OPERATING MANUAL

PMT50Ex

Progr. Universal-Transmitter

Signal conditioning
linearization
output characteristic
transformation

umn_pmt50ex_vs2.08_en

senseca

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1 Product description

1.1 Features

- Input intrinsically safe ATEX II (1) G [Ex ia] IIC/IIB
  ATEX II (1) D [Ex iaD]
- for standard signals, resistance/poti or Pt100/Pt1000 and thermocouples J, K, N, S
- Measuring range programmable
- Installed units:
- mV, V, mA, A, Ω, kΩ, µS/cm, mS/cm, °C, °F, min-1, rpm, bar, mbar, hPa, mm, cm, m, %, °, l, l/min, m^3, m^3/h, ppm and custom units programmable
- Transmitter supply 16 V DC, max. 20 mA
- Linearization or transformation of output characteristic via 32 base-points programmable
- Basic accuracy <0.2 %
- Teach-In and simulator function
- Fault monitoring for break of wire and short-circuit in the measuring circuit
- Programmable fault function: Analog output min. or max. overflow Alarm outputs min. or max. function
- Analog output 0/4 ... 20 mA; 0/2 ... 10 V DC
- 2 alarm outputs (relay SPDT)
- Full 3-port isolation

1.2 General

The programmable measurement transmitter PMT50Ex operates with analog input signals direct out of the endangered area. The device convert input signals to analog output 0/4 ... 20 mA; 0/2 ... 10 V DC. Optional a se- rial interface is available. According to the model version, temperature probes or potis situated in the explosive area are connected to the device direct or an intrinsic safe transmitter supply allows feeding of 2-wire transmit- ters. The device offers a linearization function for any sensor curves and a simulator function. 2 alarm outputs for monitoring are available.

1.3 Short information

Programming	The device is programmed by frontal buttons, in connection with the LCD display.
Alarm outputs	The alarm outputs can be programmed as max. or min. function. Switch-on delay and switch-off delay time is programmable from 1 s up to 9 h. The switching status is displayed through LED´s.
Teach-In Funktion	The input signals for start- and end value or the values of the characteristic curve will be stored automatically. Only the corresponding display values have to be entered manually.
Fault function	A fault in the measuring circuit could be monitored (break of wire/short-circuit). The switching function of the analog and alarm output(s) is programmable in case of an fault.

2 Technical data

Power supply	
Supply voltage	230 V AC ±10 %, 115 V AC ±10 %, or 24 V DC ±15 % Um 253 V AC or 125 V DC (Terminals 11 and 13)
Power consumption	< 5 VA
Operating temperature	-10 ... +55 °C (14 ... 131 °F)
Rated voltage	250 V AC between input/relay output/analog output/supply voltage degree of pollution 2, overvoltage category III
Test voltage	4 kV DC between input/relay output/analog output/supply voltage
Conformity	CE

Explosion protection				
Certification	 II (1) G [Ex ia] IIC/IIB bzw. II (1) D [Ex iaD]			
Approval	TÜV 08 ATEX 554329			
Inputs Model 1				
Input	0/2 ... 10 V DC, 0/4 ... 20 mA			
Fault detection	Break of wire			
Input resistance	Current input 10 Ω, voltage input 10 kΩ (Terminals 45, 46, 47)			
Basic accuracy	<0.1 %, ±1 Digit			
Temperature coefficient	0.01 %/K			
Max. voltage (no load) U_0	18.9 V			
Max. short circuit current I_0	92,5 mA			
Max. power consumption t P_0	580 mW			
Resistance R	272 Ω			
Characteristic curve	trapezoidal			
Internal inductivity	4 µH			
Internal capacity	1.2 nF			
Transmitter supply	approx. 16 V DC, max. 20 mA (Terminal 48)			
Explosion protection	**Ex**	**ia/IIC oder**	**ia/IIC**	**ia/IIB**
Maxim. external inductivity		2.3 mH	0.1 mH	5 mH
Maxim. external capacity		0.12 µF	0.22 µF	0.76 µF
At connection of externally supplied active and intrinsically safe circuits the rules for the interconnection to intrinsically safe circuits have to be observed.				
Max. values	U_i		30 V	
	I_i		52 mA	
	P_i		980 mW	

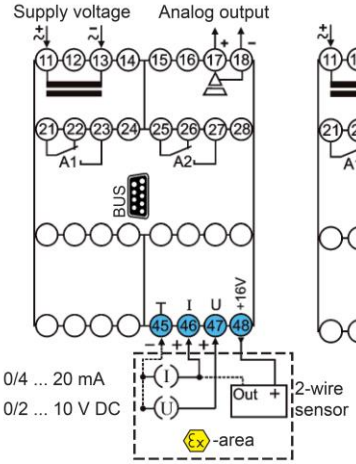
Model 2			
Input	Resistance 0 ... 20 kΩ (Terminals 35, 36, 37, 38;)		
Fault detection	Break of wire		
Basic accuracy	<0.2 %, ±1 Digit		
Temperature coefficient	0.01 %/K		
Max. voltage (no load) U_0	1.4 V		
Max. short circuit current I_0	2.5 mA		
Max. power consumption P_0	3 mW		
Resistance R	5600 Ω		
Chraracteristic curve	trapezoidal		
Internal inductivity	4 µH		
Internal capacity	135 nF		
Explosion protection	**Ex**	**ia/IIC**	**ia/IIB**
Maxim. external inductivity		100 mH	100 mH
Maxim. external capacity		25 µF	120 µF
Input	Potentiometer 1 ... 100 k0 (Terminals 45, 47, 48)		
Basic accuracy	<0.2 %, ±1 Digit		
Temperature coefficient	0.01 %/K		
Max. voltage (no load) U_0	9.6 V		
Max. short circuit current I_0	56 mA		
Max. power consumption P_0	200 mW		
Resistance R	259 Ω		
Chraracteristic curve	trapezoidal		
Internal inductivity	4 µH		
Internal capacity	negligible		
Explosion protection	**Ex**	**ia/IIC**	**ia/IIB**
Maxim. external inductivity		5 mH	20 mH
Maxim. external capacity		0.48 µF	2 µF

Model 3			
Input	Pt100 (3-wire) -100.0 ... 600.0 °C / -100 ... 600 °C Pt1000 (3-wire) -100.0 ... 300.0 °C / -100 ... 300°C Thermocouples (TC) Type J -100.0 ... 800.0 °C / -100 ... 800 °C Type K -150 ... 1200 °C Type N -150 ... 1200 °C Type S -50 ... 1600 °C (Terminals 35, 36, 37; 45, 47)		
Fault detection	Break of wire (Pt100/1000,TC) or short-circuit (only Pt100/1000)		
Basic accuracy	<0.1 %, ±1 Digit		
Temperature coefficient	0.01 %/K		
Max. voltage (no load) U_0	1.4 V		
Max. short circuit current I_0	2.5 mA		
Max. power consumption P_0	3 mW		
Resistance R	5600 Ω		
Characteristic curve	trapezoidal		
Internal inductivity	4 µH		
Internal capacity	135 nF		
Explosion protection	**Ex**	**ia/IIC**	**ia/IIB**
Maxim. external inductivity		100 mH	100 mH
Maxim. external capacity		25 µF	120 µF
Outputs			
Alarm outputs A1, A2	Relay SPDT < 250 V AC < 250 VA < 2 A cos<. 2: 0.3, < 300 V DC < 40 W <2 A (Terminals 21, 22, 23; 25, 26, 27)		
Analog output	0/4 ... 20 mA burden: 500 O; 0/2 10 V burden >500 O, galv. isolated, output changes automatically (burden impedance dependent)		
Accuracy	0.2 %; TK 0.01 %/K		
For connection at electrical equipment with supply voltage of max. 230V (Terminals 17 and 18)			

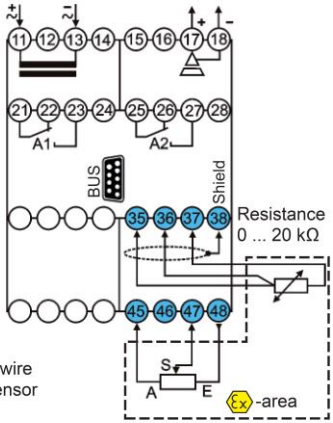
Fault function	For break of wire or short-circuit detection -belongs to the model- → Analog output 0 mA, < 3.6 mA or > 21.5 mA programmable → Alarm output(s) min. or max. function programmable
Display	Graphic LCD-Display 128x64 pixels, white background illuminated
Case	Polyamide (PA) 6.6 , UL94V-0 - DIN rail mounting TS 35
Weight	Approx. 450 g
Connection	Screw terminals 0.14 2.5 mm² (AWG 26 .. 14)
Protection	Case IP30, terminals IP20, German BGV A3

3 Connection diagram

Model PMT50Ex-1
Standard signals

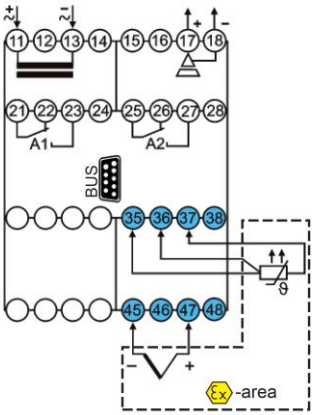


Model PMT50Ex-2
Resistance; potentiometer



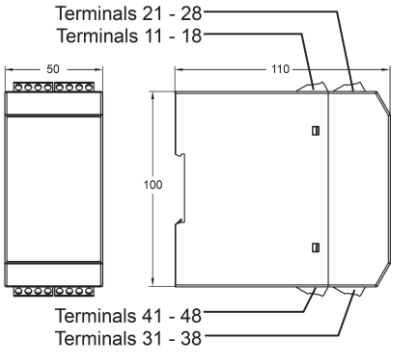
Poti
1 kΩ ... 100 kΩ,
slider current <1 µA

Model PMT50Ex-3
Pt100,Pt1000; thermocouple



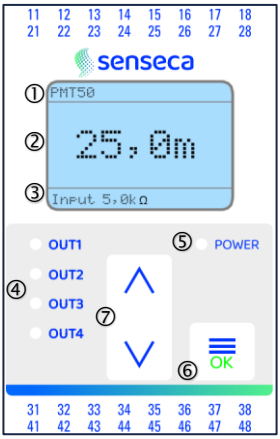
Pt100/Pt1000 3-wire,
2-wire (link terminal 35-36),
thermocopules J, K, N, S

Dimensions



4 Control and indicators

①Device name
②Measured value
③Input signal
④Alarm output A1...A4
(A3 and A4 not available)
⑤Power-ON LED
⑥Parameter button
⑦Up/down buttons



The operation of the device is implemented in 2 levels. The required parameter is called up with the button

The selection within a parameter and the setting-adjustment of a value is implemented with the buttons and .

Button combinations (press buttons simultaneously):

+ 1 Parameter back

+ Parameter is set to "O" or minimum value.

After the switching on the supply voltage, the device initializes itself. In the display the message indicating de- vice type and software version is shown. After the initialization, the device is running in the working level. The peak value storage is called up and the setpoints of the alarm outputs can be programmed.

The configuration level is called up by activation of the buttor for 2 seconds. In this case, all parameters which determine the properties of the device are programmed. After the last menu item, or if no button is pressed for longer than 2 minutes, a skip-back into the working level is implemented automatically and the current measured value is indicated in the display. The configuration level can be exited at any time by holding down button for 2 seconds.

Error reports

In case of occurring faults, the messages are shown on the display in plain text. This simplifies the location of the error. See explanation page 23.

Operational startup reference

The device is preset with an ex-works default setting. Therefore, it must be adapted to each special application. See Page 16.

⚠ **Danger!** Requirements

It is necessary to keep the conditions of the ATEX EU-Type Examination Certificate.

The device must be installed in dry and good monitored rooms.

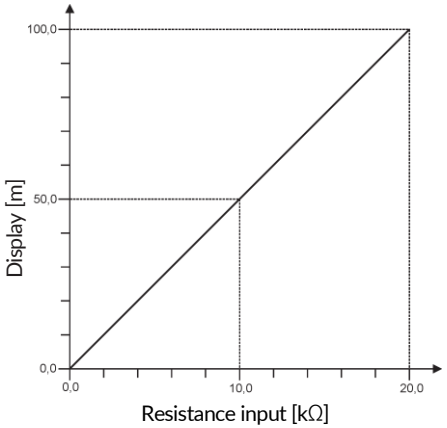
If the intrinsinc safety input is connected to the dust endangered area of zone 2O or 21, it has to be ensured that the corresponding devices in this circuit have the requirements of category 1D or 2D.

Repairing and design modifications are only allowed at works.

5 Explanations for characteristic curve programming

5.1 Linear curve (see page 18)

The linear curve needs only one value pair for start- and end value. At this every input value, the corresponding display value has to be assigned. See example:



Example:

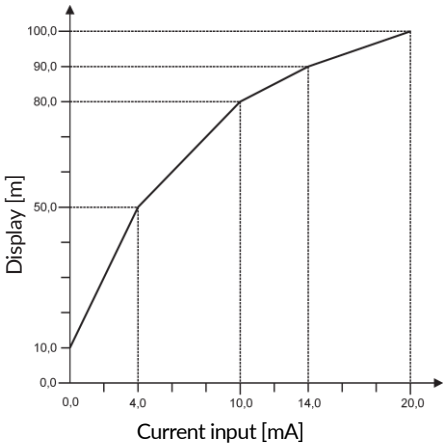
Input	Resistance
Start value	0,0 kΩ
End value	20,0 kΩ

Display	Height [m]
Start value	0,0 m
End value	100,0 m

In this example, 4 values for input and display range are needed. Every interim value belongs to the curve. Example: an input value of 10.0 kΩ is leading to the display value of 50.0 m.

5.2 Nonlinear curve (see page 19)

The nonlinear curve can have max. 32 value pairs for input and output to emulate the curve. At this, for every input value a display value can be programmed. Every interim value belongs to the curve.



Example: curve with 5 basepoints

Input	0 ... 20 mA	
Display	0,0 ... 100,0 m	
Basepoint	Input value	Display value
1	0.0 mA	10.0 m
2	4.0 mA	50.0 m
3	10.0 mA	80.0 m
4	14.0 mA	90.0 m
5	20.0 mA	100.0 m

The curve above shows clearly the classification between input signal and display value. This example has 5 value pairs. For every input value the corresponding display value has to be programmed. The procedure is finished, if the but is pressed after the last basepoint programming and OFF is selected in the following parameter.

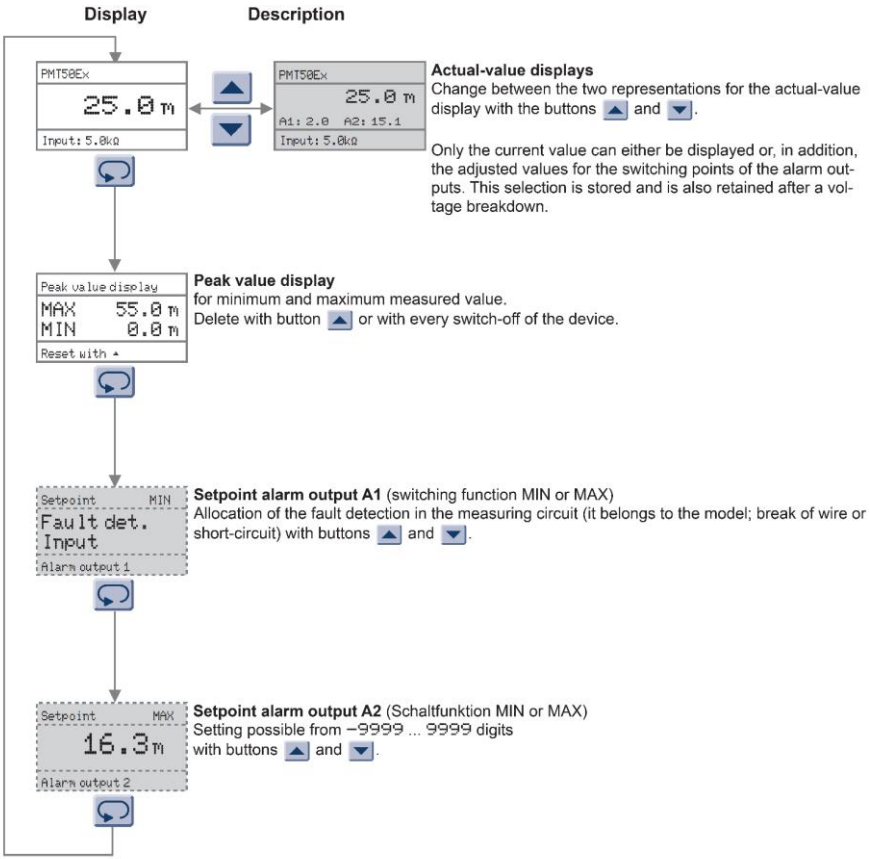
At the teaching programming not manually programming of the input values is necessary. At this, for the measure red input values the actual values will be taken over. This method is ideal if the input signal is unknown, but the corresponding display value is known (capacity gauging of tanks).

Note on the representation

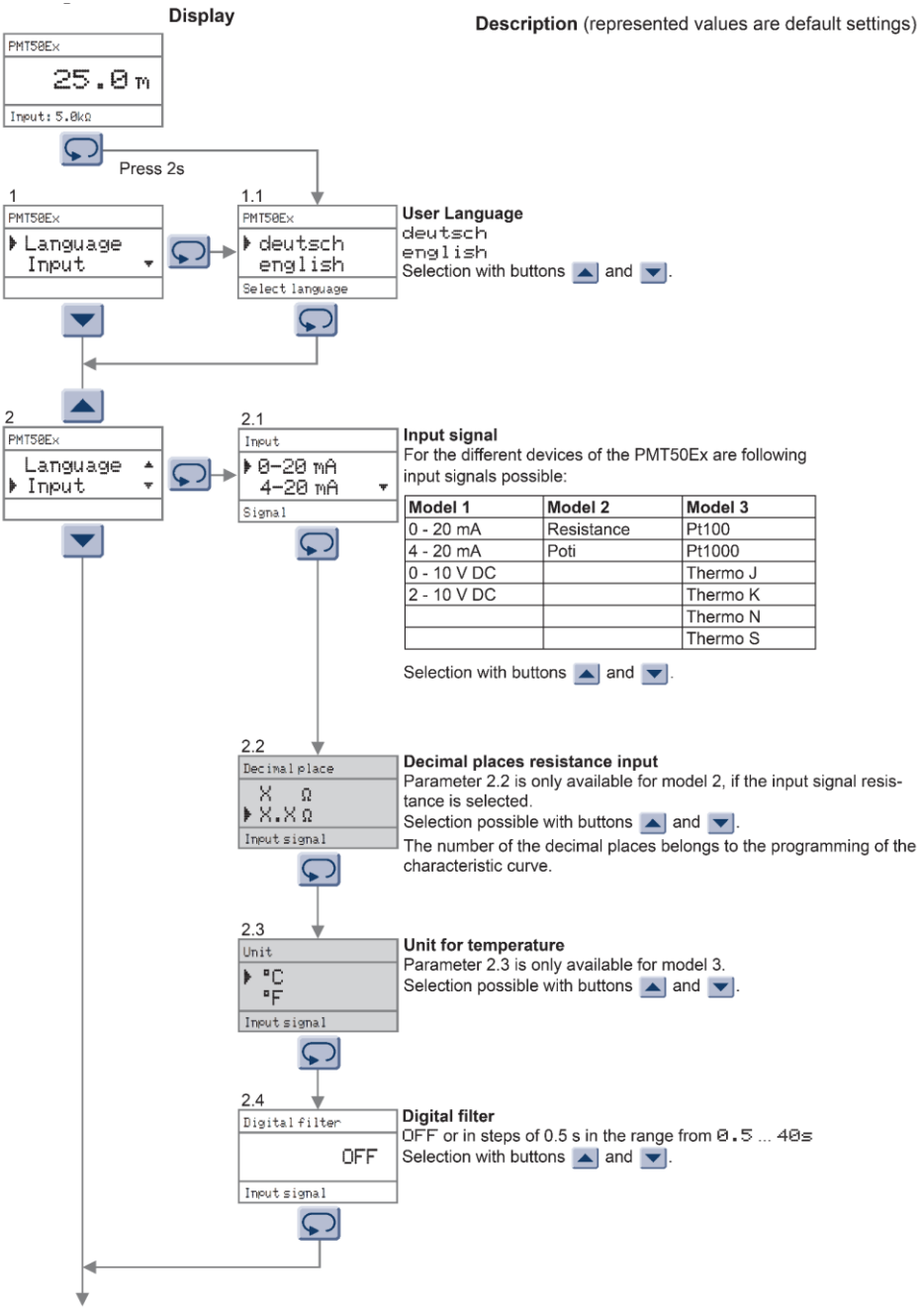
Parameter appears only with corresponding configuration

Parameter appears only with corresponding equipment version

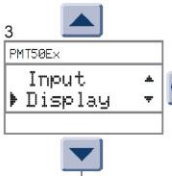
6 Working level

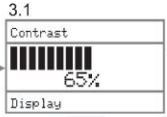


7 Configuration level

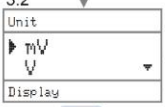


Continue page 17

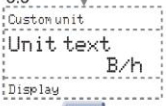




Display contrast
Setting possible from 0 ... 100% with buttons ▲ and ▼.



Display unit
The selected unit will be displayed and used for programming of the characteristic curve.
Installed units:
mV, V, mA, A, Ω, kΩ, µS/cm, mS/cm, °C, °F, min⁻¹, rpm, bar, mbar, hPa, kPa, mm, cm, m, %, ° , l, l/min, m³, m³/h, ppm and custom.
custom = max. 5 characters are free programmable.
Selection with buttons ▲ and ▼.

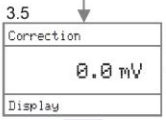


Custom unit
Only appears if custom is selected
Maximal 5 characters are programmable (see character set below).
Scrolling through the characters is possible with buttons ▲ and ▼.
The selected character will be entered with button ⟲. After that, the cursor moves to the next position. Selection procedure as before. If 5 characters are entered or no more characters wanted, the parameter custom unit will excited automatically.
Character set:
_ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
a b c d e f g h i j k l m n o p q r s t u v w x y z
ä ö ü ß
. ? ! , : _ % / \ + - * [ ] ( ) < = > " • ← → ↑ ↓ ◄ ► ▲ ▼ °
µ Ω Δ ^{1} ^{2} ^{3} $^{-1}$ $^{-2}$

Number of decimal places
For the different models are following decimal places selectable:

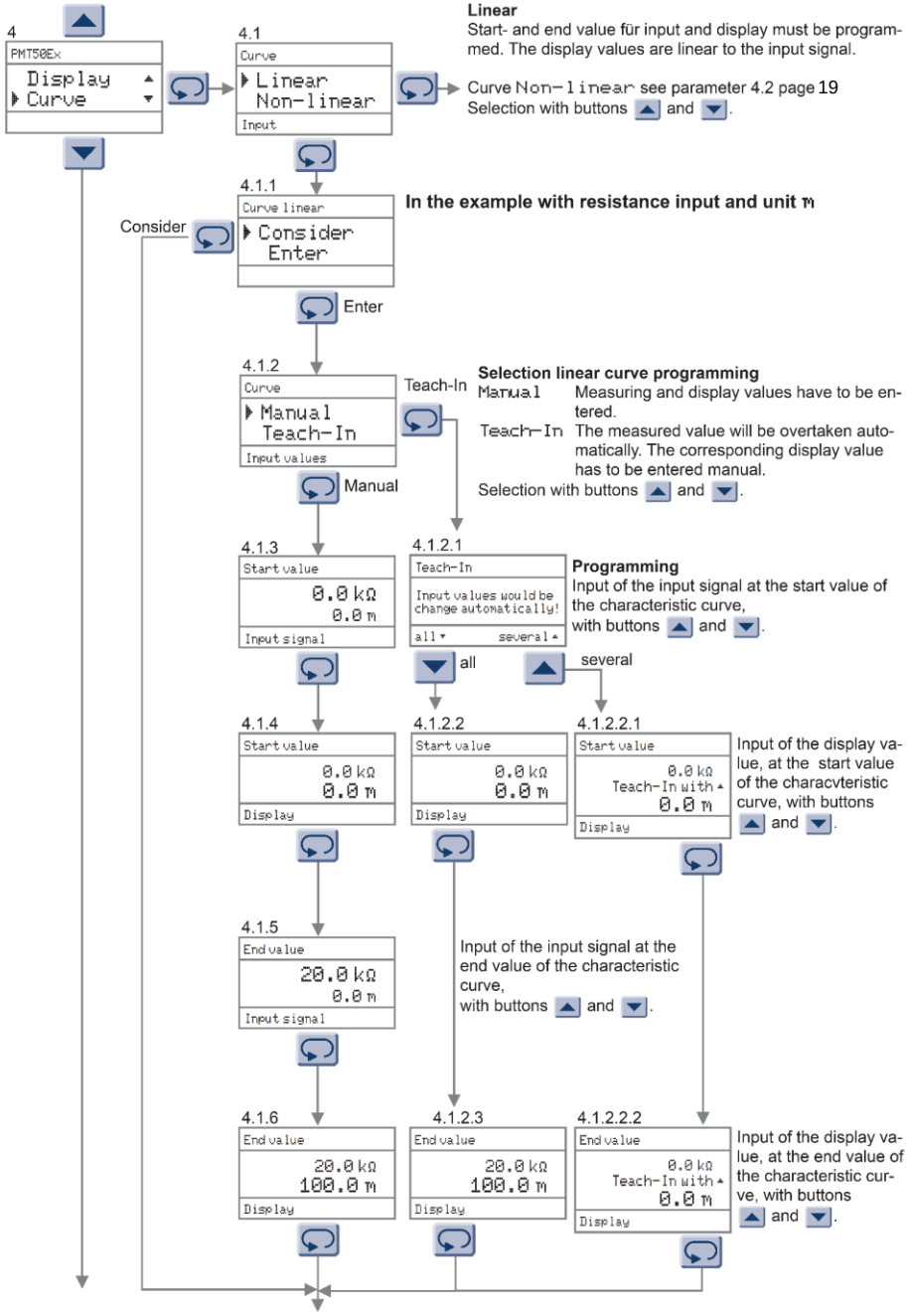
Model 1:	0;	0.0;	0.00;	0.000
Model 2:	0;	0.0;	0.00;	0.000
Model 3:	0;	0.0		

Selection with buttons ▲ and ▼.

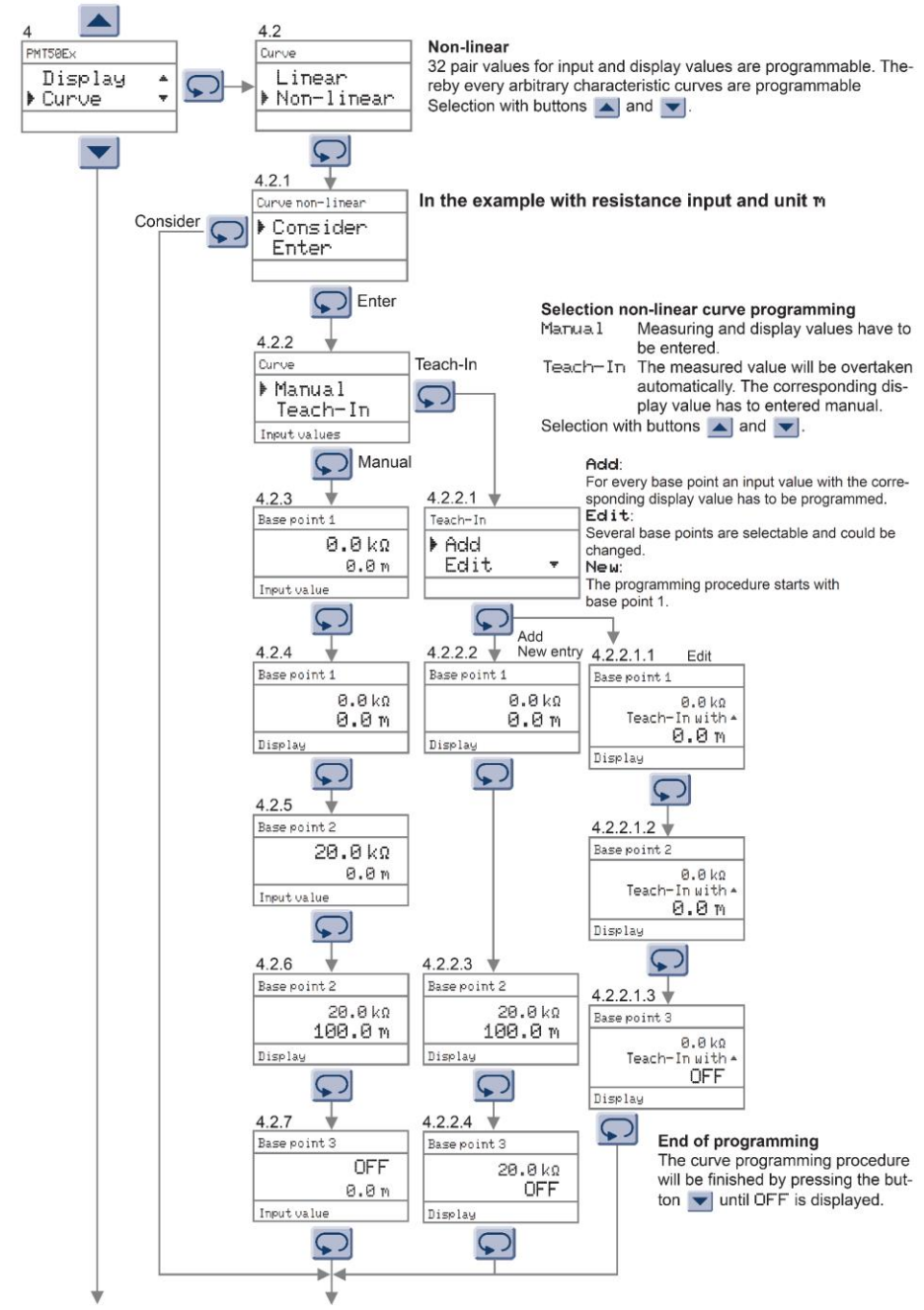


Display correction
Setting possible from −9999 ... 9999 Digit with buttons ▲ and ▼.

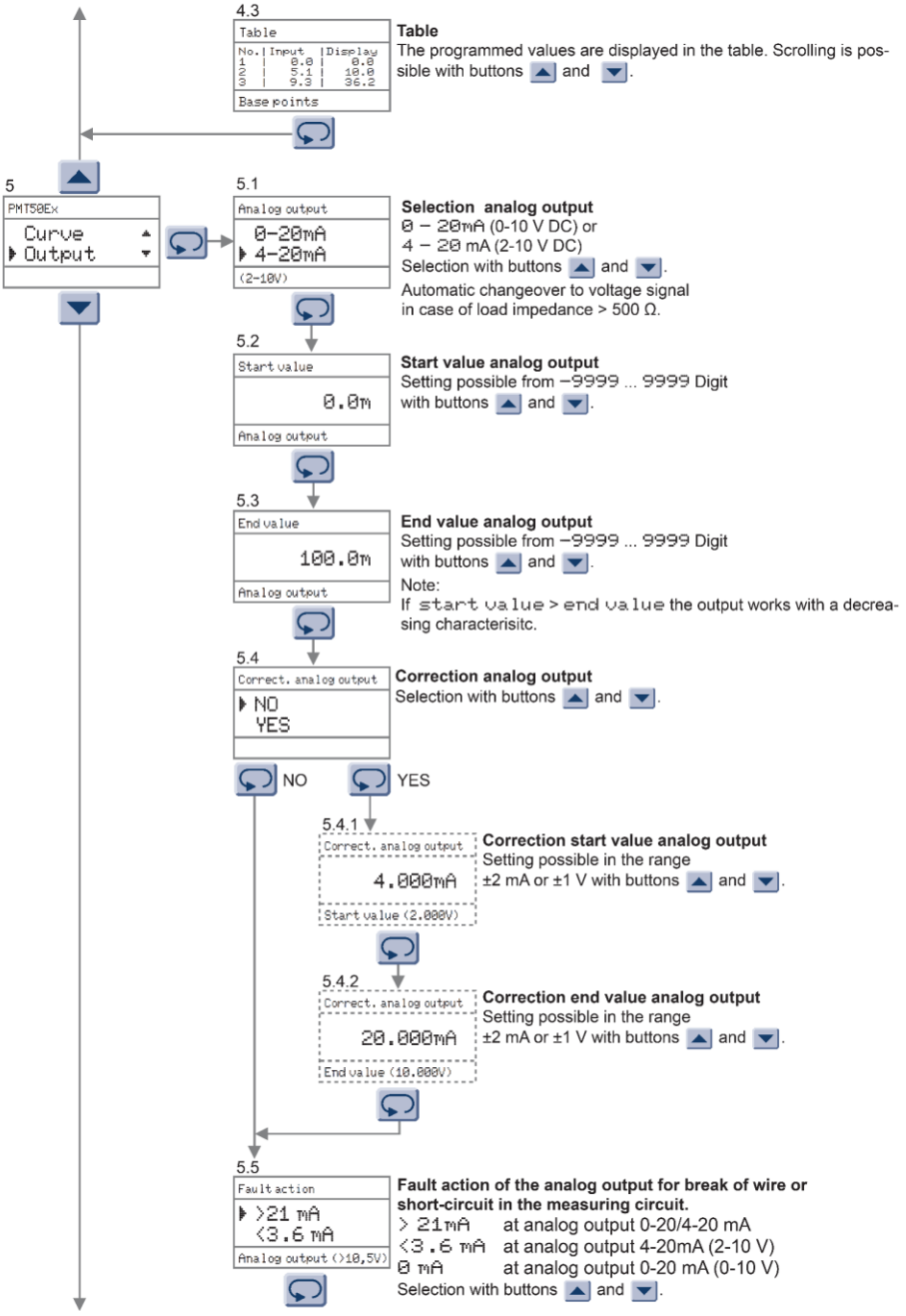
Continue page 18



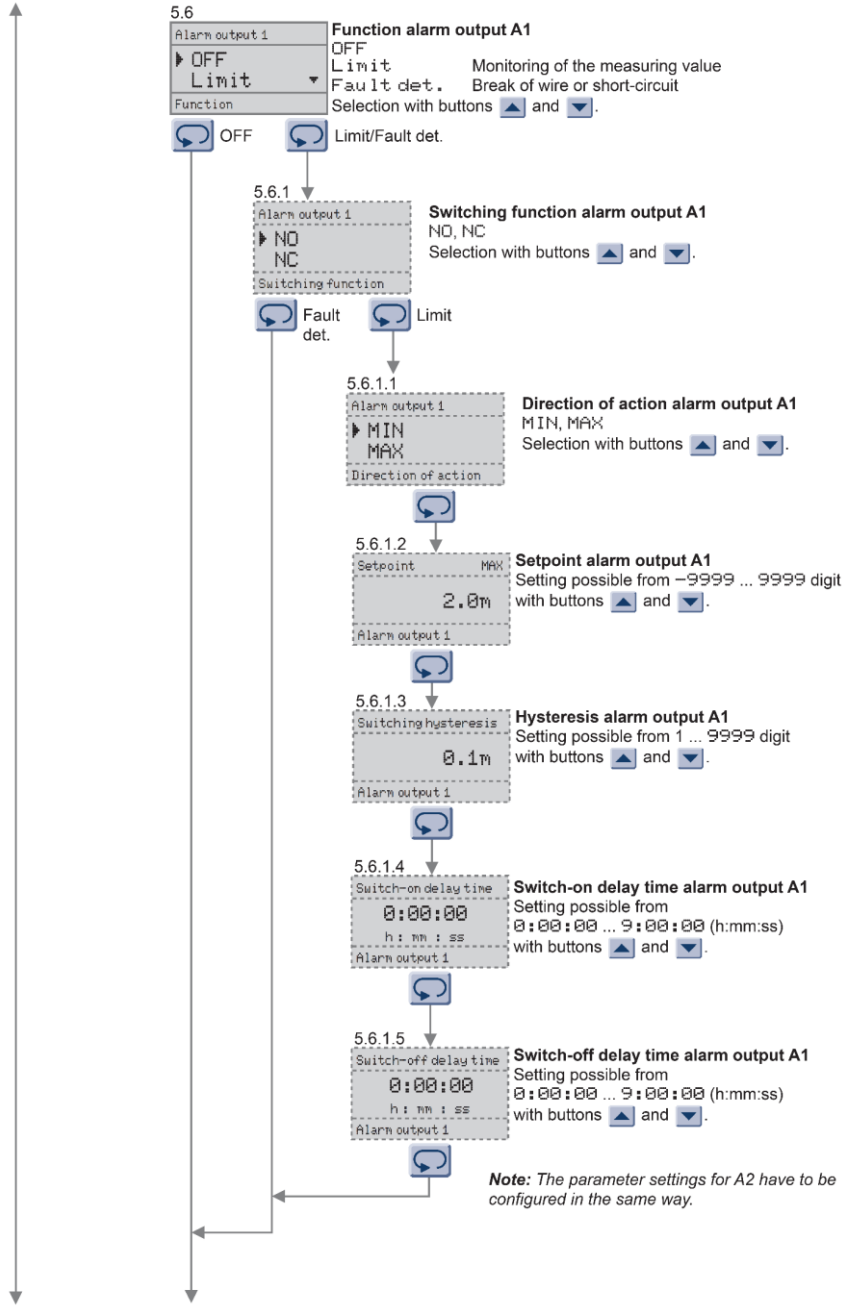
Continue page 20 Continue parameter 4.3, page 20



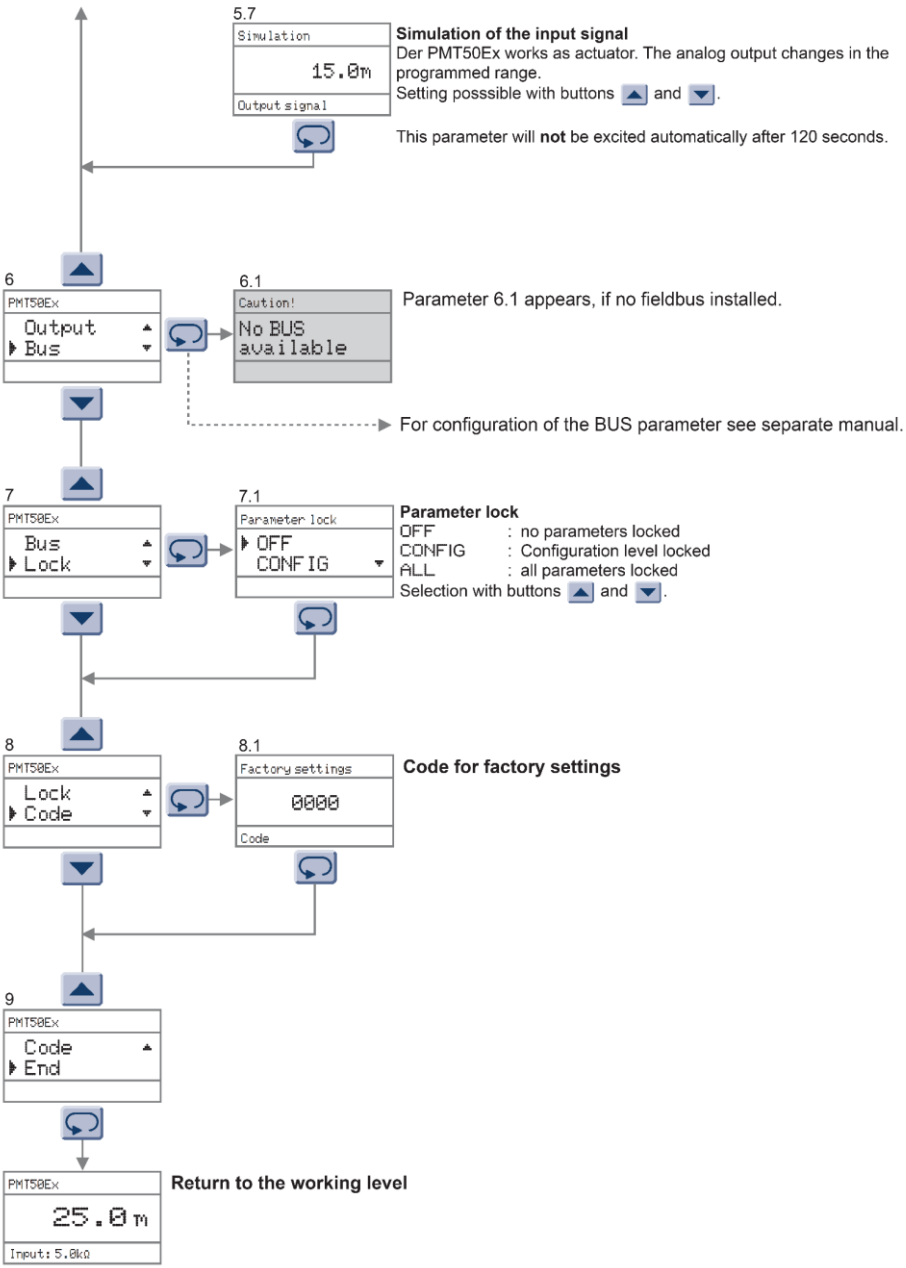
Continue page 20 Continue parameter 4.3, page 20



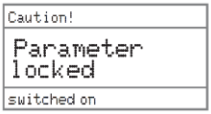
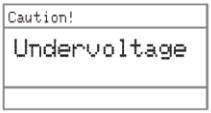
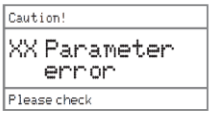
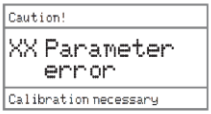
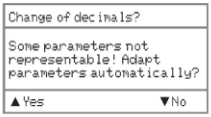
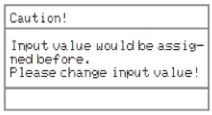
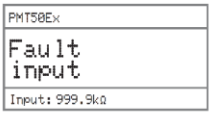
Continue page 22 Continue parameter 5.6, page 21



Continue page 22


5.7
Simulation
15.0m
Output signal
Simulation of the input signal
Der PMT50Ex works as actuator. The analog output changes in the programmed range.
Setting posssible with buttons and .
This parameter will not be excited automatically after 120 seconds.
6
PMT50Ex
Output
Bus
6.1
Caution!
No BUS available
Parameter 6.1 appears, if no fieldbus installed.
For configuration of the BUS parameter see separate manual.
7
PMT50Ex
Bus
Lock
7.1
Parameter lock
OFF
CONFIG
Parameter lock
OFF : no parameters locked
CONFIG : Configuration level locked
ALL : all parameters locked
Selection with buttons and .
8
PMT50Ex
Lock
Code
8.1
Factory settings
0000
Code
Code for factory settings
9
PMT50Ex
Code
End
PMT50Ex
25.0m
Input: 5.0kΩ
Return to the working level

8 Error reports

Error reports	Description
	
	Supply voltage to low
	At the check-up of the parameter memory, XX errors are detectet. The incorrect parameter are resetted to the factoty settings. Please check and correct parameters if necessary.
	As before, but the factory settings are incorrect. The device must be checked at works.
	Change of decimal places While changing number of decimal places, some parameters can be converted, but however, not represented! Selection "No" : Change of the decimal places is not carried out. Selection "Yes" : Decimal places are changed automatically, where the affected parameters are set to the maximum possible value. A subsequent verification of the accepted parameters is absolutely necessary.
	At the base-point programming the input value is assigned to an display value before.
	Break of wire or short-circuit in the measuring circuit. Text Input: 999.9kΩ is flashing

9 Ordering code

PMT50Ex 1. ☐ - 2. ☐ - 3. ☐ - 4. ☐ - 5. ☐ - 6. ☐

1. Modell/Imput			
1	Standard signals 0/4 ... 20 mA; 0/2 ... 10 V DC		
2	Resistance from 0 ... 20 kΩ, Poti 1 kΩ ... 100 kΩ		
3	Pt100	3-wire	-100,0 ... 600,0 °C/-100 ... 600 °C
	Pt1000	3-wire	-100,0 ... 300,0 °C/-100 ... 300 °C
	Thermocouple	J (Fe-CuNi)	-100,0 ... 800,0 °C/-100 ... 800 °C
		K (NiCr-Ni)	-150 ... 1200 °C
		N (NiCrSi-NiSi)	-150 ... 1200 °C
		S (Pt10Rh-Pt)	-50 ... 1600 °C
	Inputs intrinsically safe	ATEX II (1) G [Ex ia] IIC/IIB ATEX II (1) D [Ex iaD]	
2. Analog output			
AO		0/4 ... 20 mA; 0/2 ... 10 V DC, isolated	
3. Alarm outputs			
00		not installed	
2R		2 relay outputs A1, A2 SPDT	
4. BUS configuration			
00		not installed	
MB		Modbus RTU/ASCII RS485	
PB		Profibus DP	
5. Supply voltage			
0	230 V AC	± 10 %	50-60 Hz
1	115 V AC	± 10 %	50-60 Hz
5	24 V DC	± 15 %	
6.Option			
00		without option	

Custom configuration on requst!

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