

## Application:

The pointer type frequency meters, FM 48/72/96/144 housed in molded polycarbonate cases are suitable 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 switchboard and generating set panels. A number of meters can be mounted in a panel cut out (mosaic mounting). Front glass, bezel and dial can be easily replaced.



## Features:

- Linear Scale
- Glass filled polycarbonate housing
- Knife edge pointer
- Easily replicable glass and bezel

## Functional Principle:

Frequencies are measured with a built in electronic transducer and moving coil indicator. Moving coil movement has pivots of very high hardness. Movement is suspended between spring loaded sapphire jewels. Movement is properly shielded and critically damped by eddy currents induced in coil former.

## Mechanical Data:

Case details	Molded 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 fascia	Glass
Color of bezel	Black
Position of use	Vertical
Panel fixing	Mounting clamps
Mounting	Stackable in a single cutout
Panel thickness	≤ 25 mm
Terminals	Hexagon studs, M4 screws and wire clamps E3

## Electrical Data:

Measured quantity	Frequency
Input quantity	Alternating voltage in the sine waveform
Overload capacity	(Acc. To IS:1248/IEC 51)
Continuously	1.2 times rated voltage
Short duration	2 times rated voltage, 0.5 sec: 9 overloads; 2 times rated voltage, 5 sec: 1 overload
Enclosure code	IP52 case
(IEC 529)	IP00 for terminals without back cover; IP20 for terminals with back cover
Insulation class	Group A according to VDE 0110
Rated insulation voltage	660V
Proof voltage	2KV
Installation category	300V CAT III
Insulation resistance	≥ 50 Mohm at 500V d.c.
Power consumption	< 7Va

## Standard Measuring Ranges:

Frequency Range	45.....50.....55 Hz
	45.....55.....65 Hz
	55.....60.....65 Hz
	360...400...440 Hz
	380...400...420 Hz
Rated Input Voltage	57.7 V
	63.5 V
	100 V
	110 V
	115 V
	120 V
	127 V
	208 V
	220 V
	230 V
	240 V
	289 V
	380 V
400 V	
440 V	
500 V	
Non-Standard ranges available on request	

## Scale and Pointer:

Pointer	Knife – edge pointer
Pointer deflection	0...90°
Scale characteristics	Linear
Scale division	Coarse – fine
Scale length	FM 48 FM72 FM96 FM144 41mm 63mm 97mm 146mm

## Accuracy at Reference Conditions:

Accuracy class	0.5 according to IS: 1248 (IEC 51/DIN EN 60051)
<b>Reference Conditions</b>	
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)
Preheating time	≥ 3 Min
<b>Nominal range of use</b>	
Ambient temperature	0...50°C
Position of use	Nominal 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)
Pollution degree	2

## Options:

<b>Case</b>	
Front fascia	Antiglare glass
Color of bezel	Red, Yellow, Blue, White
Red index pointer	Front adjustable on site
Position of use	On request 0°C...180°C
<b>Dial</b>	
Blank dial	With initial and end values marked
Special markings	Numbering/Lettering
Division dials	Basic divisions without numbering
Color markings/bands	Red or Green

## Accessories:

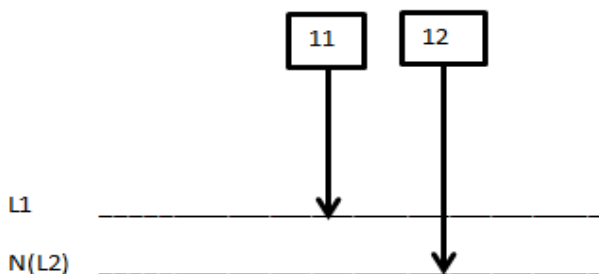
<b>Safety Terminal Protection</b>
Full sized polycarbonate back cover to provide protection against accidental contact (hand and fingers)

## Applicable Standards:

Nominal case and cutout dimensions for indicating electrical instruments	IS 2419
	DIN IEC 61554
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.	IS 9249
	DIN 40050
Instruments and their accessories	VDE 0110
	VDE 0410
	IEC 529, IEC 1010
Performance specifications for direct acting indicating analog electrical measuring instruments and their accessories.	IS 1248
	IEC51/DINEN60051
	DIN 43701
Environmental conditions	IS 1248
	IS: 9000
	VDE/VDI 3540
Front frames for indicating measuring instruments principle dimensions	DIN 43718
UL Compatibility class	UL 94 V-0
Technical conditions for delivery for electrical instruments	DIN 43701
Mechanical strength (free fall test, vibration test)	IS 1248/IEC 51
	IS 9000
	VDE 0411
	IEC 61010

Comply with the following European directives: 2004/108/EC (EMC directive), 2006/95/EC (low voltage directive) & amendment 93/68/EEC, for CE Marking.

## Connections:

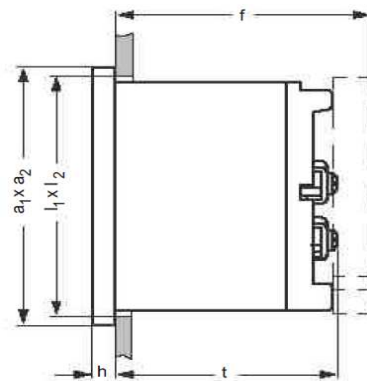


## Safety Precautions:

1	Instruments with diamond bezel or glasses must be disconnected from the mains.
2	Adequate safety clearance must be maintained to the control panel fasteners and to the 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.

## Dimensions:

Front in mm	Nominal Dimensions, mm		Cutout, mm	Installation Depth Including Terminal (t), mm	Installation Depth Incl. Full Back Cover (f), mm
	a <sub>1</sub> X a <sub>2</sub>	h	l <sub>1</sub> X l <sub>2</sub>		
48 x 48	48 x 48	5.5	45 <sup>+0.6</sup> x 45 <sup>+0.6</sup>	54	62.5
72 x 72	72 x 72	5.5	68 <sup>+0.7</sup> x 68 <sup>+0.7</sup>	54	62.5
96 x 96	96 x 96	5.5	92 <sup>+0.8</sup> x 92 <sup>+0.8</sup>	54	62.5
144 x 144	144 x 144	5.5	138 <sup>+1</sup> x 138 <sup>+1</sup>	54	62.5



## Ordering Information:

Type	ZQ	Pointer Type Frequency Meter
Front	Dimension	
	48	48mm x 48mm
	72	72mm x 72mm
	96	96mm x 96mm
	144	144mm x 144mm
Measuring Ranges		Refer to Table Inside
Terminal Protection		Full-sized polycarbonate back cover
Front Facia		Normal glass <sup>+1</sup> Antiglare glass <sup>+3</sup>
Color of Bezel		Black <sup>+1</sup> Red, Blue, Yellow, White <sup>+3</sup>
Position of Use		Vertical <sup>+1</sup> On request 0.....180°C
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> Colored marking red or green <sup>+3</sup> Colored sector red or green <sup>+3</sup>
Logo		Jewell Instruments <sup>+1</sup>

<sup>+1</sup> Standard

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

## Ordering Example:

FM72 Measuring range 45....50....55 Hz, rated voltage AC 230V  
**Specifications are subject to change without notice (04/10)**