Analog Meters with Moving-Coil Movement and Rectifier
90° Dial

VQ 48 K
VQ 72 K
VQ 96 K
VQ 144 K

with Slide-In-Dial
**Application**

The moving-coil rectifier meters VQ 48/72/96/144 K (K series) housed in moulded thermoplastic cases are used for the measurement of sinusoidal AC currents and voltages.

Moving-coil rectifier instruments measure average values and are scaled to indicate r.m.s., assuming a sinusoidal wave form.

The instruments are suitable to be mounted in switchboards, control panels, machine tool consoles and mosaic panels. The bezel, the glass window and the dial can be easily exchanged on-site.

**Movements**

Self-shielding moving-coil movements with core-type magnet and pivot suspension. Spring loaded jewel bearings for vibration and shock resistance.

**Mechanical Data**

- **case details**
  - moulded square case suitable to be mounted in control / switchgear panels, machine tool consoles or mosaic panels, stackable
- **material of case**
  - polycarbonate thermoplastics, flame retardant with UL rating of 94 V – 0
- **material of window**
  - glass
- **colour of bezel**
  - black (similar to RAL 9005)
- **position of use**
  - vertical ±5°
- **panel fixing**
  - screw clamps or spring clamps (except VQ 144 K)
- **mounting**
  - stackable next to each other
- **panel thickness**
  - < 40 mm
- **dimensions (in mm)**
  - bezel: VQ 48 K: 48, VQ 72 K: 72, VQ 96 K: 96, VQ 144 K: 144
  - depth: 53
  - panel cutout: 45°, 68°, 92°, 138°
  - weight approx.: 0.11 kg, 0.15 kg, 0.2 kg, 0.25 kg

**Electrical Data**

- **measuring unit**
  - AC voltage or current
- **frequency range**
  - voltage 40 Hz ... 50 Hz ... 10 kHz
  - current 50 Hz (others on request)
- **overload capacity (acc. to DIN EN 60 051-1)**
  - continuously: 1.2 times rated voltage / current
  - 5 s max.: 10 times rated current
- **measurement category**
  - CAT III
- **operating voltage**
  - refer to Measuring Ranges
- **pollution level**
  - 2
- **enclosure code**
  - IP 52 for front side
  - IP 00 for terminals without protection against accidental contact
  - IP 20 for terminals protected against accidental contact

**Measuring Ranges**

<table>
<thead>
<tr>
<th>AC current</th>
<th>voltage drop approx.</th>
<th>AC voltage</th>
<th>sensitivity 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 mA</td>
<td>1.7 V</td>
<td>6 V</td>
<td>900 Ω/V</td>
</tr>
<tr>
<td>15 mA</td>
<td>1.7 V</td>
<td>10 V</td>
<td>900 Ω/V</td>
</tr>
<tr>
<td>25 mA</td>
<td>1.7 V</td>
<td>15 V</td>
<td>900 Ω/V</td>
</tr>
<tr>
<td>40 mA</td>
<td>1.9 V</td>
<td>25 V</td>
<td>900 Ω/V</td>
</tr>
<tr>
<td>60 mA</td>
<td>1.9 V</td>
<td>40 V</td>
<td>900 Ω/V</td>
</tr>
<tr>
<td>100 mA</td>
<td>2.0 V</td>
<td>60 V</td>
<td>900 Ω/V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100 V</td>
<td>900 Ω/V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>150 V</td>
<td>900 Ω/V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>250 V</td>
<td>900 Ω/V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>400 V</td>
<td>900 Ω/V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>500 V</td>
<td>900 Ω/V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>600 V 2)</td>
<td>900 Ω/V</td>
</tr>
</tbody>
</table>

1) the resistance values are limited to a tolerance of ±20%
2) not for VQ 49/72 K

**Scaling**

- **pointer**
  - bar / knife–edge pointer
- **pointer deflection**
  - 0 ... 90°
- **scale characteristics**
  - linear
- **scale division**
  - coarse–fine
- **scale length**
  - VQ 48 K: 41 mm, VQ 72 K: 61 mm, VQ 96 K: 97 mm, VQ 144 K: 146 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
  - frequency: 45 ... 50 ... 65 Hz
  - wave form: sinusoidal, distortion factor <5%
  - others: DIN EN 60 051-1

**Influences**

- ambient temperature: 23°C ±2K
- position of use: nominal position ±5°
- frequency: 40 ... 45 ... 60 ... 100 Hz
- stray magnetic field: 0.5 mT

Also refer to "Options"
Environmental
climatic suitability: climatic class 3 acc. to VDE/VDI 3540 sheet 2
operating temperature range: –10 ... +55°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 (IEC 61 000-4-3 evaluation criterion B)
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)

Options

case
window: non–glaring glass
colour of bezel: gray (similar to RAL 7037)
index marking pointer: red, front adjustable
position of use: on request 15...165°
marine application: non–certified or with approbation by ”Germanischer Lloyd” (except VQ 48 K)
dial
non–calibrated: with dial symbols
blank dial: pencil–marked on initial and end values
scale division: 0 ... 100%
and figuring
linear scale division: non–standard captions on request
additional lettering: on request e.g. ”generator”
additional figuring: on request
coloured marks: red, green or blue for important scale values
coloured sector: red, green or blue within scale division
logo on the dial: none or on request
others
increased sensitivity: 4 kΩ/V for voltmeters 6 ... 600 V
10 kΩ/V for voltmeters 6 ... 150 V
adjustment of resistance: to ±1% at 23°C
terminal protection against accidental contact
full–sized rear cover (except direct–connected ammeters > 25 A), protective sleeves to go on hexagon studs and M4 screws with wire clamps E3

Connections

AC voltage

AC current

Dimensions

dimensions (in mm)

<table>
<thead>
<tr>
<th></th>
<th>VQ 48 K</th>
<th>VQ 72 K</th>
<th>VQ 96 K</th>
<th>VQ 144 K</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>48</td>
<td>72</td>
<td>96</td>
<td>144</td>
</tr>
<tr>
<td>b</td>
<td>42.5</td>
<td>66</td>
<td>90</td>
<td>136</td>
</tr>
<tr>
<td>c</td>
<td>53</td>
<td>53</td>
<td>53</td>
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</table>
## Ordering Information

<table>
<thead>
<tr>
<th>type</th>
<th>VQ</th>
<th>moving-coil rectifier panel meter</th>
</tr>
</thead>
<tbody>
<tr>
<td>front dimensions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>48 K</td>
<td>48 mm x 48 mm</td>
<td></td>
</tr>
<tr>
<td>72 K</td>
<td>72 mm x 72 mm</td>
<td></td>
</tr>
<tr>
<td>96 K</td>
<td>96 mm x 96 mm</td>
<td></td>
</tr>
<tr>
<td>144 K</td>
<td>144 mm x 144 mm</td>
<td></td>
</tr>
<tr>
<td>measuring ranges</td>
<td>refer to preceding table</td>
<td></td>
</tr>
<tr>
<td>window</td>
<td>glass 1) non-glaring glass</td>
<td></td>
</tr>
<tr>
<td>colour of bezel</td>
<td>black (similar to RAL 9005) 1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>gray (similar to RAL 7037)</td>
<td></td>
</tr>
<tr>
<td>position of use</td>
<td>vertical 1) on request 15 ... 165° 2)</td>
<td></td>
</tr>
<tr>
<td>panel fixing</td>
<td>screw clamps 1) spring clamps (except VQ 144 K)</td>
<td></td>
</tr>
<tr>
<td>marine application</td>
<td>none 1) non-certified</td>
<td></td>
</tr>
<tr>
<td></td>
<td>with approbation by &quot;Germanischer Lloyd&quot; (except VQ 48 K)</td>
<td></td>
</tr>
<tr>
<td>terminal protection</td>
<td>none 1) full-sized rear cover protective sleeves</td>
<td></td>
</tr>
<tr>
<td>index marking pointer</td>
<td>none 1) red, front adjustable</td>
<td></td>
</tr>
<tr>
<td>increased sensitivity</td>
<td>900 Ω/V for voltmeters 1) 4 kΩ/V for voltmeters 6 ... 600 V 10 kΩ/V for voltmeters 6 ... 150 V</td>
<td></td>
</tr>
<tr>
<td>adjustment of resistance</td>
<td>none 1) to ±1% at 23°C</td>
<td></td>
</tr>
<tr>
<td>dial</td>
<td>scale division &amp; measuring range alike 1) no dial non-calibrated, with dial symbols blank dial scale division and figuring 0 ... 100% linear scale division 2) additional lettering on request 2) additional figuring on request 2) coloured marks red, green or blue 2) coloured sector red, green or blue 2)</td>
<td></td>
</tr>
<tr>
<td>logo</td>
<td>WEIGEL 1) none OEM logo 2)</td>
<td></td>
</tr>
</tbody>
</table>

1) Standard
2) Please clearly add the desired specifications.

**Ordering Example**

VQ 72 K, measuring range 0 ... 100 mA, window non-glaring glass, dial 0 ... 100%, red mark at 90%, no logo