



Data Sheet

K Series
460.D.101.07

Analog Power Factor Meters, Electronically, 90° or 240° Dial

CQ 96 K
CQ 144 K
LSC 96 K

with Slide-In-Dial



WEIGEL

Application

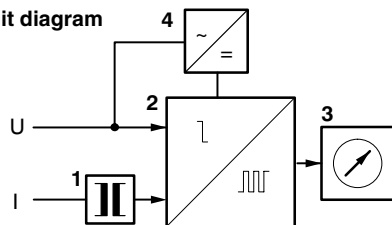
The moving - coil meter models **CQ 96/144 K** with 90° dial or **LSC 96 K** with 240° dial of the K series are suitable to measure the power factor as a ratio of active and reactive power in single phase AC or in balanced 3 phase systems:

The instruments are suitable to be mounted in switchboards, control panels, machine tool consoles and mosaic panels. The bezel, the glass window and the dial can be easily exchanged on - site.

Functional Principle

The meters consist of a moving - coil movement with core - magnet (CQ) or pivot suspended spring loaded jewel bearings (LSC) system and a measuring converter. Both devices are included in a common plastic case.

block circuit diagram



A current transformer 1 of the phase angle converter adapts the input current to the electronic circuit. Both the input voltage and the current are passed to a bistable flip - flop stage 2.

The pulse duty cycle of the flip - flop is proportional to the phase angle ψ . A low - pass filter forms the mean value which is fed to the moving - coil movement 3. The standard dial is scaled with the cosine of the phase angle ψ .

Power supply is obtained from voltage input in block 4.

Mechanical Data

case details	moulded square case suitable to be mounted in control / switchgear panels, machine tool consoles or mosaic panels, stackable	
material of case	polycarbonate thermoplastics, flame retardant with UL rating of 94 V - 0	
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	
panel thickness	≤ 40 mm	
terminals	hexagon studs with M4 screws	
dimensions	CQ/LSC 96 K	CQ 144 K
bezel	□ 96 mm	□ 144 mm
case	□ 90 mm	□ 136 mm
depth	104 mm	104 mm
panel cutout	□ $92^{+0.8}$ mm	□ 138^{+1} mm
weight approx.	0,55 kg	0,75 kg

◆ also refer to "Options"

Electrical Data

measuring unit	power factor (phase angle ψ)
frequency range	49 ... 50 ... 51 Hz (single phase system) 45 ... 50 ... 65 Hz (3 phase system)
overload capacity (acc. to DIN EN 60 051 - 1)	
continuously	1.2 times rated voltage / current
5 s max.	2 times rated voltage, 10 times rated current
power consumption	
current path	≤ 0.1 VA
voltage path	≤ 3.0 VA
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

type

E	single phase system
D	3 phase 3 wire system balanced load

measuring ranges

cos ψ	cap 0.5 ... 1 ... 0.5 ind
cos ψ	cap 0.8 ... 1 ... 0.3 ind
cos ψ	cap 0.8 ... 1 ... 0.8 ind

single phase system rated voltages	operating voltage		3 phase system rated voltages	operating voltage	
	CQ 96 K	144 K		CQ 96 K	144 K
57.7 V ($100 \text{ V} : \sqrt{3}$)	150 V	150 V			
63.5 V ($110 \text{ V} : \sqrt{3}$)	150 V	150 V			
100 V ¹⁾	150 V	150 V	100 V ¹⁾	150 V	150 V
110 V ¹⁾	150 V	150 V	110 V ¹⁾	150 V	150 V
115 V	150 V	150 V	115 V	150 V	150 V
120 V	150 V	150 V	120 V	150 V	150 V
127 V ($220 \text{ V} : \sqrt{3}$)	150 V	150 V	127 V	150 V	150 V
208 V	300 V	600 V	208 V	300 V	600 V
230 V	300 V	600 V	230 V	300 V	600 V
289 V ($500 \text{ V} : \sqrt{3}$)	600 V	600 V	289 V	600 V	600 V
400 V	600 V	600 V	400 V	600 V	600 V
			415 V	600 V	600 V
			440 V	600 V	600 V
			500 V	600 V	600 V

¹⁾ also for use on voltage transformer

rated currents

1 A
5 A



Analog Power Factor Meters, Electronically, 90° or 240° Dial

Scaling

dial	flat dial
pointer	bar / knife-edge pointer
pointer deflection	0 ... 90° (CQ) 0 ... 240° (LSC)
scale characteristics	non-linear
scale division	coarse – fine
scale length	CQ 96 K CQ 144 K LSC 96 K 97 mm 146 mm 142 mm

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 $\pm 1^\circ$ ♦
voltage	rated voltage
frequency	50 Hz $\pm 0.1\%$
wave form	sine wave
distortion factor	$\leq 0.1\%$
current	95 ... 100 % rated current
warm-up	≥ 5 min
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 3 acc. to VDE/VDI 3540 sheet 2
operating temperature range	-10 ... +55°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
-5	Part 5: Special requirements for phase meters, power factor meters, and synchrosopes
-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 (IEC 61 000 -4 -3 evaluation criterion B)
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)

Options

case

window	non-glaring glass
colour of bezel	gray (similar to RAL 7037)
index marking pointer	red, front adjustable
position of use	on request 15...165°
marine application	non-certified or with approbation by "Germanischer Lloyd" (CQ 96/144 K only)

terminal protection against accidental contact

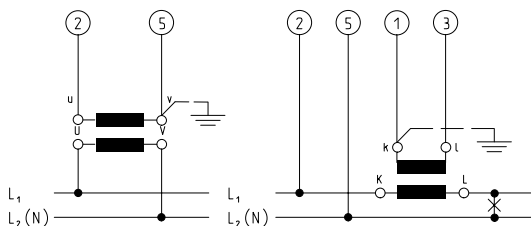
protective sleeves

dial

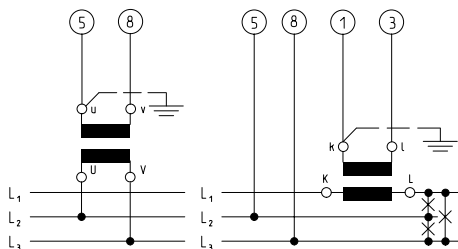
additional lettering	on request e.g. "generator"
additional figuring	on request
coloured marks	red, green or blue for important scale values
coloured sector	red, green or blue within scale division
logo on the dial	none or on request

Connections

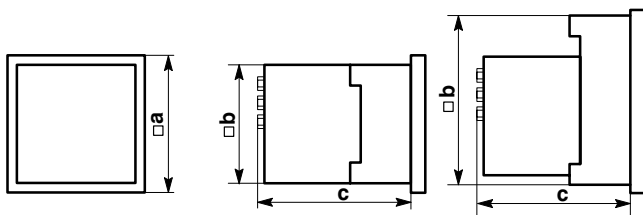
CQ 96/144 K E, LSC 96 K E



CQ 96/144 K D, LSC 96 K D



Dimensions



CQ/LSC 96 K

CQ 144 K

dimensions (in mm)

CQ/LSC 96 K

CQ 144 K

a

96

144

b

90

136

c

104

104

Ordering Information

type CQ LSC (96 K only)	power factor meter, electrical with moving-coil movement. 90° dial with moving-coil movement. 240° dial
front dimensions 96 K 144 K	96 mm x 96 mm 144 mm x 144 mm
type E D	single phase system 3 phase system balanced load
measuring ranges	cap 0.5 ... 1 ... 0.5 ind cap 0.8 ... 1 ... 0.3 ind cap 0.8 ... 1 ... 0.8 ind
rated voltages	refer to preceding table
rated currents	1 A 5 A
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 ³⁾
position of use	vertical ¹⁾ on request 15 ... 165° ²⁾
marine application	none ¹⁾ non-certified with approbation by "Germanischer Lloyd" ³⁾
safety terminal touch protection	none ¹⁾ protective sleeves
dial	scale division & measuring range alike ¹⁾ additional lettering on request ²⁾ additional figuring on request ²⁾ coloured marks red, green or blue ²⁾ coloured sector red, green or blue ²⁾
logo	WEIGEL ¹⁾ none OEM logo ²⁾

¹⁾ Standard

²⁾ Please clearly add the desired specifications.

³⁾ CQ 96/144 K only

ordering example

CQ 96 K D for 3 phase system balanced load,
measuring range ($\cos \psi$) cap 0.5 ... 1 ... 0.5 ind, rated voltage AC 230 V,
rated current 1 A, window non-glaring glass, no logo

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– specifications subject to change without notice; date of issue 2/11 –

