

Using the DMS-EB-RMS Board

General Description

When soldered to a 2V-input, 3½ digit DMS-30 Series meter, the DMS-EB-RMS Application Board enables the meter to display the true rms value of ac voltages up to 750V with a resolution of 1V. When the board is soldered to a 200mV-input DMS-30 meter, ac voltages up to 199.9V can be displayed with 0.1V resolution. The DMS-EB-RMS board will operate with either LED display (DMS-30PC) or 5V-powered LCD display (DMS-30LCD) meters.

As shown in Figure 2, a 1000:1 voltage divider consisting of resistors R1 (988k), R2 (988k) and R3 (1.98k) is used to attenuate the ac input to a level that U1 can accept. U1 is a precision, integrated circuit, ac-to-rms converter whose dc output is directly applied to the DMS-30's input.

As an example, assume a 120Vrms, 60Hz, ac power-line input is applied to TB1 terminals 1 and 3. This input is divided down to 0.120Vrms and then applied to U1. If the selected DMS-30 meter has a ±2V input range (-1 suffix), the display reading will be "120" (1Vac resolution). If the selected DMS-30 meter has an input range of ±200mV (-0 suffix), the display reading will be "120.0" (decimal point DP3 is enabled by shorting solder gap SG1).

Powering the DMS-EB-RMS

As stated in the DMS-EB-RMS's data sheet, a dedicated, transformer-isolated, +5V power supply must be used to power the DMS-EB-RMS and its meter in order to ensure safe operation when measuring ac power mains input signals. The transformer's breakdown voltage rating must always be higher than the ac input being measured. The DMS-EB-RMS provides no isolation between the ac input signal and the meter's 5V RETURN terminal. Take extreme care when connecting any ac power mains source as

an input signal to the DMS-EB-RMS. Never connect the DMS-EB-RMS's 5V RETURN terminal to earth (chassis) ground since this could defeat any safety grounding and place the system's +5V power supply, and all its associated circuitry, at dangerously elevated ac-line potentials.

The only time the above precautions may be deviated from is if the input signal is either transformer-coupled or electrically isolated from the ac power line. The output of a current transformer (used for making ac amperage measurements) is an example of an ac signal that normally exceeds the isolation requirements stated earlier. Do not hesitate to consult DATEL if you have questions regarding any aspect of your DMS-EB-RMS application.

Modifying the DMS-EB-RMS's Input Circuit

The 1000:1 input divider described above can be altered or removed altogether to suit the user's particular input requirements. However, in all cases, the maximum voltage that can be applied to U1's V_{IN} terminal (pin 2) is 1.0Vac. For example, to display a 0 to 1Vac input with 1mV resolution, a jumper wire (JP1) can be used to effectively short R1 and R2 (see Figure 1). In applications in which R1 and R2 are shorted, R3 should also be removed from the circuit because it may load down the signal source. With this configuration and an input of 1.0Vac, a DMS-30PC-1 meter (±2V input) will display "1.000".

As another example, assume that the input signal range is 0 to 10Vac. A 10Vac input is too high to be applied directly to U1; it must first be divided by a factor of 10 to obtain a level of 1.0Vac at U1 pin 2. This can easily be accomplished by leaving R1 and R2 in the circuit and replacing R3 with a precision, ±0.1%, 221k resistor.

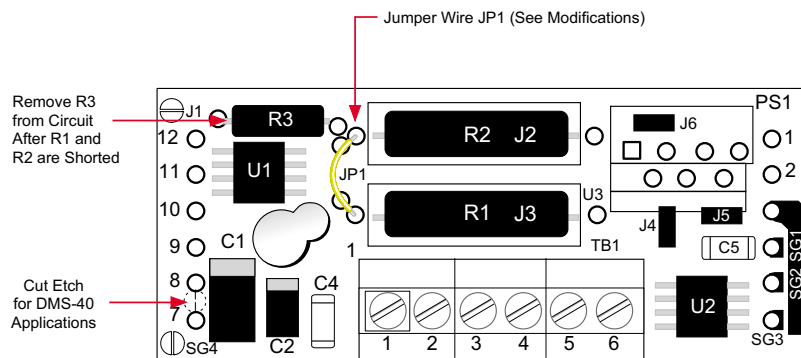


Figure 1. Modifying the DMS-EB-RMS Application Board

