

DESCRIPTION

Moving Iron Instruments are protected from damage or breakage under adverse condition due to its spring loaded jewel & pivot system. And are free from external magnetic field influences because of magnetic shielding & are 'CE' certified. These instruments have a very efficient oil damping system, which gives almost a deadbeat movement to the pointer, without irksome oscillation. The movement is light yet sturdy and has a large torque to weight ratio which assures long life to instruments. These indicate true RMS values practically independent of waveform even of high harmonics. The scale is compressed initially. Readability starts from 10 to 15 degree approximately.

FEATURES

- ◆ Scale : Non-linear.
- ◆ Suppression : Initial suppression for Voltmeter & End suppression upto 6 times for Ammeter.
- ◆ Scale Colour : Special colour scales and marks for different ranges. (on request).
- ◆ Housing : Engineering plastic.
- ◆ Terminal Protection : Shrouded terminals to protect from accident. (on request).

ELECTRICAL SPECIFICATIONS

- ◆ TYPE : Moving Iron Slide In Scale.
- ◆ OPERATING VOLTAGE : 15V to 600V.
(For Voltmeter)
Burden : 100V/110V for PT secondary.
15V to 30V - <100mA, 50V to 100V - < 30mA, 110V to 200V - <15mA,
200V to 600V - <7.5mA.
- ◆ OPERATING CURRENT : 1A to 100A in 72 x 72, 1A to 200A in 96 x 96
(For Ammeter)
Burden : 1A/5A for CT secondary.
0.25A to 30A - < 1VA, Above 30A - < 1.5 VA.
- ◆ FREQUENCY : 45Hz ~ 65Hz. (400Hz. on request).
- ◆ ACCURACY : Class 1.5
- ◆ INSULATION RESISTANCE : Greater than 20MΩ at 500V DC
- ◆ DIELECTRIC TEST : 2kV RMS for 1 minute.
- ◆ OVERLOAD CONTINUOUS : 1.2 times
- ◆ OVERLOAD SHORT TIME : 2 times V_N / 10 times I_N for 5 seconds.
- ◆ OPERATING TEMP. : -10°C to 55°C
- ◆ STORAGE TEMP. : -20°C to 70°C
- ◆ HUMIDITY : Up to 95% RH
- ◆ CONFORMS TO : I.S. 1248 / I.E.C. 60051 (Part 2).

MECHANICAL SPECIFICATIONS

MODEL	SMI72 (Slide in)	SMI96 (Slide in)
SIZE (mm)	72 x 72 x 60	96 x 96 x 60
PANEL CUTOUT (mm)	68 x 68 ^{+0.7}	92 x 92 ^{+0.8}
SCALE LENGTH (Approx. mm)	60	90
WEIGHT (Approx. gms.)	< 145 For 72 SQ Amps < 180 For 72 SQ Volts	< 200 For 96 SQ Amps < 230 For 96 SQ Volts

Note : METERS ARE ALSO AVAILABLE IN 48X48X45 (SMI48) & 144X144X60 (SMI144) IN NON SLIDE IN DIAL VERSION.

MODEL	SMI48	SMI144
SIZE (mm)	48 X 48 X 45	144 X 144 X 50
PANEL CUTOUT (mm)	45 X 45 ^{+0.6}	138 X 138 ^{+1.0}
SCALE LENGTH (Approx. mm)	40	145
WEIGHT (Approx. gms.)	100	400

Ordering information

Type 2) Model 3) Operating Voltage & PTR for Voltmeter 4) Operating Current & CTR for Ammeter.



DESCRIPTION

Moving Coil Instruments are protected from damage or breakage under adverse conditions due to spring loaded jewel & pivot system. These instruments are free from external magnetic field influences because of centre magnet system & are "CE" certified. Voltmeters are made upto 600V for direct connection and upto 1200V with external multiplier with sensitivity 1000 ohms/V. Higher sensitivities are available. Scale printed for other variables viz. Speed, Temp, pH, kW, kVAR, Hz or $\cos\phi$ etc. can be supplied on request. Ammeters with internal shunts are available upto 30 Amps and for higher currents upto 12000 Amps use external shunts of 50mV, 60mV etc. (Please refer data sheet no. Shunt 03/99.)

FEATURES

- ◆ SCALE : Linear.
- ◆ SCALE COLOUR : Special colour scales & marks for different ranges. (on request).
- ◆ GLASS : Anti-glare. (on request).
- ◆ HOUSING : Engineering plastic.
- ◆ TERMINAL PROTECTION : Shrouded terminals to protect from accident. (on request).

ELECTRICAL SPECIFICATIONS

- ◆ TYPE : Moving Coil Slide in scale. (72/96 mm Size)
- ◆ OPERATING VOLTAGE : 50mV to 600V.
- ◆ OPERATING CURRENT : 100 μ A to 30A. & Above 30A external shunt.
- ◆ ACCURACY : Class 1.5%. (1% for 144 x 144 mm Size)
- ◆ INSULATION RESISTANCE : Greater than 20M Ω at 500V DC
- ◆ DIELECTRIC TEST : 2kV for RMS for 1min.
- ◆ OVERLOAD CONTINUOUS : 1.2 times.
- ◆ OVERLOAD SHORT TIME : 2 times V_N / 10 times I_N for 5 seconds.
- ◆ OPERATING TEMP. : -10°C to 55°C.
- ◆ STORAGE TEMP. : -20°C to 70°C.
- ◆ HUMIDITY : up to 95% RH
- ◆ CONFORMS TO : I.S. 1248 / I.E.C. 60051(Part 2).

MECHANICAL SPECIFICATIONS

MODEL	SMC 72	SMC 96
SIZE (mm)	72 X 72 X 60	96 X 96 X 60
PANEL CUTOUT (mm)	68 X 68 ^{+0.7}	92 X 92 ^{+0.8}
SCALE LENGTH (Approx. mm)	60	90
WEIGHT (Approx. gms.)	130	190

Note: METERS ARE ALSO AVAILABLE IN 48X48X45 (SMC48) & 144X144X60 (SMC144) IN NON SLIDE IN DIAL VERSION.

MODEL	SMC 48	SMC 144
SIZE (mm)	48 x 48 x 45	144 x 144 x 50
PANEL CUTOUT (mm)	45 X 45 ^{+0.6}	138 X 138 ^{+0.1}
SCALE LENGTH (Approx. mm)	40	145
WEIGHT (Approx. gms.)	100	400

Ordering information

1) Type 2) Model 3) Operating Voltage / Current 4) mV in case of Ammeter with external shunt.



DESCRIPTION

Moving coil instruments with circular scale of 240° employ a platinum taut band for suspension of moving coil assembly instead of pivot & jewel system. It is robust & less prone to sluggishness & zero shift due to functionless movement.

These meters are basically used for the measurement of AC & DC current & voltage. These meters with built in rectifier for the measurement of AC current & voltage in the frequency range 45-65Hz. / 400Hz., measures average values & are scaled to indicate RMS.

These instruments are not recommended for non-sinusoidal waveforms of current & voltage. The other indications like Frequency, Power & Power factor can be offered with suitable external transducers. Speed indication is possible if used with * AC tacho-generator.

(* not in the scope of AE).

FEATURES

- ◆ Long scale instruments.

ELECTRICAL SPECIFICATIONS

- ◆ TYPE : MOVING COIL 240°.
- ◆ OPERATING VOLTAGE : 60mV to 600V.
- ◆ OPERATING CURRENT : 500μA to 30A & Above 30A with external shunt.
- ◆ ACCURACY : Class 2.5% for SQ48, 1.5% for SQ72 & SQ96, 1.0% for SQ144, SQ110.
- ◆ INSULATION RESISTANCE : Greater than 20MΩ at 500V DC
- ◆ DIELECTRIC TEST : 2kV RMS for 1min.
- ◆ OPERATING TEMP. : -10°C to 55°C
- ◆ STORAGE TEMP. : -20°C to 70°C
- ◆ HUMIDITY : Up to 95% RH
- ◆ CONFORMS TO : I.S. 1248 / I.E.C. 60051 (Part 2)

MODEL	SQ 48	SQ 72	SQ 96	SQ 144	SQ 110
ACCURACY CLASS (%)	2.5	1.5 ^A	1.0 ^A	1.0 ^A	1.0 ^A
D.C. AMMETER(MIN.)			0 - 500μA		
(MAX.)	0 - 100mA ^B		0 - 30A ^C		
D.C. VOLTMETER(MIN.)			0 - 60mV		
(MAX.)	0 - 150mV ^B		0 - 600V		
A.C. AMMETER (MIN.)	0 - 10mA ^B		0 - 10mA		
(MAX.)	0 - 30A ^B		0 - 30A		
A.C. VOLTMETER(MIN.)	0 - 10V ^B		0 - 10V		
(MAX.)	0 - 600V ^B		0 - 600V		
FREQ. METER	POSSIBLE ^B		40Hz to 100Hz Span at 110V ~ 440V		
WATT/VAR METER	POSSIBLE ^B	POSSIBLE ^D	1PH, 3PH-2/3E : 110V-440V, 1A/5A	POSSIBLE ^E	
VA METER	POSSIBLE ^B	POSSIBLE ^D	3PH - 2/3E : 110V-440V, 1A/5A	POSSIBLE ^E	
PF METER	POSSIBLE ^B	POSSIBLE ^D	1PH, 3PH-1E : 110V ~ 440V., 1A/5A		

- * Note : 1) Range below minimum & above maximum on request if feasible.
2) ILLUMINATED DIAL METERS ON REQUEST

A : Accuracy Class 0.5Hz for all Frequency meter, 1.5% for SQ96, SQ144, SQ110

AC/Ammeter/Voltmeter & Power meter, 2° for all Power Factor meter,

B : For higher ranges use AE external shunts. (Refer Data Sheet no. Shunts 10 / 11).

C : SQ72 - Power & Power factor meter with external transducer box

D : SQ110 - Power meter with external transducer box.

MECHANICAL SPECIFICATIONS

MODEL	SQ 48	SQ 72	SQ 96	SQ 144	SQ 110
FLANGE (mm)	48 X 48	72 X 72	96 X 96	144 X 144	110 X 110
PANEL CUTOUT (mm)	45 X 45 ^{+0.6}	68 X 68 ^{+0.7}	92 X 92 ^{+0.8}	138 X 138 ^{+1.0}	100φ, 5φ. 4 holes 90x90
DEPTH (mm) DC	55	55	55	60	100
AC	55	75	75 ^A	60 ^A	100
SCALE LENGTH (Approx. mm)	70 - 75	105 - 110	150 - 155	225 - 230	175 - 180
WEIGHT (Approx. gms.) DC	200	250	300	500	450
AC	200	350	400 ^B	600 ^B	650

A : Depth 100mm for SQ96 & SQ144 Power meter.

B : Weight 1.2kg for SQ96 Power meter, 1.5kg for SQ144 Power meter.

Ordering information

1) Type 2) Model 3) Range

For all & additional

4) Frequency 5) Operating Voltage 6) Operating Current 7) PTR 8) CTR

For Power & Power Factor measurement.





DESCRIPTION

Power Factor meter indicates the cosine of phase angle between current and voltage. Input voltage & current signals are applied to phase sensing zero crossover circuitry & amplifier. It delivers direct current proportional to phase angle. Which drives a moving coil movement. The indication is cosine function of phase angle.

FEATURES

- ◆ Built in Transducer.
- ◆ Panel wiring is reduced.
- ◆ Low VA burden.

ELECTRICAL SPECIFICATIONS

- ◆ TYPE : a) Single Phase b) Three Phase - Single Element
- ◆ OPERATING VOLTAGE : 110V ~ 125V , 220V ~ 250V, 380V ~ 440V (P.T.Secondary) $\pm 20\%$
- ◆ OPERATING CURRENT : 1A OR 5A (C.T. Secondary)
- ◆ MEASURING RANGE : a) 0.5 (lead) -1.0 - 0.5 (lag)
b) 0.5 (lag) -1.0 - 0.5 (lead)
c) 0.7 (lead) -1.0 - 0.3 (lag)
- ◆ FREQUENCY : 50Hz. or 60Hz. ± 5 Hz.
- ◆ ACCURACY : $\pm 2^\circ$
- ◆ VA BURDEN : Voltage 0.5VA, Current 1VA
- ◆ INSULATION RESISTANCE : Greater than 20M Ω at 500V DC
- ◆ DIELECTRIC TEST : 2kV RMS for 1 minute.
- ◆ OPERATING TEMP. : 0°C to 55°C
- ◆ STORAGE TEMP. : -20°C to 70°C
- ◆ HUMIDITY : Up to 95% RH
- ◆ CONFORMS TO : I.S. 1248 / I.E.C. 60051 (Part - 5)

MECHANICAL SPECIFICATIONS

MODEL	BIPF SM 96	BIPF SQ 96	BIPF SM 144	BIPF SQ 144
SIZE (mm)	96 X 96 X 65	96 X 96 X 65	144 X 144 X 70	144 X 144 X 70
PANEL CUTOUT (mm)	92 X 92 ^{+0.8}	92 X 92 ^{+0.8}	138 X 138 ^{+1.0}	138 X 138 ^{+1.0}
SCALE LENGTH (Approx. mm)	90	155	140	230
WEIGHT (Approx. gms.)	300	400	700	650

Ordering information

- 1) Type 2) Model 3) Operating Voltage 4) Operating Current 5) Measuring Range



DESCRIPTION

'AE' Built in Transducer type Power Meter is equipped with a measuring transducer & a moving coil movement. It measures Active, Reactive & Apparent power in Single Phase & Three Phase system.

FEATURES

- ◆ The meter doesn't require external transducer, hence panel wiring is reduced.
- ◆ Auxiliary supply is not required (Self - Powered).

ELECTRICAL SPECIFICATIONS

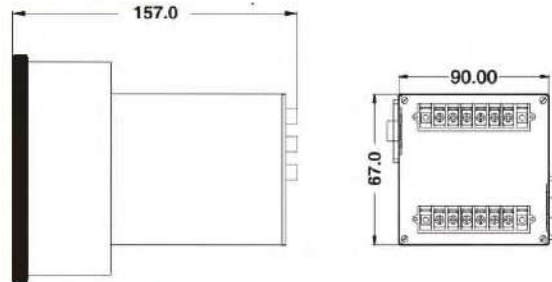
- ◆ TYPE : Active, Reactive & Apparent Power.
1 Ph / 3 Ph – 2 EL – 3 W / 3 Ph – 3 EL – 4 W
- ◆ INPUT VOLTAGE : 110V / 240V / 415V / 440V.
- ◆ INPUT CURRENT : 1A / 5A
- ◆ INPUT FREQUENCY : 50Hz or 60Hz
- ◆ MEASURING UNIT : Active Power : W, kW, MW
Reactive Power : Var, kVar, MVar
Apparent Power : VA, kVA, MVA
- ◆ ACCURACY : $\pm 1.5\%$ of full scale range
- ◆ VA BURDEN : Voltage : 3VA
Current : 1VA
- ◆ INSULATION RESISTANCE: Greater than 20M Ω at 500V DC
- ◆ DIELECTRIC TEST : 2kV RMS for 1 minute.
- ◆ OPERATING TEMP. : 0°C to 55°C
- ◆ STORAGE TEMP. : -20°C to 70°C
- ◆ HUMIDITY : Up to 95% RH
- ◆ CONFORMS TO : I.S. 1248 / I.E.C. 60051 (Part 3)

MECHANICAL SPECIFICATIONS

MODEL	SIZE (mm)	PANEL CUTOUT (mm)	WEIGHT (Approx. gms.)
BIAPM 96	96 x 96 x 157	92 x 92 ^{+0.8}	800
BIAPM 144	144 x 144 x 157	138 x 138 ^{+1.0}	1200

BIAPM 110, Size 110 x 110mm (available in 3P 2E 3W & 3P 3E 4W model)

DIMENSIONS

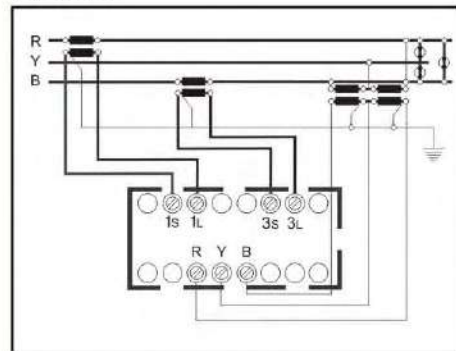


TERMINAL CONNECTIONS

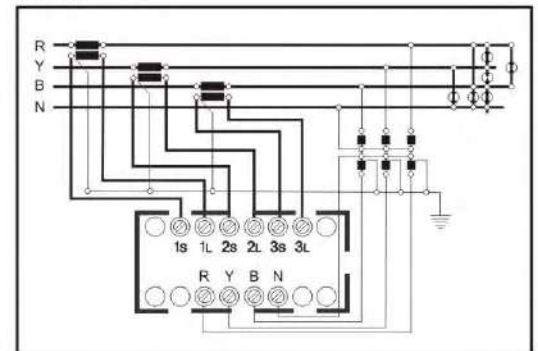
For 96 x 96				For 144 x 144			
Type	Voltage	Current	Aux. Supply	Type	Voltage	Current	Aux. Supply
1Ph	L1, N	1S, 1L	Self Powered	3Ph – 2EL – 3W	L1 = 3 L2 = 7 L3 = 11	1S = 2, 1L = 1 3S = 10, 3L = 9	Self Powered
3Ph – 2EL – 3W	L1, L2, L3	1S, 1L 3S, 3L		3Ph – 3EL – 4W	L1 = 3 L2 = 7 L3 = 11 N = 8	1S = 2, 1L = 1 2S = 6, 2L = 5 3S = 10, 3L = 9	
3Ph – 3EL – 4W	L1, L2, L3, N	1S, 1L 2S, 2L 3S, 3L					

TYPICAL WIRING DIAGRAM

For 96 x 96



For 144 x 144



Ordering information

- 1) Type 2) Size 3) Model 4) Active, Reactive or Apparent Power
- 5) Current with CTR if applicable 6) Voltage with PTR if applicable 7) Full scale indication.

DESCRIPTION

Dynamometric instruments are used for measurement of active, reactive & absolute power in 1 Phase & 3 Phase systems for balanced / unbalanced load conditions. Watt & Var instruments incorporate current coils, which are connected in series with the load & pressure coils of fine wire gauge, which are connected across the load. These instruments work on "Air cored Electro-Dynamometric" principle.

Power Factor meter incorporates two pressure coils one with non-inductive resistance in series & other with capacitance in series & are cross connected. The deflecting torque produced is proportional to the phase angle between current & voltage vectors. The pointer rests anywhere on the scale when meter is not connected in the circuit, as there is no controlling torque.

FEATURES

- ◆ SCALE : Non Linear. Side zero or center zero are available.
- ◆ ENCLOSURE : Sheet Metal (Black painted).
- ◆ TERMINAL PROTECTION : Shrouded terminals to protect from accident. (on request).

ELECTRICAL SPECIFICATIONS

- ◆ TYPE : Dynamometric.
- ◆ OPERATING VOLTAGE : 75V to 500V for 1Ph. 110V / 440V - PT secondary for 3Ph.
- ◆ BURDEN : <1.25VA upto 75V, <2.5VA 100V to 150V, <5VA 200V to 300V<10VA 350V to 600V
- ◆ OPERATING CURRENT : 0.5A to 10A for 1Ph. 1A / 5A - CT secondary for 3Ph.
- ◆ BURDEN : <5VA upto 5A, <10VA upto 10A.
- ◆ FREQUENCY : 45 ~ 65Hz. (400Hz. on request).
- ◆ ACCURACY : Class 1.5 for Watt / Var / . 2° for PF.
- ◆ INSULATION RESISTANCE : Greater than 20M Ω at 500V.DC
- ◆ DIELECTRIC TEST : 2kV RMS for 1 minute.
- ◆ OVERLOAD CONTINUOUS : 1.2 times
- ◆ OERLOAD SHORT TIME : 2 times V_N /10 times I_N for 5 seconds.
- ◆ OPERATING TEMP. : -10°C to 55°C
- ◆ STORAGE TEMP. : -20°C to 70°C
- ◆ HUMIDITY : Up to 95% RH
- ◆ CONFORMS TO : I.S. 1248 / I.E.C. 60051(Part 3) for WATT / VAR , (Part 5) for PF.



MECHANICAL SPECIFICATIONS

SIZE (mm)	DEPTH (mm)	PANEL CUTOUT (mm)	SCALE LENGTH (mm)	WEIGHT (gms.)
96 x 96 1Ph or 3Ph	See table 1	92 x 92 ^{+0.8}	80 (approx.)	See table 2
144 x 144 1Ph or 3Ph		138 x 138 ^{+1.0}	140(approx.)	

Table No. 1 (For Depth : in mm)

Para-meter	WATTMETER				VAR METER				PF METER			
	1PH	3P1E	3P2E	3P3E	1PH	3P1E	3P2E	3P3E	1PH	3P1E	3P2E	3P3E
96X96	80	80	100	100	-	-	100	-	80	80	-	-
144X144	85	85	125	165	-	-	125	165	125	125	-	-

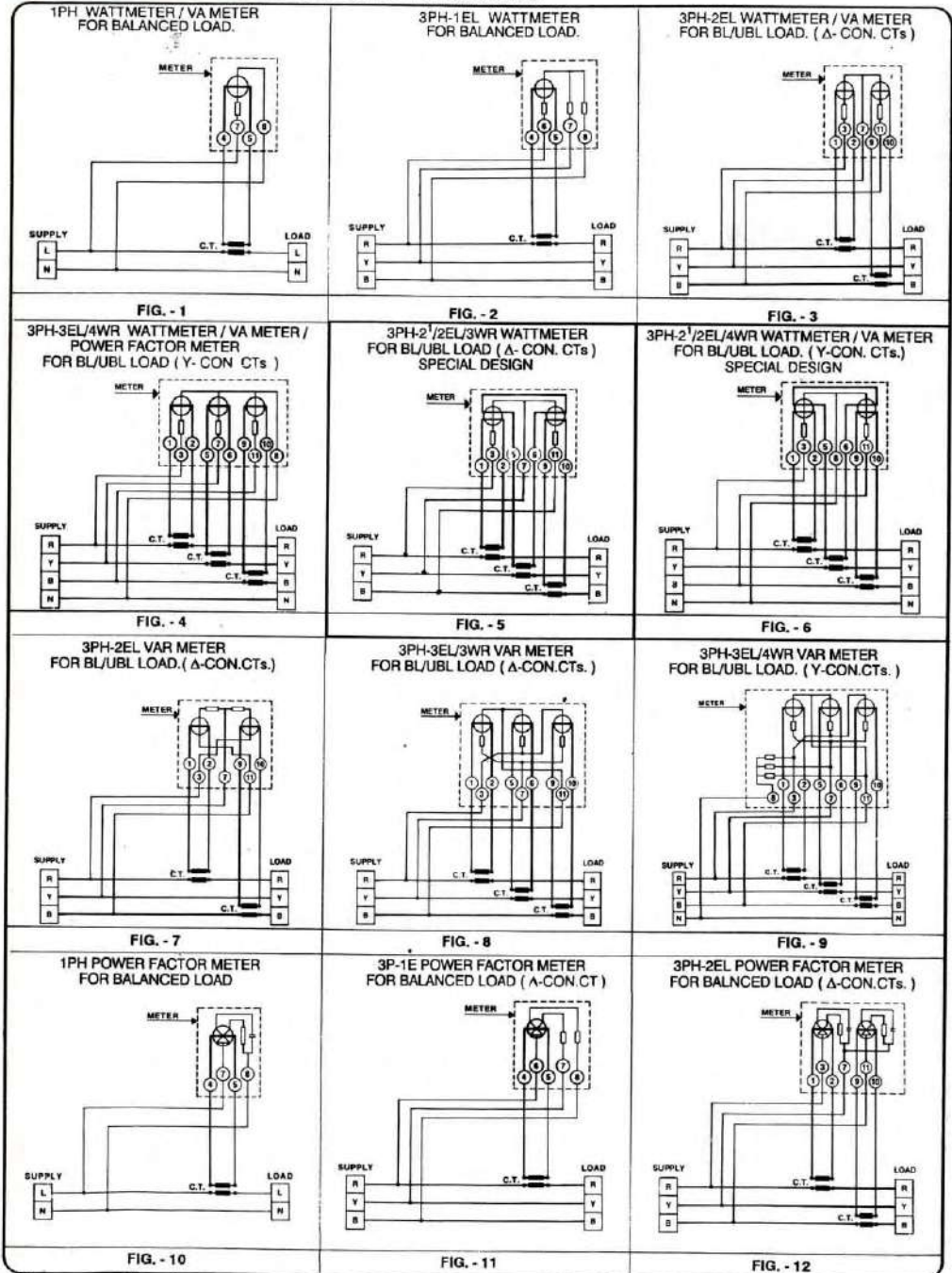
Table No. 2 (For Weight: in approx. kg)

Para-meter	WATTMETER				VAR METER				PF METER			
	1PH	3P1E	3P2E	3P3E	1PH	3P1E	3P2E	3P3E	1PH	3P1E	3P2E	3P3E
96X96	0.5	0.5	0.7	0.7	-	-	0.7	-	0.6	0.7	-	-
144X144	1.0	1.0	1.4	1.7	-	-	1.4	1.8	1.2	1.4	-	-

Note: The connection diagram label is affixed on each meter.

CONNECTION DIAGRAM

WIRING DIAGRAMS FOR SWITCHBOARD INSTRUMENTS



• The same wiring diagrams are applicable for connecting portable instruments also, for which separate connection diagram table is affixed on each meter.

Ordering information

- 1) Type 2) Size, Parameter, Phase & Element and Range
- 3) Operating Voltage & PTR 4) Operating Current & CTR

DESCRIPTION

It is used to measure the applied frequency. Vibrating Reed Frequency meters indicate the supply frequency by means of individual reeds. When rated voltage $\pm 20\%$ is applied across the terminals of the meter, the particular reed, whose natural frequency of vibration coincides with the supply frequency, vibrates with full amplitude. In case the supply frequency falls midway between two reeds both the reeds vibrate, at reduced amplitude. The amplitude of vibration at the tip of reeds is high enough for a distinct indication.

The instrument can be operated at 110V, 220V, or 440V. Terminal screws with washers are provided for the selected operating voltage & remaining two terminals are covered with insulated caps.

In case of RFD96 and RFD144 instruments, two sets of reeds with the same scale range can be offered, giving two independent meters in one casing. This facilitates in comparing the frequency of two voltage supplies for paralleling operation.

FEATURES

- ◆ Vibrating reed. ◆ Low power consumption
- ◆ No aging effect. ◆ Rugged construction
- ◆ Faster response. ◆ High reliability
- ◆ Lighter in weight.

ELECTRICAL SPECIFICATIONS

- ◆ TYPE : Vibrating Reed
- ◆ OPERATING VOLTAGE : 110V~125V, 220V~250V, 380V~440V.(4Terminals)
- ◆ POWER CONSUMPTION : Less than 0.3VA, 0.6VA and 1.2VA for respective voltage in 72 & 96.
Less than 0.6VA, 1.2VA, 2.4VA for respective voltage in 144
- ◆ INSULATION RESISTANCE: Greater than 20M Ω at 500V DC
- ◆ DIELECTRIC STRENGTH : 2kV RMS for 1minute.
- ◆ OPERATING TEMP. : -10°C to 55°C
- ◆ STORAGE TEMP. : -20°C to 70°C
- ◆ HUMIDITY : Up to 95% RH
- ◆ CONFORMS TO : I.S. 1248 / I.E.C. 60051(Part 4).

AVAILABLE RANGES

MODEL				RFS 72	RFS 96	RFD 96	RFS 144	RFD 144
RANGE	Resolution	Reeds	Acc. #	Single Scale	Single Scale	Double Scale	Single Scale	Double Scale
45 - 50 - 55	◆	13	± 1	■	■	■	■	■
47 - 50 - 53	0.5Hz	13	± 1	■	■	■	■	■
55 - 60 - 65	◆	13	± 1	■	■	■	■	■
57 - 60 - 63	0.5Hz	13	± 1	■	■	■	■	■
45 - 50 - 55	0.5Hz	21	± 1	--	--	--	■	■
55 - 60 - 65	0.5Hz	21	± 1	--	--	--	■	■

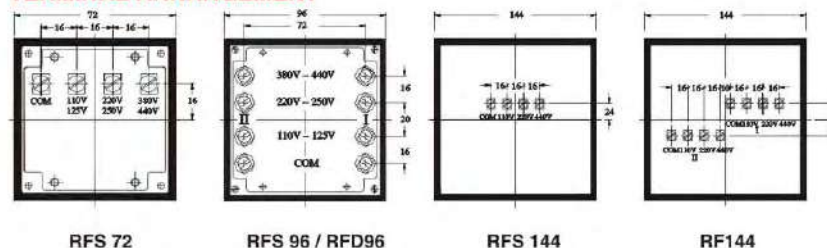
% of center frequency ■ Available models

- ◆ There are 11 reeds in a row in steps of 1Hz for range 45 - 50 - 55Hz (55 - 60 - 65Hz) with additional 2reeds for 49.5 and 50.5Hz (59.5 and 60.5Hz) respectively.

MECHANICAL SPECIFICATIONS

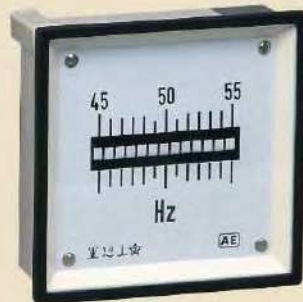
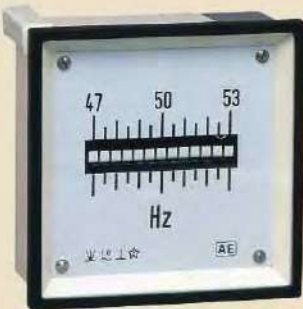
MODEL	RFS 72	RFS 96	RFD 96	RFS 144	RFD 144
SIZE (mm)	72 X 72 X 70	96 X 96 X 70	96 X 96 X 70	144 X 144 X 60	144 X 144 X 60
PANEL CUTOUT (mm)	68 X 68 ^{+0.7}	92 X 92 ^{+0.8}	92 X 92 ^{+0.8}	138 X 138 ^{+1.0}	138 X 138 ^{+1.0}
WEIGHT (Approx. gms.)	300gms.	360gms.	550gms.	650gms.	950gms.

TERMINAL ARRANGEMENT



Ordering information

- 1) Type 2) Model 3) Range



DESCRIPTION

It is used to measure the applied frequency, functionally similar to vibrating reed meter. The meter incorporates light emitting diodes which are used instead of vibrating reeds to indicate applied frequency. The frequency is determined by blinking LEDs. When applied frequency matches with the frequency marked on the dial, that particular LED blinks with maximum intensity. When the applied frequency is mid way between two adjacent LEDs, both LEDs blink. When the meter is "switched on" all the LEDs glow sequentially for a period of 1 to 1.5 seconds. Thereafter it will indicate the applied frequency.

All voltage ranges are available in single meter. Terminal screws with washers are provided only for specific voltage as per requirement & remaining two terminals are covered with insulated caps.

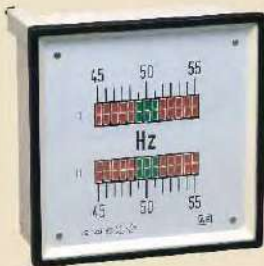
In case of 96mm & 144mm instruments, two sets of LEDs with the same scale range can be offered, giving two independent meters in one casing (Double Scale). This facilitates in comparing the frequency of two voltage supplies for paralleling operation.

FEATURES

- ◆ No vibrating parts.
- ◆ No aging effect.
- ◆ Faster response.
- ◆ Lighter in weight.
- ◆ Low power consumption
- ◆ No effect of external vibration
- ◆ Visible in dark & from distance.

ELECTRICAL SPECIFICATIONS

- ◆ TYPE : Electronic
- ◆ OPERATING VOLTAGE : 110V~125V, 220V~250V, 380V~440V.(4Terminals)
- ◆ POWER CONSUMPTION : Less than 3VA (Single scale), Less than 6VA (Double scale).
- ◆ MEASURING METHOD : Time measurement between consecutive cycles.
- ◆ DISPLAY : Box LED, Colour : Red/Green, Size : 6.3 X 3.7mm
- ◆ SAMPLING RATE : 2~3 samples/sec.
- ◆ RESPONSE TIME : Less than 1sec.
- ◆ INSULATION RESISTANCE : Greater than 20M Ω at 500V DC.
- ◆ DIELECTRIC STRENGTH : 2kV RMS for 1minute.
- ◆ OPERATING TEMP. : -10°C to 55°C
- ◆ STORAGE TEMP. : -20°C to 70°C
- ◆ HUMIDITY : Up to 95% RH
- ◆ CONFORMS TO : I.S. 1248 / I.E.C. 60051. (Part 4)



AVAILABLE RANGES

MODEL				ELFS 72	ELFS 96	ELFD 96	ELFS 144	ELFD 144
RANGE	Resolution	LEDs	Acc. #	Single Scale	Single Scale	Double Scale	Single Scale	Double Scale
45 – 50 – 55	◆	13	±1	■	■	■	■	■
47 – 50 – 53	0.5Hz	13	±1	■	■	■	■	■
55 – 60 – 65	◆	13	±1	■	■	■	■	■
57 – 60 – 63	0.5Hz	13	±1	■	■	■	■	■
370-400-430	5Hz	13	±1	■	■	■	■	■

% of centre frequency ■ Available models

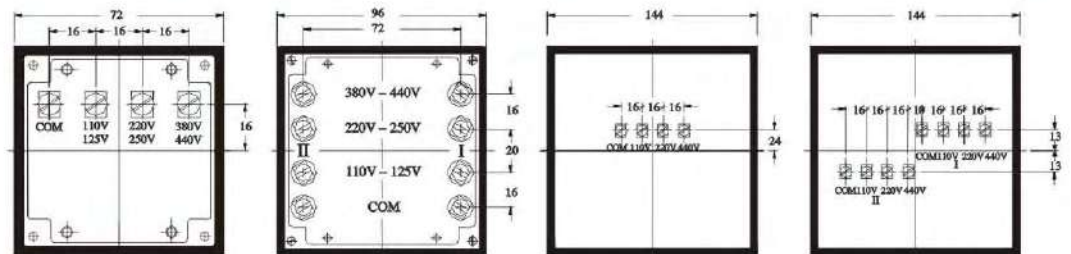
◆ There are 11 LEDs in a row in steps of 1Hz for range 45 – 50 – 55Hz (55 – 60 – 65Hz) with additional 2LEDs for 49.5 and 50.5Hz (59.5 and 60.5Hz) respectively.

NOTE : FREQUENCY METER FOR OTHER RANGE / RESOLUTION SHALL BE SUPPLIED ON REQUEST IF FEASIBLE.

MECHANICAL SPECIFICATIONS

MODEL	ELFS 72	ELFS 96	ELFD 96	ELFS 144	ELFD 144
SIZE (mm)	72 X 72 X 70	96 X 96 X 70	96 X 96 X 70	144 X 144 X 60	144 X 144 X 60
PANEL CUTOUT (mm)	68 X 68 ^{+0.7}	92 X 92 ^{+0.8}	92 X 92 ^{+0.8}	138 X 138 ^{+1.0}	138 X 138 ^{+1.0}
WEIGHT (Approx. gms.)	350gms.	400gms.	600gms.	500gms.	700gms.

TERMINAL ARRANGEMENT



ELFS 72

ELFS96 / ELFD96

ELFS144

ELFD144

Ordering information

1) Type 2) Model 3) Range 4) Operating Voltage



DESCRIPTION

'AE' SYNCHROSCOPE is categorized into two types A) Electro-mechanical and B) Electronic.

ELECTRO-MECHANICAL TYPE

It incorporates a POINTER and LED to indicate synchronising condition. If the generator- (II) frequency is higher or lower than that of mains- (I) the pointer rotates in clockwise or anti-clockwise direction respectively. The speed and direction of rotation depends upon difference in frequencies, which guides the operator to speed-up or slow-down the generator. Synchronising condition is determined by dark lamp method, wherein the pointer coincides with synchronising mark and the LED does not glow. The LED glows in accordance with difference in phase, frequency and amplitude of voltages. When the pointer is towards the bright LED, it indicates the antiphase condition. This synchroscope is available in two models:

1) SY96M 2) SY144M.

FEATURES

- ◆ Rugged construction.
- ◆ Easy serviceability.
- ◆ Wide operating voltage range.

ELECTRICAL SPECIFICATIONS

◆ TYPE	: Electro-mechanical
◆ VOLTAGE AT SYNCHRONISM	: 110V \pm 2%
◆ OPERATING VOLTAGE	: 110V \pm 20% (for other voltages use separate PT box.)
◆ FREQUENCY	: 50/60Hz. \pm 5%
◆ SYNCHRONISING CONDITION	: Dark lamp method
◆ ACCURACY	: \pm 2°
◆ ANGLE OF ROTATION	: 360°
◆ POWER CONSUMPTION	: 3VA for MAINS – (I), & 6VA for GENERATOR – (II)
◆ INSULATION RESISTANCE	: Greater than 20M Ω at 500V. DC.
◆ DIELECTRIC TEST	: 2kV RMS for One minute
◆ OPERATING TEMP.	: -10°C to 55°C
◆ STORAGE TEMP.	: -20°C to 70°C
◆ HUMIDITY	: Up to 95% RH
◆ INDICATION	: Moving pointer & LED
◆ CONFORMS TO	: I.S. 1248 / I.E.C. 60051. (Part 5)

MECHANICAL SPECIFICATIONS

◆ MODEL	: SYN 96 M	SYN 144 M
◆ SIZE	: 96 X 96 X 85mm	144 X 144 x 60 mm
◆ PANEL CUTOUT	: 92 X 92 ^{+0.8} mm	138 X 138 ^{+1.0} mm
◆ WEIGHT	: Approx.750gms.	1kg.

CAUTION: The meter is not to be left in circuit after synchronising.





DESCRIPTION

A rotating disc type instrument, which rotates in clockwise direction when correctly connected to incoming three phase power supply. Black arrow on white disk indicates correct phase sequence. If rotation is anti-clockwise then it indicates that one of the phases is reversed. It is suitable for use only in horizontal position and should not be left in circuit. Three, 1 metre long red, yellow, blue colour leads with clips and sheaths are provided.

ELECTRICAL SPECIFICATIONS

- ◆ TYPE : Electro-mechanical
- ◆ OPERATING VOLTAGE : 50V to 500V AC
- ◆ FREQUENCY : 25Hz to 60Hz.
- ◆ INSULATION RESISTANCE : Greater than 20M Ω at 500V DC
- ◆ DIELECTRIC STRENGTH : 2kV RMS for 1 minute
- ◆ OPERATING TEMP. : -10°C to 55°C
- ◆ STORAGE TEMP. : -20° to 70°C
- ◆ HUMIDITY : up to 95% RH

MECHANICAL SPECIFICATIONS

- ◆ MODEL : PSI 96 M
- ◆ SIZE : 96 X 96 X 56 mm
- ◆ WEIGHT : Approx. 600gms

Ordering information : 1) Model

DESCRIPTION

Maximum Demand meter is used for monitoring thermal loading in Power Distribution systems, Networks, Machines etc. It indicates maximum loading current over a period. Short-period current peaks are not registered but long overloads are registered.

In the Maximum Demand meter the measuring current flows through the bimetal spiral which is temperature sensitive. The free end of the spiral is connected to a black measuring pointer. The moving system is activated by heat generated by the current flowing through the spiral. The instrument is provided with an additional red slave pointer with a higher friction, which makes it to remain at its maximum position, which determines the maximum average loading current. The high torque of metallic movement drags the red pointer along with the black pointer. The red pointer remains stationary at the maximum value reached. This can be reset by rotating the knob provided on front facia. To prevent false indication due to fluctuations in ambient temperature, an additional bimetallic spiral is wound in opposite direction, which is mounted on the same spindle to compensate variation in temperature from 10 to +55 degrees Centigrade.

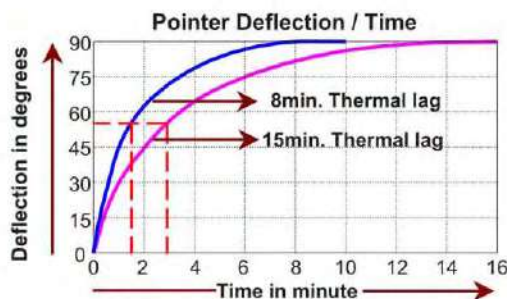
Frequently there is a need to measure instantaneous current simultaneously & hence moving iron movement having the same range is incorporated in the same meter.

FEATURES

- ◆ RMS measurement of maximum current.
- ◆ Long current peaks are registered.
- ◆ Red pointer to indicate maximum current reached.
- ◆ Analogue Indication.
- ◆ 20% overload capacity.
- ◆ Instantaneous current measurement. (3 Pointer)
- ◆ Sturdy movement.

ELECTRICAL SPECIFICATIONS

- ◆ TYPE : a) BIMETALLIC b) BIMETALLIC & ANALOGUE AMMETER.
- ◆ OPERATING CURRENT : 1Amp or 5Amp
- ◆ FREQUENCY : 40 ~ 65Hz.
- ◆ ACCURACY : ± 3% for resettable red pointer (Bimetallic).
±1.5% instantaneous value pointer (Moving Iron)
- ◆ THERMAL LAG (SETTING TIME) : 15 minutes (standard) & 8 minutes (on special request).
- ◆ VA BURDEN : Approx. 3.5VA for Bimetallic Ammeters &
Approx. 4VA for Bimetallic And Moving Iron Ammeter.
- ◆ INSULATION RESISTANCE : Greater than 20M ohms at 500V DC
- ◆ DIELECTRIC TEST : 2kV rms for 1 minute.
- ◆ OPERATING TEMP. : -10°C to 55°C (for Analogue Instrument)
- ◆ STORAGE TEMP. : -20°C to 70°C
- ◆ HUMIDITY : Up to 95% RH





Maximum Demand Meter

Instrument
Division

MECHANICAL SPECIFICATIONS

MODEL	MDIS 72A*	MDID 72A*	MDIS 96A	MDID 96A		
SIZE (mm)	72 x 72 x 70	72 x 72 x 70	96 x 96 x 70	96 x 96 x 70		
PANEL CUTOUT (mm)	68 x 68 ^{+0.7}	68 x 68 ^{+0.7}	92 x 92 ^{+0.8}	92 x 92 ^{+0.8}		
SCALE LENGTH (Approx.) OF BIMETALLIC SYSTEM	60mm	60mm	90mm	90mm		
SCALE LENGTH (Approx.) OF MI SYSTEM	N.A.	38mm	N.A.	70mm		
WEIGHT (Approx.)	0.180kg	0.200kg	0.230kg	0.250kg		
PRIMARY CURRENT	SECONDARY CURRENT : 5AMPS OR 1 AMPS — SCALE —					
MODEL	MDIS 72A	MDID 72A		MDIS 96A	MDID 96A	
100%	120%	120%	200%	120%	120%	200%
10 A	12 A	12 A	0 10 / 20A	12 A	12 A	0 10 / 20A
15 A	18 A	18 A	0 15 / 30 A	18 A	18 A	0 15 / 30 A
20 A	24 A	24 A	0 20 / 40 A	24 A	24 A	0 20 / 40 A
25 A	30 A	30 A	0 25 / 50 A	30 A	30 A	0 25 / 50 A
30 A	36 A	36 A	0 30 / 60 A	36 A	36 A	0 30 / 60 A
40 A	48 A	48 A	0 40 / 80 A	48 A	48 A	0 40 / 80 A
50 A	60 A	60 A	0 50 / 100 A	60 A	60 A	0 50 / 100 A
60 A	72 A	72 A	0 60 / 120 A	72 A	72 A	0 60 / 120 A
75 A	90 A	90 A	0 75 / 150 A	90 A	90 A	0 75 / 150 A
80 A	96 A	96 A	0 80 / 160 A	96 A	96 A	0 80 / 160 A
100 A	120 A	120 A	0 100 / 200 A	120 A	120 A	0 100 / 200 A
125 A	150 A	150 A	0 125 / 250 A	150 A	150 A	0 125 / 250 A
150 A	180 A	180 A	0 150 / 300 A	180 A	180 A	0 150 / 300 A
200 A	240 A	240 A	0 200 / 400 A	240 A	240 A	0 200 / 400 A
250 A	300 A	300 A	0 250 / 500 A	300 A	300 A	0 250 / 500 A
300 A	360 A	360 A	0 300 / 600 A	360 A	360 A	0 300 / 600 A
400 A	480 A	480 A	0 400 / 800 A	480 A	480 A	0 400 / 800 A
500 A	600 A	600 A	0 500 / 1000 A	600 A	600 A	0 500 / 1000 A
600 A	720 A	720 A	0 600 / 1200 A	720 A	720 A	0 600 / 1200 A
750 A	900 A	900 A	0 750 / 1500 A	900 A	900 A	0 750 / 1500 A
800 A	960 A	960 A	0 800 / 1600 A	960 A	960 A	0 800 / 1600 A
1000 A	1.2 kA	1.2 kA	0 1 / 2 kA	1.2 kA	1.2 kA	0 1 / 2 kA
1200 A	1.4 kA	1.4 kA	0 1.2 / 2.4 kA	1.4 kA	1.4 kA	0 1.2 / 2.4 kA
1500 A	1.8 kA	1.8 kA	0 1.5 / 3 kA	1.8 kA	1.8 kA	0 1.5 / 3 kA
2000 A	2.4 kA	2.4 kA	0 2 / 4 kA	2.4 kA	2.4 kA	0 2 / 4 kA
2500 A	3.0 kA	3.0 kA	0 2.5 / 5 kA	3.0 kA	3.0 kA	0 2.5 / 5 kA
3000 A	3.6 kA	3.6 kA	0 3 / 6 kA	3.6 kA	3.6 kA	0 3 / 6 kA
4000 A	4.8 kA	4.8 kA	0 4 / 8 kA	4.8 kA	4.8 kA	0 4 / 8 kA
5000 A	6.0 kA	6.0 kA	0 5 / 10 kA	6.0 kA	6.0 kA	0 5 / 10 kA

* PRESENTLY UNDER PROCESS.

Ordering information

- 1) Type 2) Model 3) Operating Current
- 4) C.T.R. 5) Thermal lag / Setting Time