



## 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



## Application

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

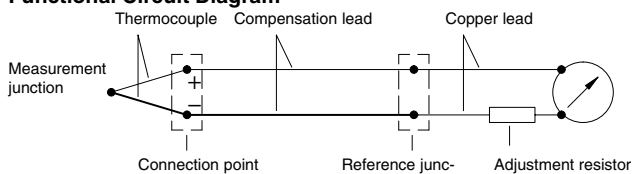
The moving-coil movements, manufactured to advanced engineering standards, are characterized by a low power consumption, high precision and excellent damping.

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  $10\ \Omega$  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) suitable to be mounted in switchboards or mosaic grid panels
material of case	pressed steel
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)

	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 <sup>+0.4</sup> mm	□ 92 <sup>+0.8</sup> mm	□ 138 <sup>+1</sup> mm
panel thickness	1 ... 15 mm	1 ... 15 mm	1 ... 15 mm
weight approx.	0.5 kg	0.6 kg	0.9 kg
<b>dimensions (in mm)</b>	<b>P 72 PrS</b>	<b>P 96 PrS</b>	<b>P 144 PrS</b>
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 <sup>+0.7</sup> mm x 33 <sup>+0.6</sup> mm	92 <sup>+0.8</sup> mm x 45 <sup>+0.6</sup> mm	138 <sup>+1.0</sup> mm x 68 <sup>+0.7</sup> 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	O
pollution level	2
enclosure code	IP 52 case front side (except P 144 PrS) IP 50 case front side (P 144 PrS)
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

### PQ 72/96/144 RS and P 72/96 PrS for thermocouples

according to DIN EN 60 584 - 1

measuring range	sensor	type	thermoelectric voltage
0 ... 300°C	Fe - CuNi	L	16.56 mV
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 ... 300°C	Fe - CuNi	J	16.33 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	45.49 mV
0 ... 900°C	Fe - CuNi	J	51.88 mV
0 ... 600°C	NiCr - Ni	K	24.91 mV
0 ... 900°C	NiCr - Ni	K	37.33 mV
0 ... 1000°C	NiCr - Ni	K	41.28 mV
0 ... 1200°C	NiCr - Ni	K	48.84 mV
0 ... 1300°C	NiCr - Ni	K	52.41 mV
0 ... 1600°C	Pt10Rh - Pt	S	16.78 mV

### P 144 PrS for thermocouples according to DIN EN 60 584 - 1

measuring range	sensor	type	thermoelectric voltage
20 ... 250°C	Fe - CuNi	J	13.56 mV
20 ... 300°C	Fe - CuNi	J	16.33 mV
20 ... 400°C	Fe - CuNi	J	21.85 mV
20 ... 600°C	Fe - CuNi	J	33.10 mV
20 ... 600°C	NiCr - Ni	K	24.91 mV
20 ... 900°C	NiCr - Ni	K	37.33 mV
20 ... 1200°C	NiCr - Ni	K	48.84 mV
20 ... 1200°C	Pt10Rh - Pt	S	11.95 mV
20 ... 1600°C	Pt10Rh - Pt	S	16.78 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	PQ 96 RS	PQ 144 RS
	69 mm	94 mm	146 mm
	P 72 PrS	P 96 PrS	P 144 PrS
	46 mm	67 mm	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 ±1° ♦  
input rated measuring value  
auxiliary voltage within specified limits  
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 ♦  
according to VDE/VDI 3540, sheet 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 60 584 - 1 Thermocouples – Part 1: Basic values of thermoelectric voltages  
DIN EN 61 010 Safety requirements for electrical measuring, control and laboratory equipment  
-1 Part 1: General requirements  
-2–030 Part 2–030: Particular requirements for testing and measuring circuits  
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

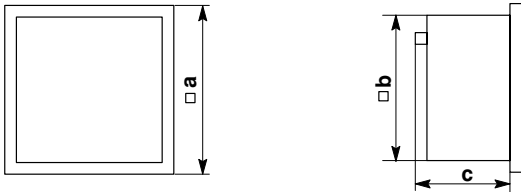
scale arrangement vertical, bottom zero (P 72/96/144 PrS)  
blank dial pencil marked initial and end values  
scale division and figuring 0 ... 100%  
additional lettering to be specified e.g. "generator"  
additional figuring to be specified  
coloured marks red, green or blue for important scale values  
coloured sector red, green or blue within scale division  
logo on the dial none or to be specified  
dial illumination by one lamp 6 V, 12 V or 24 V (PQ 72/96 RS) to be installed from the rear, dial translucent

### Connections



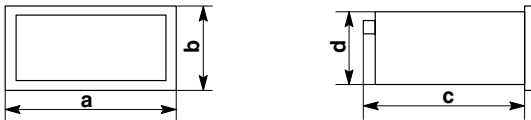
## Dimensions

### PQ 72/96/144 RS

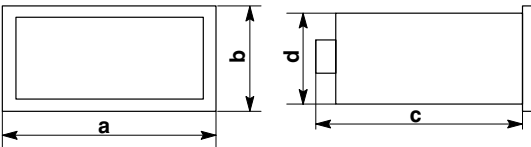


dimensions (in mm)	PQ 72 RS	PQ 96 RS	PQ 144 RS
a	72	96	144
b	66	90	137
c	60	62	60

### P 72/96 PrS

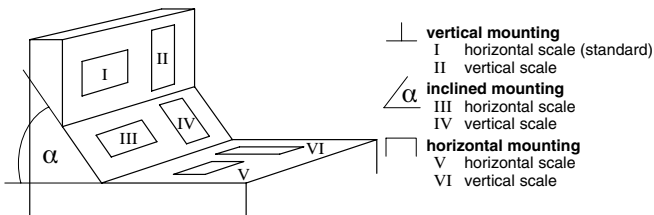


### P 144 PrS



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)



### 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

<b>type</b> PQ	moving-coil panel meter to measure thermoelectric voltages
<b>front dimensions</b> 72 RS 96 RS 144 RS	72 mm x 72 mm 96 mm x 96 mm 144 mm x 144 mm
<b>type</b> P	profile moving-coil panel meter to measure thermoelectric voltages
<b>front dimensions</b> 72 PrS 96 PrS 144 PrS	72 mm x 36 mm 96 mm x 48 mm 144 mm x 72 mm
<b>measuring ranges</b>	refer to preceding table
<b>window</b>	glass <sup>1)</sup> non-glaring glass
<b>colour of bezel</b>	black (similar to RAL 9005) <sup>1)</sup> gray (similar to RAL 7037)
<b>position of use</b>	vertical <sup>1)</sup> horizontal to be specified 15 ... 165° <sup>2)</sup>
<b>performance loads</b>	shock 15 g, vibration 2.5 g <sup>1)</sup> shock 30 g, vibration 5 g
<b>climatic suitability</b>	class 2, -25 ... +40 °C <sup>1)</sup> class 3, -10 ... +55 °C
<b>marine application</b>	none <sup>1)</sup> non-certified
<b>enclosure code</b>	IP52 (except P144PrS)/IP50 (P144PrS) <sup>1)</sup> IP 54 splash-water protected front
<b>terminal safety protection</b>	none <sup>1)</sup> full-sized rear cover <sup>3)</sup> protective sleeves
<b>terminals</b>	screws and wire clamps <sup>1)</sup> connector blades 6.3 x 0.8
<b>scale arrangement</b> (P 72/96/144 PrS)	horizontal, left-hand zero <sup>1)</sup> vertical, bottom zero
<b>dial</b>	°C (DIN range) <sup>1)</sup> blank dial scale division and figuring 0 ... 100% additional lettering to be specified <sup>2)</sup> additional figuring to be specified <sup>2)</sup> coloured marks red, green or blue <sup>2)</sup> coloured sector red, green or blue <sup>2)</sup>
<b>logo</b>	WEIGEL <sup>1)</sup> none OEM logo <sup>2)</sup>
<b>dial illumination</b>	none <sup>1)</sup> 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)

<sup>1)</sup> Standard

<sup>2)</sup> Please clearly add the desired specifications.

<sup>3)</sup> PQ 72/96/144 only

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– specifications subject to change without notice; date of issue 02/16 –

