TÜV CERT
DIN EN ISO 9001
Certificate: 01 100 80407

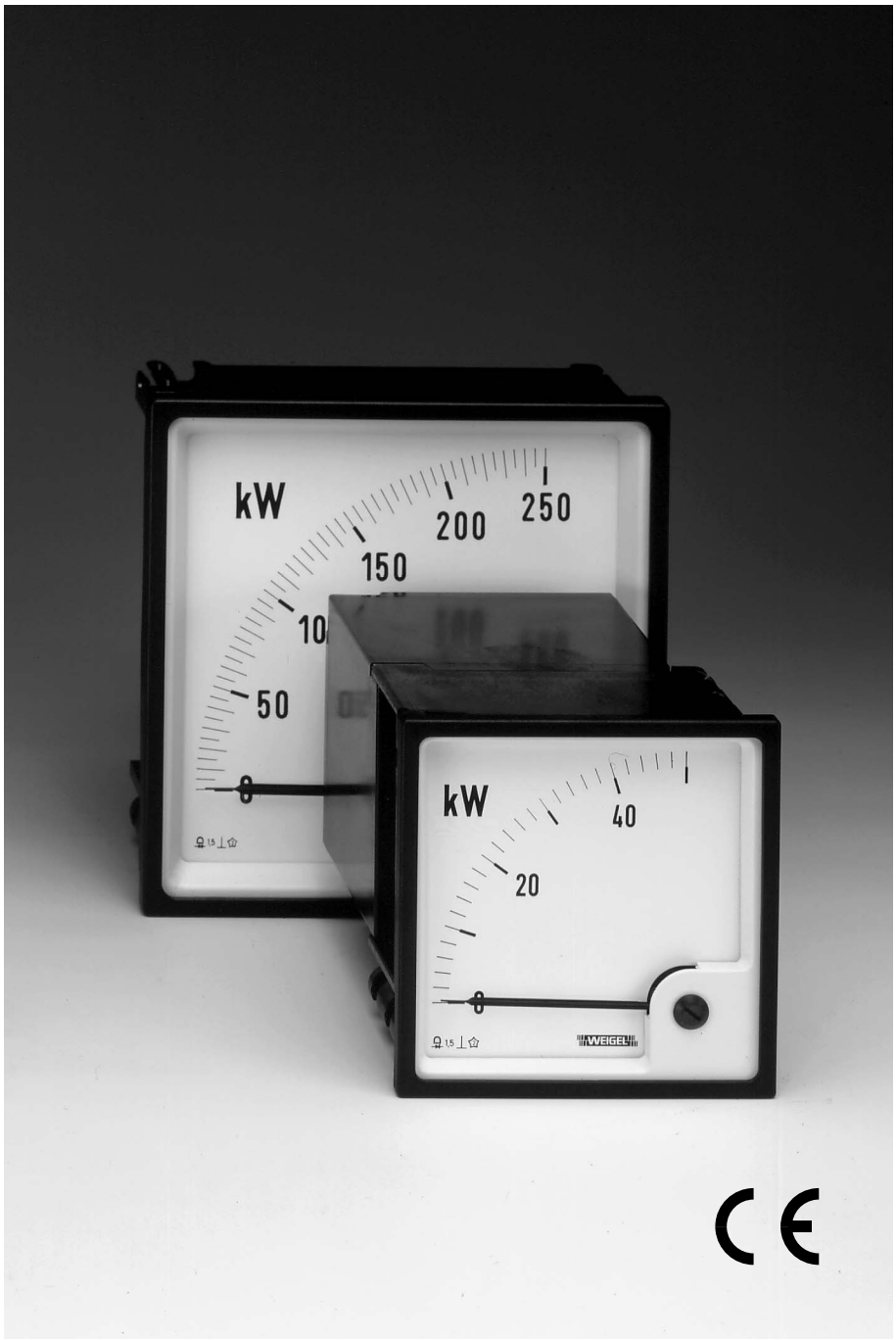
Data Sheet

K Series
470.D.101.06

Analog Watt and VAr Meters, Electronic, 90° or 240° Dial

LQ 96 K
LQ 144 K
LSL 96 K

with Slide-In-Dial



WEIGEL

Application

The electronic Watt and VAr moving-coil meter models **LQ 96**/**144 K** with 90° dial or **LSL 96 K** with 240° dial of the K series are offered for the following AC systems:

– single phase,
– 3 phase balanced load, 3 or 4 wire,
– 3 phase unbalanced load,3 or 4 wire.

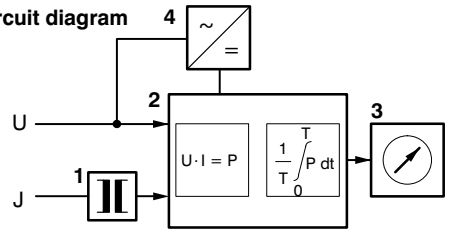
These wattmeters are suitable to indicate forward (export) and reverse (import) power flow as well as inductive and capacitive reactive power. They can be used both on sinusoidal and non–sinusoidal current.

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 (LQ) or pivot suspended spring loaded jewel bearings (LSL) system and a power converter. Both devices are included in a common plastic case.

block circuit diagram



The power converter uses one, two or three multiplier systems **2** depending on the measurement of balanced or unbalanced load AC systems. Current transformers **1** adapt the input current to the multiplier electronics.

The multipliers form the product of the instantaneous values of current and voltage (TDM principle). Subsequently, the product resultant is integrated, thereby suppressing the AC ripple. A DC voltage output signal is fed to the moving-coil movement **3**.

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 ±5° ◗
panel fixing	screw clamps
mounting	stackable next to each other
panel thickness	≤ 40 mm
terminals	hexagon studs with M4 screws

dimensions	**LQ 96 K**	**LQ 144 K**	**LSL 96 K**
bezel	□ 96 mm	□ 144 mm	□ 96 mm
case	□ 90 mm	□ 136 mm	□ 90 mm
depth	129 mm VW/B 3 versions	129 mm	129 mm all versions
depth	104 mm EW/B1, DW/B 1, VW/B 1, DW/B 2 versions	104 mm	–
panel cutout	□$92^{+0.8}$ mm	□138^{+1} mm	□$92^{+0.8}$ mm
weight approx.	1.1 kg	1.1 kg	1.1 kg

Electrical Data

measuring unit	active or reactive power
response time	4 s
overload capacity (acc. to DIN EN 60 051)	
continuously	1.2 times rated voltage / current
5 s max.	2 times rated voltage, 10 times rated current
power consumption	
current path	≤ 0.2 VA / each
voltage path types	
EW 1, DW 1, DB 1, VW 1, VB 1	≤ 3.0 VA / each
EB 1	≤ 3.5 VA / each
DW 2, DB 2	≤ 3.4 VA / each
VW 3	≤ 3.9 VA / each
VB 3	≤ 4.3 VA / each
pollution level	2
operating voltage	600 V ◗
excess voltage category	CAT II ◗
enclosure code	IP 52 case IP 00 for terminals without protection against accidental contact IP 20 for terminals protected against accidental contact ◗

Measuring Ranges

type	active power	reactive power
single phase system	**EW 1**	**EB 1**
3 phase 3 wire system balanced load	**DW 1**	**DB 1**
3 phase 4 wire system balanced load	**VW 1**	**VB 1**
3 phase 3 wire system unbalanced load	**DW 2**	**DB 2**
3 phase 4 wire system unbalanced load	**VW 3**	**VB 3**

selection of measuring range

The apparent power P_S is calculated from the primary ratings of current transformers and voltage transformers:

single phase $P_S = U \cdot I$

3 phase $P_S = \sqrt{3} \cdot U \cdot I$

Select full–scale values between 0.5 and 1.2 times the calculated apparent power preferably from DIN series (acc. to DIN 43 701): 1 – 1.2 – 1.5 – 2 – 2.5 – 3 – 4 – 5 – 6 –7.5 – 8 and their decimal multiples.

rated voltage

single phase system 3 phase 3 wire system	3 phase 4 wire system
57.7 V (100 V : $\sqrt{3}$)	
63.5 V (110 V : $\sqrt{3}$)	
100 V	57.7 / 100 V
115 V	63.5 / 110 V
120 V	
127 V (220 V : $\sqrt{3}$)	127 / 220 V
230 V (400 V : $\sqrt{3}$)	
289 V (500 V : $\sqrt{3}$)	
400 V	230 / 400 V
440 V	254 / 440 V
500 V	289 / 500 V

rated current 1 A or 5 A
If used on current transformer, please state transformer ratio on the order.

◗ also refer to "Options"

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Analog Watt and VAr Meters, Electronic, 90° or 240° Dial

Scaling

dial	flat dial		
pointer	bar / knife−edge pointer		
pointer deflection	0 ... 90° (LQ) 0 ... 240° (LSL)		
scale characteristics	linear		
scale division	coarse−fine		
scale length	LQ 96 K 97 mm	LQ 144 K 146 mm	LSL 96 K 142 mm

Accuracy at Reference Conditions

accuracy class	1.5 according to DIN EN 60 051
reference conditions	
ambient temperature	23°C±2K
position of use	nominal position ±1°
input	full−scale power value P_N
calibration factor	$\lambda = P_N / P_S$
power factor	$\cos \varphi = \lambda / 0.6$ resp. $\sin \varphi = \lambda / 0.6$ for $0.3 \leq \lambda < 0.6$ $\cos \varphi = 1$ resp. $\sin \varphi = 1$ for $0.6 \leq \lambda \leq 1.5$
voltage	rated voltage
frequency	50 Hz ±2%
warm−up	≥ 15 min
others	DIN EN 60 051
influences	
ambient temperature	−10°C ... +23°C ... +55°C
position of use	nominal position ±5°
stray magnetic field	0.5 mT
power factor	1 ind ... 0 ... 1 cap

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	≤ 75% annual average, non−condensing
shock resistance	15 g, 11 ms
vibration resistance	2.5 g, 5 ... 55 Hz

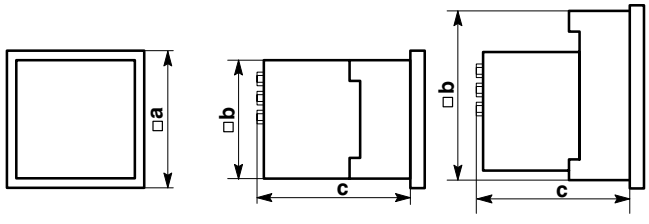
Rules and Standards

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

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" (LQ 96/144 K only)
electrical data	
operating voltage	up to 1000 V
excess voltage category	up to CAT III
terminal protection against accidental contact	
protective sleeves	
protection against accidental contact (hand and fingers) acc. to VBG 4 / DIN 57 106, sec. 100	
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

Dimensions

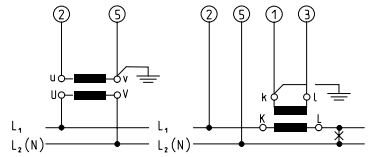


LQ/LSL 96 K LQ 144 K

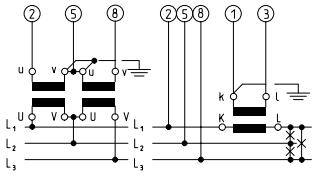
dimensions (in mm)	LQ 96 K	LQ 144 K	LSL 96 K
a	96	144	96
b	90	136	90
c	104	104	129
(EW/B1, DW/B 1, VW/B 1, DW/B 2 versions)			
c	129	129	129
(VW/B 3 versions)			

Connections

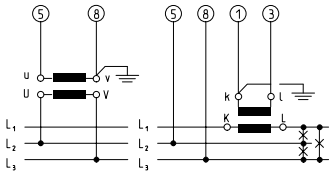
LQ/LSL 96/144 K EW1/EB1



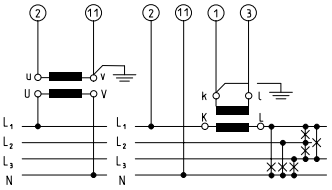
LQ/LSL 96/144 K DW1



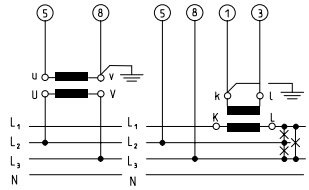
LQ/LSL 96/144 K DB1



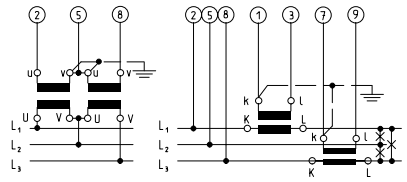
LQ/LSL 96/144 K VW1



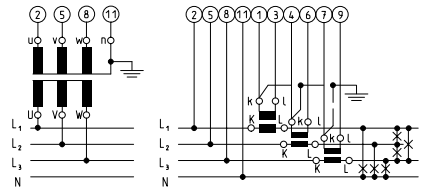
LQ/LSL 96/144 K VB1



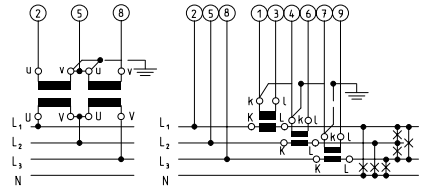
LQ/LSL 96/144 K DW2/DB2



LQ/LSL 96/144 K VW3



LQ/LSL 96/144 K VB3



Ordering Information

type **LQ** **LSL** (96 K only)	Watt and VAr meters, electronical 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 **EW1, EB1** **DW1, DB1** **VW1, VB1** **DW2, DB2** **VW3, VB3**	 single phase system 3 phase 3 wire system balanced load 3 phase 4 wire system balanced load 3 phase 3 wire system unbalanced load 3 phase 4 wire system unbalanced load
measuring ranges	refer to preceding table
rated voltages	refer to preceding table
rated currents	1 A 5 A
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 *) on request 15 ... 165° **)
marine application	none *) non–certified with approbation by "Germanischer Lloyd" ***)
terminal protection	none *) protective sleeves
dial	scale division & measuring range alike *) additional lettering on request **) additional figuring on request **) coloured marks red, green or blue **) coloured sector red, green or blue **)
logo	WEIGEL *) none OEM logo **)

*) standard
**) Please clearly add the desired specifications.
***) LQ 96/144 K only

ordering example

LQ 96 K VW3 for active power, 3 phase 4 wire system, unbalanced load,
measuring range 0 ... 400 kW, rated voltage AC 230/400 V,
for use on current transformer 600/5 A,
window non–glaring glass, no logo

– specifications subject to change without notice; date of issue 03/05 –

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