

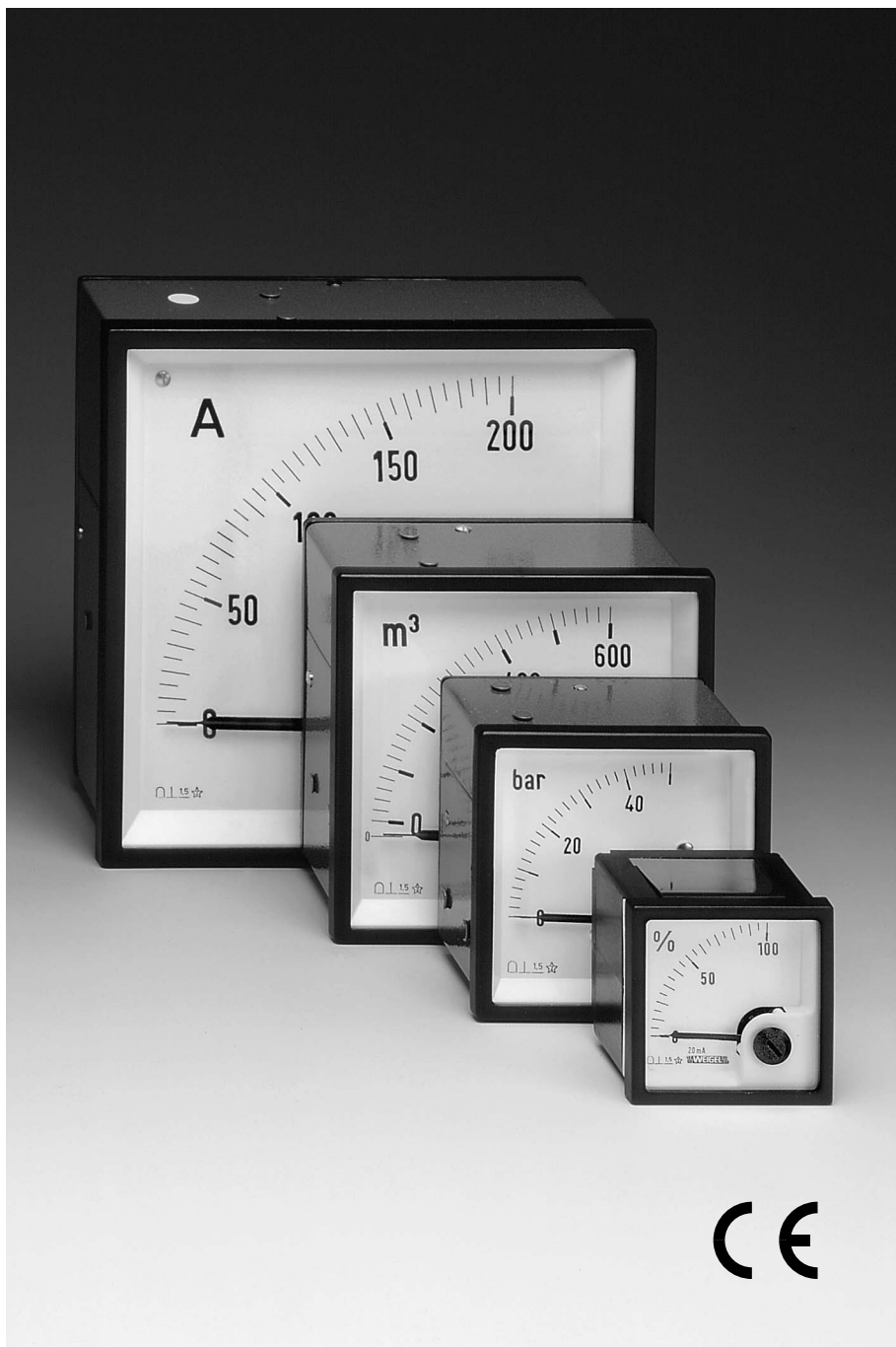


Data Sheet

M - Series
010.D.101.04

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 thermoplastic 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

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

Electrical Data

measuring unit	DC voltage or current
overload capacity (acc. to DIN EN 60 051)	
continuously	1.2 times rated voltage / current
5 s max.	
voltmeters	2 times rated voltage
ammeters	10 times rated current
protection class	I
enclosure code	IP 52 case IP 00 for terminals without protection against accidental contact IP 20 for terminals protected against accidental contact
insulation class	group A according to VDE 0110

rated insulation voltage 660 V
dielectric test 2 kV
based on 50 Hz, 1 min acc. to DIN 57 410

Measuring Ranges

DC current with amplifier (auxiliary voltage 230 V \sim , 48 ... 62 Hz)

	DC current		internal resistance*) /		DC voltage	
	PSQ 48	PQ 96 RS	voltage drop approx.	PSQ 48	PQ 96 RS	sensitivity*)
	PQ 72 RS	PQ 144 RS		PQ 72 RS	PQ 144 RS	
10 μ A			6500 Ω	4600 Ω	40 mV	3300 Ω /V 2000 Ω /V
15 μ A			5500 Ω	4400 Ω	60 mV	1000 Ω /V 1000 Ω /V
25 μ A			5000 Ω	2800 Ω	100 mV	1000 Ω /V 1000 Ω /V
			3600 Ω	2200 Ω	150 mV	1000 Ω /V 1000 Ω /V
			250 μ A	2200 Ω	250 mV	1000 Ω /V 1000 Ω /V
			400 μ A	1300 Ω	400 mV	1000 Ω /V 1000 Ω /V
			600 μ A	260 Ω	600 mV	1000 Ω /V 1000 Ω /V
			1 mA	48 Ω	1 V	1000 Ω /V 1000 Ω /V
			1.5 mA	60 mV	1.5 V	1000 Ω /V 1000 Ω /V
			2.5 mA	60 mV	2.5 V	1000 Ω /V 1000 Ω /V
			4 mA	60 mV	4 V	1000 Ω /V 1000 Ω /V
			5 mA	60 mV	6 V	1000 Ω /V 1000 Ω /V
			6 mA	60 mV	10 V	1000 Ω /V 1000 Ω /V
			10 mA	60 mV	15 V	1000 Ω /V 1000 Ω /V
			15 mA	60 mV	25 V	1000 Ω /V 1000 Ω /V
			20 mA	60 mV	40 V	1000 Ω /V 1000 Ω /V
			25 mA	60 mV	60 V	1000 Ω /V 1000 Ω /V
			40 mA	60 mV	100 V	1000 Ω /V 1000 Ω /V
			60 mA	60 mV	150 V	1000 Ω /V 1000 Ω /V
			100 mA	60 mV	250 V	1000 Ω /V 1000 Ω /V
			150 mA	60 mV	400 V	1000 Ω /V 1000 Ω /V
			250 mA	60 mV	500 V	1000 Ω /V 1000 Ω /V
			400 mA	60 mV	600 V	1000 Ω /V 1000 Ω /V
			600 mA	60 mV		
			1 A	60 mV		
			1.5 A	60 mV		
			2.5 A	60 mV		
			4 A	60 mV		
			6 A	60 mV		
			10 A	60 mV		
			15 A	60 mV		
			25 A	60 mV		
			40 A**)	60 mV		
			60 A**)	60 mV		

*) the resistance values are limited to a tolerance of $\pm 20\%$
**) not applying to PSQ 48

for use with external shunt sensitivity*)

60 mV	1000 Ω /V
150 mV	1000 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

*) the resistance values are limited to a tolerance of $\pm 20\%$

for use on transducer ("live zero")

0/4 ... 20 mA	electrically suppressed zero, with zero adjustment, voltage drop approx. 900 mV
---------------	---

also refer to "Options"



Analog Meters with Moving-Coil Movement, 90°-Dial

for use on external multiplier
movement for DC voltages

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

Scaling

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

Accuracy at Reference Conditions

accuracy class 1.5 according to DIN EN 60 051 \blacktriangleright

reference conditions

ambient temperature	23°C \pm 1K
position of use	nominal position \pm 1°
input	rated measuring value
others	DIN EN 60 051

influences

ambient temperature	-25°C ... +23°C ... +40°C
position of use	nominal position \pm 5°
stray magnetic field	0.5 mT

Environmental

climatic suitability	climatic class 2 according to VDE/VDI 3540 \blacktriangleright
operating temperature range	-25 ... +40°C \blacktriangleright
storage temperature range	-25 ... +65°C
relative humidity	\leq 75% annual average, non-condensing
shock resistance	15 g, 11 ms \blacktriangleright
vibration resistance	2.5 g, 5 ... 55 Hz \blacktriangleright

Rules and Standards

DIN 43 700	measuring and control instruments for panel mounting; nominal case and cutout dimensions
DIN 43 701	electrical switchboard instruments
DIN 43 718	bezels and front panels
DIN 43 802	scales and pointers for electrical measuring instruments
DIN 16 257	nominal position of use and position symbols applicable for measuring instruments
DIN 40 050	enclosure codes; protection of electrical equipment against ingress of solid foreign bodies and of water
DIN EN 60 051	direct acting indicating electrical measuring instruments and their accessories
DIN EN 61 010	safety requirements for electrically operated measuring, control and laboratory equipment
VDE/VDI 3540 sheet 2	reliability of measuring and control equipment (classification of climates)

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 ... 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 on request
additional measuring ranges	on request
accuracy class	1.0 with fine scale division (as far as possible) to \pm 1% at 23°C
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 Ω

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	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 according to VDE/VDI 3540
with operating temperature range	-10 ... +55°C
marine application	non-certified
enclosure code	IP 54 splash-water protected front
dielectric test	3 kV based on 50 Hz, 1 min acc. to DIN 57 410

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

\blacktriangleright also refer to "Options"

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 ≥ 100 μA, voltmeters ≥ 60 mV or electrically suppressed zero for voltmeters ≥ 6 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

Attachment

amplifier unit

inputs	10, 15 or 25 μA
voltage drop	approx. 10 mV
overload capacity	10 mA
output	1 mA
output ripple	<20 μA _{eff}
load	≤ 2 kΩ
accuracy	class 1.0
response time	<0.08 s
warm-up	<2 min
warm-up error	<0.5%
linearity error	≤ 0.2%
temperature coefficient	<0.03%/K
temperature range	0 ... +50 °C
auxiliary supply	230 V ~ , 48 ... 62 Hz

Measuring input and auxiliary supply are electrically insulated. Input and output circuits are **not** electrically insulated.

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 V
	1,500 V
	2,000 V
	2,500 V
	3,000 V
	4,000 V
	5,000 V
	6,000 V
	10,000 V
sensitivity	2 kΩ/V
for meter movement	25 V, 250 μA



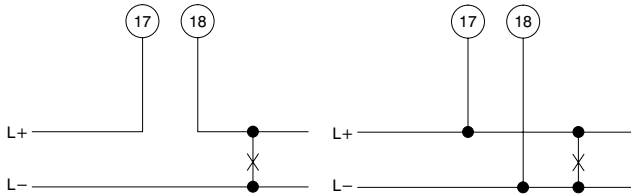
Data Sheet

M – Series
010.D.101.04

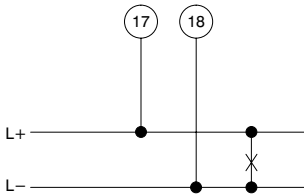
Analog Meters with Moving-Coil Movement, 90°-Dial

Connections

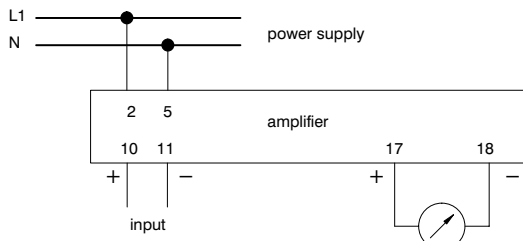
DC current



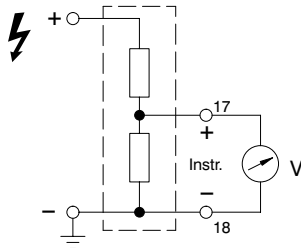
DC voltage



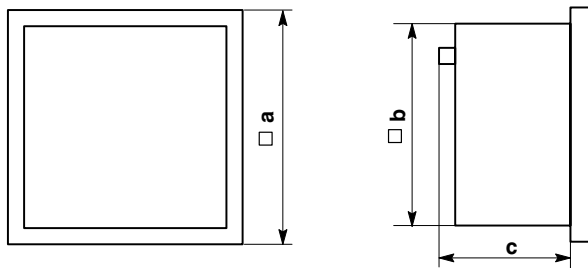
DC current including external amplifier



DC voltage including external multiplier



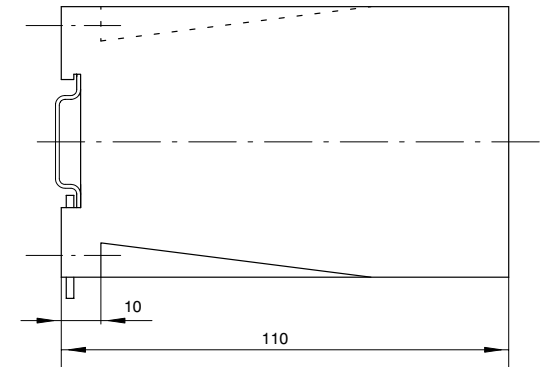
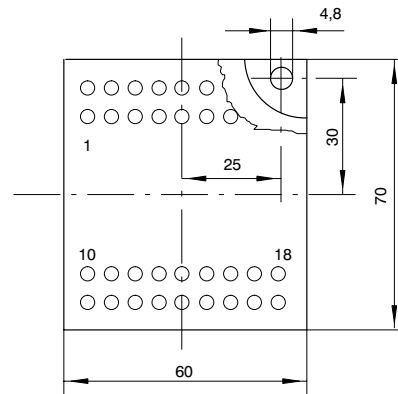
Dimensions



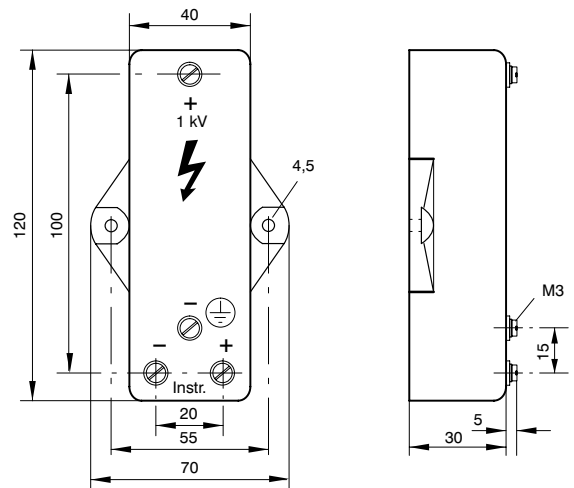
dimensions (in mm)	PSQ48	PQ72RS	PQ96RS	PQ144RS
a	48	72	96	144
b	45	66	90	137
c	48	57	60	60

external amplifier

flame retardant thermoplastic case for rail mounting (35 mm rail to DIN 46 277) or screw mounting (max. M4 screws to DIN 43 604).



external multiplier



(dimensions in mm)

Ordering Information

type (PSQ)PQ	moving-coil panel meter for DC voltage or current
front dimensions	
48	48 mm x 48 mm
72 RS	72 mm x 72 mm
96 RS	96 mm x 96 mm
144 RS	144 mm x 144 mm
measuring ranges	refer to preceding table
sp. measuring range	to special order **)
measuring range adjustment (voltmeters)	none *) adjustment range $\pm 10\%$ approx. adjustment range $\pm 20\%$ approx.
2nd measuring range	none *) 1 scale division, 2 nd figuring 2 scale divisions, 2 figurings ***)
accuracy class	1.5 *) 1.0 with fine scale division
adjustments	none internal resistance to $\pm 1\%$ at 23 °C lead resistance $> 0.05 \Omega$
sensitivity (voltmeters)	1 k Ω/V *) 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 *) non-glaring glass
colour of bezel	black (similar to RAL 9005) *) gray (similar to RAL 7037)
index marking pointer	none *) red, front adjustable
position of use	vertical *) to special order 15 ... 165° **)
panel fixing (PSQ 48)	plate springs, top and bottom plate springs, left and right side
performance loads	shock 15 g, vibration 2.5 g *) shock 30 g, vibration 5 g
climatic suitability	class 2, -25 ... +40 °C *) class 3, -10 ... +55 °C
marine application	none *) non-certified
enclosure code	IP 52 *) IP 54 splash-water protected front
dielectric test	2 kV *) 3 kV
terminal safety protection	none *) full-sized rear cover ***) protective sleeves
terminals	screws and wire clamps *) 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 *) blank dial scale division and figuring 0 ... 100% linear deviating from standard **) calibration fr. non-linear graph or chart **) scaling in ohms for voltmeters **) 2 scale divisions **) black dial, yellow scale division black dial, white scale division additional lettering to be specified **) additional figuring to be specified **) coloured marks red, green or blue **) coloured sector red, green or blue **)
logo	WEIGEL *) none OEM logo **)
zero position	left-hand zero *) centre zero or off-set zero **) mechanically suppressed zero **) electrically suppressed zero **)
expanded initial scale	none *) up to approx. 5%, electronically ***) up to approx. 20%, 30% or 40%, mechanically ***)
dial illumination	none *) 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

*) standard

**) Please clearly add the desired specifications.

***) 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 μ A

- specifications subject to change without notice; date of issue 03/04 -

WEIGEL – MESSGERÄTE GmbH

P.O.B. 720 154 • D-90241 Nürnberg • Telephone: 0911 / 423 47-0
Erlenstraße 14 • D-90441 Nürnberg • Fax: 0911 / 423 47-39
Internet: <http://www.weigel-messgeraete.de>
e-mail: webmaster@weigel-messgeraete.de

