



Data Sheet

019.D.001.04

Analog Meters with Moving-Coil Movement for use with Thermocouples

PQ 72 RS
PQ 96 RS
PQ 144 RS
P 72 PrS
P 96 PrS
P 144 PrS



WEIGEL

Application

The moving-coil panel meters **PQ 72/96/144 RS** (M series) and the profile models **P72/96/144 PrS** are used with thermocouples to measure and indicate temperature.

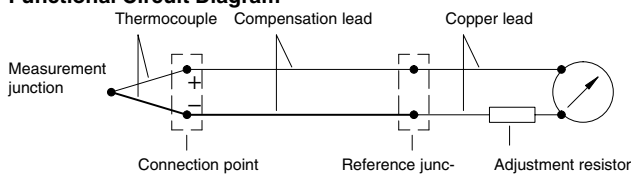
The moving-coil movements, manufactured to advanced engineering standards, are characterized by a low power consumption, high precision and excellent damping.

The square and profile meter-models are housed in pressed steel cases (except P 144 PrS with a thermoplastic case). They are suitable to be mounted in switchboards, control panels, machine tool consoles or mosaic grid panels.

Functional Principle

Moving-coil movement comprising a core-type magnetic system, pivot suspension. Dual spring loaded, shock absorbing jewel bearings.

Functional Circuit Diagram



The resistance of the connecting lead may substantially influence the temperature indication. Consequently, the lead resistance R_a (=connecting lead resistance+compensation lead resistance+thermocouple resistance) will have to be considered in the calibration of the meter. It shall be stated when ordering.

Thermoelectric voltages 15 mV and higher

A total lead resistance value $R_a=2\ \Omega$ for the thermocouple, copper lead and compensation lead is considered in the calibration of the indicator. If possible, non-standard resistance values may be considered (up to 10 Ω maximum).

The internal resistance R_i of the meter plus the calibrated lead resistance R_a is printed on the dial. The actual lead resistance will have to be adjusted to the calibrated R_a -value.

Mechanical Data

case details	square (PQ 72/96/144 RS) resp. edgewise (P 72/96/144 PrS) case suitable to be mounted in switchboards or mosaic grid panels		
material of case	pressed steel (PQ 72/96/144 RS, P 72/96 PrS) self-extinguishing thermoplastics (P 144 PrS)		
material of window	glass		
colour of bezel	black (similar to RAL 9005)		
position of use	vertical $\pm 5^\circ$		
panel fixing	screw clamps		
mounting	stackable next to each other (except P 144 PrS)		
terminals	hexagon studs, M3 screws and wire clamps (PQ 72/96/144 RS, P 72/96 PrS), connector blades 6.3 x 0.8 (P 144 PrS)		
dimensions	PQ 72 RS	PQ 96 RS	PQ 144 RS
bezel	□ 72 mm	□ 96 mm	□ 144 mm
case	□ 66 mm	□ 90 mm	□ 137 mm
depth	60 mm	62 mm	60 mm
panel cutout	□ 68.3 ^{+0.4} mm	□ 92 ^{+0.8} mm	□ 138 ⁺¹ mm
panel thickness	1 ... 15 mm	1 ... 15 mm	1 ... 15 mm
weight approx.	0.5 kg	0.6 kg	0.9 kg

dimensions (in mm)	P 72 PrS	P 96 PrS	P 144 PrS
bezel	72 x 36	96 x 48	144 x 72
case	67.5 x 32	90.5 x 42.5	137 x 67
depth	94 mm	107 mm	192 mm
panel cutout	68 ^{+0.7} mm x 33 ^{+0.6} mm	92 ^{+0.8} mm x 45 ^{+0.6} mm	138 ^{+1.0} mm x 68 ^{+0.7} mm
panel thickness	1 ... 25 mm	1 ... 12 mm	≤ 40 mm
weight approx.	0.5 kg	0.7 kg	1.3 kg

Electrical Data

measuring unit	thermoelectric voltage (DC voltage)		
measurement category	CAT III		
operating voltage	PQ 72/96/144 RS 150 V	P 72/96 PrS 50 V	P 144 PrS 150 V
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

Thermoelectric voltages from 15 mV upwards

for thermocouples according to DIN EN 60 584 - 1

measuring range sensor type thermoelectric voltage

0 ... 400°C	Fe - CuNi	L	22.16 mV
0 ... 600°C	Fe - CuNi	L	33.67 mV
0 ... 800°C	Fe - CuNi	L	46.22 mV
0 ... 900°C	Fe - CuNi	L	53.14 mV
0 ... 400°C	Fe - CuNi	J	21.85 mV
0 ... 600°C	Fe - CuNi	J	33.10 mV
0 ... 800°C	Fe - CuNi	J	45.50 mV
0 ... 900°C	Fe - CuNi	J	51.88 mV
0 ... 600°C	NiCr - Ni	K	24.90 mV
0 ... 900°C	NiCr - Ni	K	37.33 mV
0 ... 1000°C	NiCr - Ni	K	41.27 mV
0 ... 1200°C	NiCr - Ni	K	48.83 mV
0 ... 1300°C	NiCr - Ni	K	52.40 mV
0 ... 1600°C	Pt10Rh - Pt	S	16.77 mV

reference temperature 0°C

In case of external reference junction, state reference temperature 0°C, 20°C or 50°C.

Scaling

pointer	bar / knife-edge pointer		
scale arrangement	horizontal, left-hand zero (P 72/96/144 PrS)		
scale characteristics	practically linear		
scale division	coarse-fine		
scale length	PQ 72 RS 69 mm	PQ 96 RS 94 mm	PQ 144 RS 146 mm
	P 72 PrS 46 mm	P 96 PrS 67 mm	P 144 PrS 92 mm

also refer to "Options"



Analog Meters with Moving-Coil Movement for use with Thermocouples

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 $\pm 1^\circ$ ↗
input	rated measuring value
auxiliary voltage	within specified limits
others	DIN EN 60 051 - 1
influences	
ambient temperature	23 °C ± 2 K
position of use	nominal position $\pm 5^\circ$
stray magnetic field	0.5 mT

Environmental

climatic suitability	climatic class 2 ↗ according to VDE/VDI 3540, sheet 2
operating temperature range	-25 ... +40 °C ↗
storage temperature range	-25 ... +65 °C
relative humidity	$\leq 75\%$ 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 60 584 - 1	Thermocouples – Part 1: Basic values of thermoelectric voltages
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

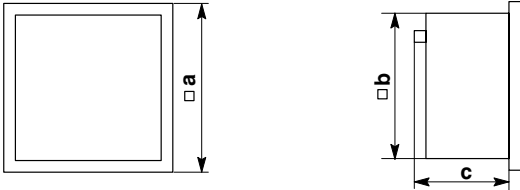
case	
window	non-glaring glass
colour of bezel	gray (similar to RAL 7037)
position of use	horizontal or to be specified 15...165°
performance	
increased mechanical loads	shock 30 g, 11 ms vibration 5 g, 5 ... 55 Hz
climatic suitability	limited use in the tropics, climatic class 3 according to VDE/VDI 3540, 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 (PQ 72/96/144 RS only) or protective sleeves SW6
terminals	connector blades 6.3 x 0.8
dial	
scale arrangement	vertical, bottom zero (P 72/96/144 PrS)
blank dial	pencil marked initial and end values
scale division and figuring	0 ... 100%
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
dial illumination	by one (PQ 72/96 RS) resp. two (PQ 144 RS) lamps 6 V, 12 V or 24 V to be installed from the rear, dial translucent

Connections



Dimensions

PQ 72/96/144 RS

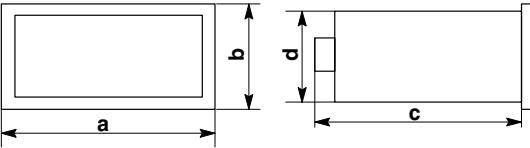


dimensions (in mm)	PQ 72 RS	PQ 96 RS	PQ 144 RS
a	72	96	144
b	66	90	137
c	60	62	60

P 72/96 PrS

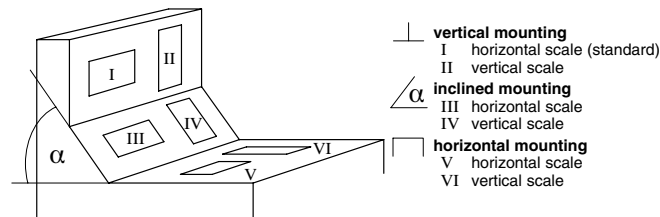


P 144 PrS



dimensions (in mm)	P 72 PrS	P 96 PrS	P 144 PrS
a	72	96	144
b	36	48	72
c	94	107	192
d	32	43	67

scales and position of use (P 72/96/144 PrS)



- ⊥ **vertical mounting**
 - I horizontal scale (standard)
 - II vertical scale
- ∠ **inclined mounting**
 - III horizontal scale
 - IV vertical scale
- ⊥ **horizontal mounting**
 - V horizontal scale
 - VI vertical scale

ordering example

P 72 PrS, measuring range 0 ... 600 °C for use with thermocouple Fe-CuNi, type L, 33.67 mV, reference temperature 0 °C, lead resistance $R_a=2 \Omega$, horizontal scale 0 ... 600 °C, vertical position of use

Ordering Information

type PQ	moving-coil panel meter to measure thermoelectric voltages
front dimensions	
72 RS	72 mm x 72 mm
96 RS	96 mm x 96 mm
144 RS	144 mm x 144 mm
type P	profile moving-coil panel meter to measure thermoelectric voltages
front dimensions	
72 PrS	72 mm x 36 mm
96 PrS	96 mm x 48 mm
144 PrS	144 mm x 72 mm
measuring ranges	refer to preceding table
window	glass ¹⁾ non-glaring glass
colour of bezel	black (similar to RAL 9005) ¹⁾ gray (similar to RAL 7037)
position of use	vertical ¹⁾ horizontal to be specified 15 ... 165° ²⁾
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
scale arrangement (P 72/96/144 PrS)	horizontal, left-hand zero ¹⁾ vertical, bottom zero
dial	°C (DIN range) ¹⁾ blank dial scale division and figuring 0 ... 100% 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⁾
dial illumination	none ¹⁾ with 1 lamp 6, 12 or 24 V (models PQ 72/96 RS only) with 2 lamps 6, 12 or 24 V (model PQ 144 RS only)

¹⁾ Standard

²⁾ Please clearly add the desired specifications.

³⁾ PQ 72/96/144 only

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

