



Technical Data Sheet

Sigma Series LFL Meter



The moving coil indicators LFL 96/144 and a phase angle adjuster are used to monitor changing power factor conditions on irreversible balanced load systems.

Special Features

- Better resolution.
- Knife edge pointer.
- Glass filled polycarbonate (UL 94-V-0)
- Easily replaceable glass and bezel.

Application

The moving coil indicators LFL 96/144 and a phase angle adjuster are used to monitor changing power factor conditions on irreversible balanced load systems.

The power factor is indirectly determined by measuring the phase angle ϕ between current and voltage (both sinusoidal). However the indicators are calibrated in values of $\cos \phi$ of the angle ϕ . These meters offer several advantages in Switchboard and Generating Set panels. Number of meters can be mounted in a Panel Cut out (Mosaic Mounting). The Bezel, Front window glass and Dial can be easily replaced

Applicable Standards

Nominal case and cutout dimensions for indicating Electrical instruments	DIN IEC 61554
Scale and pointer for electrical measuring instruments	DIN 43802
Connections and Terminal markings for panel meters	DIN 43807
Terminal bolts/leads	DIN 46200/46282
Safety requirements and protective measures for Electrical indicating instruments and their accessories	DIN 40050, VDE 0110, VDE 0410 IEC 529, IEC 1010
Performance specifications for direct acting indicating analogue electrical measuring instruments and their accessories	IEC51/DINEN60051 DIN 43701
Environmental conditions	VDE / VDI 3540
Technical conditions of delivery for electrical instruments.	DIN 43701
Front frames for indicating measuring instruments Principle dimensions	DIN 43718
UL Combustibility Class	UL 94 V-0
Mechanical strength (Free fall test, vibration test)	VDE 0411, IEC 1010

Comply with following European directives :
2004 / 108 / EC (EMC directive), 2006/95 /EC (low voltage directive) & amendment 93/68/EEC, For CE Marking.

Scale and Pointer

Pointer	Knife - edge pointer	
Pointer deflection	0...240°	
Scale characteristics	Non-Linear	
Scale division	Coarse - fine	
Scale length	LFL96	LFL 144
	142mm	230mm
Scale Interchangeability	Scales are Interchangeable	

Mechanical Data

Case details	Moulded square case suitable for mounting in Control / switchgear panels Machinery consoles.
Case material	Polycarbonate , flame retardant and drip proof as per UL 94 V-0.
Front facia	Glass
Colour of bezel	Black
Position of use	Vertical
Panel fixing	Mounting Clamp
Mounting	Stackable in a single cutout
Panel thickness	≤ 25 mm
Terminals	Hexagon studs, M4 screws and wire clamps E3 (DIN46282)

Electrical Data

Measured Quantity	Power Factor
Overload capacity acc to IEC 51	1.2 times rated current Continuously 2 times for 5 sec : 1 overload 2 times for 0.5 sec : 9 overloads Short duration

Power consumption(Approx)

Current path	< 1.0 VA
Voltage path types	< 3.5 VA
Enclosures code	IP 52 case
(IEC 529)	IP 00 for terminals
Insulation class	Group A according to VDE
Rated insulation voltage	660 V
Proof voltage testing	2 kV
Installation category (IEC)	300 VCAT III
Insulation resistance	> 50 Mohm at 500V DC

Accuracy at Reference Conditions

Accuracy class	1.5 according to IEC 51/DIN EN 60051
Ambient temperature	23° C ± 2° C
Position of use	Nominal position ±1°
Waveform	Sinewave
Distortion Factor	< 1 %
Current	95...100 % rated current
Warmup	≥ 5 minutes at min 80% of rated current and 100 % of rated voltage.
Voltage	Rated voltage + 2%
Frequency	50 Hz +/- 0.1%
Other Conditions	IEC 51/ DIN EN 60051

Nominal Range of use

Ambient Temperature	0...50 °C
Position of use	Nominal position Vertical ± 5°
External Magnetic Field	At 0.4 kA/m
Voltage	Rated voltage + 15%
Current	20 to 120 % of rated current
Frequency	49-51 Hz for single phase, 45-65 Hz for 3 phase

Environmental Conditions

Climatic Suitability	Climate category II as per IS : 1248 (climatic class 3 according to VDE/VDI 3540)
Operating Temperature	- 10... + 55° C
Storage temperature	- 25...+65° C
Relative humidity	≤ 75% annual average, non condensing
Shock resistance	15 g. for pulse duration 11ms
Vibration resistance	10-55-10Hz for ampli. 0.15mm (1.5g at50Hz)

Options

Case

Front Facia	Antiglare glass
Color of bezel	Red, yellow, blue, white
Red index pointer	Front adjustable on site
position of use	on request 0°...180°

Dial

Blank dial	With initial and end values marked
Special markings	Numbering/Lettering
Division dials	Basic divisions without numbering
Color markings/bands	Red or green

Standard Measuring Ranges

E	Single Phase System
D	3 Phase System Balanced Load

Measuring Ranges

COS φ	cap 0.5...1...0.5 ind
COS φ	cap 0.8...1...0.3 ind
COS φ	cap 0.8...1...0.8 ind

Rated Voltage

Following single phase and three phase voltages are available as standard. The voltages will be considered as a phase voltage (between phase & Neutral) in case of single phase meters and as a line voltage (between two phases) in case of 3 phase 3 wire or 4 wire meters.

Please specify the application (single ph. & 3 ph. 3 wire or 4 wire)

Single Phase	Three Phase
57.5	100
63.5	110
100	220
110	380
127	415
220	440
230	500
240	
289	

Rated Current

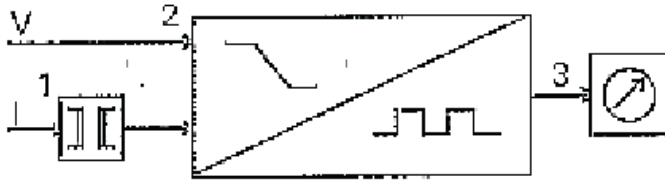
1A

5A

Functional Principle

The measuring system comprises a moving coil indicator & phase angle converter attached to the case of indicating instrument. moving coil movements has pivots of very high hardness movement is suspended. between spring loaded sapphire jewels. movement is properly shielded & critically damped by eddy currents induced in coil former.

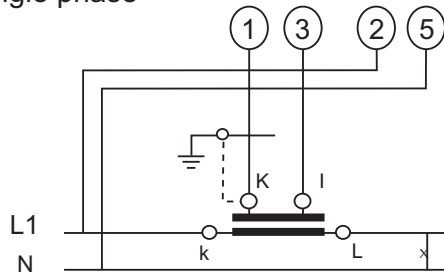
Schematic Diagram.



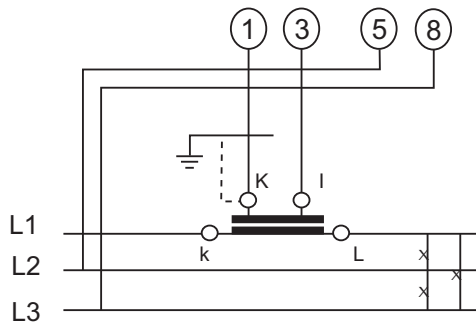
A current transformer 1 of the phase angle converter provides input current to the electronic circuit. Both the input voltage and the current are passed to a bistable flip-flop stage 2. The pulse duty cycle of flip-flop is proportional to the phase angle. A low pass filter allows the mean value which is proportional to the phase angle and is fed to the moving coil movement 3.

Electrical Connections

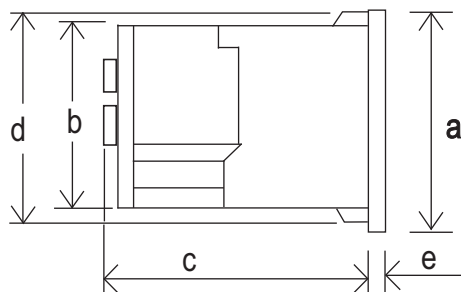
LFL 96 Single phase



LFL 96 Three phase balanced load



Dimensions



Dimensions	(in mm)	LFL96	LFL144
Bezel	a	96	144
Case	b	90	136
Depth	c	106	106
	d	91.5 ^{+0.8}	137.5
	e	5.5	5.5
Cutout Size		92	138 ^{+0.1}
Weight (approx.)		0.68 kg.	0.8 kg.

Safety Precautions

- 1) Instruments with damaged bezel or glasses must be disconnected from the mains.
- 2) Adequate safety clearance must be maintained to control panel fasteners and to sheet metal housing. If non - insulated connector wires are used.
- 3) The back cover must be snapped into place after connector wires have been clamped for protection against accidental contact.
- 4) Bezel, Scale and Glass may only be replaced under voltage free conditions.

For more details and product codes, please contact our local office



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