How to connect 48 volt adapter/lightning protector (TM-48VA) to the TriMetric battery monitor

(For use with TriMetric models TM-2020 and TM-2B that mount in "double gang" box)
Revised July 1, 1998

Description: The TM-48VA adapter will adapt a TriMetric TM-2020 or TM-2B meter for 48 volt operation. It will also provide excellent lightning protection at any operating voltage from 12 to 48V. With the protector installed as described here, the TriMetric warranty will extend to cover lightning damage. This adapter is designed to mount next to the TriMetric terminal block to which the wires to the battery are connected. It is not recommended for use with the older type TriMetric TM-1B, with its smaller steel cover, because although it will work electrically and protect the meter, the cover will not fit on the meter when the adapter is installed. A slightly different adapter is available (TM-48V) which may be used with the TM-1B.

Installation considerations for the TM-2020 meter which mounts in a "double gang" electrical box The TriMetric TM-2020 will fit with the TM-48VA adapter inside the optional Wiremold "double gang" box (Wiremold #2348-2), but not with a lot of extra space. The adapter mounts against the terminal block with short wires which connect the TriMetric to the adapter--as shown on reverse--and both adapter and meter will fit in the box. Other "double gang" boxes may be used--plastic or metal--however it is important to use one that is large enough to accommodate the extra space required by the adapter. It may be necessary to bend the adapter up, no longer parallel with the TriMetric circuit board, but more nearly perpendicular to it. An advantage of plastic boxes is that there is less chance of inadvertent shorts. However it is possible to use a large metal box: 4-9/16 inches square by 2-1/8 with a raised 2 device cover, if you bend the adapter up somewhat as just described and shown on reverse.

Installation instructions: Follow steps 1-5 on the back of this sheet.

Specifications:

Lightning protection spec: It is designed to absorb lightning induced transients with 100 Amp max. surge current (8 μs rise/100 μs decay time). Under these conditions voltage may rise at the input to 200 volts for up to 1000 μs. (This is a conservative rating.)

Maximum/minimum voltage allowed to adapter: The minimum and maximum system battery voltage which may be placed to the adapter depend upon whether it is configured for 12, 24 or 48 volt systems. (See step 1 on reverse.) *Too high voltage will damage the unit; the voltage rating should not be exceeded, even for short time (except for the very short lightning transients mentioned above.)* Too low voltage will not damage the unit, however the TriMetric may not function properly.

12 volt configuration: minimum 8 volts, *max. 18 volts*.
24 volt configuration: minimum 12 volts, *max. 50 volts*.
48 volt configuration: minimum 12 volts, *max. 70 volts*.

Power requirement: Requires less than 1 ma.

Other notes: Set the adapter for the correct voltage for your system. (Described in Step 1 on reverse). *If the adapter is configured for 12 volts and connected to a 24 or 48 volt system it will be damaged.* If the adapter is configured for 24 or 48 volts and used on a 12 volt system the meter may not operate correctly if the system voltage drops below 11 volts. You must also set the TriMetric to read properly for 48V, as described in STEP 4.

Calibration: (Step 5) *With 48 volt systems*, to obtain the best voltage accuracy, the following calibration procedure may be carried out by a qualified technician with an accurate digital voltmeter. Without calibration, the voltage will be accurate to ±1%--however calibration can decrease this to ±0.3% for voltages between 40-70 volts. (If the adapter was purchased from the factory with the adapter attached, the unit has already been calibrated for the 48V adapter supplied, and a calibration similar to that described below will be necessary to increase accuracy if meter is used with 12/24 volt systems.) You may first connect meter up to 48 volt system according to instructions. **With power off, (remove fuse in + battery line to meter at battery)** take TriMetric out of its box, so the back of the printed circuit board is accessible. Locate the small square adjustment "pot" (marked "P1") on the board, with small screwdriver slot in the middle, and obtain a very small screwdriver suitable for adjustment. Get the whole arrangement set up so you can **safely** observe the meter reading while adjusting the "pot" on the PC board. *48 volts is sufficient to deliver a shock, and can even be dangerous in some situations.* With TriMetric meter connected to system, restore power by reinstalling the fuse. Use the known accurate digital meter to measure voltage between G1 and M+ terminals (on the battery/shunt side, not the TriMetric side i.e., you should be measuring voltage across the battery) at the adapter input: Carefully adjust the pot so the TriMetric "volts" reading agrees with the digital meter. Then **remove the fuse again,** reinstall the meter, and finally reinstall fuse.

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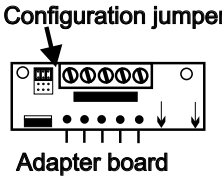
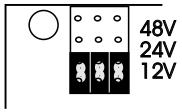
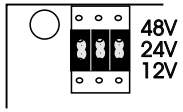
STEP 1: Configure jumpers properly on the adapter, depending on your system voltage: 12, 24 or 48. Pull three small rectangular jumpers straight off pins, and place on correct position. If you are not sure which setting to use, see "Maximum/minimum voltage allowed to adapter", shown on reverse of this sheet.

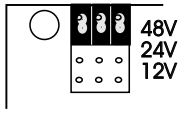




12 V. configuration



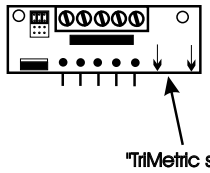
24 V. configuration

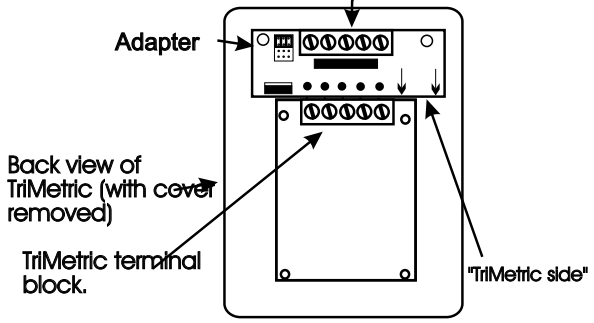


48 V. configuration

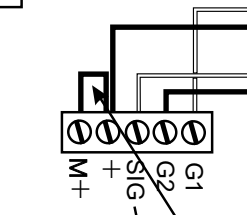
STEP2

Loosen the 5 screws on TriMetric terminal block and remove wire jumper (if present) between + and M+. Place the adaper so the 5 wires extending from the adapter poke into the TriMetric terminal block as shown. Tighten securely all 5 screws. For the adapter to fit in some boxes it may be necessary to pull this end up away slightly from front panel so adapter will fit in box.

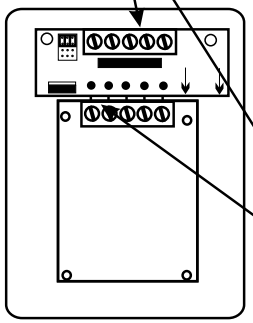




STEP3



To battery connections as shown in TriMetric manual.



Wire the TriMetric in the usual way (with the wires in the same order as shown in the regular TriMetric instructions), except connect to the adapter teminals as shown. The wire jumper from + to M+ must connect only here as shown. (Not here.)

STEP 4: IMPORTANT: Complete this step or TriMetric "VOLTS" reading will be off by a factor of 2.

For TriMetric model TM-2020 meter only: For meter to read voltage correctly with 48V systems (and jumpers configured as shown in STEP 1 for 48V) the "charged setpoint voltage" must be set to above 35.0 volts. For meter to read correctly when jumpers are configured for 12 or 24V systems the "charged setpoint voltage" must be set to below 35.0 volts. See TABLE 1 (page 13 of instructions and page 5) for how to do this. On table look under the DISPLAY MODE, volts.

For TriMetric model TM-2B meter only For meter to read voltage correctly with 48V systems (and jumpers configured as shown in STEP 1 for 48V) the meter must be set to 48V mode. To do this refer to TriMetric instructions, part 2, pages 2-3 and page 7: "d7 program". Here is a summary:

1. Use "SELECT" to select "blank" display, (just after "Amp-Hour" display).
2. Hold "SELECT" down for several seconds until you see "D 0" flashing in display. Release "SELECT".
3. Push "RESET" repeatedly until display reads "d 7". Then push "SELECT". (In display you should see maximum battery volts with occasionally flashing "d 7")
4. Push and hold down "SELECT"--and while holding push RESET momentarily. Release both buttons.
5. Either "24" or "48" will appear in dispay. To put in 48V mode, push reset unti "48" appears.
6. Push "SELECT". Meter is now in "48V" mode.

STEP 5: For 48 volt operation, if you wish to slightly increase accuracy of voltage reading, see "calibration" on reverse of this sheet.

How to connect the (TM-48VA) 48 volt adapter and lightning protector to the TriMetric battery monitor. | **BOGART ENGINEERING 1/16/03**