



# Data Sheet

## 240° Moving Coil Rectifier Meter VL



Measure



Control



Record



Analyze



Optimize

## Application

The moving coil, rectifier panel meters, VL 72/96/144 housed in moulded polycarbonate cases are suitable for the measurement of AC currents and voltages.

Moving coil rectifier instruments measure average values & are calibrated to indicate RMS values, assuming a sinusoidal waveform for frequencies from 40 to 10000 Hz (AC current 40 to 1000 Hz and for AC voltage 40 to 10000 Hz)

These instruments offer several advantages in switchboards and Generating Set Panels. Number of meters can be mounted in a single Cut out (Mosaic mounting). Front glass, Bezel & Dial can be easily replaced.

## Features

- Better resolution.
- Linear scale.
- Less VA burden.
- Glass filled polycarbonate housing (UL 94-V-0)
- Knife edge pointer.
- Easily replaceable glass and bezel.
- Easy installation with swivel screws.

## Movement

Moving coil movement 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.

## Specifications

### Scale and Pointer

Pointer	: Knife - edge pointer
Pointer deflection	: 0 ... 240°
Scale characteristics	: Linear
Scale division	: Coarse - fine
Scale length	: VL72 VL96 VL144 106mm 142mm 230mm
Scale Interchangeability	: 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	:
Voltmeters and ammeters < 10A	: Hexagon studs, M4 screws and wire clamps E3 (DIN 46282)

### Electrical Data

Measured quantity	: AC voltage or current
Overload capacity	: (acc. to IS: 1248 / IEC 51)
Continuously	: 1.2 times rated voltage / current
Short duration :	
Voltmeters	: 2 times for 5 sec : 1 overload 2 times for 0.5 sec : 9 overloads

Ammeters	: 10times for 5 sec : 1 overload 10times for 0.5 sec : 9 overloads
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 VL 72/96/144
Rated insulation voltage	: 1000V
Proof voltage	: 2kV
Installation category	: 300V CAT 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°C ± 2°C
Position of use	Nominal position ± 1°
Input	Rated value of measured quantity
Other conditions	IS : 1248 (IEC 51/ DIN EN 60051)
Nominal range of use	
Ambient temperature	0 ... 50°C
Position of use	Vertical ± 5°
External magnetic field	At 0.4 kA/m

### Environmental Conditions

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

## 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°
Accuracy class	1
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.

### Other

Increased sensitivity	4kohm/V for voltmeters 1...600V 10 kohm/V for Voltmeters 15..150V
Adjustment of Resistance (Sensitivity)	Within ± 1% at 23°C

## Standard Measuring Ranges

A. C. Current		A. C. Voltage	
Rated Value	Approx Voltage drop	Rated Value	Sensitivity (+ 10%)
100 mA	1.8 V	40 V <sup>A*2</sup>	900 ohm/ V
1 A <sup>A</sup>	75 mV	60 V <sup>A*1</sup>	900 ohm/ V
5 A <sup>A</sup>	75 mV	100 V <sup>A</sup>	900 ohm/ V
10 A <sup>A</sup>	75 mV	150 V <sup>A</sup>	900 ohm/ V
		250 V <sup>A</sup>	900 ohm/ V
		300 V <sup>A</sup>	900 ohm/ V
		400 V <sup>A</sup>	900 ohm/ V
		500 V <sup>A</sup>	900 ohm/ V
		600 V <sup>A</sup>	900 ohm/ V

NOTE : For suppression scale possible upto X6 meter

\*A : for 72, 96, 144 sizes

\*1 : Accuracy class 2.5

\*2 : Accuracy class 5

## Applicable Standards

Nominal case and cutout dimensions for indicating measuring instruments.	: IS 2419 DIN 43700
Scale and pointer for electrical measuring instruments.	: IS 1248, IEC 51 DIN 43802
Connections and Terminal markings for panel meters	: IS 1248, IEC 51 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 IEC 51/DIN EN 60051 DIN 43701
Environmental conditions	: IS 1248, IEC 51 IS: 9000, Part 5, 7, 8, VDE / VDI 3540
Front frames for indicating measuring instruments principle dimensions.	: DIN 43718
UL Combustibility class.	: UL 94 V-O
Technical conditions of delivery for electrical instruments.	: DIN 43701
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 CC marking.

## Accessories

### Safety Terminal protection

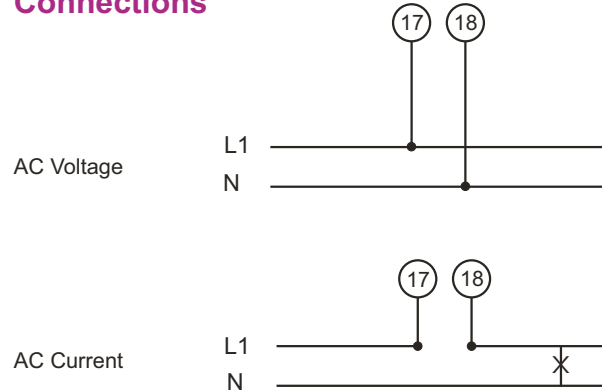
Full sized polycarbonate back cover to provide protection against accidental contact (hand and fingers) acc. to IS 9249, VDE 0410.

## Safety Precautions

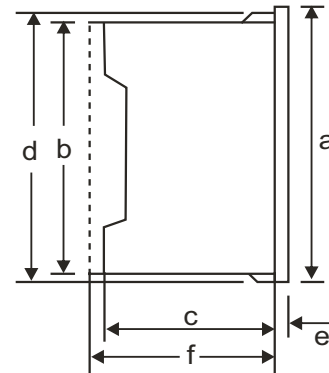
- Instruments with damaged bezels or window glasses must be disconnected from mains.

- 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

## Connections



## Dimensions



Dimensions (in mm)	VL72	VL96	VL144
<b>Bezel</b>			
a	□ 72	□ 96	□ 144
<b>Case</b>			
b	□ 66	□ 90	□ 136
<b>Depth</b>			
c*	□ 53	□ 53	□ 53
d	□ 67.5	□ 91.5	□ 137.5
e	5.5	5.5	5.5
<b>Cutout Size</b>	□ 68 <sup>+0.7</sup>	□ 92 <sup>+0.8</sup>	□ 138 <sup>+1</sup>
<b>Weight (approx.)</b>	0.25 kg.	0.30 kg.	0.43 kg.
<b>Depth with Back cover</b>	f **		
	64	64	64

## Ordering Information

Type :- VL	Moving-coil with rectifier panel meter 240°scale
Front dimension :-  72 96 144	 72 mm x 72 mm 96 mm x 96 mm 144 mm x 144 mm
Measuring ranges	refer to table inside
Front facia	Normal glass <sup>*1</sup> , PC glass <sup>*3</sup> Antiglare glass <sup>*3</sup>
Colour of bezel	Black <sup>*1</sup> Red, Blue, Yellow, White <sup>*3</sup>
Position of use	Vertical <sup>*1</sup> on request 0....180° <sup>*3</sup>
Terminal protection	Full sized polycarbonate back cover
Zero position	Centre <sup>*1</sup> , Off-set zero <sup>*3</sup>
Increased sensitivity	4 kohm/V for voltmeters 1...600 V <sup>*3</sup> 10 kohm/V for voltmeters 15...150 V <sup>*3</sup>
Adjustment Resistance (Sensitivity)	Within ± 1 % at 23°C <sup>*3</sup>
Dial	Standard scale same as measuring range <sup>*1</sup> Blank dial with division <sup>*3</sup> Additional lettering on request <sup>*3</sup> Additional numbering on request <sup>*3</sup> Coloured marking red or green <sup>*3</sup> Coloured sector red or green <sup>*3</sup>
Logo	RISHABH <sup>*1</sup> , Others <sup>*3</sup>

<sup>\*1</sup> standard

<sup>\*3</sup> Please clearly add the desired specifications while ordering

## Ordering example

VL 72 measuring range 0 ... 500 V, red mark at 415 V.

Specifications are subjects to change without notice (03/18)



RISHABH



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