



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 $\sqrt{3}$

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

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

Wattmeter | VArmeter Scale Selector Guide

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

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)
				12KV	14.4kV	24kV	34.5kV	38kV	46kV	92kV	115kV	138kV	345kV	765kV
	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 (5:1)	Max. Min.		650 325	800 400	1200 600	1500 750	2000 1000	2500 1250	200 100	200 100	250 125	300 150	400 200
	RATIO	Normal		1000KW	1200KW	2000KW	3000KW	3000KW	3500KW	8000KW	10MW	12MW	30MW	60MW
	50/5 (10:1)	Max. Min.		1200 600	1500 750	2500 1250	3500 1750	4000 2000	5000 2500	10MW 5000KW	12 6000KW	15 7500KW	35 15	80 40
	RATIO	Normal		1500KW	1800KW	3000KW	4000KW	5000KW	5000KW	10MW	15MW	15MW	45MW	100MW
	75/5 (15:1)	Max Min.		2000 1000	2000 1000	4000 2000	5000 2500	6000 3000	7500 3000	15 7500KW	15 7500KW	20 10	50 25	125 50
	RATIO	Normal		2000KW	2500KW	4000KW	6000KW	6000KW	7500KW	15MW	20MW	25MW	60MW	125MW
	100/5 (20:1)	Max. Min.		2500 1250	3000 1500	5000 2500	7500 3000	8000 4000	10MW 5000KW	20 10	25 12.5	30 15	70 35	150 75
	RATIO	Normal		3000KW	3500KW	6000KW	10MW	10MW	10MW	20MW	30MW	35MW	90MW	200MW
	150/5 (30:1)	Max. Min.		4000 2000	4000 2000	4000 2000	10 5000KW	12 6000KW	15 7500KW	30 15	35 15	40 20	100 50	250 100
	RATIO	Normal		4000KW	4500KW	8000KW	12MW	12MW	15MW	30MW	35MW	50MW	100MW	250MW
	200/5 (40:1)	Max. Min.		5000 2500	6000 3000	5000 2500	15 7500KW	15 7500KW	20 10	40 20	50 25	60 30	150 75	300 150
	RATIO	Normal		6000KW	7000KW	12MW	18MW	18MW	20MW	45MW	60MW	75MW	150MW	400MW
	300/5 (60:1)	Max. Min.		8000 4000	8000 4000	15 7.5	20 10	25 12.5	30 15	60 30	75 30	80 40	200 100	500 250
	RATIO	Normal		8000KW	10MW	15MW	24MW	25MW	30MW	60MW	80MW	100MW	200MW	500MW
	400/5 (80:1)	Max. Min.		10MW 5000KW	12 6000KW	20 10	30 15	30 15	40 20	80 40	100 50	120 60	300 150	600 300
	RATIO	Normal		12MW	15MW	25MW	35MW	40MW	45MW	90MW	100MW	150MW	350MW	800KW
	600/5 (120:1)	Max. Min.		15 7500KW	18 10	30 15	40 20	50 25	60 30	120 60	150 75	180 75	450 225	1000 500
	RATIO	Normal		15MW	20MW	30MW	50MW	50MW	60MW	120MW	150MW	200MW	500MW	1000MW
	800/5 (160:1)	Max. Min.		20 10	25 12.5	40 20	60 30	60 30	80 40	150 75	200 100	200 100	600 300	1200 600
	RATIO	Normal		20MW	25MW	40MW	50MW	60MW	75MW	150MW	200MW	250MW	600MW	1200MW
	1000/5 (200:1)	Max. Min.		25 12.5	30 15	50 25	60 30	80 40	100 50	200 100	250 125	300 150	750 300	1500 750
	RATIO	Normal		25MW	30MW	50MW	60MW	80MW	100MW	175MW	250MW	300MW	750MW	1500MW
	1200/5 (240:1)	Max. Min.		30 15	35 20	60 30	80 40	100 50	120 60	200 100	300 150	350 175	900 450	2000 1000
	RATIO	Normal		30MW	35MW	60MW	75MW	100MW	120MW	250MW	3000MW	350MW	900MW	2000MW
	1500/5 (300:1)	Max. Min.		40 20	40 20	80 40	100 50	120 60	150 75	300 150	350 175	450 225	1000 500	2500 1250
	RATIO	Normal		40MW	50MW	80MW	100MW	120MW	150MW	300MW	400MW	5000MW	1000MW	2500MW
	2000/5 (400:1)	Max. Min.		50 25	60 30	100 50	150 75	150 75	200 100	400 200	500 250	600 300	1500 750	3000 1500
	RATIO	Normal		60MW	75MW	100MW	150MW	200MW	200MW	400MW	600MW	700MW	1500MW	3500MW
	3000/5 (600:1)	Max. Min.		80 40	80 40	150 75	200 100	250 125	300 150	500 250	750 350	900 450	2000 1000	5000 2500
	RATIO	Normal		80MW	100MW	150MW	200MW	250MW	300MW	5000MW	800MW	1000MW	2000MW	500MW
	4000/5 (800:1)	Max. Min.		100 50	125 60	200 100	300 150	300 150	400 200	800 400	1000 500	1200 600	3000 1500	6000 3000
	RATIO	Normal		100MW	125MW	200MW	250MW	300MW	4000MW	750MW	1000MW	1200MW	3000MW	6000MW
	5000/5 (1000:1)	Max. Min.		120 60	150 75	250 125	300 150	400 200	500 250	1000 500	1200 600	1500 750	3500 1750	8000 400
	RATIO	Normal		120MW	150MW	250MW	350KW	400MW	450MW	1000MW	1200MW	1500MW	3500MW	8000MW
	6000/5 (1200:1)	Max. Min.		150 75	175 80	300 150	400 200	500 250	600 300	1200 600	1500 750	1750 800	4000 2000	10000 5000

AC Wattmeters

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



AC Wattmeter

Fig. A1 Models 007-215
Wattmeter Single Phase

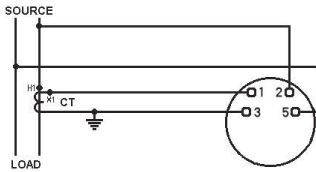


Fig. A2 Models 078-215
Wattmeter Single Phase

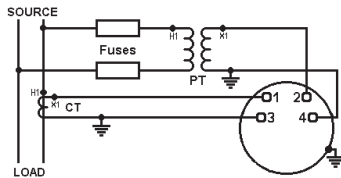


Fig. B1 Models 007-218 Wattmeter
3-Phase, 3-Wire Unbalanced Load

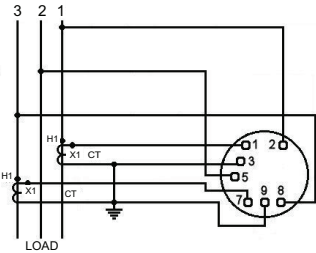
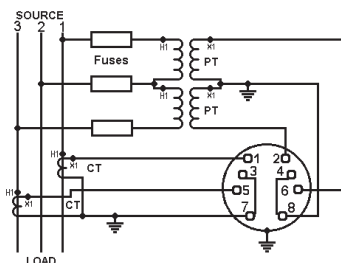


Fig. B2 Models 078-218 Wattmeter
3-Phase 3-Wire Unbalanced Load



Measured System	Scaling	4 1/2" square flange	
		Std. case catalog number	Std. case hi-shock catalog number
Phases Wires Amperes 1VA max. burden Volts 1 VA max. burden			
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 B1 & 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

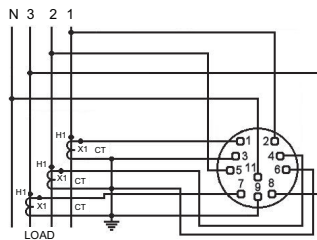
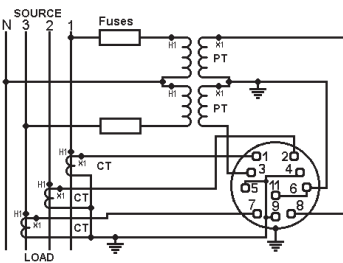


Fig. C2 Models 078-219 Wattmeter
3-Phase 4-Wire Unbalanced Load



- * 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.