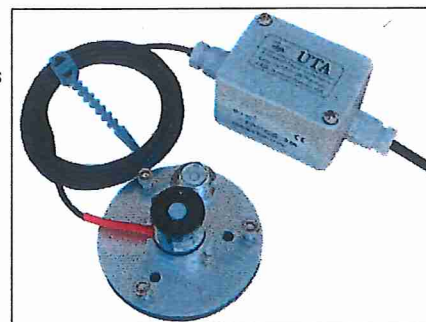


EME Systems Universal Voltage Output Amplifier for LI-COR™ Sensors

The UTA is a special purpose amplifier that provides a simple interface between LI-COR™ light level sensors and voltage input data loggers, chart recorders, HVAC, and greenhouse controls. The UTA converts the micro-Amp current output of the light sensor into a corresponding signal voltage.

This sheet describes the specific case of an LI-190™ Quantum PAR sensor amplified to a level of 0–5 Volts. The following instructions are provided to assist you in the installation and operation of your amplifier. While we have made every effort to protect the amplifier from faults, improper installation or misuse may result in incorrect readings, or at worst, failure of the amplifier. Please read the manual in its entirety before connecting power to the UTA.



Connections:

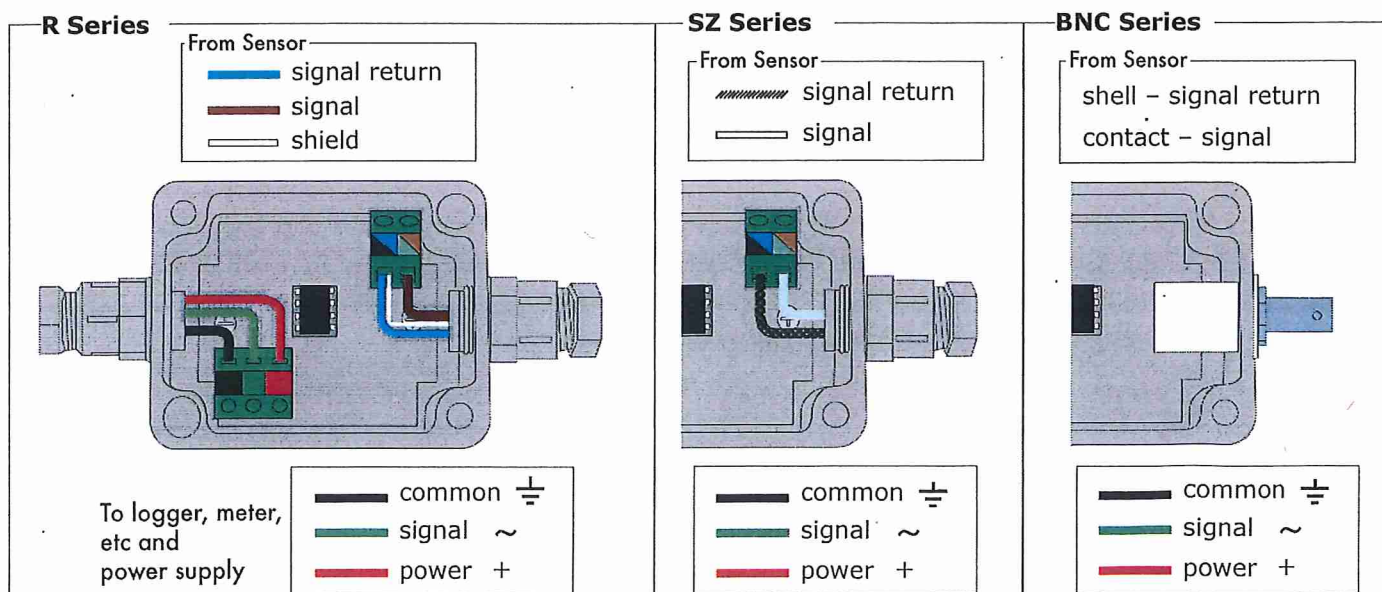
The only tool required is a 3.5-mm or 0.125-inch slot screwdriver. To open the enclosure, loosen the captive screws at the two corners and lift up the top. Refer to the connection diagram below.

- I) CONNECT LI-COR SENSOR TO UTA INPUT:** (a) Pass the LI-COR sensor cable through the UTA cable gland nearest the 2-terminal (blue/black & brown/light green) connection block. Loosen the gland nut if necessary. (b) Connect as follows:
- LI-190R signal return wire (blue) and shield to blue/black terminal.
 - LI-190R signal wire (brown) to brown/light green terminal.

If using the older SZ series of light sensor, connect shield to the blue/black terminal and the inner core wire to the brown/light green terminal.

- II) CONNECT POWER SUPPLY AND SIGNAL OUTPUT LINE TO UTA:** (a) Pass a 3-core cable (not included) through the UTA cable gland nearest the 3-terminal connection block. (b) Connect as follows:
- Black terminal on UTA to cable ground (common to power and signal).
 - Green terminal on UTA to cable signal wire (signal output to external equipment).
 - Red terminal on UTA to power supplied by external equipment, 6 to 24 volts DC, 2 mA.
- Please Note: The power supply voltage must be at least one volt above the expected full scale output voltage.
Special UTA components are available for special range or power supply requirements.

Recheck and be sure all wires are clamped solidly in place. Tighten the gland nuts on both ends. Replace the top cover on the enclosure and tighten the corner screws. Take care not to over tighten the cover screws as this may cause the cover to deform or “saddle” which can compromise the seal.



Calculate Light Level:

The UTA produces a voltage proportional to light level. In order to convert the units, you will have to program your equipment with the following formula, or enter this formula for post-processing in a program such as Microsoft EXCEL™.

$$\text{Light Level Units} = \frac{(\text{UTA volts output}) \times (\text{LI-COR calibration multiplier})}{(\text{UTA gain factor})}$$

Each individual LI-COR sensor has a distinct calibration multiplier. You can find the multiplier for your particular sensor on the calibration tag that is usually attached to the cable of your LI-COR sensor, or on the calibration certificate that accompanies each LI-190. Drop the minus sign from the multiplier when carrying out the conversion calculation. The factor 0.4 Volts/ μ Amp is set in the UTA amplifier.

Example calculation:

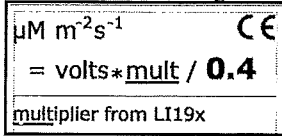
- UTA output reading: 1.836 Volts
- multiplier from LI-190 Quantum PAR sensor calibration tag or certificate: -162.34 $\mu\text{mol s}^{-1} \text{m}^{-2} \mu\text{A}^{-1}$. -->
- light level = $(1.836 * 162.34) / 0.4 = 298 \mu\text{mol s}^{-1} \text{m}^{-2}$

Troubleshooting:

1) UTA appears to be dead; the output voltage is stuck at zero or full scale regardless of light level:

1a) Check the screw terminal connections. Make sure all of the wires are clamped solidly in place, that no wires are broken, that all are in the correct locations, and that the UTA has power in the specified range.

1b) Although the UTA is protected against excess or reversed power supply voltages, it can not be expected to survive catastrophic extremes such as a lightning strike or connection to AC power lines.



1c) Check for evidence of water entry or condensation in the enclosure. The enclosure is sealed and rated NEMA 4, but it is best to keep it in a protected location. If it will be exposed to spray, position it with its lid face up and loop the wires so that water will not run up against the gland nuts. Do not over tighten the top screws. Use a pack of silica gel.

2) Amplifier responds to light, but the output seems too low or too high:

2a) Be sure you are using the correct multiplier in your calculations.

2b) Is it possible the switch setting was changed?

2c) Place sensor in full unobstructed sunlight. Indoor lighting is much weaker than full sunlight and the sensor will have to be moved close to the light to show output.

2d) The output impedance of the UTA amplifier is 1000 Ohms $\pm 1\%$. The input impedance of downstream equipment should be 10 MOhms or greater. If not, the 1000 Ohms will have to be factored into the calculation.

3) The amplifier output is unstable or the readings fluctuate under constant lighting conditions:

3a) The power supply should be filtered direct current.

3b) When testing under artificial light, realize that the light level will fluctuate at the power line frequency.

3c) Avoid routing the sensor cables next to AC power lines or next to halide lamps, refrigeration equipment or other AC power equipment, or radio transmitters.

EMC: The UTA is a DC amplifier that does not generate high frequency signals that would interfere with other equipment.

Conversely, when properly installed and using the LI-190 shielded cable, the output signal from UTA + LI-190 sensor will not be disturbed by electromagnetic fields in areas in areas where this type of equipment is typically deployed.

For more thorough technical documentation, please refer to <http://www.emesystems.com/>

