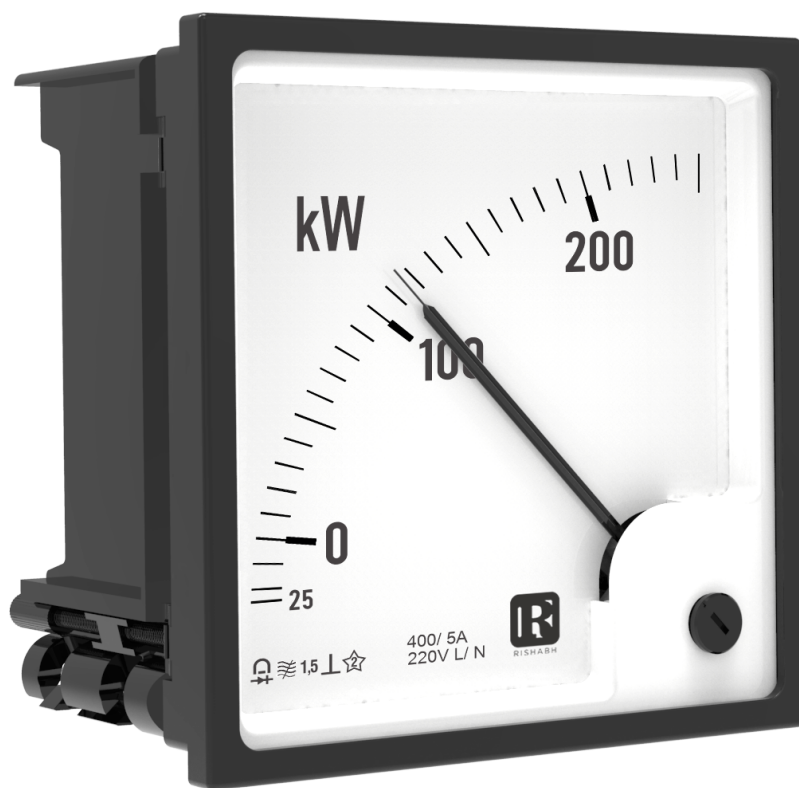




Data Sheet

Power Meter 90⁰ WQ



Measure



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Application

The Watt meters, WQ96/144 are offered for the AC systems
-single phase

-3 phase balanced load 3 or 4 wire

-3 phase unbalanced load 3 or 4 wire

These instruments are suitable to indicate forward (export / out going) and reverse (import / in coming) power flow. They can be used both on sinusoidal and non - sinusoidal current

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

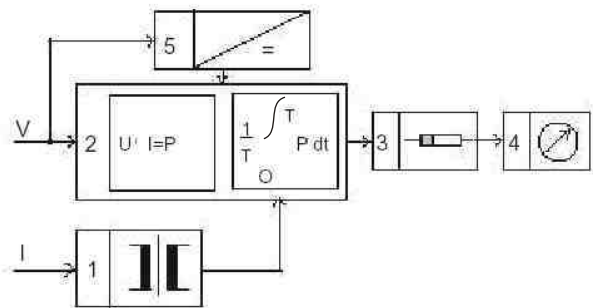
Features

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

Functional Principle

For active and reactive power measurement, a moving-coil indicator is used to indicate watts and vars for which an analogue DC signal is obtained from a power converter attached to the case of the indicator.

Schematic Diagram.



The power converter uses one, two or three for multiplier systems (2) depending on the measurement of balanced or unbalanced load AC systems. Current transformers (1) provide the input current to the multiplier circuit.

The multipliers form the product of the instantaneous values of current and voltage (TDM principle). The product resultant is integrated, thereby suppressing the AC ripple.

Subsequently product proportional output is delivered to (3).

There the voltage is converted into Current, whose magnitude also depends on Feasibility Factor (λ).

Finally this current is fed to the moving coil movement, (4).

For the instrument DC power supply is obtained from input voltage, (5).

Specifications

Scale and Pointer

Pointer	: Knife - edge pointer
Pointer deflection	: 0 ... 90°
Scale characteristics	: Linear
Scale division	: Coarse - fine
Scale length	: WQ96 WQ144 97 mm 146 mm

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 single cut out
Panel thickness	: ≤ 25 mm
Terminals	: Hexagon studs, M4 screws And wire clamps E3

Electrical Data

Measured quantity	: Active / Reactive Power
Response time	: 4s max.
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 10 times rated current ,5 Sec max

Power Consumption(Approx)

Current path	: ≤ 0.25 VA
Voltage path types	
E1W, D1W, D1B, V1W, V1B	: ≤ 3.0 VA
E1B	: ≤ 3.5 VA
D2W, D2B	: ≤ 3.4 VA
V3W	: ≤ 3.9 VA
V3B	: ≤ 4.3 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.

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°
Input	: Full-scale power value Pw or Pb
Feasibility factor	: "Lambda" = Pw/Ps or Pb / Ps
Power factor	: Cos φ = 1 ± 0.01 for Watt meters & Sin φ = 1 ± 0.01 for Var meters
Voltage	: Rated voltage + 2%
Frequency	: 45-65 Hz (50 Hz ± 0.1% for E1B)
Current	: 20% to 120% of rated current
Others	: IS: 1248 (IEC 51/ DIN EN 60051)

Electrical and mechanical zero point in the meter are not necessarily identical. Zero adjustment should be done when only voltage is applied and current circuit not energised.

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%
Power factor	: Cos φ = 1 to 0.5 (ind.) for active power Sin φ = 1 to 0.5 (ind.) for reactive power
Frequency	: 45-65 Hz (50 Hz ± 1% for E1B)

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

Type	Active power	Reactive power
Single phase system	E1W	E1B
3 phase 3 wire system balanced load	D1W	D1B
3 phase 4 wire system balanced load	V1W	V1B
3 phase 3 wire system unbalanced load	D2W	D2B
3 phase 4 wire system unbalanced load	V3W	V3B

selection of measuring range

Apparant power Ps is calculated from primary ratings of current transformer and voltage transformer.

In single phase network, $P_s = V \cdot I$

where V = voltage between phase & neutral & I = line current.

In three phase network, $P_s = \sqrt{3} V \cdot I$

where V = voltage between two phase & I = line current.

Full scale value i.e range of the instrument (Pw = active power, Pb = reactive power) must be selected in such a way that the same remain between 0.5 times and 1.2 times the value of apparent power Ps.

Thus feasibility factor "Lambda" should be between 0.5 and 1.2 where "Lambda" = Pw/Ps or Pb/Ps

Full scale values shall preferably be selected from standard series according to DIN 43701, 1-1.2-1.5-2-2.5-3-4-5-6-7.5-8 and their decadic / decimal multiples.

Rated voltage:-

For Single phase(E1W, E1B) :- 57.7, 63.5, 100, 110, 127, 220
For Three phase (D1W, D1B, :- 100, 110, 220, 240, 380, 415, D2W, D2B, V1W, V1B, V3W, V3B) 500.

The voltage will be considered as a phase voltage (between phase and 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.

Rated current:-

1A OR 5 A

If used on current transformer, please state transformer ratio on the order.

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 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 accessories. : 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

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



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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, IEC 51 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.

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.

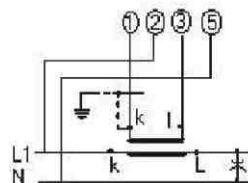
Safety Precautions

- 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

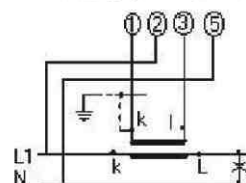
Active Power

E1W - single phase (One Element)

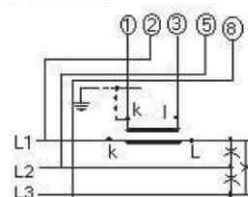


Reactive Power

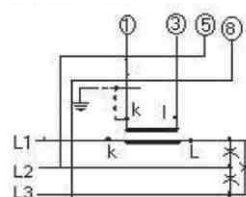
E1B - single phase (One Element)



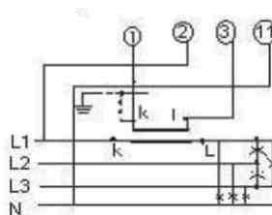
D1W Three phase, three wire
AC Supply with balanced load
(One Element)



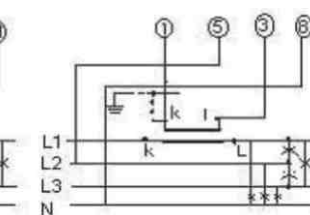
D1B Three phase, three wire
AC Supply with balanced load
(One Element)



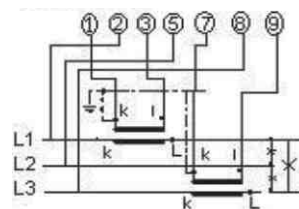
V1W Three phase, four-wire AC
Supply with balanced load
(One Element)



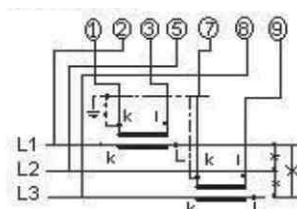
V1B Three phase, four-wire AC
Supply with balanced load
(One Element)



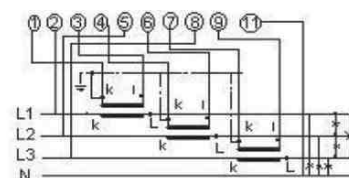
D2W Three phase, three-wire AC
Supply with Unbalanced load
(Two Element)



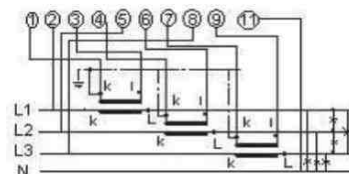
D2B Three phase, three-wire AC
Supply with Unbalanced load
(Two Element)



V3W Three phase, four-wire AC Supply
with Unbalanced load (Two Element)



V3B Three phase, four-wire AC Supply
with Unbalanced load (Three Element)



Measure



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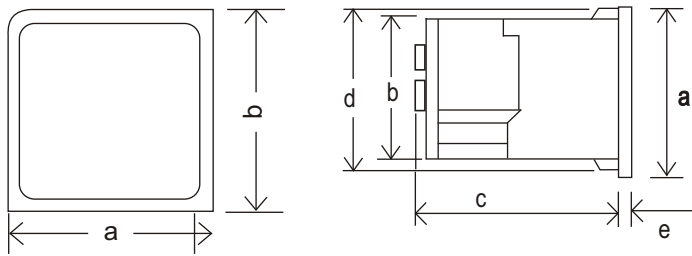


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Dimensions



Dimensions (in mm)		WQ 96	WQ 144
Bezel	a	96	144
Case	b	90	136
Depth	c ^x	106	106
	d	91.5	137.5
	e	5.5	5.5
		92 ^{+0.8}	138 ⁺¹
Cutout Size			
Depth with Back cover	f ^{x x}	64	64
Weight (approx.)		0.65-0.9 kg.	0.9-1.1 kg.



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Ordering Information

Type : WQ	Watt and Var meter, 90° Scale
Front dimension : 96 144	96 mm x 96 mm 144 mm x 144 mm
Type E1W E1B D1W D1B V1W V1B D2W D2B V3W V3B	Single phase systems 3 phase 3 wire system balanced load 3 phase 4 wire system balanced load 3 phase 3 wire system unbalanced load 3 phase 4 wire system unbalanced load
Measuring ranges	Specify while ordering
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° ^{*3}
Dial	Standard scale same as measuring range ^{*3} 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}

^{*1} standard

^{*3} Please clearly add the desired specifications while ordering

Ordering example

WQ 96 V3W for active power 3 phase 4 wire system unbalanced load, measuring range 0 ... 480 kW, voltage AC 440 V, for use on current transformer 600/5A.

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



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Specifications may change without prior notice



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RISHABH INSTRUMENTS LIMITED

Domestic (India): +91 253 2202099 | marketing@rishabh.co.in
International: +91 253 2202004/06/08/99 | global@rishabh.co.in
www.rishabh.co.in