

Digital - Panel-Meter

Operating Instructions 1044



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1. Description

1.1 General Information

With the Digital Panel Meter nearly all analog DC-input variables ($\pm 0,2$, ± 2 , ± 20 , ± 200 V, standard signals: 0 ... 10 V, respectively 0 (4) ... 20 mA) can be measured. The instrument can be scaled as desired in the range between - 1999 ... + 1999 including the decimal point by plugging jumpers into the front panel of the instrument or by connecting an external resistor. The thermoelements with cold junction temperature resistors, compensation resistors and thermo-resistors PT 100 in 2- / 3- / 4- lead technology have been linearized at the factory in modular technology in accordance with IEC / DIN. The lettered strips with the physical units can be interchanged as desired.

1.2 Safety Instructions

This instrument was built and tested in accordance with VDE 0411 / IEC 348. It left the factory in technically safe condition. In order to ensure safe operation, the user must observe the safety instructions and the warnings provided in these operating instructions. The instrument may be operated within the specified environmental conditions, which are listed in chapter 3, without impairing its safety. This instrument may only be operated by trained personnel. Maintenance and repair work may only be carried out by trained and qualified personnel who are familiar with both the relevant hazards and the conditions of guarantee. Before putting the instrument into operation, check for damages resulting from improper transport or storage. Should there be reason to assume that the instrument cannot be operated safely because of such damage, then it must not be taken into operation. If the instrument is damaged to such an extent that safe operation no longer seems possible, take the instrument out of operation and make sure that it cannot be started accidentally. In this case disconnect the supply voltage on all poles. If the instrument is connected to other instruments or devices, take the appropriate measures to ensure that these other instruments are not negatively affected when the digital panel meter is switched on or before it is removed from operation.

1.3 Repairs

Repairs may only be carried out by a qualified workshop. If the repair has to be carried out on the open instrument which is still connected electrically, this repair may only be carried out by a trained specialist who is familiar with the hazards involved. There is no liability for possible damages resulting from improper or incorrect use of the instrument.

1.4 General Mounting Instructions

Place the instrument from the front into the panel opening (in accordance with DIN 43 700). The dimensions of the opening: 91,5 x 43 mm. Mount the instrument using the enclosed mounting elements. Tighten the screws alternately until the instrument is locked firmly into position. When mounting, please take the heat radiation of adjacent instruments into consideration (bearing the permissible ambient temperature in mind!). All electrical connections must conform to local standards (e.g.. VDE 0100). The supply voltage is indicated on the label and is applied to terminals 15 and 16. The protective conductor connection only serves to lead away power supply disturbance variables.

2. Operation

2.1 Putting the Meter into Operation

With the Digital Panel Meter, standard ranges can be plugged by means of jumper J2 on the front panel. Arbitrary measuring ranges for voltage measurements or current measurements can be realized with an Rs scaling resistor and the appropriate jumper position. The decimal point can be plugged on the front panel with jumper J1. The amplification can be changed by approx. $\pm 20\%$. The zero point can be shifted compared to the applied input signal 0 V or 0 mA by approx. ± 500 digits. The zero shift can be changed from outside the instrument with programming positions A1 and A2 (see Fig. 4).

A1 open	A2 open:	± 500 digits
A1 closed	A2 open:	-500 ... - 1999 digits
A1 open	A2 closed:	+ 500 ... + 1999 digits
A1 closed	A2 closed:	- 1999 ... + 1999 digits

2.2 Setting the Measurement Range U / I

1. Remove the front frame. Select the standard measuring range from Table 1 or the resistance formula using the resistance formula in Table 2. Plug jumper J2, if necessary connect scaling resistor Rs to terminals 3/4. (Fig. 1)
2. Apply the voltage value or the current value for the measuring range starting point to input terminals 1/2.
3. Use the zero potentiometer "NP" to set the display to the desired value for the span start. (Fig. 4)
4. Apply the voltage value or the current value for the end of the measurement range to the input terminals.
5. Use the gain potentiometer "V" to set the display to the desired value.
6. Repeat points 2-5 until the desired measuring range is indicated on the display..
7. Position the decimal point with jumper J1.
8. Select the appropriate labels from the enclosed lettered strips and place them into the opening between the front folio and the filter pane If the physical dimension required is not provided, use a blank or self-created printer label.

2.3 Setting the Measurement Range Pt100 / Thermoelements

1. Remove the front frame. For a Pt100 2- or 3- lead connection, bridges must be clamped as shown in the connection diagram. (Fig. 1)
2. Apply the starting value of the measuring range with the Pt100/TC-simulator to the Pt100/TC input.
3. Use the zero potentiometer "Np" (Fig. 4) to set the display to the desired value for the starting value of the measurement.
4. Apply the end value of the measuring range with the Pt100/TC simulator to the Pt100/TC input.
5. Use the gain potentiometer "V" to set the display to the desired value.
6. Repeat points 2-5 until the desired measuring range is indicated on the display.
7. Place the appropriate label with the physical unit between the front folio and the filter pane

Table 1: Measuring ranges available:

Input	Display Span min.	Display Span max	jumper position
voltage	variable	variable	-with Rs
0 ... ± 200 V	± 1600	± 1999	3
0 ... ± 20 V	± 1600	± 1999	2
0 ... ± 2 V	± 1600	± 1999	-
0 ... ± 200 mV	± 1600	± 1999	1
Current	variable	variable	8 with Rs
0 ... 20 mA	500	760	7
0 ... 20 mA	760	1140	6
0 ... 20 mA	1140	1710	5
0 ... 20 mA	1710	1999	4
4 ... 20 mA	400	605	7
4 ... 20 mA	605	910	6
4 ... 20 mA	910	1370	5
4 ... 20 mA	1370	1999	4

Table 2:

General formula to calculate the scaling resistors:

Voltage measurement:

$$R_s[\text{k}\Omega] = \frac{1}{\frac{\text{Input voltage}[\text{V}]}{\text{Display span}[\text{digit}] - 0,001}}$$

Example 1: input voltage 0 ... 30 V, desired display 20,0 ... 120,0:

$$R_s[\text{k}\Omega] = \frac{1}{\frac{30}{1000} - 0,001} = 34,41 \text{ k}\Omega \approx 34,8 \text{ k}\Omega$$

Current measurement: $R_s[\Omega] = \frac{\text{Display span}[\text{digit}]}{\text{Input current}[\text{mA}]}$

Example 2: input current 0 ... 20 mA, desired display -1,80 ... 14,20:

$$R_s[\Omega] = \frac{1600}{20} = 80 \Omega \approx 80,6 \Omega$$

2.4 View of front and back panels

Fig. 1: pin assignment

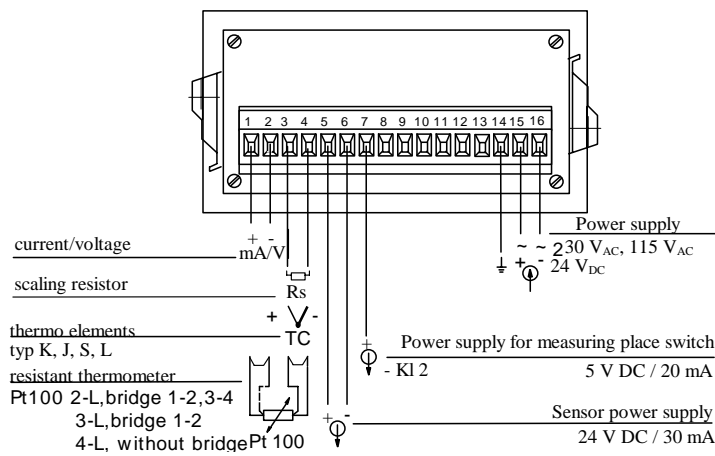


Fig. 2: Connection example: 2-lead pressure transmitter

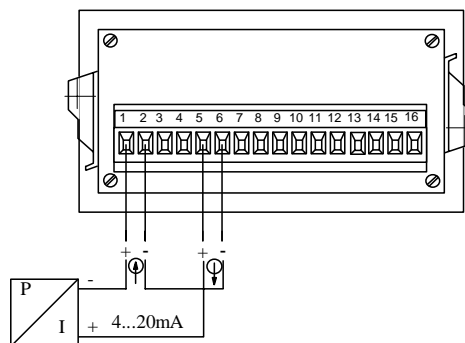
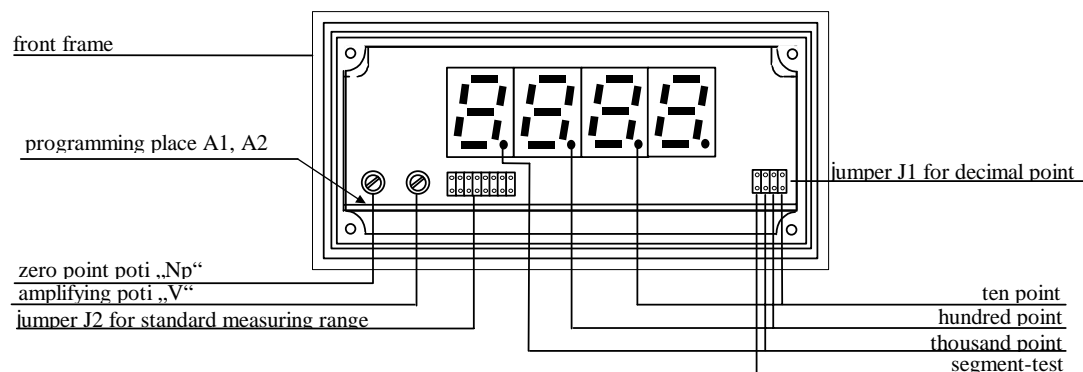


Fig. 3: Programming position

For measurement of currents > 200 mA, the PRG 1 must be closed. The scaling resistor must be designed for the corresponding power dissipation ($P=I^2 \cdot R$).

Fig. 4: Instrument with the front pane removed



3. Technical Specifications

Display:	7- segment display, 13 mm LED red
Display range:	± 1999 digits
Decimal point:	0 ... 3 behind the decimal point, can be selected with the jumper
Error display:	Display "1" for overrange and sensor failure or break Display "- 1" for underrange
Display test:	plug jumper J1 to „Test“ .
Measurement principle:	Dual Slope
Measurement rate:	approx. 2,5 measurements/second
Setting time:	< 2 seconds for sudden changes
Input signals:	
Voltages / Currents DC:	
Measurement range:	0 ... 10 V _{DC} , 0 (4) ... 20 mA, with jumper J2; can be scaled on the front panel 0 ... $\pm 0,2 / \pm 2 / \pm 20 / \pm 200$ V _{DC} (max.350 V _{DC}) with jumper and R _s 0 ... $\pm 200 / \pm 2000$ mA via soldered bridge and R _s (4W)
Accuracy:	$\leq \pm 1$ Digit $\pm 0,15$ % of the display value
Gain adjustment:	max. ± 20 %
Zero shift:	max. ± 1999 Digit
Influence of temperature:	$\pm 0,08$ digits/K (relative to 25 °C)
Thermoelements:	
IEC NiCr-Ni	Typ K: - 160 ... 1360 °C
IEC FeCu-Ni	Typ J: - 120 ... 1200 °C
IEC PtRh-Pt	Typ S: + 200 ... 1700 °C
DIN FeCu-Ni	Typ L: - 120 ... 900 °C
Resolution:	1 K
Accuracy:	$\leq \pm 1,5$ K $\pm 0,5$ % of the display value
Influence of temperature:	$\leq \pm 0,05$ °C/K (relative to 25 °C)
Input resistor:	> 1 M Ω
Input current:	< 20 nA
Integrated temperature compensation	

Thermometer Pt100:

Connection in two, three or four-lead technology
2-lead technology to 3 Ω lead resistance

Measuring range: - 100,0 ... + 199,9 °C
Resolution: 0,1 K
Accuracy: $\leq \pm 0,2 \text{ K} \pm 0,1 \%$ of the display value
Influence of temperature: $\leq \pm 0,012 \text{ °C/K}$ (relative to 25 °C)

Measuring range: -200 ... +700 °C
Resolution: 1 K
Accuracy: $\leq \pm 1 \text{ K} \pm 0,2 \%$ of the display value
Influence of temperature: $\leq \pm 0,02 \text{ °C/K}$ (relative to 25 °C)

Voltage output :

24 V_{DC} max. 30 mA, galvanically insulated for sensors 5 V_{DC} max. 20 mA for selector switch

Terminal Block

Screw terminals with wire shield for max. 1,5 mm²

Operating Temperature

0 ... 50 °C, no dew allowed

Supply Voltage: galvanically insulated

230 V_{AC} } + 10 / - 15 %, 48 ... 62 Hz,
115 V_{AC} } power consumption: approx.. 7 VA
24 V_{DC} } 18 ... 36 V
power consumption: approx. 4,5 VA
residual ripple: max. 100 mV_{SS}
Fuse: for AC- supply thermo-fuse in
the transformer, for DC- supply pole
protection.

Case:

Glass-fibre reinforced noryl, hardly inflammable, removable front frame. Dimensions: ca. 96 x 48 x 135 [mm] (BxHxL) incl. terminal block, mounting depth approx. 126 mm. Panel opening: 91,5 x 43 [mm], panel thickness max. 40 mm

Protection:

IP 50, terminal block IP 20 (DIN 40050, IEC 144)

EMC References

89/336/EWG and 73/23/EWG Fulfills EN 50081, EN 50082 and EN 61010 for unrestricted industrial application.

Weight (Mass): ca. 450 g

The delivery includes the following:

The instrument with 2 mounting elements, operating instructions, labels with the physical units: t, °C, V, mV, %, A, mA, bar, mbar, 1/min, kg and blanks (can be inscribed as required)

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