NOTE TO USERS

Low-Leakage, Low-Thermal Connectivity Set

This document provides information about the low-leakage, low-thermal connectivity set. This general-purpose cable kit enables users to construct custom cables. The components in this connectivity set are optimized for low-leakage and low-thermal EMF.

Caution This connectivity set is for low-voltage applications *only*. The maximum voltage ratings for all components are 30 V_{rms}, 42 V_{pk}, and 60 VDC max.

The cable in the connectivity set is insulated by an outer layer of Teflon. The interior of the cable consists of two conductors that are also insulated with Teflon. The two conductors are twisted and then encapsulated within a braided shield. The cable is therefore shielded and insulated.

Figure 1 shows the conductors and braided shield within the cable.

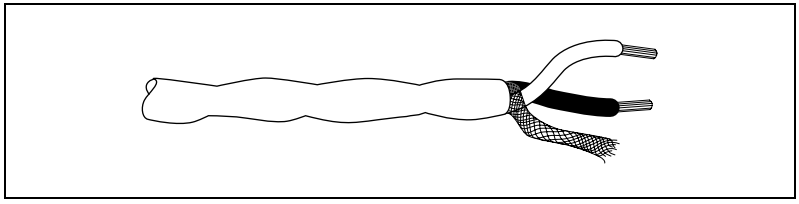

Figure 1. Cable Subcomponents

The connectors in the connectivity set can be attached to the conductors and/or to the braided shield. Usually, the shield does not need to be connected to anything. However, in noisy environments, the shield can be connected either to ground or to another signal. If you connect the shield, do so only on one end of the cable; connecting the shield to ground or to another signal on both ends of the cable can cause measurement errors.

NATIONAL INSTRUMENTS

Figure 2 provides an example of terminating the wires with connectors. Although this figure shows spade lug terminals, you can attach other types of terminals as needed.

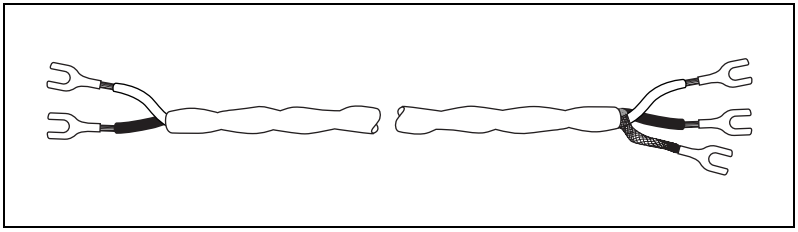

Figure 2. Cable Wire Termination

Kit Contents

The following table contains connectivity set kit information

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Component	Characteristics	Quantity in Kit	Manufacturer*	Manufacturer Part Number
Banana plug terminals	• Gold plated, brass	6	Abbatron (Formerly HH Smith)	425AA
Spade lug terminals	• Gold plated, uninsulated • For use with 16–22 AWG† wire	10	Sunbelt Fasteners	761900-01
Ring lug terminals	• Gold plated, uninsulated • For use with 26 AWG† wire	10	Sunbelt Fasteners	761901-01
Double banana plug terminals	• Gold plated • Black plastic casing	2	Pomona Electronics	4892
Teflon cable	• White casing • 22 AWG† wire strand • Two conductors (white and black) • A braided shield	3 m	Belden	83319
Heat-shrink tubing (small)	• Black • 1/8 in. diameter	6 in.	*Various electronics supply stores*	*Varies*
Heat-shrink tubing (large)	• Black • 1/4 in. diameter	6 in.	*Various electronics supply stores*	*Varies*
Safety warning labels (refer to Figure 5)	• Wraparound • Adhesive	2	Sunbelt Fasteners	193548A-01

* Most Components are also available through Sunbelt Fasteners.
† American Wire Gauge.

Connectivity Recommendations

Complete the following recommendations to minimize signal interference when creating custom cabling:

- NI recommends crimping and soldering components together. Before soldering components, clean all surfaces with rubbing alcohol to remove oil, grease, and any other contaminants. After soldering, clean all surfaces again with rubbing alcohol to remove any solder paste or other residues.
- Although the gold-plated connectors reduce oxidation, avoid bringing contaminants such as finger oil, grease, and flux into contact with the connectors.
- When using heat-shrink tubing, do *not* allow the heat-shrink tubing around neighboring wires to touch, as Figure 3 shows.

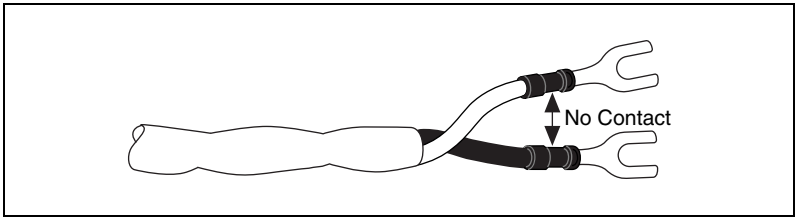

Figure 3. Avoiding Contact Between Heat-Shrink Tubing

  Any contact between the heat-shrink tubing of adjacent wires creates a leakage path between the connector terminals through the heat-shrink tubing. However, Teflon is a higher-quality material than the heat-shrink tubing, and it is acceptable for the Teflon-covered portions of the wires to touch each other when bundled together.
- When using the double banana plug terminal, consider wrapping the cable through the strain-relief hole before tightening the screws down, as Figure 4 shows.

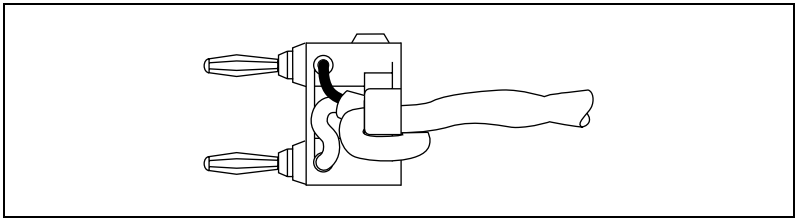

Figure 4. Using the Strain-Relief Hole

- When taking high-precision measurements, ensure that the cable is secure and free from vibration. Although Teflon has a very high resistance, Teflon does experience triboelectric effects.

Safety Labels

Cautions This connectivity set is for low-voltage applications *only*. The maximum voltage ratings for all components are 30 V_{rms}, 42 V_{pk}, and 60 VDC max.

This connectivity set contains safety warning labels that you *must* affix to the finished cable to warn other users about the maximum voltage ratings.

Refer to Figure 5 and complete the following steps to affix the safety labels.

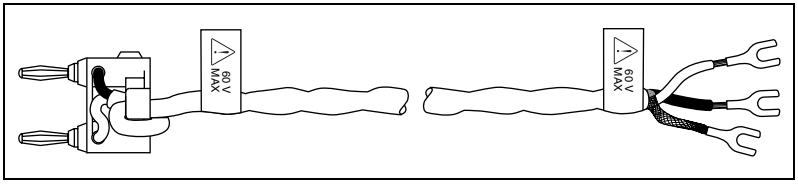

Figure 5. Affixing Safety Labels on Each End of the Cable

1. Locate each end of the cable.
2. On one end of the cable, position a label as close to the connector as possible.
3. Attach the label by peeling off the protective backing, folding the label in half, and wrapping the label around the cable. The label adheres to itself.
4. Repeat steps 2 and 3 to affix a label to the other end of the cable.