



SQUARE PANEL METERS – 90°

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CASES AND PANEL CUT-OUTS

Case dimensions and panel cut-outs comply with IEC 473 and DIN-43700. Case enclosure code is IP 52 for all meters except Bimetal meter, as per IEC 529 and DIN 40050 and IP 00 for connections. Better protection is possible with the use of different types of insulating terminal covers. Code for Bimetal meters is IP40.

SCALES AND POINTERS

All pointers are knife-edge beam type. Scales feature a coarse / fine graduation and scale markings comply with DIN 43802.

TECHNICAL PROCUREMENT STANDARDS

Meters comply with the technical procurement standards of DIN 43701 stipulating among other things full scale requirements and marking conditions. Unless stated otherwise, range 1.0 / 1.5 / 2.5 / 4.0 / 6.0 and decade multiples thereof. For current transformer connection the following scales are available as standard : 5 / 10 A - 10 / 20 A - 15 / 30 A - 20 / 40 A - 25 / 50 A - 30 / 60 A - 40 / 80 A - 50 / 100 A - 60 / 120 A - 75 / 150 A - 80 / 160 A - 100 / 200 A - 120 / 240 A - 150 / 300 A - 200 / 400 A - 250 / 500 A - 300 / 600 A - 400 / 800 A - 500 / 1000 A - 600 / 1200 A - 750 / 1500 A - 800 / 1600 A - 1000 / 2000 A - 1.2 / 2.4 kA - 1.5 / 3 kA - 2/4 kA - 2.5 / 5 kA - 3.0 / 6.0 kA. For voltage transformer connection the following scales are available as standard : 6 kV - 7.2 kV - 12 kV - 24 kV - 30 kV - 36 kV - 72 kV - 120 kV - 180 kV - 300 kV - 480 kV.

For external shunt connection the following scales are available as standard : 25 A - 40 A - 60 A - 100 A - 150 A - 200 A - 250 A - 300 A - 400 A - 500 A - 600A - 1000 A - 1.5 kA - 2.5 kA - 3 kA - 4 kA - 6 kA - 10 kA.

SAFETY REGULATIONS

Meters comply with stringent International Standards IEC 1010, DIN 57410 and VDE 0410. Safety requirements for indicating and recording electrical measuring instruments and their accessories.

ACCURACY CLASSIFICATION

Meters meet accuracy requirements of DIN 43780. Unless specified otherwise accuracy classification is 1.5 and is indicated on the scale.

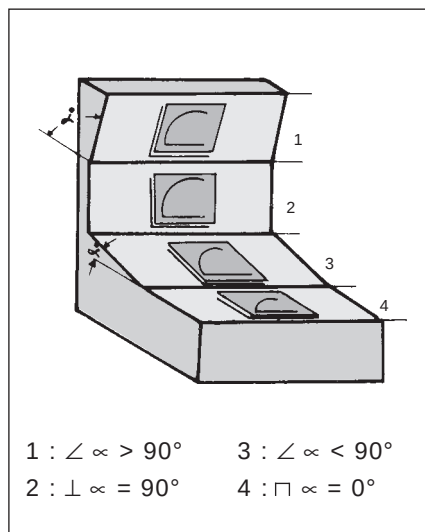
MOUNTING POSITION

Required mounting position is indicated on the scale in accordance with DIN 16257 whereby a deviation of $\pm 5^\circ$ from this position is permissible; positional error (in addition to the error on the indication) must not exceed the error appropriate to the meter classification for accuracy.

SYMBOL MEANING

	vertical
	horizontal
	Inclined (inclination of dial surface to the horizontal e.g. 60°)

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

**OPERATING TEMPERATURE RANGE**

These meters operate satisfactorily in accordance with environmental test class II, VDE/VDI 3540 climatic classification requirements when exposed to ambient temperatures within -10°C and $+55^\circ\text{C}$

VIBRATION AND SHOCK

Meters meet DIN 57411 sheet 1/ VDE 0411 Part 1 with regard to the effects of vibration and shocks. The vibration test requires the meter to be subjected to 5 sweep cycles with a sweep range of 10 - 150 - 10 Hz and an amplitude of 0.15mm.

The shock test stipulates 3 shock pulses each in both directions along 3 mutually perpendicular axes with a peak acceleration of 150 m/s.

PROOF VOLTAGE TESTING

As per DIN 57410.

Rated insulation voltage of meter	Proof Voltage Vrms, 50Hz	Proof Voltage symbol
660 V	2000 V, AC	
1000 V	3000 V, AC	

MOVEMENT SYMBOLS

Movements are represented by the following symbols :

Symbol	Meaning
	Moving coil
	Moving coil with rectifier
	Moving iron
	Bimetal
	Combination of Bimetal and moving iron
	Earth connection
	Caution ! see operating instructions
	For DC
	For AC
	For DC and AC
	For 3 - phase, 3 - wire supply measurement by a single measuring element
	For 3 - phase, 4 - wire supply measurement by a single measuring element
	For 3 - phase, 3 - wire supply unbalanced load measurement by 2 measuring elements.
	For 3 - phase, 4 - wire supply unbalanced load, measurement by 3 measuring elements.

TECHNICAL DATA

GENERAL CHARACTERISTICS

Type of Instrument	Moving Iron (EQ)	Moving Coil (PQ)	Moving Coil with rectifier (VQ)	Moving Coil with built-in transducer for power measurement (WQ)	Moving Coil with built-in transducer for cos ϕ measurement (CQ)	Moving Coil with built-in transducer for frequency measurement (ZQ)
Format	48 × 48 mm 72 × 72 mm 96 × 96 mm 144 × 144 mm	48 × 48 mm 72 × 72 mm 96 × 96 mm 144 × 144 mm	48 × 48 mm 72 × 72 mm 96 × 96 mm 144 × 144 mm	-- -- 96 × 96 mm 144 × 144 mm	-- -- 96 × 96 mm 144 × 144 mm	-- 72 × 72 mm 96 × 96 mm 144 × 144 mm
Quantity of measurement	Alternating Current Alternating Voltage	Direct Current Direct Voltage	Alternating Current Alternating Voltage	Power for all types of network and loading	Power factor for all types of single-phase and 3-phase (3wire) network (balanced load)	Frequency for all types of network
Depth behind bezel *1	53 mm	53 mm	53 mm	105 mm 131 mm for 3 phase 4 wire unbalanced loads	105mm	53 mm
Measurement ranges	See ordering information tables.					
Case	Dimensions and panel cutouts conform to IEC 473, DIN 43700 Case made of glass filled poly-carbonate, self-extinguishing and non-drip in accordance with UL 94 V-0.					
Bezel Size	Slim-line bezel, Standard colour black Optional colours other than black possible on request.					
Bezel Window	Standard : Sheet glass. Optional : Anti-glare sheet glass.					
Installation	Installation in switchboard panels, mosaic arrangement on equipment or machines of wall thickness upto 40mm for in-line horizontal or vertical arrangements.					
Fixing on Panel	Swivel captive fasteners which can be fixed at either of the two locations at 90° to each other.					
Terminals	Clamp strap with M 4 screw (permanently linked) in all meters except M 6 bolt for EQ 40 A, 60 A and PQ 6 A to 60 A, M 8 bolt for EQ/PQ 100 A					
Mounting Position	Normally scale vertical, other positions possible.					
Enclosure Code	Case IP 52 except for Bimetal meters, for which the code is IP 40. Terminals IP 00 as per IEC 529 (DIN 40050). Better protection is possible with the use of different types of insulating covers.					
Insulation Group	Insulation resistance more than 5 M Ω at 500 V as per VDE 0110					
Environment	Environment class II as per VDE/VDI 3540					
Operating temperature range	-10° C to + 55° C					

*1 : Also refer further individual data-sheets in this catalogue for deviations applicable to some ranges.

TECHNICAL DATA

GENERAL CHARACTERISTICS (Continued)

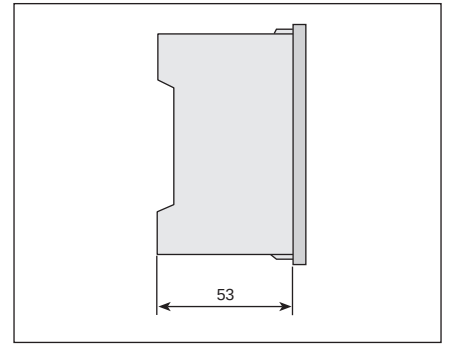
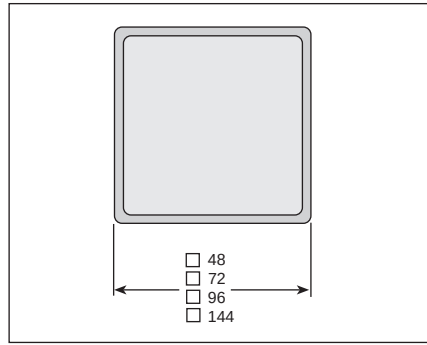
Type of Instrument	Bimetal Ammeter	Bimetal ammeter with additional moving iron movement [two fulcrums]
	(BiQ)	(BiEQ)
Format	96 × 96 mm	96 × 96 mm
Quantity of measurement	Mean rms value and maximum value of current	Mean rms value, maximum value and instantaneous value of current
Depth behind bezel	53 mm	53 mm
Measurement ranges	See ordering information tables.	
Case	Dimensions and panel cutouts conform to IEC 473, DIN 43700 Case made of glass filled poly-carbonate, self-extinguishing and non-drip in accordance with UL 94 V-0.	
Bezel size	Slim-line bezel, Standard colour black Optional colours other than black possible on request.	
Bezel window	Standard : Sheet glass. Optional : Anti-glare sheet glass.	
Installation	Installation in switchboard panels, mosaic arrangement on equipment or machines of wall thickness upto 40mm for in-line horizontal or vertical arrangements.	
Fixing on Panel	Swivel captive fasteners which can be fixed at either of the two locations at 90° to each other.	
Terminals	Clamp strap with M 4 screw (permanently linked) in all meters.	
Mounting position	Normally scale vertical, other positions possible.	
Enclosure code	Case IP 40. Terminals IP 00	
Insulation group	Insulation group A. Insulation resistance more than 5 MΩ at 500 V as per VDE 0110	
Environment	Environment class II as per VDE/VDI 3540	
Operating temperature range	-10° C to + 55° C	

TECHNICAL DATA

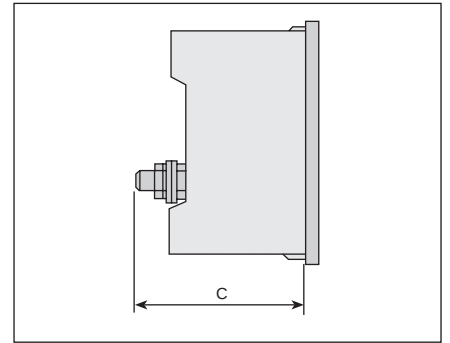
MOVEMENT CHARACTERISTICS

Movement type	Moving iron	Moving coil (also applies to AC voltage and current moving coil with rectifier type)
	Moving iron with jewel bearing, spring loaded at one end and silicon oil damping	Moving coil with core magnet system and jewel bearings, spring loaded at both ends
Internal Consumption	Ammeters : < 0.5 VA for ranges above 15A : < 0.8 VA Voltmeter : < 4.5 VA	see Ordering Table
Overload limit continuous	In accordance with DIN 43780 1.2 times for 2 hours	In accordance with DIN 43780 1.2 times for 2 hours
Short duration	Ammeter : EQ 48 : 10 times 5 s, but ≤ 200 A EQ 72 / 96 / 144 : 10 times 5 s, 40 times 1 s, but ≤ 250 A	Ammeter 10 times 5s
	Voltmeter : EQ 48 : 2 times 5s, but ≤ 1000 V EQ 72 / 96 / 144 : 2 times 5 s,	Voltmeter 2 times 5s
Life test	150,000 full scale deflections with 1s ON after steady state and 4s OFF	
Rated insulation voltage	Complies with VDE 0410 EQ 48 : 660 V EQ 72 / 96 / 144 : 1000 V	Complies with VDE 0410 PQ, VQ 48 : 660 V PQ, VQ 72 / 96 / 144 : 1000 V
Proof voltage	Complies with VDE 0410 EQ 48 : 2 kV AC EQ 72 / 96 / 144 : 3 kV AC	Complies with VDE 0410 PQ, VQ 48 : 2 kV AC PQ, VQ 72 / 96 / 144 : 3 kV AC
Climate Suitability	Class 3 as per VDE / VDI 3540. Reference temperature : 23° C, Operating temperature :- 10° C to + 55° C Storage temperature : -25° C to +65° C	
Frequency range	Complies with DIN 43780 for nominal frequency 50 Hz Ammeter : 15.... 45.... 65.... 400 Hz Voltmeter : 15.... 45.... 65.... 100 Hz for other frequency : 50 Hz ≤ f ≤ 400 Hz 0.95 f f 1.05 f	Complies with DIN 43780 for nominal frequency 50 Hz 15.... 45.... 65.... 100 Hz for moving coil AC voltage and current meters
Influence of external magnetic field	complies with DIN 43780	
Wiring for ammeter ≥ 15 A	EQ 48  EQ 72 / 96 / 144 	
Installation Category (Over voltage category)	600V, CAT III as per IEC 1010	600V, CAT III as per IEC 1010
Pollution Degree	2 as per IEC 1010	2 as per IEC 1010

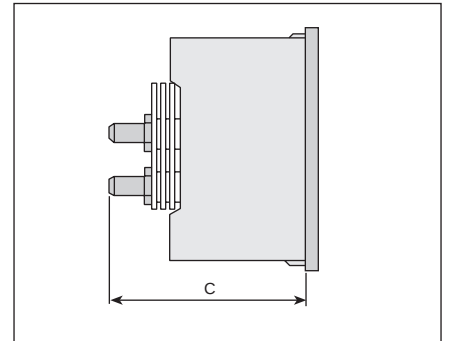
DIMENSIONS



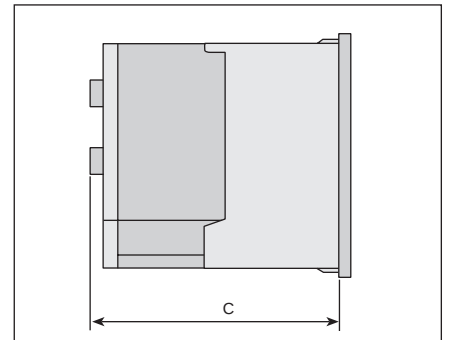
For EQ moving iron only
measuring range: Current
> 30 A to 60 A C = 64 mm
> 60 A C = 67 mm



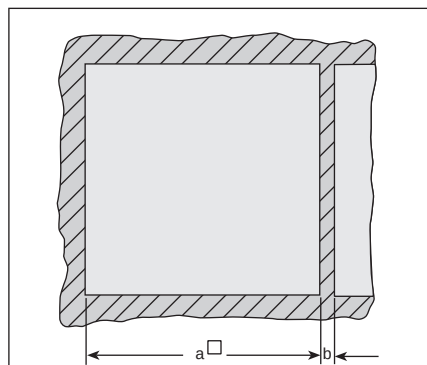
For PQ moving coil only
measuring range: Current
6 A to 60 A C = 67 mm
> 60 A C = 78 mm
PQ 48 : 6 A - 25 A C = 75 mm



For Power meters and
cos Ø meters
C = 105 mm
For 3 phase 4 wire
unbalanced load wattmeter /
varmeter (V3W / V3B)
C = 131 mm



PANEL CUT-OUT

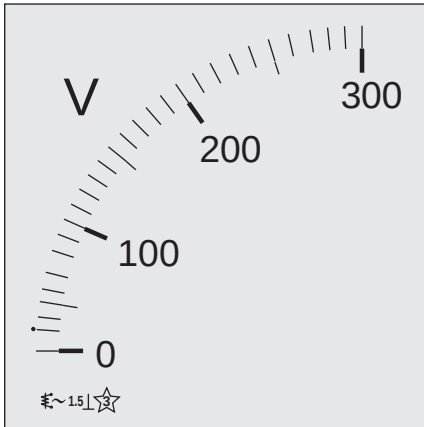


Format	Panel cut-out in mm a	b min.
48 × 48	45 ^{+0.6} × 45 ^{+0.6}	3
72 × 72	68 ^{+0.7} × 68 ^{+0.7}	4
96 × 96	92 ^{+0.8} × 92 ^{+0.8}	4
144×144	138 ^{+1.0} ×138 ^{+1.0}	6

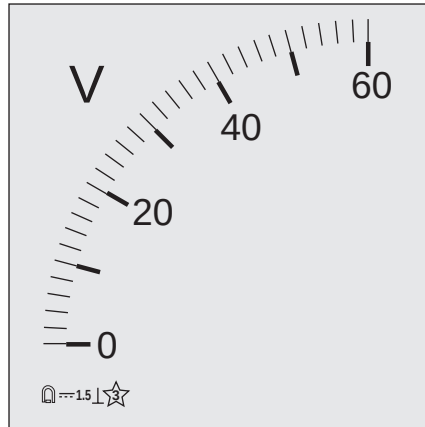
TECHNICAL DATA

SCALE AVAILABILITY

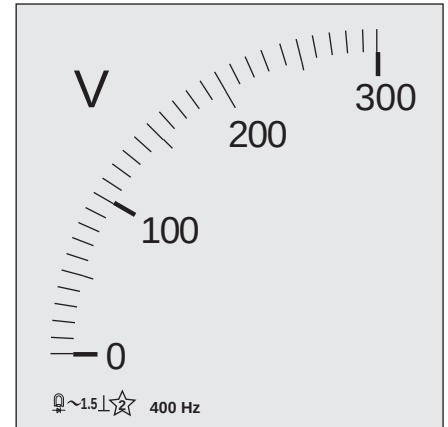
As an example of scale availability the following 9 scales are shown :



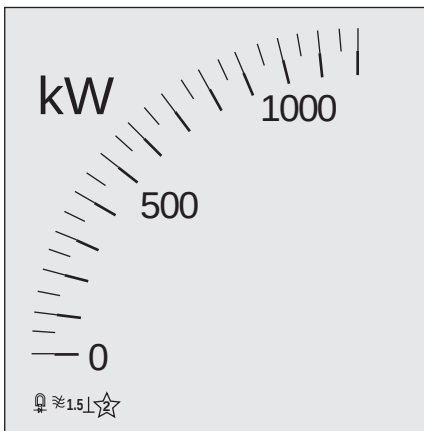
[1] Scale for moving iron voltmeter



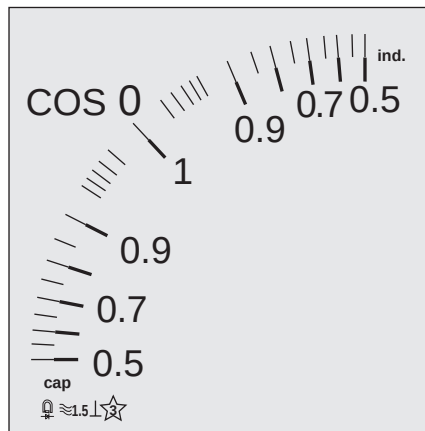
[2] Scale for moving coil voltmeter (DC application)



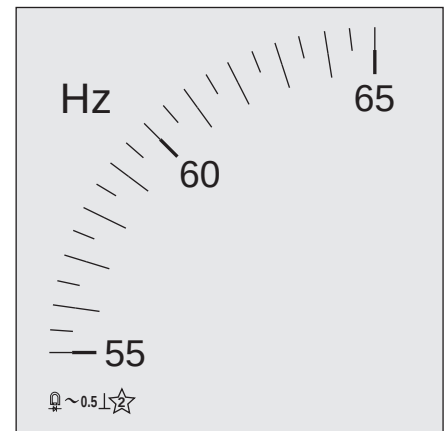
[3] Scale for moving coil voltmeter (AC application)



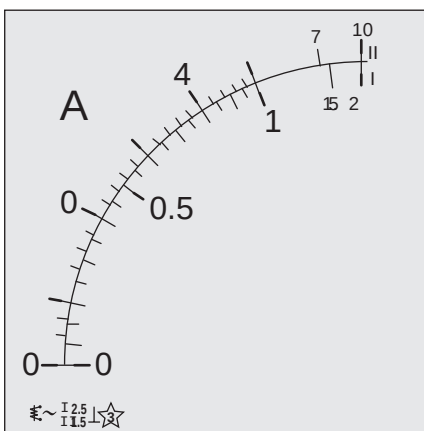
[4] Scale for power meter



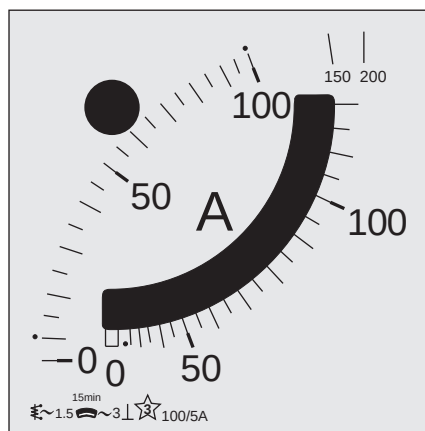
[5] Scale for power factor meter



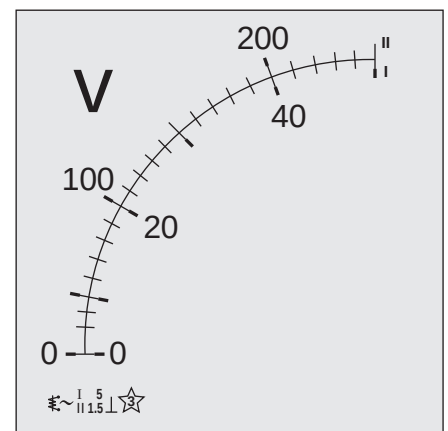
[6] Scale for frequency meter



[7] Scale for dual range moving iron ammeter

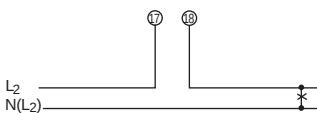
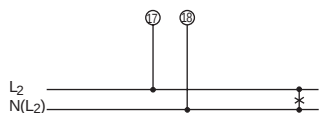
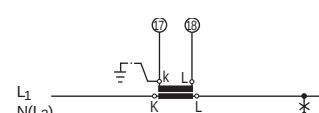
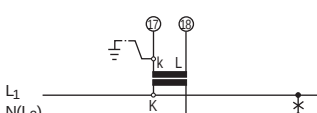
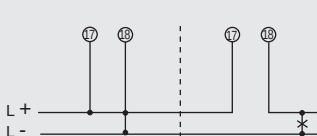
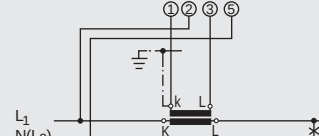
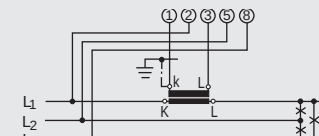
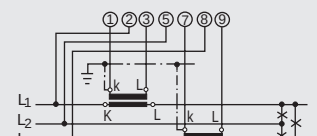
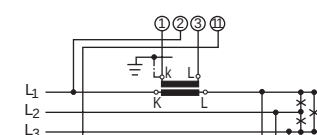
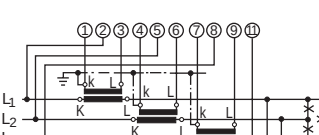
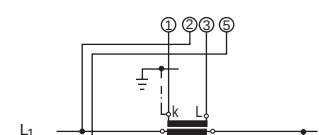
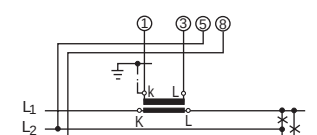
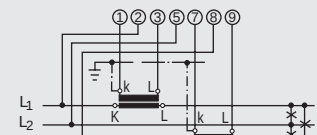
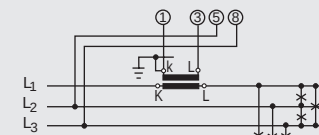
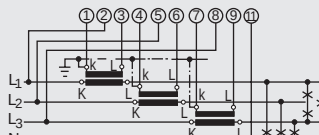
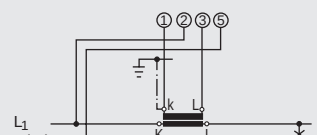
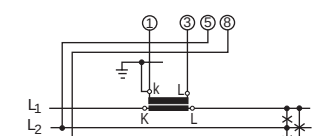
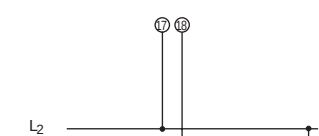


[8] Scale for bimetal moving iron ammeter



[9] Scale for dual range moving iron

TERMINAL CONFIGURATIONS

AC current direct connection 	AC voltage direct connection 	AC current transformer connection 	AC voltage transformer connection 
DC voltage DC current 	Active power single-phase AC network 	Active power three-phase, three-wire network balanced load 	Active power three-phase, three-wire network unbalanced load 
Active power three-phase, four-wire network balanced load 	Active power three-phase, four-wire network unbalanced load 	Reactive power single-phase AC network 	Reactive power three-phase, three-wire network balanced load 
Reactive power three-phase, three-wire network unbalanced load 	Reactive power three-phase, four-wire network balanced load 	Reactive power three-phase, four-wire network unbalanced load 	Power factor single-phase AC 
Power factor three-phase AC 	Frequency single-phase AC / three-phase AC 		

FEATURES

ENCLOSURE

Major enclosure components made out of Glass filled polycarbonate offer excellent mechanical properties, dimensional stability and exceptional flame retardancy meeting stringent requirements of UL 94 V-O.

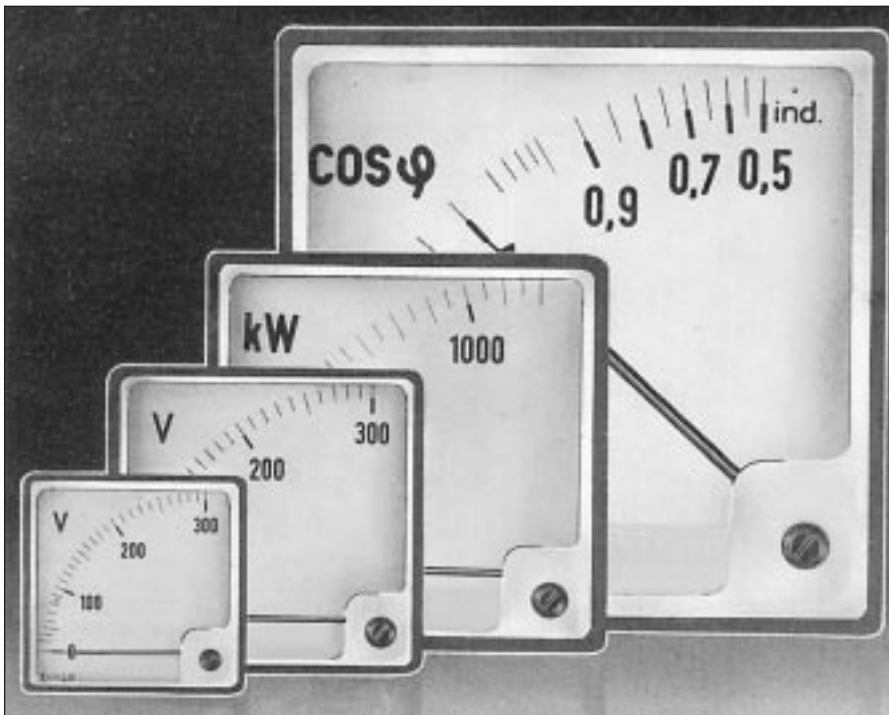
SCALES

Latest Technology offers pre-printed and interchangeable scales even for moving iron instruments. Design of the instrument is such that the moving iron movements also provide near-linear scales.

SCALE PLOTTER

Scale Plotter with PC based software can be offered for minimum inventory, flexibility, and spot delivery to Customers.

FOUR DIFFERENT SIZES IN SAME STYLE



Bezel size 48 × 48 mm

Bezel size 72 × 72 mm

Bezel size 96 × 96 mm

Bezel size 144 × 144 mm

BUILT-IN TRANSDUCERS FOR ALL TYPES OF POWER AS WELL AS FOR FREQUENCY AND COS Ø MEASUREMENT

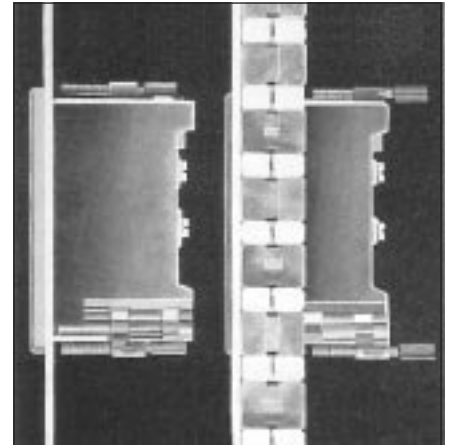
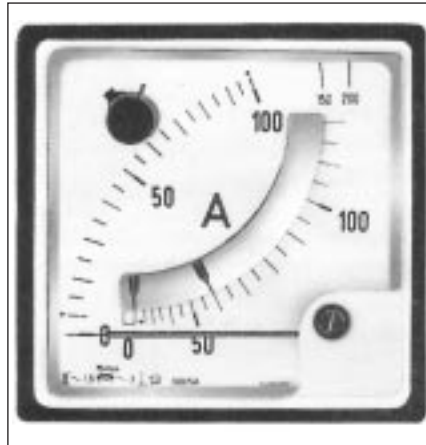


Built-in transducers forming a single unit with the meter are used for power, frequency and cos ϕ measurements. Simple to wire and install. Available for 96 and 144 square meters. Frequency meters are available in 72mm square size also.

FOR IN-LINE HORIZONTAL AND VERTICAL MOUNTING. HORIZONTAL AND VERTICAL CUT-OUTS SIMPLIFY INSTALLATION

Series S 100 meters are designed for horizontal and vertical in-line mounting because many applications require a space saving configuration and because a rectangular cut-out is much cheaper to produce in a switchboard panel than several cut-outs with dividers. Horizontal or vertical cut-outs are sufficient for a compact arrangement.

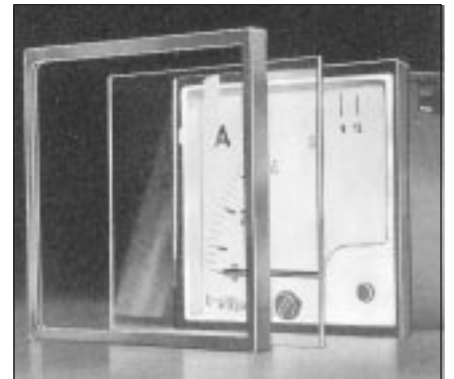
These meters are compatible with panel and mosaic arrangements, in equipment, in instruments or machines having a wall thickness of up to 40 mm.



SIMPLIFIED ARRANGEMENT FOR GLASS REPLACEMENT

The glass, if damaged, can be easily replaced by removing the bezel.

After replacement, the bezel fits firmly into position rendering the instrument dust-proof.



SIMPLE SCALE CHANGING VIA GUIDE SLOTS, REQUIRING NO TOOLS

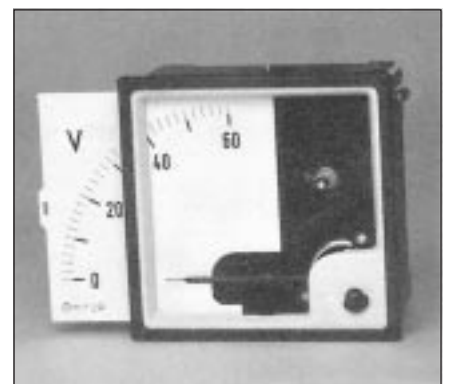
Scales are designed as interchangeable to give stated class of accuracy in all types of meters, including moving iron meters.

The scales cannot be interchangeable in 48 meters which, otherwise, lead to loss of accuracy.

Interchangeability of the scales is highly desired to allow the user to have minimum types of instruments in stock thus reducing stock inventory and in turn saving capital investment.

Scale changing is exceptionally easy; all that is required is to open the window which is permanently hinged with the instrument, pull out the old scale and insert the new scale. Guide slots ensure correct scale positioning, avoiding any damage to the pointer or movement.

Even if the hinged window is accidentally left open after changing the scale, it will automatically be closed when the meter is inserted in the panel cut-out.



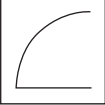


MOVING IRON METERS, TYPE EQ



MOVING IRON MOVEMENTS FOR AC VOLTAGE WITH NO OVERRANGE FOR AC CURRENT WITH DOUBLE OVERRANGE

Class 1.5 conforming to DIN 47380
Case conforming to DIN 43700

					
Type		EQ 48	EQ 72	EQ 96	EQ 144
Bezel size	(mm)	48 × 48	72 × 72	96 × 96	144 × 144
Panel cut-out	(mm)	45 ^{+0.6} × 45 ^{+0.6}	68 ^{+0.7} × 68 ^{+0.7}	92 ^{+0.8} × 92 ^{+0.8}	138 ^{+1.0} × 138 ^{+1.0}
Scale length	(mm)	41	63	97	146
Depth behind bezel	(mm)	53	53	53	53
Weight (nominal)	(kg)	0.1	0.16	0.2	0.42
Range (full-scale)					
V~	6				
	10				
	15				
	25				
	40				
	60				
	100				
	150				
	250				
	300				
	400				
	500				
	600				
	750				
for transformer connection /100V /110V					
mA~	100/200				
	150/300				
	250/500				
	400/800				
	600/1200				
A~	1/2				
	1.5/3				
	2.5/5				
	4/8				
	5/10				
	6/12				
	10/20				
	15/30				
	25/50				
	40/80				
	60/120				
	100/200				
for transformer connection /1A /5A					

Note : Standard version will be supplied unless otherwise specified.

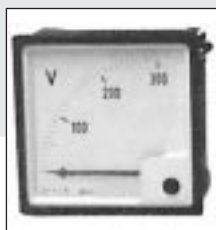
Standard version includes scale same as measuring range, bezel colour black, frequency 50 Hz, mounting-scale vertical. Ammeters will be supplied as 2 times overrange as standard version.

Scales are not changeable for EQ 48 size. Dual range EQ meters are also available. In ammeters, higher range is 2 times the lower range with accuracy class of 1.5 for higher range and class 2.5 for lower range. In voltmeters, higher range is 5 times the lower range with accuracy class of 1.5 for higher range and class 5 for lower range.

*2 : Depth behind bezel for EQ 72, 96, 144 ammeter above 30A and upto 60 A - 64 mm and above 60 A - 67 mm.

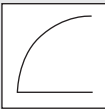


MOVING COIL METERS (WITH RECTIFIER), TYPE VQ



MOVING COIL MOVEMENTS FOR AC CURRENT AND FOR AC VOLTAGE RECTIFIER TYPE

Class 1.5 conforming to DIN 47380
Case conforming to DIN 43700

					
Type		VQ 48	VQ 72	VQ 96	VQ 144
Bezel size (mm)		48 × 48	72 × 72	96 × 96	144 × 144
Panel cut-out (mm)		45 ^{+0.6} × 45 ^{+0.6}	68 ^{+0.7} × 68 ^{+0.7}	92 ^{+0.8} × 92 ^{+0.8}	138 ^{+1.0} × 138 ^{+1.0}
Scale length (mm)		41	63	97	146
Depth behind bezel (mm)		53	53	53	53
Weight (nominal) (kg)		0.11	0.18	0.22	0.43
Range (full-scale)		Δ U / Ri	Δ U / Ri	Δ U / Ri	Δ U / Ri
$\mu A \sim$	100	1.3V	1.3V	1.3V	1.3V
	150	1.8V	2.4V	2.4V	2.4V
	250	1.9V	2.4V	2.4V	2.4V
	400	1.5V	2.4V	2.4V	2.4V
$mA \sim$	600	1.6V	2.4V	2.4V	2.4V
	1	1.6V	2.4V	2.4V	2.4V
	1.5	1.3V	1.4V	1.4V	1.4V
	2.5	1.4V	1.4V	1.4V	1.4V
	4	1.6V	1.4V	1.4V	1.4V
	6	1.6V	1.4V	1.4V	1.4V
	10	1.7V	1.4V	1.4V	1.4V
	15	1.7V	1.7V	1.7V	1.7V
	25	1.7V	1.7V	1.7V	1.7V
	40	1.9V	1.7V	1.7V	1.7V
	60	1.9V	1.7V	1.7V	1.7V
	100	2.0V	1.7V	1.7V	1.7V
$V \sim$	6	approx. 0.9 k Ω/V	approx. 0.9 k Ω/V	approx. 0.9 k Ω/V	approx. 0.9 k Ω/V
	10				
	15				
	25				
	40				
	60				
	100				
	150				
	250				
	300				
	400				
	500				
	600				

Note : Standard version will be supplied unless otherwise specified.
Standard version includes scale same as measuring range, bezel colour black,
frequency 50 Hz, mounting-scale vertical.
Scales are not changeable for VQ 48 size.

ΔU : Voltage drop across the meter at full scale value.

Ri : Internal resistance.



MOVING COIL METERS, TYPE PQ



MOVING COIL MOVEMENTS FOR DC CURRENT

Class 1.5 conforming to DIN 47380
Case conforming to DIN 43700

Type		PQ 48	PQ 72	PQ 96	PQ 144
Bezel size (mm)		48 × 48	72 × 72	96 × 96	144 × 144
Panel cut-out (mm)		45 ^{+0.6} × 45 ^{+0.6}	68 ^{+0.7} × 68 ^{+0.7}	92 ^{+0.8} × 92 ^{+0.8}	138 ^{+0.6} × 138 ^{+1.0}
Scale length (mm)		41	63	97	146
Depth behind bezel (mm)*3		53	53	53	53
Weight (nominal) (kg)		0.11	0.18	0.22	0.4
Range (full-scale)		Δ U	Δ U	Δ U	Δ U
μA ---	15 *4		140mV	140mV.	380mV
	25 *4	90mV	240mV	240mV	380mV
	40 *4	135mV	380mV	380mV	380mV
	60 *4	215mV	600mV	600mV	600mV
	100	270mV	400mV	400mV	400mV
	150	455mV	600mV	600mV	600mV
	250	120mV	140mV	140mV	140mV
	400	355mV	540mV	540mV	540mV
	500	220mV	540mV	540mV	540mV
	600	340mV	540mV	540mV	540mV
mA ---	1	30mV	40mV	40mV	40mV
	1.5	85mV			
	2.5	90mV			
	4	90mV			
	5	95mV	200mV	200mV	200mV
	6	95mV			
	10	95mV			
	15	15mV	10mV	10mV	10mV
	20				
	25				
	40				
	60				
	100				
	150	60mV	60mV	60mV	60mV
	250				
	400				
	600				
A ---	1				
	1.5				
	2.5				
	4				
	6	70mV	70mV	70mV	70mV
	10				
	15				
	25				
	30	60mV	60mV	60mV	60mV
	40				
	60				
	100				
for connection to external shunt		/60 mV /75mV /150mV	60mV 75mV 150mV	60mV 75mV 150mV	60mV 75mV 150mV

Note : Standard version will be supplied unless otherwise specified. Standard version includes scale same as measuring range, bezel colour black, frequency 50 Hz, mounting-scale vertical. Scales are not changeable for PQ 48 size.

Δ U : Voltage drop across the meter at full scale value.

* 3 : Depth behind bezel for PQ 48-6A to 25A : 75mm max; for PQ 72, 96, 144-6A to 60A : 67mm and above 60A : 78mm

* 4 : Class 2.5



MOVING COIL METERS, TYPE PQ



MOVING COIL MOVEMENTS FOR DC VOLTAGE

Class 1.5 conforming to DIN 47380
Case conforming to DIN 43700

Type		PQ 48		PQ 72		PQ 96		PQ 144	
Bezel size (mm)		48 × 48		72 × 72		96 × 96		144 × 144	
Panel cut-out (mm)		45 ^{+0.6} × 45 ^{+0.6}		68 ^{+0.7} × 68 ^{+0.7}		92 ^{+0.8} × 92 ^{+0.8}		138 ^{+1.0} × 138 ^{+1.0}	
Scale length (mm)		41		63		97		146	
Depth behind bezel (mm)		53		53		53		53	
Weight (nominal) (kg)		0.11		0.18		0.22		0.43	
Range (full-scale)		Ri		Ri		Ri		Ri	
mV $\equiv$	15 *5	1k Ω /V		3.33 k Ω /V		3.33 k Ω /V		3.33 k Ω /V	
	25 *5								
	40 *5								
mV $\equiv$	60 *6	1k Ω /V		1k Ω /V		1k Ω /V		1k Ω /V	
	100 *6								
	150								
V $\equiv$	250	1k Ω /V		1k Ω /V		1k Ω /V		1k Ω /V	
	400								
	600								
V $\equiv$	1	1k Ω /V		1k Ω /V		1k Ω /V		1k Ω /V	
	1.5								
	2.5								
V $\equiv$	4	1k Ω /V		1k Ω /V		1k Ω /V		1k Ω /V	
	6								
	10								
V $\equiv$	15	1k Ω /V		1k Ω /V		1k Ω /V		1k Ω /V	
	25								
	40								
V $\equiv$	60	1k Ω /V		1k Ω /V		1k Ω /V		1k Ω /V	
	100								
	150								
V $\equiv$	250	1k Ω /V		1k Ω /V		1k Ω /V		1k Ω /V	
	300								
	400								
V $\equiv$	500	1k Ω /V		1k Ω /V		1k Ω /V		1k Ω /V	
	600								

Note : Standard version will be supplied unless otherwise specified.
Standard version includes scale same as measuring range, bezel colour black, mounting-scale vertical.
Scales are not interchangeable for PQ 48 size.

*5 : Class 2.5.

*6 : Class 2.5 only for PQ 48.

POWER METERS, TYPE WQ



POWER METER WITH BUILT-IN TRANSDUCER FOR ALL TYPES OF NETWORKS AND LOADINGS

Class 1.5 conforming to DIN 47380
Case conforming to DIN 43700

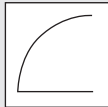
Type			WQ 96	WQ 144
Bezel size	(mm)	$\begin{matrix} + & \longrightarrow \\ & \downarrow \end{matrix}$	96 × 96	144 × 144
Panel cut-out	(mm)		$92^{+0.8} \times 92^{+0.8}$	$138^{+1.0} \times 138^{+1.0}$
Scale length	(mm)		97	146
Depth behind bezel	(mm)*7		105	105
Weight (nominal)	(kg)		between 0.65 and 1.1	between 0.65 and 1.1
Active Power	Type of network			
	in single-phase AC network	 E1W		
	in three-wire three-phase network balanced load	 D1W		
	in three-wire three-phase network unbalanced load	 D2W		
	in four-wire three-phase network balanced load	 V1W		
	in four-wire three-phase network unbalanced load	 V3W		
Reactive Power	in single-phase AC network	 E1B		
	in three-wire three-phase network balanced load	 D1B		
	in three-wire three-phase network unbalanced load	 D2B		
	in four-wire three-phase network balanced load	 V1B		
	in four-wire three-phase network unbalanced load	 V3B		
Please specify : 1. Any one Secondary Voltage rating of Voltage transformer from the following : (57.7, 63.5, 100, 110, 115, 120, 127, 208, 220, 230, 240, 289, 380, 400, 415, 440, 480, 500V). 2. Secondary current rating of the current transformer 1A or 5A.				
Range *8				
Voltage Transformer Ratio				
Current Transformer Ratio				
Installation Category (Overvoltage Category)			300 V, Cat III as per IEC 1010	
Pollution Degree			2 as per IEC 1010	

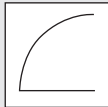
POWER FACTOR METERS, TYPE CQ

POWER FACTOR METER WITH BUILT-IN TRANSDUCER

Class 1.5 conforming to DIN 43780

Case conforming to DIN 43700

STANDARD DEPTH METERS					
Type		CQ 96 E	CQ 96 D	CQ 144 E	CQ 144 D
Type of network		Single-phase AC current	Three-wire, three-phase current balanced	Single-phase AC current	Three-wire three-phase current balanced
Bezel size	(mm)	96 × 96		144 × 144	
Panel cut-out	(mm)	92 ^{+0.8} × 92 ^{+0.8}		138 ^{+1.0} × 138 ^{+1.0}	
Scale length	(mm)	97		146	
Depth behind bezel	(mm)	105		105	
Weight (nominal)	(kg)	0.47		0.65	
Range					
cap. 0.5 - 1 - 0.5 ind.					
cap. 0.8 - 1 - 0.3 ind.					
cap. 0.8 - 1 - 0.8 ind.					
customised					
Please Specify : 1. Any one Secondary Voltage rating of Voltage transformer from the following : (57.7, 63.5, 100, 110, 115, 120, 127, 208, 220, 230, 240, 289, 380, 400, 415, 440, 480, 500V). 2. Secondary current rating of the current transformer 1A or 5A.					

REDUCED DEPTH METERS					
Type		CQ 96 ER	CQ 96 DR	CQ 144 ER	CQ 144 DR
Type of network		Single-phase AC current	Three-wire three-phase current balanced	Single-phase AC current	Three-wire three-phase current balanced
Bezel size (mm)		96 × 96		144 × 144	
Panel cut-out (mm)		92 ^{+0.8} × 92 ^{+0.8}		138 ^{+1.0} × 138 ^{+1.0}	
Scale length (mm)		97		146	
Depth behind bezel (mm)		53		53	
Weight (nominal) (kg)		0.25		0.40	
Range					
cap. 0.5 - 1 - 0.5 ind.					
cap. 0.8 - 1 - 0.3 ind.					
cap. 0.8 - 1 - 0.8 ind.					
customised					
Please specify : 1. Any one Secondary Voltage rating of Voltage transformer from the following : (57.7, 63.5, 100, 110, 115, 120, 127, 208, 220, 230, 240, 289, 380, 400, 415, 440, 480, 500V). 2. Secondary current rating of the current transformer 1A or 5A.					
Installation Category (Overvoltage Category)		300 V, Cat III as per IEC 1010			
Pollution Degree		2 as per IEC 1010			

Note :

Standard version will be supplied unless otherwise specified.

Standard version includes scale same as measuring range, bezel colour black, mounting - scale vertical, frequency 50 Hz.

Warm up time : 15 minutes at 100% of rated voltage and 80% of rated current.

For measurement of power factor in three phase four-wire balanced load network, any of the two (CQ □ E / CQ □ D) can be used.

Power factor meter for three phase three wire / four wire unbalanced load network is not manufactured, since it is an undefined quantity.

Parameter	Reference Range	Nominal Range of use
Current	95% to 100% of rated value	20% to 120% of rated value
Frequency	50 Hz ± 0.1%	49...50...51Hz for Single phase power factor meter 45...50...65Hz for three phase power factor meter

FREQUENCY METERS, TYPE ZQ

POINTER FREQUENCY METER WITH BUILT-IN TRANSDUCER

Class 0.5 conforming to DIN 43780 Case conforming to DIN 43700

				
Type		ZQ 72	ZQ 96	ZQ 144
Bezel size (mm)		72 × 72	96 × 96	144 × 144
Panel cut-out (mm)		68 ^{+0.7} × 68 ^{+0.7}	92 ^{+0.8} × 92 ^{+0.8}	138 ^{+1.0} × 138 ^{+1.0}
Scale length (mm)		63	97	146
Depth behind bezel (mm)		56	53	53
Weight (nominal) (kg)		0.21	0.29	0.50
Range	45 - 50 - 55 Hz			
	48 - 50 - 52 Hz			
	55 - 60 - 65 Hz			
	58 - 60 - 62 Hz			
	360 - 400 - 440 Hz			
	380 - 400 - 420 Hz			
	customised			
Please specify : 1. Any one Secondary Voltage rating of Voltage transformer from the following : (57.7, 63.5, 100, 110, 115, 120, 127, 208, 220, 230, 240, 289, 380, 400, 415, 440, 480, 500V).				
Installation Category (Overvoltage Category)		600 V, Cat III as per IEC 1010		
Pollution Degree		2 as per IEC 1010		

Notes : 1. Standard version will be supplied unless otherwise specified.

Standard version includes scale same as measuring range, bezel colour black, mounting scale vertical.

2. Dual voltage, 3 terminal versions, where meter can be connected either to 220V or 440V, are available as option.

Continued from page 17th for BiQ 96 and BiEQ 96

INSTRUMENT INDICATION (TYPICAL VALUES)

- * The indication shall be within the requirements of class index upto 5A.
- * Gradual saturation above 5A should be observed with a characteristics stated below.
- * Instrument with CT is designed for 20% overload continuously. Further overloads can be sustained for shorter period.

Primary (Input)	% of 5 A	Secondary (Indication)	% of 5 A
5 A	100 %	5 A ± 1.5 %	100 %
6 A	120 %	5.9 A max.	118 %
8 A	160 %	7.5 A	150 %
10 A	200 %	8.7 A	174 %
12 A	240 %	9.8 A	195 %
20 A	400 %	10.7 A	214 %
30 A	600 %	11.6 A	232 %
40 A	800 %	12 A	240 %



MAXIMUM DEMAND AMMETERS, TYPE BiQ/BiEQ



**MAXIMUM DEMAND AMMETER WITH
INTERCHANGEABLE SCALE FOR
CONNECTION TO TRANSFORMER .../1A OR .../5A**
Max. demand indication with adjustable slave
pointer reset knob for slave pointer sealable

		
Type	BiQ 96	BiEQ 96
Movement	Bimetal movement	Bimetal movement with additional moving-iron movement
Bezel size (mm)	96 × 96	96 × 96
Panel cut-out (mm)	92 ^{+0.8} × 92 ^{+0.8}	92 ^{+0.8} × 92 ^{+0.8}
Scale length		
Bimetal movement (mm)	97	71
Moving-iron movement (mm)	-	97
Depth behind bezel (mm)	53	53
Weight (kg)	0.26	0.30
Accuracy class		
Bimetal movement	max. 3	max. 3
Moving-iron movement	-	1.5
Power Consumption		
1A	< 1.6 VA	< 2.5 VA
5A	< 2.5 VA	< 3.4 VA
Transformer rating. .../1A, .../5A		
Response time (thermal time delay, bimetallic)	15 minutes (8 minutes on request)	15 minutes (8 minutes on request)
Installation Category (IEC1010)	300V, CAT III	300V, CAT III
Pollution degree (IEC 1010)	2	2

Note : 1. Standard version will be supplied unless otherwise specified. Standard version includes scale same as measuring range, bezel colour black, response time 15 min., mounting scale vertical
2. Over range : 1.2 times rated current for Bi EQ and Bi Q, 2 times for EQ movement of BiEQ meter.

* MAXIMUM DEMAND AMMETER WITH SATURATION CT.		
Type	BiQ 96	BiEQ 96
Movement	Bimetal movement	Bimetal movement with additional moving-iron movement
Bezel size (mm)	96 × 96	96 × 96
Panel cut-out (mm)	92 ^{+0.8} × 92 ^{+0.8}	92 ^{+0.8} × 92 ^{+0.8}
Scale length		
Bimetal movement (mm)	97	71
Moving-iron movement (mm)	-	97
Depth behind bezel (mm)	103	103
Weight (kg)	0.57	0.61
Accuracy class		
Bimetal movement	max. 3	max. 3
Moving-iron movement	-	1.5
Power Consumption		
1A	< 1.6 VA	< 2.5 VA
5A	< 2.5 VA	< 3.4 VA
Transformer rating. .../1A, .../5A		
Response time thermal time delay bimetallic	15 minutes (8 minutes on request)	15 minutes (8 minutes on request)
Installation Category (IEC1010)	300V, CAT III	300V, CAT III
Pollution degree (IEC 1010)	2	2

Unless requested otherwise, meters will be supplied with standard scales, black bezel, screw terminals, suitable for vertical mounting. Incase of mouting other than vertical, such as horizontal / inclined is required, and scale marking is different from standard scales are required, this must be specified in the order.

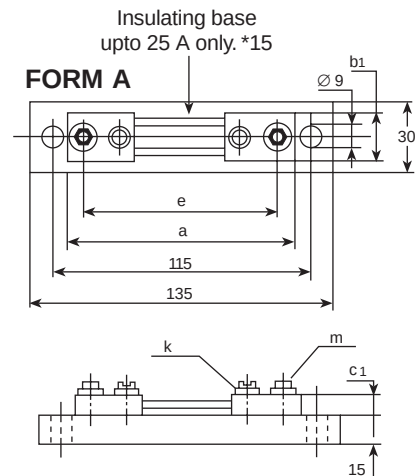
Continued on page 16th for Instrument Indication.

SHUNTS

CONFORMING TO DIN 43703

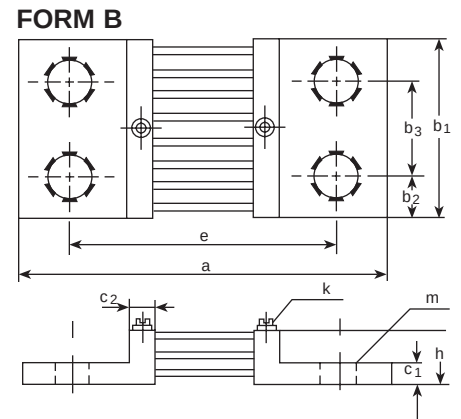
FROM A (I TYPE)

Voltage drop mV	Rated current (A)	All dimensions in mm										Current	
		a max.	b1	b2	b3	c1	c2	e	h	k	m	no. of conn.	
60	1-30	90	20	-	-	8	-	70	-	M4	M5	2×1	
	31-150	110	20	-	-	8	-	80	-	M4	M8	2×1	
75	1-30	90	20	-	-	8	-	88	-	M4	M5	2×1	
	31-150	120	20	-	-	8	-	100	-	M4	M8	2×1	
150	1-30	90	20	-	-	8	-	88	-	M4	M5	2×1	
	31-150	225	25	-	-	8	-	205	-	M4	M8	2×1	



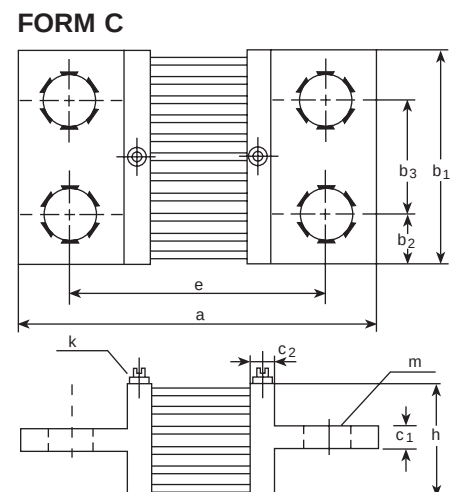
FROM B (L TYPE)

Voltage drop mV	Rated current (A)	All dimensions in mm										Current	
		a max.	b1	b2	b3	c1	c2	e	h	k	m	no. of conn.	
60	151-300	155	30	15	-	10	10	105	30	M4	M12	2×1	
	301-750	155	40	20	-	10	10	105	30	M4	M16	2×1	
	751-1000	175	60	30	-	10	10	115	30	M4	M20	2×1	
	1001-1500	175	90	21	48	10	10	115	30	M4	M16	2×2	
	1501-3000	175	120	30	60	10	10	115	30	M4	M20	2×2	
75	151-300	165	30	15	-	10	10	125	30	M4	M12	2×1	
	301-750	165	40	20	-	10	10	125	30	M4	M16	2×1	
	751-1000	185	60	30	-	10	10	135	30	M4	M20	2×1	
	1001-1500	185	90	21	48	10	10	135	30	M4	M16	2×2	
	1501-3000	185	120	30	60	10	10	135	30	M4	M20	2×2	
150	151-300	270	30	15	-	10	10	230	50	M4	M12	2×1	
	301-750	270	40	20	-	10	10	230	50	M4	M16	2×1	
	751-1000	290	70	35	-	10	10	240	60	M4	M20	2×1	
	1001-1500	290	90	21	48	15	10	240	60	M4	M16	2×2	
	1501-3000	290	120	30	60	15	10	240	60	M4	M20	2×2	



FROM C (T TYPE)

Voltage drop mV	Rated current (A)	All dimensions in mm										Current	
		a max.	b1	b2	b3	c1	c2	e	h	k	m	no. of conn.	
60	3001-5000	175	120	30	60	15	10	115	60	M4	M20	2×2	
	5001-7500	185	154	25	52	25	15	125	130	M4	M20	2×3	
	7501-10000	195	206	25	52	30	20	135	170	M4	M20	2×4	
	10001-15000	195	310	25	52	30	20	135	170	M4	M20	2×6	
75	3001-5000	185	120	30	60	15	10	135	60	M4	M20	2×2	
	5001-7500	195	154	25	52	25	15	145	130	M4	M20	2×3	
	7501-10000	205	206	25	52	30	20	155	170	M4	M20	2×4	
	10001-15000	205	310	25	52	30	20	155	170	M4	M20	2×6	
150	3001-5000	300	120	30	60	25	15	250	130	M4	M20	2×2	
	5001-7500	300	154	25	52	25	15	250	130	M4	M20	2×3	
	7501-10000	310	206	25	52	30	20	260	170	M4	M20	2×4	
	10001-15000	310	310	25	52	30	20	260	170	M4	M20	2×6	



Note : Available accuracy class : 0.5, 1.0. Required accuracy class should be specified while ordering. When current taken by the associated measuring instrument is smaller than the rated current multiplied by the class index of the shunt and divided by 300, the current taken by the associated measuring instrument may be neglected. All current connections must be connected while using the shunts to ensure the specification.

15* : Plastic shunt supports also available.

OPTIONAL FEATURES

GENERAL

Scales

Uncalibrated (Symbols and Company Logo printed. Pencil marking for zero nominal measuring range & overrange)

Blank (Without any printing. Pencil marking for zero, nominal measuring range & overrange)

Without scale (Calibration is carried out at zero point & nominal measuring range)

Scale without logo (Similar to standard scale without Company Logo)

Scale 0 ... 100%

Customised scales

Scale differing from standard available in corresponding measuring range table

Scale with customised measured quantity as a linear function

Scale with customised measurement quantity according to equation, curve or table

Scale with second division

Second division in linear function including numbering

Second division for customised measured quantity according to equation, curve or table including numbering

Supplementary to standard scale information

Additional scale marking e.g. 'loading'

Additional scale numbering

Red mark at any point of scale

Coloured sectors red, blue, green (other colours on request)

Black scale background, pointer, division or numbering yellow or white

Bezel colour

White, Red, Blue, Grey

Glass

Anti-glare

Red pointer assembly available for size 72 and 96

Mounting position

Other than scale vertical

OPTIONAL FEATURES



MOVING IRON MOVEMENTS

Range Differing from standard
Frequency 400 Hz Customised in range 50 Hz.... 400 Hz
Overload ranges Ammeter with 5 × overrange Ammeter with 6 × overrange Ammeter without overrange Voltmeter with 2 × overrange
Dual measuring range *10 2 measuring ranges with 3rd. terminal
Calibration for DC current DC voltage



MOVING COIL MOVEMENTS

Range Differing from standard
Zero point Between left and scale centre 4 ... 20 mA (suppressed zero)
High output impedance 4 k Ω / V in range 1 V ... 500V 10 kΩ / V in range 15 V ... 150V
Dual measuring range 2 measuring ranges with 3rd. terminal *11 *12
Lead resistance for connection to shunt resistors Other than 0.035Ω Value between 0.035 ... 0.5Ω
Calibration to output impedance 1% at 23° C *13
Trimmer *14

POWER METERS

Zero point Between left and scale centre
--

ACCESSORIES

Interchangeable scale in standard ranges
Leads for shunt connection: Resistance 0.035 Ω
Terminal cover
Back cover 72
Back cover 96/144
Rubber terminal cover
Polycarbonate terminal cover

ORDERING EXAMPLES

Power meter with built-in transducer 96×96 mm type WQ 96 D1W	
Type of network	active power in three-wire three phase balanced load
Input voltage	380 V
Input current	1 A
Range	0 ... 60 kW
Voltage transformer	--
Current transformer	100 / 1A
Frequency	50 Hz

Moving iron movement 72 × 72 mm type EQ 72	
Range	250 V AC
Scale	Same as measurement range (standard)
Bezel	black

Note : * 10 Not available for 48 × 48 size.

Note : * 11 Not available for 48 × 48 size.

* 12 Only for full-scale : 1 ... 10mA, 20mA ... 250mA and 60mV ... 250 V DC. (Full-scale II : 1 ... 10mA, 20mA...4A and 60mV ...250 V DC)

* 13 Only for full-scale : 15mA... 1mA and 1V ...600V DC, resistance value on request.

* 14 In the absence of class indication, for full-scale 10 V ...400V DC only, setting range min. +10%, max +20% or nominal value.