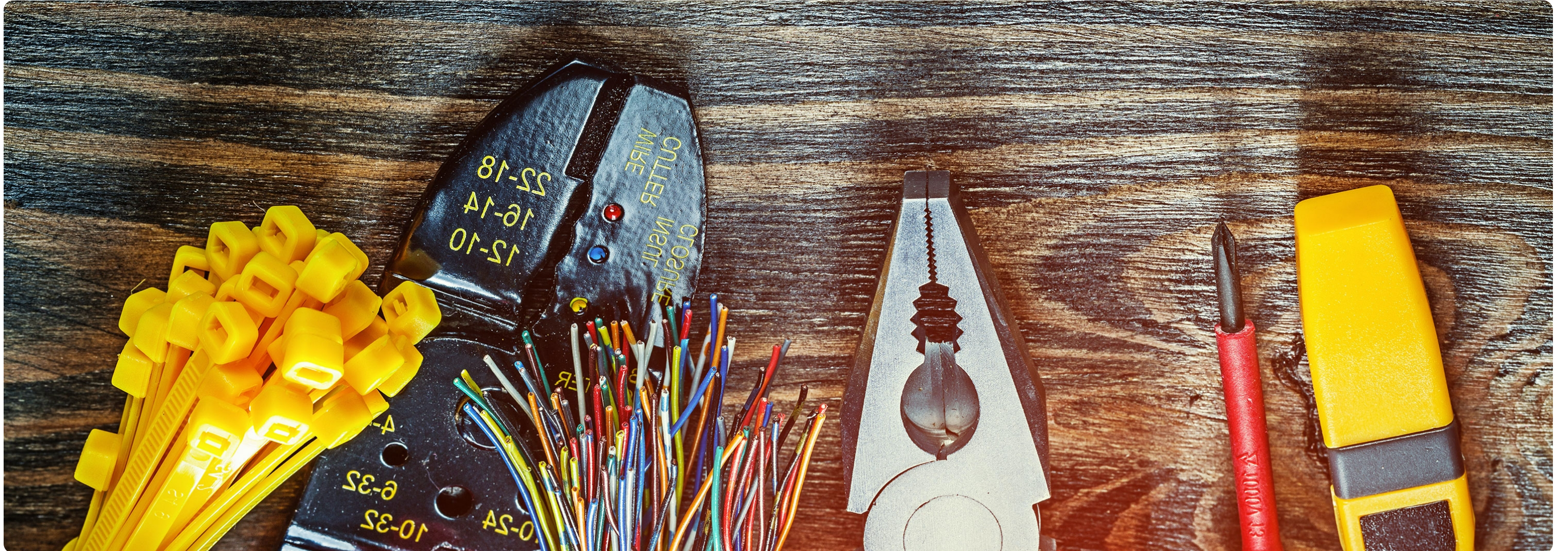




Wiring & Busing



What are the basics to wiring?

Electrical wiring is the conductor that connects components in your system. In most cases, solar system wiring should be copper with properly rated insulation for the location the wire will be occupying.

The size you need is based on the circuit's voltage, amperage, length of wire run and the area around the wire. For example, wires in free air can handle much more current than wires in close proximity in a conduit or outdoor-rated jacket. Other factors like ambient temperature and environmental conditions come into play as well. Voltage drop occurs when the conductor's natural resistance decreases the electrical potential in a circuit. This can be caused by undersized wire, a damaged wire or wire that's not properly terminated. When there's too much voltage drop, the conductor will heat up and trip a circuit breaker or fuse, or it could even burn in an unprotected circuit. The voltage rating is based on the wire jacket and is usually listed on the jacket. You must not exceed this voltage with your circuit or it could cause damage to your equipment or home.

What are the different types of wiring?

PV Wire and Tray Cable

The wire used to bring power from the solar array is sometimes referred to as PV wire. For outdoor applications, the wire needs to be able to handle the element, which may require burying the wire. To be weather-resistant, it needs to be covered in a thick, UV-resistant jacket or sometimes a second jacket. Another common wire for this application is a tray cable. This is usually made up of multiple conductors in a single, UV-resistant, outdoor-rated jacket. Typically, they're used for home runs from a combiner box or from solar panels that have an accessible junction box. Both of these options are offered in many different American wire gauges (AWG).

Thermoplastic High Heat-Resistant Nylon (THHN)

When running wire through conduit, a thick jacket is not required and the wire usually has a slick coating so it will slide through the conduit better. That is commonly referred to as building wire or thermoplastic high heat-resistant nylon, or THHN (referring to the jacket). THHN is a stiffer wire frequently used in buildings and homes. The wire strands are thick, making it not the best for small areas or mobile applications where the wire will be subject to vibration. THHN is usually used in conduit and electrical enclosures. It is not outdoor rated.

Machine Tool Wire (MTW)

Machine tool wire is made up of many fine strands of wire, making it very flexible. It's good for battery cables and mobile applications where vibration will occur. The jacket is made of PVC and holds many UL listings. This can be used in conduit, enclosures or in free air indoors. This wire is not outdoor rated. Welding cable is similar to MTW but it has a rubber jacket that is not UL listed, which is why we stock MTW over welding cable.

Grounding Wire

Grounding wire is usually a bare, solid conductor that will run through all of your system's components and ground them to a grounding rod that has been driven into the earth. It's common to run the ground wire outside of the conduit in order to give it better conductivity to the earth. It is not a current-carrying conductor and will only be energized when another conductor shorts to ground, so it can be a bit smaller than the other conductors

What is electrical busing?

The term "bus" comes from the Latin word "omnibus," meaning "for all." There are a lot of different styles of busbars offered but they all serve the same purpose—to group conductors from many sources to deliver power to a single load or to distribute power from a single source to many loads demanding power.

When distributing electrical power, we use busbars to group power from multiple sources to a central location. A solar array combiner box, for example, has many strings of solar panels that connect to the busing inside the combiner box. You will have a positive bus and a negative bus that are isolated from the enclosure and each other. We then come from those busbars with a single positive and negative wire that can handle the combined current from all the strings of solar panels.

Busing also works to distribute power from a single source to multiple circuits, like a load center in a home. Power comes from a source (such as the grid, a generator or a battery-based inverter) and energizes a set of busbars that accommodate branch circuits that go off to various loads and receptacles.

Busbars come in many different shapes and configurations. They're usually made of copper and either have studs that can accept a conductor with a ring-style termination or they have a hole with a set screw that will hold the bare wire in the terminal. Every busbar will have a max current rating that the combined circuits must not exceed. This current rating is based on the cross section of the busbar, just like with wire a thicker busbar can handle more continuous current.

Busbars are usually electrically isolated from the enclosure they are mounted to unless the purpose of that busbar is to be a ground bus. In that case the busbar will be mounted directly to the chassis of the enclosure.