



Data Sheet

Moving Coil Meter AC Ammeters & Voltmeters With Rectifier 240⁰

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	:	VL 72 VL 96 VL 144 106 mm 142 mm 230 mm
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 fascia	:	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(DIN 46282)
Voltmeters and ammeters < 10A		

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	:	2 times rated voltage, 5 Sec
Voltmeters	:	2 times for 5 sec : 1 overload 2 times for 0.5 sec : 9 overloads
Ammeters	:	10 times for 5 sec : 1 overload 10 times for 0.5 sec : 9 overloads
Enclosures code (IEC 529)	:	IP 52 case IP 00 for terminals without back - cover IP 20 for terminals with backcover
Insulation class	:	Group A according to VDE 0110 VL 72/96/144
Rated insulation voltage	:	1000V
Proof voltage	:	2 kV
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 _n 11 ms
Vibration resistance	:	10-55-10Hz / 0.15mm 1.5 g _n at about 50 Hz.

Options

Case	:	Antiglare glass
Front fascia	:	Red, Yellow, Blue, White
Colour of bezel	:	Front adjustable on site
Red index pointer	:	on request 0°....180°
Position of use	:	
Accuracy class	:	1



Measure



Control



Record



Analyze



Optimize

Dial
Blank dial : With initial & 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 $\pm 1\%$ 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 ^{2A/2}	900 ohm/ V
1 A ^{1A}	75 mV	60 V ^{2A/1}	900 ohm/ V
5 A ^{1A}	75 mV	100 V ^{2A}	900 ohm/ V
10 A ^{1A}	75 mV	150 V ^{2A}	900 ohm/ V
		250 V ^{2A}	900 ohm/ V
		300 V ^{2A}	900 ohm/ V
		400 V ^{2A}	900 ohm/ V
		500 V ^{2A}	900 ohm/ V
		600 V ^{2A}	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 60051DIN 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 V0

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 CE 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



Measure



Control



Record

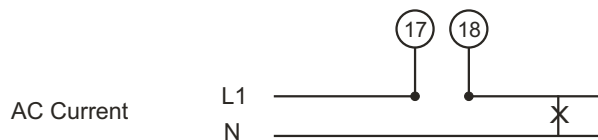
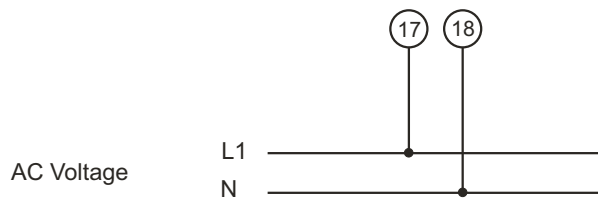


Analyze

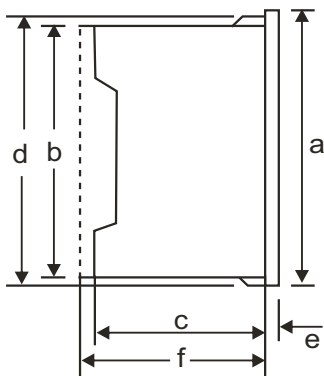


Optimize

Connections



Dimensions



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



Measure



Control



Record



Analyze



Optimize

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 ^{*1} , PC glass ^{*3} Antiglare glass ^{*3}
Colour of bezel	Black ^{*1} Red, Blue, Yellow, White ^{*3}
Position of use	Vertical ^{*1} on request 0....180° ^{*3}
Terminal protection	Full sized polycarbonate back cover
Zero position	Centre ^{*1} , Off-set zero ^{*3}
Increased sensitivity	4 kohm/V for voltmeters 1...600 V ^{*3} 10 kohm/V for voltmeters 15...150 V ^{*3}
Adjustment Resistance (Sensitivity)	Within $\pm 1\%$ at 23°C ^{*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} , Others ^{*3}

^{*1} standard

^{*3} 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)



Measure



Control



Record



Analyze



Optimize



RISHABH

Specifications may change without prior notice



Measure



Control



Record



Analyze



Optimize

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