

FML 96  
FML 144

## Data Sheet

Analogue Pointer - Type  
Frequency Meter  
240° Scale



## Application

The pointer type frequency meters, FML 96 and FML 144 housed in moulded polycarbonate cases are used for the measurement of frequencies in the range of 45 to 450 Hz.

For maximum accuracy, the essential measuring range is obtained by suppressing the unwanted frequency span.

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

## Features

- Better resolution.
- Linear Scale
- Glass filled polycarbonate (UL 94-V-0)
- Knife edge pointer.
- Easily replicable glass and bezel.

## Application Standard

Nominal case and cutout dimensions for indicating measuring instruments.	IS 2419 DIN IEC 61544
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 VDE 0110 VDE 0410 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 IS: 9000 VDE / VDI 3540 DIN 43718
Front frames for indicating measuring instruments principle dimensions.	DIN 43701
Technical conditions of delivery for electrical instruments.	
UL Combustibility class.	UL 94 V-0
Mechanical strength (Free fall test, vibration test)	IS 1248 IS 9000 VDE 0411 IEC 1010

### Comply with following European directives :

2004 / 108 / EC ( EMC directive), 2006/95/EC (low voltage directive) & amendment 93/68 EEC, for CE Marking.

## Scale and Pointer

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

## Mechanical Data

Panel thickness	≤ 25 mm
Case details	Moulded square case suitable for mounting in Control / Switchgear panels, Machinery consoles.
Case material	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	Mounting Clamp.
Mounting	Stackable in a single cutout
Terminals	Hexagon studs, M4 screws and wire clamps E3

## Electrical Data

Measured quantity	Frequency
Overload capacity	(acc to IS : 1248/ IEC 51)
Continuously	1.2 times rated voltage
Short duration	2 times rated voltage, 5 Sec:1 overload 2 times rated voltage, 0.5 Sec:9 overload
Input quantity	Alternating voltage in sine waveform
Enclosure code (IEC 529)	IP 52 case
Insulation class	IP 00 for terminals
Rated insulation voltage	Group A according to VDE 0110 660 V
Proof voltage	2 kV
Installation category	300 V CAT III
Power consumption	≤ 7VA
Insulation resistance	> 50 Mohm at 500V DC

## Accuracy at Reference Conditions

Accuracy class	0.5 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	Rated voltage of measured quantity
Voltage	Rated voltage ± 2%
Other conditions	IS : 1248 (IEC 51/DIN EN 60051)
Preheating time	>= 5 min

## Nominal range of use

Ambient temperature	0 ... 50 °C
Position of use	Normal position ± 5
External magnetic field	At 0.4 kA/m
Voltage	Rated voltage ± 15%

## 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 <sub>n</sub> for pulse duration 11 ms
Vibration resistance	10-55-10Hz for ampli. 0.15mm (1.5 g at 50Hz)

## Options

### Case

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

### 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.

## Standard Measuring Ranges

### Frequency Range

45.....50.....55Hz  
 45.....55.....65Hz  
 55.....60.....65Hz  
 360...400...440Hz  
 380...400...420Hz

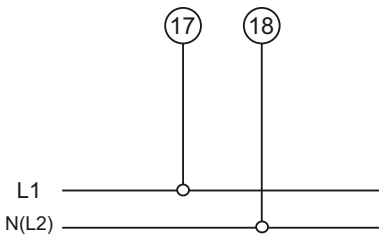
### Rated input voltage

57.7 V  
 63.5V  
 100 V  
 110 V  
 115 V  
 120 V  
 127V  
 208 V  
 220 V  
 230 V  
 240 V  
 289 V  
 380 V  
 400 V  
 415 V  
 440 V  
 500 V

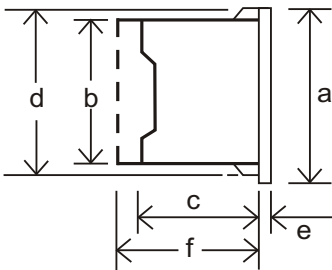
## Functional Principal

Frequencies are measured with a built in electronic transducer & moving coil indicator. 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.

## Connections



## Dimensions



Dimensions	(in mm)	FML 96	FML 144
Bezel	a	96	144
Case	b	90	136
Depth	c	53	53
	d	91.5	137.5
	e	5.5	5.5
Cutout Size		92 <sup>+0.8</sup>	138 <sup>*1</sup>
Weight (approx.)		0.45 kg	0.6 kg

## Safety Precautions

- 1) Instruments with damaged bezel or glasses must be disconnected from the mains.
- 2) Adequate safety clearance must be maintained to control panel fasteners and to sheet metal housing. If non - insulated connector wires are used.
- 3) The back cover must be snapped into place after connector wires have been clamped for protection against accidental contact.
- 4) Bezel, Scale and Glass may only be replaced under voltage free conditions.
- 5) Instruments to be used in grounded panel.

## Ordering Information

Type	FML	Pointer type frequency meter, 240° scale
Front Dimension	96 144	96mm x 96mm 144mm x 144mm
Measuring Ranges		Refer to table inside
Front facia		Normal glass <sup>*1</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
Rated voltages		Refer to table inside
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>

<sup>\*1</sup> Standard

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

## Ordering example

FML 96 measuring range 45 ... 50 ... 55Hz, rated voltage AC 230V.  
**Specifications are subject to change without notice (04/10)**



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