

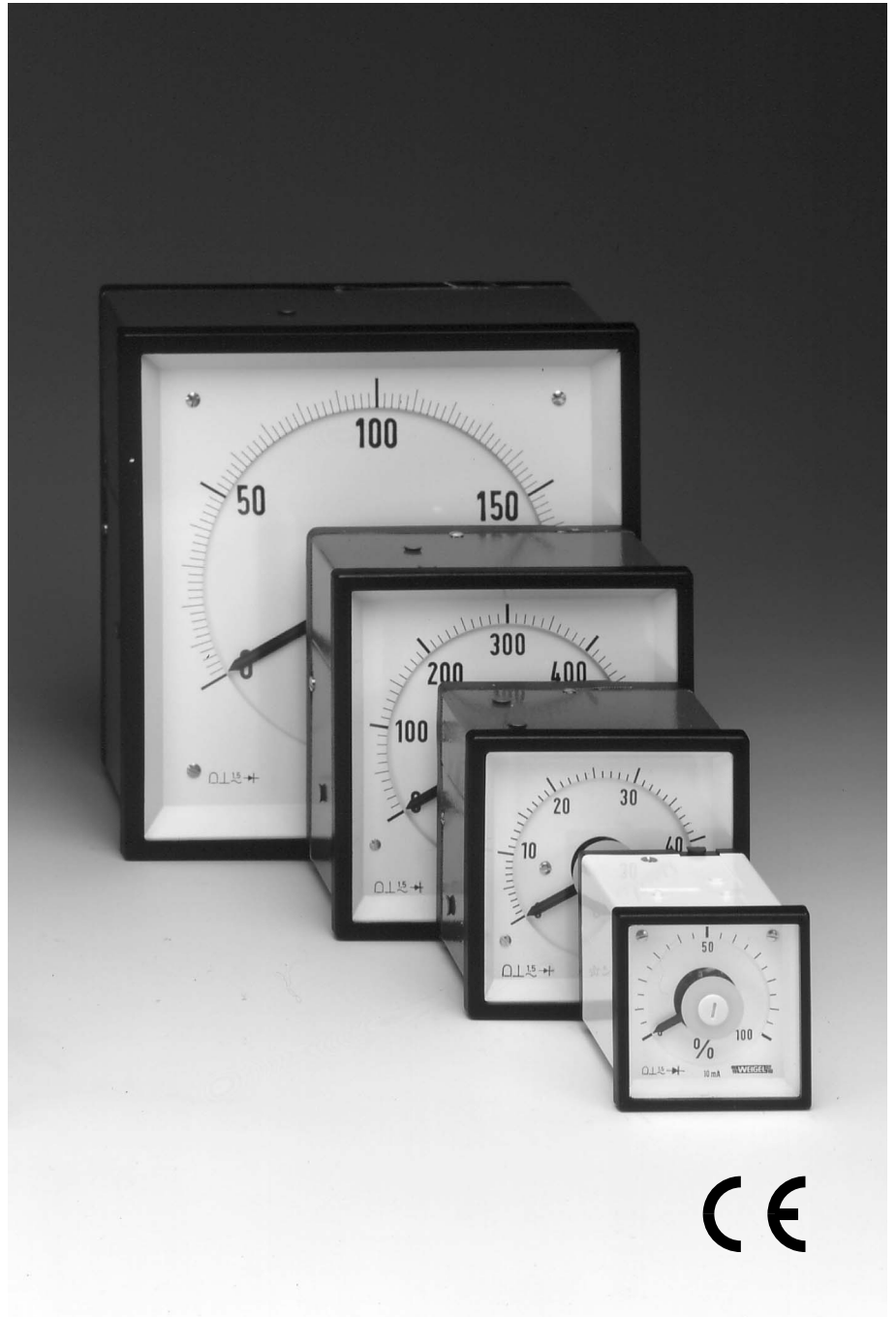


Data Sheet

M Series
016.D.101.09

Analog Meters with Moving-Coil Rectifier Movement 240° Dial

LSG 48
LSG 72
LSG 96
LSG144



WEIGEL

Application

The 240° moving-coil rectifier instruments **LSG 48/72/96/144** (M series) are used for the measurement of sinusoidal AC currents and voltages.

Moving-coil rectifier instruments measure average values and are scaled to indicate r.m.s., assuming a sinusoidal wave form.

These instruments are suitable to be mounted in switchboards, control panels, machine tool consoles and mosaic panels.

Movements

Moving-coil movements with swivel coil, pivot suspended.
Spring loaded jewel bearings for vibration and shock resistance.
Series-connected rectifier incorporated.

Mechanical Data

case details	square case suitable to be mounted in control / switchgear panels, machine tool consoles or mosaic panels, stackable
material of case	pressed steel (LSG 72/96/144) thermoplastics, flame retardant (LSG 48)
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	1 ... 15 mm
terminals ▶	
voltmeters and ammeters ≤ 3 A	hexagon studs, M3 screws and wire clamps C6
ammeters >3 A	hexagon studs, M5 screws and wire clamps C10
ammeters >30 A	hexagon studs, M6 screws and wire clamps C10
ammeters ≥1 A (LSG 72/96)	connector blades 6.3 x 0.8 for protective wire

dimensions (in mm)	LSG 48	LSG 72	LSG 96	LSG 144
bezel	□ 48	□ 72	□ 96	□ 144
case	□ 45	□ 66	□ 90	□ 137
depth	≤ 66	≤ 60	≤ 69	≤ 70
		≤ 94 including built-in miniature current transformer		
panel cutout	□45.2+0.6	□68.3+0.4	□92+0.8	□138+1
weight approx.	0.2 kg	0.3 kg	0.4 kg	0.9 kg

Electrical Data

measuring unit	AC voltage or current
frequency range	voltage 40 Hz ... 50 Hz ... 10 kHz current 50 Hz (others on request)
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
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

▶ for other ratings refer to "Options"

Measuring Ranges

For mains use

AC current	voltage drop approx.	AC voltage >5V	sensitivity ¹⁾
100 µA	1.5 V	6 V	900 Ω/V
150 µA	1.5 V	10 V	900 Ω/V
250 µA	1.5 V	15 V	900 Ω/V
400 µA	1.5 V	25 V	900 Ω/V
600 µA	1.5 V	40 V	900 Ω/V
1 mA	1.5 V	60 V	900 Ω/V
1.5 mA	1.5 V	100 V	900 Ω/V
2.5 mA	1.5 V	150 V	900 Ω/V
4 mA	1.5 V	250 V	900 Ω/V
6 mA	1.5 V	400 V	900 Ω/V
10 mA	1.5 V	500 V	900 Ω/V
15 mA	1.5 V	600 V	900 Ω/V
25 mA	1.5 V		▶
40 mA ²⁾	1.5 V		
60 mA ²⁾	1.5 V		
100 mA ²⁾	1.5 V		
150 mA ²⁾	1.5 V		
250 mA ²⁾	1.5 V		
400 mA ²⁾	1.5 V		
600 mA ²⁾	1.5 V		
1 A ³⁾	0.2 V		
1.5 A ³⁾	0.2 V		
2.5 A ³⁾	0.2 V		
4 A ³⁾	0.3 V		
6 A ³⁾	0.3 V		
10 A ³⁾	0.3 V		
15 A ³⁾	0.3 V		
25 A ³⁾	0.3 V		
for use on current transformer		for use on voltage transformer	
N/1 A ³⁾⁴⁾	0.2 V	100 V sec.	900 Ω/V
N/5 A ³⁾⁴⁾	0.3 V	110 V sec.	900 Ω/V

Not for mains use

AC voltage ≤5V	sensitivity ¹⁾
1.5; 2.5; 4 V	900 Ω/V

Operating Voltages

measuring ranges	operating voltage			
AC current	LSG 48	LSG 72	LSG 96	LSG 144
100; 150; 250; 400; 600 µA	1; 1.5; 2.5; 4; 6; 10; 15; 25 mA			
150 V	150 V	150 V	150 V	
40; 60; 100; 150; 250; 400; 600 mA ²⁾	–	150 V	150 V	150 V
1; 1.5; 2.5; 4; 6; 10; 15; 25 A; N/1 A; N/5 A	300 V	300 V	300 V	300 V
AC voltage	LSG 48	LSG 72	LSG 96	LSG 144
1.5; 2.5; 4; 6; 10; 15; 25; 40; 60; 100; 150 V	150 V	150 V	150 V	150 V
250; 400; 500 V	300 V	300 V	300 V	300 V
600 V	600 V	600 V	600 V	600 V
N/100 V; N/110 V	150 V	150 V	150 V	150 V

¹⁾ the resistance values are limited to a tolerance of ±20% ▶

²⁾ except LSG 48

³⁾ separate (LSG 48) resp. built-in (LSG 72/96/144) miniature current transformer 50 Hz, 10 mA sec. included

⁴⁾ also with overload scaling 2 times rated current (LSG 72)

also with overload scaling 2 ... 5 times rated current (LSG 96/144)



Analog Meters with Moving-Coil Rectifier Movement 240° Dial

Scaling

dial	flat dial ▶
pointer	bold bar pointer ▶
pointer deflection	0 ... 240°
scale characteristics	linear
scale division	coarse–fine
scale length	LSG 48 LSG 72 LSG 96 LSG 144 69 mm 106 mm 147 mm 224 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 ±1°
input	rated measuring value
frequency	50±2 Hz
wave form	sinusoidal, distortion factor <5%
others	DIN EN 60 051 - 1

influences

ambient temperature	23°C±2K
position of use	nominal position ±5°
frequency	40 Hz ... 50 Hz ... 10 kHz
stray magnetic field	0.5 mT

Environmental

climatic suitability	climatic class 2 ▶ acc. to VDE/VDI 3540, sh. 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 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

(IEC 61 000 -4 -3 evaluation criterion B)

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

measuring range

special measuring range deviating from standard

measuring range adjustment adjustment potentiometer installed in voltmeters, adjustment range approx. ±10% or ±20 ... 50%; ammeters on request

2nd measuring range with 3rd terminal for voltmeters 2nd figuring and 1 or 2 scale divisions on request

additional measuring ranges

accuracy class 1.0 with fine scale division (as far as possible) to ±1% at 23°C

adjustment of resistance

increased sensitivity to 2 kΩ/V, 5 kΩ/V or 10 kΩ/V for voltmeters

case

window non - glaring glass
colour of bezel gray (similar to RAL 7037)
position of use on request 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 acc. to VDE/VDI 3540, sheet 2 –10 ... +55°C

with operating temperature range

marine application non–certified
enclosure code IP 54 splash -water protected front

terminal protection against accidental contact full–sized rear cover or protective sleeves SW6 / SW10

terminals connector blades 6.3 x 0.8

pointer bar / knife -edge pointer (in combination with fine scale division or flat dial)

dial

blank dial pencil - marked on initial and end values
scale division 0 ... 100%, linear, full–scale values acc. to standardized series (1 – 1.2 – 1.5 – 2 – 2.5 – 3 – 4 – 5 – 6 – 7.5 and their decimal multiples e.g. 150 m³/h) or deviating from standard; special calibration from customer's non–linear graph or chart; scaling of voltmeters in ohms; captions on request

platform dial

2 scale divisions including figuring (for flat dial only)
dial black enamelled, scale division acc. to DIN, black on yellow or white ring, pointer and figuring yellow or white, non–glaring glass included
additional lettering on request e.g. "generator"

additional figuring

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

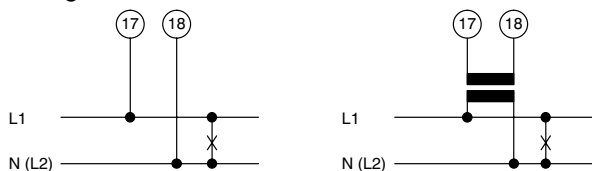
expanded scale expanded initial scale division by means of electronic circuits up to approx. 5% of full–scale value in centre of scale

dial illumination dial resp. sectors translucent
 for LSG 96/144 2 lamps 6 V, 12 V or 24 V
 for LSG 72 1 pluggable LED 24 V DC / 0.4 W
 for LSG 96/144 2 pluggable LEDs 24 V DC / 0.4 W
 on request internal LED 24 V DC

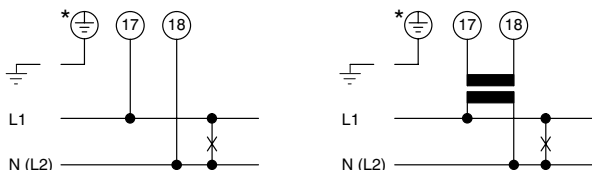
special dial illumination with light-carrier dial and dial-mask,
 dial black enamelled, scale division, figuring and pointer yellow or white,
 illumination white or red, power supply 6 V, 12 V or 24 V

Connections

AC voltage

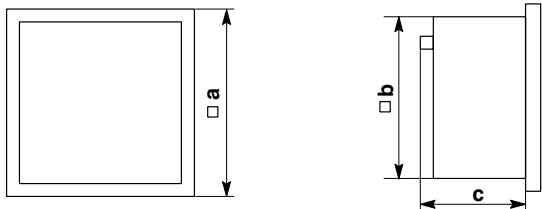


AC current



* LSG 72/96 ammeters ≥ 1 A

Dimensions



dimensions (in mm)	LSG 48	LSG 72	LSG 96	LSG 144
a	48	72	96	144
b	45	66	90	137
c	≤ 66	≤ 60	≤ 69	≤ 70

≤ 94 including built-in miniature CT

Ordering Information

type LSG	240° moving-coil rectifier meter
front dimensions 48 72 96 144	48 mm x 48 mm 72 mm x 72 mm 96 mm x 96 mm 144 mm x 144 mm
measuring ranges	refer to preceding table
special measuring range	on request ²⁾

measuring range adjustment	none ¹⁾ voltage $\pm 10\%$ voltage $\pm 20 \dots 50\%$
2 nd measuring range	none ¹⁾ 1 scale division, 2 nd figuring 2 scale divisions, 2 figurings
accuracy class	1.5 ¹⁾ 1.0 with fine scale division
adjustments	internal resistance $\pm 20\%$ ¹⁾ internal resistance $\pm 1\%$ at 23°C
sensitivity (voltmeters)	900 Ω/V ¹⁾ increased to 2 k Ω/V increased to 5 k Ω/V increased to 10 k Ω/V
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⁾ on request 15 ... 165° ²⁾
mechanical 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 protection	none ¹⁾ full-sized rear cover protective sleeves SW6 / SW10
terminals	screws and wire clamps ¹⁾ connector blades 6.3 x 0.8
pointer	bold bar pointer ¹⁾ bar / knife-edge pointer
dial	flat dial with scale div. & meas. range alike ¹⁾ platform dial blank dial scale division and figuring 0 ... 100% linear acc. to standardized series ²⁾ linear deviating from standard ²⁾ calibration fr. non-linear graph or chart ²⁾ scaling in ohms for voltmeters ²⁾ 2 scale divisions with flat dial ²⁾ black dial, yellow ring black dial, white ring 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⁾
expanded scale	none ¹⁾ electr. up to approx. 5% full-scale value ³⁾
dial illumination	none ¹⁾ refer to "Options"

1) Standard 3) LSG 72/96/144 only
 2) Please clearly add the desired specifications.

ordering example

LSG 72, measuring range 0 ... 250 V, dial 0 ... 250 V,
 window non-glaring glass, WEIGEL logo

– specifications subject to change without notice; date of issue 02/13 –

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