



sifam tinsley
PRECISION INSTRUMENTATION

PLATINUM SERIES SWITCHBOARD METERS
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DATASHEET

Issue 1.3



Multifunction Meters

Transducers & Isolators

Temperature Controllers

Converters & Recorders

Digital Panel Meters

Current Transformers

Analogue Panel Meters

Shunts

Digital Multimeters

Clamp Meters

Insulation Testers

PLATINUM SERIES SWITCHBOARD METERS

Features

- Rugged pivot and jewel suspension
- Class 1 Accuracy
- Rigid metal housing
- Compact case sizes

SUBJECT TO CHANGE WITHOUT NOTICE

This manual superseded all previous versions – please keep for future reference

Application Areas

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

Benefits

- Meets all the requirements of ANSI-C39.1 (1981)
- Parallax error-free platform dials

Case Details

- All models have heavy gauge deep drawn steel cases with matte black texture to grant it elegance with sturdiness
- Panel mounting is by four integral studs
- Enameled with chrome plating

Front Cover Details

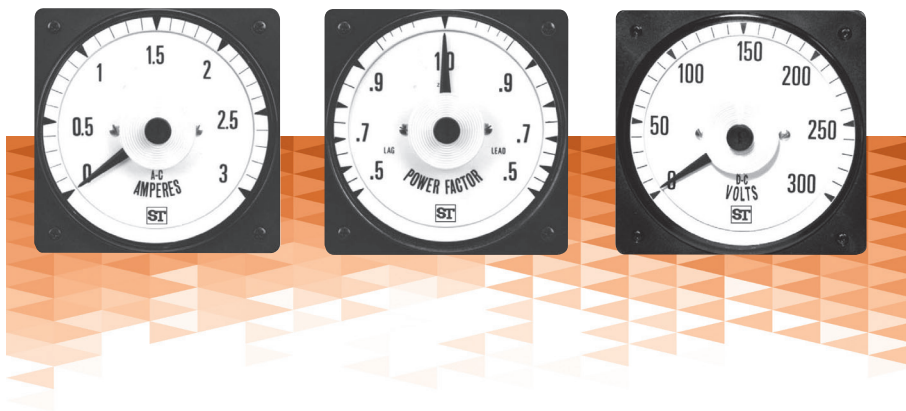
- Front Cover has bezel and window made by one piece flame retardant Polycarbonate molding with a black matte finished bezel area
- A specially contoured window to minimize reflection from adjacent light sources

Scales

- Scales are of span 250° division markings with parallax error-free platform dials
- Standard dials are white matte with black printed divisions and bar knife-edge pointers

Rear Terminals

- 10-32 UNF terminals
- PVC terminal covers to provide insulation to live terminals

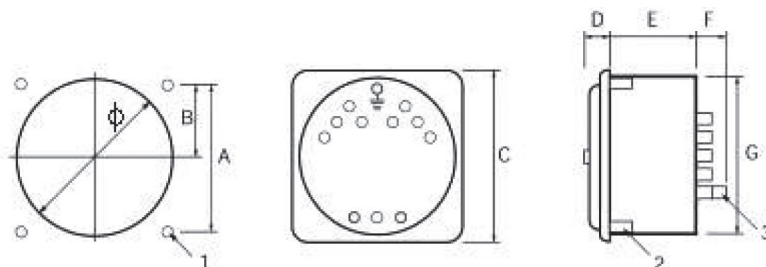


High quality range of Switchboard Instruments with class 1 accuracy, complying with American ANSI-C39.1(1981) specification. Available in 4 case size, their rugged design characteristics meet the needs of the most demanding environment applications. This extensive range of analogue meters provides 1% accuracy for all AC & DC ranges.

Specifications

Performance	ANSI C39.1 (1981)
Accuracy	Class 1
Terminals	10-32 UNF terminals
Dielectric voltage	Withstand test 2.3 kV for 1 minute
Response time	Approximately 2.5 seconds to full scale
Overshoot	33% maximum
Standard calibration	23°C ± 2°C (73.4°F ± 35.6°F)
Operating temperature	0°C to +40°C (32°F to +104°F)
Storage temperature	-10°C to +50°C (14°F to +122°F)
Extreme temp range	-20°C -to +65°C (-4°F to +149°F)
Enclosure integrity	IP54 (NEMA 3S) splash proof
Fixing on panel	4 integral 1/4 " - 28 UNF fixing studs

Dimensions



1 : Four Fixing holes $\Phi 8\text{mm}$ 2 : 1/4-28 UNF studs 3 : 10-32 UNF studs

Model	Panel cut-out						Rear view				Side View					
	Φ		A		B		C		D		E		F		G	
	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	
PtP1	103	4.06	86	3.37	43	1.69	110	4.31	17	0.65	56	2.20	25	0.98	101	
PtP2	103	4.06	86	3.37	43	1.69	110	4.31	17	0.65	86	3.4	28	1.10	101	

Product Ranges

Sr No.	Type of input	Ranges	Model
1	AC rectified ammeter	1A-30A	VLP1
2	AC rectified voltmeter	20V-600V	VLP1
3	DC milliammeter moving coil	200uA-1mA	PLP1
4	DC Ammeter moving coil	1mA-1A	PLP1
5	DC Voltmeter moving coil	50mV-600V	PLP1
6	Frequency meter	45-440 Hz	ZLP1
7	AC Wattmeter or Varmeter	1-5A, 69-450V (3P 3W & 3P 4W)	WLP2
8	Power factor	1A or 5A, 110-480 V	CLP2


PtP1 : AC & DC Ammeters, Voltmeter & Frequency Meters

This range of self contained, pivot and jewel moving coil meters features 250° linear scale.

High quality range of Switchboard Instruments with Class 1 accuracy, complying with American ANSI-C39.1 (1981) specifications.

Available in 4 1/2 " case size, their rugged design characteristics meet the needs of the most demanding environmental applications. This extensive range of analogue meters provides 1% accuracy for all AC and DC ranges.

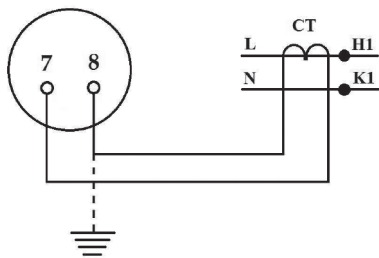


Fig. 1 Connection Diagram for Voltmeter/Frequency Meters with CT

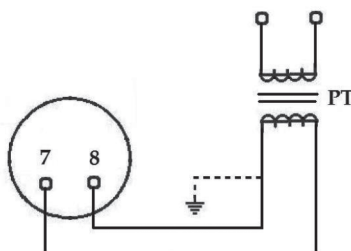


Fig. 2 Connection Diagram for Voltmeter/Frequency Meter with PT

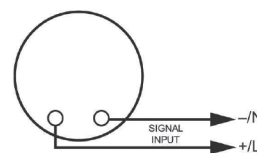


Fig. 3 Connection Diagram for Ammeter, Voltmeter and Frequency Meters (Direct Connection)

Specifications : General

Manufactured in accordance with American National Standards ANSI C39.1, (1981)

Accuracy	±1% full scale at 23°C (73.4°F)
Scales arc	250° full scale deflection
Scale length	175.2 mm (6.9")
Scale plate	2 piece, platform type
Response time	Approximately 2.5 seconds to full scale
Operating temperature	0 to 40°C (32 to 104°F)
Storage temperature	-10 to +50°C (14 to 122°F)
Extreme temperature range	-20° to +65°C (-4° to 149°F)
Terminals	Standard 10-32 UNF stud.
Dielectric withstand	2300V AC for 1 minute between electrical circuit and case
Overshoot	33% maximum
Enclosure code	IP54.
Position of use	Vertical (Scale)

Specifications : Ammeters and Voltmeters

Overload rating : AC & DC Ammeters - 1.2 x continuous, 10 x for 5 second, repeated 10 times with 1 minute interval
AC & DC Voltmeters and frequency meters - 1.2 x continuous

Frequency range : 50 or 60Hz $\pm$ 10%.

Specifications : Frequency Meters

Response time : 3 seconds maximum

External temperature influence : 0.6 times accuracy maximum with $\pm 10^{\circ}\text{C}$

External field influence : ($\pm 50^{\circ}\text{F}$) from reference temperature.
2.0 times accuracy maximum with 0.5mT field

Maximum Frequency - Hz	Center Scale - Hz	Error in Hz
45-55	50	± 0.15
46-54	50	± 0.15
45-65	55	± 0.25
50-70	60	± 0.25
55-65	60	± 0.15
56-64	60	± 0.15



AC Rectified Ammeters

Product Ranges – Self Contained 40/70Hz
(Accuracy $\pm 1\%$, 60Hz) Burden - 0.5 VA

Ratings	Scaling
1.0	0-1
1.5	0-1.5
2.0	0-2
3.0	0-3
5.0	0-5
7.5	0-7.5
10	0-10
15	0-15
20	0-20
30	0-30

Product Ranges – Transformer Rated 40/70Hz
Burden- 0.5 VA

Ratings	Scaling
5A	0-10A
5A	0-15A
5A	0-20A
5A	0-25A
5A	0-30A
5A	0-40A
5A	0-50A
5A	0-75A
5A	0-100A
5A	0-150A
5A	0-200A
5A	0-250A
5A	0-300A
5A	0-400A
5A	0-500A
5A	0-600A
5A	0-800A
5A	0-1000A
5A	0-1200A
5A	0-1500A
5A	0-1600A
5A	0-2000A
5A	0-2500A
5A	0-3000A
5A	0-4000A
5A	0-5000A
5A	0-6000A
5A	0-7000A
5A	0-8000A

Ratings	Scaling
1A	0-10A
1A	0-15A
1A	0-20A
1A	0-25A
1A	0-30A
1A	0-40A
1A	0-50A
1A	0-75A
1A	0-100A
1A	0-150A
1A	0-200A
1A	0-250A
1A	0-300A
1A	0-400A
1A	0-500A
1A	0-600A
1A	0-800A
1A	0-1000A
1A	0-1200A
1A	0-1500A
1A	0-1600A
1A	0-2000A
1A	0-2500A
1A	0-3000A
1A	0-4000A
1A	0-5000A
1A	0-6000A
1A	0-7000A
1A	0-8000A



AC Rectified Voltmeters

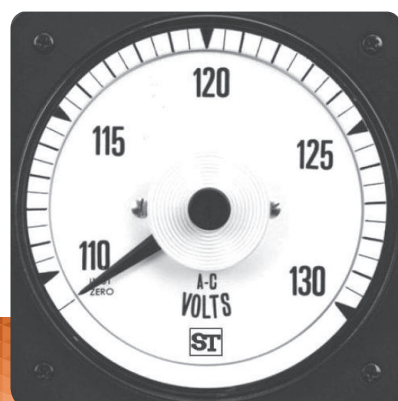
**Product Ranges – Self Contained 60Hz $\pm$ 20
(Accuracy $\pm$ 1 %) Burden - 1.5VA**

Ratings	Scaling
150V	0-150V
250V	0-250V
300V	0-300V
500V	0-500V
600V	0-600V

**Product Ranges – Transformer Rated 50/60HZ
(Accuracy $\pm$ 1 %) Burden - 1.5VA @ 150V**

Ratings	Scaling
150V	0-300V
150V	0-600V
150V	0-750V
150V	0-3000V
150V	0-5250V
150V	0-6000V
150V	0-9000V
150V	0-15kV
150V	0-18kV
150V	0-45kV
250V	0-600V

Ratings	Scaling
600V	0-300V
600V	0-600V
600V	0-750V
600V	0-3000V
600V	0-5250V
600V	0-6000V
600V	0-9000V
600V	0-15kV
600V	0-18kV
600V	0-45kV
600V	0-600V



**Product Ranges – Expanded Scale -
Moving Coil Zener Diode
(Accuracy $\pm$ 1 % of mid-scale value)**

Ratings	Scaling
110-130V 110-130V	
110-130V To suit PT	



DC Ammeters

DC Milliammeters

Product Ranges – Self Contained
(Accuracy $\pm 1\%$)

Ratings	Scaling
0-200 μ A	0-200 μ A
0-300 μ A	0-300 μ A
0-500 μ A	0-500 μ A
0-800 μ A	0-800 μ A
0-1mA	0-1mA

DC Ammeters

Product Ranges – Self Contained
(Accuracy $\pm 1\%$)

Ratings	Scaling
0-2mA	0-2mA
0-5mA	0-5mA
0-10mA	0-10mA
0-20mA	0-20mA
0-30mA	0-30mA
0-50mA	0-50mA
0-100mA	0-100mA
0-200mA	0-200mA
0-300mA	0-300mA
0-500mA	0-500mA
0-800mA	0-800mA
0-1A	0-1A

Product Ranges – Zero Left For Use With
50mV Shunts and 0.05 Ohm Shunt Leads

Ratings	Scaling
50mV	0-15A
50mV	0-20A
50mV	0-30A
50mV	0-40A
50mV	0-75A
50mV	0-100A
50mV	0-150A
50mV	0-200A
50mV	0-300A
50mV	0-400A
50mV	0-500A
50mV	0-750A
50mV	0-1000A
50mV	0-1200A
50mV	0-1500A
50mV	0-2000A
50mV	0-3000A

Product Ranges – Milliammeters -
Suppressed Zero,
No Zero Adjust Unless Specified

Ratings	Scaling
1/5mA	To Suit
4/20mA	To Suit
10/50mA	To Suit

Product Ranges – Shunt Rated
(Accuracy $\pm 1\%$)

Ratings	Scaling
50mV (4mA)	To suit
50-0-50 mV	shunt rating
100mV (4mA)	
100-0-100 mV	



DC Voltmeter

**Product Ranges – Sensitivity 1000 Ohms / Volt
(Accuracy $\pm 1\%$)**

Ratings	Scaling
50mV-600V	To suit
0-15V	0-15V
0-30V	0-30V
0-50V	0-50V
0-75V	0-75V
0-150V	0-150V
0-300V	0-300V
0-400V	0-400V
0-500V	0-500V
0-600V	0-600V

**Product Ranges – Zero Centre -
Sensitivity 2000 Ohms / Volt
(Accuracy $\pm 1\%$)**

Ratings	Scaling
150-0-150V	150-0-150V
300-0-300V	300-0-300V
500-0-500V	500-0-500V
600-0-600V	600-0-600V

Product Ranges – Suppressed Zero

Ratings	Scaling
1 - 5V	To suit



Frequency Meter

Product Ranges –120V Self Contained

Ratings	Scaling
50Hz+/-0.15	45-55Hz
50Hz+/-0.15	46-54Hz
50Hz+/-0.25	45-65Hz
60Hz+/-0.25	50-70Hz
60Hz+/-0.15	55-65Hz
60Hz+/-0.15	56-64Hz
60Hz+/-0.08	58-62Hz
400Hz+/-1.3	350-450Hz
400Hz+/-1.25	360-440Hz
400Hz+/- 0.8	380-420Hz



P2 : AC Wattmeters and Varmeters

The P2 series meters of AC Wattmeters and Varmeters incorporate a DC moving coil Jewel and Pivot suspended indicator with the micro-circuit watt transducer PCB to read power on single or three-phase systems.

Varmeters can be supplied with internal or external phase shifter according to user preferences.

The most frequently selected Wattmeter scale marking for common current and voltage transformers are listed on the following pages. In addition, these instruments may be supplied with zero-left or center-zero scales on request.

Scaling

Wattmeter and Varmeter current circuits should have equal carrying capacity because they are frequently connected in series. This means that the sum of the left and right end-scale values of the Varmeters should be equal to or greater than the full scale value of the Wattmeter (or have higher end-scale values if the instruments are center or offset-zero). Instruments measuring 10,000 kilowatts and over are marked in megawatts. Center-zero or offset-zero watt and Varmeters are marked "IN" for left deflection and "OUT" for right deflection. Scales for watts must be one of the standard full-scale dial markings shown in the charts.

Calibration

For full load value of Watts or Var, assuming unity power factor:

1-phase 2-wire watts = amps x volts

3-phase 3-wire watts = amps x line-to-line volts x $\sqrt{3}$ 3-phase 4-wire watts = amps x line-to-neutral volts x 3

Minimum scale values are obtained by multiplying resultant watts, using the above formula x 0.7 and selecting next higher standard scale.

For maximum scale value, multiply x 1.3 and select the next lowest standard.

If scale calculates to an exact listed value, use this value rather than the next higher or lower value.

Note : When ordering Wattmeters and Varmeters, please specify CT ratio, VT ratio and required scale.

Specifications

Performance	ANSI C39.1 (1981)
Accuracy	Class 1
Terminals	10-32 UNF terminals
Dielectric voltage	Withstand test 2.3 kV for 1 minute
Response time	Approximately 2.5 seconds to full scale
Overshoot	33% maximum
Standard calibration	23°C ± 2°C (73.4°F ± 35.6°F)
Operating temperature	0°C to +40°C (32°F to +104°F)
Storage temperature	-10°C to +50°C (14°F to +122°F)
Extreme temp range	-20°C to +65°C (-4°F to +149°F)
Enclosure integrity	IP54 (NEMA 3S) splash proof
Fixing on panel	4 integral 1/4 " - 28 UNF fixing studs

AC Wattmeters / Varmeters Selector Guide

	120	208	240	480
Primary potential transformer voltage system	(1:1)	(1.73:1)	(2:1)	(4:1)
3-phase 3-wire (L-L) system voltage	120	208	240	480
3-phase 4-wire (L-N) current transformer	69	120	139	277

RATIO 25/5 (5:1)	Normal Max. Min.	5KW 6 3	10KW 10 5	10KW 12 6	20KW 25 12.5
RATIO 50/5 (10:1)	Normal Max. Min.	10KW 12 6	20KW 20 10	20KW 25 12.5	40KW 50 25
RATIO 75/5 (15:1)	Normal Max. Min.	15KW 20 10	25KW 30 15	30KW 40 20	60KW 80 40
RATIO 100/5 (20:1)	Normal Max. Min.	20KW 25 12.5	30KW 40 20	40KW 50 25	75KW 100 50
RATIO 150/5 (30:1)	Normal Max. Min.	30KW 40 20	50KW 70 35	50KW 75 35	100KW 150 75
RATIO 200/5 (40:1)	Normal Max. Min.	40KW 50 25	75KW 80 40	75KW 100 50	150KW 200 100
RATIO 300/5 (60:1)	Normal Max. Min.	70KW 75 35	100KW 120 60	100KW 150 75	200KW 300 150
RATIO 400/5 (80:1)	Normal Max. Min.	75KW 100 50	125KW 150 75	150KW 200 100	300KW 400 200
RATIO 600/5 (120:1)	Normal Max. Min.	125KW 150 75	200KW 250 125	200KW 300 150	450KW 600 300
RATIO 800/5 (160:1)	Normal Max. Min.	150KW 200 100	250KW 350 175	300KW 400 200	600KW 800 400
RATIO 1000/5 (200:1)	Normal Max. Min.	200KW 250 125	350KW 450 225	400KW 500 250	800KW 1000 500
RATIO 1200/5 (240:1)	Normal Max. Min.	250KW 300 150	400KW 500 250	500KW 600 300	1000KW 1200 600
RATIO 1500/5 (300:1)	Normal Max. Min.	300KW 400 200	500KW 700 350	600KW 750 375	1200KW 1500 1000
RATIO 2000/5 (400:1)	Normal Max. Min.	400KW 500 250	750KW 800 400	800KW 1000 500	1600KW 2000 750
RATIO 3000/5 (600:1)	Normal Max. Min.	750KW 800 400	1000KW 1200 600	1200KW 1500 750	2000KW 3000 1500
RATIO 4000/5 (800:1)	Normal Max. Min.	800KW 1000 500	1200KW 1500 750	1500KW 2000 1000	3000KW 4000 2000
RATIO 5000/5 (1000:1)	Normal Max. Min.	1000KW 1250 500	1500KW 2000 1000	2000KW 2500 1250	4000KW 5000 2500
RATIO 6000/5 (1200:1)	Normal Max. Min.	1200KW 1500 750	2000KW 2500 1250	2500KW 3000 1500	5000KW 3000 1500



AC Wattmeters

**Product Ranges –Single Phase- Transformer Rated.
50/60Hz. (Accuracy 1.0 % 50/60Hz)**

Measured system				Scaling
Phases	Wires	Amperes 2 VA max. burden	Volts 4.5 VA max. burden	
1	2	5	120V	To suit
1	2	5	240V	To suit

For Connection diagram refer Fig. 4

**Product Ranges –3-Phase,3-Wire- Transformer Rated.
50/60Hz. (Accuracy 1.0 % 50/60Hz)**

Measured system				Scaling
Phases	Wires	Amperes 2 VA max. burden	Volts 4.5 VA max. burden	
3	3	5	120V	To suit
3	3	5	208V	To suit
3	3	5	240V	To suit
3	3	5	380V	To suit
3	3	5	480V	To suit

For Connection diagram refer Fig. 5 & Fig. 6

**Product Ranges –3-Phase,4-Wire- Transformer Rated.
50/60Hz. (Accuracy 1.0 % 50/60Hz)**

Measured system				Scaling
Phases	Wires	Amperes 2 VA max. burden	Volts 4.5 VA max. burden	
3	4	5	69 V	To suit
3	4	5	120 V	To suit
3	4	5	277 V	To suit
3	4	5	346 V	To suit

For Connection diagram refer Fig. 7 & Fig. 8

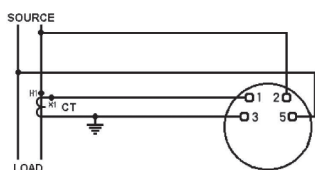


Fig. 4 AC Wattmeter Single Phase (1-element)

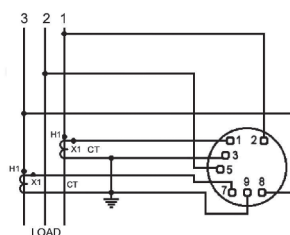


Fig. 5 AC Wattmeter 3-phase 3-wire unbalanced Load (2-element)

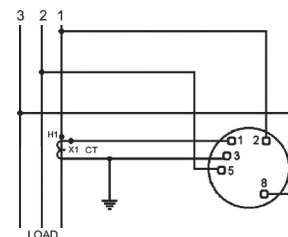


Fig. 6 AC Wattmeter 3-phase 3-wire balanced Load (1-element)

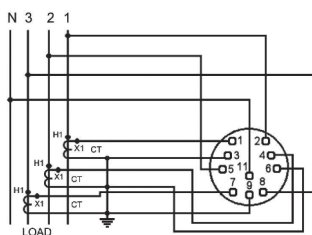


Fig. 7 AC Wattmeter 3-phase 4-wire unbalanced Load (3-element)

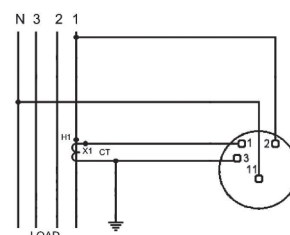


Fig. 8 AC Wattmeter 3-phase 4-wire balanced Load (1-element)

AC Varmeters

**Product Ranges –Single Phase- Transformer Rated.
50/60Hz. (Accuracy 1.0 % 50/60Hz)**

Measured system				Scaling
Phases	Wires	Amperes 2 VA max. burden	Volts 4.5 VA max. burden	
1	2	5	120V	To suit
1	2	5	240V	To suit

For Connection diagram refer Fig. 9

**Product Ranges – 3-Phase,3-Wire- Transformer Rated.
50/60Hz. (Accuracy 1.0 %. 50/60Hz)**

Measured system				Scaling
Phases	Wires	Amperes 2 VA max. burden	Volts 4.5 VA max. burden	
3	3	5	120V	To suit
3	3	5	208V	To suit
3	3	5	240V	To suit
3	3	5	380V	To suit
3	3	5	480V	To suit

For connection diagrams refer Fig. 10 & Fig. 11

**Product Ranges - 3-Phase,4-Wire-Transformer Rated.
50/60Hz (Accuracy 1.0 %, 50/60Hz)**

Measured system				Scaling
Phases	Wires	Amperes 2 VA max. burden	Volts 4.5 VA max. burden	
3	4	5	69 V	To suit
3	4	5	120 V	To suit
3	4	5	277 V	To suit
3	4	5	346 V	To suit

For connection diagrams refer Fig. 12 & Fig. 13

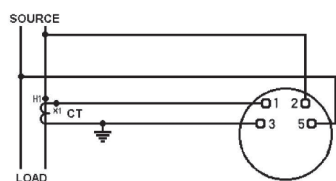


Fig. 9 AC Varmeter Single Phase (1-element)

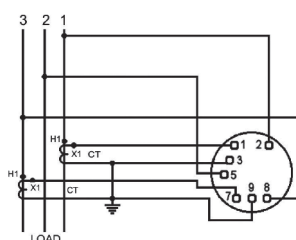


Fig. 10 AC Varmeter 3-phase 3-wire unbalanced Load (2-element)

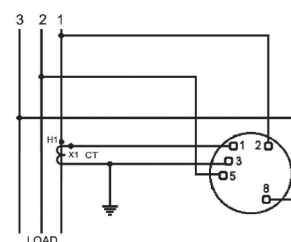


Fig. 11 AC Varmeter 3-phase 3-wire balanced Load (1-element)

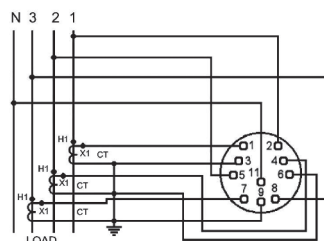


Fig. 12 AC Varmeter 3-phase 4-wire unbalanced Load (3-element)

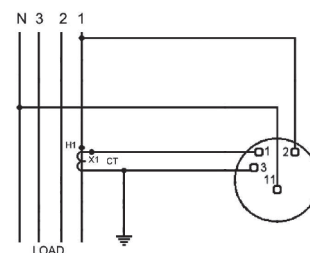


Fig. 13 AC Varmeter 3-phase 4-wire balanced Load (1-element)



AC Power Factor Meter

Specifications

Ratings, self-contained	Current windings 5A. Voltage windings minimum 50V, maximum 600V
Accuracy	Balanced Load: Class 1
Overshoot	33%
External temperature influence	0.5% fiducial max.
Frequency range	50Hz or 60Hz standard
System	Single Phase, 2 Wire 3P 3W Balance Load 3P 4W Balance Load
Frequency influence	Single phase instruments, 59 to 61Hz 1.0% fiducial maximum poly-phase instruments $\pm 10\%$ deviation from 60Hz : 1.0% fiducial.
Burdens	Each current circuit, 2VA approx. Each voltage circuit 3.5VA approx.
Ranges available	Lag 0.5 - 1 - 0.5 lead power factor

Product Ranges – Balanced Load (Accuracy $\pm 1\%$)

Phases	Measured system			Scaling
	Wires	Amperes 2 VA max. burden	Volts 4.5 VA max. burden	
1	2	5	240V	0.5-1-0.5
3	3/4	5	120V	0.5-1-0.5
3	3/4	5	208V	0.5-1-0.5
3	3/4	5	240V	0.5-1-0.5
3	3/4	5	480V	0.5-1-0.5

Instruments may be used on loads down to 20% of current and between 90% and 110% of voltage rating. Refer Connection diagram Fig. 14, 15 & 16

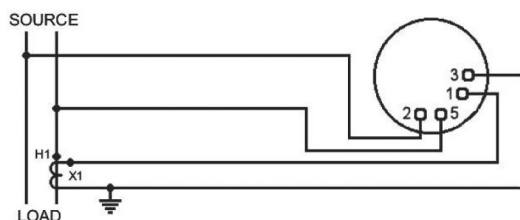


Fig. 14 Electronic Phase angle meter
Single Phase

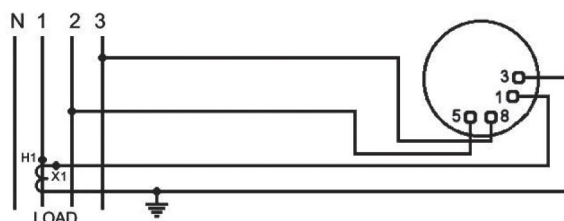


Fig. 15 Electronic Phase angle meter
3-phase, 4 wire Balanced Load

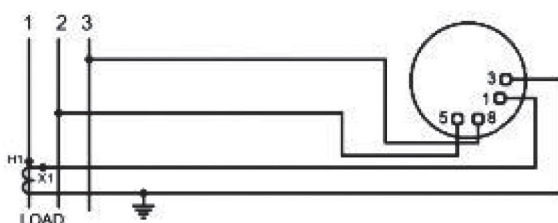


Fig. 16 Electronic Phase angle meter
3-phase, 3 wire Balanced Load

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