

# RM-350EC/AC/120 & AC/240 or RM-350TB/AC/120 & AC/240 Digital Panel Meters



## OVERVIEW

The model RM-350EC/AC/120, RM-350TB/AC/120, RM-350EC/AC/240 and RM-350TB/AC/240 are 3½ digit, fixed-range, line powered, digital panel meters for making AC voltage measurements. The suffix EC indicates Edge Connector and TB indicates Terminal Block. The last three digits of the model number indicate the line input voltage. AC current may also be measured by connecting a shunt resistor across the AC signal input terminals.

The meters are available in any one of five ranges: 200 millivolt, 2 Volts, 20 Volts, 200 Volts, or 1000 Volts.

Modification from one range to another is easily accomplished by changing one to three resistors and one capacitor. Calibration is readily accomplished by the adjustment of one potentiometer accessible at the front of the meter.

The value of the measured AC voltage (or current) is displayed in 0.56" LED numerals, a decimal point and a polarity sign. Also an 0.8" LED option is available.

## SPECIFICATIONS

**Accuracy:** ± 0.7% Reading, ±2 digits

**AC Converter Response:** Average responding, calibrated to display RMS value of sine wave.

**Decimal Location:** may be positioned by a jumper on the connector to any of the three locations, ±X.X.X.X

**Display:** 0.56" LED or 0.8" large LED option

**Frequency Range:** 50 to 400 Hz

**Input Z:** 200mV & 2V range, 1000 megohms; 20V range, 1 megohm; 200V and 1000V ranges, 10 megohms.

**Overload Indication:** Left-most digit is the numeral 1; remaining digits are blank.

**Power:**

RM-350EC/AC/120	105 to 125 VAC
RM-350TB/AC/120	50/60 Hz
RM-350EC/AC/240	210 to 250 VAC
RM-350TB/AC/240	50/60 Hz

**Operating Temp.:** 0°C to +50°C

**Range:** 0 to 200mVolts  
0 to 2Volts  
0 to 20Volts  
0 to 200Volts  
0 to 1000Volts

**Settling Time:** 2 seconds

**Update Rate:** 3 readings/sec, nominal

**Warm-up Time:** 10 seconds

**Weight:** Approx 13 ounces (368 g)

## CONSTRUCTION

The RM Series AC reading, AC powered panel meters contain two printed circuit board assemblies, mounted one above the other. The lower assembly is the display/main board assembly and the upper assembly is the AC/DC converter assembly. For the RM-350EC/AC/120 and RM-350EC/AC/240, all interconnections between the upper and lower assemblies are made via the mating connectors at the rear of the meter. For the RM-350TB/AC/120 and RM-350TB/AC/240, all interconnections between the upper and lower assemblies are made via the terminal blocks.

## MOUNTING DATA

A rectangular panel cutout is recommended for mounting the instrument. Recommended dimensions are: 92 mm, (3.622 in.) by 43 mm, (1.693 in.)

The meter will also fit the DIN/NEMA 1/8 standard cutout, 92 mm by 45 mm (3.6 in. x 1.8 in.) and the widely used, 99.7 mm by 42.72 mm (3.9 in. x 1.7 in.).

Any panel thickness from 1.52 mm (0.06 in.) to 4.57 mm (0.18 in.) may be used.

To mount the meter, insert the meter from the front side of the panel cutout. Place the retaining spring in the rear holes in the sides of the meter and slide it behind the mounting panel to fasten the meter in place. It does not matter whether the retaining spring swings from above or below the meter.

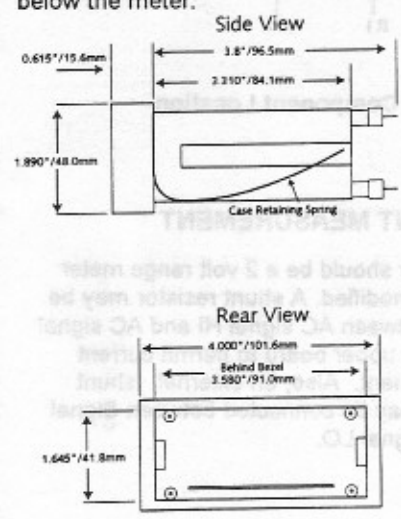


Figure 1: Card-Edge Configuration

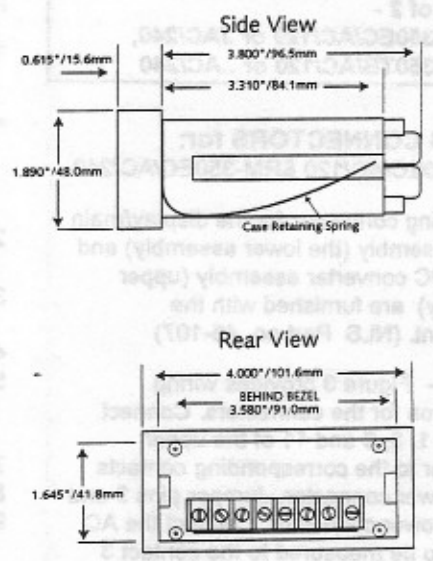


Figure 2. Terminal Block Config.

## TERMINAL BLOCK WIRING FOR:

- RM-350TB/AC/120 & RM-350TB/AC/240

Figure 4 provides wiring information for the terminal blocks. Connect terminals 1, 2, 5 and 6 of the upper terminal block to the corresponding terminals on the lower terminal block. Jumper terminals 2 and 5 on the lower terminal block. Connect the AC signal to be measured to terminals 2 and 3 of the upper terminal block (Signal HI to 3 and Signal LO to 2). To display a decimal point, jumper between terminals 3 and terminals 4, 7, or 8 on the lower terminal block, depending upon which decimal point is to be displayed.

Dec. Location X • X • X • X  
Terminal 8 — 7 — 4  
If decimal point is not desired, omit jumper.

Connect the AC power to terminals 7 and 8 of the upper terminal block. The "hot" side of the AC line should be connected to terminal 8 since it is this terminal which is connected to the internal fuse.

Terminal Numbers 1 thru 8 read from left to right when facing rear of meter.

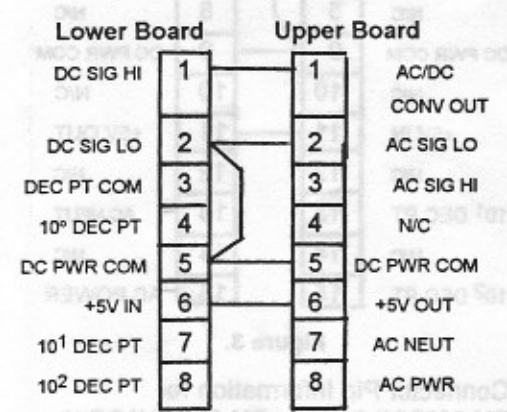


Figure 4. Terminal Block Wiring Information  
RM-350TB/AC/120 or RM-350TB/AC/240

RM-350EC/AC/120 or .AC/240,  
RM-350TB/AC/120 or ..AC/240

**WIRING CONNECTORS for:**

- RM-350EC/AC/120 & RM-350EC/AC/240

The mating connector for the display/main board assembly (the lower assembly) and the AC/DC converter assembly (upper assembly) are furnished with the instrument. (NLS Part no. 46-107)

**Wiring** - Figure 3 provides wiring information for the connectors. Connect contacts 1, 3, 9 and 11 of the upper connector to the corresponding contacts on the lower connector. Jumper pins 3 and 9 of the lower connector. Connect the AC voltage to be measured to the contact 3 and 6 of the upper connector (Signal HI to 6 and Signal LO to 3). To display a decimal point, jumper between contact 5 and contact 7, 13 or 15 on the lower connector, depending upon which decimal point is to be displayed.

Dec. Location X • X • X • X  
Conn. Term. 15 13 7

If decimal point is not desired, omit jumper.

Connect the AC power to contacts 13 and 15 on the upper connector. The "hot" side of the AC line should be connected to contact 15 since it is this contact which is connected to the internal fuse.

Contact Numbers 1 thru 15 read from left to right when facing rear of meter.

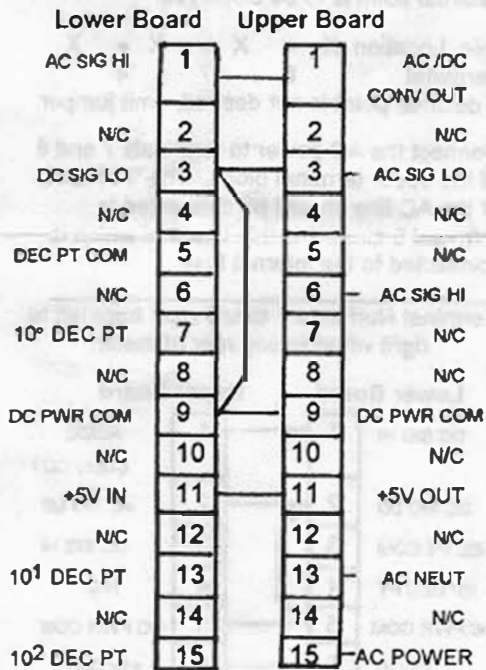


Figure 3.

Connector Pin Information for  
RM-350EC/AC/120 or RM-350EC/AC/240

**RANGE MODIFICATION.**

1. Remove all sources of power and signal from the meter.

**\*\*For RM-350EC/AC/120 & RM-350EC/AC/240 only:**

*Unplug the two mating connectors.*

2. Using a knife or a small screw driver blade, carefully pry off the front panel
3. Remove the two screws and brackets behind the front panel.
4. Slide the meter out of the case.
5. Install the resistors specified in Table I to obtain desired range. See Figure 5 for component locations.
7. Reassemble the meter.
8. Calibrate the meter.
9. If a decimal indication is required, refer to the applicable paragraphs on wiring connectors or terminal blocks.

**Resistor Values for Range Mod**

RANGE*	R9	R10
2V	100kΩ ±5%	OMIT
20V	909kΩ ±1%	100kOHM ±1%
200V	10MΩ ±1%	100kOHM ±1%
1000V	10MΩ ±1%	10kOHM ±1%

\*For 200mV range call the Factory

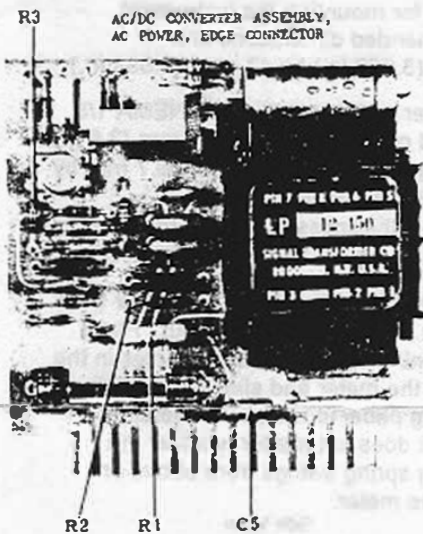


Figure 5: Component Location

**CURRENT MEASUREMENT**

The meter should be a 2 volt range meter or be so modified. A shunt resistor may be placed between AC signal HI and AC signal LO in the upper board to permit current measurement. Also, an external shunt resistor may be connected between Signal HI and Signal LO.

Select the value of the shunt resistor in Table II below. One percent metal-film or wire-wound resistors are recommended.

Full Scale Current Range.	Shunt Resistor meter in 2Volt Range
2 mA	1000 OHMs
20 mA	100 OHMs
200 mA	10 OHMs
2 A	1 OHM*

\* External shunt or transformer

**CALIBRATION**

1. Use a knife or small screw driver blade, carefully pry off the front panel to gain access to the calibration potentiometer.
2. Verify that the line voltage is correct
3. Allow the meter to warm up for five min
4. Apply AC input signal voltages as follows:

RANGE OF INSTRUMENT	CALIBRATION VOLTAGE
200 mVAC	.1990 VAC
2 VAC	1.990 VAC
20 VAC	19.90 VAC
200 VAC	199.0 VAC
1000 VAC	700 VAC

5. Adjust the potentiometer at lower right of the display panel until the display agrees with input.
6. Disconnect the calibration voltage and power supply input.
7. Replace the front panel.

**MAINTENANCE**

To facilitate maintenance, all six integrated circuits on the lower board assembly are plug-in components. They can be easily removed and installed without soldering. They include the four LED displays, the ICL7107CPL Integrated Circuit and the CD4049BE Integrated Circuit.

The fuse is located in fuse clips on the upper board assembly. The RM-350EC/AC/120 & RM-350TB/AC/120 meters are protected with a 3AG, 1/8 ampere, "Slo-Blo" fuse. The RM-350EC/AC/240 & RM-350TB/AC/240 meters are protected with a 3AG, 1/16 ampere, "Slo-Blo" fuse.

Specifications Subject to Change without Notice

Thank you for choosing Non-Linear Systems. Should you have any questions Please call or email.

**Non-Linear Systems**  
Originator of the digital voltmeter



San Diego, CA

(619) 521-2161

sales@nonlinearsystems.com