



Data Sheet

Power Factor Meters 240° CL



Measure



Control



Record



Analyze

Application

The moving coil indicators and a phase angle adjuster are used to monitor changing power factor conditions on ir-reversible 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 cosine of the angle ϕ .

These meters offer several advantages in Switchboard & Generating Set panels. Number of meters can be mounted in Panel Cut out (Mosaic Mounting). The Bezel, glass and dial can be easily replaced.

Features

- Knife edge pointer.
- Glass filled polycarbonate housing.
- Easily replicable glass and bezel.

Applicable Standards

Nominal case and cutout dimensions for indicating electrical instruments.	IS 2419 DIN IEC 61554
Scale and pointer for electrical measuring instruments.	IS 1248 DIN 43802
Connections & terminal markings for panel meters	IS 1248 DIN 43807
Terminal bolts / leads	DIN 46200/46282
Clamp straps for connections.	DIN 46282
Safety requirements and protective measures for Electrical indicating instruments and their accessories.	IS 9249 DIN 40050 VDE 0110 VDE 0410 IEC 529, IEC 1010
Performance specifications for direct acting indicating analogue electrical measuring instruments and their accessories.	IS 1248 IEC 51/DIN EN 60051 DIN 43701
Front frames for indicating measuring instruments principle dimensions.	DIN 43718
Technical conditions of delivery for electrical instruments.	DIN 43701
UL Combustibility class.	UL 94 V-0
Mechanical strength (Free fall test, vibration test)	IS 1248, IEC 51 IS 9000 VDE 041 IEC 61010

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° ... 90°
Scale characteristics	Non - Linear
Scale division	Coarse-fine
Scale length	Lf72 Lf96 61mm 97mm
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 Clamps
Mounting	Stackable in a single cutout
Panel thickness	≤ 25 mm
Terminals	Hexagon studs, M4 screws and wire clamps E3

Electrical Data

Measured quantity	Power Factor
Overload capacity (acc to IS : 1248/ IEC 51/ DIN EN 60051)	
Continuously	1.2 times rated current
Short duration	
Current circuit	10 times rated current for for 0.5 sec, 9 overloads 10 times rated current for 5 Sec, 1 overload
Voltage circuit	2 times rated current for for 0.5 sec, 9 overloads 2 times rated current for 5 Sec, 1 overload

Power consumption(Approx):-

Current path	≤ 1.0 VA
Voltage path	≤ 3.0 VA
Enclosures code (IEC 529)	IP 52 case IP 00 for terminals without backcover
Insulation class	Group A according to VDE 0110
Rated insulation voltage	660 V
Proof voltage testing	2 KV
Installation category (IEC 1010)	300 VCAT III
Insulation resistance	> 50 Mohm at 500 V d.c.

Accuracy at Reference Conditions

Accuracy class	1.5 according to IS:1248 (IEC 51/ DIN EN 60051)
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Reference conditions

Ambient temperature	23 °C ± 2 °C
Position of use	Nominal position ± 1°
Waveform	Sinewave
Distortion Factor	≤ 1 %
Current	95...100 % rated current
Warmup	³ 5 minutes at min 80% of rated current and 100 % of rated voltage.
Voltage	Rated voltage ± 2%
Frequency	50 Hz +/- 0.1%
Other Conditions	as per IS: 1248 (IEC 51/ DIN EN 60051)

Nominal range of use

Ambient temperature	0 ... 50 °C
Position of use	Nominal position + 5°
External magnetic field	At 0.4KA/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	15g _n for pulse duration 11 ms
Vibration resistance	10-55-10Hz for ampli. 0.15mm (1.5 g at 50Hz)
Pollution degree	2

Options

Case

Front facia	Antiglare glass
Colour 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.
Colour markings/bands	Red or green.

Standard Measuring Ranges

Types

- E - Single Phase System
- D - Three 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)

57.5
63.5
100
110
120
127
220
230
240
289
380
415
415
440
500
500
1A
5A

Rated Current

Non-Standard ranges available on request.

Accessories

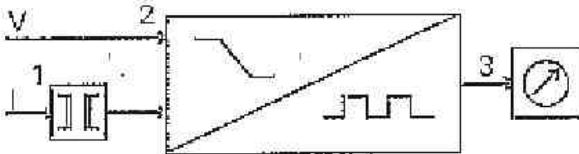
Safety terminal protection

Full sized polycarbonate back cover to provide protection against accidental contact (hand and fingers).
(acc. to IS 9249 VDE 0410)

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.

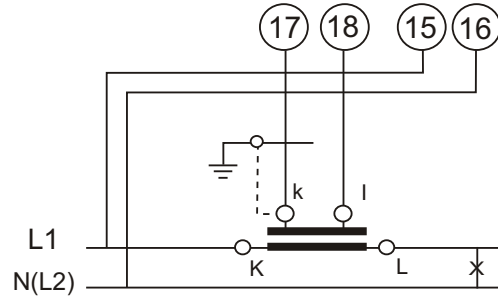
Schematic Diagram.



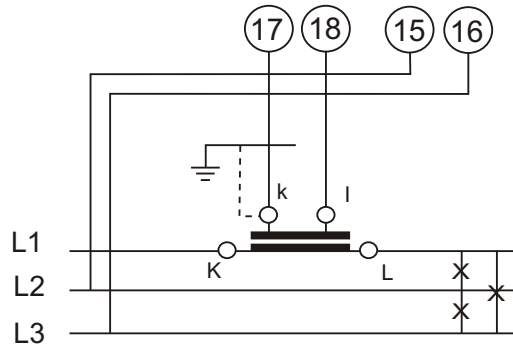
A current transformer 1 of the phase angle converter provides input current to the electronic circuit. Both the input voltage and the current are passed to a bistable flip-flop stage 2. The pulse duty cycle of flip-flop is proportional to the phase angle. A low pass filter allows the mean value which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

Connections

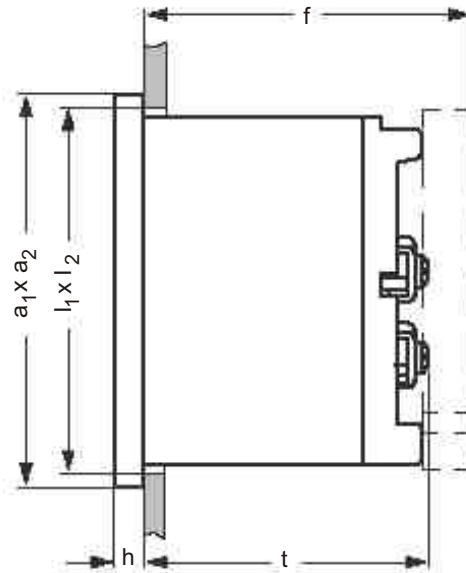
LF 72/96 Single phase



LF 72/96 three phase three wire balanced load



Dimensions



Front in mm	Nominal Dimensions, mm		Cutout, mm $l_1 \times l_2$	Installation Depth Including Terminal (t), mm	Installation Depth Incl. Full back Cover (f), mm
	$a_1 \times a_2$	h			
72 x 72	72 x 72	5.5	$68^{0.8} \times 68^{0.8}$	82.5	–
96 x 96	96 x 96	5.5	$92^{0.8} \times 92^{0.8}$	54	62.5

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.
- 5) Instruments to be used in grounded panel.

Ordering Information

Type LF	Power Factor meter
Front Dimension 72 96	72mm x 72mm 96mm x 96mm
Measuring Ranges	Refer to table inside
Terminal Protection	Full sized polycarbonate back cover
Rated voltages	Refer to table inside
Rated currents	1A, 5A
Front facia	Normal glass ¹ Antiglare glass ³ Polycarbonate glass ³
Colour of Bezel	Black ¹ Red, Blue, Yellow, White ³
Position of use	Vertical ¹ on request 0....180° ³
Dial	Standard scale same as measuring range ¹ Blank dial with division ³ Additional lettering on request ³ Additional numbering on request ³ Coloured marking red or green ³ Coloured sector red or green ³
Logo	RISHABH ¹

¹Standard

³Please clearly add the desired specifications while ordering

Ordering example

LF 96 for 3 phase 4 wire system balanced load, measuring range ($\cos \phi$) cap 0.5...1...0.5 ind, rated voltage AC 230V, rated current 1A.

Specifications are subject to change without notice (07/09)



RISHABH

All specifications are subject to change without notice



Measure



Control



Record



Analyze

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