

VAC

electrical suppliers

Meters

Available in 48, 72, 96 and 144mm² analogue type.

Ammeters, Voltmeters, Frequency Meters, Maximum Demand and Instantaneous meters, Wattmeters, 240° meters.

Moving iron and coil meters.



General Information

Standards

CEI 85, EN 600051, IEC 414, VDE 0410, UNE 21318, DIN 43780, IEC51.

Cases

- ABS & P.C material.
- Protection degree (CEI 70-1, IEC 529) IP 52 for the case.
- Protection degree (CEI 70-1, IEC 529) IP 00 for terminals.

Accuracy class

All the instruments are manufactured in 1,0; 1,5; 2,5 accuracy class.

Overloads

All amperometric circuits support an overload of 1,2In continuous and 10In for 5 seconds. All voltmetric circuits support an overload of 1,2Vn continuous and 2Vn for 5 seconds.

Working voltage: 650V

Test voltage: 2000V-50Hz / 60Hz, for 1 minute.

Insulation

Insulation reference voltage 0,6 KV.

Working temperature

20°C (± 10°C): working range between -25°C and + 55°C.

Vibrations

± 0.25 mm amplitude at 50 Hz/60Hz (CEI 50-6, IEC 68-2-6).

Humidity

Ambient relative humidity 85% without condensing, with 35°C temperature for max. 60 days per year. Yearly average humidity must not be higher than 65% (DIN 40040).

Tropical version

95% relative humidity, for a maximum of 30 days per year.

Mounting position




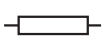





The normal execution of our instruments is for vertical mounting. If other mounting positions are known in advance, please indicate the angle of inclination when ordering.

Scales

The full scale deflections correspond to DIN 43701. The scale divisions correspond to DIN 43802.

Identification signs

Signs for identification of the instrument technical characteristics

Sign	Description
	Electronic device in a measure circuit
	Rectifier (instrument with A.C. input).
	Shunt
	Additional resistor
	Zero setting device (of the field measure amplitude)
	General accessories
	Ground terminal
	Positive terminal
	Negative terminal
1.0 1.5 2.5	Accuracy in Percent %

Special Execution

Special Executions

- Tropical version
- Red stroke at any point on the scale
- Red strip on the scale
- Additional lettering
- Anti - reflection glass
- Internal illumination (when possible)
- Test voltage higher than 2000V
- Knife edge pointer and scale with mirror reading
- Red pointer adjustable from the exterior
- Scale for other ranges
- Scale with double numbering
- Scale with double stats of numbering divisions.

Moving Iron voltmeters and ammeters

- Calibration for other ranges
- Range for voltmeters differing from standard series
- Range for ammeters differing from standard series
- Ammeters with 2In - 3In - 5In overload capacity
- Two range ammeters (3 terminal (max 10A)
- Calibration for A.C. and D.C. (max 50A)
- Separate resistance for 1000V and 1500V
- Accuracy class 1 (only 50-60Hz)

Moving coil instruments

- Scale with zero point in the middle or displaced
- Range differing from standard sizes
- Two / Three / Four range voltmeters
- Two range ammeters (3 terminals)
- Adjustment to other internal resistance for ammeters
- Internal resistance for voltmeters from 1 to 600V
- 1000Ω/V, 4000Ω/V, 10000Ω/V, 20000Ω/V
- Separate resistor box for 1000V and 1500V
- Suppressed zero
- Accuracy class 1
- Potentiometer adjustable from the exterior (+/- 20% FSD)

Wattmeters

- Scale with zero point in the middle or displaced
- Nominal current 5 A (per element)

Power factor meters

- Non standard voltage











Reed frequency meters

- Non standard voltage

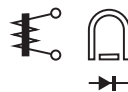
Synchronising instruments and data available on request

Identification signs

Signs for identification of the instrument technical characteristics

Sign	Description
	D.C. circuit and / or measure mark which corresponds to D.C.
	A.C. circuit and / or measure mark which corresponds to A.C.
	D.C. and / or A.C. circuit and / or measure mark which corresponds to D.C. and to A. C.
	Testing voltage higher than 500V (for example 2kV)
	Instrument to be used with vertical scale
	Instrument to be used with scale inclined compared to the horizontal (for example 60°) - on request
	Moving coil for D.C. instruments
	Moving Iron Instrument for A.C. Instruments
	Bimetal instrument
	Vibrating reeds instruments

Ammeters - Voltmeters



For AC



90°



240°

Moving iron instruments are used for measuring AC
These will withstand the following overloads.

Ammeters 1,2 In continuous 10 In 5 seconds	Voltmeters 1,2 Vn continuous 10 Vn 5 seconds
Consumption: Ammeters: 0,3 - 1VA Voltmeters: 1 - 5VA	

AMMETERS								
Type	BE-48		BE-72		BE-96		BE-144	
Size	48 x 48mm		72 x 72mm		96 x 96mm		144 x 144mm	
	Direct	CT /1A-/5A	Direct	CT /1A-/5A	Direct	CT /1A-/5A	Direct	CT /1A-/5A
	1	1	1	1	1	1	1	1
1A	•	•	••	••	••	••	•	•
5A	•	•	••	••	••	••	•	•
10A	•	•	•	••	••	••	•	•
15A	•	•	•	••	•	••	•	•
20A	•	•	•	••	•	••	•	•
25A	•	•	•	••	•	••	•	•
30A	•	•	•	••	•	••	•	•
40A		•	•	••	•	••	•	•
50A		•	•	••	•	••	•	•
60A		•	•	••	•	••	•	•
75A		•		••	•	••	•	•
100A		•		••	•	••	•	•
125A		•		••				•
150A		•		••		••		•
200A		•		••		••		•
250A		•		••		••		•
300A		•		••		••		•
400A		•		••		••		•
500A		•		••		••		•
600A		•		••		••		•
800A		•		••		••		•
1000A		•		••		••		•
1200A		•		••		••		•
1250A		•		••		••		•
1500A		•		••		••		•
2000A		•		••		••		•
2500A		•		••		••		•
3000A		•		••		••		•
VOLTMETERS								
TYPE	BE-48		BE-72		BE-96		BE-144	
150V		•		••		••		•
300V		•		••		••		•
500V		•		••		••		•
600V		•		••		••		•
•	90°	1. extractable scale						
◦	240°	1. extractable scale						

Ammeters - Voltmeters



For DC



Centre 0



90°

The moving coil movement has a central magnet with shockproof bearings. These meters are for measuring DC.

AMMETERS								
Type	BE-48		BE-72		BE-96		BE-144	
Size	48 x 48mm		72 x 72mm		96 x 96mm		144 x 144mm	
	50,60,75mV	Centre 0 50,60,75mV	50,60,75mV	Centre 0 50,60,75mV	50,60,75mV	Centre 0 50,60,75mV	50,60,75mV	Centre 0 50,60,75mV
	1	1	1	1	1	1	1	1
10A	• +	• +	•• +	•• +	•• +	•• +	• +	• +
15A	• +	• +	•• +	•• +	•• +	•• +	• +	• +
20A	• +	• +	•• +	•• +	•• +	•• +	• +	• +
25A	• +	• +	•• +	•• +	•• +	•• +	• +	• +
30A	•	•	•• +	•• +	•• +	•• +	• +	• +
40A	•	•	•• +	•• +	•• +	•• +	• +	• +
50A	•	•	••	••	••	••	•	•
60A	•	•	••	••	••	••	•	•
80A	•	•	••	••	••	••	•	•
100A	•	•	••	••	••	••	•	•
150A	•	•	••	••	••	••	•	•
200A	•	•	••	••	••	••	•	•
300A	•	•	••	••	••	••	•	•
400A	•	•	••	••	••	••	•	•
500A	•	•	••	••	••	••	•	•
600A	•	•	••	••	••	••	•	•
800A	•	•	••	••	••	••	•	•
1000A	•	•	••	••	••	••	•	•
1500A	•	•	••	••	••	••	•	•
2000A	•	•	••	••	••	••	•	•
3000A	•	•	••	••	••	••	•	•

VOLTMETERS								
TYPE	BE-48		BE-72		BE-96		BE-144	
Size	48x48mm		72x72mm		96x96mm		144x144mm	
Direct	Centre 0		Centre 0		Centre 0		Centre 0	
60mV	•	•	••	••	••	••	•	•
10V	•	•	••	••	••	••	•	•
20V	•	•	••	••	••	••	•	•
40V	•	•	••	••	••	••	•	•
100V	•	•	••	••	••	••	•	•
150V	•	•	••	••	••	••	•	•
200V	•	•	••	••	••	••	•	•
300V	•	•	••	••	••	••	•	•
400V	•	•	••	••	••	••	•	•
500V	•	•	••	••	••	••	•	•
200A	•	•	••	••	••	••	•	•

•	90°	1. extractable scale
◦	240°	
+	Direct	

Frequency Meters



BE-72/96



BE-48/72/96

System Description (Pointer)

These are moving coil instruments with an integral electronic transducer.

System Description (Reed)

The movement consists of a row of reeds mounted on an electromagnet. Alternating current produces an alternating magnetic field in a coil which causes the vibration of the reeds. The natural vibrating rate corresponds to the frequency of the alternating current. The vibration of the reeds is proportional to the square voltage.

Internal Consumption: approx. 1.5VA

Pointer Type

Type	Frequency Range Hz	Voltage
BE48/72/96/144	45 - 55Hz	110v-220v-380v ±15%
BE48/72/96/144	55 - 65Hz	110v-220v-380v ±15%

Reed Type

BE-72	7reeds	1cycle / reed	47~53Hz 57~63Hz
BE-96	11reeds	1cycle / reed	45~55Hz 55~65Hz

Voltage 110V; 220V; 380V

Power Factor Meters



Cos ϕ Meters



BE /96

System Description

This instrument is made up of an electronic circuit which supplies current to a moving coil system. The current is directly proportional to the phase out between voltage and intensity (cos ϕ).

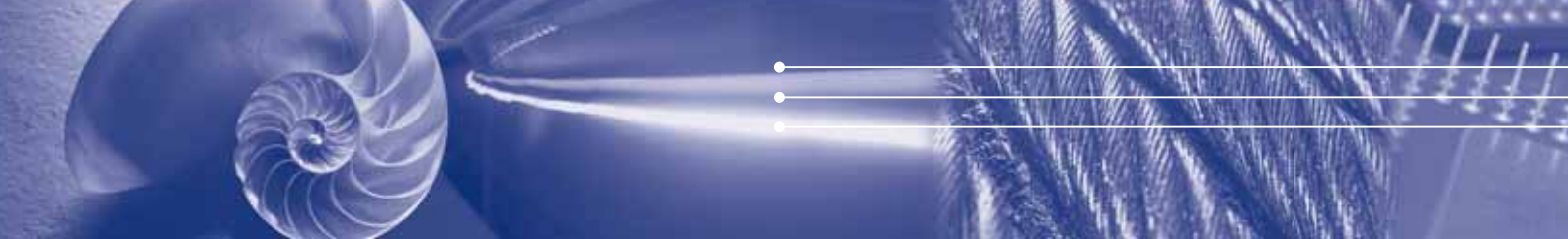
There are two versions: single phase and three phase balanced.

Three or four - wire, Three Phase balanced load

110V	5A	1A
380V	5A	1A

Single Phase A.C.

110V	5A	1A
220V	5A	1A



Maximum Demand Meters



Maximum Demand Meters

These have a bimetallic measuring system. The bimetallic system drives a red pointer to mark the maximum current used. The range of the meter is 6A and 1,2A. The meter works off a-15A or -1A, C.T. with a 20% overload. The red maximum demand pointer is resetable by a manual knob which can also be sealed. The response time is 15 minutes.

Internal Consumption: approximately 2,5VA

Maximum Demand & Instantaneous Meters

This meter combines a bimetallic movement with an instantaneous ammeter. The advantage of this meter is that it is possible to read both instantaneous and average current as well as the maximum demand current on one meter. The instantaneous ammeter has an overload of 100%.

Internal Consumption: approximately 3VA



MAXIMUM DEMAND METERS								
Type	MD 72		MDI 72		MD 96		MDI 96	
Range	1A	5A	1A	5A	1A	5A	1A	5A
1A	•	•	•	•	•	•	•	•
5A	•	•	•	•	•	•	•	•
10A	•	•	•	•	•	•	•	•
15A	•	•	•	•	•	•	•	•
20A	•	•	•	•	•	•	•	•
25A	•	•	•	•	•	•	•	•
30A	•	•	•	•	•	•	•	•
40A	•	•	•	•	•	•	•	•
50A	•	•	•	•	•	•	•	•
75A	•	•	•	•	•	•	•	•
100A	•	•	•	•	•	•	•	•
150A	•	•	•	•	•	•	•	•
200A	•	•	•	•	•	•	•	•
250A	•	•	•	•	•	•	•	•
300A	•	•	•	•	•	•	•	•
400A	•	•	•	•	•	•	•	•
500A	•	•	•	•	•	•	•	•
600A	•	•	•	•	•	•	•	•
800A	•	•	•	•	•	•	•	•
1000A	•	•	•	•	•	•	•	•
1200A	•	•	•	•	•	•	•	•
1250A	•	•	•	•	•	•	•	•
1500A	•	•	•	•	•	•	•	•
2000A	•	•	•	•	•	•	•	•
2500A	•	•	•	•	•	•	•	•
3000A	•	•	•	•	•	•	•	•

Electro Dynamic Wattmeters & Varmeters



Active and Reactive Power



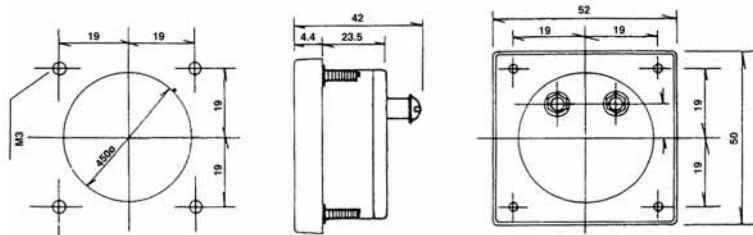
These instruments are used for measuring active and reactive power. The movement is ferrodynamic with EDDY current damping.

Size	Type	Volt	Current	
96x96	Single phase	110V	1A	5A
		220V	1A	5A
96x96	3-Wire, 3-Phase current Balanced load	110V	1A	5A
		380V	1A	5A
		440 - 500V	1A	5A
96x96	3-Wire, 3-Phase current Unbalanced load	110V	1A	5A
		380V	1A	5A
		440 - 500V	1A	5A
96x96	4-Wire, 3-Phase current Unbalanced load	110V	1A	5A
		380V	1A	5A
		440 - 500V	1A	5A

Panel Meter



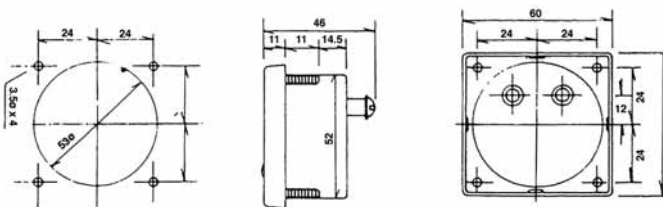
BP 50



Measuring Range:	Moving Coil Type:	Moving Iron Type:	Rectifier Type:	Accuracy:
50 μ A – 15A DC	3V – 1000V DC	50mA – 15A AC 150V – 500V AC	3V – 500V AC	Class 2.5 %



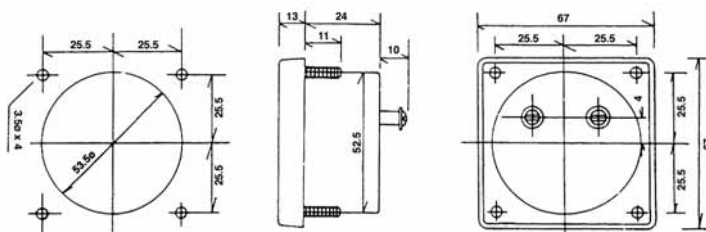
BP 60



Measuring Range:	Moving Coil Type:	Moving Iron Type:	Accuracy:	Rectifier Type:	Accuracy:
50 μ A – 50A DC	3V – 1000V DC	50mA – 50A AC 150V – 500V AC	Class 1.5% Class 2.5 %	3V – 500V AC	Class 2.5 %



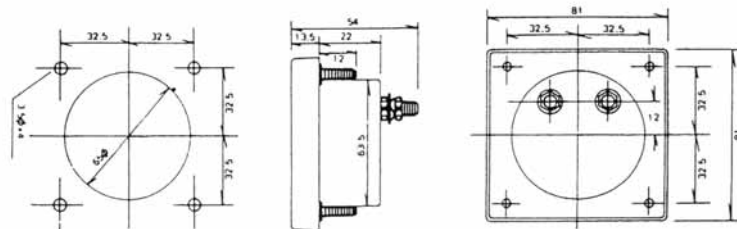
BP 65



Measuring Range:	Moving Coil Type:	Moving Iron Type:	Rectifier Type:	Accuracy:
50 μ A – 30A DC	3V – 1000V DC	50mA – 30A AC 150V – 500V AC	3V – 500V AC	Class 2.5 %



BP 80



Measuring Range:	Moving Coil Type:	Moving Iron Type:	Rectifier Type:	Accuracy:
50 μ A – 30A DC	3V – 1000V DC	50mA – 30A AC 150V – 500V AC	3V – 500V AC	Class 2.5 %

Case and Composition: Acrylic Resin front and bakelite case for BP - 120S, BP - 100S, BP - 100P, BP - 80, BP - 80A, BP - 70P, BP - 65, BP - 60, BP - 45, BP - 670. Glass Window and ABS Resin for BP - 680. Four Stud mounting. Acrylic Resin front and ABS Resin case for BP - 670R. Two Stud mounting.

Colour: Black case white scale plate.

Pointer: Colour in black or red.

Overall Dimensions

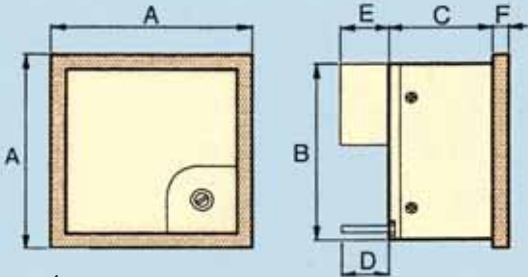


Figure 1

SIZE	A	B	C	D	E	F	Hole
BE-48	48	44	39	17	20	5.5	46x46
BE-72	72	66	36.5	17	17.5	5.5	68x68
BE-96	96	90	45	17	17.5	6	92x92
BE-144	144	136	144	17	20	7	140x140

mm

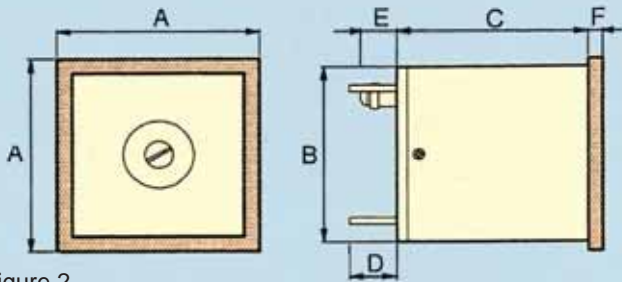


Figure 2

SIZE	A	B	C	D	E	F	Hole
BE-72LS	73	66	68	17	13	6.5	68x68
BE-96LS	96.5	90	45	17	13	6	92x92

mm

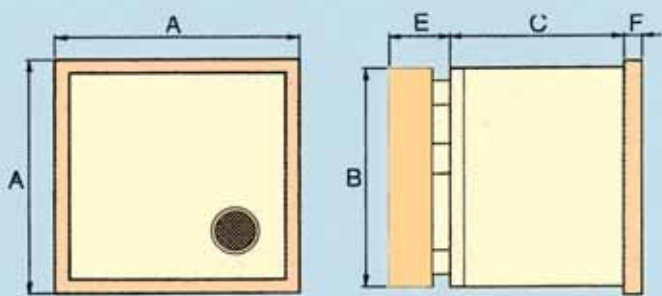


Figure 3

SIZE	A	B	C	E	F	Hole
BE-96Bi	96	90	68	24	8	92x92

mm

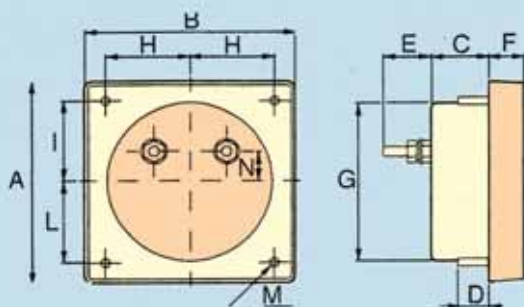


Figure 4

SIZE	A	B	C	D	E	F	G	H	I	L	M	N	Hole
BP-50s	50	52	23.5	13.5	4.4	12.5	45	19	19	19	3.5	15	46
BP-60	60	60	24	11	9.5	11	52	24	24	24	3.5	4	53
BP-65	67	67	24	11	10	13	52.5	25.5	25.5	25.5	3.5	4	53.5
BP-670	60	70	25.5	13	10	11	52.5	24	24	24	3.5	5	53
BP-80	81	81	22	12	18.5	13.5	63.5	32.5	32.5	32.5	3.5	12	65
BP-100S	80	100	25	13.5	11	14	64	41.5	36.5	27.5	3.5	4	65

mm