

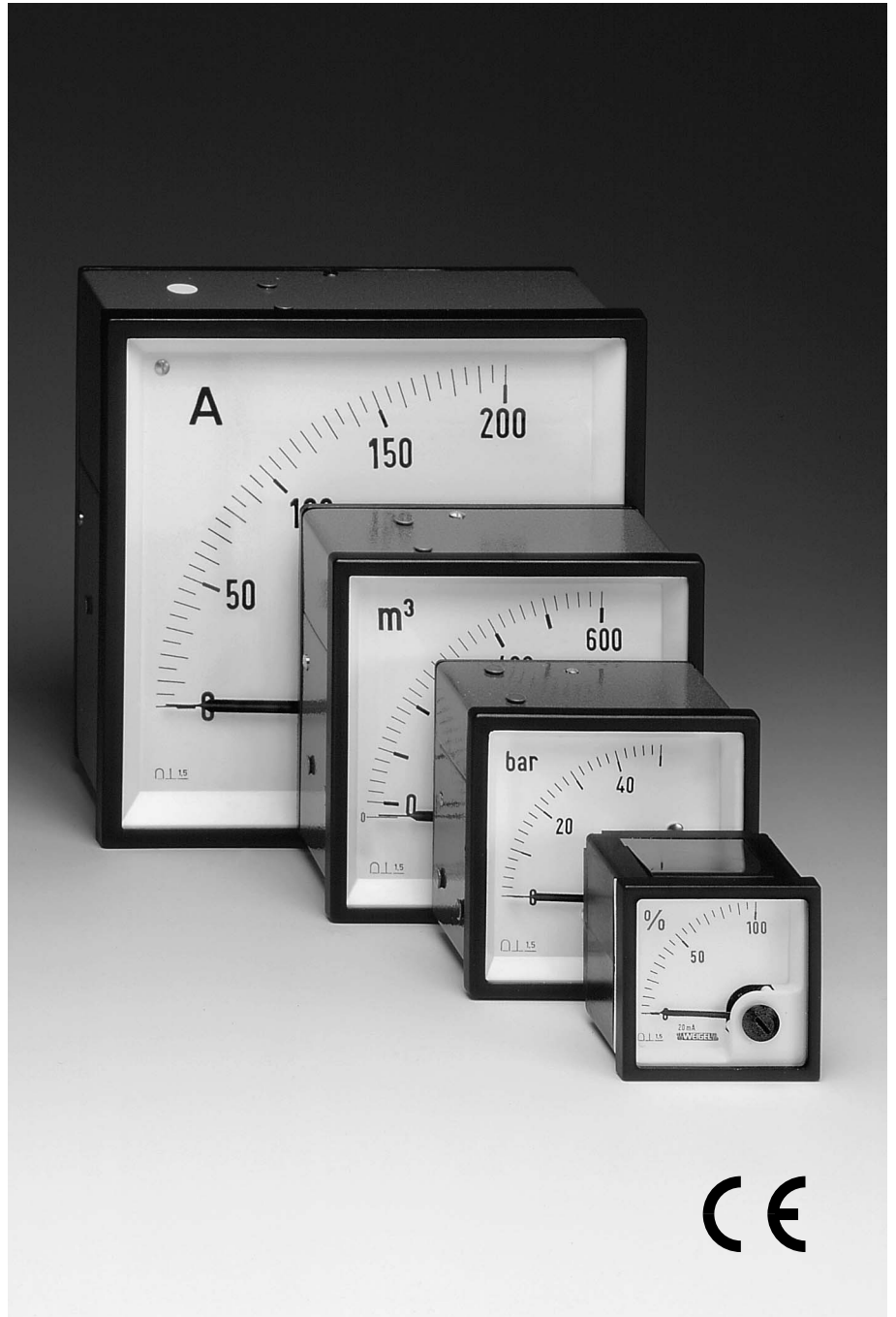


Data Sheet

M Series
010.D.101.08

Analog Meters with Moving-Coil Movement, 90° Dial

PSQ 48
PQ 72 RS
PQ 96 RS
PQ 144 RS



WEIGEL

Application

The moving-coil panel meters **PSQ 48** in a housing of moulded thermo-plastic with slide-in dial and **PQ 72/96/144 RS** models (M Series) in pressed steel cases are used for the measurement of DC currents or voltages.

The moving-coil movements manufactured to advanced engineering standards are characterized by a low power consumption, high precision and excellent damping.

The meters are suitable for mounting in switchboards, control panels, machine tool consoles or mosaic grid panels.

Movements

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

Mechanical Data

case details	square case suitable to be mounted in control / switchgear panels, machine tools or mosaic grid panels, stackable
material of case	thermoplastics, flame retardant (PSQ 48) pressed steel (PQ 72/96/144 RS)
material of window	glass
colour of bezel	black (similar to RAL 9005)
position of use	vertical $\pm 5^\circ$
panel fixing	plate springs, at top and bottom (PSQ 48) screw clamps (PQ 72/96/144 RS)
panel thickness	1 ... 15 mm
mounting	stackable next to each other

terminals

voltmeters and ammeters ≤ 15 A (PSQ 48)	hexagon studs, M4 screws and wire clamps
voltmeters and ammeters ≤ 3 A (PQ 72/96/144 RS)	hexagon studs, M3 screws and wire clamps
ammeters > 3 A (PQ 72/96/144 RS), > 15 A (PSQ 48) up to 30 A	hexagon studs, M5 screws and wire clamps
ammeters > 30 A	hexagon studs, M6 screws and wire clamps
voltmeters > 150 V (PQ 72/96 RS)	connector blades 6.3 x 0.8 for protective wire

dimensions (in mm)	PSQ 48	PQ 72 RS	PQ 96 RS	PQ 144 RS
bezel	□ 48	□ 72	□ 96	□ 144
case	□ 45	□ 66.5	□ 90.5	□ 137
depth	48	57	60	60
panel cutout	□ 45.2 ^{+0.3}	□ 68.3 ^{+0.4}	□ 92 ^{+0.8}	□ 138 ⁺¹
weight approx.	0.1 kg	0.2 kg	0.3 kg	0.6 kg

also refer to "Options"

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

Measuring Ranges

For mains use

DC current	internal resistance ¹⁾ / voltage drop approx.		DC voltage > 5 V sensitivity ¹⁾	
	PSQ 48	PQ 96 RS PQ 72 RS PQ 144 RS		
40 μ A	6500 Ω	4600 Ω	6 V	1 k Ω /V
60 μ A	5500 Ω	4400 Ω	10 V	1 k Ω /V
100 μ A	5000 Ω	2800 Ω	15 V	1 k Ω /V
150 μ A	3600 Ω	2200 Ω	25 V	1 k Ω /V
250 μ A	2200 Ω	740 Ω	40 V	1 k Ω /V
400 μ A	1300 Ω	630 Ω	60 V	1 k Ω /V
600 μ A	260 Ω	260 Ω	100 V	1 k Ω /V
1 mA	48 Ω	48 Ω	150 V	1 k Ω /V
1.5 mA	60 mV	60 mV	250 V	1 k Ω /V
2.5 mA	60 mV	60 mV	400 V	1 k Ω /V
4 mA	60 mV	60 mV	500 V	1 k Ω /V
5 mA	60 mV	60 mV	600 V	1 k Ω /V
6 mA	60 mV	60 mV		
10 mA	60 mV	60 mV		
15 mA	60 mV	60 mV		
20 mA	60 mV	60 mV		
25 mA	60 mV	60 mV		
40 mA	60 mV	60 mV		
60 mA	60 mV	60 mV		
100 mA	60 mV	60 mV		
150 mA	60 mV	60 mV		
250 mA	60 mV	60 mV		
400 mA	60 mV	60 mV		
600 mA	60 mV	60 mV		
1 A	60 mV	60 mV		
1.5 A	60 mV	60 mV		
2.5 A	60 mV	60 mV		
4 A	60 mV	60 mV		
6 A	60 mV	60 mV		
10 A	60 mV	60 mV		
15 A	60 mV	60 mV		
25 A	60 mV	60 mV		
40 A ²⁾	60 mV	60 mV		
60 A ²⁾	60 mV	60 mV		

for use with external shunt

sensitivity^{*}

60 mV	1 k Ω /V
150 mV	1 k Ω /V

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

1) the resistance values are limited to a tolerance of $\pm 20\%$
2) not for PSQ 48



Analog Meters with Moving-Coil Movement, 90° Dial

for use on external multiplier movement for DC voltages

25 V, 250 μA	1; 1.5; 2.5; 3; 4; 5; 6; 10 kV
sensitivity ¹⁾	2000 Ω/V

Not for mains use

DC voltage ≤5V		
sensitivity ¹⁾		
PSQ 48	PQ 96 RS	
PQ 72 RS	PQ 144 RS	

40 mV	3.3 kΩ/V	2 kΩ/V
60 mV	1 kΩ/V	1 kΩ/V
100 mV	1 kΩ/V	1 kΩ/V
150 mV	1 kΩ/V	1 kΩ/V
250 mV	1 kΩ/V	1 kΩ/V
400 mV	1 kΩ/V	1 kΩ/V
600 mV	1 kΩ/V	1 kΩ/V
1 V	1 kΩ/V	1 kΩ/V
1.5 V	1 kΩ/V	1 kΩ/V
2.5 V	1 kΩ/V	1 kΩ/V
4 V	1 kΩ/V	1 kΩ/V

for use on transducer ("live zero")

4 ... 20 mA	mechanically suppressed zero, without zero adjustment, voltage drop approx. 60 mV
0/4 ... 20 mA	electrically suppressed zero, with zero adjustment, voltage drop approx. 900 mV

Operating Voltages

measuring ranges operating voltage

DC current	PSQ 48	PQ 72 RS	PQ 96 RS	PQ 144 RS
40; 60; 100; 150; 250; 400; 600 μA				
1; 1.5; 2.5; 4; 5; 6; 10; 15; 20; 25; 40; 60; 100; 150; 250; 400; 600 mA	100 V	150 V	150 V	150 V
1; 1.5; 2.5; 4; 6; 10; 15; 25 A	300 V	300 V	300 V	300 V
40; 60 A ²⁾	–	300 V	300 V	300 V
DC voltage	PSQ 48	PQ 72 RS	PQ 96 RS	PQ 144 RS
40; 60; 100; 150; 250; 400; 600 mV	100 V	300 V	300 V	150 V
1; 1.5; 2.5; 4; 6; 10; 15; 25; 40; 60; 100 V	100 V	150 V	150 V	150 V
150 V	300 V	150 V	150 V	150 V
250 V	300 V	600 V	600 V	300 V
400; 500; 600 V	on request	600 V	600 V	on request

¹⁾ the resistance values are limited to a tolerance of ±20%
²⁾ not for PSQ 48

Scaling

pointer	bar / knife-edge pointer
colour of pointer	black
pointer deflection	0 ... 90°
colour of dial	white
scale characteristics	linear
scale division	coarse-fine
scale length	PSQ 48 PQ 72 RS PQ 96 RS PQ 144 RS
	44 mm 69 mm 94 mm 146 mm

also refer to "Options"

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 acc. to VDE/VDI 3540, sh. 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

special measuring range	deviating from standard
measuring range adjustment	adjustment potentiometer installed in voltmeters, adjustment range approx. $\pm 10\%$ or $\pm 20 \dots 50\%$, ammeters on request
2 nd measuring range	with 3 rd terminal for voltmeters up to 600 V and ammeters up to 6 A 2 nd figuring and 1 or 2 scale divisions
additional measuring ranges	on request
accuracy class	1.0 with fine scale division (as far as possible)
adjustment of internal resistance	to $\pm 1\%$ at 23°C
increased sensitivity	to 2 k Ω /V, 5 k Ω /V, 10 k Ω /V or 20 k Ω /V for voltmeters 1 ... 600 V (as far as possible)
lead resistance	calibration to $>0.05\Omega$

case

window	non-glaring glass
colour of bezel	gray (similar to RAL 7037)
index marking pointer	red, front adjustable
position of use	horizontal or to be specified 15° ... 165°
panel fixing (PSQ 48)	plate springs on the left and right side

performance

increased mechanical loads	shock 30 g, 11 ms vibration 5 g, 5 ... 55 Hz
climatic suitability	limited use in the tropics climatic class 3 acc. to VDE/VDI 3540, sheet 2
with operating temperature range	-10 ... +55°C
marine application	non-certified
enclosure code	IP 54 splash-water protected front

accessories

terminal protection against accidental contact	full-sized rear cover (not applying to PSQ 48) or protective sleeves
terminals	connector blades 6.3 x 0.8

dial

blank dial	pencil marked initial and end values
scale division and figuring	0 ... 100%, linear, full-scale values acc. to standardized series (1 – 1.5 – 2.5 – 4 – 6 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 optional
2 nd scale division	including figuring
coloured dial	dial plate black; pointer, scale division acc. to DIN and figuring yellow or white
additional lettering	to be specified e.g. "generator"
additional figuring	to be specified
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 to be specified

zero position	centre zero or off-set zero, mechanically suppressed zero, no zero adjustment, max. 40% of full-scale value for ammeters $\geq 100 \mu\text{A}$, voltmeters $\geq 60 \text{ mV}$ or electrically suppressed zero for voltmeters $\geq 6 \text{ V}$
expanded scale PQ 72/96/144 RS models only	expanded initial scale (electronically) up to approx. 5% of full-scale value in centre-scale to approx. 40%, 30% or 20% of full-scale value in centre scale (magnetically)

dial illumination by one (PQ 72/96 RS) or two lamps (PQ 144 RS) 6 V, 12 V or 24 V to be installed from the rear, dial translucent

special dial illumination with light-carrier dial and dial mask, dial plate black, scale divisions black on a yellow or white arc; pointer and figures yellow or white, illumination white or red, supply voltage 6 V, 12 V or 24 V

Accessories

external multipliers

Film resistors of class 0.5 accuracy to DIN, cast resin insulated.
Only for use with moving-coil DC meters on DC equipment connected to the ground.

DC voltage	1,000; 1,500; 2,000; 2,500; 3,000; 4,000; 5,000; 6,000; 10,000 V
sensitivity	2 k Ω /V
for meter movement	25 V, 250 μA



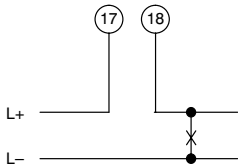
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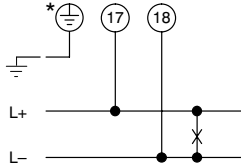
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Connections

DC current

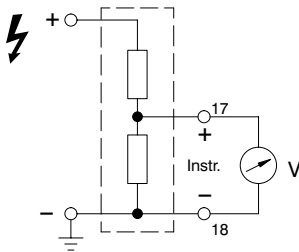


DC voltage

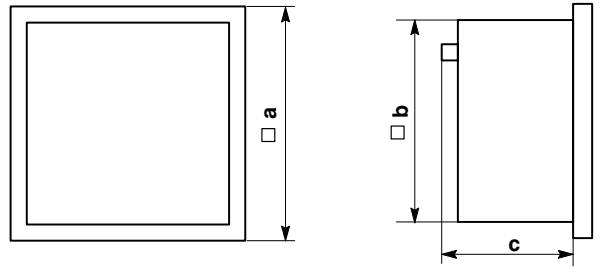


* PQ 72/96 RS voltmeters >150 V

DC voltage including external multiplier

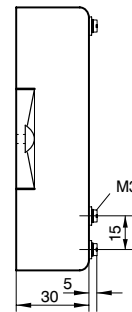
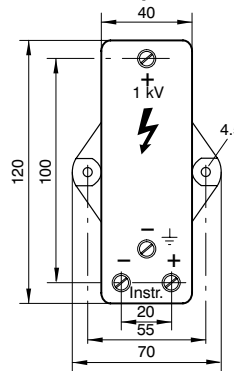


Dimensions



dimensions (in mm)	PSQ48	PQ72RS	PQ96RS	PQ144RS
a	48	72	96	144
b	45	66	90	137
c	48	57	60	60

external multiplier



(dimensions in mm)

Ordering Information

type (PSQ)PQ	moving-coil panel meter for DC voltage or current
front dimensions 48 72 RS 96 RS 144 RS	48 mm x 48 mm 72 mm x 72 mm 96 mm x 96 mm 144 mm x 144 mm
measuring ranges	refer to preceding table
"live zero"	4 ... 20 mA mechan. suppressed zero ¹⁾ 0/4 ... 20 mA electrically suppressed zero
sp. measuring range	to special order ²⁾
measuring range adjustment (voltmeters)	none ¹⁾ adjustment range $\pm 10\%$ approx. adjustment range $\pm 20\%$ approx.
2nd measuring range	none ¹⁾ 1 scale division, 2 nd figuring 2 scale divisions, 2 figurings ³⁾
accuracy class	1.5 ¹⁾ 1.0 with fine scale division
adjustments	none ¹⁾ internal resistance to $\pm 1\%$ at 23 °C lead resistance $> 0.05 \Omega$
sensitivity (voltmeters)	1 k Ω/V ¹⁾ increased to 2 k Ω/V increased to 5 k Ω/V increased to 10 k Ω/V increased to 20 k Ω/V
window	glass ¹⁾ non-glaring glass
colour of bezel	black (similar to RAL 9005) ¹⁾ gray (similar to RAL 7037)
index marking pointer	none ¹⁾ red, front adjustable
position of use	vertical ¹⁾ to special order 15 ... 165° ²⁾
panel fixing (PSQ 48)	plate springs, top and bottom plate springs, left and right side
performance loads	shock 15 g, vibration 2.5 g ¹⁾ shock 30 g, vibration 5 g
climatic suitability	class 2, -25 ... +40 °C ¹⁾ class 3, -10 ... +55 °C
marine application	none ¹⁾ non-certified
enclosure code	IP 52 ¹⁾ IP 54 splash-water protected front
terminal safety protection	none ¹⁾ full-sized rear cover ³⁾ protective sleeves
terminals	screws and wire clamps ¹⁾ connector blades 6.3 x 0.8

dial	scale division and measuring range alike resp. full-scale values acc. to standardized series 1 – 1.5 – 2.5 – 4 – 6 ¹⁾ blank dial scale division and figuring 0 ... 100% linear deviating from standard ²⁾ calibration fr. non-linear graph or chart ²⁾ scaling in ohms for voltmeters ²⁾ 2 scale divisions ²⁾ black dial, yellow scale division black dial, white scale division additional lettering to be specified ²⁾ additional figuring to be specified ²⁾ coloured marks red, green or blue ²⁾ coloured sector red, green or blue ²⁾
logo	WEIGEL ¹⁾ none OEM logo ²⁾
zero position	left hand zero position ¹⁾ centre or off-set zero position ²⁾ mechan. suppressed z.p. ²⁾ ($\geq 100 \mu A / 60 mV$) electrically suppressed z.p. ²⁾ ($\geq 6V$)
expanded initial scale	none ¹⁾ up to approx. 5%, electronically ³⁾ up to approx. 20%, 30% or 40%, mechanically ³⁾
dial illumination	none ¹⁾ with 1 lamp 6 V, 12 V or 24 V (models PQ 72/96 RS only) with 2 lamps 6 V, 12 V or 24 V (model PQ 144 RS only)
special dial illumination	with light-carrier dial 6, 12 or 24 V

¹⁾ Standard

²⁾ Please clearly add the desired specifications.

³⁾ PQ 72/96/144 RS only

ordering example

PQ 72 RS, measuring range 0 ... 60 mV, dial 0 ... 10 kA, window non-glaring glass, WEIGEL logo

type	external multiplier for DC voltage
measuring ranges	refer to table on page 4

ordering example

external multiplier 5,000 V DC for meter movement 25 V, 250 μA

Weigel Meßgeräte GmbH

Postfach 720 154 • 90241 Nürnberg • Phone: 0911/42347-0
Erlenstraße 14 • 90441 Nürnberg • Fax: 0911/42347-39
Sales: Phone: 0911/42347-94
Internet: <http://www.weigel-messgeraete.de>
e-mail: vertrieb@weigel-messgeraete.de

– specifications subject to change without notice; date of issue 04/11 –

