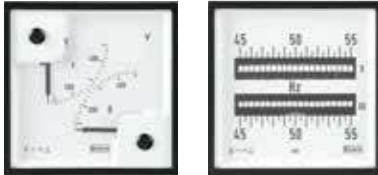


# DUAL VOLTMETER AND FREQUENCY METER



## Features

- Measures AC frequencies of two independent systems
- Pointer type dual voltmeter and frequency meter with two independent 90° short scale movements
- Reed type available with two independent measuring circuits - 21 reeds (45-55Hz, 55-65Hz)
- Direct or VT connected

## Benefits

- Easy to operate
- High visibility
- Terminal cover included

## Applications

- AC switchgears, panels and distribution boards
- Control board
- Generator sets

## Construction

- Pointer type contains internal transducer, powered from input voltage and moving coil meter
- Reed type uses steel reeds in an electromagnetic field. Reeds are calibrated to its individual frequency to vibrate in resonance with the electromagnet and vibrates at full amplitude
- Slot in screw fixing

## Standards

- CE marked
- BV approved

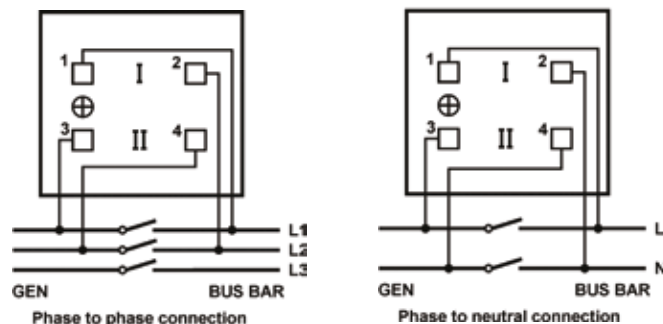
## General Specification

- Accuracy class dual voltmeter - 1.5
- Accuracy class dual frequency meter - pointer type - 1
- Accuracy class dual frequency meter - reed type - 0.5
- Overload - 10xI<sub>n</sub> - 9x0.5s+1x5s/60s
- Dual voltmeter - 2xU<sub>n</sub> - 9x0.5s+1x5s/60s
- Dual frequency meter - pointer type - 1.2 x U<sub>n</sub> continuously, 1.5 x U<sub>n</sub> for 2 hours (pointer type only)
- Dual frequency meter - reed type - 2 x U<sub>n</sub> for 5 seconds
- Burden frequency meter - pointer type - 1 VA at nominal voltage 57-110V and 230 V - 1.7 VA at nominal voltage 400V - 2 VA at nominal voltage 500V
- Burden frequency meter - reed type - 0.7 ... 1.2 VA at nominal voltage 110-230V - 1.4 ... 2 VA at all other nominal voltages

## Product Codes

Bezel size (mm)	96	96	96	-
Scale length (mm)	41	41	-	-
Voltmeter meter 2 x 90°	M244-80L	-	-	-
Frequency meter 2 x 90°	-	M244-41D	-	-
Frequency meter 2 x 21 reeds	-	-	M244-41E	-
<b>Standard input ranges</b>				
Dual voltmeter (direct connected)	300V, 500V			
Dual voltmeter (VT connected)	120V (for use with VT's x/100V), 132V (for use with VT's x/110V), 144V (for use with VT's 120V), 125V, 137.5V, 150V (for use with some VT's having primary voltage less than 1kV)			
Dual frequency meter - pointer type	57-110 V, 400V +/- 20%, 500V +/-20%			
Dual frequency meter - reed type	100V, 110V, 230V, 400V +/- 20%, 500V +/-20%			
<b>Scaling</b>				
Dual voltmeter	Specify to suit application			
Dual frequency meter - pointer type	45-50-55Hz, 55-60-55Hz, 45-55-65Hz			
Dual frequency meter - reed type	45-50-55Hz, 55-60-65Hz			

## Connection Diagrams



## Order data/examples

### Dual voltmeter - LV direct connected

- 1) Select type: M244-80L,
- 2) Specify input voltage: 500V,
- 3) Specify scaling: 0-500V,
- 4) Specify frequency: 50Hz

### Dual voltmeter - VT connected

- 1) Select type: M244-80L,
- 2) Specify input: 0-120V,
- 3) Specify scaling: 0-12kV,
- 4) Specify frequency: 50Hz,
- 5) Specify VT ratio: 10/0.1 kV

### Dual frequency meter - pointer type

- 1) Select type: M244-41D,
- 2) Specify input voltage: 400V,
- 3) Specify frequency: 45/65Hz,
- 4) Specify scaling: 45-55-65Hz

### Dual frequency meter - reed type

- 1) Select type: M244-41E,
- 2) Specify input voltage: 110V,
- 3) Specify frequency: 55/65Hz,
- 4) Specify scaling: 55-60-65Hz

## DIN PANEL METERS - SHORT SCALE



### Features

- A range of the most popular short-scale measuring instruments in 4 case sizes
- Shock resistant sprung pivot and jewel movement
- Terminal covers supplied as standard
- EMC hard frequency meters are fully EMC and LVD compliant
- 1/4" 'fast on' terminals available

### Benefits

- Low cost
- Local indication
- Ease of installation
- Minimal training
- Low maintenance
- Customised options and features

### Applications

- Switchgear
- Distribution systems
- Generator sets
- Control panels
- Energy management
- Building management
- Utility power monitoring
- Process control
- Motor control

A range of 48, 72, 96 and 144mm DIN style panel meters measuring all electrical parameters and featuring moving coil or moving iron movements. All meters incorporate slide-in dials and terminal covers as standard. A range of customised options is available.

### Movements

#### Moving Coil Meter

Centre cored, self shielding moving coil movement, using pivots, hairsprings and sprung jewels. Seven variations have been designed in movement ranges: all intermediate ranges are achieved by shunting the next lowest range. All DC voltmeters are 1000 ohms per volt, rectified product run at 900 ohms per volt, millivolt meters use the 5 milliamp movement.

#### Moving Iron Meter

Clapper type repulsion design using pivots, hairsprings and jewel movements. The bottom jewel is oil filled to provide damping while the top is sprung for resilience. All voltmeters are manufactured with external voltage dropper resistors to substantially reduce the self heating effects.

#### Frequency Meter

Meter uses a 100 microamp 4000 ohm movement driven by an EMC hard frequency conversion circuit.

#### Dials, Scales and Pointers

Standard dials are white matt with black printed scales and bar knife-edge pointers. Black dials with white or yellow scales and pointers are also available. Interchangeable slide-in dials are used on the E242, E243, E244 and E246 90° moving iron, moving coil and frequency meter models.

General options include red supplementary pointers, red indexes (quadrant scales), red, green or blue lines, bands or segments, finely spaced divisions, multi-scales, special scales and captions to customer's requirements.

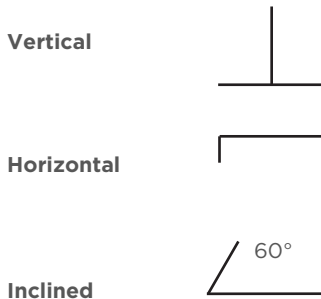
### Specifications

Type of instrument	Moving iron for current and voltage	Moving coil for current and voltage	Moving coil with rectifiers for current and voltage	Moving coil with built-in transducer for frequency measurement	Maximum demand indicators	Combined MD with moving iron movement
<b>Format</b>	48 x 48mm 72 x 72mm 96 x 96mm 144 x 144mm	48 x 48mm 72 x 72mm 96 x 96mm 144 x 144mm	48 x 48mm 72 x 72mm 96 x 96mm 144 x 144mm	72 x 72mm 96 x 96mm 144 x 144mm	72 x 72mm 96 x 96mm	96 x 96mm
<b>Movement type</b>	Sprung pivot jewel with silicon oil damping	Sprung pivot jewel with eddy current damping	Sprung pivot jewel with eddy current damping	Sprung pivot jewel with eddy current damping	Sprung pivot jewel with silicon oil damping	Sprung pivot jewel with silicon oil damping
<b>Burden</b>	0.5VA-15A then 0.8VA voltmeters 4.5VA	See detailed specifications	See detailed specifications	See detailed specifications	2.5VA	3VA
<b>Accuracy</b>	1.5% to DIN43780	1.5% to DIN43780	2.5% to DIN43780	0.5% to DIN43780	3%	3% on MDI 1.5% ammeter
<b>Input type</b>	AC current or voltage	DC current or voltage	AC current or voltage	AC voltage	AC current	AC current
<b>Measuring range</b>	6-600V 100mA-100A 48mm only up to 40A	50mV-600V 100µA-40A, 48mm only 25A	15-600V 1mA-100mA and 1A & 5A	57.7V @ 45Hz 500V @ 44Hz	0-1/1.2A or 0-5/6A 8, 15 or 20 minute delays	1-6A 8, 15 or 20 minute delays 0-5A/6A instantaneous
<b>Dielectric voltage withstand test</b>	3kV AC	3kV AC	3kV AC	3kV AC	3kV AC	3kV AC

## Approvals

- Lloyds:  
03/00055 - Moving coil meters  
03/00056 - Moving iron meters  
03/00057 - Frequency meters
- UL file No E203000

## DIN16257 symbol meaning for calibration position



Inclination of dial surface.

Required orientation must always be stated when ordering if other than vertical mounting is required.

## General Specifications

Performance:	BS EN60051
Measuring ranges:	DIN43701
Accuracy overload:	BS EN60051
Dimensions:	DIN43700
Scale marking generally to:	DIN43802
Magnetic influence:	BS EN60051
Safety:	BS EN61010-1
Terminals:	Clamp strap M4 for up to 25A. Clamp strap M8 for over 25A 1/4" spade terminals available for models E243 and E244
Humidity range:	Up to 95% RH (non condensing)
Test voltage @50Hz:	3kV RMS for 1 minute
Ammeter ranges:	1.0/1.2/1.5/2.5/5/6 and decade multiples thereof
Overload AC current:	x 1.2 continuous x 10 for 5 seconds
AC voltage and frequency:	x 1.2 continuous x 2 for 5 seconds
Standard calibration:	23°C. Calibration at other temperatures available on request
Operating temperature:	-20°C to +60°C
Damping time:	Less than 3 seconds
Enclosure code:	IP52 as standard IP54 on request
Case and base:	Grade UL94V0
Case:	Dimensions and panel cut out conform to IEC473, DIN43700. Case made from glass filled polycarbonate self-extinguishing and non drip in accordance with UL94V-O
Bezel:	Slim-line DIN43802, black as standard
Bezel window:	Standard sheet glass, with zero adjusters where appropriate. Non reflecting glass or polycarbonate shatterproof windows are available
Installation:	Installations in switchboard panel or mosaic arrangement on equipment or machine with a panel thickness of up to 40mm in a horizontal or vertical plane
Fixing on panel:	Swivel captive fasteners, which can be fixed at either corner
Mounting position:	Normal vertical mounting or as indicated on the scale in accordance with DIN16257. A deviation of 315° is permissible
Insulation group:	Insulation resistance more than 5Ω@ 500V
Environmental:	Measurement category III IEC 1010-1 Pollution degree 2 IEC 1010-1 Electrical rating 600V RMS (920V peak)
Approvals:	EMC, LVD and Lloyds

## Dimensions

Moving coil measuring range		Moving iron measuring range	
6-60A	C=67mm	0-30A	C=64mm
>60A	C=78mm	>30A	C=67mm

Max. panel thickness = 40mm

D	A	B
48 x 48	45 x 45	4
72 x 72	68 x 68	4
96 x 96	92 x 92	4
144 x 144	138 x 138	4

