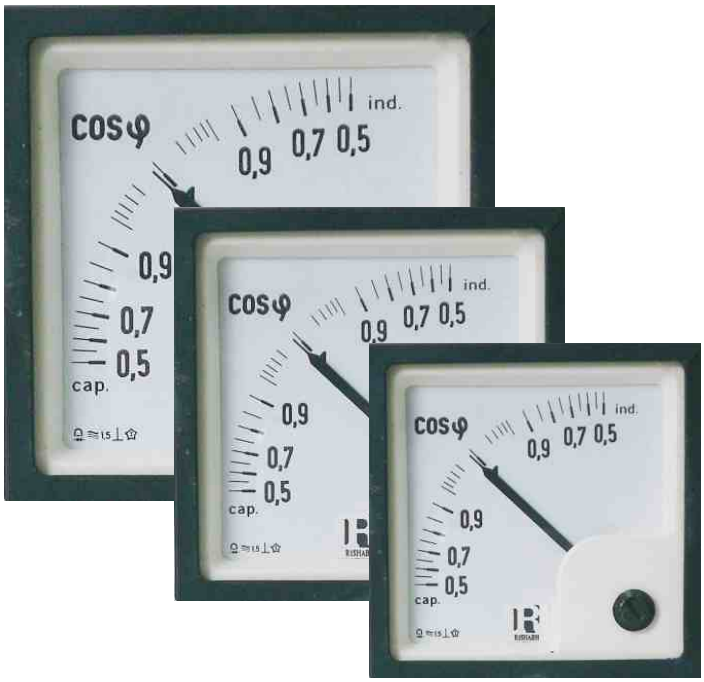
Analogue Power Factor Meters - CQ

CQ	72
CQ	96
CQ	144

Data Sheet

Analogue Power Factor Meters



Application

The moving coil indicators CQ 72/96/144 and a phase angle adjuster are used to monitor changing power factor conditions on ir-reversible balanced load systems & Unbalanced System.

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 φ of the angle φ.

These meters offer several advantages in Switchboard & 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

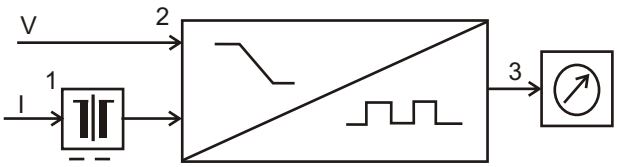
Features

- Knife edge pointer.
- Glass filled polycarbonate housing
- Easily replicable glass and bezel.
- Easy installation with swivel screws.

Functional Principle

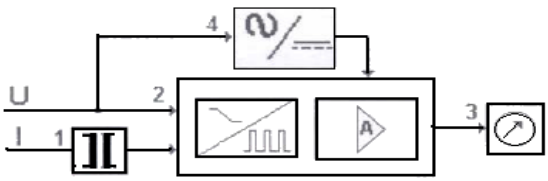
The measuring system comprises a moving coil indicator & phase angle converter attached to the case of indicating instrument. moving coil movements has pivots of very high hardness movement is suspended. between spring loaded saphire jewels. movement is properly shielded & critically damped by eddy currents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

Schematic Diagram. E1C, D1C (1Phase & 3Ph.3W Bal.)



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 .A low pass filter allows the mean value which is proportional to the phase angle and is fed to the moving coil movement 3.

V3C, D2C (3Ph.4W & 3Ph.3W Unbal.)



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The pulse duty cycle of the flip-flop is propotional to the phase angle. A low pass filter allows the mean value which is proportional to the phase angle is fed to the moving coil movement 3, though an amplifier. Subsequent calibration is done in terms of cosphi.
Power supply is obtained from voltage in in block 4

Specifications

Scale and Pointer

Pointer	:	Knife - edge pointer
Pointer deflection	:	0 ... 90°
Scale characteristics	:	Non - Linear
Scale di vision	:	Coarse-fine
Scale length	:	CQ72 61mm, CQ96 97mm, CQ144 146mm
Interchangeability	:	Scales are interchangeble.

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/ DIN EN 60051)	
Continuously	1.2 times rated voltage / current
Short duration	2 times rated voltage , 5 Sec max over load 10 times rated current, 5 Sec max over load

Power consumption(Approx):-

Current path	≤ 1.0 VA
Voltage path	≤ 3.0 VA Bal / 3.5 VA for Unbal
Enclosures code (IEC 529)	IP 52 case IP 00 for terminals without backcover IP 20 for terminals with backcover
insulation class	Group A according to VDE 0110
Rated insulation voltage	660 V
Proof voltage testing	2 kV
Installation catagory (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	20°C ± 2 °C
Position of use	Nominal position ± 1°
Waveform	Sinewave
Distortion Factor	<= 1 %
current	95...100 % rated current for bal. 40...100 % rated current for unbal.
warmup	>= 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	10-55-10 Hz/0.15 mm 1.5 g at about 50 Hz.

Standard Measuring Ranges

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 multi phase 3 wire and 4 wire meters.

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

E1C, D1C	V3C, D2C
57.5	100
63.5	110
100	220
110	380
120	415
127	440
220	500
230	
240	
289	
380	
415	
440	
500	

Rated Current: 1A
5A

Applicable Standards

Nominal case and cutout dimensions for indicating electrical instruments.	:	IS 2419 DIN 43700
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 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 instrumentsand 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 0411, part I, Sec.43/44.IEC 1010

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.

Accessories

Safety terminal protection

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

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.

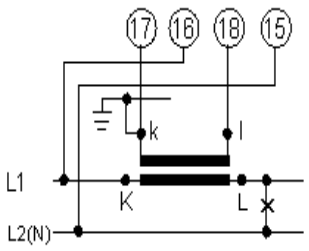
* The back cover must be snapped into place after the connector wires have been clamped for protection against accidental contact.

- Scales should be replaced under Voltage - free conditions.
- Bezels and window glasses should be replaced under Voltage-free conditions

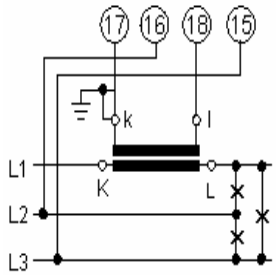
Specifications are subject to change without notice(02/09)

Connections

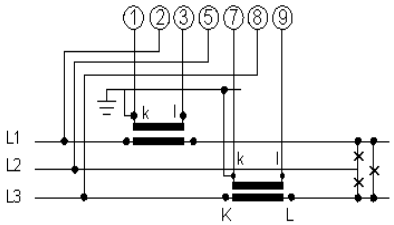
CQ 96/144 Single phase



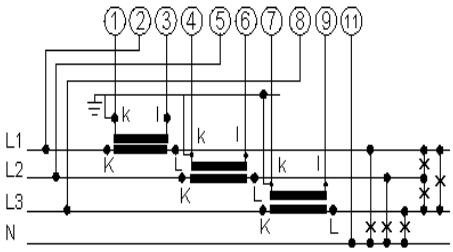
CQ 72/96/144 three ph. bal. Load



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



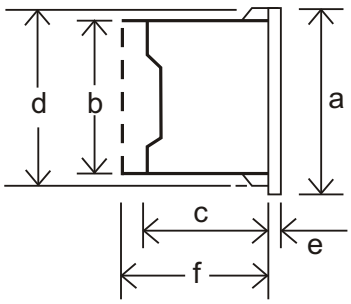
CQ 96/144 3ph. 4W Unbal. Load



Ordering Information

Type CQ	Power Factor meter
Front dimension 72, 96 and 144	72 mm x 72 mm 96 mm x 96 mm 144mm x 144mm
Type E D V	Single phase systems 3 phase system balance / Unbal. load 3 phase 4wire system Unbalance load
Measuring ranges (COS ⌀)	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 back cover
Rated voltages	Refer to table inside
Rated currents	1A, 5A
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 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, for Indian sales C.G.*1, export through Crompton Greaves I.D. Others*3

Dimension



Dimensions (in mm)		CQ 72	CQ 96	CQ 144
Bezel	a	72	96	144
Case	b	66	90	136
Depth	c	53	53	53
	d	$67.5^{+0.7}$	$91.5^{+0.8}$	137.5^{+1}
	e	5.5	5.5	5.5
Cutout Size		68	92	138
Depth with Back cover	f	64	64	64
Weight (approx.)		0.55 kg.	0.6 kg.	0.8 kg.

*1 standard

*3 Please clearly add the desired specifications while ordering

Ordering example

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

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RISHABH INSTRUMENTS
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