NON-LINEAR SYSTEMS

RM-350TB

DIGITAL PANEL METER

INSTRUCTIONS

The RM-350TB is a 3 ½ digit, fixed range digital panel meter for making DC voltage measurements. DC current may also be measured by internally or externally connecting a shunt resistor across the DC signal input terminals.

Connections to the RM-350TB are made via a terminal block. The meters are available in any one of five ranges: 1.999mV F.S., 1.999V F.S., 19.99V F.S., 199.9V F.S. or 1000V F.S.

Modification among the highest four ranges may be accomplished by the substitution, addition or removal of one or two resistors. Calibration is readily accomplished by adjusting one potentiometer accessible at the front of the meter. For operation, an external +5VDC (±5%) power supply is required.

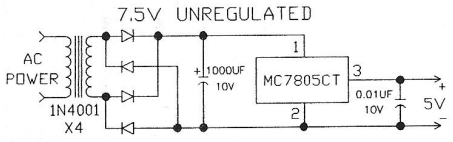


Figure 1. Typical Power Supply

SPECIFICATIONS

Ranges:

0	to	+/- 199.9 mVDC
0	to	+/- 1.999 VDC
0	to	+/- 19.99 VDC
0	to	+/- 199.9 VDC
0	to	+/- 1000 VDC

Accuracy: ±(0.05% Rdg ±0.05% F.S)

Update Rate: 3 Rdg / sec, nominal

Display: 0.56" high LED Red (std)

Operating Temp: 0°C to +80°C

Power: +5VDC (±5%) @ 200mA maximum

Size: See **Figure 2**

Weight: 5 ounces (142 g)

T/C: ±0.02% Rdg/°C on 200mV & 2V ranges; ±0.025% Rdg/°C on other ranges.

Input Z: 200mV range, 100MΩ; 2V range, 1000MΩ; 20V range, 1MΩ; 200V & 1000V ranges, 10MΩ

Common-Mode Rejection: 80 DB minimum

Common-Mode Compliance: ±100mV between signal low and power common

Decimal Location: May be positioned by jumper on connector to any one of three locations: **X . X . X . X**

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

Input Current: 250 pA max. (room temp.)

Input Voltage Protection: ±50Vdc or 50Vrms max., 200mV & 2V ranges; ±150Vdc or 150Vrms max., 20V range; ±1000Vdc or 700Vrms max., 200V & 1000V ranges.

INSTALLATION

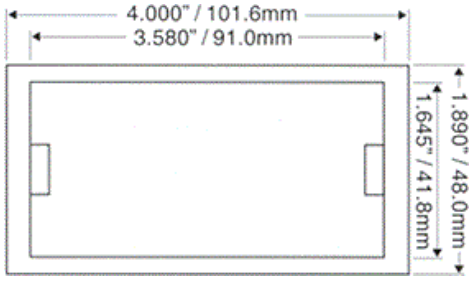
A rectangular panel cutout is recommended for mounting the instruments. The recommended dimensions are:

92 mm +1, -0 mm (3.622 in +0.040, -0 in)
43 mm +1, -0 mm (1.693 in +0.040, -0 in)

The meters will also fit the DIN/NEMA standard cutout, 92 mm x 45 mm (3.622 in x 1.772 in) and the widely used 99.7 mm x 42.72 mm (3.925 in x 1.682 in) cutout.

Any panel thickness from 1.524 mm (0.060 in) to 4.57 mm (0.18 in) may be used.

To mount the meter, insert the meter from the front of the panel cutout. Insert the retaining spring into the holes in the sides of the meter case at the rear. Slide the spring 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.



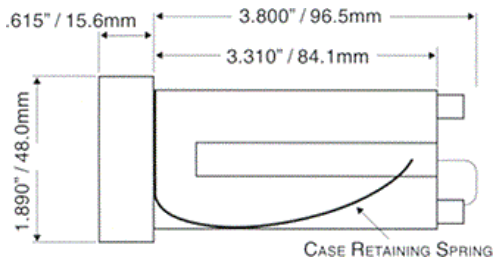


Figure 2. Case Dimensions

OPERATION

1. **Signal:** Connect the signal to be measured to terminal **1** of the terminal block. A shielded lead may be needed if the signal has a high source resistance. Connect the low side of the signal to terminals **2** and **5** of the terminal block. It will usually be better to do this with two separate wires rather than a jumper across **2** and **5** at the terminal block. This will eliminate current flow through the signal low connection to terminal **2.**

2. **Power Supply:** Connect the ground of the +5V power supply to terminal **5** and the positive side to terminal **6**.

3. **Decimal Point:** Jumper between terminal 3 (dec com) and terminal 4, 7 or 8, depending upon which decimal point is to be displayed.

   DECIMAL LOCATION: X . X . X . X
   TERMINAL NO.: 8 7 4

4. **Polarity Display**: Negative polarity indication with a negative signal. Positive indication is implied.

Terminal	Function
1	**Signal High**
2	**Signal Low**
3	**Decimal Pt Com**
4	**10⁰ Decimal**
5	**Power Ground**
6	**+5Vdc Power**
7	**10¹ Decimal**
8	**10² Decimal**

Figure 3. Terminal Block Information

Polarity / Display: Blanking or dimming. The polarity is energized via a resistor onthe board assembly. See **Figure 4**.

To blank or dim the display, remove the jumper. To dim the display, replace the jumper with a resistor. The value of the resistor, to obtain desired dimming effect, is the best by determining experimentally.

To gain access to the components withinthe instrument, perform the first five steps under Range Modification.

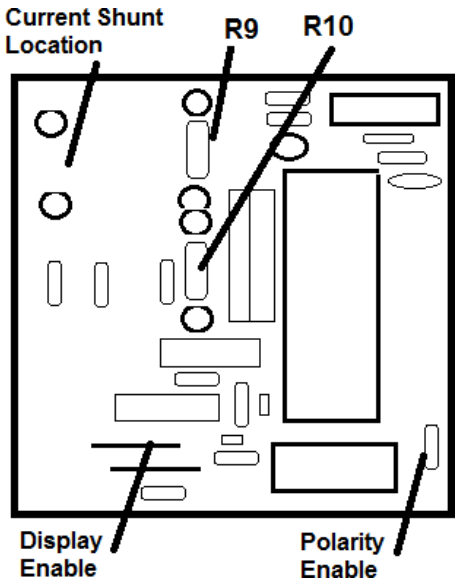


FIGURE 4

CALIBRATION

1. Using a knife or a small screwdriver blade, carefully pry off the front panel to gain access to the calibration potentiometer.
2. Adjust power supply voltage to within 2% of its nominal value.
3. Allow a five-minute warm-up period.
4. Apply DC input signal voltages as follows:

RANGE OF INSTRUMENT	CALIBRATION VOLTAGE
200 mV	190.0 mV
2 V	1.900 V
20 V	19.00 V
200 V	190.0 V
1000 V	900.0 V

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

RANGE MODIFICATION

(except 200 mV range)

A range modification kit containing the components needed to modify the instrument within any of its four highest range isavailable, NLS part number **N39-356**. The procedure for changing ranges is as follows:

1. Remove all sources of power and signal voltage from the meter.
2. Remove front panel (see step 1 under Calibration).
3. Remove the two screws and the two retaining brackets behind front panel.
4. Slide meter out of case.
5. Install resistors specified in **Table 1** to attain desired range. See **figure 4** for component location. Note that these components should be placed in the lower board assembly.
6. Reassemble meter.
7. Calibrate meter.
8. If a decimal indication is required, refer to the Decimal location paragraph.

TABLE 1. Component values for Range Modification

RANGE	R9	R10
2V	100 KΩ 5%	OMIT
20V	909 KΩ 1%	100 KΩ 1%
200V	10 MΩ 1%	100 KΩ 1%
1000V	10 MΩ 1%	10 KΩ 1%

CURRENT MEASUREMENT

A shunt resistor may be plugged into the terminals shown in **Figure 4** to permit current measurement. Alternatively, an externalshunt resistor may be connected between signal high and signal low. For currentmeasurement, the meter should be connected in the 200mV or 2V range, depending upon the full-scale voltage drop which can be tolerated. **Table II** shows the shunt resistor value required. The accuracy of the measurement will be determined largely by the accuracy of the shunt resistor.

Table II. Shunt Resistor Values

200 mV Range Meter	
Full Scale Current Range	Shunt Resistor
2 mA	100 Ω
20 mA	10 Ω
200 mA	1 Ω
2 A	0.1 Ω

2 V Range Meter	
Full Scale Current Range	Shunt Resistor
2 mA	1 KΩ
20 mA	100 Ω
200 mA	10 Ω
2 A *	1 Ω *

***Use external shunt only**

MAINTENANCE

To facilitate maintenance, all six integrated circuits on the circuit board assembly are plug-in components. They can easily be removed and installed without soldering. They include the four LED displays, ICL7107CPL and the CD4049 ICs.

Specifications Subject to change withoutnotice

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