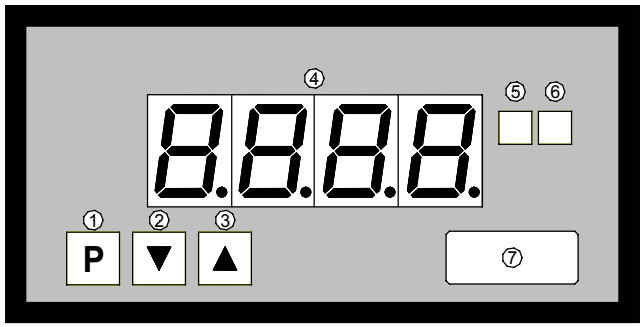
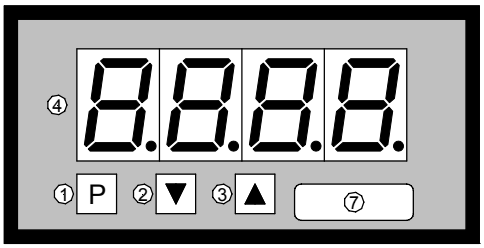
Operating instructions for PVE4 units
- panel meter for standard signals
- freely scalable display with set points from –999 up to 9999

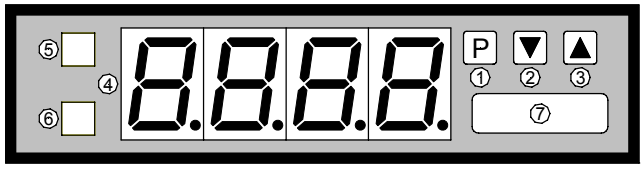
Housing size 96x48



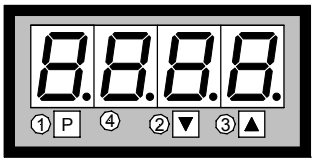
Housing size 72x36



Housing size 96x24



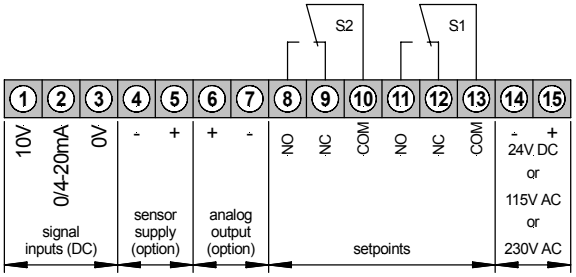
Housing size 48x24



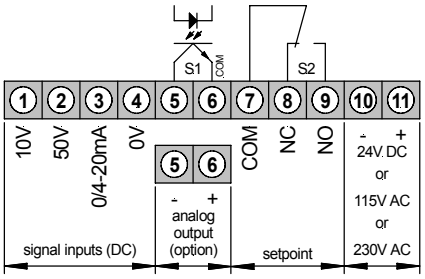
① Program key
② Minus key
③ Plus key
④ 7-segment display
⑤ Setpoint indication 1
⑥ Setpoint indication 2
⑦ Insertable dimensionstrip

Terminal connection

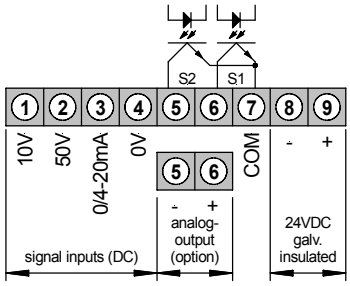
Housing size 96x48 and 96x24



Housing size 72x36



Housing size 48x24



Ordering code

TYPE ORDER NUMBER (housing size 96x48)

PVE 4.001.1522B	Power supply 230 VAC	terminal connection	15=L	14=N
PVE 4.001.1422B	Power supply 115 VAC	terminal connection	15=L	14=N
PVE 4.001.1722B	Power supply 24 VDC (galvanic insulated)	terminal connection	15=L+	14=L–

TYPE ORDER NUMBER (housing size 96x24)

PVE 4.001.3522B	Power supply 230 VAC	terminal connection	15=L	14=N
PVE 4.001.3422B	Power supply 115 VAC	terminal connection	15=L	14=N
PVE 4.001.3722B	Power supply 24 VDC (galvanic insulated)	terminal connection	15=L+	14=L–

TYPE ORDER NUMBER (housing size 72x36)

PVE 4.001.6522B	Power supply 230 VAC	terminal connection	11=L	10=N
PVE 4.001.6422B	Power supply 115 VAC	terminal connection	11=L	10=N
PVE 4.001.6722B	Power supply 24 VDC (galvanic insulated)	terminal connection	11=L+	10=L–

TYPE ORDER NUMBER (housing size 48x24)

PVE 4.001.7782B	Power supply 24 VDC (galvanic insulated)	terminal connection	9=L+	8=L–

Options	Housing 96x48	Housing 96x24	Housing 72x36	Housing 48x24
Green LED	x	x	x	x
Protection IP54	x	x	x	x
Protection IP65	x	x	x	x
Plug in terminal with protection IP40	x	x	x	
Plug in terminal with protection IP54	x	x	x	
Plug in terminal with protection IP65	x	x	x	
Sensor supply 24 VDC/50 mA	x			
Sensor supply 24 VDC/50 mA (for UB 24 VDC)		x		
Sensor supply 24 VDC/20 mA (for UB 230 VAC)		x		
Sensor supply 24 VDC/20 mA (for UB 115 VAC)		x		
Sensor supply 10 VDC/20 mA	x	x		
Analogue output 0-10 VDC (12 bit)	x	x	x	x
Analogue output 0-20 mA/load 500 Ω	x	x	x	x
Analogue output 4-20 mA/load 500 Ω	x	x	x	x
Setpoints as open emitter				x
Dimension strips on request	x	x	x	x
Other power supplies on request	x	x	x	x

Proper use

The devices of the **PVE4** range for standard signals (direct voltage, direct current) are used for the evaluation of different sensor signals. The electronic circuit alters the sensor signal lying at the input and displays it in a 7-segment display. The use of the devices regarding to the ambient conditions must be in accordance to their protection type.

Programming (see also programming example)

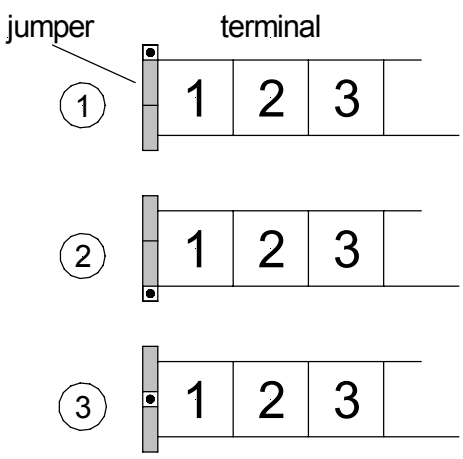
The PVE4 must be installed by a suitably qualified specialist (e.g. with a qualification in industrial electronics).

1. Assemble the unit in a suitable panel cut-out.
2. Connect device in line with connection diagram. Connect screen of the sensor line with suitable potential. Switch on supply voltage. This is followed by a segment test with subsequent switching to operating mode.
3. Press program key [P]. Program number **0** is displayed (lights up).
4. Change program number by simultaneously pressing program key **[P]** and ▲ key.
5. By pressing the ▲ or ▼ key, the display changes to the value stored under this program number.
6. Change displayed value by pressing the ▼ or ▲ key.
7. With program numbers **1** and **2**, the applied voltage (sensor calibration under program number **0** active) can be saved by simultaneously pressing the **[P]** and ▼ keys. This is confirmed by the appearance of a horizontal bar in the display. If a different calibration mode (1, 2, 3) is selected, it is not necessary to apply a voltage to the measuring input. In these modes, all that is needed is to assign certain display data to the stored restart points (offset and full-scale). The programming is also carried out under the program numbers **1** and **2** and must be saved with the **[P]** and ▼ keys. The appearance of horizontal bars in the display confirms that the save was successful.
8. If no further keys are pressed, the device changes back to operating mode after approx. 7 seconds. This definitively saves all the data, which do not have to be explicitly saved with the **P** and ▼ keys.

Programming lock

Keyboard lock

Possible jumper settings on the back



Variation 1

Unrestricted programming. The user has access to all program numbers.

Variation 2

Programming locked, programming is not possible. The programming mode is blocked.

Variation 3

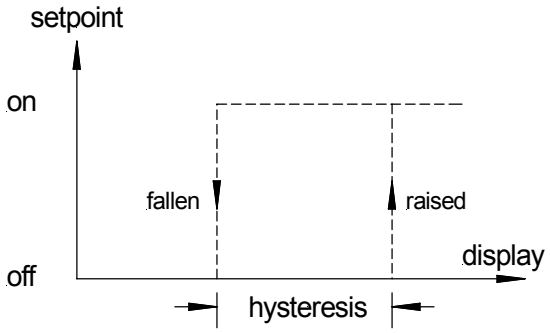
Restricted programming. The program numbers 1...6 are blocked for the user. The program number 61...68 (setpoints) can be freely configured.

Setpoints

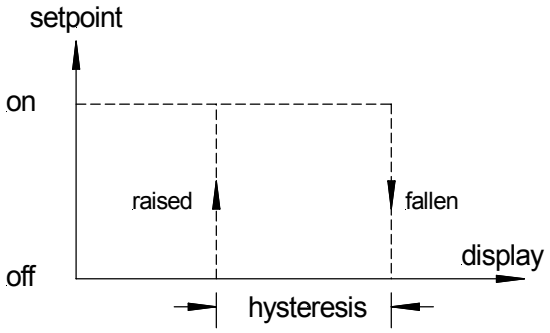
Operating characteristics of the relays

The following diagrams illustrate the behavior of the setpoints (relays). The hysteresis can be programmed freely for each setpoint. In open circuit mode, the respective relay rises on reaching the threshold, while in closed circuit mode, the respective relay falls when the threshold is reached. By using the closed circuit mode, for example, a breakdown of the supply voltage can be signaled in the form of an alarm.

Definition: The hysterisis is the width of the window between the two threshold values of a setpoint!



Open curcuit mode



Closed curcuit mode

MIN/MAX data

Additional functions in normal mode for memory inquiry of the MIN/MAX data.

The MIN/MAX memory is a volatile memory in which, after switching on the device or since the last erasure, the relevant minimum and/or maximum values are stored.

- By pressing the ▲ key, the MAX memory is displayed.
- By pressing the ▼ key, the MIN memory is displayed.
- Simultaneously pressing the ▼ and ▲ keys erases the memory stored in the display.

Special functions with adjustable fixed zero for the lowest digit of the display

Via program number 9 (PN9 = 1), a permanent zero can be parameterised for the lowest digit. The lowest (smallest) digit is then – without being rounded up or down – overwritten with a static zero. At the analogue output and the threshold values for the relays, the lowest digit overwritten with a zero is nevertheless evaluated. The function is intended to stabilise the display if, due to the sensor value, permanent drifting or jumping of the displayed measurement occurs at the lowest digit.

Program table

Program number	Function	Remark	Display	Factory setting
Measuring input				
0	Calibration mode	0 = sensor calibration 1 = 0...10 V 2 = 0...20 mA 3 = 4...20 mA (Save with P and ▼)	0 / 1 / 2 / 3	0
1	Input of desired indication value for full scale	Dependent on selected calibration mode e.g. 10 V measuring input = end value 300.0 (Save with P and ▼)	-999...9999	2000
2	Input of offset for indication value	Dependent on selected calibration mode e.g. 4 mA measuring input = initial value 0.0 (Save with P and ▼)	-999...9999	0
3	Setting of decimal point	With ▲ to the desired decimal point		no decimal point
4	Input of display time	Display time = measuring time Integrated measuring process	0.1...10.0 seconds	1,0
Analogue output optional				
5	Input of final value for analogue output	e.g. 300.0 as in programming example	-999...9999	2000
6	Input of offset for analogue output	e.g. 0.0 as in programming example	-999...9999	0
Set lowest digit in the display to a permanent zero				
9	Zeroise lowest digits in the display	0 = no permanent zero 1 = permanent zero on lowest digit	0 / 1	0
Setpoint S1				
61	Threshold	Threshold	-999...9999	500
62	Hysteresis	Width of window between the two threshold values of a setpoint	0...9999	1
63	Closed circuit / open circuit	Working principle	0 / 1	1
Setpoint S2				
66	Threshold	Threshold	-999...9999	1500
67	Hysteresis	Width of window between the two threshold values of a setpoint	0...9999	1
68	Closed circuit / open circuit	Working principle	0 / 1	1

Notes on programming

The following programming examples describe the two different tuning methods for setting the device. A brief explanation will first be given on documenting the display procedure after pressing the [P] key.

If the keyboard lock is not set (see programming lock), pressing the [P] key will always switch to programming mode with the program number 0. For approx. 3 seconds, a 0 will appear in the display, preceded by a **P** – see programming examples. After 3 seconds, the calibration mode 0 will flash alternately with the program number 0 for a further 4 seconds. By pressing the ▼ or ▲ keys, the value stored for the calibration mode is displayed for approx. 3 seconds, during which it can be changed with the ▼ or ▲ keys. After the 3 seconds have elapsed, the program number 0 flashes alternately with the currently set calibration mode for further 4 seconds. The changed value can be saved by simultaneously pressing the [P] and ▼ keys simultaneously. The device acknowledges this by displaying 4 horizontal bars. Changing to program number 1 is done by pressing the [P] and ▲ keys.

All further settings can be made by following the above procedure. If you are in programming mode and do not press any key within 7 seconds, the device automatically reverts from the programming mode to the operating mode. You can change back again to programming mode at any time by pressing the [P] key.

Programming example

1. Sensor calibration / Tuning the measuring section to a real measuring value

When using the sensor calibration, a voltage or current signal must be applied to the display unit for the scaling. Furthermore, it must be ensured that the device is supplied with the correct auxiliary voltage. During **sensor calibration**, the device is tuned to a **real measuring value**.

The base for this programming example is the basic value after resetting to the factory settings.

For the sensor calibration, a zero must always be stored under program number 0!

Measuring input:	0/4...20 mA
Measuring signal:	4...20 mA
Display:	4 mA = 0.0 20 mA = 300.0
Display time:	2.0 seconds
Set point S1:	60.0 and closed circuit falling at 60.0 and rising at 58.0 (corresponding hysteresis = 2.0)
Set point S2:	150.0 and open circuit Rising at 150.0 and falling at 80.0 (corresponding hysteresis = 70.0)
Analogue output:	Measuring signal 4 mA corresponds to a display of 0.0 and 0 V at the analogue output. Measuring signal 20 mA corresponds to a display of 300.0 and 10 V at the analog output.

Programming example

Start of programming

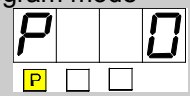
Switch on supply voltage!

Segment test

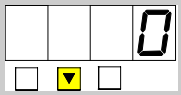
Operating mode

Calibration mode

Enter program mode

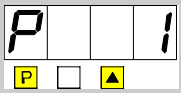


To memorized value with ▼.

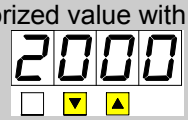


Full scale

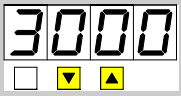
Connect 20mA to the measuring input. To program number 1 with **P** and ▲.



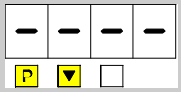
To memorized value with ▼ or ▲.



Set free scalable value.

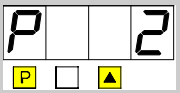


Memorize value with **P** and ▼.
Take over by display of transversal bars.

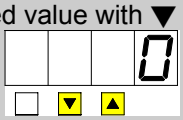


Offset

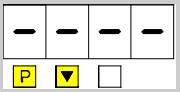
To program number 2 with **P** and ▲.



Connect measuring value 4mA. To memorized value with ▼ or ▲.

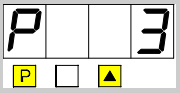


Memorize value with **P** and ▼.
Take over by display of transversal bars.

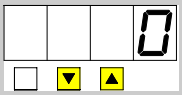


Decimal point

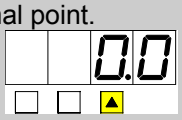
To program number 3 with **P** and ▲.



To memorized value with ▼ or ▲.

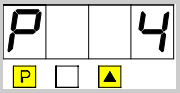


Set decimal point.

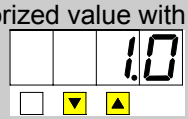


Display time

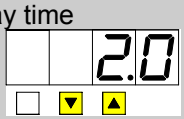
To program number 4 with **P** and ▲.



To memorized value with ▼ or ▲.



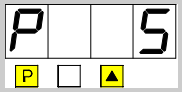
Set display time



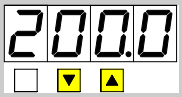
Analogue output (optionally)

Final value

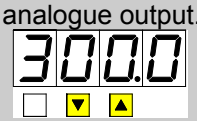
To program number 5 with **P** and ▲.



To memorized value with ▼ or ▲.

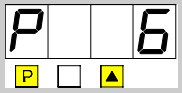


Set free scalable final indication value for analogue output.

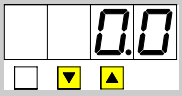


Offset

To program number 3 with **P** and ▲.



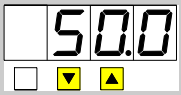
To memorized value with ▼ or ▲.



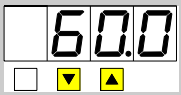
Setpoint S1

To program number 61 with **P** and ▲.

To memorized value with ▼ or ▲.

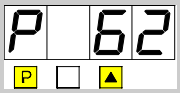


Set free scalable value for setpoint S1.

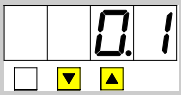


Hysteresis S1

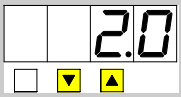
To program number 62 with **P** and ▲.



To memorized value with ▼ or ▲.

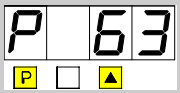


Set hysteresis for S1.

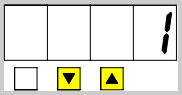


Working principle S1

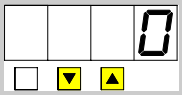
To program number 63 with **P** and ▲.



To memorized value with ▼ or ▲.

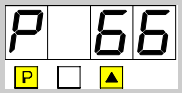


Set open circuit.

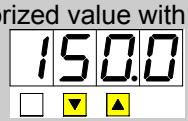


Setpoint S2

To program number 66 with **P** and ▲.

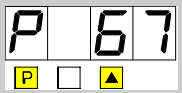


To memorized value with ▼ or ▲.

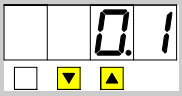


Hysterese S2

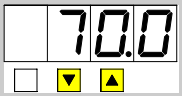
To program number 67 with **P** and ▲.



To memorized value with ▼ or ▲.

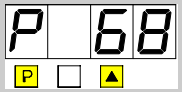


Set hysteresis for S2.

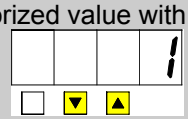


Working principle S2

To program number 68 with **P** and ▲.



To memorized value with ▼ or ▲.



Programming terminated.

2. Factory calibration (standard signals)

When using the factory calibration, there is no need to apply a measuring voltage to the display unit for scaling. It must be ensured that the device is supplied with the correct auxiliary voltage and that the correct measuring input is selected. The settings refer to calibration values preset in the factory. These calibration values are an integral part of the device programming and cannot be erased by resetting to the factory settings.

The starting basis for this programming example are the basic values following a reset to the factory settings.

With the factory calibration, a 1, 2 or 3 must be stored under program no. 0.

Programming example

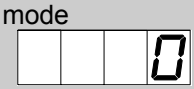
Measuring input:	0/4...20 mA
Measuring signal:	4...20 mA
Display:	4 mA = 0.0 20 mA = 300.0
Display time:	2.0 seconds
Setpoint S1:	60.0 and closed circuit falling at 60.0 and rising at 58.0 (corresponding hysteresis = 2.0)
Setpoint S2:	150.0 and open circuit rising at 150.0 and falling at 80.0 (corresponding hysteresis = 70.0)
Analogue output:	Measuring signal 0 V corresponds to a display of 0.0 and 0 V at the analogue output. Measuring signal 10 V corresponds to a display of 300.0 and 10 V at the analogue output.

Start of programming

Switch on supply voltage

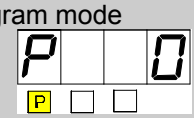
Segment test

Operating mode

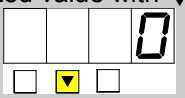


Calibration mode

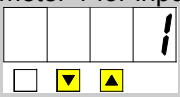
Enter program mode



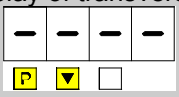
To memorized value with ▼ or ▲.



Select parameter 1 for input 0...10 V.

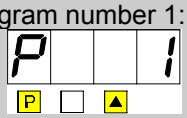


Memorize value with **P** and ▼. Take over by display of transversal bars.

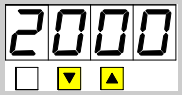


Full scale

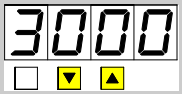
Select program number 1: Full scale



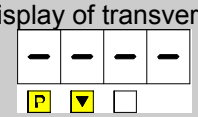
To memorized value with ▼ or ▲.



Set free scalable value.

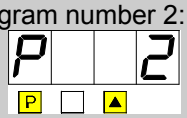


Memorize value with **P** and ▼. Take over by display of transversal bars.

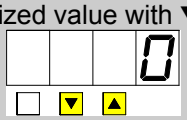


Offset

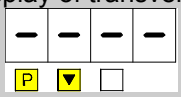
Select program number 2: Offset



To memorized value with ▼ or ▲.

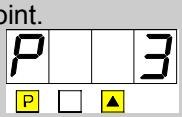


Memorize value with **P** and ▼. Take over by display of transversal bars.

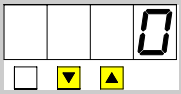


Decimal point

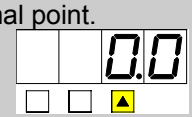
Select program number 3: Decimal point.



To memorized value with▼ or ▲.



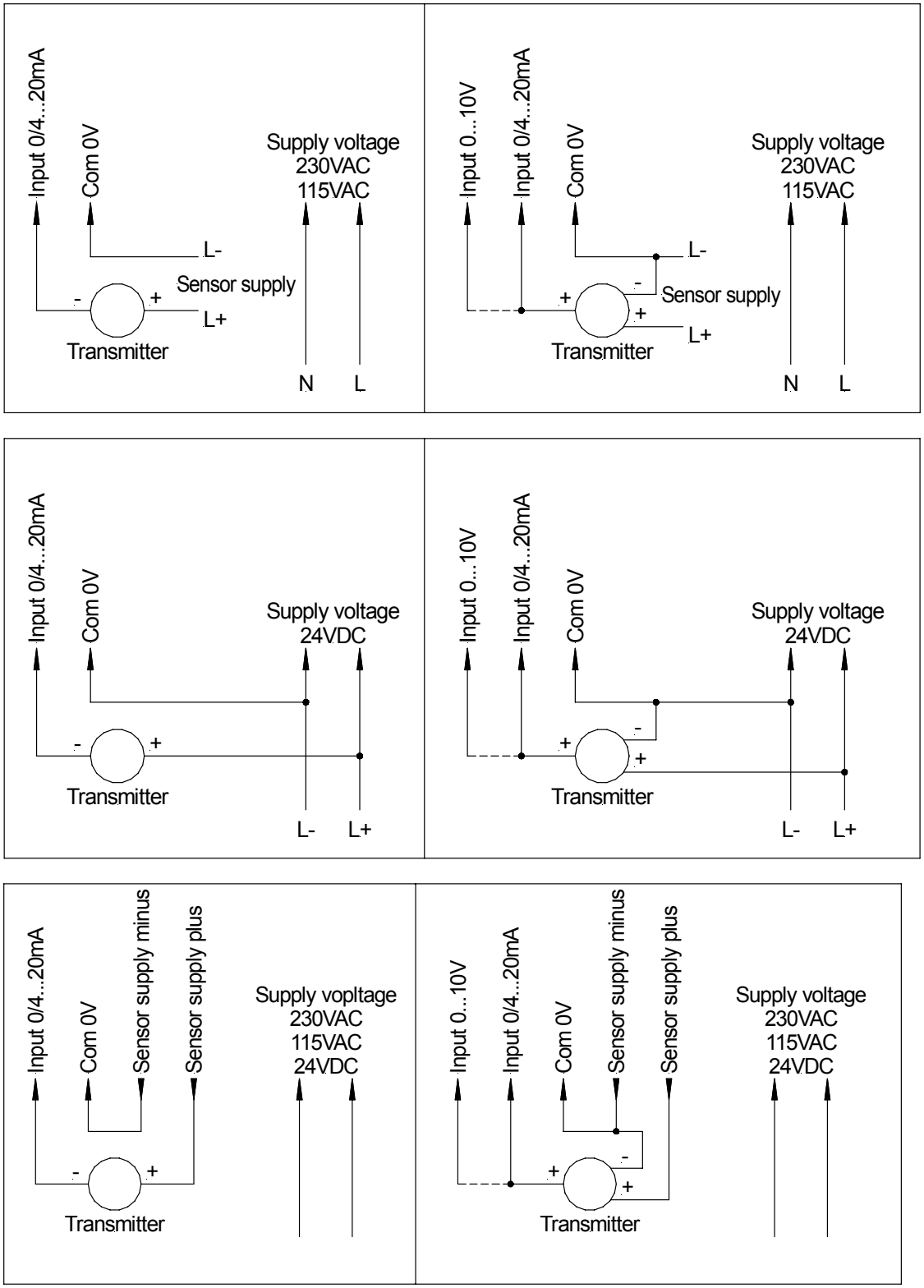
Set decimal point.



The further settings are the same as in programming example 1.

Proceed to the section on display time.

Configuration for transmitter connections



Notes, factory settings and error elimination

After the supply voltage is switched on, the device performs a reset including a segment test (all the LED light up). It then carries out a self-test. Should any fault occur during this procedure, the word HELP appears in the display. This also applies to normal operation. This function serves to protect the surrounding components and units. If the word HELP appears in the display, a reset must be made to the factory settings. A reset is performed by switching on the supply voltage with the **P** key pressed. The display remains until the **P** key is released in the segment test, after which the default data are stored. The unit must now be reprogrammed to the user-specific data.

Technical data

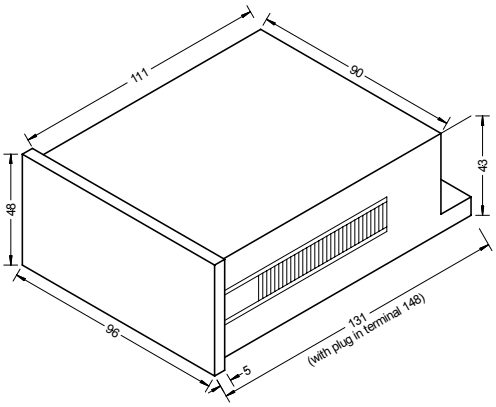
Dimensions	Housing	96 x 48 x 134 mm, including screw terminal
	Assembly cut out	$92.0^{+0.8}$ x $45.0^{+0.6}$ mm
	Housing	96 x 24 x 134 mm, including screw terminal
	Assembly cut out	$92.0^{+0.8}$ x $22.0^{+0.6}$ mm
	Housing	72 x 36 x 97 mm, including screw terminal
	Assembly cut out	$68.0^{+0.7}$ x $33.0^{+0.6}$ mm
	Housing	48 x 24 x 91 (T=101 including plug in terminal)
	Assembly cut out	$45.0^{+0.6}$ x $22.2^{+0.3}$ mm
	Fixing	snap-in, quick-fix system with plastic clips for wall thicknesses up to 50 mm
	Housing material	PC/ABS blend, color black, UL94V-0
	Protective system	front IP40, connection IP00
	Weight (96x48)	approx. 450 g
	Weight (96x24)	approx. 290 g
	Weight (72x36)	approx. 200 g
	Weight (48x24)	approx. 75 g
	Connection	on the back with terminals up to 2.5 mm^2
	Connection (48x24)	on the back with terminals up to 1.5 mm^2
Input	Range (96x48)	0-10 V, 0-20 mA, 4-20 mA
	Range (96x24)	0-10 V, 0-20 mA, 4-20 mA
	Range (72x36)	0-10 V, 0-50 V, 0-20 mA, 4-20 mA
	Range (48x24)	0-10 V, 0-50 V, 0-20 mA, 4-20 mA
		The maximum permitted value on the input clips is is 120% of the nominal value.
		All ranges can be selected via connecting clip.
	Input resistance	
	96x48	Ri with 10 V= ~100 kΩ, 20 mA=~100 Ω
	96x24	Ri with 10 V= ~100 kΩ, 20 mA=~100 Ω
	72x36	Ri with 10 V= ~100 kΩ, 50 V= ~500 kΩ, 20 mA=~100 Ω
	48x24	Ri with 10 V= ~100 kΩ, 50 V= ~500 kΩ, 20 mA=~100 Ω
Output	Sensor supply	**Sensor supplies are galvanic insulated!**
	96x48	24 VDC/50 mA – 10 VDC/20 mA
	96x24	24 VDC/20 mA for power supply 230/115 VAC
		24 VDC/50 mA for power supply 24 VDC/DC
		(other voltage supplies on request)
	Relay output	
	96x48	charge 230 VAC/5 A – 30 VDC/2 A, with ohm resistive burden
	Switching cycles	$0.5 * 10^5$ at max. contact rating
		$5 * 10^6$ mechanically
	All other sizes	charge 240 VAC/0.25 A – 24 VDC/1 A, with ohm resistive burden
	Switching cycles	$2 * 10^5$ at max. contact rating
		$10 * 10^6$ mechanically
	Analogue output	0-10 VDC (12 bit) ***galvanic insulated!***
		0-20 mA (12 bit) - load 500 Ohm ***galvanic insulated!***
		4-20 mA (12 bit) - load 500 Ohm ***galvanic insulated!***
	Open collector	switching voltage 5-40 VDC; $I_{max.}$ =100 mA
Accuracy	Resolution	-999 up to 9999

	Measuring fault	+/-0.2% of measuring range, +/- 1 digit
	Temp. coeff.	100 ppm/K
	Measuring principle	voltage/frequency converter
Mains unit	Supply voltage	230/115 VAC +/- 10% (50-60 Hz) 24 VDC +/-10% galvanic insulated
Mains unit	Power consumption	
	96x48	approx. 5 VA
	96x24	approx. 5 VA
	72x36	approx. 3 VA
	48x24	approx. 2 VA
Indication	Display	7-segment-LED, 14 mm or 10 mm high, red (with option RG red/green, only for 96x48) 4-digit = indication 9999 digit
	Overflow	indication of 4 transversal bars
	Display time	adjustable from 0.1 ... 10.0 seconds
Ambient conditions	Working temperature	0... + 60 °C
	Storing temperature	-20... + 80 °C

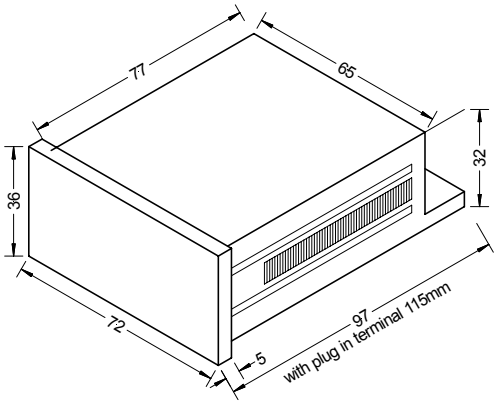
CE symbol
For unrestricted use of the device in accordance with the guideline on electromagnetic compatibility 89/336/EWG, analogue input lines must be screened off. The screen must be places on one side as close to the device as possible.

Housing:

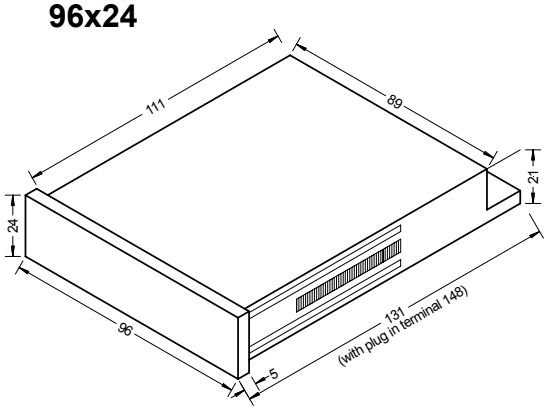
96x48



72x36



96x24



48x24