

**FM-3TB/120 &  
FM-3TB/240  
FM-300TB/120 &  
FM-300TB/240**



**INTRODUCTION**

The FM-3TB and FM-300TB Frequency Monitors were designed to monitor and display the frequency of AC power lines. The use of a quartz crystal to control the time-base oscillator insures long-term accuracy and stability. No calibration adjustments are required. All solid-state circuitry is used to insure reliability and long life.

**SPECIFICATIONS**

**Input Voltage**

FM-3TB/120 &  
FM-300TB/120: 105\* to 125VAC

FM-3TB/240 &  
FM-300TB/240: 210\* to 250VAC

\* The instrument will function properly at voltages substantially below those shown. However, thereadout display becomes dimmer as the input voltage is decreased.

**Frequency Range:** 45.0 Hz 99.9 Hz

**Accuracy:** ± 0.1 Hz

**Time Base:**

1 second, crystal controlled

**Display:**

FM-3TB/120 &  
FM-3TB/240: 3 digits, 0.56" LED

FM-300TB/120 &  
FM-300TB/240: 3 digits, 0.6" LCD

Decimal point is fixed between the two right-most digits.

Display is updated every two seconds.

**Operating Temperature:** 0° to 50°C

**Weight:** 6.6 ounces (187grams)

**Input Power:** Less than 3 watts

**OPERATING PRINCIPLES**

The FM-3 & FM-300 consist of a phase-locked loop frequency multiplier, a three-decade counter with latches and display, and a one-second crystal-controlled time base.

The frequency multiplier multiplies the input frequency by a factor of ten, thus increasing the resolution capability of the FM-3 & FM-300 by a factor of ten. The resulting resolution is 0.1 Hz. Use of the phase-locked loop insures that the frequency multiplication is exact.

The counter counts the output of the frequency multiplier for a period of one second. At the end of the one-second period, the reading in the counter is transferred to the latches where it is stored. The readout displays the numbers stored in the latches. One-half second after the transfer, the counter is reset to zero. After another one-half second a new count is initiated.

The time base is derived from a 2.097152 megahertz crystal oscillator. The output of the oscillator drives a 21-stage counter which, in turn, produces the accurate one-second timing pulses used to control the decade counter.

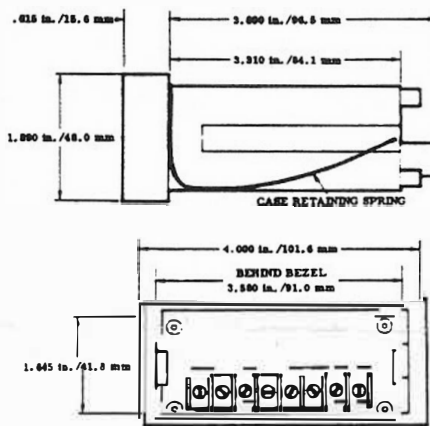


Figure 1. Outline Drawing

**MOUNTING DATA**

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

92 mm +1, -0mm (3.622 in+0.04,-0 in) x 43 mm +1, -0 mm(1.693 in+0.04,-0in)

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 57 mm (0.18 in) may be used.

To mount the meter, remove the retaining spring from its holes in the sides of the meter at the rear. Insert the meter from the front of the panel cutout. Replace the retaining spring and slide it behind the mounting panel to fasten the meter in place. It does not matter whether the retraining spring swings from above or below the meter.

**OPERATION**

Connect input AC line to terminals 3 and 6 of the terminal block. Apply power and allow ten seconds for the instrument to stabilize; the correct frequency reading should then be displayed.

**FUSE REPLACEMENT**

The FM-3TB, FM-300TB contains a ¼ ampere fuse for line protection. The fuse is type 3AG, Part Number 312.250 (Littlefuse Inc.). To replace the fuse, perform the following steps:

1. Shut off input line power.
2. Disconnect input line from terminal block at rear of instrument.
3. Using a knife or a small screwdriver blade, carefully pry off plastic front panel.
4. Remove the two screws and two retaining brackets behind front panel.
5. Slide meter out of case.
6. Carefully pull up on upper P.C. board until it has separated from lower P.C. board. the fuse, located on the lower board, will then be accessible.
7. Replace fuse.
8. Carefully replace upper P.C. board, making sure that every post is seated in it corresponding socket. Note that NLS logo and P.C. board number on both P.C. boards are toward rear of the instrument.
9. Reassemble instrument.

*Specifications Subject to Change without Notice*

**Non-Linear Systems**

San Diego, CA 92120  
P: 619-521-2161  
sales@nonlinearsystems.com

