



# Data Sheet

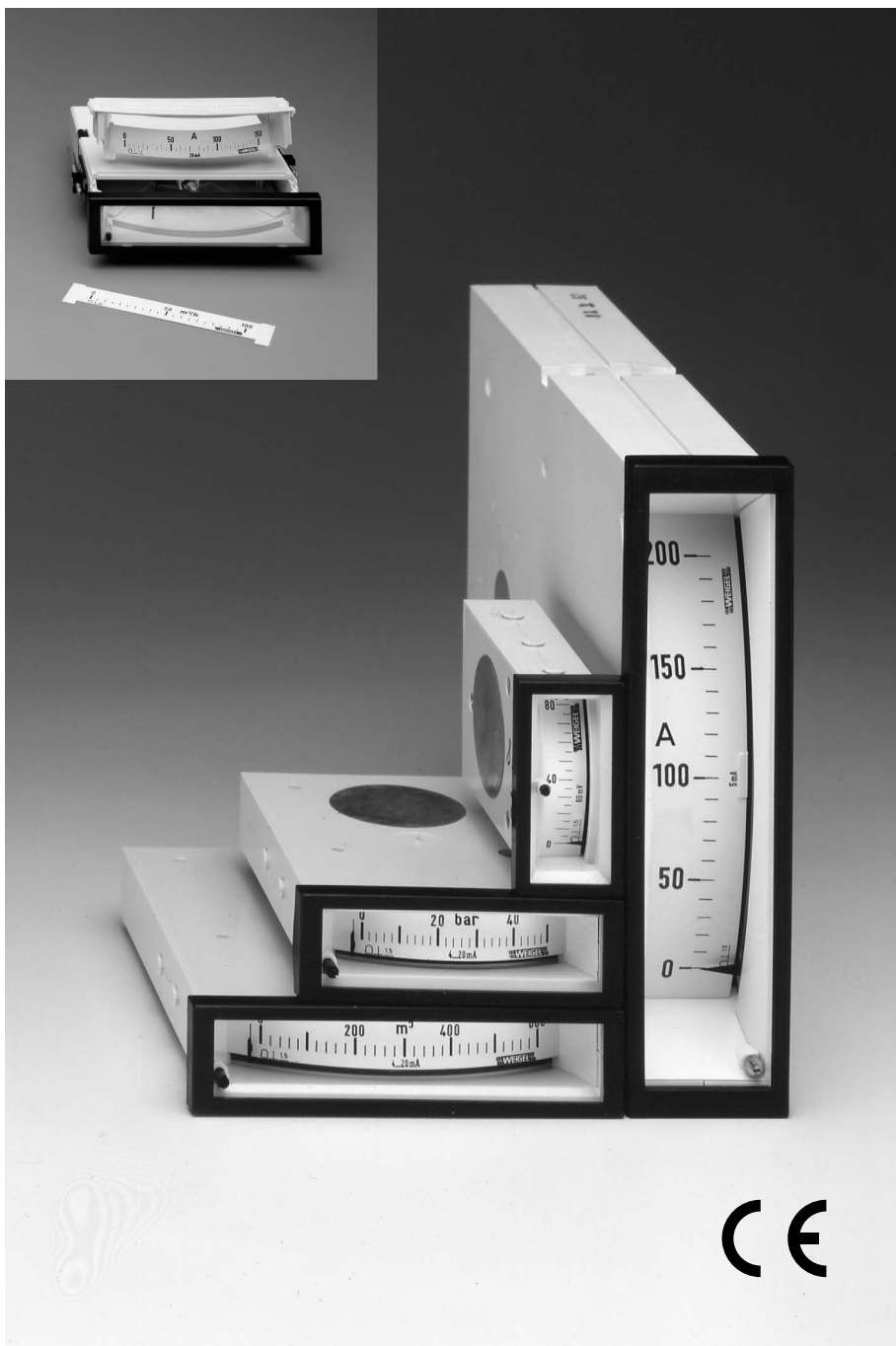
Edgewise Series  
010.D.301.08

## 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 P 144x36), stackable |                                              |                                              |                                             |
| material of case          | thermoplastics                                                                                                              |                                              |                                              |                                             |
| material of window        | glass ♦                                                                                                                     |                                              |                                              |                                             |
| colour of bezel           | black (similar to RAL 9005) ♦                                                                                               |                                              |                                              |                                             |
| position of use           | vertical $\pm 5^\circ$ ♦                                                                                                    |                                              |                                              |                                             |
| 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)                                                       |                                              |                                              |                                             |
| <b>dimensions</b> (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 <sup>+0.6</sup><br>x 22.2 <sup>+0.3</sup>                                                                                | 68 <sup>+0.7</sup><br>x 22.2 <sup>+0.3</sup> | 92 <sup>+0.8</sup><br>x 22.2 <sup>+0.3</sup> | 138 <sup>+1.0</sup><br>x 33 <sup>+0.6</sup> |
| 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<br>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 ♦<br>IP 00 for terminals without protection against accidental contact<br>IP 20 for terminals protected against accidental contact |

♦ for other ratings refer to "Options"

<sup>1)</sup> the resistance values are limited to a tolerance of  $\pm 20\%$

<sup>2)</sup> sensitivity <sup>1)</sup> 1000  $\Omega/V$  ♦

<sup>3)</sup> MP 48x24 on request

## Measuring Ranges

### For mains use

DC current internal resistance<sup>1)</sup> / voltage drop approx.  
MP 48x24 MP 72x24/MP 96x24 K P 144x36

|             |               |               |              |
|-------------|---------------|---------------|--------------|
| 100 $\mu A$ | 1000 $\Omega$ | 1000 $\Omega$ | 652 $\Omega$ |
| 150 $\mu A$ | 835 $\Omega$  | 835 $\Omega$  | 437 $\Omega$ |
| 250 $\mu A$ | 500 $\Omega$  | 500 $\Omega$  | 256 $\Omega$ |
| 400 $\mu A$ | 310 $\Omega$  | 310 $\Omega$  | 38 $\Omega$  |
| 600 $\mu A$ | 208 $\Omega$  | 208 $\Omega$  | 100 $\Omega$ |
| 1 mA        | 41 $\Omega$   | 33 $\Omega$   | 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 <sup>2)</sup>  
150 mV <sup>2)</sup>

a total lead resistance of 0.05  $\Omega$  is considered in the calibration of the indicator for connecting leads 1 m, 2 x 0.75 mm<sup>2</sup> ♦

### DC voltage >5V <sup>2)</sup>

6 V, 10 V, 15 V, 25 V, 40 V, 60 V, 100 V, 150 V, 250 V  
400 V, 500 V, 600 V <sup>3)</sup>

### Not for mains use

### DC voltage $\leq 5V$ <sup>2)</sup>

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 $\mu A$ – 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 <sup>3)</sup> | –     | 600 V | 600 V | 600 V |



## 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 60 mm   K 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 ♦<br>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<br>Part 1: General requirements      |
| DIN EN 61 326 - 1 | Electrical equipment for measurement, control and laboratory use – EMC requirements<br>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. deviating from standard |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------|

special measuring range

|                       |                                                                                          |
|-----------------------|------------------------------------------------------------------------------------------|
| 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<br>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 m³/h) or deviating from standard; special calibration from customer's non-linear graph or chart; scaling of voltmeters in ohms; captions on request |
| 2 <sup>nd</sup> 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                                                                                                                                                     |

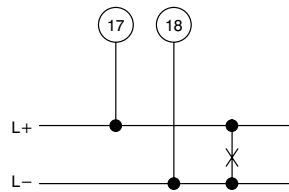
zero adjustment  
(MP 96x24 K only)  
expanded scale

rear accessible  
  
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 translucent  
internal LED 24 V DC  
1 lamp 6 V, 12 V or 24 V  
2 lamps 6 V, 12 V or 24 V

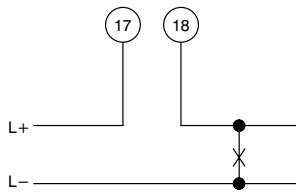
**dial illumination**  
for MP 48x24  
for MP 96x24  
for P 144x36

## Connections

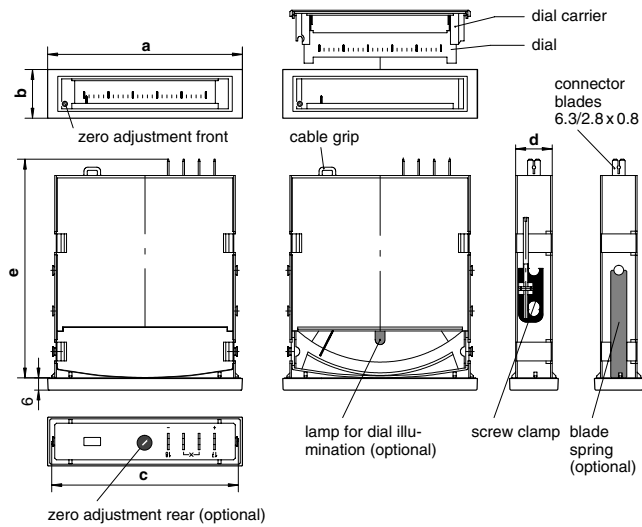
### DC voltage



### DC current

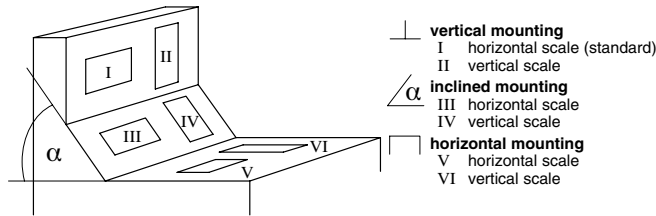


## Dimensions



| 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



- vertical mounting**
  - I horizontal scale (standard)
  - II vertical scale
- inclined mounting**
  - III horizontal scale
  - IV vertical scale
- horizontal mounting**
  - V horizontal scale
  - VI vertical scale

## Ordering Information

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

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

<sup>1)</sup> Standard

<sup>2)</sup> Please clearly add the desired specifications.

<sup>3)</sup> MP 96x24 K only

<sup>4)</sup> 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

