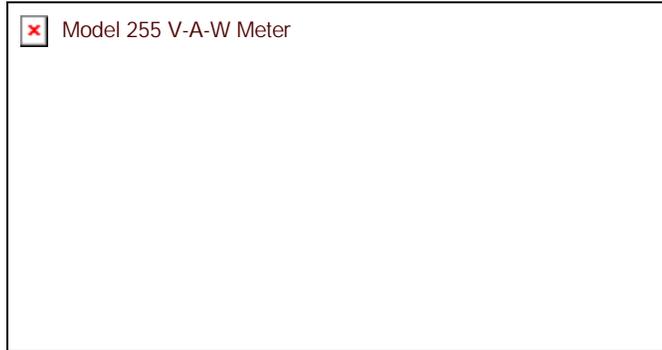




OTHER  
WATT  
METERS

## Volt-Ampere-Watt Meter Model 255/256

- WIDE BANDWIDTH
- TRUE RMS
- WAVESHAPES INDEPENDENT



The Model 255 digital V-A-W meter provides TRUE RMS measurements of VOLTAGE, CURRENT, and POWER. These measurements are essentially independent of the wave shape and of the power factor from DC up to frequencies of hundreds of kilohertz. Voltage and current readings are typically within 1% to 400 kHz for sine waves. The power in a 100 kHz square wave may normally be measured within 2%.

### WIDE MEASUREMENT RANGE - AMPLE RESOLUTION

The Model 255 provides FOUR full scale current ranges from 5 mA to 5A, THREE full scale voltage ranges from 20 V to 1000 V, TWELVE full scale power ranges from 100 mW to 5000 W and TWELVE, increased resolution POWER x10 ranges from 10.00mV to 500.0W.

A full four digit display provides  $\pm 1$  digits of resolution for full scale ranges corresponding to 1000, 2000, or 5000 digits.

### ISOLATED ANALOG OUTPUT

The meters have as an option an optically isolated ANALOG output board. The ANALOG board provides one volt output for a Full Scale display reading of either Current, Voltage or Power.

### CURRENT OR VOLTAGE RANGE EXTENSION

Full Scale CURRENT ranges down to 50.00  $\mu$ A or VOLTAGE ranges down to 1.000 V or 2.000 V are possible. External broadband shunts or transformers allow CURRENT extension to 50.00 A or 500.0 A. External voltage dividers allow VOLTAGE extension to 3500 V. Full Scale POWER for each case is equal to the VOLTAGE x CURRENT product.

### DEALS WITH MANY DIFFICULT MEASUREMENTS

The Model 255 is ideally suited to measuring almost any non-sinusoidal and/or low power factor wave shape. Typical uses are in connection with Switching Power Supplies, Transformer Losses, Fluorescent Lamp Ballasts, R-C Filter Rectifier Circuits, SCR Circuits, Mercury-Arc Lamp Circuits, Servo Systems, Motor Testing, Ultrasonics, MOV Loss Testing, Automatic Test Equipment, Sodium Lamp Ballasts, Ferrite Core Losses, Television Set Losses, and Electric Automobile Efficiency Measurements.

### EASY TO USE/HARD TO DAMAGE

The Model 255 is an all solid state, digital readout instrument. The V-A-W meter is complete, self contained instrument that is easy to use, hard to damage, easy to service, and easy to maintain.

### LOW CIRCUIT LOADING

An input impedance of 5 M $\Omega$  for the VOLTAGE terminals coupled with a full scale voltage drop of 100 mV across the CURRENT terminals cause negligible circuit loading or errors in most practical cases.

### PACKAGING/PROTECTION

The Model 255 is housed in a heavy duty aluminum case. The three lowest current range shunts are also diode and fuse protected.

*The Model 256 differs from the Model 255 by having a 100.0 V range instead of a 1000 V range and by having the CURRENT input fuse located on the front panel instead of internal to the instrument.*

## SPECIFICATIONS

### VOLTAGE and CURRENT

Readings between 1/12 and 1.7 times Full Scale

Frequency Range (3)	Accuracy
dc to 30 Hz (1)	$\pm 0.6\%$ Full Scale $\pm 0.4\%$ Reading
30 Hz to 100 kHz	$\pm 0.4\%$ Full Scale $\pm 0.2\%$ Reading
100 kHz to 300 kHz	$\pm 0.6\%$ Full Scale $\pm 0.6\%$ Reading

### POWER

Power Factor (PF) = Power/V-A > 0.5

V-A/Power (F.S.)	dc to 30 Hz (1)	30Hz - 50kHz	50 kHz - 100 kHz
< 1.5	$\pm 0.6\%$ F. S. $\pm 0.4\%$ V. A.	$\pm 0.4\%$ F. S. $\pm 0.2\%$ V. A.	$\pm 0.6\%$ F. S. $\pm 0.6\%$ V. A.
> 1.5, < 2.5	$\pm 1.0\%$ V.A.	$\pm 0.6\%$ F. S.	$\pm 1.0\%$ V.A.

Power Factor (PF) < 0.5

V-A/Power (F.S.)	dc to 30 Hz (1)	30Hz - 50kHz	50 kHz - 100 kHz
< 1.5	$\pm 0.4\%$ F. S. $\pm 0.2\%$ V. A.	$\pm 0.5\%$ F. S. $\pm 0.5\%$ V. A.	$\pm 0.7\%$ F. S. $\pm 0.8\%$ V. A.
> 1.5, < 2.5	$\pm 0.6\%$ V.A.	$\pm 1.0\%$ F. S.	$\pm 1.5\%$ V.A.

Terms: V-A.means the actual product of the input Volts and Amperes as measured on the model 255.

Power(F.S.) means the value of the Power range . This is the product of the selected Current range value and the selected Voltage range value.

Power Factor is defined as the ratio of the measured Power to the measured Volt -Amperes. In the case where both current and voltage are sinusoidal, then the Power Factor is the cosine of the phase angle between the voltage and the current.

### POWER x 10

In cases where **both** the input Voltage and the input Current are less than 40% of their full scale values, the POWER x 10 range allows an additional decade of resolution. The decimal point is automatically adjusted to give a direct reading of power. The measurement uncertainty remains the same as that stated for POWER.

### POWER FACTOR (Sine Wave Inputs ONLY)

Sinusoidal inputs between 30 Hz and 25 kHz. Current and Voltage inputs individually each less than 1.7 full scale. Input Volt-Ampere product between 1/3 and three times the corresponding Power full scale value.

Uncertainty:  $\pm 3.0\%$  of Full Scale

### CREST FACTOR

Except for the top voltage and current ranges (which are amplitude, restricted) the Model 255 will measure pulse inputs with peak values of 3.5 times the full scale value of the range. (Peak-to-peak values around a zero average value, may be seven times the full scale d-c level).

### RESOLUTION - USEFUL RANGE (VALUES IN RMS)

FULL SCALE	LOWER LIMIT	UPPER LIMIT	RESOLUTION
20 V	1.6 V	34 V	10 mV
200 V	16 V	340 V	100 mV
1000 V	83 V	1000 V	1 V
5 mA	400 $\mu$ A	8.5 mA	1 $\mu$ A
50 mA	4 mA	85 mA	10 $\mu$ A
500 mA	40 mA	850 mA	100 $\mu$ A
5000 mA	400 mA	7.5 A	1 mA

### INPUT IMPEDANCES/ PROTECTION LIMITS

RANGE	INPUT IMPEDANCE	PROTECTION LIMITS
20 V, 200 V, 1000 V	5 M $\Omega$ - 16 pF	2 kV peak input
5 mA, 50 mA, 500 mA	20 $\Omega$ , 2.0 $\Omega$ , 0.33 $\Omega$	1.5 A (Fast Fuse)
5000mA	28 m $\Omega$	10 A peak input

At frequencies up to 600 Hz, the COMMON terminals may be operated up to 250Vrms(400Vpeak) above the grounded metal case.

### DISPLAYS, OUTPUTS, AND CONTROLS

The Model 255 has a four digit display with full scale values of 5000, 2000, and 1000 depending upon the function being displayed.

The numeric display is made up of four identical 10.9 mm (0.43 inch) high, seven segment, high efficiency, LED units mounted in sockets. A non-glare, optically matched, filter covers the display. Decimal point placement is automatic. Four separate LEDs indicate NEGATIVE power or power factor readings, INPUT OVERLOAD, OUTPUT OVERLOAD, and MILLIWATTS.

The seven position FUNCTION switch provides ON/OFF control, the selection of the five different FUNCTIONS (I, V, P, P x 10, and PF) and a REMOTE position. In REMOTE any FUNCTION may be selected by an appropriate contact closure that is capable of "sinking" 1.0 mA to ground.

### MEASUREMENT RATE

The measurement rate and the display rate are locked to the power line frequency and are normally set at 10 readings/second (60 Hertz operation) or at 8.33 readings/second (50 Hertz operation). Other "line locked" rates are possible as well as the use of an external clock to control the timing.

## TEMPERATURE

Operating Temperature Range: 0°C to 50°C  
Specified Accuracy: 15°C to 35°C

## DIMENSIONS

Width: 29.0cm. (11.4 inches) Height: 13.2 cm. (5.2 inches) Depth: 33.0 cm. (13inches)

**WEIGHT** 4.1 kg. (9 lbs.)

**Rack Mount Available**

## POWER REQUIREMENTS

95-105 V or 105-125 V or 210-240 V, 50-60 Hz. Specify line voltage when ordering.

## NOTES:

(1) Additional internal filtering will be necessary to prevent the display from "tracking" the input for input frequencies below 10 Hz. Provision has been made for the easy addition of such filtering.

(2) In the model 255/256 the two COMMON terminals are connected together internally . In normal usage the meter is connected so that the load current flows through the internal shunt and the meter voltage measures the sum of the load and the shunt voltage drops. Thus, the POWER reading is the load power plus  $I^2r$ , where r is the shunt resistance. In high power factor situations, the  $I^2r$  correction term is usually negligible. In low power factor situations, the  $I^2r$  term may make up 90% of the reading.

(3) 5A scale is specified to 200 kHz only.

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