Wiring Principles

Wiring principles, such as standard polarity conventions, and wiring sizes by gauge. Some discussion of power losses due to low voltage, but very thin profile wires, which are less expensive, but waste a lot of energy. Controllers have trouble sensing the correct terminal voltage of the batteries, if the charging wires are too thin as well, leading to charging errors and battery cutout errors.

Also we have now seen village allocations where the gauge of wire used from the roof top to the solar controller within the village house is way too “high” or “too small” in diameter. The user should start by thinking about 10 gauge wire as a minimum and definitely move to 8 gauge wire if available and affordable. Otherwise considerable power is wasted due to resistive losses in the length of wire required, typically 5-10 meters.

Wiring Principles

Wire Diameter Sizes

Amps	#14	#12	#10	#8
1	45	70	115	180
2	22.5	35	57.5	90
4	10	17.5	27.5	45
6	7.5	12	17.5	30
8	5.5	8.5	11.5	22.5
10	4.5	7	11.5	18

A nice "low current" chart suitable for what one would expect for a 1-3 amp, netbook setup. Some users will want larger panels and batteries to accommodate 12 volt village lighting systems, hence higher current requirements.

For relatively long runs, such as the roof top solar panel to the solar chttp://lingtran.net/img/icons/wiki_plugin_edit.pngontroller inside the house, care must be taken to have a suitably large enough wire diameter. This is to minimize the loss of solar energy due to heat or resistance losses. The chart at the right14) is for a 2% voltage drop for runs of copper wire as measured in feet. Other kinds of metal wire have a different resistance.

We are recommending #10 gauge (6 mm2) or #8 gauge (10 mm2) copper wire runs, but obviously this increases cost per foot or meter if you use more expensive #8 gauge wire. If you must use #12 or #14 gauge, then be sure to adjust the Xantrex C-12 controller accordingly to get the right results at the battery terminals, where it counts - NOT the controller terminals where it doesn't count. Feel free to adjust as necessary, the LVD, RVD, LVR and HVR levels for the battery type you are considering.

Wire Gauge Conversions

Wire Size Comparison between AWG (American Standard) and Euro Standard (mm^2)

AWG	Euro Std mm^2	AWG in mm^2	AWG	Euro Std mm^2	AWG in mm^2
16	1.5	1.31	6	16.0	13.30
14	2.5	2.08	4	25.0	21.15
12	4.0	3.31	2	35.0	33.62
10	6.0	5.26	1	50.0	42.41
8	10.0	8.38	0	50.0	53.49
			00	70.0	67.43

Conversion chart between USA and European wire diameter conventions.

If you are purchasing wire from the USA, then diameter is measured by AWG number. However Europeans and other Commonwealth countries often sell wire by the square millimeter. Here is a rough conversion chart to help at right.15)