

Description

These digital measuring instruments are designed to measure, display and monitor either DC and AC currents (MDA480), or DC and AC voltages (MDV480) in industrial applications.

The instruments are panel mounted with a front frame dimension of 96 mm x 48 mm and a mounting depth of 166 mm and are available with 3 1/2 or 4 1/2 digit 7-segment LED display covering various measuring ranges.

Different supply voltages can be provided for a wide spread of applications. Options include analogue, or relay output with 2 setpoints. These features also add to the application possibilities offered by these compact instruments.

Measuring ranges

Current

DC, individual measuring range

Measuring range	Resolution with 3 1/2 digits	Input resistance	Overload protection cont. max. 3 s		Pin designation input decimal pt. - + bridge	
2 mA	1 µA	100 Ω	50 mA	100 mA	1 - 3	---
20 mA	10 µA	10 Ω	160 mA	300 mA	1 - 3	---
200 mA	0.1 mA	1 Ω	600 mA	1.5 A	1 - 5	---
2 A	1 mA	0.1 Ω	3 A	5 A	1 - 5	---
10 A	10 mA	0.01 Ω	10 A	12 A	1 - 5	---

DC, triple/double measuring range

2 mA	1 µA	100 Ω	50 mA	100 mA	1 - 6	7-10
20 mA	10 µA	10 Ω	160 mA	300 mA	1 - 5	8-10
200 mA	0.1 mA	1 Ω	600 mA	1.5 A	1 - 3	7-10,8-10
2 A	1 mA	0.1 Ω	3 A	5 A	1 - 5	7-10
10 A	10 mA	0.01 Ω	10 A	12 A	1 - 3	8-10

AC, individual measuring range

Measuring bereich	Resolution with 3 1/2 digits	Input resistance	Overload protection cont. max. 3 sec		Pin designation input decimal pt. Lo Hi bridge		
2 mA	1 µA	100 Ω	50 mA	100 mA	1 - 3	---	
20 mA	10 µA	10 Ω	160 mA	300 mA	1 - 3	---	
200 mA	0.1 mA	1 Ω	600 mA	1.5 A	1 - 5	---	
2 A	1 mA	0.1 Ω	3 A	5 A	1 - 5	---	
10 A	10 mA	0.01 Ω	10 A	12 A	1 - 5	---	

Voltage

DC, individual measuring range

Measuring range	Resolution with 3 1/2 digits	Input resistance	Overload protection continuously	Pin designation input decimal pt. - + bridge	
200 mV	0.1 mV	1 MΩ	150 V	1 - 3	---
2 V	1 mV	4 MΩ	500 V	1 - 3	---
20 V	10 mV	20 MΩ	700 V	1 - 3	---
200 V	0.1 V	20 MΩ	700 V	1 - 3	---
600 V	1 V	20 MΩ	1000 V	1 - 3	---

DC, double measuring range

200 mV	0.1 mV	440 kΩ	150 V	2 - 5	7-10, 8-10
2000 mV	1 mV	4 MΩ	500 V	1 - 3	---
20 V	10 mV	1.8 MΩ	700 V	2 - 5	8-10
200 V	0.1 V	18 MΩ	700 V	1 - 3	7-10, 8-10

AC, individual measuring range

Measuring range	Resolution with 3 1/2 digits	Input resistance	Overload protection continuously	Pin designation input decimal pt. Lo Hi bridge		
200 mV	0.1 mV	>10 MΩ	150 V	1 - 3	---	
2 V	1 mV	>10 MΩ	350 V	1 - 3	---	
20 V	10 mV	2 MΩ	350 V	1 - 3	---	
200 V	0.1 V	10 MΩ	700 V	1 - 3	---	
600 V	1 V	10 MΩ	1000 V	1 - 3	---	



MDA480



MDV480

Technical data

Display: Red 7-segment LED display
3 1/2
13 mm high

Full scale range: 1999 digits

Over-range indication: The last 3 digits will extinguish

With DC measuring ranges: display test by means of a front button and Hold signal via terminal strip on the rear.

Accuracy of display (at 23 °C)

Current / Voltage, DC version:

individual measuring range

0.1 % dA ± 1 digit

multiple measuring range

0.15 % dA ± 1 digit

Current / Voltage, AC version:

individual measuring range

0.2 % dA ± 1 digit

dA = of reading

The accuracy given refers to the indicated value.

DC input: Potenzial free differential input

Common-mode range ± 1 V

Common-mode rejection > 60 dB

AC input: Input related to instrument mass (Lo = 0 V)

Reading characteristics: Integrating dual-slope

Count rate: 2.5 readings/second

Setting time for a 100 % reading change: < 3sec

Frequency range:

With AC version: 15 Hz...1 kHz

Temperature drift: ≤ 0.01 % span/K with 3 1/2 digit display

Warm-up to full accuracy: 15 min

Operating temperature

range: 0...+50 °C

Storage temperature

range: -20...+70 °C

Application class:

KWF to DIN 40 040

Relative humidity: 0...75 % annual average, 95 % max.

(without condensation)
Shock test: 10 g (11ms), to IEC 68-2-29/DIN 40 046, part 26

3 x shocks in 3 planes

on duty: 2 g (0.15 mm), 10...55 Hz
on transport: 5 g (0.35 mm) 10...150 Hz,
to IEC 68-2-6/DIN 40 046

(span = full measuring range)

Voltage supply (voltage rating):

AC 230 V (standard) ±10 % 48...62 Hz

other voltages: AC 240 V, 120 V, 115 V ±10 % 48...62 Hz

(optional) AC 48 V, 24 V ±10 % 48...62 Hz

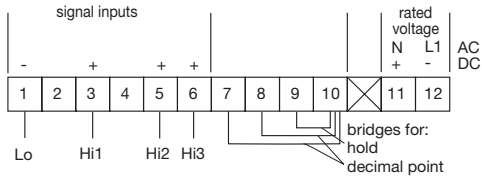
DC 12 V...28 V (physically isolated)

Maximum allowed residual ripple 10 %, but not less than the minimum voltage or more than the maximum voltage.

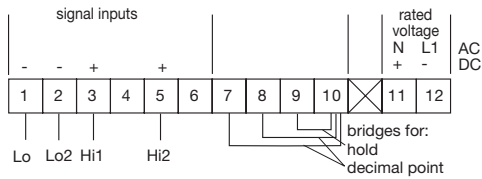
Power consumption: ≤ 9 VA/6.5 W

Connector pin assignment

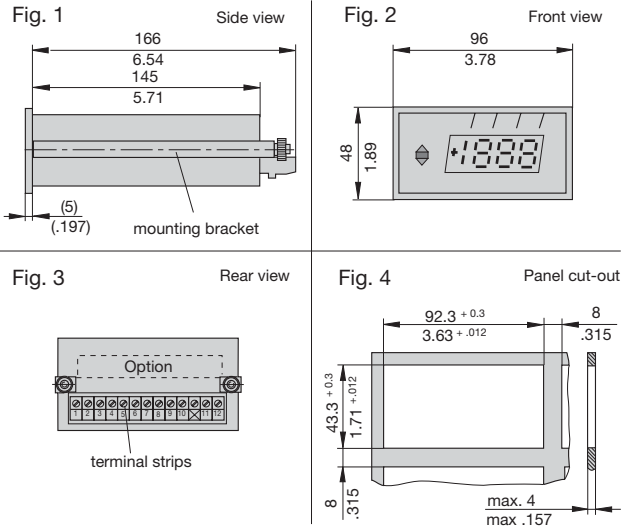
Current measuring instrument



Voltage measuring instrument



Case



This is a metric design and millimeter dimensions take precedence ($\frac{\text{mm}}{\text{inch}}$)

Caution:

If several instruments are to be fitted, a minimum of 8 mm between each cut-out must be provided for correct removal of front glass. (Fig. 4)

Case material:

glass-fibre reinforced
black Noryl SE 1

Degree of protection:

IP20 (front), with external setpoint setting
IP50 (front), with internal setpoint setting
(only with DC measurement)
IP20 (rear)

Applicable specification:

VDE 0411 part 100
Pollution degree 3 to IEC 664 and 664 A

Instrument mass (without options): approx. 500 g

Terminations

Plug-in screw-terminal strip for max. 1.5 mm² cables.

Analogue output (AA and AB options)

Description

Each of the DC current or voltage measuring instruments accepts a current and a voltage analogue output. The voltage output is a differential output which depends on the negative supply voltage; the current output is ground-related. There is no physical isolation between the analogue outputs and the measuring input.

Technical data

Current output:

Output current: 0...20 mA corresponding to a 0...100 % measuring range
or
4...20 mA corresponding to a 0...100 % measuring range
Load resistance: $R_L \leq 300 \Omega$

Voltage output:

Output voltage: 0...10 V corresponding to a 0...100 % measuring range
Load resistance: $R_L \geq 10 \text{ k}\Omega$

Overload protection: continuous short-circuit or no load

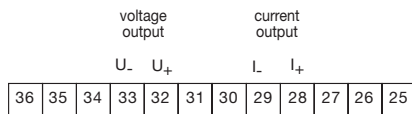
Caution!

Do not electrically connect the inputs and outputs simultaneously when several instruments with analogue outputs are connected, as this will cause ground loops short-circuiting the internal supply across the analogue outputs. Otherwise provide additional interface couplers with physical isolation at the outputs.

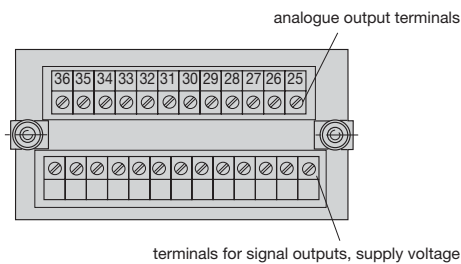
Terminations:

12-pole plug-in screw-terminal strip for max. 1.5 mm² cables

Connector pin assignment



Rear view of analogue output option:



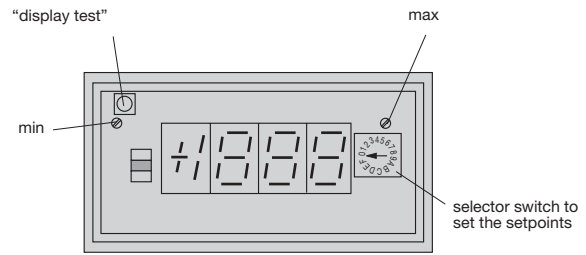
Setpoints

Description

The instruments may be fitted with setpoints. The setpoints are with output relays to provide physical isolation. The response threshold may be set with a potentiometer after removing the front glass. Fade-in reading of the set values with a selector switch accessible from the front.

2 Setpoints (option G1)

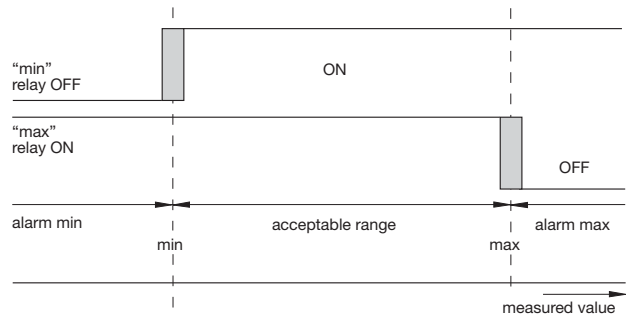
Setting the setpoints (after removal of front glass)



Switch position	Readout
or 8	measuring value
1 or 9	min
3 or 6	max
All other switch positions	overflow

Setting accuracy: = accuracy of readout
Accuracy of response: $\leq 0.2 \% \text{ span} \pm 1 \text{ digit}$
Hysteresis: $\leq 0.5 \% \text{ span} \pm 1 \text{ digit}$
Response: ca. 0.5 s

Switching performance (here "relay de-energized" = self-protection)

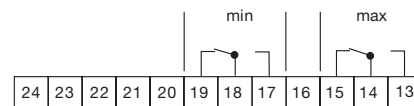


All relay switching conditions are inverted with "relay de-energized".

Three LEDs indicate the switching position of the setpoints:

- lighted: above max. limit (max) (red LED)
- lighted: "acceptable range" (green LED)
- lighted: below min limit (min) (red LED)

Connector pin assignment: 2 setpoints



Contact position shown in the "acceptable range" condition with version "relay de-energized".

Output:

Switching capacity:

max: 2-way contact 250 V/ 3 A/660 VA/100 W
min: 2-way contact 250 V/ 3 A/660 VA/100 W

Terminations:

12-pole plug-in screw-terminal strip for max. 1.5 mm² cables.

2 Setpoints + Analogue output

2 setpoints + analogue output 0...20 mA
 2 setpoints + analogue output 4...20 mA
 2 setpoints + analogue output 0...10 V
 See page 15 for setpoint description

Analogue output:

The voltage or current analogue output is designed as a differential output which depends on the internal negative supply voltage; the current output is ground-related.
 There is no physical isolation between the analogue output and the measuring input.

Current output:

Output current 0...20 mA corresponding to a 0...100 % measuring range
 or 4...20 mA corresponding to a 0...100 % measuring range
 Load resistance $R_L \leq 300 \Omega$

Voltage output:

Output voltage 0...10 V corresponding to a 0...100 % measuring range

Load resistance: $R_L \geq 10 \text{ k}\Omega$

Overload protection: continuous short-circuit or no-load

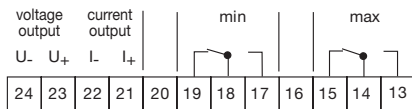
Caution!

Do not electrically connect the inputs and outputs simultaneously when several instruments with analogue outputs are connected, as this will cause ground loops short-circuiting the internal supply across the analogue outputs. Otherwise provide additional interface couplers with physical isolation at the outputs.

Terminations:

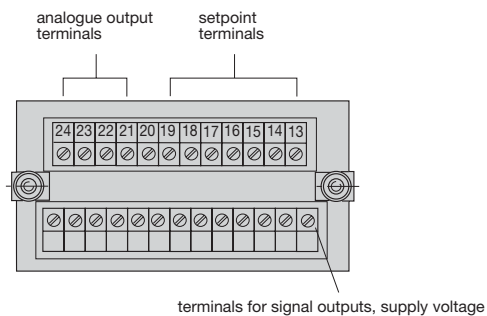
12-pole plug-in screw-terminal strip for max. 1.5 mm² cables.

Connector pin assignment



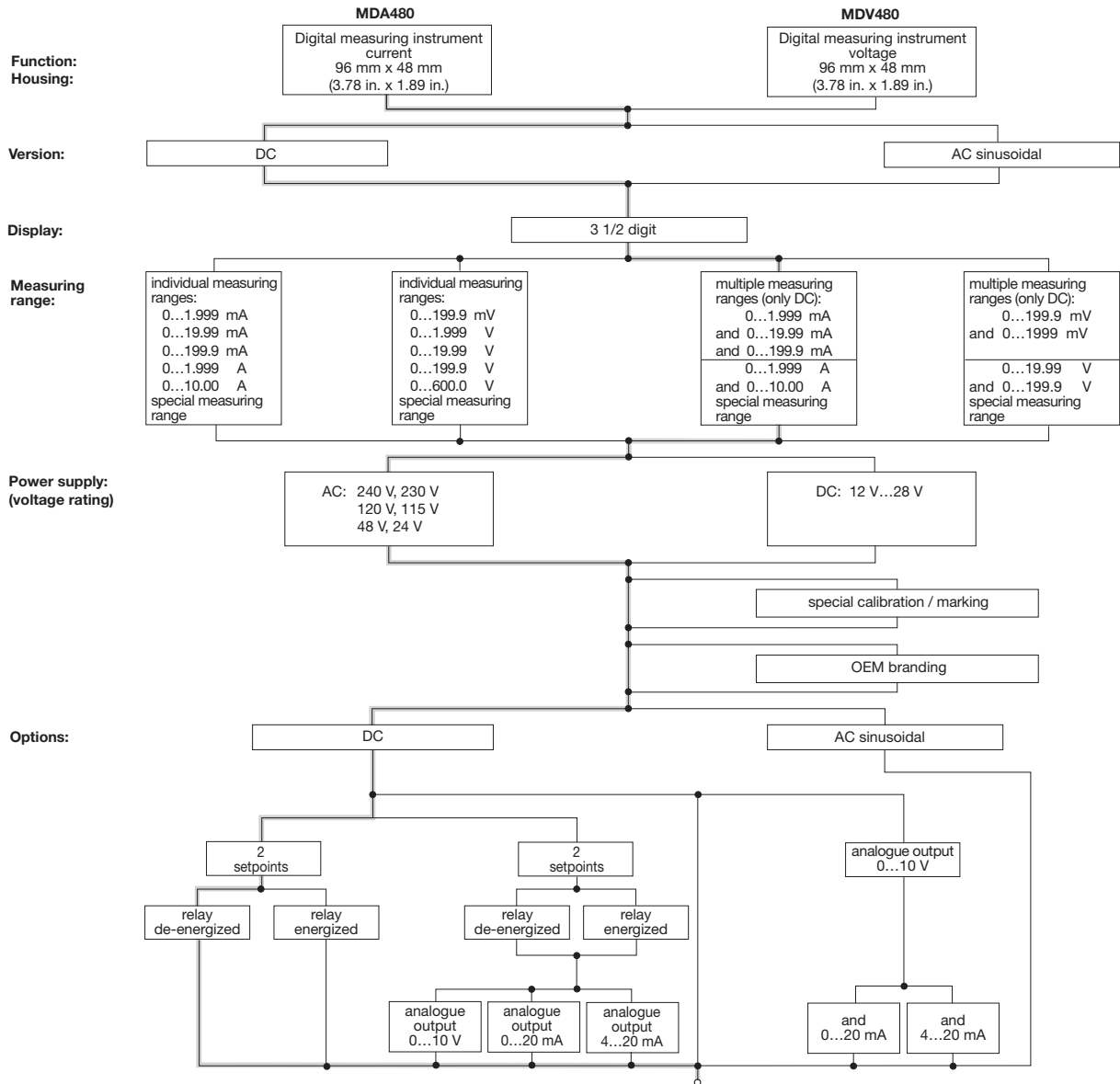
Contact position shown in the "acceptable range" condition with version "relay de-energized".

Rear view: 2 setpoints and analogue output



Selector chart

Please select the required type by following the chart below.



Example: MDA480-D 3 22 A9 G1 N
 Current measuring instrument 96 x 48 mm / 3.78 in. x 1.89 in., DC 3 1/2 digit, double measuring range 2 A + 10 A, AC 230 V supply, with E-T-A. trademark, 2 setpoints, internal setting, IP50, relay de-energized

Ordering information

Please check that combining the options is possible (see Selector Chart on the previous page).

Type No.

Physical dimensions

A current

V voltage

Case

480 96 mm x 48 mm

Version

D DC

A AC

Display

3 3 1/2 digit

Measuring range

11 2 mA/200 mV

12 20 mA/2 V

13 200 mA/20 V

14 2 A/200 V

15 10 A/600 V

21 2 mA + 20 mA + 200 mA/200 mV + 2000 mV

22 2 A + 10 A / 20 V + 200 V

} multiple measuring range, with DC input signals only

00 special measuring range*)

Power supply (rated voltage)

A1 240 V AC

A3 120 V AC

A6 48 V AC

A7 24 V AC

A8 115 V AC

A9 230 V AC (standard)

D8 12...28 V DC

K special marking (see below for standard markings*)

special marking as required by customer*)

special calibration*)

F OEM branding*)

Options (with DC instruments only)

AA analogue output: 0...20 mA + 0...10 V

AB analogue output: 4...20 mA + 0...10 V

G1 2 setpoints, internal setting, IP50

G6 2 setpoints, internal setting, IP50 + analogue output 0...20 mA

G7 2 setpoints, internal setting, IP50 + analogue output 0...10 V

G9 2 setpoints, internal setting, IP50 + analogue output 4...20 mA

N relay de-energized, standard

I relay energized

MD A 480 - D 3 22 A9 . . G1 N ordering example

*) Clearly add desired specifications.

Standard markings:

V, mV, kV, MV, A, mA, kA, kW, MW, °F, °C, %, % r.F., ms, Stück, Ohm, pH, µs, l, N, kN, kg, t, lbf, Ncm, Nm, m, cm, mm, km, inch, bar, mbar, Pa, hPa, psi, kg/cm², mmWs, mWs, N/m², N/mm², Hz, kHz, U/min, min⁻¹, sec⁻¹, rpm, l/h, l/min, kg/h, m³/h, m/min, m/sec, t/h

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.