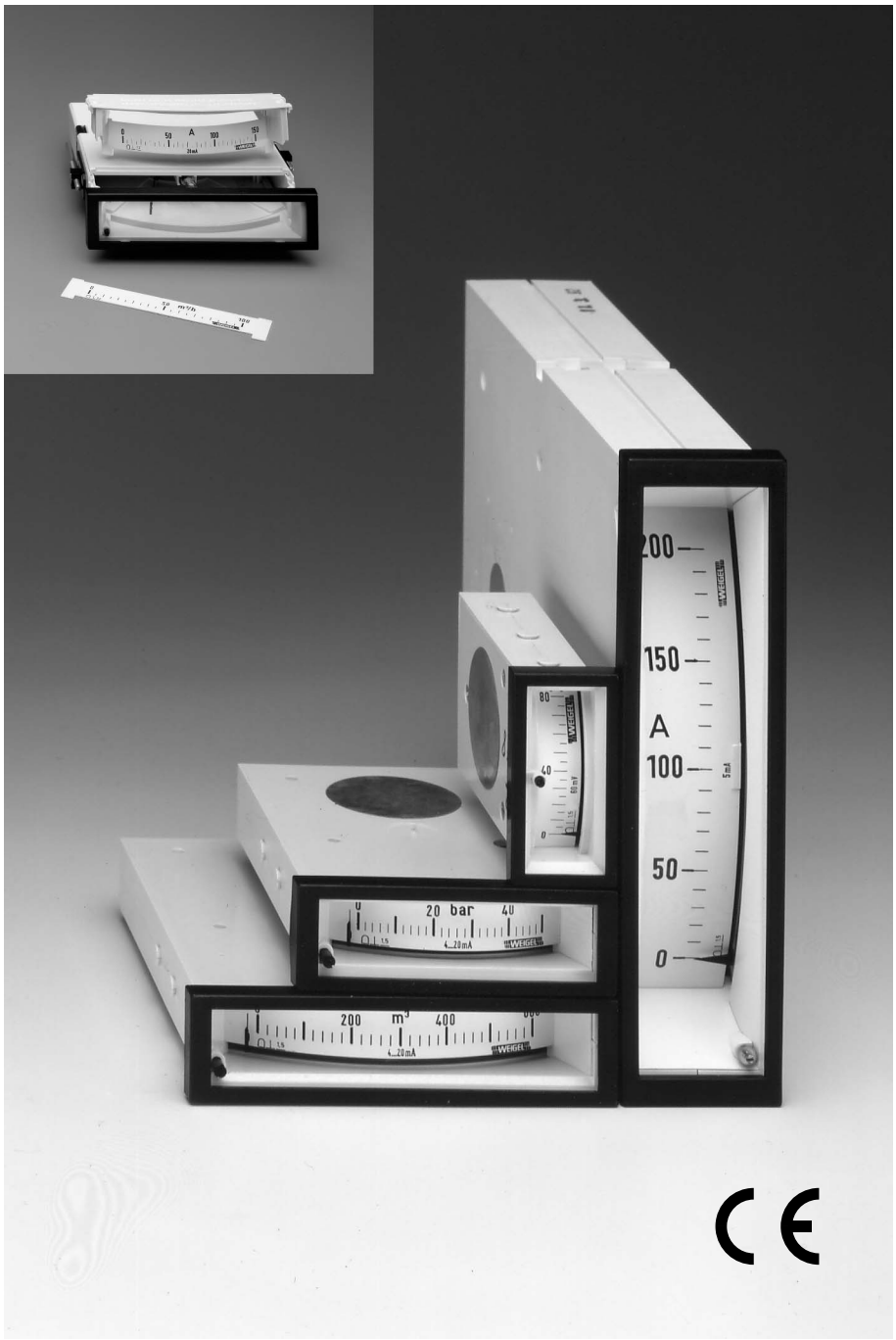
Data Sheet

Edgewise Series
010.D.301.08

Analog Meters
Slim Edgewise with Moving-Coil Movement

MP 48x24
MP 72x24
MP 96x24 K
P 144x36



MP 96x24 K

with Slide-In-Dial

Application

The edgewise moving-coil panel meters **MP 48x24**, **MP 72x24**, **MP 96x24 K** and **P 144x36** with a slim-line dial are used for measurement of **DC currents and voltages**.

The moving-coil movement is manufactured to newest findings and distinguishes in a small power consumption, a high accuracy and a very good damping.

The instruments are suitable to be mounted in switchboards, control panels, machine tool consoles and mosaic panels (except P 144x36).

With MP 96x24 K **the front panel, the front window and the dial** as well as the **dial illumination** (optional) can be exchanged easily. On the rear side a cable grip for the connecting leads is integrated.

Movements

Self-shielding moving-coil movements with swivel coil, pivot suspended. Spring loaded jewel bearings for vibration and shock resistance.

Mechanical Data

case details	edgewise case suitable to be mounted in control panels, machine tool consoles or mosaic panels (except P144x36), stackable			
material of case	thermoplastics			
material of window	glass ◗			
colour of bezel	black (similar to RAL 9005) ◗			
position of use	vertical ±5° ◗			
panel fixing	screw clamps ◗			
mounting	stackable next to each other			
panel thickness	1 ... 25 mm			
terminals	connector blades 6.3 x 0.8 or connector blades 2.8 x 0.8 (MP 96x24 K)			
dimensions (in mm)	MP 48x24	MP 72x24	MP 96x24 K	P 144x36
bezel	48 x 24	72 x 24	96 x 24	144 x 36
case	43 x 17	66 x 17	92 x 18	137 x 32
depth	75	98	108	173
panel cutout	$45^{+0.6}$ x $22.2^{+0.3}$	$68^{+0.7}$ x $22.2^{+0.3}$	$92^{+0.8}$ x $22.2^{+0.3}$	$138^{+1.0}$ x $33^{+0.6}$
weight approx.	0.08 kg	0.1 kg	0.12 kg	0.5 kg

Electrical Data

measuring unit	DC voltage or DC current
overload capacity (acc. to DIN EN 60 051-1)	
continuously	1.2 times rated voltage / current
5 s max. voltmeters	2 times rated voltage
ammeters	10 times rated current
measurement category	CAT III
operating voltage	refer to Measuring Ranges
pollution level	2
enclosure code	IP 52 case front side ◗ IP 00 for terminals without protection against accidental contact IP 20 for terminals protected against accidental contact

◗ for other ratings refer to "Options"

[1]) the resistance values are limited to a tolerance of ±20%
[2]) sensitivity[1]) 1000 Ω/V ◗
[3]) MP 48x24 on request

Measuring Ranges

For mains use

DC current	internal resistance[1]) / voltage drop approx. MP 48x24	MP 72x24/MP 96x24 K	P 144x36
100 µA	1000 Ω	1000 Ω	652 Ω
150 µA	835 Ω	835 Ω	437 Ω
250 µA	500 Ω	500 Ω	256 Ω
400 µA	310 Ω	310 Ω	38 Ω
600 µA	208 Ω	208 Ω	100 Ω
1 mA	41 Ω	33 Ω	60 mV
1.5 mA	55 mV	47 mV	60 mV
2.5 mA	55 mV	47 mV	60 mV
4 mA	55 mV	47 mV	60 mV
5 mA	55 mV	47 mV	60 mV
6 mA	55 mV	47 mV	60 mV
10 mA	55 mV	47 mV	60 mV
15 mA	55 mV	47 mV	60 mV
20 mA	55 mV	47 mV	60 mV
25 mA	55 mV	47 mV	60 mV
40 mA	55 mV	47 mV	60 mV
60 mA	55 mV	47 mV	60 mV
100 mA	55 mV	47 mV	60 mV
150 mA	55 mV	47 mV	60 mV
250 mA	55 mV	47 mV	60 mV
400 mA	55 mV	47 mV	60 mV
600 mA	55 mV	47 mV	60 mV
1 A	55 mV	47 mV	60 mV

for use with external shunt

60 mV [2])
150 mV [2])

a total lead resistance of 0.05 Ω is considered in the calibration of the indicator for connecting leads 1 m, 2 x 0.75 mm² ◗

DC voltage >5V [2])

6 V, 10 V, 15 V, 25 V, 40 V, 60 V, 100 V, 150 V, 250 V
400 V, 500 V, 600 V [3])

Not for mains use

DC voltage ≤5V [2])

60 mV, 100 mV, 150 mV, 250 mV, 400 mV, 600 mV,
1 V, 1.5 V, 2.5 V, 4 V

for use on transducer ("live zero")

4 ... 20 mA	mechanically suppressed zero, without zero adjustment, voltage drop approx. 46 mV (MP 48x24) approx. 60 mV (MP 72x24/96x24 K, P 144x36)
0/4 ... 20 mA	electrically suppressed zero (MP 72x24/96x24 K, P 144x36), with zero adjustment, voltage drop approx. 900 mV

Operating Voltages

measuring ranges operating voltage	MP 48x24	MP 72x24	MP 96x24 K	P 144x36
100 µA – 1 A	300 V	600 V	300 V	300 V
Shunt 60 mV, 150 mV	300 V	600 V	300 V	300 V
live zero (0/)4...20 mA	300 V	600 V	300 V	300 V
60 mV – 4 V	50 V	100 V	300 V	100 V
6 V – 40 V	50 V	100 V	300 V	100 V
60 V, 100 V	300 V	100 V	300 V	100 V
150 V, 250 V	300 V	600 V	300 V	300 V
400 V – 600 V [3])	–	600 V	600 V	600 V

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Analog Meters Slim Edgewise with Moving-Coil Movement

Scaling

pointer	bar pointer
zero adjustment	front accessible ➧
response time	1 s for full–scale deflection
scale arrangement	horizontal (left–hand zero) ➧
scale characteristics	linear
scale division	coarse–fine
scale length	MP 48x24 30 mm; MP 72x24 52 mm; MP 96x24 K 60 mm; P 144x36 95 mm

Accuracy at Reference Conditions

accuracy class	1.5 according to DIN EN 60 051 - 1
reference conditions	
ambient temperature	23˚C
position of use	nominal position ±1˚
input	rated measuring value
others	DIN EN 60 051 - 1
influences	
ambient temperature	23˚C±2K
position of use	nominal position ±5˚
stray magnetic field	0.5 mT

Environmental

climatic suitability	climatic class 2 ➧ according to VDE/VDI 3540 sheet 2
operating temperature range	–25 ... +40˚C ➧
storage temperature range	–25 ... +65˚C
relative humidity	≤ 75% annual average, non–condensing
shock resistance	15 g, 11 ms ➧
vibration resistance	2.5 g, 5 ... 55 Hz ➧

Rules and Standards

DIN 43 718	Measurement and control; front - frames and frontpanels of measurement and control equipment; principal dimensions
DIN 43 802	Line scales and pointers for indicating electrical measuring instruments; general requirements
DIN 16 257	Nominal positions and position symbols used for measuring instruments
DIN EN 60 051	Direct acting indicating analogue electrical measuring instruments and their accessories
–1	Part 1: Definitions and general requirements common to all parts
–2	Part 2: Special requirements for ammeters and voltmeters
–9	Part 9: Recommended test methods
DIN EN 60 529	Enclosure codes by housings (IP - code)
DIN EN 61 010 - 1	Safety requirements for electrical measuring, control and laboratory equipment Part 1: General requirements
DIN EN 61 326 - 1	Electrical equipment for measurement, control and laboratory use – EMC requirements Part 1: General requirements
DIN IEC 61 554	Panel mounted equipment – Electrical measuring instruments – Dimensions for panel mounting
VDE/VDI 3540 sheet 2	reliability of measuring and control equipment (classification of climates) (non - condensing)

Options

measuring range	
"live zero" (MP 96x24 K)	measuring range 0/4 ... 20 mA electrically suppressed zero with zero adjustment, voltage drop 900 mV approx.
special measuring range	deviating from standard
internal resistance	adjustment to ±1% at 23˚C
increased sensitivity	for voltmeters 1 V and higher to 2 kΩ/V, 5 kΩ/V, 10 kΩ/V or 20 kΩ/V (as far as possible)
lead resistance	calibration of total value >0.05Ω
case	
window	non–glaring glass
colour of bezel	gray (similar to RAL 7037)
position of use	horizontal or on request 15...165˚
mounting (MP 96 x24 K)	blade springs on the narrow sides
performance	
climatic suitability	limited use in the tropics climatic class 3 according to VDE/VDI 3540 sheet 2
with operating temperature range	–10 ... +55˚C
increased mechanical loads	shock 30 g, 11 ms vibration 5 g, 5 ... 55 Hz
marine application	non–certified
enclosure code	IP 54 splash–water protected front (without zero adjustment or with zero adjustment rear accessible for MP 96x24 K)

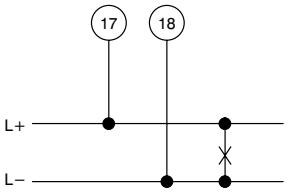
terminal protection against accidental contact
protective sleeves B6 for connector blades 6.3 x 0.8
protective sleeves 110 for connector blades 2.8 x 0.8

dial	
scale arrangement	vertical (bottom zero)
blank dial	pencil–marked on initial and end values
scale division and figuring	0 ... 100%, linear, full–scale values acc. to standardized series (1 - 1.2 - 1.5 - 2 - 2.5 - 3 - 4 - 5 - 6 - 7.5 and their decimal multiples e.g. 150 m^3/h) or deviating from standard; special calibration from customer's non–linear graph or chart; scaling of voltmeters in ohms; captions on request
2nd scale division	including figuring (on request)
coloured scale (MP 96x24 K only)	scale in black; pointer, scale division and lettering yellow or white
additional lettering	on request e.g. "generator"
additional figuring	on request
coloured marks	red, green or blue for important scale values
coloured segment	red, green or blue within scale division
logo on the dial	none or on request
zero position	centre zero or off–set zero, mechanically suppressed zero, no zero adjustment, max. 40% of full–scale value for ammeters ≥ 100 μA, voltmeters ≥ 60 mV

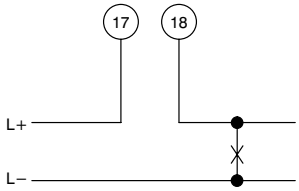
zero adjustment (MP 96x24 K only)	rear accessible
expanded scale	expanded initial scale division by means of electronic circuits up to approx. 5% of full–scale value in centre of scale for MP 72x24 / 96x24 K, P 144x36
dial illumination	dial translucent
for MP 48x24	internal LED 24 V DC
for MP 96x24	1 lamp 6 V, 12 V or 24 V
for P 144x36	2 lamps 6 V, 12 V or 24 V

Connections

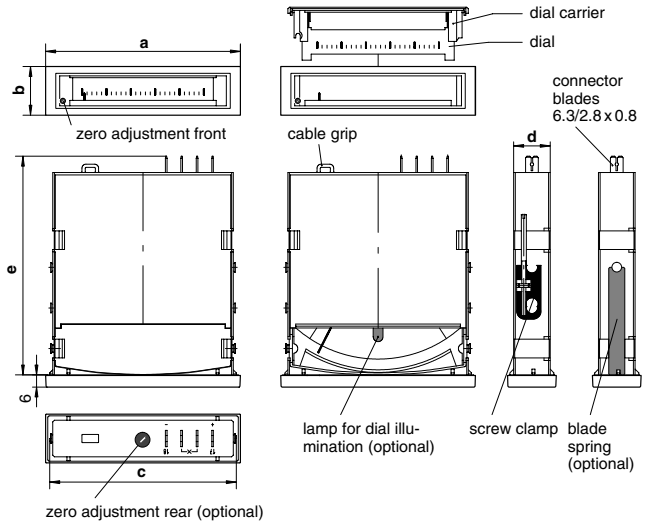
DC voltage



DC current

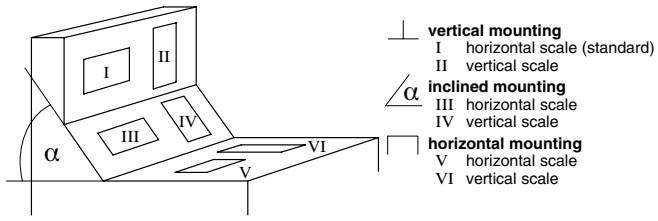


Dimensions



dimensions (in mm)	**MP 48x24**	**MP 72x24**	**MP 96x24 K**	**P 144x36**
a	48	72	96	144
b	24	24	24	36
c	43	66	92	137
d	17	17	18	32
e	75	98	108	173

scales and position of use



Ordering Information

type (M)P	slim edgewise moving-coil panel meter for DC voltage or current
front dimensions	
48x24	48 mm x 24 mm
72x24	72 mm x 24 mm
96x24 K	96 mm x 24 mm
144x36	144 mm x 36 mm
measuring ranges	refer to preceding table
specal measuring range	on request [2])
"live zero"	4 ... 20 mA mechan. suppressed zero [1]) 0/4 ... 20 mA electric. suppressed zero [4])
adjustment	internal resistance ±20% [1]) internal resistance ±1% at 23˚C lead resistance >0,05 Ω
sensitivity voltmeters	1 kΩ/V [1]) 2 kΩ/V 5 kΩ/V 10 kΩ/V 20 kΩ/V as far as possible
window	glass [1]) non-glaring glass
colour of bezel	black (similar to RAL 9005) [1]) gray (similar to RAL 7037)
position of use	vertical [1]) horizontal on request 15 ... 165° [2])
mounting	screw clamps [1]) spring blades
climatic suitability	class 2, –25 ... +40˚C [1]) class 3, –10 ... +55˚C
mechanical loads	shock 15 g, vibration 2.5 g [1]) shock 30 g, vibration 5 g
marine application	none [1]) non-certified
enclosure code	IP 52 [1]) IP 54 splash–water protected front
terminal protection	none [1]) protective sleeves B6 (for 6.3 x 0.8) protective sleeves 110 (for 2.8 x 0.8)
scale arrangement	horizontal [1]) vertical

dial	scale division & measuring range alike [1]) blank dial scale division and figuring 0 ... 100% linear acc. to standardized series [2]) linear deviating from standard [2]) calibration f. non-linear graph or chart [2]) scaling in ohms for voltmeters [2]) 2 scale divisions on request [2]) yellow on black dial [3]) white on black dial [3]) additional lettering on request [2]) additional figuring on request [2]) coloured marks red, green or blue [2]) coloured sector red, green or blue [2])
logo	none OEM logo [2])
zero position	left hand zero position [1]) centre or off-set zero position [2]) mechan. suppressed z.p. [2]) (≥100µA/60mV)
zero adjustment	front accessible [1]) rear accessible [3])
expanded scale (not for MP 48x24)	none [1]) up to approx. 5% of full-scale value in center scale electronically [2])
dial illumination for MP 48x24 for MP 96x24 for P 144x36	none [1]) internal LED 24 V DC 1 lamp 6 V, 12 V or 24 V 2 lamps 6 V, 12 V or 24 V

[1]) Standard
[2]) Please clearly add the desired specifications.
[3]) MP 96x24 K only
[4]) MP 72x24/96x24 K, P 144x36 only

ordering example

MP 72x24, measuring range 0 ... 20 mA, horizontal scale 0 ... 100%, vertical mounting, window non–glaring glass

Camille Bauer Metrawatt AG

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