Interface Description

40/11-51 EN

Temperature Transmitter TF12, TF212

PROFIBUS PA,
DPV1 Object dictionary / profile description

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Declaration of conformity

This product meets the requirements specified in EMC Directive 89/336/EEC and in Low Voltage Directive 73/23/EEC.

Table of contents

1 Abbreviations

Variable	Name of a parameter
Object Type	Variable class
Data Type	Type and structure of a variable (see Profibus standards for additional information). In some cases also the allowed selctions are listet in that column.
Store	storage class C = Constant (Value is stored in ROM), N = Nonvolatile (Value is stored in EEPROM, no influence to static revision counter), D = Dynamic (Value will be calculated on runtime by the Slave, the storage will be in the RAM) S = Static (Value is stored in EEPROM, static revision counter will be incremented, wenn write access is done to this parameter)
Size	Number or bytes
ACC	Access, allowed acces Read and / or Write
Parameterusage	C = will be used internal within the block O = Output to functionblock I = Inputparameter (from another block)
Type of transport	a = acyclic (this parameter is only in acyclic communication available) cyc = cyclic (this parameter is available through cyclic communication, possible only in the function block)
Default Values	The parameter will be set to this value wenn Factory Reset is executet
Man/Opt.	m = mandatory (according to the Profil definition of the PNO), o = optional (according to the Profil definition of the PNO), s = manufacturer specific
Indication type	Type of clearing the status information R = Indication remains active as long as the reason for the message exists **A** = Indication will be automatically reset after reading

2 Physical Block

Standard Parameter description

PARAMETER	Standard Parameter Description
ALARM_SUM	It contains the current states of the block alarms. See Datatypes at the end of this document
ALERT_KEY	It contains the identification number of the plant unit. It helps to identify the location of an event.
BLOCK OBJECT	This object contains the characteristics of the blocks.
MODE_BLK	It contains the current mode and the permitted and normal mode of the block.
ST_REV	Static Revision counter: Each block has static parameters (see parameter attributes table column "Store"), that are not changed by the process. Values to this parameters are assigned during the configuration or optimization procedure. The value of ST_REV will be automatically increased by 1 after every change of a static parameter. This provides a check of the parameter revision.
STRATEGY	Grouping of Function Block. This can be used to group blocks (this parameter has no effect to the transmitter).
TAG_DESC	Every block can be assigned a textual TAG description. The TAG_DESC is the address of the block. It must be unambiguous and unique in the fieldbus system.
TARGET_MODE	This parameter contains desired mode normally set by a control application or an operator.

Standard Parameter attributes

Relative Index	Variable	Object type	Data type	Store	Size	Access	Parameter usage/ Type of transport	Default Values	Man/ opt.	Slot	Absolute Index
0	BLOCK OBJECT	Record	DS-32	C	20	r	C/a		m	1	114
1	ST_REV	Simple	unsigned16	N	2	r	C/a	0	m	1	115
2	TAG_DESC	Simple	Octetstring	S	32	r,w	C/a	‘ ’	m	1	116
3	STRATEGY	Simple	unsigned16	S	2	r,w	C/a	0	m	1	117
4	ALERT_KEY	Simple	unsigned8	S	1	r,w	C/a	0	m	1	118
5	TARGET MODE	Simple	unsigned8	S	1	r,w	C/a	8	m	1	119
6	MODE_BLK actual permitted normal	Record	DS-37	 D Cst Cst	3	r	C/a	888	m	1	120
7	ALARM_SUM	Record	DS_42	D	8	r	C/a	0;0;0...	m	1	121

Block Object of Physical Block

E	Element Name	Data Type (Index)	Size	Value
1	Reserved	Unsigned 8 - (5)	1	250
2	Block Object	Unsigned 8 - (5)	1	1
3	Parent Class	Unsigned 8 - (5)	1	1
4	Class	Unsigned 8 - (5)	1	250
5	DD Reference	Unsigned 32 - (7)	4	-
6	DD Revision	Unsigned 16 - (6)	2	-
7	Profile	OctetString (10)	2	64; 2
8	Profile Revision	Unsigned 16 - (6)	2	3; 0
9	Execution Time	Unsigned 8 - (5)	1	-
10	Number_of_parameters	Unsigned 16 - (6)	2	33
11	Address of VIEW_1	Unsigned 16 - (6)	2	1;147
12	Number of View List	Unsigned 8 - (5)	1	1

Physical Block Parameter Descriptions

Parameter	Physical Block Parameter Descriptions
DEVICE_CERTIFICATION	Certifications of the device
DEVICE_ID	Identification
DEVICE_MAN_ID	Id-code of the manufacturer of the device (defined by PNO)
DEVICE_SER_NUM	Serial number of the device
DIAGNOSIS	Detailed information of the device, bitwise coded. If MSB of byte 4 is set to 1, than more diagnose information is available in the DIAGNOSIS_EXTENSION parameter.
DIAGNOSIS_EXTENSION	Additional manufacturer specifications of the device, bitwise coded.
DIAGNOSIS_MASK	Definition of supported DIAGNOSIS bits. 0 = not supp. 1 = supp.
DIAGNOSIS_MASK_EXT.	Definition of supported DIAGNOSIS_EXTENSION bits. 0 = not supp. 1 = supp.
FACTORY_RESET	Value = 1 is the command for resetting device for default values, if the device has bus address setting the bus address remains the same. Value = 2506 is the command for warmstart of the device. All parametrisation remains unchanged. Value = 2712 reset the bus address only. The Ident_Number parameter isn't effected by the Factory_Reset.
HARDWARE_REVISION	Revision number of the hardware of the device.
WRITE_LOCKING	Storage location for a password. This password may be read and written by a tool to perform a write protection strategy. 0 – acyclic write service of all parameter, except this WRITE_LOCKING one, are refused, i.e. access is denied 1- 2456 reserved by PNO 2457 is the default value and means all writeable parameters of a device are writeable. 2458 - 65535 manufacturer specific
SOFTWARE_REVISION	Revision number of the software of the device.
IDENT_NUMBER_ SELECTOR	Each PROFIBUS-DP /EN50170/ device shall have an Ident_Number provided by the PNO. There are profile specific Ident_Numbers. A device may have a profile specific one and the manufacturer specific one. The user is able to chose one of both using this parameters. O - profile specific Ident_Number (0x9702 = device with 3 AI - FB´s) 1 – manufacturer specific Ident_Number (0x04C4 for TF12/TF212) If a device is switched to the profile Ident_Number, the device shall interact with the profile features of the GSD file. The Ident_Number parameter isn't effected by the Factory_Reset.
DESCRIPTOR	User definable text to describe the device within the application
DEVICE INSTALL DATE	Date of installation
DEVICE MESSAGE	User definable text to describe the device within the application or in the plant

Parameter Attribute Table

Relative Index	Variable	Object type	Data type	Store	Size	Access	Parameter usage/ Type of transport	Default Values	Man/ opt.	Slot	Absolute Index
8	SOFTWARE REVISION	Simple	Visiblestring	Cst	16	r	C/a	-	m	1	122
9	HARDWARE REVISION	Simple	Visiblestring	Cst	16	r	C/a	-	m	1	123
10	DEVICE MAN ID	Simple	Unsigned16	Cst	2	r	C/a	-0x001A	m	1	124
11	DEVICE ID	Simple	Visiblestring	Cst	16	r	C/a	-„TF12/ TF212“	m	1	125
12	DEVICE SER NUM	Simple	Visiblestring	Cst	16	r	C/a	-	m	1	126
13	DIAGNOSIS	Simple	Octetstring	D	4	r	C/a	0	m	1	127
14	DIAGNOSIS EXTENSION	Simple	Octetstring	D	6	r	C/a	0	o	1	128
15	DIAGNOSIS MASK	Simple	Octetstring	Cst	4	r	C/a	-	m	1	129
16	DIAGNOSIS MASK EXTENSION	Simple	Octetstring	Cst	6	r	C/a	-	o	1	130
17	DEVICE CERTIFICATION	Simple	Visiblestring	Cst	32	r	C/a	-	o	1	131
18	WRITE LOCKING	Record	Unsigned16 0 = write lock. 2457 = all write-able	N	2	r,w	C/a	2457	o	1	132
19	FACTORY RESET	Record	Unsigned16 1 = set all defaults 2506 = warmstart 2712 = reset bus address	S	2	r,w	C/a	-	o	1	133
20	DESCRIPTOR	Simple	Octetstring	s	32	r,w	C/a	32 blanks	m	1	134
21	DEVICE MESSAGE	Simple	Octetstring	s	32	r,w	C/a	32 blanks	m	1	135
22	DEVICE INSTALL DATE	Simple	Octetstring	s	16	r,w	C/a	8 blanks	m	1	136
24	IDENT_NUMBER_ SELECTOR	Simple	Unsigned8	s	1	r,w	C/a	1	m	1	138
26-32	Reserved by PNO									1	140 - 146

Standard Diagnosis Parameter (Rel. Index 13)

Bit	Mnemonic	Description	Diagnosis Mask Rel. Index 15	Indication Remain/ Automatic
0	DIA_HW_ELECTR	Hardware failure of electronic caused by: - Analog/Digital Converter Error - Any Bit of Input_fault_gen (Transducer Block)	1	R
1	DIA_HW_MECH	Hardware failure of mechanic	0	R
2	DIA_TEMP_MOTOR	Motor- temperature too high	0	R
3	DIA_TEMP_ELECTR	Electronic temperature too high	0	R
4	DIA_MEM_CHECKSUM	Memory checksum error EEPROM Error,	1	R
5	DIA_MEASUREMENT	Failure in measurement caused by short / open circuit of the Sensors (see also Input_fault in Transducer Block)	1	R
6	DIA_NOT_INIT	Device not initialized Parameter in EEPROM are not available because of EEPROM Error	11	R
7	DIA_INIT_ERROR	SELFCALIBRATION FAILED	0	R
8	DIA_ZERO_ERROR	ZERO POINT ERROR	0	R
9	DIA_SUPPLY	POWER SUPPLY FAILED (ELECTRICAL, PNEUM.)	0	R
10	DIA_CONF_INVALID	Different Dimensions of Sensor 1 and Sensor 2 selected, so the mathematical function of Sensor 1 and 2 is not possible	1	R
11	DIA_WARMSTART	RE-START-UP CARRIED OUT (set after factory reset with 2506)	1	A
12	DIA_COLDSTART	NEW-START-UP CARRIED OUT (set after factory reset with 1)	1	A
13	DIA_MAINTAINANCE	SERVICE REQUIRED	0	R
14	DIA_CHARACT	Charactarisation invalid	0	R
15	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 parameter are different. Because of different data types a comparison is impossible.	1	R
16... 30	reserved	Reserved for use within PNO	0	
31	EXTENSION_AVAILABLE	If set, more diagnosis information is available	1	

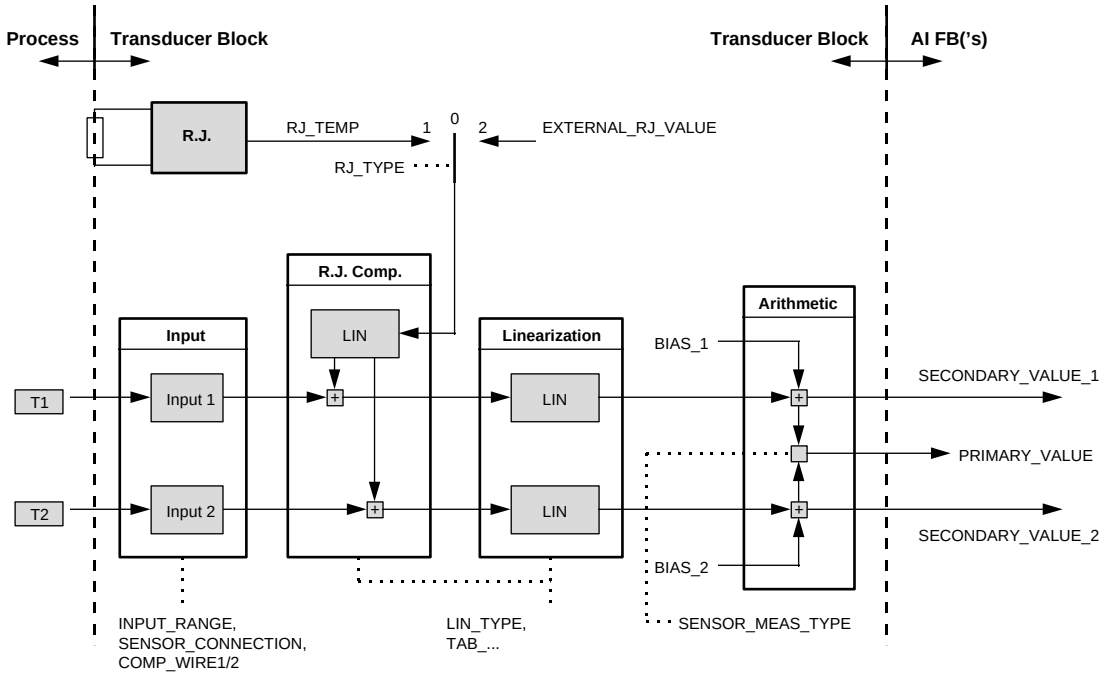
Extended Diagnosis Parameter (Rel. Index 14/16)

Bit	Mnemonic	Description	Diagnosis Mask Rel. Index 15	Indication Remain/ Automatic
0	ADC_CALIBRATED	Device not calibrated, therfore the measurement will be not accurate	1	R
1..47 not used			0	

View Object Table

Relative Index	Parameter Mnemonic	Operation Dynamic VIEW_1	Operation Static VIEW_2	All Dynamic VIEW_3	Other static VIEW_4
0	BLOCK_OBJECT				
1	ST_REV	2			
2	TAG_DESCRIPTION				
3	STRATEGY				
4	ALERT_KEY				
5	TARGET_MODE				
6	MODE_BLK	3			
7	ALARM_SUM	8			
8	SOFTWARE REVISION				
9	HARDWARE REVISION				
10	DEVICE MAN ID				
11	DEVICE ID				
12	DEVICE SER NUM				
13	DIAGNOSIS	4			
14	DIAGNOSIS EXTENSION				
15	DIAGNOSIS MASK				
16	DIAGNOSIS MASK EXTENSION				
17	DEVICE CERTIFICATION				
18	SECURITY LOCKING				
19	FACTORY RESET				
20	DESCRIPTOR				
21	DEVICE_MESSAGE				
22	DEVICE_INSTALL_DAT				
24	IDENT_NUMBER				

3 Transducer Block Temperature



Standard Parameter description
See 1.1 Standard Parameter description of Physical Block.

Standard Parameter attributes
See 1.1.1 Standard Parameter attributes of Physical Block.

Block Object of Transducer Block

E	Element Name	Data Type (Index)	Size	Value
1	Reserved	Unsigned 8 - (5)	1	-
2	Block Object	Unsigned 8 - (5)	1	3
3	Parent Class	Unsigned 8 - (5)	1	2
4	Class	Unsigned 8 - (5)	1	240
5	DD Reference	Unsigned 32 - (7)	4	-
6	DD Revision	Unsigned 16 - (6)	2	-
7	Profile	OctetString (10)	2	64; 2
8	Profile Revision	Unsigned 16 - (6)	2	3; 0
9	Execution Time	Unsigned 8 - (5)	1	-
10	Number_of_parameters	Unsigned 16 - (6)	2	81
11	Address of VIEW_1	Unsigned 16 - (6)	2	4;81
12	Number of View List	Unsigned 8 - (5)	1	1

Parameter Description

Process Parameter

Parameter	Description
BIAS_1	Bias of sensor 1: Value that will be algebraically added to process temperature 1 (like an offset value). Unit is primary value unit.
BIAS_2	Bias of sensor 2: Value that will be algebraically added to process temperature 2 (like an offset value). Unit is primary value unit.
COMP_WIRE1	Value in Ohm to compensate line when the sensor 1 (RTD) connection is 2 wires. For 3 or 4-wire connection the parameter is don´t care. The value must be the resistance of the complete wire loop. Note: - If the COMP_Wire value is bigger than the measuring value the result will be negative.
COMP_WIRE2	Value in Ohm to compensate line when the sensor 2 (RTD) connection is 2 wires. For 3 or 4-wire connection the parameter is don´t care. The value must be the resistance of the complete wire loop. Note: - If the COMP_Wire value is bigger than the measuring value the result will be negative
INPUT_FAULT_ GEN	Input malfunction: Diagnosis object for errors that concerns all values 0 = device OK Bit: 0 = Rj error (Set if 150°C < RJ_Temp or < -50°C) 1 = Hardware error 2 – 4 = reserved 5 – 7 = manufacturer specific
INPUT_FAULT_1	Input malfunction: Diagnosis object for errors that concern SV_1 0 = Input OK Bit: 0 = underrange 1 = overrange 2 = lead breakage 3 = short circuit 4 – 5 = reserved 6 – 7 = manufacturer specific
INPUT_FAULT_2	Input malfunction: Diagnosis object for errors that concern SV_2 0 = Input OK Bit definition see INPUT_FAULT_1
INPUT_ RANGE	Electrical input range and mode of sensor 1, only active if Lin_Type is linear otherwise don´t care.
LOWER_SENSOR_ LIMIT	Physical lower limit function of sensor 1 (e.g. Pt 100 = -200°C) and input range.The unit of LOWER_SENSOR_LIMIT is the PRIMARY_VALUE_UNIT.
LIN_TYPE	Select the type of sensor1 (Code) for Thermocouples, Rtd or linear.
PRIMARY_VALUE	Process value, function of SECONDARY_VALUE_1/2. The unit of PRIMARY_VALUE is the PRIMARY_VALUE_UNIT. If the dimensions of temperature 1 and 2 are not the same type (e.g. °C and mV), and measuring type is other than 0..3, this parameter will allways contain NAN (not a number). In this case the flag "DIA_CONF_INVALID" in the standard diagnoses will be set.
PRIMARY_VALUE_ UNIT	Select the unit code of the PRIMARY_VALUE and other values. Set of unit codes: 1000: K (Kelvin) 1001: °C (degree Celsius) 1002: °F (degree Fahrenheit) 1003: Rk (Rankine) 1243: mV 1281: 1997: None The following table shows the possible unit selections at the different configurations:.

	Sensor 1	Sensor 2	PV_Unit: available units
	THC or RTD	THC or RTD or not available	None, °C, F, K, Rk
	linear mV or linear	THC or RTD	None
	THC or RTD	linear mV or linear	None
	linear mV	linear mV or not available	None, mV

	linear	linear or not available	None,
	linear mV	linear	None
	linear	linear mV	None
EXTERNAL_RJ_VALUE	Fixed temperature value of an external reference junction. The unit of EXTERNAL_RJ_VALUE is the PRIMARY_VALUE_UNIT. If PRIMARY_VALUE_UNIT is no temperature unit (e.g. mV) EXTERNAL_RJ_VALUE is stated in °C. The allowed range is -50....+150°C other values will not be accepted.		
RJ_TEMP	Reference junction temperature. The unit of RJ_TEMP is the PRIMARY_VALUE_UNIT. If PRIMARY_VALUE_UNIT is no emperature unit (e.g. mV) RJ_TEMP is stated in °C.		
RJ_TYPE	Select reference junction from internal to fixed value. Defined codes: 0 = No reference: Compensation is not used (e.g. for TC Type B). 1 = Internal: Reference junction temperature is measured by the device itself via an internal sensor. 2 = External: The fixed value EXTERNAL_RJ_VALUE is used for compensation. Note: -For type B thermocouple Rj_type is always „No reference“. So if one changes the Lin_Type to type B the RJ-type is automatically changed to „No reference“ - For Lin_Type = linear and Input_range = mV and LINMODE_1 = linear the Rj_Type is fixed to „No reference“. Also for Lin_Type = linear and Input_range = Ω the Rj_Type is fixed to „No reference“. On the other hand if the linear input range = mV is selected with LINMODE_1 = polynome_n the RJ compensation can still be set to Internal or external or no reference.		
SECONDARY_VALUE1 (SV1)	Process value connected to the channel 1 corrected by BIAS_1. The unit of SECONDARY_VALUE1 is the PRIMARY_VALUE_UNIT.		
SECONDARY_VALUE2 (SV2)	Process value connected to the Sensor 2 corrected by BIAS_2. The unit of SECONDARY_VALUE2 is the PRIMARY_VALUE_UNIT.		
SENSOR_CONNECTION	Connection of the sensor 1, either 2, 3 or 4 wires connection. Defined codes: 0 = 2 wires 1 = 3 wires 2 = 4 wires This parameter is valid only if sensor1 is thermoresistance or linear resistance.		
SENSOR_MEAS_TYPE	Mathematical function to calculate PRIMARY_VALUE (PV). Defined codes: 0: PV = SV_1 1: PV = SV_2 128: PV = SV_1 - SV_2 Difference.. 129: PV = SV_2 - SV_1 Difference 192: PV = ½ * (SV_1 + SV_2) Average 193: PV = ½ * (SV_1 + SV_2) Average but SV_1 or SV_2 if the other is wrong 194: = reserved : 219: = reserved 220: = manufacturer specific : 239: = manufacturer specific		
UPPER_SENSOR_LIMIT	Physical upper limit function of sensor 1 (e.g. Pt 100 = 850°C) and input range.The unit of UPPER_SENSOR_LIMIT is the PRIMARY_VALUE_UNIT.		

Process Parameter, Manufacturer Specific Extensions

Parameter		Description
DIFFERENCE		T2-T1.If only one sensor is available, this value is NAN.
INPUT_ RANGE2		Electrical input range and mode of sensor 2, only active if Lin_Type2 is linear otherwise don´t care.
LINMODE_1		This activates the linearization for sensor 1. It selects one of four 4th order polynoms for the input. For using this feature, LIN_TYPE of sensor 1 has to be LINEAR.
LINMODE_2		This activates the linearization for sensor 2. It selects one of four 4th order polynoms for the input. For using this feature, LIN_TYPE_2 has to be LINEAR.
LOWER_SENSOR _LIMIT2		Minimum sensor temperature: physical lower limit of sensor 2. e.g.: Pt100 = -200 °C.
LIN_TYPE2		Select the type of sensor 2 (Code) for Thermocouples, Rtd or linear.
POLYNOM_C		Their are 4 sets of coefficents availabe to be used with a 4th order polynom Any of the the 4 sets could be used to linearize Sensor 1 or Sensor 2 (Linmode_1 and Linmode_2 must be set). For Linmode_1 and Linmode_2 all combinations are allowed e.g.: both set to polynom 1, or Linmode_1 = polynom 1 and Linmode_2 = 4 The polynom is: $y = A+Bx+Cx^2+Dx^3+Ex^4$. So a set of coefficients are defined by 5 coefficients (P_C1_A....P_C1_E). An additional index (1...4) seperates the 4 sets of coefficients. So every coefficient parameter (P_C1_n) consists of a float value and an index. There could be also a descriptor string set for each polynom so the operator can easily identify the polynom. The coefficients P_C1_n describe the polynom where x is a mV value and y is the corresponding temperature value in °C.
	P_C1_A	Coefficient A including the coefficient and the index.
	P_C1_B	Coefficient B including the coefficient and the index
	P_C1_C	Coefficient C including the coefficient and the index
	P_C1_D	Coefficient D including the coefficient and the index
	P_C1_E	Coefficient E including the coefficient and the index
	P_DESC	Descriptor String for the set of polynom coefficients
POLYNOM_ INDEX		Index of coefficient set, that should be read by a following read access via parameter P_Cn_m; m = [A...E] (same for P_C1_m , P_C2_m and P_DESC. Only effective for read access)
PT0DEG_ VALUE1		Value in Ohm at zero degrees for sensor 1, when SENSOR_TYPE of sensor 1 is PTxxx. In this case the standard table for PT100 is used as base and it's values are spreaded.
PT0DEG_ VALUE2		Value in Ohm at zero degrees for sensor 2, when SENSOR_TYPE_2 is PTxxx. In this case the standard table for PT100 is used as base and it's values are spreaded.
SENSOR_CONNE CTION2		Connection of the sensor 2, could be either 2, 3 wires connection. This parameter is valid only if sensor 2 type is thermoresistance or linear resistance.
UPPER_SENSOR_ LIMIT2		Maximum sensor temperature: physical upper limit function of sensor2. EG: Pt100=850 C.
RJ_TYPE2		Select reference junction from internal to fixed value. Defined codes: 0 = No reference: Compensation is not used (e.g. for TC Type B). 1 = Internal: Reference junction temperature is measured by the device itself via an internal sensor. 2 = External: The fixed value EXTERNAL_RJ_VALUE2 is used for compensation. Note: -For type B thermocouple Rj_type2 is always „No reference". So if one changes the Lin_Type_2 to type B the RJ_type2 is automatically changed to „No reference" - For Lin_Type_2 = linear and Input_range_2 = mV and LINMODE_2 = linear the Rj_Type is fixed to „No reference". Also for Lin_Type_2 = linear and Input_range_2 = Ω the Rj_Type is fixed to „No reference". On the other hand if the linear Input_Range = mV is selected with LINMODE_2 = polynome_n the RJ compensation can still be set to Internal or external or no reference.
EXTERNAL_ RJ_VALUE2		Fixed temperature value of an external reference junction. The unit of EXTERNAL_RJ_VALUE2 is the PRIMARY_VALUE_UNIT. If PRIMARY_VALUE_UNIT is no temperature unit (e.g. mV) EXTERNAL_RJ_VALUE2 is stated in °C. The allowed range is -50....+150°C other values will not be accepted.

Transducer Block Temperature Parameter Attributes

Rel. Index	Variable	Object type	Data type	Store	Size	Access	Parameter usage / Type of transport	Default Values	Man/ opt.	Slot	Absolute Index
0-7	Standard Parameters								m	4	0-7
8	Primary_value	record	DS-33	D	5	r	O/a	-	m	4	8
9	Primary_value_unit	simple	unsigned16	S	2	r,w	C/a	deg C	m	4	9
10	Secondary_value_1	record	DS-33	D	5	r	O/a	-	m	4	10
11	Secondary_value_2	record	DS-33	D	5	r	O/a	-	o	4	11
12	Sensor_meas_ type	simple	unsigned8 0 = Temp.1 1 = Temp.2 128 = T1-T2 129 = T2-T1 192 = Average 193 = Average but T1 or T2 if other is wrong	S	1	r,w	C/a	0	m	4	12
13	Input_range (sensor 1)	simple	unsigned8 0 = -15...115mV 128=0...400 129=0...4000	S	1	r,w	C/a	0	m	4	13
14	Lin_type (sensor 1)	simple	unsigned8 0=linear 128 = TC type B 129 = TC type C 130 = TC type D 131 = TC type E 133 = TC type J 134 = TC type K 139 = TC type L 135 = TC type N 136 = TC type R 137 = TC type S 138 = TC type T 140 = TC type U 102 = Pt100 105 = Pt1000 123 = Ni100 253 = Ptxxx xxx is Value in at 0 C	S	1	r,w	C/a	Pt100	m	4	14
19	Bias_1	simple	float	S	4	r,w	C/a	0	m	4	19
20	Bias_2	simple	float	S	4	r,w	C/a	0	o	4	20
21	Upper_sensor_ limit (sensor 1)	simple	float	N	4	r	C/a	-	m	4	21
22	Lower_sensor_ limit (sensor 1)	simple	float	N	4	r	C/a	-	m	4	22
24	Input_fault_gen	simple	unsigned8 Bit 0=RJ error 1=HW error	D	1	r	a	-	m	4	24

Rel. Index	Variable	Object type	Data type	Store	Size	Access	Parameter usage / Type of transport	Default Values	Man/ opt.	Slot	Absolute Index
25	Input_fault_1	simple	unsigned8 Bit 0 =underrange 1 =overrange. 2 = lead reakage 3 = short circuit	D	1	r	a	-	m	4	25
26	Input_fault_2	simple	unsigned8 see input_fault1	D	1	r	a	-	o	4	26
33	Rj_temp	simple	float	D	4	r	C/a	-	o	4	33
34	Rj_type	simple	unsigned8 0=no reference 1=internal 2=external	S	1	r,w	C/a	0	m	4	34
35	External_rj_value	simple	float	S	4	r,w	C/a	0	o	4	35
36	Sensor_connection (sensor 1)	simple	unsigned8 0 = 2 wires 1 = 3 wires 2 = 4 wires 4 wires only for single input	S	1	r,w	C/a	1	m	4	36
37	Comp_wire_1	simple	float	S	4	r,w	C/a	0	m	4	37
38	Comp_wire_2	simple	float	S	4	r,w	C/a	0	o	4	38
62	Lin_type2	simple	unsigned8 0=linear 251 = sensor 2 not available 128 = TC type B 129 = TC type C 130 = TC type D 131 = TC type E 133 = TC type J 134 = TC type K 139 = TC type L 135 = TC type N 136 = TC type R 137 = TC type S 138 = TC type T 140 = TC type U 102 = Pt100 105 = Pt1000 123 = Ni100 253 = Ptxxx xxx is Value in at 0 C	S	1	r,w	a	Pt100	s	4	62
63	Sensor_connection2	simple	unsigned8 0 = 2 wires 1 = 3 wires	S	1	r,w	a	1	s	4	63
64	Linmode_1	simple	unsigned8 0=linear 1=polynom1 2=polynom2 3=polynom3 4=polynom4	s	1	r,w	a	0	s	4	64

Rel. Index	Variable	Object type	Data type	Store	Size	Access	Parameter usage / Type of transport	Default Values	Man/ opt.	Slot	Absolute Index
65	Linmode_2	simple	unsigned8 0=linear 1=polynom1 2=polynom2 3=polynom3 4=polynom4	s	1	r,w	a	0	s	4	65
66	Pt0deg_value1	simple	float Range=50...1000	S	4	r,w	a	100	s	4	66
67	Pt0deg_value2	simple	float Range=50...1000	S	4	r,w	a	100	s	4	67
68	P_C1_A	record	DS-33	N	5	r,w	a	0, 1	s	4	68
69	P_C1_B	record	DS-33	N	5	r,w	a	0, 1	s	4	69
70	P_C1_C	record	DS-33	N	5	r,w	a	0, 1	s	4	70
71	P_C1_D	record	DS-33	N	5	r,w	a	0, 1	s	4	71
72	P_C1_E	record	DS-33	N	5	r,w	a	0, 1	s	4	72
73	P_ DESC	record	Visiblestring (16 Octects), unsigned8 (Range: 1...4)	N	17	r,w	a	‘ ‘, 1	s	4	73
74	Polynom_Index	simple	unsigned8 Range: 1...4	N	1	r,w	a	1	s	4	74
75	Input_range2 (sensor 2)	simple	unsigned8 0 = -15...115mV 128=0...400 129=0...4000	S	1	r,w	a	0	s	4	75
76	Upper_sensor_ limit2 (sensor 2)	simple	float	N	4	r	a	-	s	4	76
77	Lower_sensor_ limit2 (sensor 2)	simple	float	N	4	r	a	-	s	4	77
78	Difference	record	DS-33	D	5	r	O/a	-	s	4	78
79	Rj_type2	simple	unsigned8 0=no reference 1=internal 2=external	S	1	r,w	C/a	0	s	4	79
80	External_rj_value2	simple	float	S	4	r,w	C/a	0	so	4	80

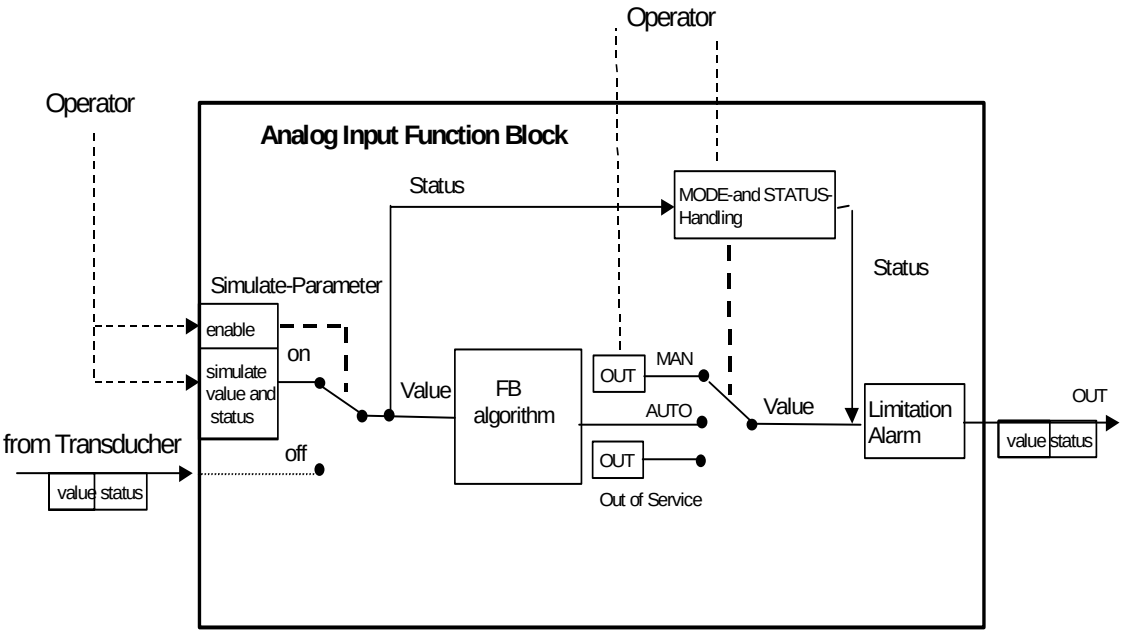
View Object Table

Relative Index	Parameter Mnemonic	Operation Dynamic VIEW_1	Operation Static VIEW_2	All Dynamic VIEW_3	Other static VIEW_4
0	BLOCK_OBJECT				
1	ST_REV	2			
2	TAG_DESCRIPTION				
3	STRATEGY				
4	ALERT_KEY				
5	TARGET_MODE				
6	MODE_BLK	3			
7	ALARM_SUM	8			
8	PRIMARY_VALUE	5			
24	INPUT_FAULT_GEN	1			
25	INPUT_FAULT_1	1			

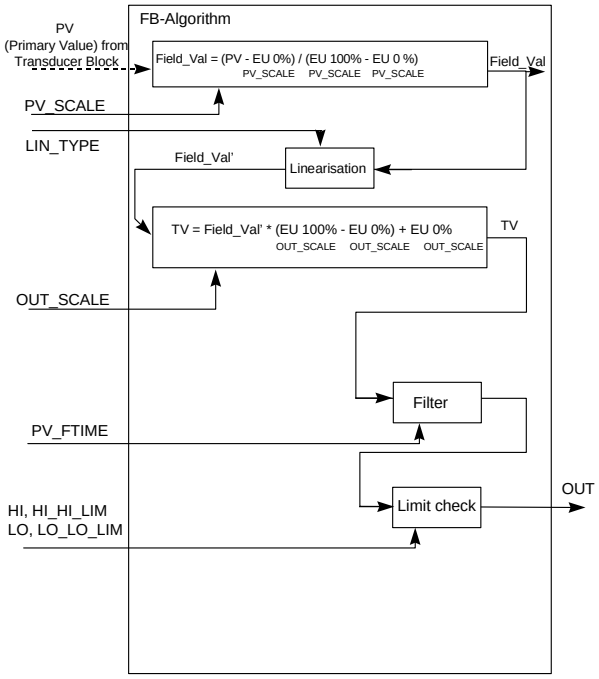
4 Function Block 1: Calculated Temperature

The Input for this function block is the parameter PRIMARY_VALUE, rel. Index 8, of the transducer block.

Simulation, Mode and Status diagram of Analog Input Function Block:



Parameter relationship of AI FB



Standard Parameter Description

See 1.1 Standard parameter description of physical block.

Standard Parameter Attributes

See 1.1.1 Standard parameter attributes of physical block.

Block Object of Function Block

E	Element Name	Data Type (Index)	Size	Value
1	Reserved	Unsigned 8 - (5)	1	-
2	Block Object	Unsigned 8 - (5)	1	2
3	Parent Class	Unsigned 8 - (5)	1	1
4	Class	Unsigned 8 - (5)	1	1
5	DD Reference	Unsigned 32 - (7)	4	-
6	DD Revision	Unsigned 16 - (6)	2	-
7	Profile	OctetString (10)	2	64; 2
8	Profile Revision	Unsigned 16 - (6)	2	3; 0
9	Execution Time	Unsigned 8 - (5)	1	-
10	Number_of_parameters	Unsigned 16 - (6)	2	45
11	Address of VIEW_1	Unsigned 16 - (6)	2	1;61
12	Number of View List	Unsigned 8 - (5)	1	1

Analog Input Function Block 1: Parameter Description

Process Parameter

Parameter	Description
BATCH	This parameter is intended to be used in Batch applications in line with IEC 61512 Part1. Only Function blocks carry this parameter. There is no algorithm necessary within a function block. 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.
CHANNEL	Reference to the active transducer block which provides the measurement value to the function block. In this application this value is constant.
LIN_TYPE	Type of linearisation. details see General Requirement. Here always zero.
OUT	Process Variable
PV_SCALE	Conversion of the Process Variable into percent using the high and low scale values. The engineering unit of PV_SCALE high and low scale values are 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	Scale of the process variable. It contains the values of the lower limit and upper limit effective range, engineering units code, and number of digits to the right of the decimal point.
PV_FTIME	Filter time of the Process Variable The function block parameter PV_FTIME contains the time constant for the rise time of the FB output up to a value of 63,21 % resulted from a jump on the input (PT1 filter). The engineering unit of the parameter is second.
ALARM_HYS	Hysteresis (effective to all limits).
HI_ALM	State of the upper limit of warnings. It contains the state of the upper limit of an alarm and the relating time stamp. Time stamp is not supported and therefore fixed to 0
HI_HI_ALM	State of the upper limit of alarms. It contains the state of the upper limit of an alarm and the relating time stamp. Time stamp is not supported and therefore fixed to 0
HI_HI_LIM	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.
HI_LIM	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_ALM	State of the lower limit of warnings. It contains the state of the lower limit of an alarm and the relating time stamp. Time stamp is not supported and therefore fixed to 0
LO_LIM	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_ALM	State of the lower limit of alarms. It contains the state of the lower limit of an alarm and the relating time stamp. Time stamp is not supported and therefore fixed to 0
LO_LO_LIM	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.
Simulate	For comissioning and test purposes the input from the transducer block can be disconnected, and the input value and status can be set by the parameter Simulate.

Analog Input Function Block 1: Parameter Attributes

Rel. Index	Variable	Object type	Data type	Store	Size	Access	Parameterusage/ Type of transport	Default Values	Man/ opt.	Slot	Absolute Index
0-7	Standard Parameters								m	1	16-23
8	BATCH	record	DS-67	S	10	r,w	C/a	0,0,0,0	m	1	24
10	OUT	record	DS-33	D	5	r	O/Cyc		m	1	26
11	PV_SCALE	array	float	S	8	r,w	C/a	100,0	m	1	27
12	OUT_SCALE	record	DS-36	S	11	r,w	C/a	100,0,-,-	m	1	28
13	LIN_TYPE	simple	unsigned8	S	1	r,w	C/a	0	m	1	29
14	CHANNEL	simple	unsigned16 0x0108	S	2	r,w	C/a	to TB, rel.Idx.8	m	1	30
16	PV_FTIME	simple	float Range = 0...60	S	4	r,w	C/a	0	m	1	32
19	ALARM_HYS	simple	float	S	4	r,w	C/a	0,5% of range	m	1	35
21	HI_HI_LIM	simple	float	S	4	r,w	C/a	*1	m	1	37
23	HI_LIM	simple	float	S	4	r,w	C/a	*1	m	1	39
25	LO_LIM	simple	float	S	4	r,w	C/a	*1	m	1	41
27	LO_LO_LIM	simple	float	S	4	r,w	C/a	*1	m	1	43
30	HI_HI_ALM	record	DS-39	D	16	r	C/a	0	o	1	46
31	HI_ALM	record	DS-39	D	16	r	C/a	0	o	1	47
32	LO_ALM	record	DS-39	D	16	r	C/a	0	o	1	48
33	LO_LO_ALM	record	DS-39	D	16	r	C/a	0	o	1	49
34	SIMULATE	record	DS-50	S	6	r,w	C/a	disable	m	1	50
36-44	Reserved by PNO										52-60

*1 The default values are lower sensor limit and upper sensor limit of the default sensor type1.

View Object Table

Relative Index	Parameter Mnemonic	Operation Dynamic VIEW_1	Operation Static VIEW_2	All Dynamic VIEW_3	Other static VIEW_4
1	ST_REV	2			
2	TAG_DESCRIPTION				
3	STRATEGY				
4	ALERT_KEY			0	BLOCK_OBJECT
5	TARGET_MODE				
6	MODE_BLK	3			
7	ALARM_SUM	8			
10	OUT	5			
11	PV_SCALE				
12	OUT_SCALE				
14	CHANNEL				
16	PV_FTIME				
19	ALARM_HYS				
21	HI_HI_LIM				
23	HI_LIM				
25	LO_LIM				
27	LO_LO_LIM				
30	HI_HI_ALM				
31	HI_ALM				
32	LO_ALM				
33	LO_LO_ALM				
34	SIMULATE				

5 Function Block 2: Process Temperatur 1

The Input for this function block is the parameter SECONDARY_VALUE1, rel. Index 10, of the transducer block.

Standard Parameter Description

See 1.1 Standard parameter description of physical block.

Standard Parameter Attributes

See 1.1.1 Standard parameter attributes of physical block.

Block Object of Function Block

E	Element Name	Data Type (Index)	Size	Value
1	Reserved	Unsigned 8 - (5)	1	-
2	Block Object	Unsigned 8 - (5)	1	2
3	Parent Class	Unsigned 8 - (5)	1	1
4	Class	Unsigned 8 - (5)	1	1
5	DD Reference	Unsigned 32 - (7)	4	-
6	DD Revision	Unsigned 16 - (6)	2	-
7	Profile	OctetString (10)	2	64; 2
8	Profile Revision	Unsigned 16 - (6)	2	3; 0
9	Execution Time	Unsigned 8 - (5)	1	-
10	Number_of_parameters	Unsigned 16 - (6)	2	45
11	Address of VIEW_1	Unsigned 16 - (6)	2	2;61
12	Number of View List	Unsigned 8 - (5)	1	1

Analog Input Function Block 2: Parameter Description

Process Parameter

Parameter	Description
BATCH	This parameter is intended to be used in Batch applications in line with IEC 61512 Part1. Only Function blocks carry this parameter. There is no algorithm necessary within a function block. 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.
CHANNEL	Reference to the active transducer block which provides the measurement value to the function block. In this application this value is constant.
LIN_TYPE	Type of linearisation. details see General Requirement. Here always zero.
OUT	Process Variable
PV_SCALE	Conversion of the Process Variable into percent using the high and low scale values. The engineering unit of PV_SCALE high and low scale values are 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	Scale of the process variable. It contains the values of the lower limit and upper limit effective range, engineering units code, and number of digits to the right of the decimal point.
PV_FTIME	Filter time of the Process Variable The function block parameter PV_FTIME contains the time constant for the rise time of the FB output up to a value of 63,21 % resulted from a jump on the input (PT1 filter). The engineering unit of the parameter is second.

Alarm Parameter and Simulation

Parameter	Description
ALARM_HYS	Hysteresis (effective to all limits).
HI_ALM	State of the upper limit of warnings. It contains the state of the upper limit of an alarm and the relating time stamp. Time stamp is not supported and therefore fixed to 0
HI_HI_ALM	State of the upper limit of alarms. It contains the state of the upper limit of an alarm and the relating time stamp. Time stamp is not supported and therefore fixed to 0
HI_HI_LIM	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.
HI_LIM	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_ALM	State of the lower limit of warnings. It contains the state of the lower limit of an alarm and the relating time stamp. Time stamp is not supported and therefore fixed to 0.
LO_LIM	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_ALM	State of the lower limit of alarms. It contains the state of the lower limit of an alarm and the relating time stamp. Time stamp is not supported and therefore fixed to 0
LO_LO_LIM	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.
Simulate	For comissioning and test purposes the input from the transducer block can be disconnected, and the input value and status can be set by the parameter Simulate.

Analog Input Function Block 2: Parameter Attributes

Rel. Index	Variable	Object type	Data type	Store	Size	Access	Parameterusage/ Type of transport	Default Values	Man/ opt.	Slot	Absolute Index
0-7	Standard Parameters								m	2	16-23
8	BATCH	record	DS-67	S	10	r,w	C/a	0,0,0,0	m	2	24
10	OUT	record	DS-33	D	5	r	O/Cyc		m	2	26
11	PV_SCALE	array	float	S	8	r,w	C/a	100,0	m	2	27
12	OUT_SCALE	record	DS-36	S	11	r,w	C/a	100,0,-,-	m	2	28
13	LIN_TYPE	simple	unsigned8	S	1	r,w	C/a	0	m	2	29
14	CHANNEL	simple	unsigned16 0x010a	S	2	r,w	C/a	toTB,rel. Idx. 10	m	2	30
16	PV_FTIME	simple	float Range = 0...60	S	4	r,w	C/a	0	m	2	32
19	ALARM_HYS	simple	float	S	4	r,w	C/a	0,5% of range	m	2	35
21	HI_HI_LIM	simple	float	S	4	r,w	C/a	*1	m	2	37
23	HI_LIM	simple	float	S	4	r,w	C/a	*1	m	2	39
25	LO_LIM	simple	float	S	4	r,w	C/a	*1	m	2	41
27	LO_LO_LIM	simple	float	S	4	r,w	C/a	*1	m	2	43
30	HI_HI_ALM	record	DS-39	D	16	r	C/a	0	o	2	46
31	HI_ALM	record	DS-39	D	16	r	C/a	0	o	2	47
32	LO_ALM	record	DS-39	D	16	r	C/a	0	o	2	48
33	LO_LO_ALM	record	DS-39	D	16	r	C/a	0	o	2	49
34	SIMULATE	record	DS-50	S	6	r,w	C/a	disable	m	2	50
36-44	Reserved by PNO										52-60

*1 The default values are lower sensor limit and upper sensor limit of the default sensor 1 type.

View Object Table

Relative Index	Parameter Mnemonic	Operation Dynamic VIEW_1	Operation Static VIEW_2	All Dynamic VIEW_3	Other static VIEW_4
0	BLOCK_OBJECT				
1	ST_REV	2			
2	TAG_DESCRIPTION				
3	STRATEGY				
4	ALERT_KEY				
5	TARGET_MODE				
6	MODE_BLK	3			
7	ALARM_SUM	8			
10	OUT	5			
11	PV_SCALE				
12	OUT_SCALE				
14	CHANNEL				
16	PV_FTIME				
19	ALARM_HYS				
21	HI_HI_LIM				
23	HI_LIM				
25	LO_LIM				
27	LO_LO_LIM				
30	HI_HI_ALM				
31	HI_ALM				
32	LO_ALM				
33	LO_LO_ALM				
34	SIMULATE				

6 Function Block 3: Process Temperature 2

The Input for this function bloc is the parameter SECONDARY_VALUE2, rel. Index 11, of the transducer bloc.

Standard Parameter Description

See 1.1 Standard parameter description of physical block.

Standard Parameter Attributes

See 1.1.1 Standard parameter attributes of physical block.

Block Object of Function Block

E	Element Name	Data Type (Index)	Size	Value
1	Reserved	Unsigned 8 - (5)	1	-
2	Block Object	Unsigned 8 - (5)	1	2
3	Parent Class	Unsigned 8 - (5)	1	1
4	Class	Unsigned 8 - (5)	1	1
5	DD Reference	Unsigned 32 - (7)	4	-
6	DD Revision	Unsigned 16 - (6)	2	-
7	Profile	OctetString (10)	2	64; 2
8	Profile Revision	Unsigned 16 - (6)	2	3; 0
9	Execution Time	Unsigned 8 - (5)	1	-
10	Number_of_parameters	Unsigned 16 - (6)	2	45
11	Address of VIEW_1	Unsigned 16 - (6)	2	3;61
12	Number of View List	Unsigned 8 - (5)	1	1

Analog Input Function Block 3: Parameter Description

Process Parameter

Parameter	Description
BATCH	This parameter is intended to be used in Batch applications in line with IEC 61512 Part1. Only Function blocks carry this parameter. There is no algorithm necessary within a function block. 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 lerts.
CHANNEL	Reference to the active transducer block which provides the measurement value to the function block. In this application this value is constant.
LIN_TYPE	Type of linearisation. details see General Requirement. Here always zero.
OUT	Process Variable
PV_SCALE	Conversion of the Process Variable into percent using the high and low scale values. The engineering unit of PV_SCALE high and low scale values are 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	Scale of the process variable. It contains the values of the lower limit and upper limit effective range, engineering units code, and number of digits to the right of the decimal point.
PV_FTIME	Filter time of the Process Variable The function block parameter PV_FTIME contains the time constant for the rise time of the FB output up to a value of 63,21 % resulted from a jump on the nput (PT1 filter). The engineering unit of the parameter is second.

Alarm Parameter and Simulation

Parameter	Description
ALARM_HYS	Hysteresis (effective to all limits).
HI_ALM	State of the upper limit of warnings. It contains the state of the upper limit of an alarm and the relating time stamp. Time stamp is not supported and therefore fixed to 0
HI_HI_ALM	State of the upper limit of alarms. It contains the state of the upper limit of an alarm and the relating time stamp. Time stamp is not supported and therefore fixed to 0
HI_HI_LIM	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.
HI_LIM	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_ALM	State of the lower limit of warnings. It contains the state of the lower limit of an alarm and the relating time stamp. Time stamp is not supported and therefore fixed to 0
LO_LIM	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_ALM	State of the lower limit of alarms. It contains the state of the lower limit of an alarm and the relating time stamp. Time stamp is not supported and therefore fixed to 0
LO_LO_LIM	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.
Simulate	For comissioning and test purposes the input from the transducer block can be disconnected, and the input value and status can be set by the parameter Simulate.

Analog Input Function Block 3: Parameter Attributes

Rel. Index	Variable	Object type	Data type	Store	Size	Access	Parameter usage/ Type of transport	Default Values	Man/ opt.	Slot	Absolute Index
0-7	Standard Parameters								m	3	16-23
8	BATCH	record	DS-67	S	10	r,w	C/a	0	m	3	24
10	OUT	record	DS-33	D	5	r	O/Cyc		m	3	26
11	PV_SCALE	array	float	S	8	r,w	C/a	100,0	m	3	27
12	OUT_SCALE	record	DS-36	S	11	r,w	C/a	100,0,-,-	m	3	28
13	LIN_TYPE	simple	unsigned8	S	1	r,w	C/a	0	m	3	29
14	CHANNEL	simple	unsigned16 0x010b	S	2	r,w	C/a	toTB,rel. Idx. 11	m	3	30
16	PV_FTIME	simple	float Range = 0...60	S	4	r,w	C/a	0	m	3	32
19	ALARM_HYS	simple	float	S	4	r,w	C/a	0,5% of range	m	3	35
21	HI_HI_LIM	simple	float	S	4	r,w	C/a	*1	m	3	37
23	HI_LIM	simple	float	S	4	r,w	C/a	*1	m	3	39
25	LO_LIM	simple	float	S	4	r,w	C/a	*1	m	3	41
27	LO_LO_LIM	simple	float	S	4	r,w	C/a	*1	o	3	43
30	HI_HI_ALM	record	DS-39	D	16	r	C/a	0	o	3	46
31	HI_ALM	record	DS-39	D	16	r	C/a	0	o	3	47
32	LO_ALM	record	DS-39	D	16	r	C/a	0	o	3	48
33	LO_LO_ALM	record	DS-39	D	16	r	C/a	0	o	3	49
34	SIMULATE	record	DS-50	S	6	r,w	C/a	disable	m	3	50
36-44	Reserved by PNO										52-60

*1 The default values are lower sensor limit and upper sensor limit of the default sensor 2 type.

View Object Table

Relative Index	Parameter Mnemonic	Operation Dynamic VIEW_1	Operation Static VIEW_2	All Dynamic VIEW_3	Other static VIEW_4
0	BLOCK_OBJECT				
1	ST_REV	2			
2	TAG_DESCRIPTION				
3	STRATEGY				
4	ALERT_KEY				
5	TARGET_MODE				
6	MODE_BLK	3			
7	ALARM_SUM	8			
10	OUT	5			
11	PV_SCALE				
12	OUT_SCALE				
14	CHANNEL				
16	PV_FTIME				
19	ALARM_HYS				
21	HI_HI_LIM				
23	HI_LIM				
25	LO_LIM				
27	LO_LO_LIM				
30	HI_HI_ALM				
31	HI_ALM				
32	LO_ALM				
33	LO_LO_ALM				
34	SIMULATE				

7 Mapping to PROFIBUS

SLOT	INDEX decimal	Description
1	2	DEVICE MANAGEMENT
1	3...13	not used / Reserved by PNO
1	16...60	Analog Input Function Block (Calc. Temp.)
1	61	View Object Function Block (Calc. Temp.)
1	114... 146	PHYSICAL BLOCK
1	147	View Object Physical Block
2	16...60	Analog Input Function Block (Proc. Temp. 1)
2	61	View Object Function Block (Proc. Temp. 1)
3	16...60	Analog Input Function Block (Proc. Temp. 2)
3	61	View Object Function Block (Proc. Temp. 2)
4	0...80	TRANSDUCER BLOCK TEMPERATURE
5	81	View Object Transducer Block TEMPERATURE
5	0..5	Test Block

Cyclic Data Communication

The cyclic data telegram has the following structure:

Byte	Data	Access	Data Format
0 - 4	Function Block 1 rel. Index 10 (OUT)	r	Meas.val.t (32-Bit floating point (IEEE-754)) State Byte (80h = 0k)
5 - 9	Function Block 2 rel. Index 10 (OUT)	r	Meas.val. (32-Bit floating point (IEEE-754)) State Byte (80h = 0k)
10 - 14	Function Block 3 rel. Index 10 (OUT)	r	Meas.val. (32-Bit floating point (IEEE-754)) State Byte (80h = 0k)

The status byte is coded according to "PROFIBUS-PA Profile for Process Control Devices"

The above table shows the maximum length of a cyclic data telegram. The telegram could be fit to the needs of the application. So if not all of the output data of the transmitter is necessary to transmit, the master class I has the possibility to configure the number of output data he needs to have on cyclic communication. This configuration could only be done when the master starts the communication with the slave.

According to the PROFIBUS spec´s the master has to send for each of the 3 output values (or block) either a "42h 84h 08h 05h" to make this block active or a FREE PLACE "00h" to make this block inactive, as configuration data (CHK_CFG). The "42h 84h 08h 05h" may also be replaced by „94h“as defined by the Profile spec. The table below shows all possibilties of configuration and the effect to the output data or cyclic data of the transmitter.

Configuration data (CHK_CFG) Special Format	Configuration data (CHK_CFG) Identifier Bytes	Function block 1	Function block 2	Function block 3	Number of Output bytes
42h 84h 08h 05h 00h 00h	94h 00h 00h	active	inactive	inactive	5
00h 42h 84h 08h 05h 00h	00h 94h 00h	inactive	active	inactive	5
00h 00h 42h 84h 08h 05h	00h 00h 94h	inactive	inactive	active	5
42h 84h 08h 05h 42h 84h 08h 05h 00h	94h 94h 00h	active	active	inactive	10
00h 42h 84h 08h 05h 42h 84h 08h 05h	00h 94h 94h	inactive	active	active	10
42h 84h 08h 05h 00h 42h 84h 08h 05h	94h 00h 94h	active	inactive	active	10
42h 84 08h 05h 42h 84h 08h 05h 42h 84h 08h 05h	94h 94h 94h	active	active	active	15

Manufacturer Specific Cyclic Data Communication

The following configuration telegram allowes to select secondary values of the transducer bloc.

Byte	Data	Access	Data Format
0 - 4	Analog Input Function Block 1, rel. index 10	r	32-Bit floating point (IEEE-754)) State Byte (80h = 0k)
5 - 9	Transducer Block, rel. Index 82 Difference (T2-T1)	r	32-Bit floating point (IEEE-754) State Byte (80h = 0k)

It is assumed that these parameters belongs to a virtual fourth function bloc. So the configuration telegram is as follows:

0x42h 0x84h 0x08h 0x05h 0x00h 0x00h 0x42h 0x84 0x08h 0x05h

8 Listing of not supported optional Parameters

All optional parameters that are mentioned within the Profile 3.0 of the PNO but not supported by the device are listed here.

Physical Block

rel. Index	Variable Name
23	LOCAL_OP_ENA
25	HW_WRITE_PROTECTION

Transducer Block

rel. Index	Variable Name
27	SENSOR_WIRE_CHECK1
28	SENSOR_WIRE_CHECK2
29	MAX_SENSOR_VALUE1
30	MIN_SENSOR_VALUE1
31	MAX_SENSOR_VALUE2
32	MIN_SENSOR_VALUE2
45	TAB_INDEX
46	TAB_X_Y_VALUE
47	TAB_MIN_NUMBER
48	TAB_MAX_NUMBER
49	TAB_OP_CODE
50	TAB_STATUS
51	TAB_ACTUAL_NUMBER

Analog Input Function Blocks

This table is valid for all the analog input function blocks.

rel. Index	Variable Name
17	**FSAFE_TYPE**
18	**FSAVE_VALUE**
35	**OUT_UNIT_TEXT**

9 Datatypes

The datatypes are defined by the Profibus PA Profile document and are listed here as reference only.

Block structure (DS 32)

Index	E	Element name	Data type (index)	Size
32	1	Reserved	UNSIGNED8 - (5)	1
	2	Block object	UNSIGNED8 - (5)	1
	3	Parent class	UNSIGNED8 - (5)	1
	4	Class	UNSIGNED8 - (5)	1
	5	DD reference	UNSIGNED32 - (7)	4
	6	DD revision	UNSIGNED16 - (6)	2
	7	Profile	UNSIGNED16 - (6)	2
	8	Profile revision	UNSIGNED16 - (6)	2
	9	Execution time	UNSIGNED8 - (5)	1
	10	Number of parameters	UNSIGNED16 - (6)	2
	11	Index of VIEW_1	UNSIGNED16 - (6)	2
	12	Number of view lists	UNSIGNED8 - (5)	1

Value and Status (DS 33)

This data structure consists of the values and the state of the Floating Point parameters. These parameters can be inputs or outputs.

DataType Value & Status - Floating Point

Key Attribute Index = 33

Attribute: Number of Elements = 2

Attribute: Lists of Elements (shown below)

E	Element Name	Data Type (Index)	Size
1	Value	Float (8)	4
2	Status	Unsigned 8 (5)	1

Coding of Status for Transducer Block:

Note: Bit 0,1 are assumed to be 0 for the following table

Code (hexadecimal)	Meaning	caused by
4	Bad, configuration error	DIA_CONF_INVALID is active or Extended Diagnoses: ADC_CALIBRATED active
0C	Bad, device failure	DIA_HW_ELECTR or DIA_MEM_CHECKSUM is active
10	Bad, Sensor failure	DIA_MEASUREMENT active (Open / Short circuit of sensor)
20	Configuration Error	Variable not supported
50	Uncertain, Sensor conversion not accurate	Measuring value out of sensor limits
80	Good	---

Coding of Status for Function Block:

Note: Bit 0,1 are assumed to be 0 for the following table

Code (hexadecimal)	Meaning	caused by
1C	Bad, Out of service	Mode_Blk = out of service
44	Uncertain, last usable value	Fail safe active, after normal operation
60	Uncertain, simulated value	Mode_Blk = manual, Out value is set by operator
4C	Uncertain, initial value	Fail safe active, after power on without normal operation
54	Uncertain, engineering unit violation	Primary_value out of PV_Scale settings.
80	Good	---
88	Good, active advisory alarm	High_Lim or Low_Lim active
8C	Good, active critical alarm	High_High_Lim or Low_Low_Lim active

For all Status messages of class bad or uncertain bit 0,1 give the information of the limit status:

bit 1	bit 0	Meaning
0	0	Ok
0	1	Low Limit
1	0	High Limit
1	1	Constant output

Scaling structure (DS 36)

Index	E	Element name	Data type (index)	Size
36	1	EU at 100%	FLOAT - (8)	4
	2	EU at 0%	FLOAT - (8)	4
	3	Unit index	UNSIGNED16 - (6)	2
	4	Decimal point	INTEGER - (2)	1

Decimal point is a memo how many digit after the point are valid.

Mode structure (DS37)

Index	E	Element name	Data type (index)	Size
37	1	Actuel	UNSIGNED8 - (5)	1
	2	Permitted	UNSIGNED8 - (5)	1
	3	Normal	UNSIGNED8 - (5)	1

Alarm Float structure (DS39)

Index	E	Element name	Data type (index)	Size
39	1	Unacknowledged	UNSIGNED8 - (5)	1
	2	Alarm state	UNSIGNED8 - (5)	1
	3	Time stamp	TIME_VALUE - (21)	8
	4	Subcode	UNSIGNED16 - (6)	2
	5	Value	Float- (8)	4

Alarm Summary Structure (DS 42)

This data structure consists of data that summarize 16 alarms.

DataType Alarm Summary

Key Attribute Index = 42

Attribute Number of Elements = 4

Attribute Lists of Elements (shown below)

E	Element Name	Data Type (Index)	Size
1	Current	Octet String - (10)	2
2	Unacknowledged	Octet String - (10)	2
3	Unreported	Octet String - (10)	2
4	Disabled	Octet String - (10)	2

Table 28.List of elements of the Alarm Summery Structure

Bits of the Octet String are associated with the following alarms:

Octet 0

0 = Discrete alarm (LSB) (only Function Blocks with discrete limit parameters)

1 = HI_HI_Alarm (only Function Blocks with analog limit parameters)

2 = HI_Alarm (only Function Blocks with analog limit parameters)

3 = LO_LO_Alarm (only Function Blocks with analog limit parameters)

4 = LO_Alarm (only Function Blocks with analog limit parameters)

5 = reserved

6 = reserved

7 = Update Event (e.g. increment of ST_REV)

Octet 1

0 -7 = reserved

Current	Limit alarm bits will be set to 1 or 0 if the alarm reason occurs (1) or is gone (0). The update event bit will be set to 1 after ST_REV increment or other problems (see block specification) and will be set to 0 after 10 s.
Unreported	for future use
Unacknowledged	for future use
Disabled	for future use

Simulation parameter for floating point (DS 50)

Index	E	Element name	Data type (index)	Size
50	1	Simulate status	UNSIGNED8 - (5)	1
	2	Simulate value	FLOAT - (8)	4
	3	Simulate emabled	UNSIGNED8 - (5)	1

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