

# Data Sheet

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Analogue  
Power Factor Meters  
240° Scale



In Technical Collaboration with

# Ziegler



## Application

The moving coil indicators CL 96 and a phase angle adjuster are used to monitor changing power factor conditions on ir-reversible balanced load systems

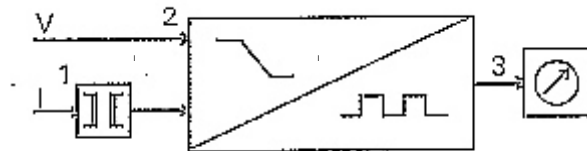
The power factor is indirectly determined by measuring the phase angle between current and voltage (both sinusoidal). However the indicators are calibrated in values of  $\cos \phi$  of the angle  $\phi$

These meters offer several advantages in Switchboard and Generating Set panels. Number of meters can be mounted in a single Cut out (Mosaic Mounting). The Bezel, Front window glass and Dial can be easily replaced

## 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 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.

## Mechanical Data

Case details	Moulded square case suitable for mounting in Control / Switchgear panels, Machinery consoles.
Case material	Glass filled polycarbonate, flame retardant and drip proof as per UL 94 V-0.
Front fascia	Glass
Colour of bezel	Black
Position of use	Vertical
Panel fixing	Swivel screws.
Mounting	Stackable in a single cutout
Panel thickness	≤ 40 mm
Terminals	Hexagon studs, M4 screws and wire clamps E3 (DIN 46282)

## Electrical Data

Measured quantity	Power Factor
Overload capacity (acc to IS : 1248/ IEC 51)	
Continuously	1.2 times rated voltage / current
Short duration	2 times rated voltage , 5 Sec max 10 times rated current ,5 Sec max
Power consumption (Approx):-	
Current path	≤ 1.0 VA
Voltage path	≤ 3.5 VA
Enclosures code	IP 52 case
(IEC 529)	IP 00 for terminals
insulation class	Group A according to VDE 0110
Rated insulation voltage	660 V
Proof voltage testing	2 kV
Installation category	300 VCAT III
(IEC 1010)	
insulation resistance	> 50 Mohm at 500 V d.c.

## Standard Measuring Ranges

Type	
E	Single phase system
D	3 phase system balanced load

### Measuring ranges

$\cos \phi$	cap 0.5....1....0.5 ind
$\cos \phi$	cap 0.8....1....0.3 ind
$\cos \phi$	cap 0.8....1....0.8 ind

### Rated Voltages:

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 multiface 2 wire, 3 wire and 4 wire meters.

Please clearly specify the application ( 3 ph. 2 wire, 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
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## Scale and Pointer

Pointer	Kinfe-edge pointer
Pointer deflection	0 ... 240°
Scale characteristics	Non-Linear
Scale division	Coarse-fine
Scale length	142 mm
Interchangeability	Scales are interchangeable.

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## Accuracy at Reference Conditions

Accuracy class	1.5 according to IS:1248 (IEC 51/ DIN EN 60051)
Reference conditions	
Ambient temperature	23° C ± 2° C
Position of use	Nominal position ± 1°
Waveform	Sinewave
Distortion Factor	<= 1 %
current warmup	95...100 % rated current >= 5 minutes at min 80 % of rated current and 100 % of rated voltage.
Voltage	Rated voltage ± 2%
Frequency	50 Hz + - 0.1%
Others	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	0.5 mT
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, 11ms
Vibration resistance	10-150-10 Hz/0.15 mm 1.5 g at about 50 Hz.

## Applicable Standards

Nominal case and cutout dimensions for indicating electrical instruments.	: IS 2419 DIN 43700
Scale and pointer for electrical measuring instruments.	: IS 1248 - 1983 DIN 43802
Connections and Terminal markings for panel meters.	: IS 1248-1983 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 9249-1979 DIN 40050 / 8-70 VDE 0110 /11-72 VDE 0410 /10-76 IEC 529,IEC 1010
Performance specifications for direct acting indicating analogue electrical measuring instruments and their accessories	: IS 1248-1983 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-O
Mechanical strength (Free fall test, vibration test)	: IS 1248-1983,IEC 51 IS 9000-1979 VDE 0411, part I, Sec.43/44.IEC 1010
Environmental Conditions	: IS 1248-1983 IS:9000,Part 5,7,8,VDE /VDI 3540

# Data Sheet

## Analogue Power Factor Meters 240°Scale

Electro Magnetic Compatibility(EMC)Compliance as per following standards:- EN 50081-2,EN 50082-2,EN 55011/CISPR 11, EN 60555-2,IEC 555-2, EN 61000-4-4 / IEC 1000-4-4, EN 61000-4-2 / IEC 1000-4-2, EN 61000-4-5 / IEC 1000-4-5, ENV 50140.

Comply with following European directives: 89/336/EEC( EMC directive),73/23/EEC(low voltage directive)&amendment 93/68/EEC, for CE marking.

## Options

### Case

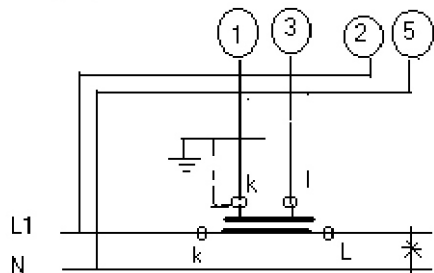
Front facia	Antiglare glass
Colour of bezel	Red, Yellow, Blue, White
Red index pointer	Front adjustable on site
Position of use	on request 0° ....180°

### Dial

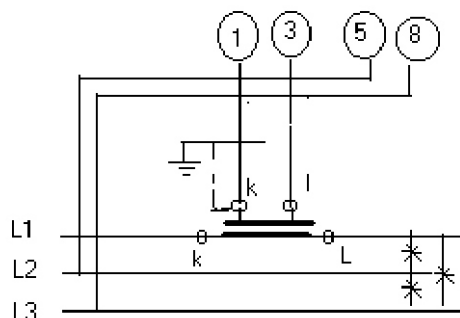
Blank dial	With initial and end values marked.
Special markings	Numbering /Lettering.
Division dials	Basic divisions without numbering.
Colour markings/bands	Red or green.

## Connections

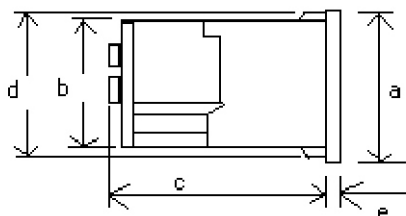
CL 96 single phase



CL 96 Three phase balanced load



## Dimensions



Dimensions(in mm) CL 96	
Bezel a	□ 96
Case b	□ 90
Depth c	106
d	□ 91.5 +0.8
e	□ 5.5
Cutout size	□ 92
Weight(appox)	0.68 kg

## Ordering Information

Type CL	Power Factor meter 240 degree scale
Front dimension 96	96 mm x 96 mm
Type E D	Single phase systems 3 phase 3 wire system balance load
Measuring Ranges(cos φ)	cap 0.5...1...0.5 ind cap 0.8...1...0.3 ind cap 0.8...1...0.8 ind
Terminal protection	full sized polycarbonate backcover
Rated voltages	Refer to table inside
Rated currents	1 A , 5 A
Front facia	Normal glass ↗ Antiglare glass ↗
Colour of bezel	Black ↗ Red,Blue,Yellow,White ↗
Position of use	Vertical ↗ On request 0 .... 180 ↗
Dial	Standard scale same as measuring range ↗ Blank dial with division ↗ Additional lettering on request ↗ Additional numbering on request ↗ Coloured marking red or green ↗ Coloured sector red or green ↗
Logo	RISHABH ↗, for Indian sales C.G. ↗, export through Crompton Greaves I.D. Others ↗

↗ standard

↗ Please clearly add the desired specifications while ordering

### Ordering example

CL 96 D for 3 phase system balanced load, measuring range (cos φ) cap 0.5...1...0.5 ind, rated voltage AC 230 V, rated current 1A.

## Safety Precautions

- \* Instruments with damaged bezels or window glasses must be disconnected from mains.
- \* Adequate safety clearance must be maintained to control panel fasteners and to sheet metal housing, if non - insulated connector wires are used.
- \* Scales should be replaced under Voltage - free conditions.
- \* Bezels and window glasses should be replaced under Voltage - free conditions

Specifications are subject to change without notice(10/98)

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