

Model B3PU

Configuration Manual

(PROFIBUS PA)

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Introduction

This manual contains the necessary information for the configuration of the temperature transmitter B3PU via a host system with application software for PROFIBUS PA. For more related information, please refer to “PROFIBUS-PA Profile for Process Control Devices, Ver. 3.0” published by PNO.

1 PROFIBUS PA Communication

1.1 System architecture for PROFIBUS PA

PROFIBUS PA is an open fieldbus standard based on IEC61158, that was specially designed for the requirements of process automation.

A minimum, complete measurement system consists of a PA device, a segment coupler or linker, a PROFIBUS PA termination resistance, and a PLC or PC with a PROFIBUS DP communication board and an operation software. The maximum number of transmitters per bus segment is dependent on the current consumption of each transmitter, the maximum power of the segment coupler or link, and the required bus length. For details, please see “PROFIBUS PA User and Installation Guideline” published by PNO.

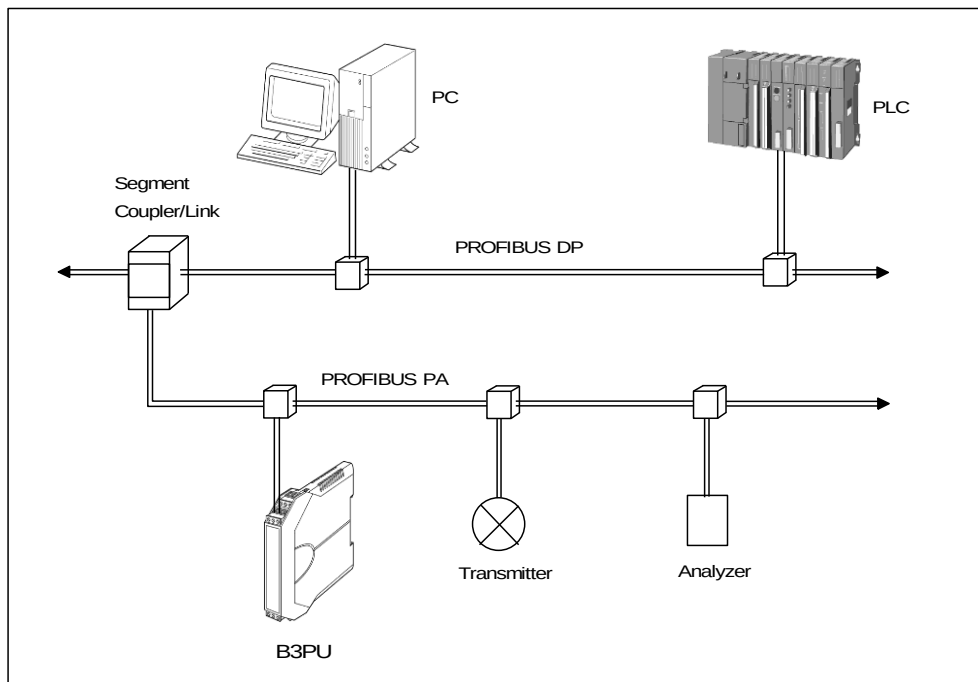


Figure 1.1-1 System Architecture for PROFIBUS PA

1.2 System integration

1.2.1 GSD files

In order to realize the cyclical and acyclical communication of data between PLC or PC (masters) and the PA devices (slaves), PROFIBUS system requires a description of the device-specific parameters such as output data, input data, data format, data quantity and the transmission speed supported. The device-specific parameters are defined in the form of an electronic device data base file (GSD file), that is made available to the master during the commissioning of the communications system.

The following two types of GSD using PA Profile 3.0 are possible for the B3PU, and the manufacturer specific GSD is assigned as factory default setup.

- 1) Manufacturer specific GSD
ID Number: 0804 (HEX)
GSD file: MSYS0804.GSD
- 2) Profile specific GSD
ID Number: 9700 (HEX)
GSD file: PA139700.GSD

The GSD files of the B3PU can be obtained from our website or PNO (PROFIBUS User Organization) <http://www.profibus.com/> (GSD library).

How to install GSD files is dependent on the application software of masters being used. Users must refer to the related operating manuals.

1.2.2 EDDL Files

We have developed Electronic Device Description Language (EDDL) files for Siemens PDM application software that can be downloaded via Internet from our website or PNO. Please follow the instructions for Siemens PDM application software when installing the files.

After the installation of the EDDL files into Siemens PDM, users can easily monitor the measured value and the status of the device, or change the configuration of the device.

2 PA Profile of B3PU

The PA profile of the B3PU, shown in Appendix A, consists of the device management parameters, a Physical Block, a Transducer Block and an Analogue Input Function Block. Detailed information regarding those can be found in the specification of “PROFIBUS PA Profile for Process Control Devices, Version 3.0”.

2.1 Physical Block

The Physical Block describes the necessary parameters and functions of the device or the operation of the device hardware itself.

2.1.1 Diagnosis

In order to provide some information about the device to the masters, there are diagnosis parameters in the device. The diagnosis parameters have a bit string data type and there is a mask parameter indicating which diagnosis is supported by the device.

In the Physical Block, the DIAGNOSIS parameter has the information about “alerts” into the device (e.g., memory error, configuration not valid, failure in measurement, etc). The DIAGNOSIS_MASK has the diagnosis supported by the device.

2.1.2 Factory Reset

The device supports three types of factory reset. The value of the FACTORY_RESET parameter determines the characteristics of the reset.

FACTROY_RESET

= 1	Reset the device for default values. If the device has bus address setting, the bus address remains the same.
= 2506	Warmstart of the device. All parameterization remains unchanged.
= 2712	Reset the bus address only.

The IDENT_NUMBER_SELECTOR is not effected by the factory reset. Other manufacturer specific commands for other reset results are possible.

Resetting the device to default values may be required when a diagnosis error such as the memory error is found in the DIAGNOSIS parameter.

2.2 Transducer Block

The Transducer Block contains all of the measurement specific parameters that define how the B3PU functions as a temperature transducer. Selection such as setting of input type, engineering unit, and so forth, are performed in the Transducer Block. The Function of the Transducer Block is shown in Figure 2.2-1. Please note that only the Input 1 is effective for the B3PU.

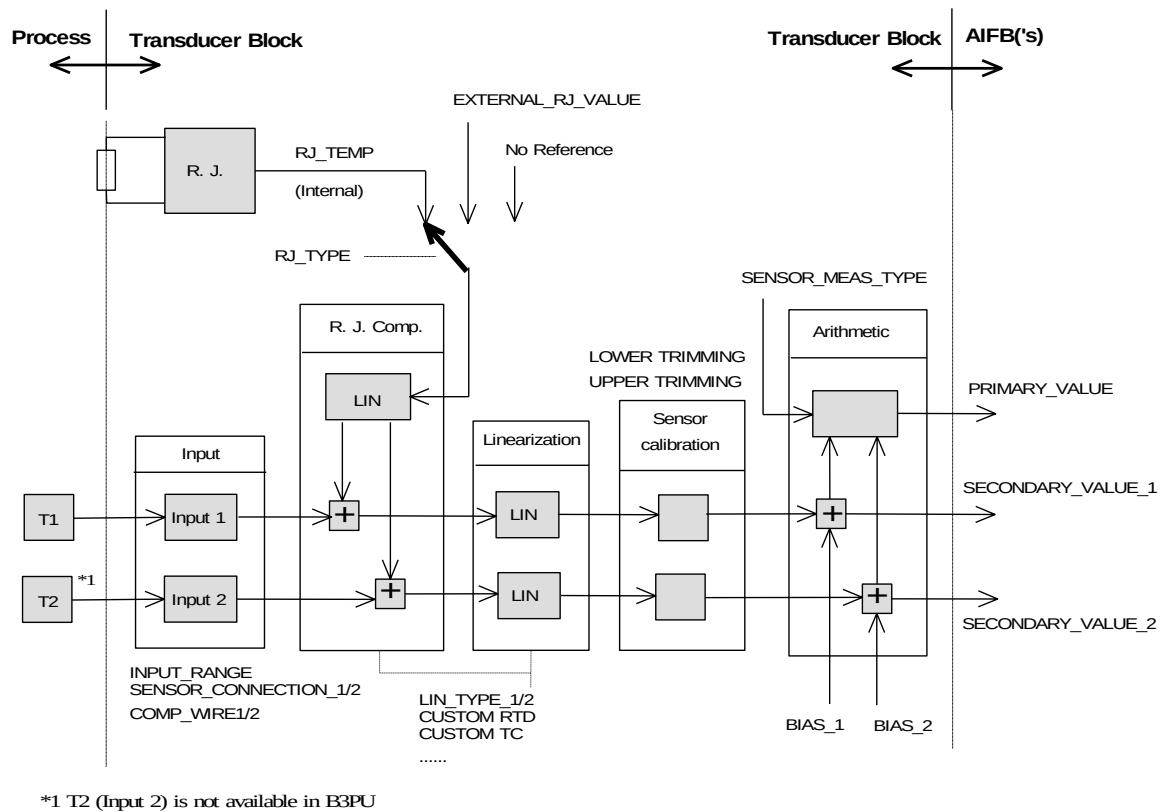


Figure 2.2-1 Functional Diagram of the Transducer Block

2.2.1 Sensor Selection

The parameters related to the selection of input sensors are given below. According to “PROFIBUS-PA Profile for Process Control Devices, Ver. 3.0”, the access sequence of the parameters for sensor selection is defined as LIN_TYPE, PRIMARY_VALUE_UNIT, SENSOR_MEAS_TYPE, INPUT_RANGE, BIAS_1. All sensor settings are valid only after writing BIAS_1 parameter (Index 19 of the Transducer Block). If you use the EDDL files for the B3PU installed on Siemens PDM software, you do not need to consider the access sequence of the parameters because it is done automatically while downloading sensor settings to the B3PU.

1) RTD Input

LIN_TYPE:	Any RTD in the Transducer Block
PRIMARY_VALUE_UNIT:	K, °C, °F or °R
INPUT_RANGE:	N/A (ignored in setup check)
RJ_TYPE:	N/A (ignored in setup check)
SENSOR_CONNECTION:	2, 3 or 4 wires

2) Thermocouple (TC) Input

LIN_TYPE:	Any TC in the Transducer Block
PRIMARY_VALUE_UNIT:	K, °C, °F or °R
INPUT_RANGE:	N/A (ignored in setup check)
RJ_TYPE:	No Reference Junction, Internal, External (fixed value)
SENSOR_CONNECTION:	N/A (ignored in setup check)

3) Resistance Input

LIN_TYPE:	No linearization
PRIMARY_VALUE_UNIT:	Ohm
INPUT_RANGE:	Ohm range 1 to Ohm range 7 in the Transducer Block
RJ_TYPE:	N/A (ignored in setup check)
SENSOR_CONNECTION:	2, 3 or 4 wires

4) Potentiometer Input

LIN_TYPE:	No linearization
PRIMARY_VALUE_UNIT:	%
INPUT_RANGE:	Ohm range 1 to Ohm range 7 in the Transducer Block
RJ_TYPE:	N/A (ignored in setup check)
SENSOR_CONNECTION:	N/A (ignored in setup check)

5) DC Voltage Input

LIN_TYPE:	No linearization
PRIMARY_VALUE_UNIT:	mV
INPUT_RANGE:	mV range 1 to mV range 7 in the Transducer Block
RJ_TYPE:	N/A (ignored in setup check)
SENSOR_CONNECTION:	N/A (ignored in setup check)

2.2.2 Custom-defined RTD and TC

The B3PU supports the custom-defined RTD and TC table functions. The following parameters are used in generating the custom-defined RTD or TC table.

TB_SPEC_LIN_TYPE:	=240 for the custom-defined RTD. =241 for the custom-defined TC.
TB_SPEC_MAX_LEN:	=500 for the maximum length of the custom-defined RTD table. =1000 for the maximum length of the custom-defined TC table.
TB_SPEC_TEMP_UNIT:	Temperature unit. Only degree Celsius can be selected.
TB_SPEC_MIN_TEMP:	Minimum temperature value in the custom-defined RTD or TC table.
TB_SPEC_PITCH:	Temperature difference between two consecutive elements in the custom-defined RTD or TC table. The valid value is 1 to 50 degree Celsius.

TB_SPEC_ACTUAL_LEN:	Actual length of the custom-defined RTD or TC table.
TB_SPEC_INDEX:	Indicates which element of the custom-defined RTD or TC table is currently in the TB_SPEC_ENTRY_X.
TB_SPEC_ENTRY_X:	Value of the custom-defined RTD or TC table, indexed by the TB_SPEC_INDEX. The unit of the TB_SPEC_ENTRY_X is Ohm for RTD, and mV for TC.
TB_SPEC_OP_CODE:	Operation code of the custom-defined RTD or TC table. 0 = table is valid. 2 = table is not initialized. 165 = table is editable.

The download order of the parameters for generating a whole custom-defined RTD or TC table is given below.

- STEP 1:** TB_SPEC_LIN_TYPE
- STEP 2:** TB_SPEC_OP_CODE (=165)
- STEP 3:** TB_SPEC_TEMP_UNIT
- STEP 4:** TB_SPEC_MIN_TEMP
- STEP 5:** TB_SPEC_PITCH
- STEP 6:** TB_SPEC_ACTUAL_LEN
- STEP 7:** TB_SPEC_INDEX
- STEP 8:** TB_SPEC_ENTRY_X
- STEP 9:** Repeat STEP 7 and STEP 8 (TB_SPEC_ACTUAL_LEN - 1) times
- STEP 10:** TB_SPEC_OP_CODE (=0)

With the use of the EDDL files provided by us, users can easily download a custom-defined RTD or TC table to the B3PU with only modifying a text file named as "MSYS_B3PU_USER_SENSOR.inc". For details, please see the description in that text file.

2.2.3 Sensor Calibration

Sensor calibration is a very useful function when the transmitter output needs to be adjusted to the sensor signal, e.g. when the sensor does not correspond to the ideal values for the selected range. The results depend on the accuracy of the calibrator or reference equipment.

Two point calibration method is adopted for the sensor calibration of the B3PU. The calibration points can be specified to any point within the measuring range. The mV and thermocouple inputs are calibrated against the measured voltage, while the resistance and RTD inputs are against the measured resistance. The following parameters are used in the sensor calibration.

- SENSOR_LOWER_TRIM: the lower calibration value applied to the input.
- SENSOR_UPPER_TRIM: the upper calibration value applied to the input.

At sensor calibration, the succeeding procedure shown below must be followed precisely.

- Step 1:** Apply the lower calibration value of the calibrator to the input.
- Step 2:** Type in the lower calibration value and download it to SENSOR_LOWER_TRIM.
- Step 3:** Apply the upper calibration value of the calibrator to the input.
- Step 4:** Type in the upper calibration value and download it to SENSOR_UPPER_TRIM.

2.3 Analog Input Function Block

The Analog Input (AI) Function Block (FB) represents transmitters. The parameters are shown in Figure 2.3-1.

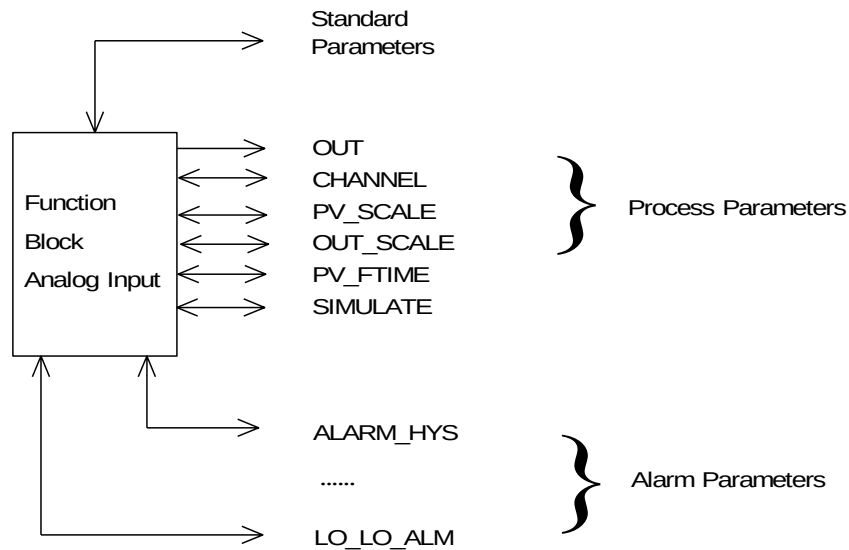


Figure 2.3-1 Summary of the parameter of Analog Input Function Block

The structure of the AI with Simulation, Mode and Status is shown in Figure 2.3-2. More details about the relationships between the AI parameters are visible in Figure 2.3-3.

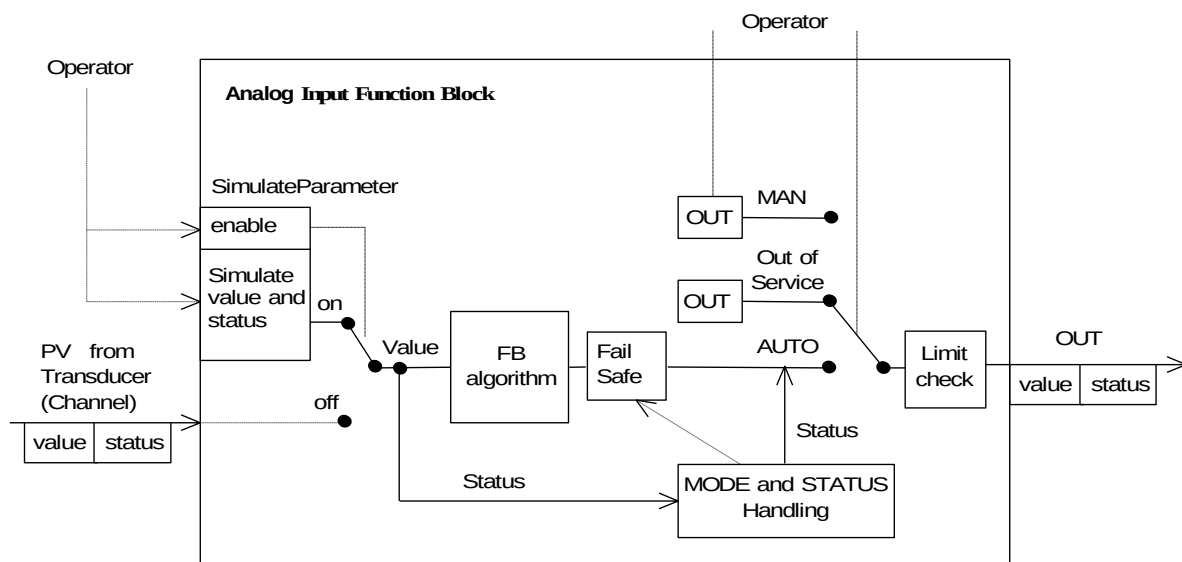


Figure 2.3-2 Simulation, Mode and Status diagram of Analog Input Function Block

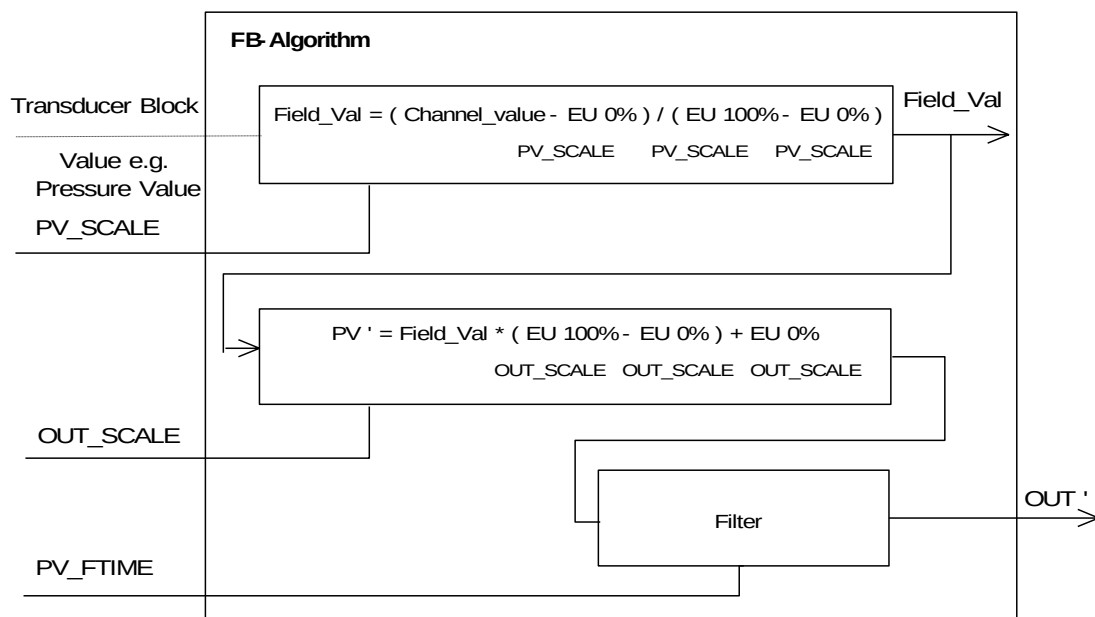


Figure 2.3-3 Parameter relationship of AI FB

Appendix A PA Profile Tables of B3PU

A.1 Explanation of Abbreviations

The abbreviations used in the PA Profile Tables of B3PU are explained below.

A.1.1 “Class” column

MAND: Absolutely mandatory parameter
OPT: Optional parameter
MSYS: Manufacturer-specific parameter

A.1.2 “Store” column

C: Constant, stored in the ROM. The parameter does not change in the device.
D: Dynamic, stored in the RAM. The value is calculated by the block or read from another block.
N: Non-volatile parameter, stored in the EEPROM.
S: Static, stored in the EEPROM. Changing the parameter increases the static revision counter ST_REV.

A.1.3 “Acc.” column

r: Indicates that the parameter can be read.
w: Indicates that the parameter can be written.

A.1.4 “Parameter Usage/Type of Transport” column

1) Parameter Usage

C: Contained
I: Input
O: Output

2) Type of Transport

a: acyclic
cyc: cyclic

A.2 PA Profile Tables

Table 1 Device management

Class	Index Abs.	Index Rel.	Element	Object	Parameter Description	Object Type	Data Type	Size (in bytes)	Store	Acc.	Default Value	Parameter Usage/ Type of Transport
MAND	0	0		DIRECTORY HEADER		Array	Unsigned16	12	C	r		a
			1	Dir ID	Directory ID (reserved)						0x0000	
			2	Num Dir Rev	Directory Revision Number						0x0001	
			3	Num Dir Obj	Number of Directory Objects(Directories)						0x0003	
			4	Num Dir Entries	Total Number of Directory Entries						0x0006	
			5	First comp Dir Entry	Entry Number of First Composite List Dir Entry						0x0001	
MAND	1	1	6	Num Com Dir Entry	Number of Composite List Directory Entries						0x0003	a
				COMPOSITE_LIST_DIRECTORY_ENTRY_1		Array	Unsigned16	16	C	r		
			1	Start PB Ref	Directory Index for Physical Block(Resource Block)						0x0104	
			2	Num PB	Number of Physical Blocks						1	
			3	Start First TB Ref	Directory Index for First Transducer Block						0x0205	
			4	Num TB	Number of Transducer Blocks						1	
			5	Start First FB Ref	Directory Index for First Function Block						0x0306	
			6	Num FB	Number of Function Blocks						1	
			7	Slot Index PB	Communication related absolute address index to PB						0x01AA	
			8	Num PB Param	Number of PB parameters including reserved cells						80	
MAND	2	2		COMPOSITE_LIST_DIRECTORY_ENTRY_2		Array	Unsigned16	4	C	r		a
			1	Slot Index TB	Communication related absolute address index to TB						0x0146	
			2	Num TB Param	Number of TB parameters including reserved cells						100	
MAND	3	3		COMPOSITE_LIST_DIRECTORY_ENTRY_3		Array	Unsigned16	4	C	r		a
			1	Slot Index FB	Communication related absolute address index to FB						0x0110	
			2	Num FB Param	Number of FB parameters including reserved cells						54	

Table 2 Analog Input Function Block

Class	Index Abs.	Index Rel.	Element	Object	Parameter Description	Object Type	Data Type	Size (in bytes)	Store	Acc.	Default Value	Parameter Usage/ Type of Transport
Block	16	0		BLOCK_OBJECT	Block characteristic	Record	DS-32	20	C	r		C/a
			1	Reserved	Not used		Unsigned8	1			250	
			2	Block Object	Block Type(Function)		Unsigned8	1			2	
			3	Parent Class	Parent class: 01 = Input		Unsigned8	1			1	
			4	Class	Class: 01 = Analog Input		Unsigned8	1			1	
			5	DD-Reference	Reserved		Unsigned32	4			0x00000000	
			6	DD-Revision	Reserved		Unsigned16	2			0x0000	
			7	Profile	Number of PROFIBUS PA Profile assigned by PNO and Class of the Profile. Byte 1 = 64(PROFIBUS PA), Byte 2 = 2(Compact Class B).		OctetString	2			0x4002	
			8	Profile Revision	Profile 3.0		Unsigned16	2			0x0300	
			9	Execution Time	For future use		Unsigned8	1			0	
			10	Number of Parameters	Number of parameters not including the view objects		Unsigned16	2			0x002D	
			11	Index of View 1	Index of View 1		Unsigned16	2			0x0145	
			12	Number of View Lists	Number of views		Unsigned8	1			1	
STD	17	1		ST_REV	Static Rev. No. of Function Block. Incremented by 1 after every change of static block parameter.	Simple	Unsigned16	2	N	r	0	C/a
STD	18	2		TAG_DESC	Unique tag in the system which the user can specify.	Simple	OctetString	32	S	r, w		C/a
STD	19	3		STRATEGY	Strategy	Simple	Unsigned16	2	S	r, w	0	C/a
STD	20	4		ALERT_KEY	Value can be written by the user for alert handling.	Simple	Unsigned8	1	S	r, w	0	C/a
STD	21	5		TARGET_MODE	Target mode of the FB set by a control application or an operator.	Simple	Unsigned8	1	S	r, w	0x08	C/a
STD	22	6		MODE_BLK	Contains the actual, the permitted and the normal modes of the FB.	Record	DS-37	3	D	r		C/a
			1	Actual	Auto		Unsigned8	1			0x08	
			2	Permitted	Auto, O/S, MAN		Unsigned8	1			0x98	
STD	23	7		ALARM_SUM	Alarm status	Record	DS-42	8	D	r		C/a
			1	Current Alarm	Current alarm		OctetString	2			0x0000	
			2	Unacknowledged	Unacknowledged		OctetString	2			0x0000	
			3	Unreported	Unreported		OctetString	2			0x0000	
MAND	24	8		BATCH_INFORMATION	Stored information for batch process	Record	DS-67	10	S	r, w		C/a
			1	Batch_ID	Batch identification		Unsigned32	4			0x00000000	
			2	RUP	No. of Recipe Unit Procedure or of Unit.		Unsigned16	2			0x0000	
			3	Operation	No. of Recipe Operation		Unsigned16	2			0x0000	
			4	Phase	No. of Recipe Phase		Unsigned16	2			0x0000	
MAND	26	10		OUT	Output value, measured value in selected output representation, the unit is determined in the output scaling.	Record	DS-33	5	D	r		O/cyc
			1	Value	Value		Float				0.0	
MAND	27	11		PV_SCALE	Conversion of the Process Variable into percent using the high and low scale value. The engineering unit of the high and low scale values are directly related to the PV_UNIT of the configured Transducer Block.	Array	Float	8	S	r, w		C/a
			1	EU100	High scale value						1370.0	
			2	EU0	Low scale value						-270.0	
MAND	28	12		OUT_SCALE	Scale of the Process Variable.	Record	DS-36	11	S	r, w		C/a
			1	EU100	Upper scale value		Float	4			1370.0	
			2	EU0	Lower scale value		Float	4			-270.0	
			3	UNIT	Code number of the engineering unit of the Process Variable for output.		Unsigned16	2			1001	
			4	Dec_Point	Number of digits on the right side of the decimal point.		Integer8	1			1	
MAND	29	13		LIN_TYPE	Linearization type	Simple	Unsigned8	1	S	r, w	0x00	C/a
MAND	30	14		CHANNEL	Reference to the active Transducer Block which provides the measurement value to the Function Block. TB_ID and the relative index of the used TB parameter.	Simple	Unsigned16	2	S	r, w	0x0108	C/a
MAND	32	16		PV_FTIME	Filter time for the Process Variable in second. Valid value: 0-60.	Simple	Float	4	S	r, w	0.0	C/a
OPT	33	17		FSAVE_TYPE	Defines the reaction of the device if a fault is detected. The calculated ACTUAL MODE remains in AUTO.	Simple	Unsigned8	1	S	r, w	0x01	C/a
OPT	34	18		FSAVE_VALUE	Default value for the OUT parameter if sensor or sensor electronic fault is detected.	Simple	Float	4	S	r, w	0.0	C/a
MAND	35	19		ALARM_HYS	Alarm hysteresis. Default value: 0.5% of the input range.	Simple	Float	4	S	r, w	8.2	C/a
MAND	37	21		HI_HI_LIM	Value for the upper limit of alarms	Simple	Float	4	S	r, w	1370.0	C/a
MAND	39	23		HI_LIM	Value for the upper limit of warnings	Simple	Float	4	S	r, w	1370.0	C/a
MAND	41	25		LO_LIM	Value for the lower limit of warnings	Simple	Float	4	S	r, w	-270.0	C/a
MAND	43	27		LO_LO_LIM	Value for the lower limit of alarms	Simple	Float	4	S	r, w	-270.0	C/a
MAND	50	34		SIMULATE	Simulation of the measured value(refers to PRIMARY_VALUE in TB)	Record	DS-50	6	N	r, w		C/a
			1	Simulate_Status	Simulated Transducer Block output value status. Default value: "uncertain subst. value constant"		Unsigned8	1			0x00	
			2	Simulate_Value	Simulated Transducer Block output value		Float	4			0.0	
			3	Simulate_Enable	Switch to enable/disable simulation. simulation; Default value: disabled(=0)		Unsigned8	1			0x00	
OPT	51	35		OUT_UNIT_TEXT	If a specific unit of OUT parameter is not in the code list, the user has the possibility of writing the specific text in this parameter. The unit code is then equal to "textual unit definition".	Simple	OctetString	16	S	r, w		C/a
	52-60	36-44			Reserved by PNO							
VIEW MAND	69	53		VIEW_1	View object 1 of Analog Input Function Block	Record	Void	18	D	r		
			1	1	ST_REV		Unsigned16	2				
			2	6	MODE_BLK		DS-37	3				
			3	7	ALARM_SUM		DS-42	8				
			4	10	OUT		DS-33	5				

Table 3 Transducer Block (Part I)

Class	Index Abs.	Index Rel.	Element	Object	Parameter Description	Object Type	Data Type	Size (in bytes)	Store	Acc.	Default Value	Parameter Usage/ Type of Transport
Block	70	0		BLOCK_OBJECT	Block characteristic	Record	DS-32	20	C	r		C/a
			1	Reserved	GR 2.0 = 0; GR 2.1 = 250		Unsigned8	1			250	
			2	Block Object	Block Type(Transducer)		Unsigned8	1			3	
			3	Parent Class	Parent class		Unsigned8	1			2	
			4	Class	Class		Unsigned8	1			18	
			5	DD-Reference	Reserved		Unsigned32	4			0x00000000	
			6	DD-Revision	Reserved		Unsigned16	2			0x0000	
			7	Profile	Number of PROFIBUS PA Profile assigned by PNO and Class of the Profile. Byte 1 = 64(PROFIBUS PA), Byte 2 = 2(Compact Class B).		OctetString	2			0x4002	
			8	Profile Revision	Profile 3.0		Unsigned16	2			0x0300	
			9	Execution Time	For future use		Unsigned8	1			0x00	
			10	Number Of Parameters	Number of parameters		Unsigned16	2			0x0063	
			11	Index of View 1	Index of View 1		Unsigned16	2			0x01A9	
			12	Number of View Lists	Number of views		Unsigned8	1			1	
STD	71	1		ST_REV	Static Rev. No. of Transducer Block. Incremented by 1 after every change of static block parameter.	Simple	Unsigned16	2	N	r	0	C/a
STD	72	2		TAG_DESC	Unique tag in the system which the user can specify.	Simple	OctetString	32	S	r, w		C/a
STD	73	3		STRATEGY	Strategy	Simple	Unsigned16	2	S	r, w	0	C/a
STD	74	4		ALERT_KEY	Value can be written by the user for alert handling.	Simple	Unsigned8	1	S	r, w	0	C/a
STD	75	5		TARGET_MODE	Target mode of the TB set by a control application or an operator.	Simple	Unsigned8	1	S	r, w	0x08	C/a
STD	76	6		MODE_BLK	Contains the actual, the permitted and the normal modes of the TB.	Record	DS-37	3	D	r		C/a
			1	Actual	Auto		Unsigned8	1			0x08	
			2	Permitted	Auto		Unsigned8	1			0x08	
			3	Normal	Auto		Unsigned8	1			0x08	
STD	77	7		ALARM_SUM	Alarm status	Record	DS-42	8	D	r		C/a
			1	Current Alarm	Current alarm		OctetString	2			0x0000	
			2	Unacknowledged	Unacknowledged		OctetString	2			0x0000	
			3	Unreported	Unreported		OctetString	2			0x0000	
			4	Disabled	Disabled		OctetString	2			0x0000	
MAND	78	8		PRIMARY_VALUE	Process value, function determined by SENSOR_MEAS_TYPE of SECONDARY_VALUE_1/2. The unit of PRIMARY_VALUE is	Record	DS-33	5	D	r		C/a
			1	Value	Value		Float	4			0.0	
			2	Status	Status attribute of the value		Unsigned8	1			0x4F	
MAND	79	9		PRIMARY_VALUE_UNIT	Selection of the unit code for the PRIMARY_VALUE and other values. 1000 = K (Kelvin) 1001 = °C (degree Celsius) 1002 = °F (degree Fahrenheit) 1003 = °R (degree Rankine) 1243 = mV (millivolt) 1281 = Ohm (Ohm) 1342 = % (percent)	Simple	Unsigned16	2	S	r, w	1001	C/a
MAND	80	10		SECONDARY_VALUE_1	Process value connected to channel 1, corrected by BIAS_1. Its unit is PRIMARY_VALUE_UNIT.	Record	DS-33	5	D	r		C/a
			1	Value	Value		Float	4			0.0	
			2	Status	Status attribute of the value		Unsigned8	1			0x4F	
MAND	82	12		SENSOR_MEAS_TYPE	Mathematical function to calculate PRIMARY_VALUE. Only PV = SV_1 is effective.	Simple	Unsigned8	1	S	r, w	0	C/a
MAND	83	13		INPUT_RANGE	Electrical input range and mode for channel 1 and 2. The range for mV or Ohm is adjustable. For thermocouple or RTD, the range is set to the whole sensor range. Defined codes: 0 = mV range 1 (-16 to +16 mV) 1 = mV range 2 (-32 to +32 mV) 2 = mV range 3 (-50 to +64 mV) 3 = mV range 4 (-50 to +128 mV) 4 = mV range 5 (-50 to +256 mV) 5 = mV range 6 (-50 to +500 mV) 6 = mV range 7 (-50 to +1000 mV) 128 = Ohm range 1 (0 to 20 Ohm) 129 = Ohm range 2 (0 to 80 Ohm) 130 = Ohm range 3 (0 to 200 Ohm) 131 = Ohm range 4 (0 to 500 Ohm) 132 = Ohm range 5 (0 to 1000 Ohm) 133 = Ohm range 6 (0 to 2000 Ohm) 134 = Ohm range 7 (0 to 4000 Ohm)	Simple	Unsigned8	1	S	r, w	0	C/a
MAND	84	14		LIN_TYPE	Select the type of sensor for RTD, TC or linear. Defined codes: 0 = no linearization 102 = RTD Pt100 a=0.003850 (IEC, JIS'97 etc.) 103 = RTD Pt200 a=0.003850 (IEC, JIS'97 etc.) 104 = RTD Pt500 a=0.003850 (IEC, JIS'97 etc.) 105 = RTD Pt1000 a=0.003850 (IEC, JIS'97 etc.) 107 = RTD Pt50 a=0.003916 (JIS'81) 108 = RTD Pt100 a=0.003916 (JIS'81) 120 = RTD Ni120 a=0.006720 (Edison curve no. 7) 126 = RTD Cu10 a=0.004270 128 = TC Type B, Pt30Rh-Pt6Rh (IEC, JIS and etc.) 129 = TC Type C, W5Re-W26Re (ASTM E 988) 131 = TC Type E, Ni10Cr-Cu45Ni (IEC, JIS etc.) 133 = TC Type J, Fe-Cu45Ni (IEC, JIS etc.) 134 = TC Type K, Ni10Cr-Ni5 (IEC, JIS etc.) 135 = TC Type N, Ni14CrSi-NiSi (IEC, JIS etc.) 136 = TC Type R, Pt13Rh-Pt (IEC, JIS etc.) 137 = TC Type S, Pt10Rh-Pt (IEC, JIS etc.) 138 = TC Type T, Cu-Cu45Ni (IEC, JIS etc.) 139 = TC Type L, Fe-CuNi (DIN 43710) 140 = TC Type U, Cu-CuNi (DIN 43710) 143 = TC Type P (Platinel II) 240 = Custom-defined RTD 241 = Custom-defined TC	Simple	Unsigned8	1	S	r, w	134	C/a

Table 3 Transducer Block (Part II)

Class	Index Abs.	Index Rel.	Element	Object	Parameter Description	Object Type	Data Type	Size (in bytes)	Store	Acc.	Default Value	Parameter Usage/ Type of Transport
MAND	89	19		BIAS_1	Bias that can be algebraically added to process value of channel 1. Its unit is PRIMARY_VALUE_UNIT.	Simple	Float	4	S	r, w	0.0	C/a
MAND	91	21		UPPER_SENSOR_LIMIT	Physical upper limit function of sensor and input range. Its unit is PRIMARY_VALUE_UNIT.	Simple	Float	4	N	r	1370.0	C/a
MAND	92	22		LOWER_SENSOR_LIMIT	Physical lower limit function of sensor and input range. Its unit is PRIMARY_VALUE_UNIT.	Simple	Float	4	N	r	-270.0	C/a
MAND	94	24		INPUT_FAULT_GEN	Input malfunction: Diagnosis object for errors that concerns all values. 0 = Device OK Bit: 0 = Rj error 1 = hardware error 2 - 4 = reserved 5 - 7 = manufacturer-specific	Simple	Unsigned8	1	D	r	0x00	C/a
MAND	95	25		INPUT_FAULT_1	Input malfunction: Diagnosis object for errors that concerns SV_1. 0 = Input OK Bit: 0 = underrange 1 = overrange 2 = lead breakage 3 = short circuit 4 - 5 = reserved 6 - 7 = manufacturer-specific	Simple	Unsigned8	1	D	r	0x00	C/a
OPT	103	33		RJ_TEMP	Reference junction temperature. Its unit is PRIMARY_VALUE_UNIT or Degree Celcius if PRIMARY_VALUE_UNIT is not a temperature unit.	Simple	Float	4	D	r	0.0	C/a
MAND	104	34		RJ_TYPE	Select reference junction from internal to fixed value. Defined codes: 0 = no reference 1 = internal 2 = external (fixed value in EXTERNAL_RJ_VALUE)	Simple	Unsigned8	1	S	r, w	1	C/a
OPT	105	35		EXTERNAL_RJ_VALUE	Fixed temperature value of an external reference junction. Its unit is PRIMARY_VALUE_UNIT or Degree Celcius if PRIMARY_VALUE_UNIT is not a temperature	Simple	Float	4	S	r, w	0.0	C/a
MAND	106	36		SENSOR_CONNECTION	Sensor connection type: Sensor connection in 2, 3 or 4-wire circuit. 0 = 2 wires; 1 = 3 wires; 2 = 4 wires	Simple	Unsigned8	1	S	r, w	1	C/a
MAND	107	37		COMP_WIRE1	Value in Ohm to compensate line resistance when a resistive sensor is connected with 2 wires.	Simple	Float	4	S	r, w	0.0	C/a
	122-131	52-61		Reserved by PNO								
MSYS	132	62		TB_SPEC_LIN_TYPE	Custom-defined sensor type with a specific linearization table: 240 = Custom-defined RTD 241 = Custom-defined TC	Simple	Unsigned8	1	N	r.w.	241	C/a
MSYS	133	63		TB_SPEC_MAX_LEN	Length limit of the custom-defined RTD or TC table; 1000 entries for TC, 500 for RTD	Simple	Unsigned16	2	C	r.		C/a
MSYS	134	64		TB_SPEC_TEMP_UNIT	Temperature unit used in the custom-defined RTD or TC	Simple	Unsigned16	2	N	r.w.	1001	C/a
MSYS	135	65		TB_SPEC_MIN_TEMP	Minimum temperature value in the custom-defined RTD or TC table.	Simple	Float	4	N	r.w.		C/a
MSYS	136	66		TB_SPEC_PITCH	Temperature difference between two consecutive elements in the custom-defined RTD or TC table. Though the value can be set in the form of float point number with any temperature unit, only one byte is kept for saving this value in degree Celsius. When creating the custom-defined table, set degree Celsius to TB_SPEC_TEMP_UNIT if possible.	Simple	Float	4	N	r.w.		C/a
MSYS	137	67		TB_SPEC_ACTUAL_LEN	Actual length of the custom-defined RTD or TC table.	Simple	Unsigned16	2	N	r.w.		C/a
MSYS	138	68		TB_SPEC_INDEX	Indicates which element of the custom-defined RTD or TC table is currently in the TB_SPEC_ENTRY_X.	Simple	Unsigned16	2	N	r.w.		C/a
MSYS	139	69		TB_SPEC_ENTRY_X	Value of the custom-defined RTD or TC table, indexed by TB_SPEC_INDEX.	Simple	Float	4	N	r.w.		C/a
MSYS	140	70		TB_SPEC_OP_CODE	Operation Code of the custom-defined RTD or TC table. 0 = table is valid 2 = table is not initialized 165(0x00A5) = table is editable	Simple	Unsigned16	2	S	r.w.		C/a
MSYS	143	73		TB_SENSOR_UPPER_RANGE	Reserved	Simple	Float	4		r.		C/a
MSYS	144	74		TB_SENSOR_LOWER_RANGE	Reserved	Simple	Float	4		r.		C/a
MSYS	145	75		SENSOR_UPPER_TRIM	Reset to default after sensor changed	Simple	Float	4	S	r.w.		C/a
MSYS	146	76		SENSOR_LOWER_TRIM	Reset to default after sensor changed	Simple	Float	4	S	r.w.		C/a
VIEW	169	99		VIEW1	View Object 1 of Transducer Block	Record	Void	20	D	r		
			1	1	ST_REV	Simple	Unsigned16	2				
			2	6	MODE_BLK		DS-37	3				
			3	7	ALARM_SUM		DS-42	8				
			4	8	PRIMARY_VALUE		DS-33	5				
			5	24	INPUT_FAULT_GEN	Simple	Unsigned8	1				
			6	25	INPUT_FAULT_1	Simple	Unsigned8	1				

Table 4 Physical Block

Class	Index Abs.	Index Rel.	Element	Object	Parameter Description	Object Type	Data Type	Size (in bytes)	Store	Acc.	Default Value	Parameter Usage/ Type of Transport
Block	170	0		BLOCK_OBJECT	Block characteristic	Record	DS-32	20	C	r		C/a
			1	Reserved	Default: 250 = not used		Unsigned8	1			250	
			2	Block Object	Block Type(Physical)		Unsigned8	1			1	
			3	Parent Class	Parent class: 01 = Transmitter		Unsigned8	1			1	
			4	Class	Class: 250 = not used		Unsigned8	1			250	
			5	DD-Reference	Reserved		Unsigned32	4			0x00000000	
			6	DD-Revision	Reserved		Unsigned16	2			0x0000	
			7	Profile	Number of PROFIBUS PA Profile assigned by PNO and Class of the Profile. Byte 1 = 64(PROFIBUS PA), Byte 2 = 2(Compact Class B).		OctetString	2			0x4002	
			8	Profile Revision	Profile 3.0		Unsigned16	2			0x0300	
			9	Execution Time	For future use		Unsigned8	1			0x00	
			10	Number Of Parameters	Number of parameters		Unsigned16	2			0x002D	
			11	Index of View 1	Index of View 1		Unsigned16	2			0x01F9	
			12	Number of View Lists	Number of views		Unsigned8	1			1	
STD	171	1		ST_REV	Static Rev. No. of Physical Block.: Incremented by 1 after every change of static block parameter.	Simple	Unsigned16	2	N	r	0	C/a
STD	172	2		TAG_DESC	Unique tag in the system which the user can specify.	Simple	OctetString	32	S	r, w		C/a
STD	173	3		STRATEGY	Strategy	Simple	Unsigned16	2	S	r, w	0x0000	C/a
STD	174	4		ALERT_KEY	Value can be written by the user for alert handling.	Simple	Unsigned8	1	S	r, w	0x00	C/a
STD	175	5		TARGET_MODE	Target mode of the PB = Auto	Simple	Unsigned8	1	S	r, w	0x08	C/a
STD	176	6		MODE_BLK	Contains the actual, the permitted and the normal modes of the PB.	Record	DS-37	3	D	r		C/a
			1	Actual	Auto		Unsigned8	1			0x08	
			2	Permitted	Auto, O/S		Unsigned8	1			0x88	
			3	Normal	Auto		Unsigned8	1			0x08	
STD	177	7		ALARM_SUM	Alarm status	Record	DS-42	8	D	r		C/a
			1	Current Alarm	Current alarm		OctetString	2			0x0000	
			2	Unacknowledged	Unacknowledged		OctetString	2			0x0000	
			3	Unreported	Unreported		OctetString	2			0x0000	
MAND	178	8		SOFTWARE_REVISION	Software revision number: Entered at the factory	Simple	VisibleString	16	C	r	VER. 01.01	C/a
				HARDWARE_REVISION	Hardware revision number: Entered at the factory	Simple	VisibleString	16	C	r	P-2049A	C/a
				DEVICE_MAN_ID	Identification code of the manufacturer	Simple	Unsigned16	1	C	r	29	C/a
				DEVICE_ID	Manufacturer specific device identification	Simple	VisibleString	16	C	r	B3PU	C/a
MAND	182	12		DEVICE_SER_NUM	Serial number of the device. Entered at the factory.	Simple	VisibleString	16	C	r		C/a
MAND	183	13		DIAGNOSIS	Detailed information of the device, bitwize coded.	Simple	OctetString	4	D	r	0x00000000	C/a
MAND	185	15		DIAGNOSIS_MASK	Definition of supported DIAGNOSIS information bits.	Simple	OctetString	4	C	r	0x389C000	C/a
OPT	187	17		DEVICE_CERTIFICATION	Certification of the device, e.g. Ex certification.	Simple	VisibleString	32	C	r	CE	C/a
OPT	188	18		WRITE_LOCKING	Software write protection. 0 = acyclic write services of all parameters, except WRITE_LOCKING, are refused. 2457 = all writeable parameters are writeable.	Simple	Unsigned16	2	N	r, w	2457	C/a
OPT	189	19		FACTORY_RESET	Factory reset: 1 = reset the device for default values 2506 = warmstart of the device 2712 = reset the bus address to a default value	Simple	Unsigned16	2	S	r, w	2506	C/a
OPT	190	20		DESCRIPTOR	User-definable text to describe the device within the application.	Simple	OctetString	32	S	r, w		C/a
OPT	191	21		DEVICE_MESSAGE	User-definable MESSAGE to describe the device within the application or in the plant.	Simple	OctetString	32	S	r, w		C/a
OPT	192	22		DEVICE_INSTALL_DATE	Date of the device installation.	Simple	OctetString	16	S	r, w		C/a
MAND	194	24		IDENT_NUMBER_SELECTOR	Which GSD identification number is used. 0 = Profile specific Ident_Number(=9700) 1 = Manufacturer specific Ident_Number(=0804)	Simple	Unsigned8	1	S	r, w	1	C/a
	196-202	26-32		Reserved by PNO								
MSYS	203	33		Used by M-System internally								C/a
MSYS	204	34		Error_Code		Simple	Unsigned8	1	D	r		C/a
MSYS	205	35		Device_Bus_Address		Simple	Unsigned8	1	N	r, w	126	C/a
VIEW MAND	249	79		VIEW_1	View object 1 of Physical Block	Record	Void	17	D	r		
			1	1	ST_REV		Unsigned16	2				
			2	6	MODE_BLK		DS-37	3				
			3	7	ALARM_SUM		DS-42	8				
			4	13	DIAGNOSIS		OctetString	4				