Data Sheet

M Series
011.D.101.09

Analog Meters with Moving-Coil Movement, 240° Dial

LSP 48
LSP 72
LSP 96
LSP 144

CE

WEIGEL

Application

The 240 degrees moving-coil panel meters **LSP 48/72/96/144** (M series) are used for the measurement of DC currents and voltages.

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.

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 (LSP 72/96/144) thermoplastics, flame retardant (LSP 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

dimensions (in mm)	**LSP 48**	**LSP 72**	**LSP 96**	**LSP 144**
bezel	□ 48	□ 72	□ 96	□ 144
case	□ 45	□ 66	□ 90	□ 137
depth	≤ 66	≤ 60	≤ 69	≤ 70
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	DC voltage or current
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

◗ also refer to "Options"

[1]) the resistance values are limited to a tolerance of ±20% ◗
[2]) not for LSP 48

Measuring Ranges

For mains use

DC current ◗ internal resistance[1])		**DC current** voltage drop approx. 60 mV	**DC voltage** ◗	sensitivity[1])
100 µA	6500 Ω	6 mA	6 V	1 kΩ/V
150 µA	4900 Ω	10 mA	10 V	1 kΩ/V
250 µA	2500 Ω	15 mA	15 V	1 kΩ/V
400 µA	2500 Ω	20 mA	25 V	1 kΩ/V
600 µA	1700 Ω	25 mA	40 V	1 kΩ/V
1 mA	270 Ω	40 mA	60 V	1 kΩ/V
1.5 mA	225 Ω	60 mA	100 V	1 kΩ/V
2.5 mA	135 Ω	100 mA	150 V	1 kΩ/V
4 mA	85 Ω	150 mA	250 V	1 kΩ/V
5 mA	12 Ω	250 mA	400 V	1 kΩ/V
		400 mA	500 V	1 kΩ/V
		600 mA	600 V	1 kΩ/V
		1 A		
		1.5 A		
		2.5 A		
		4 A [2])		
		6 A [2])		
		10 A [2])		
		15 A [2])		
		25 A [2])		
		40 A [2])		
		60 A [2])		

for use with external shunt

60 mV, 150 mV sensitivity[1]) 200 Ω/V
a total lead resistance of 0.035 Ω is considered in the calibration of the indicator for connecting leads 1 m, 2 x 0.75 mm^2 ◗

Not for mains use

DC voltage	sensitivity[1])◗
60 mV; 100 mV; 150 mV; 250 mV	200 Ω/V
400 mV; 600 mV; 1 V; 1.5 V; 2.5 V; 4 V	1 kΩ/V

for use on transducer ("live zero")

4 ... 20 mA	mechanically suppressed zero, without zero adjustment, voltage drop approx. 60 mV
0/4 ... 20 mA	electrically suppressed zero, with zero adjustment, voltage drop approx. 900 mV

Operating Voltages

measuring ranges	operating voltage			
DC current	LSP 48	LSP 72	LSP 96	LSP 144
100; 150; 250; 400; 600 µA 1; 1.5; 2.5; 4; 5; 6; 10; 15; 20; 25; 40; 60; 100; 150; 250; 400; 600 mA	150 V	150 V	150 V	150 V
1; 1.5; 2.5 A	300 V	300 V	300 V	300 V
4; 6; 10; 15; 25; 40; 60 A [2])	–	300 V	300 V	300 V
for use on transducer 0/4 ... 20 mA	150 V	150 V	150 V	150 V
DC voltage	LSP 48	LSP 72	LSP 96	LSP 144
60; 100; 150; 250; 400; 600 mV	150 V	300 V	300 V	150 V
1; 1.5; 2.5; 4; 6; 10; 15; 25; 40; 60; 100; 150 V	150 V	150 V	150 V	150 V
250 V	300 V	300 V	300 V	300 V
400; 500; 600 V	600 V	600 V	600 V	600 V
for use with external shunt 60; 150 mV	300 V	300 V	300 V	300 V

Data Sheet

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Analog Meters with Moving-Coil Movement, 240° Dial

Scaling

dial	flat dial ◗			
pointer	bold bar pointer ◗			
pointer deflection	0 ... 240°			
scale characteristics	linear			
scale division	coarse–fine			
scale length	LSP 48 69 mm	LSP 72 106 mm	LSP 96 147 mm	LSP 144 224 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
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 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	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

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 and ammeters up to 6 A, 2nd figuring and 1 or 2 scale divisions

additional measuring ranges on request

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

increased sensitivity to 2 kΩ/V, 5 kΩ/V or 10 kΩ/V for voltmeters ≥ 1 V

lead resistance	calibration of a total value >0.035Ω
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 with operating temperature range	limited use in the tropics climatic class 3 acc. to VDE/VDI 3540, sheet 2 –10 ... +55°C
marine application	non–certified or type approval by "Germanischer Lloyd" (only for LSP 72/96/144), type approval by "Wheelmark/Steuerrad" (only for LSP 72/96/144)
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 and figuring	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 m^3/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	with figuring (for flat dial only)

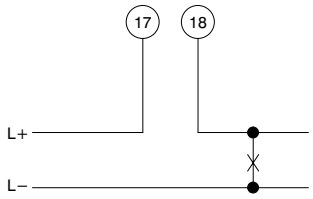
dial black enamelled, scale division acc. to DIN, black on yellow or white ring, pointer and figuring yellow or white, non–glaring glass included

additional lettering	on request e.g. "generator"
additional figuring	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
zero position	centre zero or off–set zero, electrically suppressed zero f. voltmeters ≥ 6 V
expanded scale for LSP 72/96/144	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 LSP 72/96/144	2 lamps 6 V, 12 V or 24 V
for LSP 72	1 pluggable LED 24 V DC / 0.4 W
for LSP 96/144	2 pluggable LEDs 24 V DC / 0.4 W
on request	internal LED 24 V DC

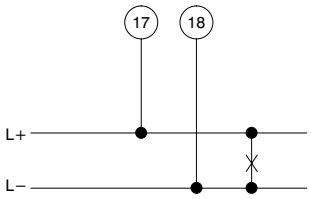
special dial illumination with light–carrier dial and dial–mask, dial black enamelled, scale division, figuring and pointer yellow or white, illumination white or red, power supply 6 V, 12 V or 24 V

Connections

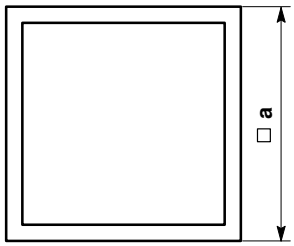
DC current

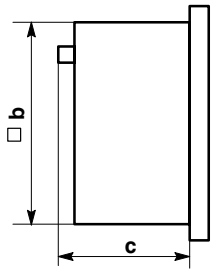


DC voltage



Dimensions





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

Ordering Information

type **LSP**	 240° moving–coil panel 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
"live zero"	4 ... 20 mA mechan. suppressed zero [1] 0/4 ... 20 mA electrically suppressed zero
sp. measuring range	on request [2]
measuring range adjustment	none [1] voltage ±10% voltage ±20 ... 50% current on request
2nd measuring range	none [1] 1 scale division, 2nd figuring 2 scale divisions, 2 figurings
accuracy class	1.5 [1] 1.0 with fine scale division
adjustments	internal resistance ±20% [1] internal resistance ±1% at 23°C lead resistance >0.035Ω
sensitivity, voltmeters	1 kΩ/V [1] increased to 2 kΩ/V increased to 5 kΩ/V increased to 10 kΩ/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]
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 type approval by "Germanischer Lloyd" [3] type approval by "Wheelmark/Steuerrad" [3]
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] flat dial 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]
zero position	left hand zero position [1] centre or off-set zero position [2] mechan. suppressed z.p.[2] (≥100µA/60mV) electrically suppressed z.p.[2] (≥6V)
expanded scale	none [1] electr. up to approx. 5% full–scale value [3]
dial illumination	none [1] refer to "Options"
sp. dial illumination	with light–carrier dial 6 V, 12 V or 24 V

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

ordering example

LSP 72, measuring range 0 ... 20 mA, dial 0 ... 100 A,
window non–glaring glass, WEIGEL logo

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– specifications subject to change without notice; date of issue 09/14 –