

WATT METER SYSTEM DATA

Preferred Scales Wattmeters and Varmeters

In the interest of standardization of preferred wattmeter and varmeter scale markings for the common current and potential transformers a listing appears on this page. Such instruments may be supplied with left zero or center zero scales at the same list price.

Since wattmeter and varmeter current circuits are frequently connected in series, they should have equal current carrying capacity. This means that to assure equality the sum of the left and right end-scale values of the varmeter must be equal to or greater than the full-scale value of the wattmeter, (or the higher of the end-scale values if center or offset zero). Standard end markings and the proper scale divisions are listed in Application Data 43-200. If other combinations must be made, check with Weschler.

Scales outside the preferred ranges are available at an extra price for any current transformer secondary between .050 and 10 amps at full scale for circular scale, .100 and 20 amps for 100⁰ scale and .500 and 10 amps for Edgewise instruments.

Type 221 and 252 instruments 1000 kilowatts and over are marked in megawatts.

Center zero or offset zero varmeters are marked "IN" for left deflection and "OUT" for right deflection.

Preferred scales may be calculated for wattmeters and varmeters not listed on the charts. Scale watts must be one of the standard full scale dial markings shown on the charts or on Table A, Application Data 43-200, page 2.

3 phase, 4 wire (3 current coil)

MIN =ct ratio x pt ratio x 1.2 (Select next higher scale)

NOM =ct ratio x pt ratio x 1.5 (Select nearest scale)

MAX =ct ratio x pt ratio x 2.1 (Select next lower scale)

3 phase, 3 wire (2 current coil)

MIN =ct ratio x pt ratio x 0.8 (Select next higher scale)

NOM =ct ratio x pt ratio x 1.0 (Select nearest scale)

MAX =ct ratio x pt ratio x 1.25 (Select next lower scale)

1 phase

MIN =ct ratio x pt ratio x 0.4 (Select next higher scale)

NOM =ct ratio x pt ratio x 0.5 (Select nearest scale)

MAX =ct ratio x pt ratio x 0.62 (Select next lower scale)

Example: For 3 phase, 3 wire wattmeter with 400:5 ct and 1200:1 pt

MIN = 400/5 x 1200/1 x 0.8 = 77,000 Next higher = 80 MW

NOM = 400/5 x 1200/1 x 1.0 = 96,000 Nearest = 100 MW

MAX = 400/5 x 1200/1 x 1.25 = 120,000 Next lower = 120 MW

Note: If scale calculates to an exact listed value use it rather than the next higher or lower value.

$$1\text{ph Test Watts} = \frac{\text{Scale Watts}}{\text{CT ratio} \times \text{PT ratio} \times K}$$

Where

K = 1 1 - element

K = 2 2 - element

K = 4 2½ - element

Scale Selector Chart Wattmeters and Varmeters, Single Phase 2-Wire
Single Phase Test Range: 400-625 Watts

Current Transformer Ratio		System Voltage														
		120	240	480	600	2400	4200	4800	7200	8400	12Kv	14.4Kv	24Kv	34.5Kv	46Kv	69Kv
		Potential Transformer Ratio														
		None	2:1	4:1	5:1	20:1	35:1	40:1	60:1	70:1	100:1	120:1	200:1	300:1	400:1	600:1
25:5	Min	2	4	8	10	40	70	80	120	150	200	250	400	600	800	1200
	Nom	2.5	5	10	12	50	90	100	150	175	250	300	500	750	1000	1500
	Max	3	6	12	15	60	100	120	180	200	300	350	600	900	1200	1800
50:5	Min	4	8	16	20	80	150	160	250	300	400	500	800	1200	1600	2500
	Nom	5	10	20	25	100	175	200	300	350	500	600	1000	1500	2000	3000
	Max	6	12	25	30	120	200	250	350	400	600	750	1200	1800	2500	3500
75:5	Min	6	12	25	30	120	250	250	400	450	600	750	1200	1800	2500	4000
	Nom	7.5	15	30	40	150	250	300	450	500	750	900	1500	2500	3000	4500
	Max	9	18	35	45	180	300	350	500	650	900	1000	1800	2500	3500	5000
100:5	Min	8	16	35	40	160	300	350	500	600	800	1000	1600	2500	3500	5000
	Nom	10	20	40	50	200	350	400	600	700	1000	1200	2000	3000	4000	6000
	Max	12	25	50	60	250	400	500	750	800	1200	1500	2500	3500	5000	7500
150:5	Min	12	25	50	60	250	450	500	750	900	1200	1500	2500	4000	5000	7500
	Nom	15	30	60	75	300	500	600	900	1000	1500	1800	3000	4500	6000	9000
	Max	18	35	75	90	350	650	750	1000	1200	1800	2000	3500	5000	7500	10MW
200:5	Min	16	35	65	80	350	600	650	1000	1200	1600	2000	3500	5000	6500	10
	Nom	20	40	80	100	400	700	800	1200	1500	2000	2500	4000	6000	8000	12
	Max	25	50	100	120	500	800	1000	1500	1750	2500	3000	5000	7500	10MW	15
300:5	Min	25	50	100	120	500	900	1000	1500	1750	2500	3000	5000	7500	10	15
	Nom	30	60	120	150	600	1000	1200	1800	2000	3000	3500	6000	9000	12	18
	Max	35	75	150	180	750	1200	1500	2000	2500	3500	4500	7500	10MW	15	20
400:5	Min	35	65	150	160	650	1200	1500	2000	2500	3500	4000	6500	10	15	20
	Nom	40	80	160	2000	800	1500	1600	2500	3000	4000	5000	8000	12	16	25
	Max	50	100	200	250	1000	1750	2000	3000	3500	5000	6000	10MW	15	20	30
600:5	Min	50	100	200	250	1000	1750	2000	3000	3500	5000	6000	10	15	20	30
	Nom	60	120	250	300	1200	2000	2500	3500	4000	6000	7000	12	18	25	35
	Max	75	150	300	350	1500	2500	3000	4500	5000	7500	9000	15	20	30	45
800:5	Min	65	150	300	350	1500	2500	3000	4000	5000	6500	8000	15	20	30	40
	Nom	80	160	300	400	1600	3000	3000	5000	6000	8000	10MW	16	25	30	50
	Max	100	200	400	500	2000	3500	4000	6000	7000	10MW	12	20	30	40	60
1200:5	Min	100	200	400	500	2000	3500	4000	6000	7000	10	12	20	30	40	60
	Nom	120	250	500	600	2500	4000	5000	7500	8000	12	15	25	35	50	75
	Max	150	300	600	750	3000	5000	6000	9000	10MW	15	17.5	30	45	60	90
1500:5	Min	120	250	500	600	2500	4500	5000	7500	9000	12	15	25	40	50	75
	Nom	150	300	600	750	3000	5000	6000	9000	10MW	15	18	30	45	60	90
	Max	180	350	750	900	3500	6500	7500	10MW	12	18	20	35	50	75	100
2000:5	Min	160	350	650	800	3500	6000	6500	10	12	16	20	35	50	65	100
	Nom	200	400	800	1000	4000	7000	8000	12	15	20	25	40	60	80	120
	Max	250	500	1000	1200	5000	8000	10MW	15	17.5	25	30	50	75	100	120
3000:5	Min	250	500	1000	1200	5000	9000	10	15	17.5	25	30	50	75	100	150
	Nom	300	600	1200	1500	6000	10MW	12	18	20	30	35	60	90	120	180
	Max	350	750	1500	1800	7500	12	15	20	25	35	45	75	100	150	200
4000:5	Min	350	650	1500	1600	6500	12	15	20	25	35	40	65	100	150	200
	Nom	400	800	1600	2000	8000	15	16	25	30	40	50	80	120	160	250
	Max	500	1000	2000	2500	10MW	17.5	20	30	35	50	60	100	150	200	300
5000:5	Min	400	800	1600	2000	8000	16	16	25	30	40	50	80	120	260	250
	Nom	500	1000	2000	2500	10MW	20	20	30	35	50	60	100	150	200	300
	Max	600	1200	2500	3000	12	25	25	35	40	60	75	120	180	250	350
6000:5	Min	500	1000	2000	2500	10	17.5	20	30	40	50	60	100	150	200	300
	Nom	600	1200	2500	3000	12	20	25	35	45	60	75	120	180	250	50
	Max	750	1500	3000	3500	15	25	30	45	50	75	90	150	200	300	450

Scale Selector Chart

Wattmeters and Varmeters
3 Phase 3-Wire

Scale Selector Chart Wattmeters and Varmeters, 2 Current Coil Polyphase 3-Phase 3-Wire

Single Phase Test Range: 400-625 Watts

Current Transformer Ratio		System Voltage														
		120	240	480	600	2400	4200	4800	7200	8400	12Kv	14.4Kv	24Kv	34.5Kv	46Kv	69Kv
		Potential Transformer Ratio														
		None	2:1	4:1	5:1	20:1	35:1	40:1	60:1	70:1	100:1	120:1	200:1	300:1	400:1	600:1
25:5	Min	4	8	16	20	80	150	160	250	300	400	500	800	1200	1600	2500
	Nom	5	10	20	25	100	175	200	300	350	500	600	1000	1500	2000	3000
	Max	6	12	25	30	120	200	250	350	400	600	750	1200	1800	2500	3500
50:5	Min	8	16	35	40	160	300	350	500	600	800	1000	1600	2500	3500	5000
	Nom	10	20	40	50	200	350	400	600	700	1000	1200	2000	3000	4000	6000
	Max	12	25	50	60	250	400	500	750	800	1200	1500	2500	3500	5000	7500
75:5	Min	12	25	50	60	250	450	500	750	900	1200	1500	2500	4000	5000	7500
	Nom	15	30	60	75	300	500	600	900	1000	1500	1800	3000	4500	6000	9000
	Max	18	35	75	90	350	650	750	1000	1200	1800	2000	3500	5000	7500	10MW
100:5	Min	16	35	70	80	350	600	700	1000	1200	1750	2000	3500	5000	7000	10
	Nom	20	40	80	100	400	700	800	1200	1500	2000	2500	4000	6000	8000	12
	Max	25	50	100	125	500	800	1000	1500	1750	2500	3000	5000	7500	10MW	15
150:5	Min	25	50	100	120	500	800	1000	1500	1750	2500	3000	5000	7500	15	20
	Nom	30	60	120	150	600	1000	1200	1800	2000	3000	3500	6000	9000	15	25
	Max	35	75	150	180	750	1200	1500	2000	2500	3500	4000	7500	10MW	20	30
200:5	Min	35	65	150	140	650	1200	1500	2000	2500	3500	4000	6500	10	15	20
	Nom	40	80	150	200	800	1500	1500	2500	3000	4000	5000	8000	12	15	25
	Max	50	100	200	250	1000	1750	2000	3000	3500	5000	6000	10MW	15	20	30
300:5	Min	50	100	200	250	1000	1750	2000	3000	3500	5000	6000	10	15	20	30
	Nom	60	120	250	300	1200	2000	2500	3500	4000	6000	7000	12	18	25	35
	Max	75	150	300	350	1500	2500	3000	4500	5000	7500	9000	15	20	30	45
400:5	Min	65	150	300	350	1500	2500	3000	4000	4500	6500	8000	15	20	30	40
	Nom	80	150	300	400	1500	3000	3000	5000	5000	8000	10MW	15	25	30	50
	Max	100	200	400	500	2000	3500	4000	6000	7000	10MW	12	20	30	40	60
600:5	Min	100	200	400	500	2000	3500	4000	6000	7000	10	12	20	30	40	60
	Nom	120	250	500	600	2500	4000	5000	7000	8000	12	15	25	35	50	70
	Max	150	300	600	750	3000	5000	6000	9000	10MW	15	18	30	45	60	90
800:5	Min	150	300	600	650	3000	4500	6000	8000	9000	15	16	30	40	60	80
	Nom	150	300	600	800	3000	5000	6000	10MW	12MW	16	20	30	50	60	100
	Max	200	400	800	1000	4000	7000	8000	12	12	20	20	40	60	80	120
1200:5	Min	200	400	800	1000	4000	7000	8000	12	15	20	25	40	60	80	120
	Nom	250	500	1000	1200	5000	8000	10MW	15	17.5	25	15	50	70	100	150
	Max	300	600	1200	1500	6000	10MW	12	18	20	30	17.5	60	90	120	180
1500:5	Min	250	500	1000	1200	5000	9000	10	15	17.5	25	30	50	75	100	150
	Nom	300	600	1200	1500	6000	10MW	12	18	20	30	35	60	90	120	180
	Max	350	750	1500	1800	7500	12	15	20	25	35	45	75	100	150	200
2000:5	Min	350	650	1500	1600	6500	12	15	20	25	35	40	65	100	150	200
	Nom	400	800	1500	2000	8000	15	15	25	30	40	50	80	120	150	250
	Max	500	1000	2000	2500	10MW	17.5	20	30	35	50	60	100	150	200	300
3000:5	Min	500	1000	2000	2500	10	17.5	20	30	35	50	60	100	150	200	300
	Nom	600	1200	2500	3000	12	20	25	35	40	60	70	120	180	250	350
	Max	750	1500	3000	3500	15	25	30	40	50	75	90	150	200	300	450
4000:5	Min	650	1500	3000	3500	15	25	30	40	45	65	80	150	200	300	400
	Nom	800	1500	3000	4000	16	30	30	50	50	80	100	160	250	300	500
	Max	1000	2000	4000	5000	20	35	40	60	70	100	120	200	300	400	600
5000:5	Min	800	1600	3500	4000	16	30	35	50	60	80	100	160	250	350	500
	Nom	1000	2000	4000	5000	20	35	40	60	70	100	120	200	300	400	600
	Max	1200	2500	5000	6000	25	40	50	75	80	120	150	250	350	500	750
6000:5	Min	1000	2000	4000	5000	20	35	40	60	70	100	120	200	300	400	600
	Nom	1200	2500	5000	6000	25	40	50	70	80	120	150	250	350	500	700
	Max	1500	3000	6000	7500	30	50	60	90	100	150	180	300	450	600	900

Scale Selector Chart Wattmeters and Varmeters, 3 Current Coil 3-Phase 4-Wire
Single Phase Test Range: 313-521 Watts

		System Voltage											
		208	480	4160	7274	8320	12.47 Kv	14.56 Kv	25 Kv	34.5 Kv	46 Kv	69 Kv	
Current Transformer Ratio		Line To Neutral											
		120	277	2400	4200	4800	7200	8400	14.4 Kv	20.125 Kv	27.6 Kv	40.25 Kv	
		Potential Transformer Ratio											
		None	2.4:1	20:1	35:1	40:1	60:1	70:1	120:1	175:1	240:1	350:1	
25:5	Min	K	7	15	125	250	250	400	450	750	1200	1500	2500
	Nom		8	17.5	150	300	300	500	600	1000	1500	2000	3000
	Max		10	20	200	350	400	600	700	1200	1800	2500	3500
50:5	Min	I	15	30	250	450	500	800	900	1500	2500	3000	4500
	Nom		17.5	35	300	600	600	1000	1200	2000	3000	4000	6000
	Max		20	45	400	700	800	1200	1200	2500	3500	5000	7000
75:5	Min	L	20	45	400	700	750	1200	1500	2500	3500	4500	7000
	Nom		25	65	500	800	1000	1500	1750	3000	4000	6000	9000
	Max		30	70	600	1000	1200	1800	2000	3500	5000	7500	10MW
100:5	Min	O	25	60	500	900	1000	1500	1750	3000	4600	6000	9000
	Nom		35	70	600	1200	1200	2000	2500	4000	6000	8000	12MW
	Max		40	90	800	1200	1600	2500	2500	5000	7000	10MW	12
150:5	Min	W	40	90	750	1500	1500	2500	3000	4500	700	9000	15
	Nom		50	100	1000	1750	2000	3000	3500	6000	8000	12MW	17.5
	Max		60	120	1200	2000	2500	3500	4000	7500	10MW	15	20
200:5	Min	A	50	120	1000	1750	2000	3000	3500	6000	9000	12	17.5
	Nom		70	150	1200	2500	2500	4000	4500	8000	12MW	15	25
	Max		80	180	1600	2500	3000	5000	5000	10MW	12	20	25
300:5	Min	T	75	175	1500	3000	3000	4500	6000	9000	15	18	30
	Nom		100	200	2000	3500	4000	6000	7000	12MW	17.5	25	35
	Max		120	250	2500	4000	5000	7500	8000	15	20	30	40
400:5	Min	T	100	250	2000	3500	4000	6000	7000	12	17.5	25	35
	Nom		120	300	2500	4500	5000	7500	9000	15	25	30	45
	Max		160	350	3000	5000	6000	10MW	10MW	20	25	40	50
600:5	Min	S	150	350	3000	6000	6000	9000	12	18	30	40	60
	Nom		200	450	4000	7000	8000	12MW	15	25	35	50	70
	Max		250	500	5000	8000	10MW	15	17.5	30	40	60	80
800:5	Min		200	500	4000	7000	8000	12	15	25	35	50	70
	Nom		250	600	5000	9000	10MW	15	17.5	30	45	60	90
	Max		300	750	6500	10MW	12	20	20	40	50	80	100
1200:5	Min		300	700	6000	12	12	18	25	40	60	75	120
	Nom		400	800	7500	15	15	25	30	50	70	90	150
	Max		500	1000	10MW	17.5	20	30	35	60	80	120	175
1500:5	Min		400	900	7500	15	15	25	30	45	70	90	150
	Nom		500	1000	10MW	17.5	20	30	35	60	80	120	175
	Max		600	1200	12	20	25	35	40	75	100	150	200
2000:5	Min		500	1200	10	17.5	20	30	35	60	90	120	175
	Nom		700	1500	12	25	25	40	45	80	120	150	250
	Max		800	1800	16	25	30	50	50	100	120	200	250
3000:5	Min		750	1750	15	30	30	45	60	90	150	180	300
	Nom		1000	2000	20	35	40	60	70	120	175	250	350
	Max		1200	2500	25	40	50	75	80	150	200	300	400
4000:5	Min		1000	2500	20	35	40	60	70	120	175	250	350
	Nom		1200	3000	25	45	50	75	90	150	250	300	450
	Max		1600	3500	30	50	60	100	100	200	250	400	500
5000:5	Min		1500	3000	25	45	50	80	90	150	250	300	450
	Nom		1750	3500	30	60	60	100	120	200	300	400	600
	Max		2000	4500	40	75	80	120	120	250	350	500	700
6000:5	Min		1500	3500	30	60	60	90	120	180	300	400	600
	Nom		2000	4500	40	70	80	120	150	250	350	500	700
	Max		2500	5000	50	80	100	150	175	300	400	600	800

Scale Selector Chart Wattmeters and Varmeters, 3 Current Coil 3-Phase 4-Wire
Single Phase Test Range: 313-521 Watts

		System Voltage										
		92	115	138	161	196	230	260	287	345	460	
		Kv	Kv	Kv	Kv	Kv	Kv	Kv	Kv	Kv	Kv	
		55.2	69	80.5	92	115	138	161	172.5	207	276	
		Kv	Kv	Kv	Kv	Kv	Kv	Kv	Kv	Kv	Kv	
Current Transformer Ratio		480:1	600:1	700:1	800:1	1000:1	1200:1	1400:1	1500:1	1800:1	2400:1	
25:5	Min	3000	4000	4500	5000	7000	7500	9000	10MW	12MW	13MW	M
	Nom	K 4000	5000	6000	7000	8000	10MW	12MW	12	15	20	
	Max	5000	6000	7000	8000	10MW	12	12	15	20	25	
50:5	Min	6000	8000	9000	10MW	15	15	17.5	20	25	30	E
	Nom	I 8000	10MW	12MW	12	17.5	20	25	25	30	40	
	Max	10MW	12	12	16	20	25	25	30	35	50	
75:5	Min	9000	12	15	15	20	25	30	30	35	45	G
	Nom	L 12MW	15	17.5	20	25	30	35	35	45	60	
	Max	15	18	20	25	30	35	40	40	50	75	
100:5	Min	12	15	17.5	20	25	30	35	40	45	60	A
	Nom	O 15	20	25	25	35	40	45	50	60	80	
	Max	20	25	25	30	40	50	50	60	75	100	
150:5	Min	18	25	30	30	40	45	60	60	70	90	W
	Nom	W 25	30	35	40	50	60	70	75	90	120	
	Max	30	35	40	50	60	75	80	90	100	150	
200:5	Min	25	30	35	40	50	60	70	75	90	120	A
	Nom	A 30	40	45	50	70	80	90	100	120	150	
	Max	40	50	50	65	80	100	100	120	150	200	
300:5	Min	40	45	60	60	75	90	120	120	150	180	T
	Nom	T 50	60	70	75	100	120	150	150	175	250	
	Max	60	75	80	100	120	150	175	175	200	300	
400:5	Min	50	60	70	80	100	120	150	150	180	250	T
	Nom	T 60	75	90	100	120	150	175	200	250	300	
	Max	80	100	100	120	160	200	200	250	300	400	
600:5	Min	80	90	120	120	150	180	250	250	300	400	S
	Nom	S 100	120	150	150	200	250	300	300	350	500	
	Max	120	150	175	200	250	300	350	350	450	600	
800:5	Min	100	120	150	160	200	250	300	300	400	500	
	Nom	120	150	175	200	250	300	350	400	500	600	
	Max	150	200	200	250	300	400	450	500	600	800	
1200:5	Min	150	180	250	250	300	400	450	450	600	750	
	Nom	200	250	300	300	400	500	600	600	750	900	
	Max	240	300	350	400	500	600	700	750	900	1200	
1500:5	Min	180	250	300	300	400	450	600	600	700	900	
	Nom	250	300	350	400	500	600	700	750	900	1200	
	Max	300	350	400	500	600	750	800	900	1000	1500	
2000:5	Min	250	300	350	400	500	600	700	750	900	1200	
	Nom	300	400	450	500	700	800	900	1000	1200	1500	
	Max	400	500	500	650	800	1000	1000	1200	1500	2000	
3000:5	Min	400	450	600	600	750	900	1200	1200	1500	1800	
	Nom	500	600	700	750	1000	1200	1500	1500	1750	2500	
	Max	600	750	800	1000	1200	1500	1750	1750	2000	3000	
4000:5	Min	500	600	700	800	1000	1200	1500	1500	1800	2500	
	Nom	600	750	900	1000	1200	1500	1750	2000	2500	3000	
	Max	800	1000	1000	1200	1600	2000	2000	2500	3000	4000	
5000:5	Min	600	800	900	1000	1500	1500	1750	2000	2500	3000	
	Nom	800	1000	1200	1200	1750	2000	2500	2500	3000	4000	
	Max	1000	1200	1200	1600	2000	2500	2500	3000	3500	5000	
6000:5	Min	800	900	1200	1200	1500	1800	2500	2500	3000	4000	
	Nom	1000	1200	1500	1500	2000	2500	3000	3000	3500	5000	
	Max	1200	1500	1750	2000	2500	3000	3500	3500	4500	6000	