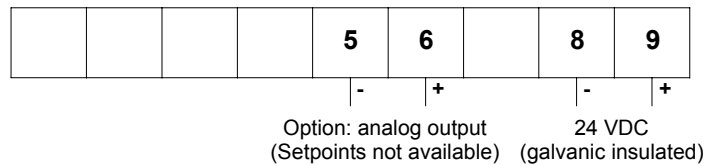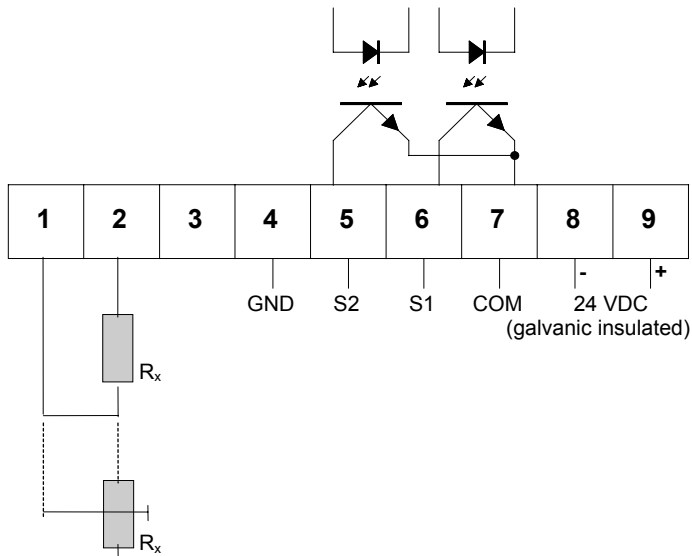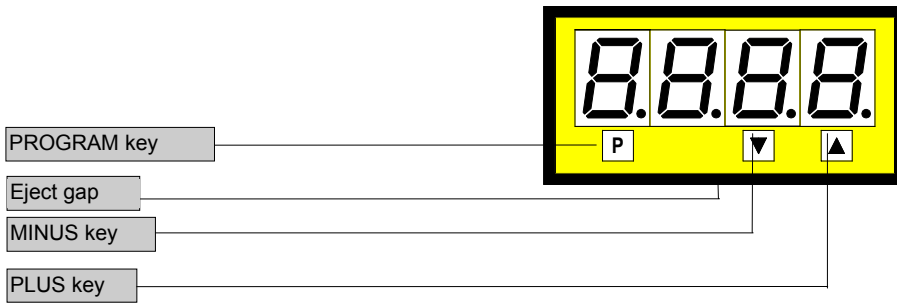# Resistance, potentiometer measurement - microprocessor based technology

- Free scalable indication and setpoints from -999 to +9999
- Standard: 2 setpoints, min/max memory - optional analogue output
- Allows to be placed side by side in grid and mosaics systems up to 50 mm

48x24

8888

PROGRAM key

Eject gap

MINUS key

PLUS key

1	2	3	4	5	6	7	8	9

GND   S2   S1   COM   24 VDC
(galvanic insulated)

R_x

R_x

ORDER NUMBER OF TYPE

Measuring range

Measuring range	Order number
1KΩ - 10KΩ	**PVE 4.506.7782B**
10KΩ - 100KΩ	**PVE 4.606.7782B**
100KΩ - 1MΩ	**PVE 4.706.7782B**

				5	6		8	9

       -      +   -   +

Option: analog output   24 VDC
(Setpoints not available) (galvanic insulated)

Options

- green LED
- Protection IP54
- Plug in terminal with protection IP40
- Plug in terminal with protection IP54
- Analog output 0-10 VDC - (12 bit)
- Analog output 0-20 mA/load 500 Ω
- Analog output 4-20 mA/load 500 Ω

With analog output setpoints S1 and S2 not available!

- Setpoints as open emitter
- Dimension strips selectable (8 characters max)

Technical data

Dimensions	Housing	48 x 24 x 90 mm, including screw terminal
	Assembly cut out	$45.0^{+0.6}$ x $22.2^{+0.3}$ mm
	Fastening	special quick plastic clamp proper to fix in wall thickness up to 50 mm
	Housing material	PC/ABS-Blend, colour black, UL94V-0
	Protective system	at the front IP40
		connection IP00
	Weight	approx. 75 g
	Connection	at the rear side via plug in connector up to 1.5 mm^2
Input	Measuring range	1 KΩ - 10 KΩ
		10 KΩ -100 KΩ
		100 KΩ - 1 MΩ
Output	Open collector	2 outputs
		supply by customers (U_B=5-40 V/I_{max}=100 mA)
	Analogue output	0-10 VDC (12 bit)
		0-20 mA/load 500 Ohm (12 bit)
		4-20 mA/load 500 Ohm (12 bit)
Accuracy	Resolution	-999 up to +9999 digit
	Nonlinearty	+/-0.2 % of measuring value, +/- 1 digit
	Temp. drift	100 ppm/K
	Measuring principle	voltage/frequency converter
Power unit	Supply voltage	24 VDC +/-10 % galvanic insulated
	Power consumption	approx. 2 VA
Indication	Display	LED with 7 segments, 10 mm high, red
		4-digit = indication 9999
	Overflow	indication of four transversal bars
	Time of indication	adjustable from 0.1 to 10.0 seconds
Ambient conditions	Working temperature	0 up to + 60 °C
	Storing temperature	-20 up to + 80 °C

Housing:

77 mm
48 mm
42 mm
24 mm
21 mm
91 mm
(with plug in terminal 101 mm)
86 mm
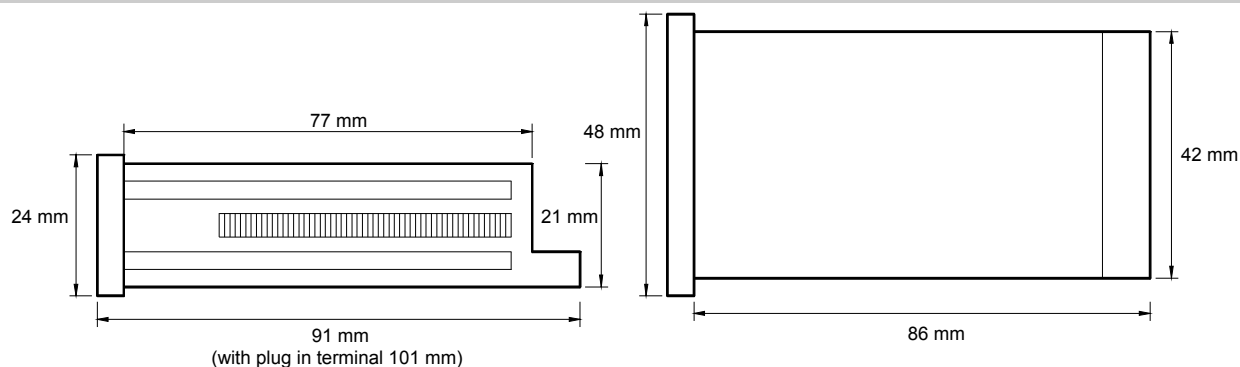
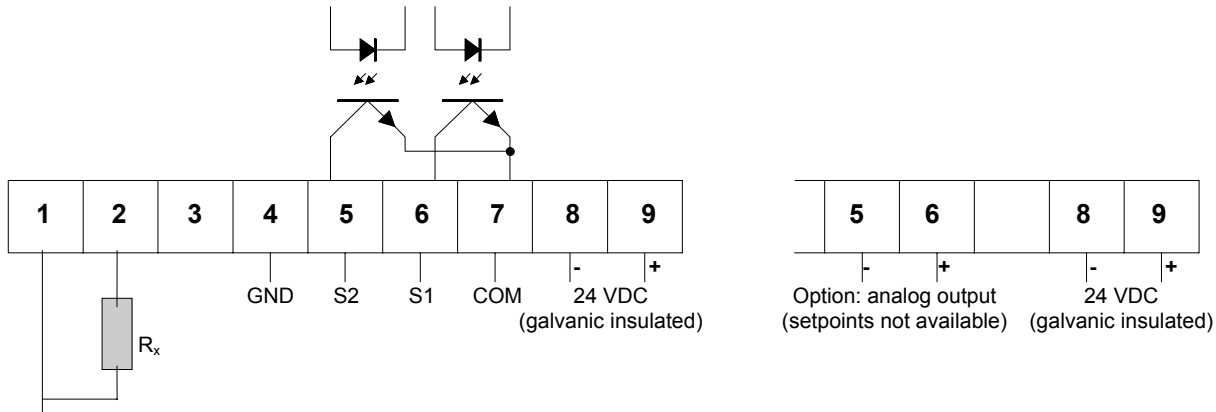**CE-sign**
For unlimited use of the instrument within the directives for electromagnetic compatibility 89/336/EC analogue input wires have to be used with shielded cable and cable's shield connected to earth ground at one end only.

Connection diagram, programming, remarks

1	2	3	4	5	6	7	8	9
				GND	S2	S1	COM	24 VDC

- +

5	6		8	9

- + - +

GND S2 S1 COM 24 VDC
(galvanic insulated)

Option: analog output   24 VDC
(setpoints not available)   (galvanic insulated)

Rx

Setting

1. Connect the instrument according to the wiring diagram.
2. After power on, the instrument runs into a lamp test and returns back to the standard mode.
3. Connect the desired resistance value to the measuring input.
4. Pressing the **P**-key enters the program mode with indication of "**P1**" on the display.
5. Pressing the **P**-key and ▲-key simultaneously steps through the different program numbers .
6. Pressing ▲ or ▼ -key shows the current values.
7. To change values use ▼- or ▲-key.
8. Memorizing of the values under program number 1 and 2 by pressing Plus- and ▼-key simultaneously . Four transversal bars are indicating memorization.
9. Otherwise the remaining values will be memorized automatically 7 seconds after the last touch of key with leaving program mode.

Additional key-functions in standard mode for indication of min/max values.

Simultaneously pressing of ▼ and ▲ key deletes and actualizes min/max-memory.
▲ key enters max-memory.
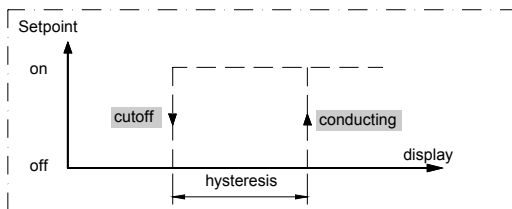▼ key enters min-memory.

Instructions

After power on the instrument with his inbuilt microcontroller starts with an initial program activating lamp test and readout of memorized parameters in an EEPROM. In case of loosing parameters or any defects in hardware the system generates an error message "HELP". This function prevents damage from peripherials and human life, totally reset is required. After a new power on, the system remains in lamptest while pressing **P**-key. Then the unit storages the default parameters and is ready for new programming.

The unit you have bought provides several resistance inputs as well as optional analog output and open collector setpoints. In order to achieve the maximum value indication of 9999, the following minimum input resistance values are required at the various measuring inputs:

| Measuring input	10 KΩ	100 KΩ	1 MΩ
R min	5 KΩ	50 KΩ	500 KΩ
R max	11 KΩ	110 KΩ	1,1 MΩ

The following diagrams are showing the switching operation of PVE4 open collector outputs, the hysteresis is free programmable.
There are two kinds of operation:

Example: operation current

Setpoint
on
cutoff ▼   ▲ conducting
                    display
off
hysteresis

Example: quiescent current

Setpoint
on
conducting ▲   ▼ cutoff
                    display
off
hysteresis

Operation current means that the open collector will be conducted if reaching the adjusted setpoint.
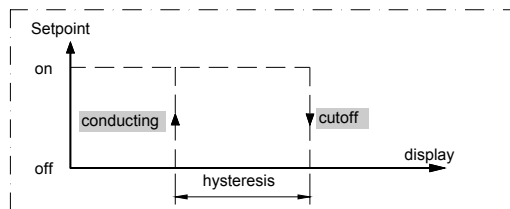
Quiescent current means that the open collector will be cutoff if reaching the adjusted setpoint.

Operation, setting instructions

Program table 1

Program-Number (PN)	Function	Remark	Display	Basic parameter after reset
1	Input of the desired indication value	Feed measured magnitude (acknowledged by pressing key **P** and ▼) e.g. 10 KΩ measuring input=final value 3500	-999 to +9999	2000
2	Input of offset for indication value	Feed measured magnitude (acknowledged by pressing key **P** und ▼) e.g. 0 Ω measuring input = initial value 0	-999 to +9999	0
3	Setting of decimal point	Press▲until desired decimal point is shown		no decimal point
4	Input of display time	Display time = measuring time Method of measurement integrating	0.1 to 10.0 seconds	1.0
5	Input of final value for analog output	Option	-999 to +9999	2000
6	Input of offset for analog output	Option	-999 to +9999	0

Program table 2 (Setpoints)

S1 PN	S2 PN	Function	Display	Basic parameter after reset
61	66	Setpoint	-999 to +9999	500 / 1500
62	67	Hysteresis	0 to +9999	1
63	68	Quiescent current	0	0
		Operating current	1	-

Example for programming

Measuring input: 1 KΩ - 10 KΩ
Measuring resistance: 0 Ω - 10 KΩ
Display: 0.0 to 300.0
Display refresh. time: 2.0 seconds
Setpoints: S1 ==>   60.0 and quiescent current
                                   open collector conducting = 58.0 ==> hysteresis 2.0
                        S2 ==>   150.0 and operation current
                                   open collector cut off = 80.0 ==> hysteresis 70.0
Analog output: 0 V output   ==>   display 0.0   ==>   resistance 0 Ω
(no setpoints)   10 V output   ==>   disolay 300.0   ==>   resistance 10 KΩ

Program key **P**   MINUS key ▼   PLUS key ▲
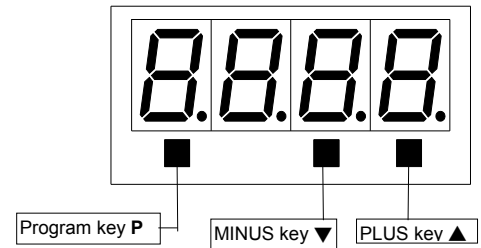
The basic adjustments concerning to the following program example are the ground parameters after a total reset occuring through a power on with pressing **P**-key (see previous page).

Program advices:
Pressing the **P**-key enters **always** the program mode with program number 1. The "**P1**" starts to blink in change with the current value after 3 seconds. After further 4 seconds the system leaves the program mode and turns to the standard mode. In program mode pressing ▼ or ▲-key selects the current values which are free scalable with both the keys. In program-number 1 and 2 the memorization will be executed by pressing **P** and ▼ simultaneously - four transversal bars indicate the storage. All the other parameters will be memorized automatically after leaving program mode.
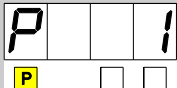
Programming

Switch power on

Lamp test

Standard mode

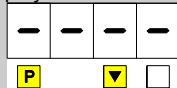Connect resistance 10 KΩ.
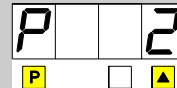Enter program mode.

To memorized value with ▼ or ▲.

Set free scalable value.

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

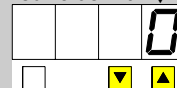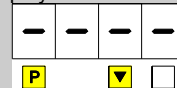To program number 2 with **P** and ▲

Connect resistance 0 Ω .
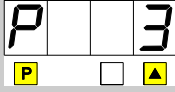To memorized value with ▼ or ▲.

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

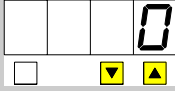# Example for programming

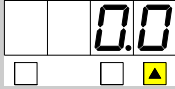To program number 3 with **P** and ▲.

```
P      3
[P]  [ ]  [▲]
```
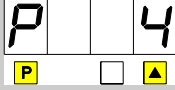
To memorized value with ▼ or ▲.

```
       0
[ ]  [▼]  [▲]
```

Set decimal point.

```
     0.0
[ ]  [ ]  [▲]
```

To program number 4 with **P** and ▲.

```
P      4
[P]  [ ]  [▲]
```

To memorized value with ▼ or ▲.

```
     1.0
[ ]  [▼]  [▲]
```

Set display time.

```
     2.0
[ ]  [▼]  [▲]
```
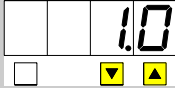
The following programming steps are necessary for the setpoint programming of S1 and S2 only.
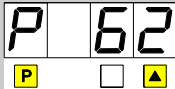
To program number 61 with **P** and ▲.

```
P     61
[P]  [ ]  [▲]
```

To memorized value with ▼ or ▲.

```
    50.0
[ ]  [▼]  [▲]
```

Set free scalable value for setpoint S1

```
    60.0
[ ]  [▼]  [▲]
```

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

```
P     62
[P]  [ ]  [▲]
```

To memorized value with ▼ or ▲.

```
     0.1
[ ]  [▼]  [▲]
```

Set hysteresis for S1.

```
     2.0
[ ]  [▼]  [▲]
```

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

```
P     63
[P]  [ ]  [▲]
```

To memorized value with ▼ or ▲.

```
       0
[ ]  [▼]  [▲]
```
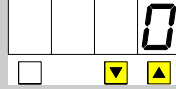
To program number 66 with **P** and ▲.

```
P     66
[P]  [ ]  [▲]
```

To memorized value with ▼ or ▲.

```
   150.0
[ ]  [▼]  [▲]
```

Set free scalable value for setpoint S2.

```
   150.0
[ ]  [▼]  [▲]
```

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

```
P     67
[P]  [ ]  [▲]
```

To memorized value with ▼ or ▲.

```
     0.1
[ ]  [▼]  [▲]
```
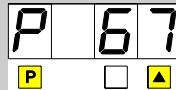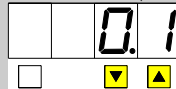
Set hysteresis for S2.

```
    70.0
[ ]  [▼]  [▲]
```

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

```
P     68
[P]  [ ]  [▲]
```

To memorized value with ▼ or ▲.

```
       0
[ ]  [▼]  [▲]
```
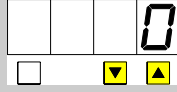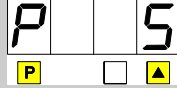
Set operation current.
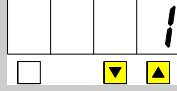
```
       1
[ ]  [▼]  [▲]
```

Programming finished.
All programmed values are memorized after 7 seconds. Jumps back into standard mode automatically.

The program numbers 5 and 6 are available with option analogue output only.

To program number 5 with **P** and ▲.

```
P      5
[P]  [ ]  [▲]
```

To memorized value with ▼ or ▲.

```
   200.0
[ ]  [▼]  [▲]
```

Set free scalable final indication value for analogue output.

```
   300.0
[ ]  [▼]  [▲]
```
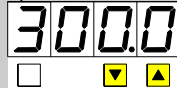
To program number 6 with **P** and ▲.

```
P      6
[P]  [ ]  [▲]
```

To memorized value with ▼ or ▲.

```
     0.0
[ ]  [▼]  [▲]
```

Programming finished.
All programmed values are memorized after 7 seconds. Jumps back into standard mode automatically.