**Product Guide**

**Analog Panel Meters for use in Electrical Engineering Systems**

### M Series

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**WEIGEL**

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**CE**
**Short Form Data**

**Analog Meters**
for clamping to 35 mm DIN rails

**Functional Principle**

**W 35**
- pivot and jewel moving-iron movement, silicon oil damped
- for use on CT: 0 ... 1; 1.5; 2.5; 4; 5; 6; 10; 15; 25 A

**P 35**
- pivot and jewel moving-coil movement, core-magnet system
- for use on CT: 0 ... N / 1 A or 0 ... N / 5 A

**LSP 35**
- pivot and jewel moving-coil movement; swivel-coil system
- for use on VT: 0 ... 100; 110 V

**Measuring Ranges**

**W 35**
- AC current: 0 ... 1; 1.5; 2.5; 4; 5; 6; 10; 15; 25 A
- DC current: 0 ... 1; 6; 20 mA; 1; 1.5; 2.5; 4; 6 A

**P 35/LSP 35**
- AC voltage: 0 ... 100; 150; 250; 400; 500 V
- DC voltage: 0 ... 60 mV or 0 ... 150 mV

**P 35**
- DC voltage: 0 ... 20 mA; 1; 1.5; 2.5; 4; 10; 40 V

**LSP 35**
- DC voltage: 0 ... 20 mA; 1; 1.5; 2.5; 4; 10; 40 V

**Accuracy**
- AC current: ±0.5 %
- AC voltage: ±0.5 %
- DC current: ±0.2 %
- DC voltage: ±0.2 %

**Others**

**Dimensions (in mm)**

**W 35**
- 75 mm x 52.5 mm x 68 mm
- 95 mm x 52.5 mm x 63 mm

**P 35**
- 75 mm x 52.5 mm x 68 mm
- 95 mm x 52.5 mm x 63 mm

**LSP 35**
- 75 mm x 52.5 mm x 68 mm
- 95 mm x 52.5 mm x 63 mm

**Weight approx.**

**W 35**
- 0.1 kg

**P 35**
- 0.1 kg

**LSP 35**
- 0.2 kg

**additional data**
- refer to Data Sheet No. 010.D.981.##

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**Short Form Data**

**Operating Hours Counters**

**Functional Principle**

- Cyclometer register driven by a wheel gearing and
- synchronous motor (BWQ ...)
- stepper motor with quartz controlled electronics (BGQ ...)

**Measuring Ranges**

**Counting range**

**BGQ 48/55/72/96**
- 000,000.0 ... 999,999.9 h

**BWQ 48/55/72/96**
- 00,000.00 ... 99,999.99 h

**Operating voltage**

**BWQ 48**
- AC 24, 115 V, 230 V

**BWQ 55**
- AC 110, 230 V, optionally 24, 48, 60 V

**BWQ 72**
- AC 110, 230 V, optionally 24, 48, 24 V

**BWQ 96**
- AC 110, 230 V, optionally 24 V

**BGQ 48**
- AC 12 ... 48 V, optionally 5 ... 24 V, 36 ... 110 V

**BGQ 55/72/96**
- DC 12 ... 48 V, optionally 5 ... 24 V, 36 ... 110 V

**Rated frequency**
- BWQ 50 Hz, optionally 60 Hz

**Indication**

- size of numerals: 4.4 mm (BWQ/BGQ 48)
- 4 mm (BWQ/BGQ 55/72/96)

- running indicator: by a running gear

**Accuracy**

- same as supply frequency (BWQ ...)
- ±0.02 s in 24 h (BGQ ...)

**Dimensions**

**BWQ 48**
- bezel: 48 sticky
- case: 45 sticky
- case depth: 58 sticky
- panel cutout: 46 sticky
- panel thickness: 1 ... 10
- weight approx.: 60 g

**BGQ 48**
- bezel: 55 sticky
- case: 50 sticky
- case depth: 53 sticky
- panel cutout: 46 sticky
- panel thickness: 1 ... 10
- weight approx.: 60 g

**BWQ/BGQ 48**
- bezel: 72 sticky
- case depth: 53 sticky
- panel cutout: 67 sticky
- panel thickness: 1 ... 10
- weight approx.: 140 g

**Front mask for BWQ/BGQ 48**
- 72 mask 72 mm x 72 mm, or
- optionally: 72 mask 72 mm e

**Weight**
- approx. 90 g

**additional data**
- refer to Data Sheet No. 040.D.100.##
**General Data**

**Analog Meters**

for use in switchgear, machine tools or mosaic grid panels

**Application**

reliable instrumentation technology for special applications in electrical engineering systems

for measuring

DC voltage, AC current or AC voltage, suppressed zero voltage, frequency, thermal maximum demand, phase comparison, phase sequence, synchronizing

connection

direct or for use on CT/VT

**Technical Data**

scaling

lettering and custom-logo possible to special order

case

complying with DIN IEC 61 554 square or rectangular form stackable suitable for use in mosaic grid panels

material of case

pressed steel (.Q 96/144, .192) or thermoplastics, flame-retardant (.144 Pr)

material of window

glass or as an option non-glaring glass

bezel

black or as an option gray

position of use

vertical, horizontal or to be specified between 15 to 165°

enclosure code

IP 52 or as an option IP 54 splash-water protected front

terminal protection

protective sleeves or full sized rear cover option

marine application

optionally (non-certified)

dimensions (in mm)

<table>
<thead>
<tr>
<th></th>
<th>.Q 96</th>
<th>.Q 144</th>
<th>.144 Pr</th>
<th>.192</th>
</tr>
</thead>
<tbody>
<tr>
<td>bezel case</td>
<td>96 x 144</td>
<td>144 x 72</td>
<td>192 x 96</td>
<td></td>
</tr>
<tr>
<td>panel cutout</td>
<td>90.5 x 137</td>
<td>137 x 67</td>
<td>184 x 90.5</td>
<td></td>
</tr>
<tr>
<td>panel thickness</td>
<td>1 ... 15°</td>
<td>1 ... 15°</td>
<td>&lt;40</td>
<td>1 ... 15</td>
</tr>
<tr>
<td>panel fixing</td>
<td>4 pieces Weigel screw clamps</td>
<td>2 pieces type B screw clamps acc. to DIN 43 835</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

climatic suitability

climatic class 2 or as an option climatic class 3 (limited use in the tropics)

according to VDE/VDI 3540 sheet 2

operating temperature range

-25°C ... +23°C ... +40°C (climatic class 2) -10°C ... +23°C ... +55°C (climatic class 3)

storage temperature range

-25 ... +65°C

relative humidity

≤75% annual average, non-condensing

mechanical load

shock 15 g or as an option 30 g, 11 ms vibration 2.5 g or as an option 5 g, 5 ... 55 Hz

**Short Form Data**

**Analog Meters**

**Segmental Voltmeters** with Moving - Coil Movement

TP 96
TP 144
TP 144 Pr
TG 96
TG 144
TG 144 Pr

**Functional Principle**

pivot and jewel moving-coil movement, electrically suppressed initial scale range; TG 98/144, TG 144 Pr rectifier incorporated

**Measuring Ranges**

<table>
<thead>
<tr>
<th>DC voltage</th>
<th>TP 96/144, TP 144 Pr</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 ... 100 ... 110 V</td>
<td></td>
</tr>
<tr>
<td>100 ... 110 ... 120 V</td>
<td></td>
</tr>
<tr>
<td>200 ... 220 ... 240 V</td>
<td></td>
</tr>
<tr>
<td>400 ... 440 ... 480 V</td>
<td></td>
</tr>
<tr>
<td>550 ... 600 ... 650 V</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AC voltage</th>
<th>TG 96/144, TG 144 Pr</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 ... 100 ... 110 V</td>
<td></td>
</tr>
<tr>
<td>100 ... 110 ... 120 V</td>
<td></td>
</tr>
<tr>
<td>210 ... 230 ... 250 V</td>
<td></td>
</tr>
<tr>
<td>360 ... 400 ... 440 V</td>
<td></td>
</tr>
<tr>
<td>450 ... 500 ... 550 V</td>
<td></td>
</tr>
<tr>
<td>550 ... 600 ... 650 V</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>for use on VT</th>
<th>TG 96/144, TG 144 Pr</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 ... 100 ... 110 V</td>
<td></td>
</tr>
<tr>
<td>100 ... 110 ... 120 V</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>frequency range TG</th>
<th>approx. 10mA depending on measuring range</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 Hz ... 50 Hz ... 65 Hz</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>current consumption accuracy</th>
<th>class 0.5 acc. to DIN EN 60 051-1</th>
</tr>
</thead>
</table>

**Others**

case details

square form (TP/G 96/144) resp. rectangular form (TP/G 144 Pr)

dial position

horizontal dial, optionally vertical dial (TP/G 144 Pr)

pointer

bar / knife-edge pointer

pointer deflection

0 ... 90° (TP/G 96/144)

scale characteristics

linear within measuring range; the lower voltage value is offset by approx. 8% of the scale length from scale zero value

mounting depth

TP/G 96 62 mm
TP/G 144 60 mm
TP/G 144 Pr 192 mm

weight approx.

0.3 kg 0.6 kg 1.0 kg

**additional data**

refer to Data Sheet No. 013.D.001.##
Short Form Data
Analog Meters
Null Voltmeters with Moving - Iron Movement 90°- Dial

WQ 96 /0S
WQ 144 /0S

Functional Principle
pivot and jewel moving-iron movement, silicon oil damped

Measuring Ranges
- rated voltage:
  - 0 ... 115/230 V
  - 0 ... 230/460 V
  - 0 ... 400/800 V
  - 0 ... 500/1000 V
- for use on VT:
  - 0 ... 100/200 V
  - 0 ... 110/220 V
- power consumption: approx. 4.2 ... 7.2 VA depending on rated voltage
- frequency range: 50 ... 100 Hz
- accuracy: class 1.5 acc. to DIN EN 60 051-1

Others
- pointer: bar / knife-edge pointer
- pointer deflection: 0 ... 90°
- scale characteristics: initial range greatly expanded
- mounting depth: 60 mm
- weight approx.: WQ 96 /0S 0.6 kg, WQ 144 /0S 0.7 kg

additional data refer to Data Sheet No. 022.D.101.##

Short Form Data
Analog Meters
Dual Voltmeters with two Moving - Iron Movements

WQ 96 /2S
WQ 144 /2S

Functional Principle
2 pivot and jewel moving-iron movements, silicon oil damped

Measuring Ranges
- AC voltage:
  - 2 x 0 ... 100 V
  - 2 x 0 ... 110 V
  - 2 x 0 ... 150 V
  - 2 x 0 ... 250 V
  - 2 x 0 ... 500 V
  - 2 x 0 ... 600 V
- for use on VT:
  - 2 x 0 ... 100 V
  - 2 x 0 ... 110 V
- power consumption: approx. 1.8 ... 4.5 VA depending on rated voltage
- frequency range: 50 ... 100 Hz
- accuracy: class 1.5 acc. to DIN EN 60 051-1

Others
- pointer: bar / knife-edge pointer
- pointer deflection: 0 ... 60°
- scale characteristics: practically linear down to 1/6 th of full-scale rating
- mounting depth:
  - WQ 96 /2S 115 mm
  - WQ 144 /2S 121 mm
- weight approx.:
  - WQ 96 /2S 1.2 kg
  - WQ 144 /2S 1.5 kg

additional data refer to Data Sheet No. 023.D.101.##
### Short Form Data

**Analog Meters**

**Frequency Meters with two Vibrating Reed Movements**

FQ 96 /2  
FQ 144 /2

### Functional Principle

2 Vibrating Reed Movements. Each reed is tuned to a different value in the frequency span.

### Measuring Ranges

<table>
<thead>
<tr>
<th>Identical Frequency Ranges</th>
<th>Number of Reeds</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>2x 47 ... 50 ... 53 Hz</td>
<td>2x 13</td>
<td>1 Hz</td>
</tr>
<tr>
<td>2x 45 ... 50 ... 55 Hz</td>
<td>2x 21</td>
<td>½ Hz</td>
</tr>
<tr>
<td>2x 57 ... 60 ... 63 Hz</td>
<td>2x 13</td>
<td>1 Hz</td>
</tr>
<tr>
<td>2x 55 ... 60 ... 65 Hz</td>
<td>2x 21</td>
<td>½ Hz</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Consecutive Frequency Ranges</th>
<th>Number of Reeds</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>left 47 ... 50 ... 53 Hz and right 57 ... 60 ... 63 Hz</td>
<td>2x 13</td>
<td>1 Hz</td>
</tr>
<tr>
<td>left 45 ... 50 ... 55 Hz and right 55 ... 60 ... 65 Hz</td>
<td>2x 21</td>
<td>½ Hz</td>
</tr>
</tbody>
</table>

Rated Voltage: 100 V up to 600 V  
Power Consumption: approx. 1.1 ... 2.9 VA per movement depending on rated voltage  
Accuracy: class 0.5 acc. to DIN EN 60 051-1

### Others

- Reed Arrangement: vertical or as an option horizontal  
  - FQ 96 /2  
  - FQ 144 /2
- Mounting Depth: 66 mm  
  - 58 mm
- Weight: approx. 0.65 kg  
  - 1.0 kg

**Additional Data**

Refer to Data Sheet No. 031.D.101.##

### Short Form Data

**Triple Combination Meters**

**with Moving - Iron, Bimetallic or Bimetallic / Moving - Iron Movements**

W 192 RnS  
W 192 RhS  
BI 192 RnS  
BI 192 RhS  
BIW 192 RnS  
BIW 192 RhS

### Functional Principle

- W 192 RnS/RhS: 3 moving-iron movements (horizontal/vertical)  
- BI 192 RnS/RhS: 3 bimetallic movements  
- BIW 192 RnS/RhS: 3 bimetallic + 3 moving-iron movements (horizontal/vertical)

### Measuring Ranges

**W 192 RnS/RhS**

- AC current (for use on CT): 0 ... 100 / 200 mA up to 0 ... 25 / 50 A *) **)  
- AC voltage (for use on VT): 0 ... 6 V up to 0 ... 600 V  
- Frequency Range: 50 ... 100 Hz or as an option calibration to a definite frequency 100 ... 1000 Hz

**BI/BIW 192 RnS/RhS**

- AC current (for use on CT): 0 ... 1 / 1.2 A or 0 ... 5 / 10 A *)  
- Bimetallic (for use on CT): 0 ... N / 1 / 1.2 A or 0 ... N / 5 / 10 A *)  
- Moving-iron: 0 ... N / 1 / 2 A 0 ... N / 5 / 10 A *)  

*) scaling with overload range, optionally without or with overload range 1.5 times rated current (bimetallic movement)  

- Thermal Time Lag: 15 min or 6 min option (bimetallic movement)  
- Frequency Range: 90 ... 100 Hz or as an option calibration to a definite frequency 100 ... 1000 Hz

- Accuracy: acc. to DIN EN 60 051-1  
- Bimetallic: class 3 (referred to slave pointer)  
- Moving-iron: class 1.5

### Others

- Mounting Depth: 60 mm
- Weight: approx. W 192 RnS BI 192 RnS BIW 192 RnS  
  - 0.9 kg  
  - 0.7 kg  
  - 1.0 kg

**Additional Data**

Refer to Data Sheet No. 050.D.251.##
### Short Form Data

**Analog Meters for Phase Comparison Synchronoscopes**

<table>
<thead>
<tr>
<th>Model</th>
<th>SY 96 S</th>
<th>SY 144 S</th>
</tr>
</thead>
</table>

#### Functional Principle

electrodynamic air-cored movement arranged as a ratio meter. The pointer rotates over 360° in both directions.

#### Measuring Ranges

<table>
<thead>
<tr>
<th></th>
<th>SY 96 S</th>
<th>SY 144 S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring unit</td>
<td>phase angle between two sinusoidal AC voltages</td>
<td></td>
</tr>
<tr>
<td>Indication</td>
<td>pointer rotating at a small difference in frequency is stationary at the 12 o’clock position when phases are balanced. The pointer will not be visible when the meter is disconnected.</td>
<td></td>
</tr>
<tr>
<td>Rated frequency</td>
<td>50 Hz or optionally 60 Hz</td>
<td></td>
</tr>
<tr>
<td>Rated voltage</td>
<td>100 V</td>
<td>110 V</td>
</tr>
<tr>
<td>Power consumption approx. generator side</td>
<td>0.7 VA</td>
<td>0.7 VA</td>
</tr>
<tr>
<td>Mains side</td>
<td>4.0 VA</td>
<td>4.0 VA</td>
</tr>
<tr>
<td>Weight approx.</td>
<td>1.0 kg</td>
<td>1.1 kg</td>
</tr>
<tr>
<td>Mounting depth</td>
<td>119 mm</td>
<td>117 mm</td>
</tr>
</tbody>
</table>

### Additional Data
refer to Data Sheet No. 080.D.101.##

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### Short Form Data

**Phase Sequence Indicators**

<table>
<thead>
<tr>
<th>Model</th>
<th>DFQ 96</th>
</tr>
</thead>
</table>

#### Functional Principle

Induction movement with a freely rotating disc.

#### Measuring Ranges

<table>
<thead>
<tr>
<th></th>
<th>DFQ 96</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring unit</td>
<td>phase sequence in three-phase systems</td>
</tr>
<tr>
<td>Indication</td>
<td>disc (ø 36 mm) rotating clockwise at correct phase connection</td>
</tr>
<tr>
<td>Frequency range</td>
<td>40 ... 100 Hz or 400 Hz on request</td>
</tr>
<tr>
<td>Voltage range</td>
<td>100 ... 500 V</td>
</tr>
<tr>
<td>Power consumption at 100 V</td>
<td>approx. 0.5 VA per phase</td>
</tr>
<tr>
<td>Safe operational period</td>
<td>max. 5 min</td>
</tr>
</tbody>
</table>

#### Others

<table>
<thead>
<tr>
<th>Measure</th>
<th>SY 96 S</th>
<th>SY 144 S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting depth</td>
<td>62 mm</td>
<td></td>
</tr>
<tr>
<td>Weight approx.</td>
<td>0.4 kg</td>
<td></td>
</tr>
</tbody>
</table>

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### Additional Data
refer to Data Sheet No. 090.D.101.##
Short Form Data

Wall Brackets, empty
Synchronizing Wall Brackets

WA 96
WA 144

Application

The empty wall brackets can hold three each panel meters of the standard square form 96 mm x 96 mm resp. 144 mm x 144 mm with a mounting depth of up to 150 mm / 190 mm.

Indicators for synchronizing wall brackets combinations possible

- Synchronoscope SY 96/144 S
- Null Voltmeter WQ 96/144 /0S
- Dual Voltmeter WQ 96/144 /2S
- Dual Frequency Meter FQ 96/144 /2

short form data see above

Mechanical Data

form A  wall bracket upright, support on bottom
form B  wall bracket suspended, support on top
form C  wall bracket upright, support on top and bottom (WA 144 only)
form D  bench-type wall bracket, support on bottom

All wall brackets have a swivel range of 180°.

material
- case pressed steel
- support Al-die casting
- colour gray (similar to RAL 7037)
- fixing by 4 each screws ø10 mm

weight approx.
- WA 96-A/B/D  4.5 kg  6.5 kg  7.5 kg
- WA 144 -A/B/D  7 kg  10 kg  11 kg

additional data refer to Data Sheet No. 100.D.101.##

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