ANSI Switchboard Meters

High quality range of switchboard instruments with Class 1 accuracy and which complies with American ANSI-C39.1 (1981) specifications. Available in 4 1/2" case size, the rugged design characteristics meet the needs of the most demanding environmental applications. This extensive range of analog and digital/analog meters utilizes high shock and provides 1% accuracy for all RMS AC and DC ranges. The range offers various customized options and features.

Description

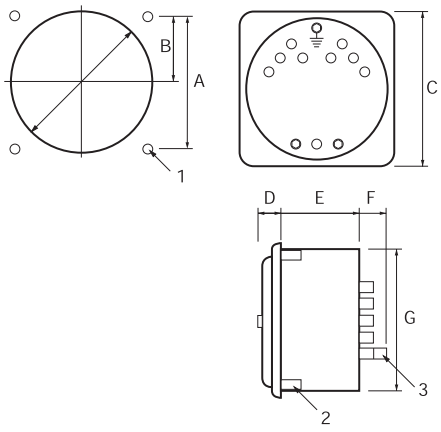
Our Switchboard Meter series offers two case types; models 007 and 078.

Model 078 is high shock hermetically sealed and all models have heavy gauge pressed steel cases. Mounting is by four integral studs. Model 078 has a die-cast bezel and a projecting moulded toughened glass window, which incorporates a gas tight zero adjuster.

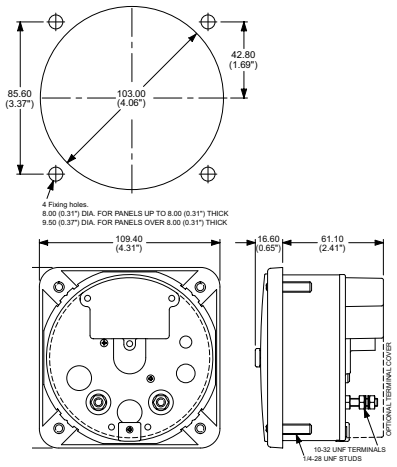
Model 007 is a one piece flame retardant polycarbonate moulding with a black matte finished bezel area, and a specially contoured window to minimize reflection from adjacent light sources.

Scales are 240° moving iron and 250° moving coil with parallax error-free platform dials. Standard dials are white matte with black printed scales and bar knife-edge pointers.

007 Power and 078



007 AMPs | Volts | Frequency Only



Specifications

Performance	ANSI C39.1 (1981)
Accuracy	Class 1
Terminals	10 - 32 UNF terminals
Response time	Approximately 2.5 seconds to full scale (007 and 078)
Dielectric voltage	Withstand test 2.3 kV for 1 minute
Standard calibration	23°C
Operating temperature	0°C to +60°C. Model 078: -40°C to +70°C
Storage temperature	-10°C to +50°C
Extreme temperature range	-20°C to +65°C
Enclosure integrity	Model 007 to IP54 (NEMA 3S) splash proof, Model 078 to IP67 (NEMA 6 and 6P
Fixing on panel	4 integral 1/4 -28 UNF fixing studs
Certifications	**Model 007=cULus (selected ranges)** **Model 078= ce Only**

Dimensions (in inches)

Model	Panel Cutout			Rear View		Side View		
	Dia	A	B	C	D	E	F	G
007 (Amps, Volts & Freq.)	4.06	3.37	1.69	4.31	0.65	2.41	-	4.05
007 Others	4.06	3.37	1.69	4.31	0.65	-	0.91	4.05
078	4.06	3.37	1.69	4.31	0.63	-	0.91	4.05

Dimension E on 007 others and 078 products varies with measured parameter. See product code on following page.

Dimension F on 078 (Amps, Volts & Freq.) products is included with dimension E.

1–4 Fixing holes Ø 8mm. 2–1/4-28 UNF fixing studs. 3–10-32 UNF terminals.

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Features
- Rugged pivot and jewel movement
- Class 1 accuracy

Terminal Cover Included with all units no extra charge

Benefits
- Meets all the requirements of ANSI-C39.1 (1981)
- Parallax error-free platform dials
- Bump, shock and vibration proof
- Customized options and features

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

Certifications

007= cULus (on selected ranges)

078= ce Only

Type of instrument	Ranges	DIMENSION E (mm)		Product code
		007	078	
AC rectified ammeter	1 - 30A	56	86	007/078-05B
AC rectified voltmeter	30 - 800V	56	86	007/078-05W
AC RMS ammeter	1 - 30A	56	86	007/078-05F
AC RMS voltmeter	150 - 750V	56	86	007/078-05G
Elapsed time meter (99999.99)	50 or 60Hz / 100 - 440V* and DC	56	56	007/078-155/156/077-15
Frequency meter	50, 60	56	56	007/078-41L
AC wattmeter or VArmeter	0.2 - 10A/100 - 440V*	86	86	007/078-21 or 31
LED synchroscope only	63.5 - 480V****	86	-	077-14A
LED synchroscope and synchro check relay	63.5 - 480V****	86	-	077-14 L/G/D/U
Phase sequence indicator	100 - 150, 151 - 300, 301 - 500V	56	-	077-12P
Transducer operated indicator	1, 5, 10, 20, or 4/20mA	56	56	007/078-05
DC ammeter moving coil	200QA - 30A 56	56	56	007/078-05A
DC voltmeter moving coil	50mV - 600V 56	56	56	007/078-05V
240° phase angle | power factor	1 or 5A, 100 - 400V, 50, 60	86	86	007/078-42
DIGI/Analog AC ammeter	1mA - 10A	86	-	007-DIB
DIGI/Analog AC voltmeter	200mV - 600V	86	-	007-DIW
DIGI/Analog DC ammeter	1mA - 1A	86	-	007-DIA
DIGI/Analog DC voltmeter	20mV - 600V	86	-	007-DIV
DIGI/Analog transducer indicator	DC mA	86	-	007-DIT
DIGI/Analog tachometer	AC or DC rated	86	-	007-DI2

* 100-440V = (100/125, 200/250, 380/440).
**100-440V = (100/125, 200/250, 380/440). Frequencies 45/55, 55/65, 45/65, 46/54, 50/70, 58/62, 56/64.
****Nominal voltage to be specified.

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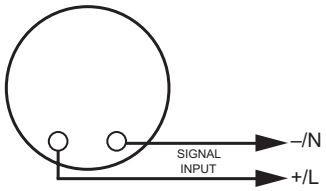
Fig. AA 007-05/007-41



AC and DC Ammeters, Voltmeters and Frequency Meters

This range of self contained, pivot and jewel moving iron meters feature 250° linear scale. AC instruments are available with true RMS converting circuit or RMS compensated rectifier. While types of frequency meters can be damaged by transient supply voltage spike, Crompton Instruments 007-41 frequency meters can withstand, without damage, 10 successive transient spikes of 1250 volts. The range offers c-UL-us certification.

Specifications-General

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

Accuracy	±1% full scale at 23°C (73°F)
Scales arc	250° full scale deflection
Scale length	007 and 078: 175.2 mm (6.9")
Scale plate	2 piece, platform type
Response time	007 and 078: 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. M5 screw clamp is optional
Dielectric withstand	2300V AC for 1 minute between electrical circuit and case
Overshoot	33% maximum
Enclosure code	007: IP54, optional IP55 and 078: IP67
Certification	c-UL-us

Specifications-Ammeters and Voltmeters

Overload rating	AC ammeters - 2 x continuous, 50 x for 1 second AC voltmeters and frequency meters - 1.2 x continuous DC ammeters - 2 x continuous 10 x for 1 second DC voltmeters - 1.2 x continuous
Frequency range	AC calibration 50/60Hz ±20%

Specifications-Frequency Meters

Response time	3 seconds maximum
External temperature influence	0.6 times accuracy maximum with ±10°C from reference temperature
External field influence	2.0 times accuracy maximum with 0.5m T field
Acceptable input harmonic influence	up to 30% distortion

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

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RMS Reading AC Ammeters

AC Ammeter

Product Codes – Self Contained 50/60 Hz - Accuracy ±1%, 60Hz***

Rating	Scaling*	4 1/2" square flange	
		Std. case catalog number	Std. case hi-shock catalog number
1A	0-1A	•007-05FA-LALA-C7	078-05FJ-LALA-C7
1.5A	0-1.5A	•007-05FA-LCLC-C7	078-05FJ-LCLC-C7
2A	0-2A	•007-05FA-LELE-C7	078-05FJ-LELE-C7
3A	0-3A	•007-05FA-LJLJ-C7	078-05FJ-LJLJ-C7
5A	0-5A	•007-05FA-LSLS-C7	078-05FJ-LSLS-C7
7.5A	0-7.5A	•007-05FA-MFMF-C7	078-05FJ-MFMF-C7
10A	0-10A	•007-05FA-MTMT-C7	078-05FJ-MTMT-C7
15A	0-15A	•007-05FA-NDND-C7	078-05FJ-NDND-C7
20A	0-20A	•007-05FA-NGNG-C7	078-05FJ-NGNG-C7
30A	0-30A	•007-05FA-NLNL-C7	078-05FJ-NLNL-C7

C7=50/60 Hz note: model 078= approval 'ce' only

For AC rectified non-RMS compensated meter, please replace the -05F in the product code with -05B.

Product Codes – Transformer Rated 50/60Hz - Burden 0.3VA***

5A	0-10A	•007-05FA-LSMT-C7	078-05FJ-LSMT-C7
5A	0-15A	•007-05FA-LSND-C7	078-05FJ-LSND-C7
5A	0-20A	•007-05FA-LSNG-C7	078-05FJ-LSNG-C7
5A	0-25A	•007-05FA-LSNJ-C7	078-05FJ-LSNJ-C7
5A	0-30A	•007-05FA-LSNL-C7	078-05FJ-LSNL-C7
5A	0-40A	•007-05FA-LSNP-C7	078-05FJ-LSNP-C7
5A	0-50A	•007-05FA-LSNT-C7	078-05FJ-LSNT-C7
5A	0-75A	•007-05FA-LSPB-C7	078-05FJ-LSPB-C7
5A	0-100A	•007-05FA-LSPK-C7	078-05FJ-LSPK-C7
5A	0-150A	•007-05FA-LSPZ-C7	078-05FJ-LSPZ-C7
5A	0-200A	•007-05FA-LSRL-C7	078-05FJ-LSRL-C7
5A	0-250A	•007-05FA-LSRS-C7	078-05FJ-LSRS-C7
5A	0-300A	•007-05FA-LSRX-C7	078-05FJ-LSRX-C7
5A	0-400A	•007-05FA-LSSC-C7	078-05FJ-LSSC-C7
5A	0-500A	•007-05FA-LSSF-C7	078-05FJ-LSSF-C7
5A	0-600A	•007-05FA-LSSJ-C7	078-05FJ-LSSJ-C7
5A	0-800A	•007-05FA-LSSN-C7	078-05FJ-LSSN-C7
5A	0-1000A	•007-05FA-LSSS-C7	078-05FJ-LSSS-C7
5A	0-1200A	•007-05FA-LSSU-C7	078-05FJ-LSSU-C7
5A	0-1500A	•007-05FA-LSTC-C7	078-05FJ-LSTC-C7
5A	0-1600A	•007-05FA-LSTE-C7	078-05FJ-LSTE-C7
5A	0-2000A	•007-05FA-LSTM-C7	078-05FJ-LSTM-C7
5A	0-2500A	•007-05FA-LSTU-C7	078-05FJ-LSTU-C7
5A	0-3000A	•007-05FA-LSUA-C7	078-05FJ-LSUA-C7
5A	0-4000A	•007-05FA-LSUE-C7	078-05FJ-LSUE-C7
5A	0-5000A	•007-05FA-LSUJ-C7	078-05FJ-LSUJ-C7
5A	0-6000A	•007-05FA-LSUP-C7	078-05FJ-LSUP-C7
5A	0-7000A	•007-05FA-LSUS-C7	078-05FJ-LSUS-C7
5A	0-8000A	•007-05FA-LSUW-C7	078-05FJ-LSUW-C7

C7=50/60 Hz note: model 078= approval 'ce' only

For AC rectified non-RMS compensated meter, please replace the -05F in the product code with -05B.

* Other scales are available.
*** For case types 007/078 use 10-32 UNF terminals.
• c-UL-us certified.

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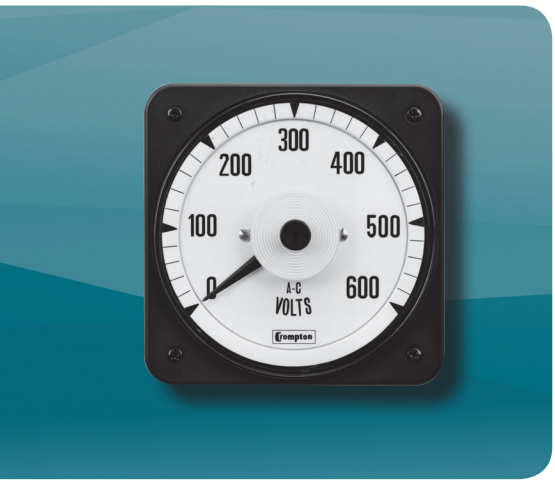

AC Voltmeter

RMS Reading AC Voltmeters

Product Codes – Self Contained 50/60Hz ± 20% - Accuracy ±1%***

Rating	Scaling*	4 1/2" square flange	
		Std. case catalog number	Std. case hi-shock catalog number
150V	0-150V	•007-05GA-PZPZ-C7	078-05GJ-PZPZ-C7
250V	0-250V	•007-05GA-RSRS-C7	078-05GJ-RSRS-C7
300V	0-300V	•007-05GA-RXRX-C7	078-05GJ-RXRX-C7
500V	0-500V	•007-05GA-SFSF-C7	078-05GJ-SFSF-C7
600V	0-600V	•007-05GA-SJSJ-C7	078-05GJ-SJSJ-C7

C7=50/60 Hz note: model 078= approval 'ce' only

For AC rectified non-RMS compensated meter, please replace the -05G in the product code with -05W.

Product Codes – Transformer Rated 50/60Hz - Accuracy +/- 1 % 0.8VA @ 150V***

150V	0-300V	•007-05GA-PZRX-C7	078-05GJ-PZRX-C7
150V	0-600V	•007-05GA-PZSJ-C7	078-05GJ-PZSJ- C7
150V	0-750V	•007-05GA-PZSM-C7	078-05GJ-PZSM- C7
150V	0-3000V	•007-05GA-PZUA-C7	078-05GJ-PZUA-C7
150V	0-5250V	•007-05GA-PZUL-C7	078-05GJ-PZUL-C7
150V	0-6000V	•007-05GA-PZUP-C7	078-05GJ-PZUP-C7
150V	0-9000V	•007-05GA-PZUY-C7	078-05GJ-PZUY- C7
150V	0-15kV	•007-05GA-PZWC-C7	078-05GJ-PZWC-C7
150V	0-18kV	•007-05GA-PZWD-C7	078-05GJ-PZWD-C7
150V	0-45kV	•007-05GA-PZWJ-C7	078-05GJ-PZWJ- C7
250V	0-600V	•007-05GA-RSSJ-C7	078-05GJ-RSSJ- C7

C7=50/60 Hz note: model 078= approval 'ce' only

For AC rectified non-RMS compensated meter, please replace the -05G in the product code with -05W.

* Other scales are available.
** Scaling information provided at time of order.
*** For case types 007/078 use 10-32 UNF terminals.
• c-UL-us listed.

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DC Ammeters

Product Codes – Self Contained - Accuracy ±1%***

Rating	Scaling*	4 1/2" square flange	
		Std. case catalog number	Std. case hi-shock catalog number
0-200uA	0-200uA	•007-05AA-EAEA	078-05AJ-EAEA
0-300uA	0-300 uA	•007-05AA-EEEE	078-05AJ-EEEE
0-500uA	0-500uA	•007-05AA-EMEM	078-05AJ-EMEM
0-800uA	0-800uA	•007-05AA-EWEW	078-05AJ-EWEW
0-1mA	0-1mA	•007-05AA-FAFA	078-05AJ-FAFA
0-2mA	0-2mA	•007-05AA-FGFG	078-05AJ-FGFG
0-5mA	0-5mA	•007-05AA-FXFX	078-05AJ-FXFX
0-10mA	0-10mA	•007-05AA-HAHA	078-05AJ-HAHA
0-20mA	0-20mA	•007-05AA-HFHF	078-05AJ-HFHF
0-30mA	0-30mA	•007-05AA-HMHM	078-05AJ-HMHM
0-50mA	0-50mA	•007-05AA-HXHX	078-05AJ-HXHX
0-100mA	0-100mA	•007-05AA-JRJR	078-05AJ-JRJR
0-200mA	0-200mA	•007-05AA-KAKA	078-05AJ-KAKA
0-300mA	0-300mA	•007-05AA-KGKG	078-05AJ-KGKG
0-500mA	0-500mA	•007-05AA-KMKM	078-05AJ-KMKM
0-800mA	0-800mA	•007-05AA-KWKW	078-05AJ-KWKW
0-1A	0-1A	•007-05AA-LALA	078-05AJ-LALA
0-5A	0-5A	•007-05AA-LSLS	078-05AJ-LSLS
0-10A	0-10A	•007-05AA-MTMT	078-05AJ-MTMT
0-15A	0-15A	•007-05AA-NDND	078-05AJ-NDND
0-20A	0-20A	•007-05AA-NGNG	078-05AJ-NGNG
0-30A	0-30A	•007-05AA-NLNL	078-05AJ-NLNL

note: model 078= approval 'ce' only

Product Codes – milliamps Suppressed Zero, No Zero Adjust

4/20mA	To Suit	•007-05RA-HG**	078-05RJ-HG**

**=STATE SCALING & CAPTION

note: model 078= approval 'ce' only

Product Codes – Shunt Rated - Accuracy ±1%***

Rating	Scaling*	4 1/2" square flange	
		Std. case catalog number	Std. case hi-shock catalog number
50mV	To suit shunt rating	•007-05AA-EY**	078-05AJ-EY**
50-0-50mV		•007-05CA-GB**	078-05CJ-GB**
100mV		•007-05AA-GB**	078-05AJ-GB**
100-0-100mV		•007-05CA-GM**	078-05CJ-GM**

**=STATE SCALING & CAPTION

note: model 078= approval 'ce' only

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

50mV	0-15A	•007-05AA-EYND	078-05AJ-EYND
50mV	0-20A	•007-05AA-EYNG	078-05AJ-EYNG
50mV	0-30A	•007-05AA-EYNL	078-05AJ-EYNL
50mV	0-40A	•007-05AA-EYNP	078-05AJ-EYNP
50mV	0-75A	•007-05AA-EYPB	078-05AJ-EYPB
50mV	0-100A	•007-05AA-EYPK	078-05AJ-EYPK
50mV	0-150A	•007-05AA-EYPZ	078-05AJ-EYPZ
50mV	0-200A	•007-05AA-EYRL	078-05AJ-EYRL
50mV	0-300A	•007-05AA-EYRX	078-05AJ-EYRX
50mV	0-400A	•007-05AA-EYSC	078-05AJ-EYSC
50mV	0-500A	•007-05AA-EYSF	078-05AJ-EYSF
50mV	0-750A	•007-05AA-EYSM	078-05AJ-EYSM
50mV	0-1000A	•007-05AA-EYSS	078-05AJ-EYSS
50mV	0-1200A	•007-05AA-EYSU	078-05AJ-EYSU
50mV	0-1500A	•007-05AA-EYTC	078-05AJ-EYTC
50mV	0-2000A	•007-05AA-EYTM	078-05AJ-EYTM
50mV	0-3000A	•007-05AA-EYUA	078-05AJ-EYUA

note: model 078= approval 'ce' only

DC Ammeter

- c-UL-us certified.
  Specify shunt lead resistance value if in excess of 0.05 ohms for calibration purposes.
  DC shunt rated ammeters have thermistor circuit ambient temperature compensation.
  Separate shunt and shunt leads are not included.

* Other scales are available.

** Specify scale required.

*** Other mV ratings and scale options available upon request.

**** For case types 007/078 use 10-32 UNF terminals.

DC Voltmeter

DC Voltmeters

Product Codes – Sensitivity 1000 Ohms / Volt - Accuracy ±1%***

Rating	Scaling*	4 1/2" square flange	
		Std. case catalog number	Std. case hi-shock catalog number
500MV- 600 V	To suit	•007-05VA-**	078-05VJ-**
0-15V	0-15V	•007-05VA-NDND	078-05VJ-NDND
0-30V	0-30V	•007-05VA-NLNL	078-05VJ-NLNL
0-50V	0-50V	•007-05VA-NTNT	078-05VJ-NTNT
0-75V	0-75V	•007-05VA-PBPB	078-05VJ-PBPB
0-150V	0-150V	•007-05VA-PZPZ	078-05VJ-PZPZ
0-300V	0-300V	•007-05VA-RXRX	078-05VJ-RXRX
0-400V	0-400V	•007-05VA-SCSC	078-05VJ-SCSC
0-500V	0-500V	•007-05VA-SFSF	078-05VJ-SFSF
0-600V	0-600V	•007-05VA-SJSJ	078-05VJ-SJSJ

**=STATE INPUT , SCALING , & CAPTION

note: model 078= approval 'ce' only

Product Codes – Zero Center - Sensitivity 2000 Ohms / Volt Accuracy ±1%***

150-0-150V	150-0-150V	•007-05NA-RXRX	078-05NJ-RXRX
300-0-300V	300-0-300V	•007-05NA-SJSJ	078-05NJ-SJSJ
500-0-500V	500-0-500V	•007-05NA-SSSS	078-05NJ-SSSS
600-0-600V	600-0-600V	•007-05NA-SUSU	078-05NJ-SUSU

note: model 078= approval 'ce' only

Frequency Meter

Frequency Meters

Product Codes – 120V Self Contained***

Ratings	Scaling*	4 1/2" square flange	
		Std. case catalog number	Std. case hi-shock catalog number
50Hz +/-0.15	45-55Hz	•007-41LA-PNAG-AG	078-41LJ-PNAG-AG
50Hz +/-0.15	46-54Hz	•007-41LA-PNAH-AH	078-41LJ-PNAH-AH
50Hz +/-0.25	45-65Hz	•007-41LA-PNAJ-AJ	078-41LJ-PNAJ-AJ
60Hz +/-0.25	50-70Hz	•007-41LA-PNAL-AL	078-41LJ-PNAL-AL
60Hz +/-0.15	55-65Hz	•007-41LA-PNAN-AN	078-41LJ-PNAN-AN
60Hz +/-0.15	56-64Hz	•007-41LA-PNAO-AO	078-41LJ-PNAO-AO
60Hz+/-0.08	58-62Hz	•007-41LA-PNAT-AT	078-41LJ-PNAT-AT

note: model 078= approval 'ce' only

For alternative voltage rating 200-250V, use code RN instead of PN.
For alternative voltage rating 380-480V, case types 007/078 use code SE instead of PN.

10-32 UNF terminals.
* Other scales are available.
** Specify scale required.
***For case types 007/078 use 10-32 UNF terminals.
• c-UL-us certified.

Crompton TECHNOLOGY

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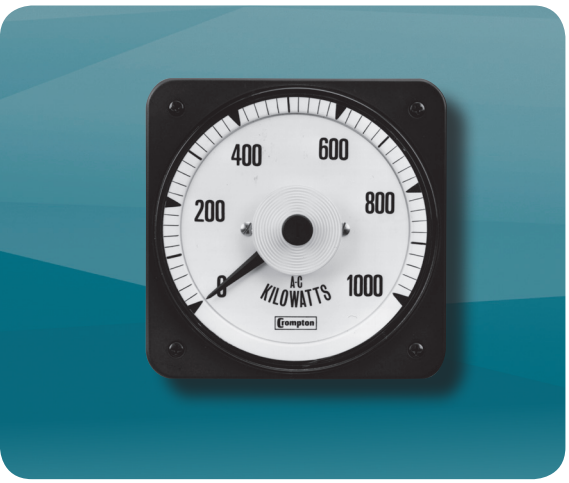

AC Wattmeters and VArmeters

The Crompton Instruments Switchboard series of AC Wattmeters and VArmeters incorporate a DC moving coil, pivot and jewel indicator with a micro-circuit watt transducer PCB to read power on single or three-phase systems. 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 scale.

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. On ordering, Wattmeter and VArmeter scales will be calculate, the nearest preferred scale will be offered from the charts on the following pages. Custom scales are available but at an extra cost.

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 √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

Burden per element	Current circuit: 2VA | Voltage Circuit: 1VA
Accuracy	Class 1.0
Ambient range	0° to ± 60° (32° to 104°F) std. calibration 20°C (68°F)
Ambient influence	0.05% per 1°C maximum
Overloads-current	10 x rating for 5 seconds, 1.2 x continuously
Voltage influence	2 x rating for 5 seconds, 1.2 x continuously voltage
	Accuracy maintained, 80 - 110% rated voltage
Power factor influence	Accuracy maintained, 0.1 lag to 0.1 lead
Enclosure code	007 IP54 optional IP55 | 078 IP67
Response time	007 and 078 approximately 2.5 seconds
Dielectric withstand	Live parts to case including panel 2600V RMS for 1 minute

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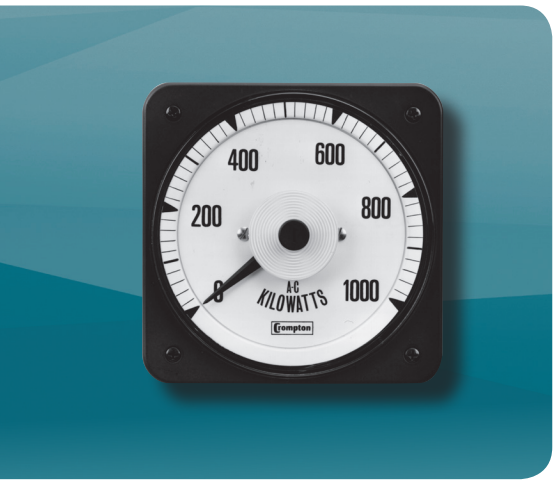
AC Wattmeters



AC Wattmeter

Fig. A1 Models 007-215 Wattmeter Single Phase

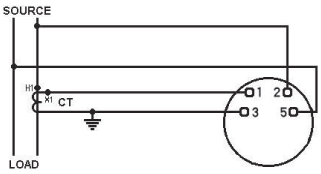


Fig. A2 Models 078-215 Wattmeter Single Phase

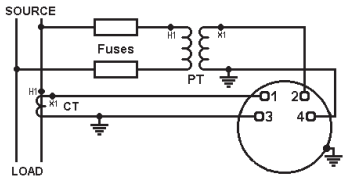
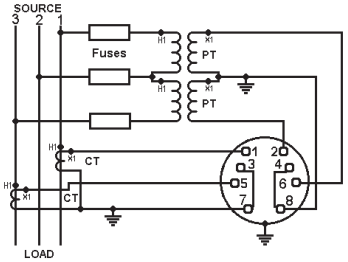


Fig. B2 Models 007/078-218 Wattmeter 3-Phase 3-Wire Unbalanced Load



Product Codes – 1-Element, Transformer Rated, 50/60Hz Integral Transducer - Accuracy 1.0%, 50/60Hz

Measured System			Scaling	4 1/2" square flange	
Phases	Wires	Amperes 1VA max. burden / Volts 1 VA max. burden		Std. case catalog number	Std. case hi-shock catalog number
1	2	5 120V	To suit	•007-215A-QQ**-C7	078-215J-QQ**-C6
1	2	5 240V	To suit	007-215A-QS**-C7	078-215J-QS**-C6

For connection diagram refer to Figure A1 & A2.

Product Codes - 2 -Element, Transformer Rated, 50/60Hz Taut Band Integral Transducer - Accuracy 1.0%, 50/60Hz

3	3	5 120V	To suit	•007-218A-QQ**-C7	078-218J-QQ**-C6
3	3	5 208V	To suit	•007-218A-QR**-C7	078-218J-QR**-C6
3	3	5 240V	To suit	•007-218A-QS**-C7	078-218J-QS**-C6
3	3	5 380V	To suit	•007-218A-QX**-C7	078-218J-QX**-C6
3	3	5 480V	To suit	•007-218A-QT-**-C7	078-218J-QT**-C6

For connection diagram refer to Figure B2

Product Codes - 2 1/2 - Element, Transformer Rated, 50/60Hz Taut Band Integral Transducer - Accuracy 1.0%, 50/60Hz

3	4	5 69V	To suit	•007-219A-QL-C7**	078-219J-QL**-C6
3	4	5 120V	To suit	•007-219A-QQ-C7**	078-219J-QQ**-C6
3	4	5 277V	To suit	•007-219A-QY-C7**	078-219J-QY**-C6
3	4	5 346V	To suit	•007-219A-QZ-C7**	078-219J-QZ**-C6

For connection diagram refer to Figure C1 & C2.

Fig. C1 Models 007-219 Wattmeter 3-Phase 4-Wire Unbalanced Load

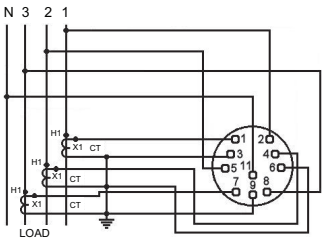
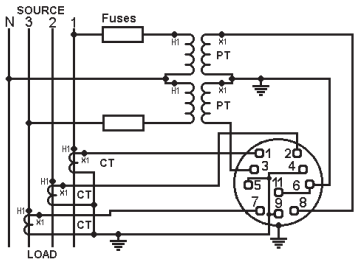


Fig. C2 Models 078-219 Wattmeter 3-Phase 4-Wire Unbalanced Load



* Other scales are available.

** Specify CT (Current Transformer) and VT (Voltage Transformer) ratios if used and preferred scale at time of ordering.

• c-UL-us certified.

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AC VArmeters

Product Codes - Element, Transformer Rated, 50/60Hz
Integral Transducer - Accuracy 1.0%, 50/60Hz

Measured System				Scaling	4 1/2" square flange	
Phases	Wires	Amperes 1VA max. burden	Volts 1 VA max. burden		Std. case catalog number	Std. case hi-shock catalog number
3	3	5	120V	To suit	•007-31LA-QQ**-C7	078-31LJ-QQ**-C6
3	3	5	208V	To suit	•007-31LA-QR**-C7	078-31LJ-QR**-C6
3	3	5	240V	To suit	•007-31LA-QS**-C7	078-31LJ-QS**-C6
3	3	5	380V	To suit	•007-31LA-QX**-C7	078-31LJ-QX**-C6
3	3	5	480V	To suit	•007-31LA-QT**-C7	078-31LJ-QT**-C6

For connection diagram refer to Figure D2

Product Codes - 2 1/2-Element, Transformer Rated, 50/60Hz
Taut Band Integral Transducer - Accuracy 1.0%, 50/60Hz

3	4	5	120V	To suit	•007-31UA-QQ**-C7	078-31UJ-QQ**-C6
3	4	5	208V	To suit	•007-31UA-QR**-C7	078-31UJ-QR**-C6
3	4	5	480V	To suit	•007-31UA-QT**-C7	078-31UJ-QT**-C6

For connection diagram refer to Figure D1

* Other scales are available.
** Specify CT (Current Transformer) and VT (VoltageTransformer) ratios if used and preferred scale at time of ordering.
• c-UL-us certified.

AC VArmeter

Fig D1 Model 007-31U Varmeter 3 Phase 4 Wire Unbalanced Load

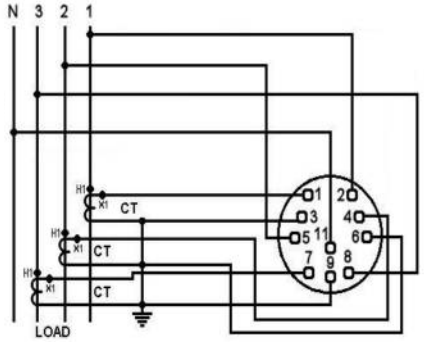
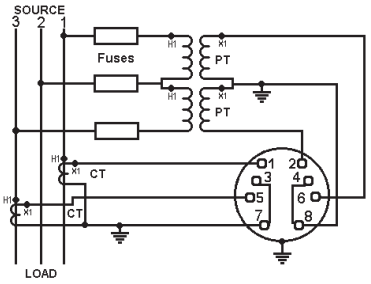


Fig. D2 Models 007/078-31L VArmeter
3-Phase 3-Wire Unbalanced Load



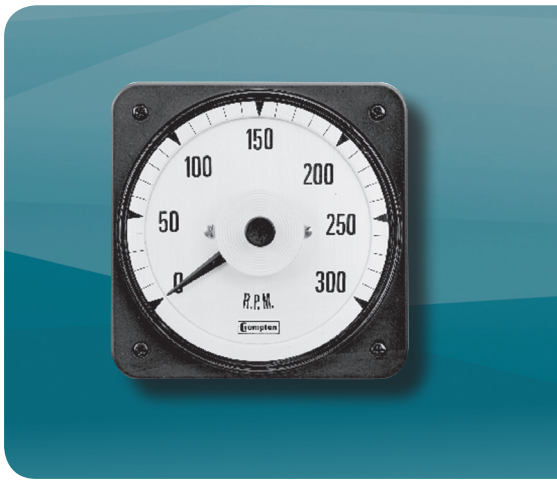
DC Transducer Indicators

Product Codes

Rating	Scaling*	4 1/2" square flange	
		Std. case catalog number	Std. case hi-shock catalog number
Watts 1mA	To suit	•007-055A-FA**	078-055J-FA**
VArs 1mA	To suit	•007-056A-FA**	078-056J-FA**
Frequency 1mA	To suit	•007-053A-FA**	078-053J-FA**
Power factor 1mA	To suit	•007-054A-FA**	078-054J-FA**
AC amps 1mA	To suit	•007-05AA-FA**	078-05AJ-FA**
AC volts 1mA	To suit	•007-05VA-FA**	078-05VJ-FA**
Speed 1mA	To suit	•007-052A-FA**	078-052J-FA**
VA 1mA	To suit	•007-057A-FA**	078-057J-FA**

*Case types 007/078 use 10-32 UNF terminals.
**Specify scale. Input: 1mA DC for 4/20mA change "FA" to "HG".
• c-UL-us certified.

For use with the following transducers: Watts, Vars, Frequency, Power Factor, AC amperes, AC volts and temperature.



DC Transducer Indicator

Wattmeter | VArmeter Scale Selector Guide

Primary potential transformer voltage system		120 (1:1)	208 (1.73:1)	240 (2:1)	480 (4:1)	600 (5:1)	2400 (20:1)	3600 (30:1)	4200 (35:1)	4800 (40:1)	6000 (50:1)	7200 (60:1)	8400 (70:1)
3-phase 3-wire (L-L) system voltage		120	208	240	480	600	2400	3600	4200	4800	6000	7200	8400
3-phase 4-wire (L-N) current transformer		69	120	139	277	347	1390	2100	2400	2770	3500	4160	4800
RATIO	Normal	5KW	10KW	10KW	20KW	25KW	100KW	150KW	175KW	200KW	250KW	300KW	350KW
25/5	Max.	6	10	12	25	30	120	200	200	250	300	400	450
(5:1)	Min.	3	5	6	12.5	15	60	100	100	125	150	200	225
RATIO	Normal	10KW	20KW	20KW	40KW	50KW	200KW	300KW	350KW	400KW	500KW	600KW	700KW
50/5	Max.	12	20	25	50	60	250	400	450	500	600	800	900
(10:1)	Min.	6	10	12.5	25	30	125	200	250	250	300	400	450
RATIO	Normal	15KW	25KW	30KW	60KW	75KW	300KW	500KW	500KW	600KW	750KW	900KW	1000KW
75/5	Max.	20	30	40	80	100	400	600	700	800	1000	1200	1200
(15:1)	Min.	10	15	20	40	50	200	300	350	400	500	600	600
RATIO	Normal	20KW	30KW	40KW	75KW	100KW	400KW	600KW	700KW	800KW	1000KW	1200KW	1200KW
100/5	Max.	25	40	50	100	120	500	800	900	1000	1200	1500	1500
(20:1)	Min.	12.5	20	25	50	60	250	400	450	500	600	750	750
RATIO	Normal	30KW	50KW	50KW	100KW	150KW	600KW	800KW	1000KW	1200KW	1500KW	1800KW	2000KW
150/5	Max.	40	70	75	150	200	800	1200	1200	1500	2000	2400	2500
(30:1)	Min.	20	35	35	75	100	400	600	600	750	1000	1000	1250
RATIO	Normal	40KW	75KW	75KW	150KW	200KW	800KW	1200KW	1200KW	1500KW	2000KW	2500KW	3000KW
200/5	Max.	50	80	100	200	250	1000	1500	1500	2000	2500	3000	3500
(40:1)	Min.	25	40	50	100	125	500	750	750	1000	1250	1500	1500
RATIO	Normal	70KW	100KW	100KW	200KW	300KW	1200KW	1500KW	2000KW	2500KW	3000KW	3500KW	4500KW
300/5	Max.	75	120	150	300	400	1500	2000	2500	3000	4000	4000	5000
(60:1)	Min.	35	60	75	150	200	750	1000	1250	1500	2000	2000	2500
RATIO	Normal	75KW	125KW	150KW	300KW	400KW	1500KW	2500KW	3000KW	3000KW	4000KW	5000KW	6000KW
400/5	Max.	100	150	200	400	500	2000	3000	3600	4000	5000	6000	7000
(80:1)	Min.	50	75	100	200	250	1000	1500	1500	2000	2500	3000	3500
RATIO	Normal	125KW	200KW	200KW	450KW	600KW	2000KW	3000KW	4000KW	5000KW	6000KW	7500KW	8000KW
600/5	Max.	150	250	300	600	800	3000	4000	5000	6000	8000	8000	10MW
(120:1)	Min.	75	125	150	300	400	1500	2000	2500	3000	4000	4000	5000KW
RATIO	Normal	150KW	250KW	300KW	600KW	800KW	3000KW	5000KW	6000KW	6000KW	8000KW	10MW	12MW
800/5	Max.	200	350	400	800	1000	4000	6000	7500	8000	10MW	12	15
(160:1)	Min.	100	175	200	400	500	2000	3000	3000	40000	5000KW	6000KW	7500KW
RATIO	Normal	200KW	350KW	400KW	800KW	1000KW	4000KW	6000KW	6000KW	8000KW	10MW	12MW	15MW
1000/5	Max.	250	450	500	1000	1200	5000	8000	8000	10MW	12	15	18
(200:1)	Min.	125	225	250	500	600	2500	4000	4000	5000KW	6000KW	7500KW	10
RATIO	Normal	250KW	400KW	500KW	1000KW	1200KW	5000KW	7000KW	8000KW	10MW	12MW	15MW	10MW
1200/5	Max.	300	500	600	1200	1500	6000	8000	10MW	12	15	18	20
(240:1)	Min.	150	250	300	600	750	3000	4000	5000KW	6000KW	7500KW	10	10
RATIO	Max.	300KW	500KW	600KW	1200KW	1500KW	6000KW	10MW	10MW	12MW	15MW	20MW	20MW
1500/5	Max.	400	700	750	1500	2000	8000	12	12	15	20	20	25
(300:1)	Min.	200	350	375	1000	1000	4000	6000KW	6000KW	7500KW	10	10	12.5
RATIO	Normal	400KW	750KW	800KW	1600KW	2000KW	8000KW	12MW	12MW	15MW	20MW	25MW	30MW
2000/5	Max.	500	800	1000	2000	2500	10MW	15	15	20	25	30	35
(400:1)	Min.	250	400	500	750	1250	5000	7500KW	7500KW	10	12.5	15	20
RATIO	Normal	750KW	1000KW	1200KW	2000KW	3000KW	12MW	18MW	20MW	25MW	30MW	35MW	40MW
3000/5	Max.	800	1200	1500	3000	4000	15	20	25	30	40	40	50
(600:1)	Min.	400	600	750	1500	2000	7500KW	10	12.5	15	20	20	25
RATIO	Normal	800KW	1200KW	1500KW	3000KW	4000KW	15MW	20MW	25MW	30MW	40MW	50MW	50MW
4000/5	Max.	1000	1500	2000	4000	5000	20	30	30	40	50	60	75
(800:1)	Min.	500	750	1000	2000	2500	10	15	15	20	25	30	40
RATIO	Normal	1000KW	1500KW	2000KW	4000KW	5000KW	20MW	30MW	20MW	40MW	50MW	60MW	75MW
5000/5	Max.	1250	2000	2500	5000	6000	25	40	25	50	60	80	80
(1000:1)	Min.	500	1000	1250	2500	3000	12.5	20	12.5	25	30	40	40
RATIO	Normal	1200KW	2000KW	2500KW	5000KW	6000KW	25MW	35MW	40MW	50MW	60MW	60MW	80MW
6000/5	Max.	1500	2500	3000	3000	8000	30	40	50	60	80	80	100
(1200:1)	Min.	750	1250	1500	1500	4000	15	20	25	30	40	40	50

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Wattmeter | VArmeter Scale Selector Guide

Primary potential transformer voltage system			12kV (100:1)	14.4kV (120:1)	24kV (200:1)	34.5kV (300:1)	38kV (330:1)	46kV (400:1)	92kV (800:1)	115kV (1000:1)	138kV (1200:1)	345kV (3000:1)	765kV (6000:1)
3-phase 3-wire (L-L) system voltage			12KV	14.4kV	24kV	34.5kV	38kV	46kV	92kV	115kV	138kV	345kV	765kV
3-phase 4-wire (L-N) current transformer			6900	8300	13.8KV	20kV	22kV	26.5kV	53kV	66kV	80kV	200kV	440kV
RATIO	Normal		500KW	600KW	1000KW	1500KW	1500KW	1500KW	3000KW	5000KW	6000KW	15MW	30MW
25/5	Max.		650	800	1200	1500	2000	2500	200	200	250	300	400
(5:1)	Min.		325	400	600	750	1000	1250	100	100	125	150	200
RATIO	Normal		1000KW	1200KW	2000KW	3000KW	3000KW	3500KW	8000KW	10MW	12MW	30MW	60MW
50/5	Max.		1200	1500	2500	3500	4000	5000	10MW	12	15	35	80
(10:1)	Min.		600	750	1250	1750	2000	2500	5000KW	6000KW	7500KW	15	40
RATIO	Normal		1500KW	1800KW	3000KW	4000KW	5000KW	5000KW	10MW	15MW	15MW	45MW	100MW
75/5	Max		2000	2000	4000	5000	6000	7500	15	15	20	50	125
(15:1)	Min.		1000	1000	2000	2500	3000	3000	7500KW	7500KW	10	25	50
RATIO	Normal		2000KW	2500KW	4000KW	6000KW	6000KW	7500KW	15MW	20MW	25MW	60MW	125MW
100/5	Max.		2500	3000	5000	7500	8000	10MW	20	25	30	70	150
(20:1)	Min.		1250	1500	2500	3000	4000	5000KW	10	12.5	15	35	75
RATIO	Normal		3000KW	3500KW	6000KW	10MW	10MW	10MW	20MW	30MW	35MW	90MW	200MW
150/5	Max.		4000	4000	4000	10	12	15	30	35	40	100	250
(30:1)	Min.		2000	2000	2000	5000KW	6000KW	7500KW	15	15	20	50	100
RATIO	Normal		4000KW	4500KW	8000KW	12MW	12MW	15MW	30MW	35MW	50MW	100MW	250MW
200/5	Max.		5000	6000	5000	15	15	20	40	50	60	150	300
(40:1)	Min.		2500	3000	2500	7500KW	7500KW	10	20	25	30	75	150
RATIO	Normal		6000KW	7000KW	12MW	18MW	18MW	20MW	45MW	60MW	75MW	150MW	400MW
300/5	Max.		8000	8000	15	20	25	30	60	75	80	200	500
(60:1)	Min.		4000	4000	7.5	10	12.5	15	30	30	40	100	250
RATIO	Normal		8000KW	10MW	15MW	24MW	25MW	30MW	60MW	80MW	100MW	200MW	500MW
400/5	Max.		10MW	12	20	30	30	40	80	100	120	300	600
(80:1)	Min.		5000KW	6000KW	10	15	15	20	40	50	60	150	300
RATIO	Normal		12MW	15MW	25MW	35MW	40MW	45MW	90MW	100MW	150MW	350MW	800KW
600/5	Max.		15	18	30	40	50	60	120	150	180	450	1000
(120:1)	Min.		7500KW	10	15	20	25	30	60	75	75	225	500
RATIO	Normal		15MW	20MW	30MW	50MW	50MW	60MW	120MW	150MW	200MW	500MW	1000MW
800/5	Max.		20	25	40	60	60	80	150	200	200	600	1200
(160:1)	Min.		10	12.5	20	30	30	40	75	100	100	300	600
RATIO	Normal		20MW	25MW	40MW	50MW	60MW	75MW	150MW	200MW	250MW	600MW	1200MW
1000/5	Max.		25	30	50	60	80	100	200	250	300	750	1500
(200:1)	Min.		12.5	15	25	30	40	50	100	125	150	300	750
RATIO	Normal		25MW	30MW	50MW	60MW	80MW	100MW	175MW	250MW	300MW	750MW	1500MW
1200/5	Max.		30	35	60	80	100	120	200	300	350	900	2000
(240:1)	Min.		15	20	30	40	50	60	100	150	175	450	1000
RATIO	Normal		30MW	35MW	60MW	75MW	100MW	120MW	250MW	3000MW	350MW	900MW	2000MW
1500/5	Max.		40	40	80	100	120	150	300	350	450	1000	2500
(300:1)	Min.		20	20	40	50	60	75	150	175	225	500	1250
RATIO	Normal		40MW	50MW	80MW	100MW	120MW	150MW	300MW	400MW	5000MW	1000MW	2500MW
2000/5	Max.		50	60	100	150	150	200	400	500	600	1500	3000
(400:1)	Min.		25	30	50	75	75	100	200	250	300	750	1500
RATIO	Normal		60MW	75MW	100MW	150MW	200MW	200MW	400MW	600MW	700MW	1500MW	3500MW
3000/5	Max.		80	80	150	200	250	300	500	750	900	2000	5000
(600:1)	Min.		40	40	75	100	125	150	250	350	450	1000	2500
RATIO	Normal		80MW	100MW	150MW	200MW	250MW	300MW	5000MW	800MW	1000MW	2000MW	500MW
4000/5	Max.		100	125	200	300	300	400	800	1000	1200	3000	6000
(800:1)	Min.		50	60	100	150	150	200	400	500	600	1500	3000
RATIO	Normal		100MW	125MW	200MW	250MW	300MW	4000MW	750MW	1000MW	1200MW	3000MW	6000MW
5000/5	Max.		120	150	250	300	400	500	1000	1200	1500	3500	8000
(1000:1)	Min.		60	75	125	150	200	250	500	600	750	1750	400
RATIO	Normal		120MW	150MW	250MW	350KW	400MW	450MW	1000MW	1200MW	1500MW	3500MW	8000MW
6000/5	Max.		150	175	300	400	500	600	1200	1500	1750	4000	10000
(1200:1)	Min.		75	80	150	200	250	300	600	750	800	2000	5000

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Elapsed Time Meter

Elapsed Time Meters

Product Codes – 99,999.99 Hours, Non Reset, Burden 2.5VA
50 or 60Hz

Synchronous motor running time meter with a non-resettable indicator.

Rating	4 1/2" square flange	
	Std. case catalog number	Std. case hi-shock catalog number
110/130V 50Hz	•007-155A-PNZH-C5	078-155J-PNZH-C5
200/250V 50Hz	•007-155A-RNZH-C5	078-155J-RNZH-C5
480V 50Hz	•007-155A-SEZH-C5	078-155J-SEZH-C5
110/130V 60Hz	•007-156A-PNZH-C6	078-156J-PNZH-C6
200/250V 60Hz	•007-156A-RNZH-C6	078-156J-RNZH-C6
480V 60Hz	•007-156A-SEZH-C6	078-156J-SEZH-C6

Note: Model 078=approval 'ce' only

Units with * are csa/cul/ul approved

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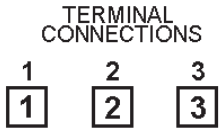
AC Phase Sequence and Phase Failure Indicator

Fig. E Model 077-12P
Phase Sequence Indicator
3-Phase 3- or 4-Wire systems



AC Phase Sequence, Phase Failure Indicators

Product Codes – Neon Bulb Type, Burnden 2.5VA

Two neon bulbs for phase sequence indication - first marked the caption “correct 1-2-3”, the second marked “incorrect 3-2-1”. Three neon bulbs for phase failure indication - first marked 1, second marked 2, third marked 3.

Rating	4 1/2" square flange	
	Std. case catalog number	Std. case hi-shock catalog number
100/150V 50/60Hz	077-12PA-P2C7	Not available
151/300V 50/60Hz	077-12PA-P3C7	Not available
301/500V 50/60Hz	077-12PA-P4C7	Not available

For connection diagram refer to Figure E.

'CE' Approval - Not csa/cUL/UL approved

DC Indicators for Tachometer Generators

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AC Power Factor Meter

Fig. E Models 007-425
Electronic Phase Angle Meter
Single Phase

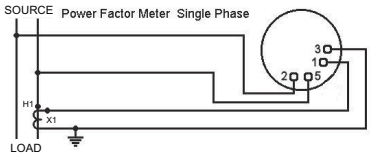
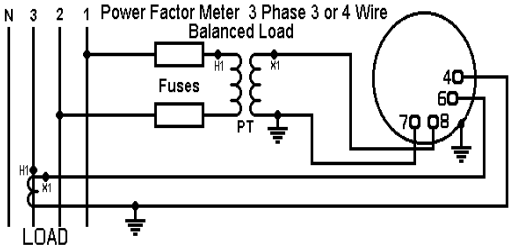


Fig. F Models 007-427
Electronic Phase Angle Meter
3-phase, 3- or 4-wire Balanced Load



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% fid minimum
External field influence	0.5% fid maximum
Frequency range	50Hz or 60Hz standard, 25-3000Hz optional (Specify)
Frequency influence	Single phase instruments, 59 to 61Hz 1.0% fid maximum polyphase instruments ±10% deviation from 69Hz: 1.0%
Overload capacity: 25% indefinitely	Current coils 1000% momentarily, 100% for 15 minutes Voltage circuits 25% indefinitely
Burdens	Each current circuit, 1.5VA approximately Each voltage circuit 1VA approximately Measuring systems 077-427-3 or 4-wire
Ranges available	Lag 0.5-1 - 0.5 lead power factor Lag 0.2-1 - 0.8 lead power factor

Product Codes - Balanced Load - Accuracy ±1%

Measured System				Scaling	4 1/2" square flange
Phases	Wires	Amperes 2VA max. burden	Volts 1 VA max. burden		Std. case catalog no.
1	2	5	120V	0.5-1-0.5	•007-425A-QQAD-C6
1	2	5	240V	0.5-1-0.5	•007-425A-QSAD-C6
3	3/4	5	120V	0.5-1-0.5	•007-427A-QQAD-C6
3	3/4	5	208V	0.5-1-0.5	•007-427A-QRAD-C6
3	3/4	5	240V	0.5-1-0.5	•007-427A-QSAD-C6
3	3/4	5	480V	0.5-1-0.5	•007-427A-QTAD-C6

Instruments may be used on loads down to 20% of current and between 90% and 110% of voltage rating.

For connection diagrams refer to Fig. E and F.

- c-UL-us certified.

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