simple	Floating_ Point	S	4	SRW	FLT_MAX	Value for lower limit of warnings. Lower limit value for warnings with engineering unit of the OUT parameter. If the measured variable is equal to or lower than the lower limit value, the State Bits in the State Byte of OUT and in the FB parameter ALARM_SUM have to change to 1. The unit of this parameter is the same like the OUT one.
LO_LO_LIM	21	37	Simple	Floating_ Point	S	4	SRW	FLT_MAX	Value for the lower limit of alarms. Lower limit value for alarms with engineering unit of the OUT parameter. If the measured variable is equal to or lower than the lower limit value, the State Bits in the State Byte of OUT and in the FB parameter ALARM_SUM have to change to 1. The unit of this parameter is the same like the OUT one.
HI_HI_ALM	22	38	Record	DS-39	D	12	DR	0;0;0,0;0;0.0	State of the upper limit of alarms. This parameter contains the state of the upper limit of an alarm and the relating time stamp. The time stamp expresses the time the measured variable has been equal or higher than the upper limit of the alarm. Devices without clock use the beginning of the PROFIBUS-PA time (1st January 1984) as time stamp.
HI_ALM	23	39	Record	DS-39	D	12	DR	0;0;0,0;0;0.0	State of the upper limit of warnings. This parameter contains the state of the upper limit of a warning and the relating time stamp. The time stamp expresses the time the measured variable has been equal or higher than the upper limit of the warning. Devices without clock use the beginning of the PROFIBUS-PA time (1st January 1984) as time stamp.
LO_ALM	24	40	Record	DS-39	D	12	DR	0;0;0,0;0;0.0	State of the lower limit of warnings. This parameter contains the state of the lower limit of a warning and the relating time stamp. The time stamp expresses the time at which the measured variable has been equal to or higher than the lower limit of the warning. Devices without clock use the beginning of the PROFIBUS-PA time (1st January 1984) as time stamp.
LO_LO_ALM	25	41	Record	DS-39	D	12	DR	0;0;0,0;0;0.0	State of the lower limit of alarms. This parameter contains the state of the lower limit of an alarm and the relating time stamp. The time stamp expresses the time at which the measured variable has been equal to or higher than the lower limit of the alarm. Devices without clock use the beginning of the PROFIBUS-PA time (1st January 1984) as time stamp.

AO-General Description (Function Block) – Slot 5/6/7

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Default Value	Description
BLOCK_OBJECT	0	16	Record	DS-32	Cst	20	R	-	This structure contains general information about the block like block type, profile version, etc.
ST_REV	1	17	Simple	Unsigned16	N	2	NR	0	Revision counter for static variables. If a variable changes, the revision counter is incremented each time by one.
TAG_DESC	2	18	Simple	OctetString	S	32	SRW	""	A textual description of the block. This has to be unique within a fieldbus.
STRATEGY	3	19	Simple	Unsigned16	S	2	SRW	0	This parameter can be used to build groups of blocks. Each block of a group gets the same reference number.
ALERT_KEY	4	20	Simple	Unsigned8	S	1	SRW	0	This parameter is used as identification number for a part of a plant.
TARGET_MODE	5	21	Simple	Unsigned8	S	1	SRW	-	The desired operating mode of the block: 0x08: Auto 0x10: Man 0x80: Out Of Service
MODE_BLK	6	22	Record	DS-37	D	3	DR	8; 8; 8	This parameter includes the actual valid and normal operating modes of the block.
ALARM_SUM	7	23	Record	DS-42	D	8	DR	0; 0; 0; 0	This parameter includes a summary of the block alarms.
BATCH	8	24	Record	DS-67	S	10	SRW	0;0;0;0	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.
SP	9	25	Record	DS-101	D	5	DRWI	0.0;24	Set point. Defines the position of the final control element within the travel span (between OPEN and CLOSE position) in units of PV_SCALE in mode AUTO.
NULL_PARAM	10	26							
PV_SCALE	11	27	Record	DS-36	S	11	SRW	100.0;0.0;1342;0	Conversion of the PV in engineering units to PV in percent as the input value of the Function Block. It consists of the high and low scale values, engineering unit code, and number of digits to the right of the decimal point.
READBACK	12	28	Record	DS-101	D	5	DRO	0.0;0	The actual position of the final control element within the travel span (between OPEN and CLOSE position) in units of PV_SCALE.
NULL_PARAM	13	29							
RCAS_IN	14	30	Record	DS-101	D	5	DRWI	0.0;24	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.
NULL_PARAM	15	31							
NULL_PARAM	16	32							
NULL_PARAM	17	33							
NULL_PARAM	18	34							
NULL_PARAM	19	35							
NULL_PARAM	20	36							

… 4 Block overview

… AO-General Description (Function Block) – Slot 5/6/7

Parameter Name	Rel. Idx	SlotObj. Idx	Type	Data Type	Store	Bytes	Access	Default Value	Description
IN_CHANNEL	21	37	Simple	Unsigned16	S	2	SRW	0	Reference to the active Transducer Block and its parameter that provides the actual position of the final control element.
OUT_CHANNEL	22	38	Simple	Unsigned16	S	2	SRW	0	Reference to the active Transducer Block and its parameter that provides the position value for the final control element.
FSAVE_TIME	23	39	Simple	Floating-Point	S	4	SRW	0	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.
FSAVE_TYPE	24	40	Simple	Unsigned8	S	1	SRW	2	Defines 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.
FSAVE_VALUE	25	41	Simple	Floating-Point	S	4	SRW	0	Set point used if FSAFE_TYPE = 1 and FSAFE is activated.
NULL_PARAM	26	42							
RCAS_OUT	27	43	Record	DS-101	D	5	DRO	0.0;0	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.
NULL_PARAM	28	44							
NULL_PARAM	29	45							
NULL_PARAM	30	46							
POS_D	31	47	Record	DS-102	D	2	DRO	0;0	The current position of the valve (discrete). Value: 0: not initialized 1: closed 2: opened 3: intermediate
SETP_DEVIATION	32	48	Simple	Floating-Point	D	4	DR	0;0	Difference between OUT signal and feedback position in % travel span (between OPEN and CLOSE position).
CHECK_BACK	33	49	Simple	OctetString	D	3	DRO	0;0;0	
CHECK_BACK_MASK	34	50	Simple	OctetString	R	3	R	1,72,0	
SIMULATE	35	51	Record	DS-50	S	6	SRW	0;0.0;0	For commissioning and maintenance reasons, it is possible to simulate the READBACK by defining the value and the status. That means that the signal path from the Transducer Block to the AO FB will be disconnected.
INCREASE_CLOSE	36	52	Simple	Unsigned8	S	1	SRW	0	Defines actuator movement relative to the set point in mode RCAS and AUTO. Value: 0: rising (increasing of set point results in OPENING of the valve) 1: falling (increasing of set point results in CLOSING of the valve) The following parameters are influenced by the setting of INCREASE_CLOSE: READBACK, POS_D, OUT and CHECKBACK.

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Default Value	Description
OUT	37	53	Record	DS-101	D	5	DRW	0.0;0	This parameter is 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.
OUT_SCALE	38	54	Record	DS-36	S	11	SRW	100.0;0.0; 1342;0	Conversion of the OUT of the Function Block in percent to OUT in engineering units as the output value of the Function Block. The high and low scale values,engineering unit code, and the number of digits to the right of the decimal point.
NULL_PARAM	39	55							
NULL_PARAM	40	56							

… 4 Block overview

DI-General Description (Function Block) – Slot 8

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Default Value	Description
BLOCK_OBJECT	0	16	Record	DS-32	Cst	20	R	-	This structure contains general information about the block like block type, profile version, etc.
ST_REV	1	17	Simple	Unsigned16	N	2	NR	0	Revision counter for static variables. If a variable changes, the revision counter is incremented each time by one.
TAG_DESC	2	18	Simple	OctetString	S	32	SRW	""	A textual description of the block. This has to be unique within a fieldbus.
STRATEGY	3	19	Simple	Unsigned16	S	2	SRW	0	This parameter can be used to build groups of blocks. Each block of a group gets the same reference number.
ALERT_KEY	4	20	Simple	Unsigned8	S	1	SRW	0	This parameter is used as identification number for a part of a plant.
TARGET_MODE	5	21	Simple	Unsigned8	S	1	SRW	-	The desired operating mode of the block: 0x08: Auto 0x10: Man 0x80: Out Of Service
MODE_BLK	6	22	Record	DS-37	D	3	DR	8; 8; 8	This parameter includes the actual valid and normal operating modes of the block.
ALARM_SUM	7	23	Record	DS-42	D	8	DR	0; 0; 0; 0	This parameter includes a summary of the block alarms.
BATCH	8	24	Record	DS-67	D	10	SRW	0;0;0;0	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.
NULL_PARAM	9	25							
OUT	10	26	Record	DS-102	D	2	DRWO	0;0x4F	OUT is the output of the Function Block. The value is specified by the operator in MODE Man.
CHANNEL	14	30	Simple	Unsigned16	S	2	SRW	0	Reference to the active Transducer Block which provides the measurement value to the Function Block. The value of Channel: DI_LOW_CUT_OFF=0x021d, DI_SWITCH_OUT=0x021e
INVERT	15	31	Simple	Unsigned8	S	1	SRW	0	Indicates whether the input value of the PV_D should be logically inverted before it is stored in the OUT. Value: 0: not inverted 1: inverted

Parameter Name	Rel. Idx	Slot Idx	Obj. Type	Data Type	Store	Bytes	Access	Default Value	Description
FSAVE_TYPE	20	36	Simple	Unsigned8	S	1	SRW	1	Defines reaction of the device, if a fault is detected. Value: 0: value FSAFE_VAL_D is used as OUT, Status = UNCERTAIN-substitute value 1: use of last stored valid OUT value, Status = UNCERTAIN-last usable value(if no valid value is available UNCERTAIN-Initial Value shall be used) 2: OUT has the wrong calculated value and status Status = BAD
FSAVE_VAL_D	21	37	Simple	Unsigned8	S	1	SRW	0	Default value for the OUT parameter, if a sensor or sensor electronic fault is detected.
SIMULATE	24	40	Record	DS-51	S	3	SRW	0;0;0	For commissioning and test purposes the input value from the Transducer Block in the Discrete Input Function Block DI-FB can be modified. That means that the Transducer and DI-FB will be disconnected.

… 4 Block overview

Function Blocks Details including channel relations

Slot Nr.	Function Block Description	Execute time [ms]	Channel Selection / Relation to Tranducer				
			TB Slot Nr.	TB Descrption	Parameter Name	Rel. Idx	Default
1	Analog Input	20	13 (TB1)	PCB	QV	8	x
			13 (TB1)	PCB	TEMPERATURE	20	
2	Analog Input	20	13(TB1)	PCB	PARTIAL_QV	10	x
			13(TB1)	PCB	QM	16	
			13(TB1)	PCB	TEMPERATURE	20	
3	Analog Input	20	13(TB1)	PCB	QN	12	x
			13(TB1)	PCB	TEMPERATURE	20	
4	Analog Input	20	13(TB1)	PCB	PARTIAL_QN	14	x
			13(TB1)	PCB	TEMPERATURE	20	
			13(TB1)	PCB	POWER	18	
5	Analog Output	20	13(TB1)	PCB	INLET_TEMPERATURE	22	x
6	Analog Output	20	13(TB1)	PCB	GAS_CONTENT	30	x
			13(TB1)	PCB	OUTLET_TEMPERATURE	24	
7	Analog Output	20	13(TB1)	PCB	GAGE_PRESSURE	26	x
			13(TB1)	PCB	ABS_PRESSURE	27	
			13(TB1)	PCB	DENSITY	32	
8	Discrete Input	20	13(TB1)	PCB	DI_LOW_CUT_OFF	34	
			13(TB1)	PCB	DI_SWITCH_OUT	35	x
9	Totalizer	20	13(TB1)	PCB	QV	8	x
			13(TB1)	PCB	PARTIAL_QV	10	
			13(TB1)	PCB	QM	16	
10	Totalizer	20	13(TB1)	PCB	QN	12	x
			13(TB1)	PCB	QV	8	
11	Totalizer	20	13(TB1)	PCB	QV	8	
			13(TB1)	PCB	PARTIAL_QN	14	
			13(TB1)	PCB	POWER	18	x

5 Diagnosis / error messages

Coding of the Physical Block Parameter DIAGNOSIS

Classic / Extended Status

Octet	Bit	Unit_Diag_Bit (GSD)	DIAGNOSIS Mnemonic	Description	Diagnosis Mask (x = enabled)
0	0	24	DIA_HW_ELECTR	Hardware failure of the electronic	
	1	25	DIA_HW_MECH	Hardware failure mechanics	
	2	26	DIA_TEMP_MOTOR	Motor- temperature too high	
	3	27	DIA_TEMP_ELECTR	Electronic temperature too high	
	4	28	DIA_MEM_CHKSUM	Memory error	x
	5	29	DIA_MEASUREMENT	Failure in measurement	x
	6	30	DIA_NOT_INIT	Device not initialized (No self-calibration)	x
	7	31	DIA_INIT_ERR	Self calibration failed	
1	0	32	DIA_ZERO_ERR	Zero point error (limit position)	
	1	33	DIA_SUPPLY	Power supply failed (electrical, pneumatic)	
	2	34	DIA_CONF_INVAL	Configuration not valid	
	3	35	DIA_WARMSTART	New-start-up (warmstart up) carried out.	
	4	36	DIA_COLDSTART	Re-start-up (coldstart up) carried out.	
	5	37	DIA_MAINTAINANCE	Maintenance required	x
	6	38	DIA_CHARACT	Characterization invalid	
	7	39	IDENT_NUMBER_VIOLATION	Set to 1(one), if the Ident_number of the running cyclic data transfer and the value of Physical Block IDENT_NUMBER_SELECTOR parameter are different.	x
2	0 to 7	40 to 47	reserved	Reserved	
3	0 to 6	48 to 54	reserved	Reserved	
3	7	55	EXTENSION_AVAILABLE	0: There is no more information available 1: More diagnosis information is available in DIAGNOSIS_EXTENSION	x

… 5 Diagnosis / error messages

… Coding of the Physical Block Parameter DIAGNOSIS

Condensed Status

Octet	Bit	Unit_Diag_Bit (GSD)	DIAGNOSIS Mnemonic	Description	Diagnosis Mask (x = enabled)
0	0 to 7	24 to 31		reserved by PNO, fixed to 0	
1	0 to 2	32 to 34		reserved by PNO, fixed to 0	
	3	35	DIA_WARMSTART		x
	4	36	DIA_COLDSTART		x
	5	37	DIA_MAINTAINANCE	Maintenance required	x
	6	38		reserved by PNO, fixed to 0	
	7	39	IDENT_NUMBER_VIOLATION		x
2	0	40	DIA_MAINTENANCE_ALARM	Failure of the device or armature	
	1	41	DIA_MAINTENANCE_DEMANDED	Maintenance demanded	
	2	42	DIA_FUNCTION_CHECK	Device is in function check mode or in simulation or under local control e.g. maintenance	x
	3	43	DIA_INV_PRO_COND	The process conditions don't allow to return valid values. (Set if a value has the quality Uncertain – Process related, no maintenance or Bad - Process related, no maintenance	
	4 to 7	44 to 47	reserved	reserved by PNO, fixed to 0	
3	0 to 6	48 to 54	reserved	reserved by PNO, fixed to 0	
3	7	55	EXTENSION_AVAILABLE	0: There is no more information available 1: More diagnosis information is available in DIAGNOSIS_EXTENSION	x

Coding of the Physical Block Parameter DIAGNOSIS_EXTENSION

Octet	Bit	Unit_Diag_Bit (GSD)	DIAGNOSIS Mnemonic	Description	Diagnosis MASK_EXTENSION
0	0	56	FE_BOARD_COMM_ERROR	FE board Communication Error	0xFF
	1	57	FE_SYNC_MISSING	FE board Synchronization missing Error	
	2	58	VORTEX_SENSOR_FAILURE	Vortex Sensor Failure	
	3	59	TEMP_SENSOR_FAILURE	Temperature Sensor Failure	
	4	60	VIBRAT_SENSOR_FAILURE	Vibration Sensor Failure	
	5	61	SNR_FAILURE	SNR Failure	
	6	62	FE_NV_FAILURE	FE NV Failure	
	7	63	CB_NV_FAILURE	CB NV Failure	
1	0	64	MAPPER_ALM_NO_AO_IN	Mapper Alarm No AO Input	0xFF
	1	65	DIAG_SIMU_ALARM	Diagnositics Simulation Alarm	
	2	66	DATA_SIMU_ALARM	Data Simulation Alarm	
	3	67	FLOWRATE_REACH_QMAX	Volume Flowrate reach max value	
	4	68	FLOWRATE_REACH_QMIN	Volume Flowrate reach min value	
	5	69	PROCESS_TEMP_REACH_TMAX	Process Temperature reach max value	
	6	70	PROCESS_TEMP_REACH_TMIN	Process Temperature reach min value	
	7	71	LOW_FLOWRATE_CUTOFF	Low Flowrate Cutoff	
2	0	72	RE_OUT_LINEAR_RANGE	RE out of Linear range	0xFF
	1	73	DIGITAL_OUT_CUTOFF	Digital Output Cutoff	
	2	74	NV_REPLACE_WARN	NV Replace Warning	
	3	75	MAINTENANCE_WARNING	Maintenance Warning	
	4	76	SENSOR_CAL_STATUS	Sensor Calibration Status	
	5	77	STEAM TYPE MISMATCH	Steam Type Mismatch	
	6	78	RESERVED		
	7	79	RESERVED		
3	0 to 7	80 to 87	RESERVED		
4	0 to 7	88 to 95	RESERVED		
5	0 to 7	96 to 103	RESERVED		

… 5 Diagnosis / error messages

Detailed coding of the Physical Block Parameter DIAGNOSIS_EXTENSION

Bit settings in PB-DIAGNOSIS

Bit depends on Condensed or Classic / Extended Status

Octet	Bit	Unit_Diag_Bit (GSD)	Alarm Mapping	NAMUR Class	Priority	ID	Bit settings in PB-DIAGNOSIS
0	0	56	FE_BOARD_COMM_ERROR	FAILURE	215	0	EXTENSION_AVAILABLE
	1	57	FE_SYNC_MISSING	FAILURE	214	1	EXTENSION_AVAILABLE; DIA_MEASUREMENT
	2	58	VORTEX_SENSOR_FAILURE	FAILURE	213	2	EXTENSION_AVAILABLE; DIA_MEASUREMENT
	3	59	TEMP_SENSOR_FAILURE	FAILURE	212	3	EXTENSION_AVAILABLE; DIA_MEASUREMENT
	4	60	VIBRAT_SENSOR_FAILURE	FAILURE	211	4	EXTENSION_AVAILABLE; DIA_MEASUREMENT
	5	61	SNR_FAILURE	FAILURE	210	5	EXTENSION_AVAILABLE; DIA_MEASUREMENT
	6	62	FE_NV_FAILURE	FAILURE	209	6	EXTENSION_AVAILABLE; DIA_MEM_CHKSUM
	7	63	CB_NV_FAILURE	FAILURE	207	7	EXTENSION_AVAILABLE; DIA_MEM_CHKSUM
1	0	64	MAPPER_ALM_NO_AO_IN	CHECK_FUNCTION	153	8	EXTENSION_AVAILABLE; DIA_FUNCTION_CHECK
	1	65	DIAG_SIMU_ALARM	CHECK_FUNCTION	152	9	EXTENSION_AVAILABLE; DIA_FUNCTION_CHECK
	2	66	DATA_SIMU_ALARM	CHECK_FUNCTION	151	10	EXTENSION_AVAILABLE; DIA_FUNCTION_CHECK
	3	67	FLOWRATE_REACH_QMAX	OFF_SPECIFICATION	114	11	EXTENSION_AVAILABLE
	4	68	FLOWRATE_REACH_QMIN	OFF_SPECIFICATION	113	12	EXTENSION_AVAILABLE
	5	69	PROCESS_TEMP_REACH_TMAX	OFF_SPECIFICATION	112	13	EXTENSION_AVAILABLE
	6	70	PROCESS_TEMP_REACH_TMIN	OFF_SPECIFICATION	111	14	EXTENSION_AVAILABLE
	7	71	LOW_FLOWRATE_CUTOFF	OFF_SPECIFICATION	110	15	EXTENSION_AVAILABLE
2	0	72	RE_OUT_LINEAR_RANGE	OFF_SPECIFICATION	109	16	EXTENSION_AVAILABLE
	1	73	DIGITAL_OUT_CUTOFF	OFF_SPECIFICATION	103	17	EXTENSION_AVAILABLE
	2	74	NV_REPLACE_WARN	MAINTENANCE	54	18	EXTENSION_AVAILABLE; DIA_MAINTENANCE
	3	75	MAINTENANCE_WARNING	MAINTENANCE	53	19	EXTENSION_AVAILABLE; DIA_MAINTENANCE
	4	76	SENSOR_CAL_STATUS	MAINTENANCE	52	20	EXTENSION_AVAILABLE; DIA_MAINTENANCE
	5	77	STEAM TYPE MISMATCH	OFF_SPECIFICATION	116	21	EXTENSION_AVAILABLE
	6	78	RESERVED			22	
	7	79	RESERVED			23	
3	0 to 7	80 to 87	RESERVED			24	
4	0 to 7	88 to 95	RESERVED			32	
5	0 to 7	96 to 103	RESERVED			40	

Meaning of status codes (condensed status)

For more details regarding Condensed Status see PA Profile 3.02

Name	Value	Meaning NE 107
BAD-maintance Alarm	00 1001 00 => 0x24	Failure(F)
BAD-function check	00 1111 00 => 0x3C	Check(C)
UNCERTAIN-process related	01 1111 00 => 0x78	Out of Specification(S)
GOOD-maintance required	10 1001 00 => 0xA4	Maintenance(M)
GOOD	10 0000 00 => 0x80	Good(G)
GOOD-update event	10 0001 00 => 0x84	—
GOOD-advisory alarm,low limit	10 0010 01 => 0x89	—
GOOD-advisory alarm,high limit	10 0010 10 => 0x8A	—
GOOD-critical alarm,low limit	10 0011 01 => 0x8D	—
GOOD-critical alarm,high limit	10 0011 10 => 0x8E	—

Meaning of Status Codes (Classic / Extended Status)

For more details regarding Classic / Extended Status see PA. Profile 3.02 (chapter 2.3.1)

Value		Quality - Bits		Quality Substatus - Bits				Limit - Bits		Quality Substatus
Hex	Dec.	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	
		Quality: BAD								SQ_BAD (0 * 0x40)
0x00	0	0	0	0	0	0	0			non specific
0x04	4	0	0	0	0	0	1			configuration error
0x08	8	0	0	0	0	1	0			not connected
0x0C	12	0	0	0	0	1	1			device failure
0x10	16	0	0	0	1	0	0			sensor failure
0x14	20	0	0	0	1	0	1			no communication (last usable value)
0x18	24	0	0	0	1	1	0			no communication (no usable value)
0x1C	28	0	0	0	1	1	1			out of service
		Quality: UNCERTAIN								SQ_UNCERTAIN (1 * 0x40)
0x40	64	0	1	0	0	0	0			non specific
0x44	68	0	1	0	0	0	1			last usable value (LUV)
0x48	72	0	1	0	0	1	0			substitute value
0x4C	76	0	1	0	0	1	1			initial value
0x50	80	0	1	0	1	0	0			sensor conversion not accurate
0x54	84	0	1	0	1	0	1			engineering unit violation
0x58	88	0	1	0	1	1	0			sub normal
0x5C	92	0	1	0	1	1	1			configuration error
0x60	96	0	1	1	0	0	0			simulated value
0x64	100	0	1	1	0	0	1			sensor calibration

… 5 Diagnosis / error messages

… Detailed coding of the Physical Block Parameter DIAGNOSIS_EXTENSION

Value		Quality - Bits		Quality Substatus - Bits				Limit - Bits		Quality Substatus
Hex	Dec.	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	
		Quality: GOOD (Non Cascade)								SQ_GOOD_NC (2 * 0x40)
0x80	128	1	0	0	0	0	0			ok
0x84	132	1	0	0	0	0	1			update event
0x88	136	1	0	0	0	1	0			active advisory alarm
0x8C	140	1	0	0	0	1	1			active critical alarm
0x90	144	1	0	0	1	0	0			unacknowledged update event
0x94	148	1	0	0	1	0	1			unacknowledged advisory alarm
0x98	152	1	0	0	1	1	0			unacknowledged critical alarm
0xA0	160	1	0	1	0	0	0			initiate fail safe
0xA4	164	1	0	1	0	0	1			maintenance required
		Quality: GOOD (Cascade)								SQ_GOOD_CAS (3 * 0x40)
0xC0	192	1	1	0	0	0	0			ok
0xC4	196	1	1	0	0	0	1			initialisation acknowlegded
0xC8	200	1	1	0	0	1	0			initialisation request
0xCC	204	1	1	0	0	1	1			not invited
0xD0	208	1	1	0	1	0	0			reserved
0xD4	212	1	1	0	1	0	1			do not select
0XD8	216	1	1	0	1	1	0			local override
0xDC	220	1	1	0	1	1	1			reserved
0xE0	224	1	1	1	0	0	0			initiate fail safe
								0	0	ok
								0	1	low limited - LIMIT_LOW_LIM (1 * 0x01)
								1	0	high limited - LIMIT_HIGH_LIM (2 * 0x01)
								1	1	constant - LIMIT_CONST (3 * 0x01)

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Condensed or Classic / Extended Status

Octet	Bit	Unit_Diag_Bit (GSD)	Alarm Mapping	NAMUR Class	Priority	ID	Condensed Status	Classic / Extended Status
0	0	56	FE_BOARD_COMM_ERROR	FAILURE	215	0	Maintenance alarm, more diagnosis available (0x24)	Bad-device failure (0x0c)
	1	57	FE_SYNC_MISSING	FAILURE	214	1	Maintenance alarm, more diagnosis available (0x24)	Bad-device failure (0x0c)
	2	58	VORTEX_SENSOR_FAILURE	FAILURE	213	2	Maintenance alarm, more diagnosis available (0x24)	Bad-sensor failure(0x10)
	3	59	TEMP_SENSOR_FAILURE	FAILURE	212	3	Good – maintenance demanded(0xa8)	Good – maintenance required(0xa4)
	4	60	VIBRAT_SENSOR_FAILURE	FAILURE	211	4	Maintenance alarm, more diagnosis available (0x24)	Uncertain-sensor conversion not accurate (0x50)
	5	61	SNR_FAILURE	FAILURE	210	5	Maintenance alarm, more diagnosis available (0x24)	Uncertain-sensor conversion not accurate (0x50)
	6	62	FE_NV_FAILURE	FAILURE	209	6	Maintenance alarm, more diagnosis available (0x24)	Bad-device failure (0x0c)
	7	63	CB_NV_FAILURE	FAILURE	207	7	Maintenance alarm, more diagnosis available (0x24)	Bad-device failure (0x0c)
1	0	64	MAPPER_ALM_NO_AO_IN	CHECK_FUNCTION	153	8	GOOD – maintenance required (0xa4)	Uncertain-configuration error (0x5c)
	1	65	DIAG_SIMU_ALARM	CHECK_FUNCTION	152	9	Uncertain-No maintenance (0x78)	Uncertain-simulated value(0x60)
	2	66	DATA_SIMU_ALARM	CHECK_FUNCTION	151	10	Uncertain-No maintenance (0x78)	Uncertain-simulated value(0x60)
	3	67	FLOWRATE_REACH_QMAX	OFF_SPECIFICATION	114	11	Good-high limit (0x82)	Good-active advisory alarm ,high limit(0x8a)
	4	68	FLOWRATE_REACH_QMIN	OFF_SPECIFICATION	113	12	Good-low limit (0x81)	Good-active advisory alarm ,low limit(0x89)
	5	69	PROCESS_TEMP_REACH_TMAX	OFF_SPECIFICATION	112	13	Good – maintenance demanded (0xa8)	Good-active advisory alarm (0x88)
	6	70	PROCESS_TEMP_REACH_TMIN	OFF_SPECIFICATION	111	14	Good – maintenance demanded (0xa8)	Good-active advisory alarm (0x88)
	7	71	LOW_FLOWRATE_CUTOFF	OFF_SPECIFICATION	110	15	Uncertain-No maintenance (0x78)	Uncertain-Low limit (0x41)

… 5 Diagnosis / error messages

… Detailed coding of the Physical Block Parameter DIAGNOSIS_EXTENSION

Octet	Bit	Unit_Diag_Bit (GSD)	Alarm Mapping	NAMUR Class	Priority	ID	Condensed Status	Classic / Extended Status
2	0	72	RE_OUT_LINEAR_RANGE	OFF_SPECIFICATION	109	16	Uncertain-maintenance demanded (0x68)	Uncertain-configuration error (0x5c)
	1	73	DIGITAL_OUT_CUTOFF	OFF_SPECIFICATION	103	17	Good-Maintencance required (0xa4)	Good-maintenance required(0xa4)
	2	74	NV_REPLACE_WARN	MAINTENANCE	54	18	Good-Maintencance required (0xa4)	Good-maintenance required(0xa4)
	3	75	MAINTENANCE_WARNING	MAINTENANCE	53	19	Good-Maintencance required (0xa4)	Good-maintenance required(0xa4)
	4	76	SENSOR_CAL_STATUS	MAINTENANCE	52	20	Uncertain-maintenance demanded (0x68)	Uncertain-sensor calibration (0x64)
	5	77	STEAM TYPE MISMATCH	OFF_SPECIFICATION	116	21	Good-Maintenance required (0xA4)	Good-maintenance required (0xA4)
	6	78	RESERVED			22		
	7	79	RESERVED			23		
3	0 to 7	80 to 87	RESERVED			24		
4	0 to 7	88 to 95	RESERVED			32		
5	0 to 7	96 to 103	RESERVED			40		

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Condensed or Classic / Extended Status

Octet	Bit	Unit_Diag_Bit (GSD)	Alarm Mapping	NAMUR Class	Priority	ID	Condensed status	Classic / extended status
0	0	56	FE_BOARD_COMM_ERROR	FAILURE	215	0	Maintenance alarm, more diagnosis available (0x24)	Bad-device failure (0x0c)
	1	57	FE_SYNC_MISSING	FAILURE	214	1	Maintenance alarm, more diagnosis available (0x24)	Bad-device failure (0x0c)
	2	58	VORTEX_SENSOR_FAILURE	FAILURE	213	2	Maintenance alarm, more diagnosis available (0x24)	Bad-sensor failure (0x10)
	3	59	TEMP_SENSOR_FAILURE	FAILURE	212	3	Good – maintenance demanded (0xa8)	Good-maintenance required (0xa4)
	4	60	VIBRAT_SENSOR_FAILURE	FAILURE	211	4	Maintenance alarm, more diagnosis available (0x24)	Uncertain-sensor conversion not accurate (0x50)
	5	61	SNR_FAILURE	FAILURE	210	5	Maintenance alarm, more diagnosis available (0x24)	Uncertain-sensor conversion not accurate (0x50)
	6	62	FE_NV_FAILURE	FAILURE	209	6	Maintenance alarm, more diagnosis available (0x24)	Bad-device failure (0x0c)
	7	63	CB_NV_FAILURE	FAILURE	207	7	Maintenance alarm ,more diagnosis available (0x24)	Bad-device failure (0x0c)
1	0	64	MAPPER_ALM_NO_AO_IN	CHECK_FUNCTION	153	8	Uncertain – maintenance demanded (0x68)	Uncertain-configuration error (0x5c)
	1	65	DIAG_SIMU_ALARM	CHECK_FUNCTION	152	9	Uncertain-No maintenance (0x78)	Uncertain-simulated value (0x60)
	2	66	DATA_SIMU_ALARM	CHECK_FUNCTION	151	10	Uncertain-No maintenance (0x78)	Uncertain-simulated value (0x60)
	3	67	FLOWRATE_REACH_QMAX	OFF_SPECIFICATION	114	11	Good-high limit(0x82)	Good-active advisory alarm ,high limit (0x8a)
	4	68	FLOWRATE_REACH_QMIN	OFF_SPECIFICATION	113	12	Good-low limit (0x81)	Good-active advisory alarm ,low limit (0x89)
	5	69	PROCESS_TEMP_REACH_TMAX	OFF_SPECIFICATION	112	13	Good – maintenance demanded (0xa8)	Good-active advisory alarm (0x88)
	6	70	PROCESS_TEMP_REACH_TMIN	OFF_SPECIFICATION	111	14	Good – maintenance demanded (0xa8)	Good-active advisory alarm (0x88)
	7	71	LOW_FLOWRATE_CUTOFF	OFF_SPECIFICATION	110	15	Uncertain-No maintenance (0x78)	Uncertain-Low limit (0x41)

… 5 Diagnosis / error messages

… Detailed coding of the Physical Block Parameter DIAGNOSIS_EXTENSION

Octet	Bit	Unit_Diag_Bit (GSD)	Alarm Mapping	NAMUR Class	Priority	ID	Condensed Status	Classic / Extended Status
2	0	72	RE_OUT_LINEAR_RANGE	OFF_SPECIFICATION	109	16	Uncertain-maintenance demanded (0x68)	Uncertain-configuration error (0x5c)
	1	73	DIGITAL_OUT_CUTOFF	OFF_SPECIFICATION	103	17	Good-Maintenance required (0xa4)	Good-maintenance required (0xa4)
	2	74	NV_REPLACE_WARN	MAINTENANCE	54	18	Good-Maintenance required (0xa4)	Good-maintenance required (0xa4)
	3	75	MAINTENANCE_WARNING	MAINTENANCE	53	19	Good-Maintenance required (0xa4)	Good-maintenance required (0xa4)
	4	76	SENSOR_CAL_STATUS	MAINTENANCE	52	20	Uncertain-maintenance demanded (0x68)	Uncertain-sensor calibration (0x64)
	5	77	STEAM TYPE MISMATCH	OFF_SPECIFICATION	116	21	Uncertain-maintenance demanded (0x68)	Uncertain-configuration error (0x5c)
	6	78	RESERVED			22		
	7	79	RESERVED			23		
3	0 to 7	80 to 87	RESERVED			24		
4	0 to 7	88 to 95	RESERVED			32		
5	0 to 7	96 to 103	RESERVED			40		

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Condensed or Classic / Extended Status

Octet	Bit	Unit_Diag_Bit (GSD)	Alarm Mapping	NAMUR Class	Priority	ID	Condensed status	Classic / extended status
0	0	56	FE_BOARD_COMM_ERROR	FAILURE	215	0	Maintenance alarm, more diagnosis available (0x24)	Bad-device failure (0x0c)
	1	57	FE_SYNC_MISSING	FAILURE	214	1	Maintenance alarm, more diagnosis available (0x24)	Bad-device failure (0x0c)
	2	58	VORTEX_SENSOR_FAILURE	FAILURE	213	2	Maintenance alarm, more diagnosis available (0x24)	Bad-sensor failure(0x10)
	3	59	TEMP_SENSOR_FAILURE	FAILURE	212	3	Good – maintenance demanded(0xa8)	Good-maintenance required(0xa4)
	4	60	VIBRAT_SENSOR_FAILURE	FAILURE	211	4	Maintenance alarm, more diagnosis available (0x24)	Uncertain-sensor conversion not accurate (0x50)
	5	61	SNR_FAILURE	FAILURE	210	5	Maintenance alarm, more diagnosis available (0x24)	Uncertain-sensor conversion not accurate (0x50)
	6	62	FE_NV_FAILURE	FAILURE	209	6	Maintenance alarm, more diagnosis available (0x24)	Bad-device failure (0x0c)
	7	63	CB_NV_FAILURE	FAILURE	207	7	Maintenance alarm, more diagnosis available (0x24)	Bad-device failure (0x0c)
1	0	64	MAPPER_ALM_NO_AO_IN	CHECK_FUNCTION	153	8	UNCERTAIN – maintenance demanded(0x68)	Uncertain-configuration error (0x5c)
	1	65	DIAG_SIMU_ALARM	CHECK_FUNCTION	152	9	Uncertain-No maintenance(0x78)	Uncertain-simulated value(0x60)
	2	66	DATA_SIMU_ALARM	CHECK_FUNCTION	151	10	Uncertain-No maintenance(0x78)	Uncertain-simulated value(0x60)
	3	67	FLOWRATE_REACH_QMAX	OFF_SPECIFICATION	114	11	Good-high limit(0x82)	Good-active advisory alarm ,high limit(0x8a)
	4	68	FLOWRATE_REACH_QMIN	OFF_SPECIFICATION	113	12	Good-low limit(0x81)	Good-active advisory alarm ,low limit(0x89)
	5	69	PROCESS_TEMP_REACH_TMAX	OFF_SPECIFICATION	112	13	Good – maintenance demanded (0xa8)	Good-active advisory alarm (0x88)
	6	70	PROCESS_TEMP_REACH_TMIN	OFF_SPECIFICATION	111	14	Good – maintenance demanded (0xa8)	Good-active advisory alarm (0x88)
	7	71	LOW_FLOWRATE_CUTOFF	OFF_SPECIFICATION	110	15	Uncertain-No maintenance (0x78)	Uncertain-Low limit (0x41)

… 5 Diagnosis / error messages

… Detailed coding of the Physical Block Parameter DIAGNOSIS_EXTENSION

Octet	Bit	Unit_Diag_Bit (GSD)	Alarm Mapping	NAMUR Class	Priority	ID	Condensed Status	Classic / Extended Status
2	0	72	RE_OUT_LINEAR_RANGE	OFF_SPECIFICATION	109	16	Uncertain-maintenance demanded (0x68)	Uncertain-configuration error (0x5c)
	1	73	DIGITAL_OUT_CUTOFF	OFF_SPECIFICATION	103	17	Good-Maintenance required (0xa4)	Good-maintenance required (0xa4)
	2	74	NV_REPLACE_WARN	MAINTENANCE	54	18	Good-Maintenance required (0xa4)	Good-maintenance required (0xa4)
	3	75	MAINTENANCE_WARNING	MAINTENANCE	53	19	Good-Maintenance required (0xa4)	Good-maintenance required (0xa4)
	4	76	SENSOR_CAL_STATUS	MAINTENANCE	52	20	Uncertain-maintenance demanded (0x68)	Uncertain-sensor calibration (0x64)
	5	77	STEAM TYPE MISMATCH	OFF_SPECIFICATION	116	21	Uncertain-maintenance demanded (0x68)	Uncertain-configuration error (0x5c)
	6	78	RESERVED			22		
	7	79	RESERVED			23		
3	0 to 7	80 to 87	RESERVED			24		
4	0 to 7	88 to 95	RESERVED			32		
5	0 to 7	96 to 103	RESERVED			40		

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Condensed or Classic / Extended Status

Octet	Bit	Unit_Diag_Bit (GSD)	Alarm Mapping	NAMUR Class	Priority	ID	Condensed status	Classic / extended status
0	0	56	FE_BOARD_COMM_ERROR	FAILURE	215	0	Maintenance alarm, more diagnosis available (0x24)	Bad-device failure (0x0c)
	1	57	FE_SYNC_MISSING	FAILURE	214	1	Maintenance alarm, more diagnosis available (0x24)	Bad-device failure (0x0c)
	2	58	VORTEX_SENSOR_FAILURE	FAILURE	213	2	Maintenance alarm, more diagnosis available (0x24)	Bad-sensor failure(0x10)
	3	59	TEMP_SENSOR_FAILURE	FAILURE	212	3	Good – maintenance demanded (0xa8)	Good-maintenance required(0xa4)
	4	60	VIBRAT_SENSOR_FAILURE	FAILURE	211	4	Maintenance alarm, more diagnosis available (0x24)	Uncertain-sensor conversion not accurate (0x50)
	5	61	SNR_FAILURE	FAILURE	210	5	Maintenance alarm, more diagnosis available (0x24)	Uncertain-sensor conversion not accurate (0x50)
	6	62	FE_NV_FAILURE	FAILURE	209	6	Maintenance alarm, more diagnosis available (0x24)	Bad-device failure (0x0c)
	7	63	CB_NV_FAILURE	FAILURE	207	7	Maintenance alarm, more diagnosis available (0x24)	Bad-device failure (0x0c)
1	0	64	MAPPER_ALM_NO_AO_IN	CHECK_FUNCTION	153	8	UNCERTAIN – maintenance demanded (0x68)	Uncertain-configuration error (0x5c)
	1	65	DIAG_SIMU_ALARM	CHECK_FUNCTION	152	9	Uncertain-No maintenance (0x78)	Uncertain-simulated value(0x60)
	2	66	DATA_SIMU_ALARM	CHECK_FUNCTION	151	10	Uncertain-No maintenance (0x78)	Uncertain-simulated value(0x60)
	3	67	FLOWRATE_REACH_QMAX	OFF_SPECIFICATION	114	11	Good-high limit (0x82)	Good-active advisory alarm ,high limit(0x8a)
	4	68	FLOWRATE_REACH_QMIN	OFF_SPECIFICATION	113	12	Good-low limit (0x81)	Good-active advisory alarm ,low limit(0x89)
	5	69	PROCESS_TEMP_REACH_TMAX	OFF_SPECIFICATION	112	13	Good – maintenance demanded (0xa8)	Good-active advisory alarm (0x88)
	6	70	PROCESS_TEMP_REACH_TMIN	OFF_SPECIFICATION	111	14	Good – maintenance demanded (0xa8)	Good-active advisory alarm (0x88)
	7	71	LOW_FLOWRATE_CUTOFF	OFF_SPECIFICATION	110	15	Uncertain-No maintenance (0x78)	Uncertain-Low limit (0x41)

… 5 Diagnosis / error messages

… Detailed coding of the Physical Block Parameter DIAGNOSIS_EXTENSION

Octet	Bit	Unit_Diag_Bit (GSD)	Alarm Mapping	NAMUR Class	Priority	ID	Condensed Status	Classic / Extended Status
2	0	72	RE_OUT_LINEAR_RANGE	OFF_SPECIFICATION	109	16	Uncertain-maintenance demanded (0x68)	Uncertain-configuration error (0x5C)
	1	73	DIGITAL_OUT_CUTOFF	OFF_SPECIFICATION	103	17	Good-Maintenance required (0xA4)	Good-maintenance required (0xA4)
	2	74	NV_REPLACE_WARN	MAINTENANCE	54	18	Good-Maintenance required (0xA4)	Good-maintenance required (0xA4)
	3	75	MAINTENANCE_WARNING	MAINTENANCE	53	19	Good-Maintenance required (0xA4)	Good-maintenance required (0xA4)
	4	76	SENSOR_CAL_STATUS	MAINTENANCE	52	20	Uncertain-maintenance demanded (0x68)	Uncertain-sensor calibration(0x64)
	5	77	STEAM TYPE MISMATCH	OFF_SPECIFICATION	116	21	Uncertain-maintenance demanded (0x68)	Uncertain-configuration error (0x5C)
	6	78	RESERVED			22		
	7	79	RESERVED			23		
3	0 to 7	80 to 87	RESERVED			24		
4	0 to 7	88 to 95	RESERVED			32		
5	0 to 7	96 to 103	RESERVED			40		

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Condensed or Classic / Extended Status

Octet	Bit	Unit_Diag_Bit (GSD)	Alarm Mapping	NAMUR Class	Priority	ID	Condensed status	Classic / extended status
0	0	56	FE_BOARD_COMM_ERROR	FAILURE	215	0	Maintenance alarm, more diagnosis available (0x24)	Bad-device failure (0x0c)
	1	57	FE_SYNC_MISSING	FAILURE	214	1	Maintenance alarm, more diagnosis available (0x24)	Bad-device failure (0x0c)
	2	58	VORTEX_SENSOR_FAILURE	FAILURE	213	2	Maintenance alarm, more diagnosis available (0x24)	Bad-sensor failure(0x10)
	3	59	TEMP_SENSOR_FAILURE	FAILURE	212	3	Good – maintenance demanded(0xa8)	Good-maintenance required(0xa4)
	4	60	VIBRAT_SENSOR_FAILURE	FAILURE	211	4	Maintenance alarm, more diagnosis available (0x24)	Uncertain-sensor conversion not accurate (0x50)
	5	61	SNR_FAILURE	FAILURE	210	5	Maintenance alarm, more diagnosis available (0x24)	Uncertain-sensor conversion not accurate (0x50)
	6	62	FE_NV_FAILURE	FAILURE	209	6	Maintenance alarm, more diagnosis available (0x24)	Bad-device failure (0x0c)
	7	63	CB_NV_FAILURE	FAILURE	207	7	Maintenance alarm, more diagnosis available (0x24)	Bad-device failure (0x0c)
1	0	64	MAPPER_ALM_NO_AO_IN	CHECK_FUNCTION	153	8	UNCERTAIN – maintenance demanded (0x68)	Uncertain-configuration error (0x5c)
	1	65	DIAG_SIMU_ALARM	CHECK_FUNCTION	152	9	Uncertain-No maintenance (0x78)	Uncertain-simulated value (0x60)
	2	66	DATA_SIMU_ALARM	CHECK_FUNCTION	151	10	Uncertain-No maintenance (0x78)	Uncertain-simulated value (0x60)
	3	67	FLOWRATE_REACH_QMAX	OFF_SPECIFICATION	114	11	Good-high limit (0x82)	Good-active advisory alarm ,high limit (0x8a)
	4	68	FLOWRATE_REACH_QMIN	OFF_SPECIFICATION	113	12	Good-low limit (0x81)	Good-active advisory alarm ,low limit (0x89)
	5	69	PROCESS_TEMP_REACH_TMAX	OFF_SPECIFICATION	112	13	Good – maintenance demanded (0xa8)	Good-active advisory alarm (0x88)
	6	70	PROCESS_TEMP_REACH_TMIN	OFF_SPECIFICATION	111	14	Good – maintenance demanded (0xa8)	Good-active advisory alarm (0x88)
	7	71	LOW_FLOWRATE_CUTOFF	OFF_SPECIFICATION	110	15	Uncertain-No maintenance (0x78)	Uncertain-Low limit (0x41)

… 5 Diagnosis / error messages

… Detailed coding of the Physical Block Parameter DIAGNOSIS_EXTENSION

Octet	Bit	Unit_Diag_Bit (GSD)	Alarm Mapping	NAMUR Class	Priority	ID	Condensed Status	Classic / Extended Status
2	0	72	RE_OUT_LINEAR_RANGE	OFF_SPECIFICATION	109	16	Uncertain-maintenance demanded (0x68)	Uncertain-configuration error (0x5C)
	1	73	DIGITAL_OUT_CUTOFF	OFF_SPECIFICATION	103	17	Good-Maintenance required (0xA4)	Good-maintenance required (0xA4)
	2	74	NV_REPLACE_WARN	MAINTENANCE	54	18	Good-Maintenance required (0xA4)	Good-maintenance required (0xA4)
	3	75	MAINTENANCE_WARNING	MAINTENANCE	53	19	Good-Maintenance required (0xA4)	Good-maintenance required (0xA4)
	4	76	SENSOR_CAL_STATUS	MAINTENANCE	52	20	Uncertain-maintenance demanded (0x68)	Uncertain-sensor calibration (0x64)
	5	77	STEAM TYPE MISMATCH	OFF_SPECIFICATION	116	21	Uncertain-maintenance demanded (0x68)	Uncertain-configuration error (0x5C)
	6	78	RESERVED			22		
	7	79	RESERVED			23		
3	0 to 7	80 to 87	RESERVED			24		
4	0 to 7	88 to 95	RESERVED			32		
5	0 to 7	96 to 103	RESERVED			40		

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Condensed or Classic / Extended Status

Octet	Bit	Unit_Diag_BitAlarm Mapping (GSD)	NAMUR Class	Priority	IDCondensed status	Classic / extended status
	1	57FE_SYNC_MISSING	FAILURE	214	1maintenance alarm, more diagnosis available (0x24)	Bad-device failure (0x0C)
	2	58VORTEX_SENSOR_FAILURE	FAILURE	213	2maintenance alarm, more diagnosis available (0x24)	Bad-sensor failure (0x10)
	3	59TEMP_SENSOR_FAILURE	FAILURE	212	3Good – maintenance demanded (0xA8)	Good-maintenance required(0xA4)
	4	60VIBRAT_SENSOR_FAILURE	FAILURE	211	4maintenance alarm, more diagnosis available (0x24)	Uncertain-sensor conversion not accurate (0x50)
	5	61SNR_FAILURE	FAILURE	210	5maintenance alarm, more diagnosis available (0x24)	Uncertain-sensor conversion not accurate (0x50)
	6	62FE_NV_FAILURE	FAILURE	209	6maintenance alarm, more diagnosis available (0x24)	Bad-device failure (0x0C)
	7	63CB_NV_FAILURE	FAILURE	207	7maintenance alarm, more diagnosis available (0x24)	Bad-device failure (0x0C)
1	0	64MAPPER_ALM_NO_AO_IN	CHECK_FUNCTION	153	8UNCERTAIN – maintenance demanded (0x68)	Uncertain-configuration error (0x5C)
	1	65DIAG_SIMU_ALARM	CHECK_FUNCTION	152	9Uncertain-No maintenance (0x78)	Uncertain-simulated value (0x60)
	2	66DATA_SIMU_ALARM	CHECK_FUNCTION	151	10Uncertain-No maintenance (0x78)	Uncertain-simulated value (0x60)
	3	67FLOWRATE_REACH_QMAX	OFF_SPECIFICATION	114	11Good-high limit (0x82)	Good-active advisory alarm ,high limit (0x8A)
	4	68FLOWRATE_REACH_QMIN	OFF_SPECIFICATION	113	12Good-low limit (0x81)	Good-active advisory alarm ,low limit (0x89)
	5	69PROCESS_TEMP_REACH_TMAX	OFF_SPECIFICATION	112	13Good – maintenance demanded (0xA8)	Good-active advisory alarm (0x88)
	6	70PROCESS_TEMP_REACH_TMIN	OFF_SPECIFICATION	111	14Good – maintenance demanded (0xA8)	Good-active advisory alarm (0x88)
	7	71LOW_FLOWRATE_CUTOFF	OFF_SPECIFICATION	110	15Uncertain-No maintenance (0x78)	Uncertain-Low limit (0x41)

… 5 Diagnosis / error messages

… Detailed coding of the Physical Block Parameter DIAGNOSIS_EXTENSION

Octet	Bit	Unit_Diag_BitAlarm Mapping (GSD)	NAMUR Class	Priority	IDCondensed Status	Classic / Extended Status
2	0	72RE_OUT_LINEAR_RANGE	OFF_SPECIFICATION	109	16Uncertain-maintenance demanded (0x68)	Uncertain-configuration error (0x5C)
	1	73DIGITAL_OUT_CUTOFF	OFF_SPECIFICATION	103	17Good-Maintenance required (0xA4)	Good-maintenance required (0xA4)
	2	74NV_REPLACE_WARN	MAINTENANCE	54	18Good-Maintenance required (0xA4)	Good-maintenance required (0xA4)
	3	75MAINTENANCE_WARNING	MAINTENANCE	53	19Good-Maintenance required (0xA4)	Good-maintenance required (0xA4)
	4	76SENSOR_CAL_STATUS	MAINTENANCE	52	20Uncertain-maintenance demanded (0x68)	Uncertain-sensor calibration (0x64)
	5	77STEAM TYPE MISMATCH	OFF_SPECIFICATION	116	21Uncertain-maintenance demanded (0x68)	Uncertain-configuration error (0x5C)
	6	78RESERVED			22	
	7	79RESERVED			23	
3	0 to 7	80 to 87RESERVED			24	
4	0 to 7	88 to 95RESERVED			32	
5	0 to 7	96 to 103RESERVED			40	

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Condensed or Classic / Extended Status

Octet	Bit	Unit_Diag_Bit (GSD)	Alarm Mapping	NAMUR Class	Priority	ID	Condensed status	Classic / extended status
0	0	56	FE_BOARD_COMM_ERROR	FAILURE	215	0	Maintenance alarm, more diagnosis available (0x24)	Bad-device failure (0x0c)
	1	57	FE_SYNC_MISSING	FAILURE	214	1	Maintenance alarm, more diagnosis available (0x24)	Bad-device failure (0x0c)
	2	58	VORTEX_SENSOR_FAILURE	FAILURE	213	2	Good – maintenance demanded (0xa8)	Good-active critical alarm (0x8c)
	3	59	TEMP_SENSOR_FAILURE	FAILURE	212	3	Maintenance alarm, more diagnosis available (0x24)	Bad-sensor failure (0x10)
	4	60	VIBRAT_SENSOR_FAILURE	FAILURE	211	4	Maintenance alarm, more diagnosis available (0x24)	Good-active critical alarm (0x8c)
	5	61	SNR_FAILURE	FAILURE	210	5	Good – maintenance demanded (0xa8)	Good-active critical alarm (0x8c)
	6	62	FE_NV_FAILURE	FAILURE	209	6	Maintenance alarm, more diagnosis available (0x24)	Bad-device failure (0x0c)
	7	63	CB_NV_FAILURE	FAILURE	207	7	Maintenance alarm, more diagnosis available (0x24)	Bad-device failure (0x0c)
1	0	64	MAPPER_ALM_NO_AO_IN	CHECK_FUNCTION	153	8	UNCERTAIN – maintenance demanded (0x68)	Uncertain-configuration error (0x5c)
	1	65	DIAG_SIMU_ALARM	CHECK_FUNCTION	152	9	Uncertain-No maintenance (0x78)	Uncertain-simulated value(0x60)
	2	66	DATA_SIMU_ALARM	CHECK_FUNCTION	151	10	Uncertain-No maintenance (0x78)	Uncertain-simulated value(0x60)
	3	67	FLOWRATE_REACH_QMAX	OFF_SPECIFICATION	114	11	Good-(0x80)	Good-active advisory alarm (0x88)
	4	68	FLOWRATE_REACH_QMIN	OFF_SPECIFICATION	113	12	Good-(0x80)	Good-active advisory alarm (0x88)
	5	69	PROCESS_TEMP_REACH_TMAX	OFF_SPECIFICATION	112	13	Good – maintenance demanded, high limit (0xaa)	Good-active advisory alarm ,high limit (0x8a)
	6	70	PROCESS_TEMP_REACH_TMIN	OFF_SPECIFICATION	111	14	Good – maintenance demanded, low limit (0xaa)	Good-active advisory alarm ,low limit (0x89)
	7	71	LOW_FLOWRATE_CUTOFF	OFF_SPECIFICATION	110	15	Good- (0x80)	Good-active advisory alarm (0x88)

… 5 Diagnosis / error messages

… Detailed coding of the Physical Block Parameter DIAGNOSIS_EXTENSION

Octet	Bit	Unit_Diag_BitAlarm Mapping (GSD)	NAMUR Class	Priority	IDCondensed status	Classic / extended status
2	0	72RE_OUT_LINEAR_RANGE	OFF_SPECIFICATION	109	16Good-Maintenance demanded (0xA8)	Good-active advisory alarm (0x88)
	1	73DIGITAL_OUT_CUTOFF	OFF_SPECIFICATION	103	17Good-Maintenance required (0xA4)	Good-maintenance required (0xA4)
	2	74NV_REPLACE_WARN	MAINTENANCE	54	18Good-Maintenance required (0xA4)	Good-maintenance required (0xA4)
	3	75MAINTENANCE_WARNING	MAINTENANCE	53	19Good-Maintenance required (0xA4)	Good-maintenance required (0xA4)
	4	76SENSOR_CAL_STATUS	MAINTENANCE	52	20Uncertain-maintenance demanded (0x68)	Uncertain-sensor calibration (0x64)
	5	77STEAM TYPE MISMATCH	OFF_SPECIFICATION	116	21Good-Maintenance demanded (0xA8)	Good-maintenance required (0xA4)
	6	78RESERVED			22	
	7	79RESERVED			23	
3	0 to 7	80 to 87RESERVED			24	
4	0 to 7	88 to 95RESERVED			32	
5	0 to 7	96 to 103RESERVED			40	

6 Revision history

Revision	Date	Changes
A	11.2018	First edition

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