Power Factor Meters 240° scale - CL

CL 96
CL 144

Data Sheet

Analogue Power Factor Meters
240° Scale

Applications

The moving coil indicators CL 96/144 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 sinosoidal). However the indicators are calibrated in values of cos φ of the angle φ

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

Features

- Better resolution.
- Knife edge pointer.
- Glass filled polycarbonate (UL 94-V-0)
- Easily replicable glass and bezel.
- Easy installation with swivel screws.

Specifications

Scale and Pointer

Pointer	:	Knife -edge pointer
Pointer deflection	:	0 ... 240^0
Scale characteristics	:	Non-Linear
Scale division	:	Coarse - fine
Scale length	:	CL 96 CL 144 142 mm 230 mm
Scale Interchangeability	:	Scales are interchangeable.

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 facia	:	Glass
Colour of bezel	:	Black
Position of use	:	Vertical
Panel fixing	:	Swivel screws.
Mounting	:	Stackable in a single cutout
Panel thickness	:	£ 25 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 types : ≤ 3.5 VA

Enclosures code (IEC 529) : IP 52 case
IP 00 for terminals

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)
Reference conditions	
Ambient temperature	23^{0}C ± 2^{0}C
Position of use	Nominal position ± 1^0
Waveform	Sinewave
Current	95...100% rated current
Warmup	>=5 minutes at min 80% of rated current and 100% of rated voltage. IS : 1248 (IEC 51 / DIN EN 60051)
Voltage	Rated voltage ± 2%
Frequency	50 Hz + /- 0.1%
Others	IS: 1248 (IEC 51/ DIN EN 60051)
Distortion factor	≤ 1%
Nominal range of use	
Ambient temperature	0 ... 50^{0}C
Position of use	Nominal position + 5^0
External magnetic field	0.5 mT
Voltage	Rated voltage ± 15%
Current	20 to 120% of rated current
Frequency	49-51 Hz *Note for frequency 60Hz contact factory

Environmental Conditions

Climatic suitability	Climate category II as per IS : 1248 (climatic class 3 according to VDE/VDI 3540)
Operating temperature	-10 ... + 55^{0}C
Storage temperature	-25 .... + 65^{0}C
Relative humidity	≤ 75% annual average, non-condensing
Shock resistance	15g. 11ms
Vibration resistance	10-55-10 Hz / 0.15 mm 1.5 g at about 50 Hz.

Standard Measuring Ranges

Type

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 voltages

Following single phase and three phase voltages are available as standard. The voltage 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 multi phase 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 currents :- 1A
5A

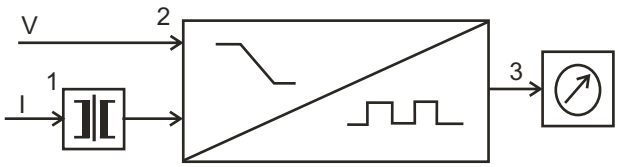
Options

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

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 saphire 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 filp-flop stage 2.

The pulse duty cycle of flip-flop is proportional to the phase angle φ. A low pass filter allows the mean value which is proportional to the phase angle and is fed to the moving coil movement 3.

Applicable Standards

Nominal case and cutout dimensions for indicating measuring instruments.	:	IS 2419 DIN 43700
Scale and pointer for electrical measuring instruments.	:	IS 1248 DIN 43802
Connections and 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 acessories.	:	IS 9249 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 & their accessories	:	IS 1248 IEC 51/DIN EN 60051 DIN 43701
Environmental conditions	:	IS 1248 - 1983 IS: 9000, Part 5, 7, 8, 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)	:	IS 1248, IEC 51 IS 9000- VDE 0411, part I, Sec.43/44.IEC 1010
Environmental conditions	:	IS : 1248 IS : 9000, Part 5,7,8 VDE / VDI 3540

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.

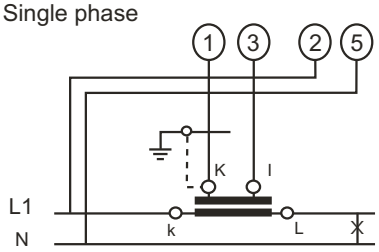
Comply with following European directives : 89 / 336/ EEC (EMC directive), 73 / 23 / EEC (low voltage directive) & amendment 93 / 68 / EEC, for CE marking.

Safety Precautions

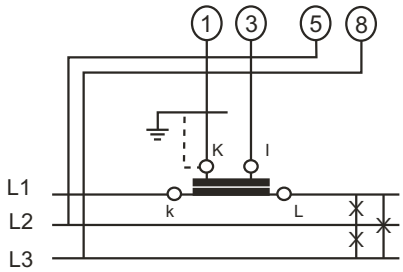
- Instruments with damaged bezels or window glasses must be disconnected from mains.
- Adequate safety clearance must be maintained to control panel fasteners and to sheet metal housing, if non - insulated connector wires are used.
- Scales should be replaced under Voltage - free conditions.
- Bezels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

Connections

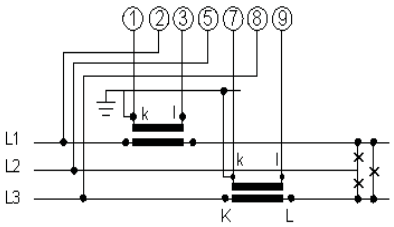
CL 96/144 Single phase



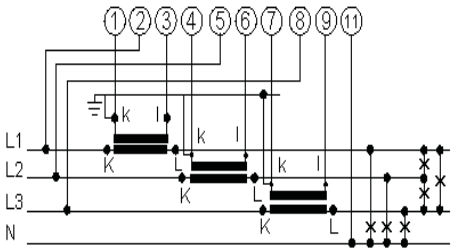
CL 96/144 Three phase balanced load



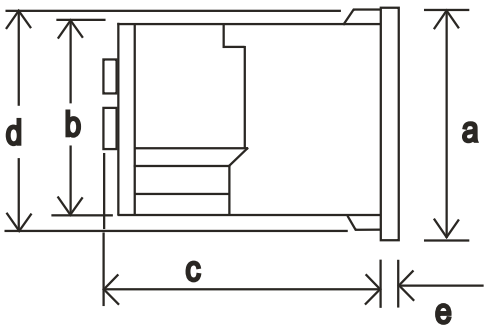
CL 96/144 3ph. 3W Unbal. Load



CL 96/144 3ph. 4W Unbal. Load



Dimensions



Dimensions (in mm)		CL 96	CL 144
Bezel	a	96	144
Case	b	90	136
Depth	c	102	136
	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

Ordering Information

Type CL	Power Factor meter 240 degree scale
Front dimension 96 144	 96 mm x 96 mm 144 mm x 144 mm
Type	Single phase systems 3 phase system balance load 3 phase system unbalance load
Measuring ranges (COS Æ)	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 *1 Antiglare glass *3
Colour of bezel	Black*1 Red, Blue, Yellow, White*3
Position of use	Vertical *1 On request 0 .... 180 0 *3
Dial	Standard scale same as measuring range*1 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, for Indian sales C.G.*1, for export through Crompton Greaves I.D. Others*3

*1 standard
*3 Please clearly add the desired specifications while ordering

Ordering example

CL 96 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.

Specifications are subject to change without notice (11/11)

Measure Control Record Analyze Optimize

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