

# Product Guide

M Series  
200.U.001.05

## Analog Panel Meters for use in Electrical Engineering Systems

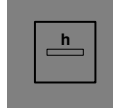
### M Series

W/P/  
LSP



Instruments clamping to  
35 mm DIN rails

BWQ  
BGQ



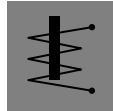
Operating Hours Counters

TP  
TG



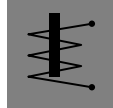
Segmental Voltmeters  
with Moving-Coil Movement

WQ  
/0S



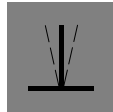
Null Voltmeters  
with Moving-Iron Movement

WQ  
/2S



Dual Voltmeters  
with Moving-Iron Movements

FQ  
/2



Frequency Meters with two  
Vibrating Reed Movements

W  
BI  
BIW



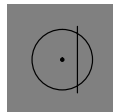
Triple Combination Meters  
with Moving-Iron, Bimetallic or  
Bimetallic / Moving-Iron Move-  
ments

SY



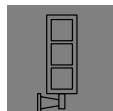
Synchrosopes

DFQ



Phase Sequence Indicators

WA



Wall Brackets, empty  
Synchronizing Wall Brackets





## Short Form Data

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

**W 35**  
**P 35**  
**LSP 35**



### Functional Principle

**W 35** pivot and jewel moving - iron movement, silicon oil damped  
**P 35** pivot and jewel moving - coil movement, core - magnet system  
**LSP 35** pivot and jewel moving - coil movement; swivel - coil system

### Measuring Ranges

<b>W 35</b>	
<b>AC current</b>	0 ... 1; 1.5; 2.5; 4; 5; 6; 10; 15; 25 A *)
for use on <b>CT</b>	0 ... N / 1 A or 0 ... N / 5 A *)
*) scaling to DIN series with 2x overload range	
<b>AC voltage</b>	0 ... 100; 150; 250; 400; 500 V
for use on <b>VT</b>	0 ... 100; 110 V **)
**) scaling to DIN series with 1.2x overload range	
rated frequency	50 Hz
<b>P 35 / LSP 35</b>	
<b>DC current</b>	0 ... 1; 6; 20 mA; 1; 1.5; 2.5; 4; 6 A
<b>DC voltage</b>	0 ... 1; 1.5; 2.5; 4; 10; 40 V
for use with external <b>shunt</b>	0 ... 60 mV or 0 ... 150 mV (scaling to DIN series)
accuracy	class 1.5 acc. to DIN EN 60 051 - 1
<b>Others</b>	
case details	projecting case for clamping to 35 mm rails according to DIN EN 60 715
pointer	bar pointer (W/P 35 with knife - edge pointer)
pointer deflection	0 ... 90° (W/P 35), 0 ... 240° (LSP 35)
material of case	thermoplastics, self - extinguishing
colour	W 35, P 35 gray (similar to RAL 7032) LSP 35 gray (similar to RAL 7035)
terminals	screw terminals (up to 5 mm <sup>2</sup> )
dimensions LxWxH	W 35, P 35 75 mm x 52.5 mm x 68 mm LSP 35 95 mm x 52.5 mm x 63 mm
weight approx.	W 35 P 35 LSP 35 0.1 kg 0.1 kg 0.2 kg

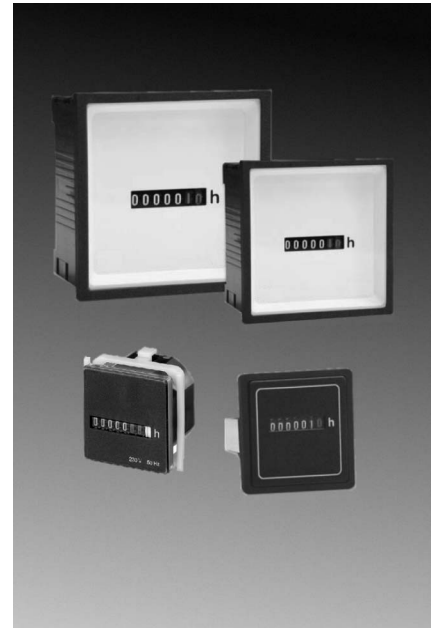
additional data refer to Data Sheet No. 010.D.981.##



## Short Form Data

### Operating Hours Counters

**BWQ 48**  
**BWQ 55**  
**BWQ 72**  
**BWQ 96**  
**BGQ 48**  
**BGQ 55**  
**BGQ 72**  
**BGQ 96**



### Functional Principle

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

### Measuring Ranges

<b>Counting range</b>	
BGQ 48/55/72/96	000,000.0 ... 999,999.9 h
BWQ 48/55/72/96	00,000.00 ... 99,999.99 h
<b>Operating voltage</b>	
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 V
BWQ 96	AC 110, 230 V, optionally 24 V
BGQ 48	DC 12 ... 48 V, optionally 5 ... 24 V, 36 ... 110 V
BGQ 55/72/96	DC 10 ... 50 V =
<b>Rated frequency</b> BWQ 50 Hz, optionally 60 Hz	
<b>Indication</b>	
size of numerals	4.4 mm (BWQ/BGQ 48) 4 mm (BWQ/BGQ 55/72/96)
colour of numerals	pre - decimal places white on black, decimal places red on black
running indicator	by a running gear
<b>Accuracy</b>	same as supply frequency (BWQ ... ) ±0.02 s in 24 h (BGQ ... )
<b>Dimensions</b>	
(in mm)	<b>BWQ 48</b> <b>BWQ 55</b> <b>BWQ 72</b> <b>BWQ 96</b> <b>BGQ 48</b> <b>BGQ 55</b> <b>BGQ 72</b> <b>BGQ 96</b>
bezel	□ 48 □ 55 □ 72 □ 96
case	□ 45 □ 50 □ 67 □ 90
case depth	31 58 53 53
panel cutout	□ 46 ∅ 50 <sup>+1</sup> □ 68 <sup>+0.7</sup> □ 92 <sup>+0.7</sup>
panel thickness	1 ... 10 1 ... 10 1 ... 10 1 ... 10
weight approx.	60 g 60 g 140 g 180 g
<b>Front mask for BWQ/BGQ 48</b> optionally Q55 bezel 55 mm x 55 mm, Q72 mask 72 mm x 72 mm, or D72 mask 72 mm ∅	

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,  
supressed zero voltage,  
frequency,  
thermal maximum demand,  
phase comparison,  
phase sequence,  
synchronizing

**connection** direct or for use on CT/VT

#### Technical Data

<b>scaling</b>	lettering and custom - logo possible to special order			
<b>case</b>	complying with DIN IEC 61 554 square or rectangular form stackable suitable for use in mosaic grid panels			
<b>material of case</b>	pressed steel (.Q 96/144, . 192) or thermoplastics, flame - retardant (. 144 Pr)			
<b>material of window</b>	glass or as an option non - glaring glass			
<b>bezel</b>	black or as an option gray			
<b>position of use</b>	vertical, horizontal or to be specified between 15 to 165°			
<b>enclosure code</b>	IP 52 or as an option IP 54 splash - water protected front			
<b>terminal protection</b>	protective sleeves or full sized rear cover option			
<b>marine application</b>	optionally (non - certified)			
<b>dimensions (in mm)</b>	<b>.Q 96</b>	<b>.Q 144</b>	<b>. 144 Pr</b>	<b>. 192</b>
<b>bezel</b>	□ 96	□ 144	144 x 72	192 x 96
<b>case</b>	□ 90.5	□ 137	137 x 67	184 x 90.5
<b>panel cutout</b>	□ 92 <sup>+0.8</sup>	□ 138 <sup>+1</sup>	138 <sup>+1</sup> x 68 <sup>+0.7</sup>	186 <sup>+1.1</sup> x 92 <sup>+0.8</sup>
<b>panel thickness</b>	1 ... 15 <sup>*</sup>	1 ... 15 <sup>*</sup> 1 ... 40 <sup>**</sup>	≤40	1 ... 15
<b>panel fixing</b>	<sup>*</sup> ) 4 pieces Weigel screw clamps <sup>**</sup> ) 2 pieces type B screw clamps acc. to DIN 43 835			
<b>climatic suitability</b>	climatic class 2 or as an option climatic class 3 (limited use in the tropics)			
<b>according to</b>	VDE/VDI 3540 sheet 2			
<b>operating temperature range</b>	-25°C ... +23°C ... +40°C (climatic class 2) -10°C ... +23°C ... +55°C (climatic class 3)			
<b>storage temperature range</b>	-25 ... +65°C			
<b>relative humidity</b>	≤75% annual average, non - condensing			
<b>mechanical load</b>				
<b>shock</b>	15 g or as an option 30 g, 11 ms			
<b>vibration</b>	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 96/144, TG 144 Pr rectifier incorporated

#### Measuring Ranges

<b>DC voltage</b>	90 ... 100 ... 110 V
<b>TP 96/144, TP 144 Pr</b>	100 ... 110 ... 120 V 200 ... 220 ... 240 V 400 ... 440 ... 480 V 550 ... 600 ... 650 V
<b>AC voltage</b>	90 ... 100 ... 110 V
<b>TG 96/144, TG 144 Pr</b>	100 ... 110 ... 120 V 210 ... 230 ... 250 V 360 ... 400 ... 440 V 450 ... 500 ... 550 V 550 ... 600 ... 650 V
<b>for use on VT</b>	90 ... 100 ... 110 V
<b>TG 96/144, TG 144 Pr</b>	100 ... 110 ... 120 V
<b>frequency range TG</b>	40 Hz ... 50 Hz ... 65 Hz
<b>current consumption</b>	approx. 10mA depending on measuring range
<b>accuracy</b>	class 0.5 acc. to DIN EN 60 051 - 1

#### Others

<b>case details</b>	square form (TP/G 96/144) resp. rectangular form (TP/G 144 Pr)		
<b>dial position</b>	horizontal dial, optionally vertical dial (TP/G 144 Pr)		
<b>pointer</b>	bar / knife - edge pointer		
<b>pointer deflection</b>	0 ... 90° (TP/G 96/144)		
<b>scale characteristics</b>	linear within measuring range; the lower voltage value is offset by approx. 8% of the scale length from scale zero value		
<b>mounting depth</b>	TP/G 96	TP/G 144	TP/G 144 Pr
<b>weight approx.</b>	62 mm 0.3 kg	60 mm 0.6 kg	192 mm 1.0 kg

additional data

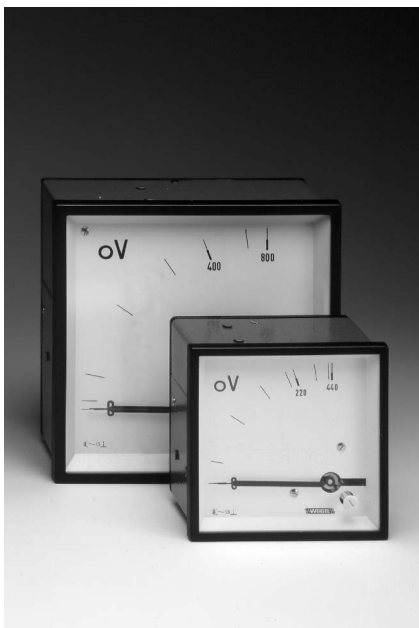
refer to Data Sheet No. 013.D.001.##



## 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            WQ 144 /0S 0.6 kg                    0.7 kg

additional data

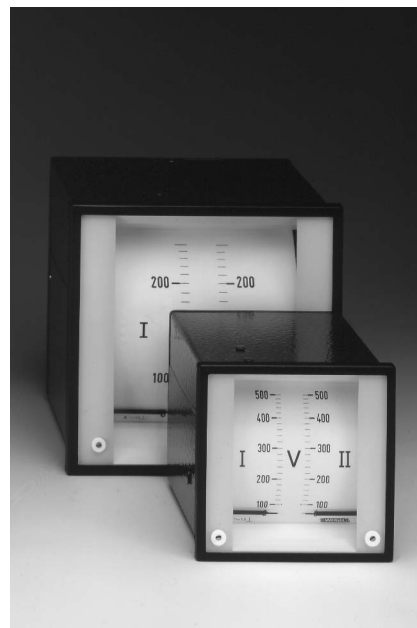
refer to Data Sheet No. 022.D.101.##



## 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 1/5 th of full-scale rating
mounting depth	WQ 96 /2S            WQ 144 /2S 115 mm                121 mm
weight approx.	1.2 kg                    1.5 kg

additional data

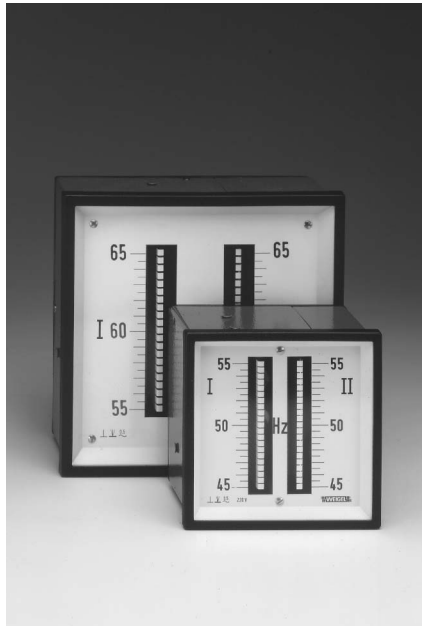
refer to Data Sheet No. 023.D.101.##



## 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

identical frequency ranges	number of reeds	resolution
2x 47 ... 50 ... 53 Hz	2x 13	1 Hz
2x 45 ... 50 ... 55 Hz	2x 21	1/2 Hz
2x 57 ... 60 ... 63 Hz	2x 13	1 Hz
2x 55 ... 60 ... 65 Hz	2x 21	1/2 Hz
consecutive frequency ranges	number of reeds	resolution
left 47 ... 50 ... 53 Hz and	2x 13	1 Hz
right 57 ... 60 ... 63 Hz		
left 45 ... 50 ... 55 Hz and	2x 21	1/2 Hz
right 55 ... 60 ... 65 Hz		
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	
mounting depth	FQ 96 /2 66 mm	FQ 144 /2 58 mm
weight approx.	0.65 kg	1.0 kg

additional data

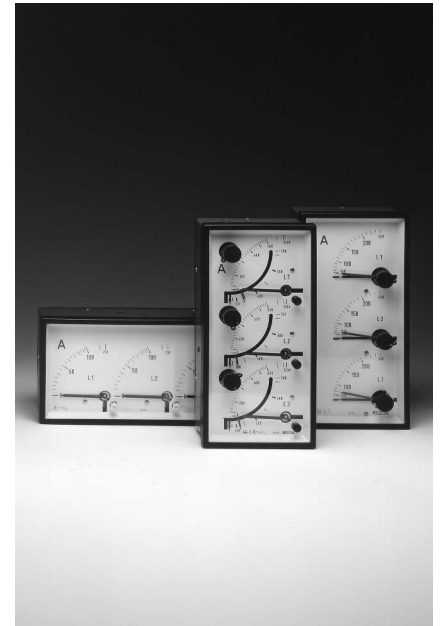
refer to Data Sheet No. 031.D.101.##



## 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 (horizontal/vertical)
BIW 192 RnS/RhS	3 Bimetallic + 3 moving-iron movements (horizontal/vertical)

### Measuring Ranges

#### W 192 RnS/RhS

**AC current** 0 ... 100 / 200 mA up to 0 ... 25 / 50 A \*) \*\*)

for use on CT 0 ... N / 1 / 2 A or 0 ... N / 5 / 10 A \*) \*\*)

**AC voltage** 0 ... 6 V up to 0 ... 600 V

for use on VT 0 ... 100 / 120 V or 0 ... 110 / 132 V \*)

\*) scaling to DIN series with overload range  
\*\*) optional: no overload range

frequency range 50 ... 100 Hz or as an option calibration to a definite frequency 100 ... 1000 Hz

#### BI/BIW 192 RnS/RhS

**AC current**

bimetallic	0 ... 1 / 1.2 A	or	0 ... 5 / 6 A *)
moving-iron	0 ... 1 / 2 A		0 ... 5 / 10 A *)

for use on CT (scaling to DIN series)

bimetallic	0 ... N / 1 / 1.2 A	or	0 ... N / 5 / 6 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 8 min option (bimetallic movement)

frequency range 50 ... 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 0.9 kg	BI 192 RnS 0.7 kg	BIW 192 RnS 1.0 kg
	W 192 RhS	BI 192 RhS	BIW 192 RhS

additional data

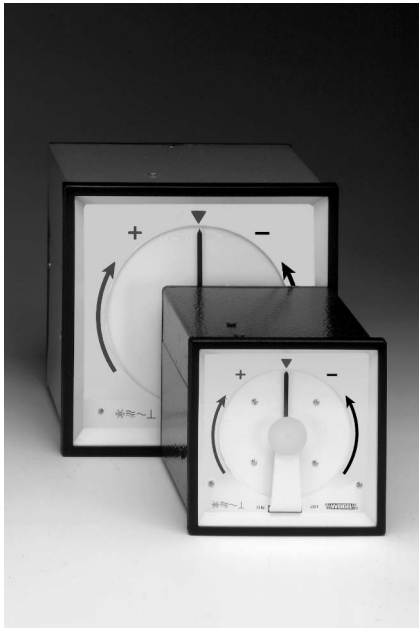
refer to Data Sheet No. 050.D.251.##



## Short Form Data

### Analog Meters for Phase Comparison Synchronoscopes

**SY 96 S**  
**SY 144 S**



### Functional Principle

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

### Measuring Ranges

measuring unit	phase angle between two sinusoidal AC voltages				
indication	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.				
rated frequency	50 Hz or optionally 60 Hz				
rated voltage	100 V	110 V	230 V	400 V	500 V
power consumption approx.					
generator side	0.7 VA	0.7 VA	1.5 VA	3.2 VA	3.5 VA
mains side	4.0 VA	4.0 VA	5.3 VA	4.8 VA	6.7 VA
rated voltage	optionally 24 V, 60 V, 440 V				

### Others

	<b>SY 96 S</b>	<b>SY 144 S</b>
mounting depth	119 mm	117 mm
weight approx.	1.0 kg	1.1 kg

additional data refer to Data Sheet No. 080.D.101.##



## Short Form Data

### Phase Sequence Indicators

**DFQ 96**



### Functional Principle

Induction movement with a freely rotating disc.

### Measuring Ranges

measuring unit	phase sequence in three-phase systems
indication	disc (ø 36 mm) rotating clockwise at correct phase connection
frequency range	40 ... 100 Hz or 400 Hz on request
voltage range	100 ... 500 V
power consumption	at 100 V approx. 0.5 VA per phase at 500 V approx. 2 VA per phase
safe operational period	max. 5 min

### Others

mounting depth	62 mm
weight approx.	0.4 kg

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 <b>synchronizing wall brackets</b>		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

<b>form A</b>	wall bracket upright, support on bottom
<b>form B</b>	wall bracket suspended, support on top
<b>form C</b>	wall bracket upright, support on top and bottom (WA 144 only)
<b>form D</b>	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	WA 144 - A/B/D	WA 144 - C
wall bracket empty	4.5 kg	6.5 kg	7.5 kg
wall bracket equipped	7 kg	10 kg	11 kg

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

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– specifications subject to change without notice; date of issue 06/11 –

