SUBMERSIBLE TRANSDUCER CABLE REPAIR

APPLICATION NOTE

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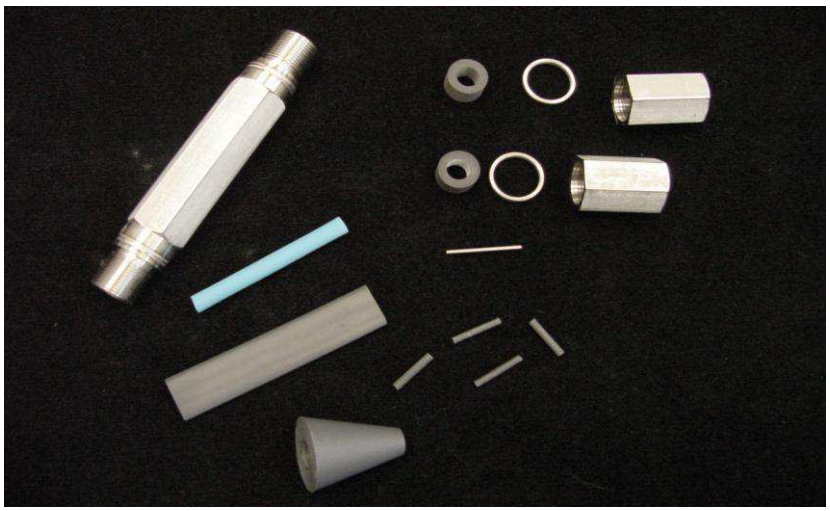
One of the most frequent causes of level transducer failure is its cable being cut, which allows moisture to infiltrate the transducer cable jacket. Many of our customers purchase several hundred feet of cable to connect their transducer to a remote recording or control device. If this cable is cut or damaged, the only options are to either replace the transducer or repair the cable in the field in a manner that prevents moisture ingress. The latter can save you time and money.

This Application Note provides information on how to repair submersible cable using a **KPSI transducer cable splice kit** (shown below, **PN 830**). The cable may be repaired using commonly available tools and, if properly applied, will provide years of trouble-free service.



TOOLS NEEDED

Wire cutter/stripper
Household cleaner, such as Formula 409
Sharp knife or razor blade
Masking or electrical tape
Portable soldering station
Heat gun (or hair dryer)
Two (2) 3/4” open-end wrenches
Ruler or tape measure
Lubricant (petroleum jelly or similar)
Oven capable of 50° C

INSPECT YOUR CABLE

Before beginning transducer cable repair, try to determine where the cable jacket was cut. The cut will likely allow liquid to enter into the cable and into the transducer. This moisture must be removed before beginning cable repair. Pre-heat an oven to 50ºC (122ºF). Coil the cable and transducer in a pan and place the pan in an oven, for approximately two (2) hours**. Be careful that the oven temperature does not exceed 50ºC or damage to the transducer and cable could result.**

NOTE: Longer cables or extensive moisture incursion may require longer drying time.

ASSEMBLY INSTRUCTIONS

Ensure the transducer is disconnected from its power supply.

Step 1 Prepare the cable that is to be spliced by cutting the cable and internal conductors at the point of damage. Cut away all damaged portions and clean the cable approximately 18 inches back from each end. Use a household cleaner, such as Formula 409 to remove all dirt and grease from the outer surface of the cable.

Step 2 Using the KPSI Transducer cable splice kit, remove the nuts, seals, spacers and anti-snag nose cap from the package. On the cable end away from the transducer, install the anti-snag nose cap, a nut, seal, spacer and the housing, such that the cable goes all the way through the housing and out the other end by about 12 inches. On the other end, install the other nut, seal and spacer. **See Figure 1.**

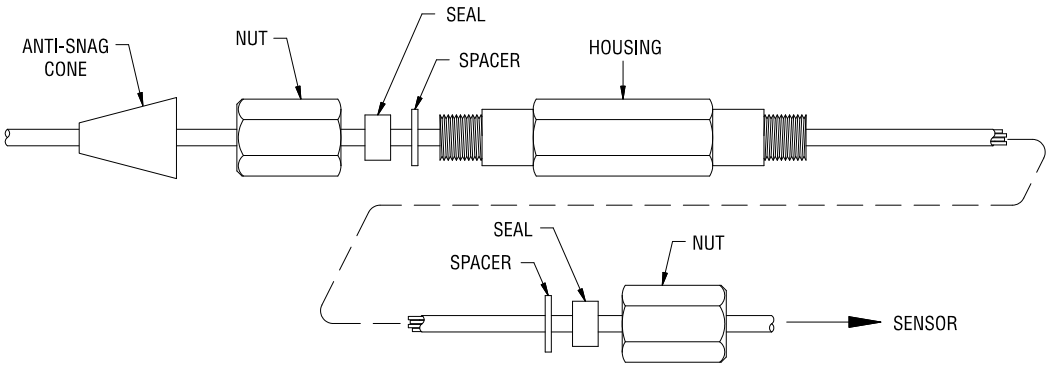


FIGURE 1

Step 2a Slide the large diameter shrink tubing onto one of the cable ends for future use.

Step 3 Prepare each cable end as shown in **Figure 2** and described on the following page.

Step 3a Remove the outer jacket by carefully scoring with a sharp knife or razor blade. Bending the cable back and forth, break any remaining uncut portion. Score the jacket approximately 2 ½" from the end. Be careful not to cut through the underlying shield and/or conductors.

Step 3b A couple of yellow threads will be exposed when the jacket is removed. Trim these threads back as short as possible.

Step 3c Remove the plastic moisture barrier wrap and water-block fabric by carefully trimming with a sharp knife or razor blade.

Step 3d Unwrap the shield from around the bundle of conductors and fillers. Gather it and compress to as small a diameter as possible with a rolling motion between the thumb and forefinger.

Step 3e Trim the white poly fillers back as short as possible.

Step 3f Cut the vent tube to a length of 1 ½" as shown in **Figure 2.**

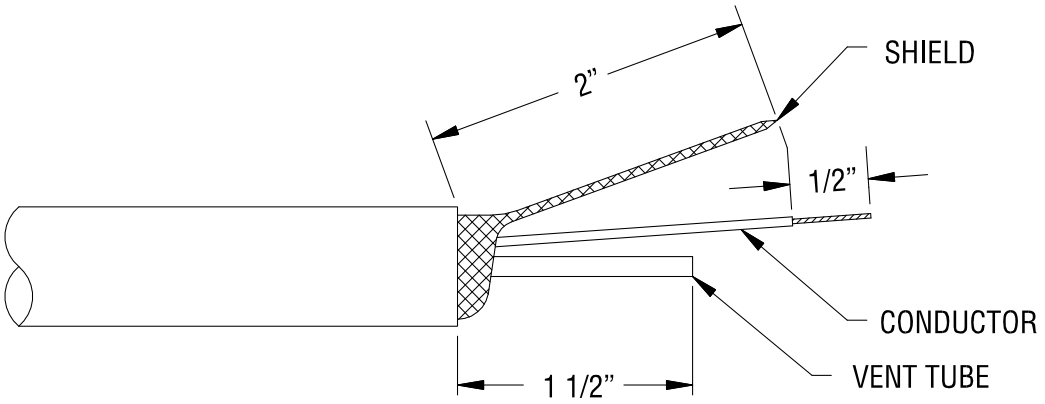


FIGURE 2

CONDUCTORS

Step 4 For mV output units, all four (4) conductors are needed. For voltage output units (e.g., 0-5 or 0-10 VDC), only the red, white and black conductors are needed. For 4-20 mA output units, only the red and black conductors are needed. Cut the unused conductor(s) as short as possible. Required conductors should be cut to a length of 2 ½" as shown in Figure 2. One-half inch (1/2") of wire insulation should be stripped from the ends of required conductors.

Step 4a On the cable end where only the nut/seal and spacer were installed, wrap a piece of tape around the cable exactly ¾" from the end of the outer jacket. This will be used later to center the splice inside the housing.

Step 4b Slide the 3/8" x 2 ½" large piece of heat shrink over one of the cable ends for future use.

Step 4c Connect the vent tubes together using the small, 1/16" diameter metal tube included in the repair kit. Be sure the vent tubes are butted all the way together.

Step 4d Splice like-colored conductors together by twisting the stripped ends together, followed by soldering them. After twisting and soldering the wires, slide a small diameter (1/8" x ¾") shrink tube over the twisted portion and up onto the insulation by about 1/16". Shrink in place with a suitable heat source. A heat gun is preferred, but a hair dryer may be used. A match or lighter may also be used, but caution must be observed to avoid the burn hazard. Also, care must be taken not to melt the wire insulation or the shrink tubing. Refer to Figure 3.

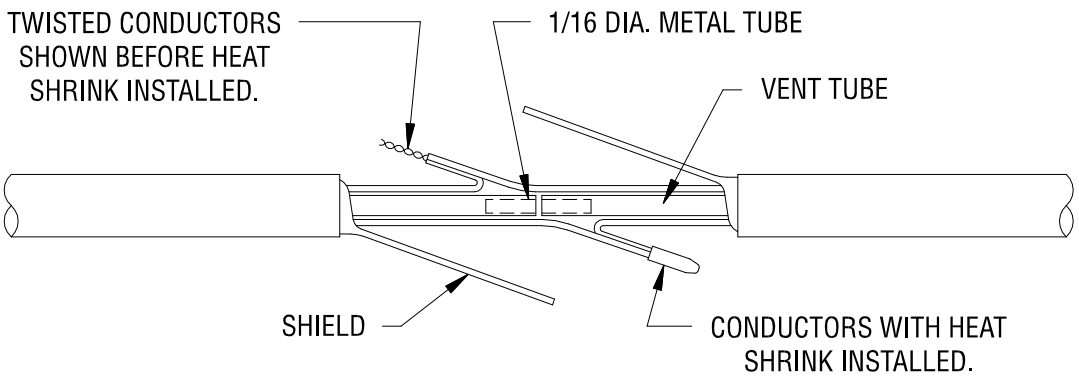


FIGURE 3

Step 4e Once all conductors are spliced, fold them over and compress the bends as much as possible as shown in Figure 4.

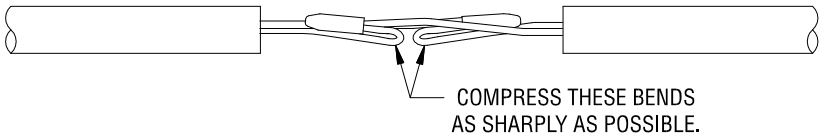


FIGURE 4

Step 4f Install medium (1/8" x 2") heat shrink over one end of the shield. Solder the shields together and slide the heat shrink over the soldered shields. If soldering is not possible, proceed as follows: Install the medium diameter blue shrink tubing over one of the shields until it is centered between the two cable ends and then insert the other shield into the shrink tubing from the other end until both shields are fully inserted into the shrink tubing. At this point, the shields will be overlapping by about ½". Shrink the tubing in place as instructed previously. See **Figure 5.**

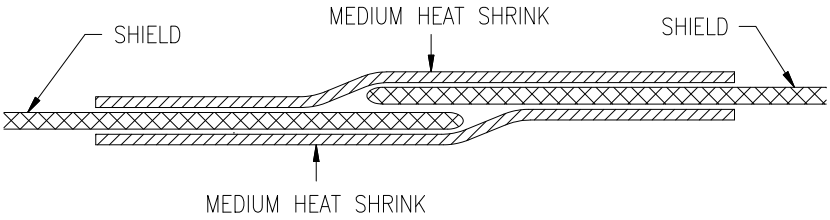


FIGURE 5

Step 5 Check the transdducer for proper operation. Once this is confirmed, slide the large diameter shrink tubing into place, centered over the splice area. Shrink in place. When finished, the splice area should be no larger, and preferably slightly smaller, than the original cable. See **Figure 6.**

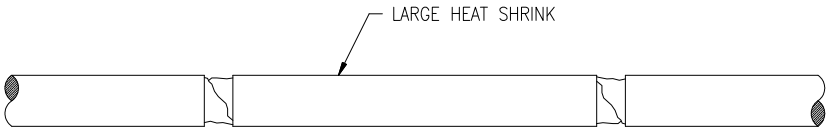


FIGURE 6

Step 6 Slide the cable back through the housing until the tape marker contacts the end of the housing. **(See Figure 7).** If difficulty is encountered trying to slide the splice through the housing, a small amount of lubricant (like petroleum jelly) may be applied to the high spots. Remove the tape marker and slide the nut seal and spacers into position on both ends of the housing. Make sure the cable does not slip in relation to the housing.

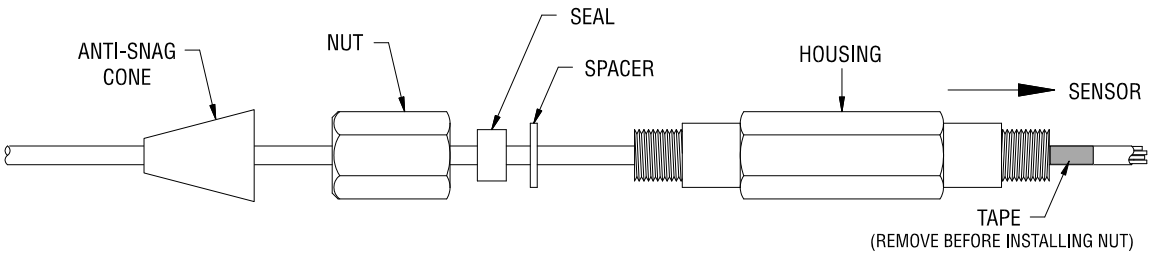


FIGURE 7

Step 7 Tighten the nuts until they contact the spacers. Make sure the cable does not twist as the nuts are tightened.

Careful application of this procedure will save costly factory repairs and provide fast turnaround back to in-service conditions.

NOTE: For reliable operation, all splices should be soldered. If this is not possible at the time repairs are being made, then temporary splices can be made by tightly twisting conductors together in place of the soldering steps. This is NOT recommended for long-term use.

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