MMCX CONNECTOR ASSEMBLY

This document describes in detail how to assemble a male or female Cinch/Johnson MMCX connector.

If you have purchased a CS1X0 or a FC100 and have not also purchased the PPMS kit, you will need to install a male MMCX connector onto your own cabling. These mating connectors are provided free with your stress or strain cells. If you have a problem with the existing female MMCX connectors attached to your strain cell you may be required to replace it with new female connector.

MMCX CONNECTORS

MMCX is standard connector type with many different manufacturers making their own versions. Any male connector from any manufacturer ought to mate with and female connector from any manufacturer. This installation guide only applies to the Johnson/Cinch connectors that we supply with Razorbill products. If you are installing a MMCX from another manufacturer, refer to their installation instructions.

MMCX Connector Gender	Manufacturer Part number
Male	135-9436-001
Female	135-3336-001

There are very few micro-coaxial connectors that are compact, reliable, non-magnetic and have a high number of mating cycles before failure.

The MMCX connectors we provide with our strain cells fit the above criteria and are in generally reasonably good for the task. They do have certain behaviours that the user should be aware of;

- The mating force can be very high. This makes it difficult to pull apart. Care should be taken to grip the metal connector when pulling the male and female connectors apart (do not pull on the cables).
- To get a low noise signal, it is preferable for coax 'outer' to be connected to only one clean ground (at the capacitance bridge). Consequently, you should insulate the metal connectors from making contact with the metal of the cryostat. This can be done by wrapping the cryostat or connector with PTFE or other insulating tape.
- In rare situations the connectors may not connect correctly, not forming a good electrical connection between the cores. This can be detected by finding that the capacitance measured when the capacitance bridge is connected to the strain cell is very low, in the femtofarads rather than picofarads. This is may only occur at low temperature or

happen intermittently. This is usually a sign that one of the connectors needs replacing. Attempt to determine which connector is at fault by trying different combinations of male and female connectors and seeing which combinations have faults. You may be able to identify the faulty connector by observing changes in capacitance when the connector is touched or twisted.

CONNECTOR INSTALLATION

The following procedure works for male and female connectors. The female connectors should be on the leads connecting to the stress or strain cell and the male connectors should be on the cryostat/capacitance bridge side.

The procedure is very similar for both male and female connections, with only the shape of the 'body assembly' differing.

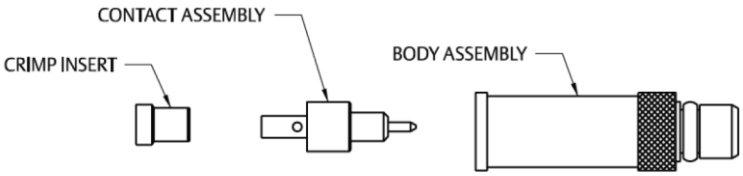

Figure 1. The three parts that make up a MMCX connector. Pictured above is the male version of the body assembly.

Tools required to install the connector:

- End-cutter
- Tweezers
- Calliper (or ruler)
- Scalpel (optional)
- Microscope
- Soldering iron
- Crimping tool (1.69 mm or .105 inch)

Remove existing connector (if required)

Figure 2. If you are replacing a connector that is suspected of being faulty, it will be necessary to use an end-cutter to cut off the existing connector. Cut close to the connector as it is undesirable to waste the coax cable by cutting off too much.

Adding Crimp insert and heat shrink

Figure 3. Thread the crimp insert onto cable with the narrow end pointing towards the connector. If you are using coloured heat shrink tubing to label the cable, add that now.

Removing a section of outer insulation

Figure 4. Use the end cutter and/or scalpel to remove a 3.4 mm of the outer (transparent) insulation. Take care not to damage the gold-coated copper strands inside. The photo shows the tip of a dial calliper that has been set to 3.4 mm, which helped to judge the correct length of insulation to remove.

Bending back the braid

Figure 5. Using tweezers, bend back the gold-coated copper strands leaving the inner exposed.

Removing a section of insulation from the inner

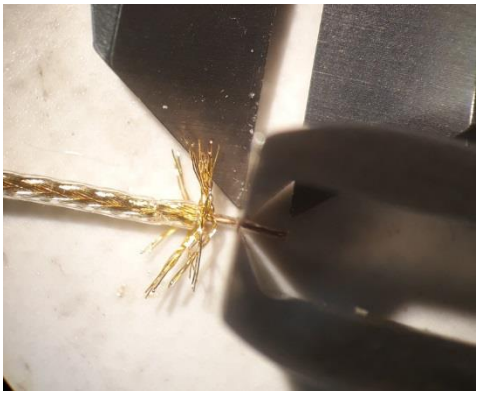

Figure 6. Using the end cutters, carefully remove 1.6 mm of the inner insulation. In the photo to the left the callipers (which are now set to 1.6 mm gap) were used to judge the length of the insulation to be removed

‘Tinning’ the exposed inner with solder

Figure 7. Add flux to the exposed inner strands and cover them with solder using a soldering iron. For cryogenic use it is preferable to use lead-containing solder. Make sure the strands are tightly aligned because the next step requires inserting this tinned section into a tight hole.

Adding the contact assembly

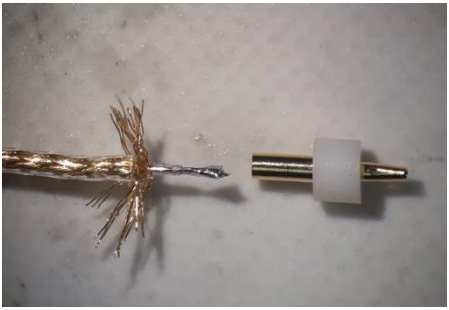

Figure 8. insert the tinned section of the inner into the hole in the back of the contact assembly. It may be necessary to heat the metal and the tinned inner in order to melt the solder in order to slide the tinned section into the narrow hole. Once the section is inserted a soldering iron should be used to heat the metal so that the wire becomes firmly attached to the contact assembly. Much care should be taken to ensure that all of the strands of the inner go into the hole and no stray strands stick out in a sideways direction as these could cause shorts between the inner and the outer.

Positioning the Crimp Insert

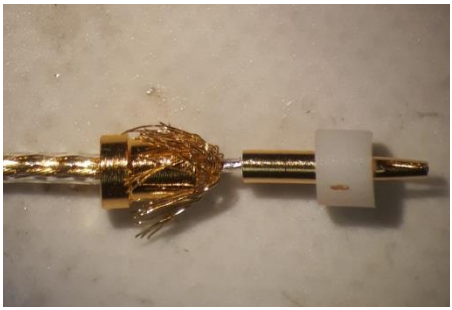

Figure 9. Once the inner has been inserted and soldered securely in position, move the crimp insert back up the cable and arrange the outer strands around it as shown in photo. Make sure that none of the outer stands touch the contact assembly or this will lead to a short between the inner and the outer when the connector is assembled.

Inserting into the body assembly

Figure 10. Ensuring that the crimp insert remains in the correct position (with the strands surround it), insert it into the body assembly. Hold the crimp insert and push firmly in. Do not simply push forward on the cable or the crimp insert will lose its position surrounded by the strands of braid. Firmly push the crimp insert and the cable in firmly and check it is well positioned by inspecting the mating side of the connector.

Crimping the cable together

Figure 11. Using a 1.69 mm or .105 inch crimping tool, crimp the connector. The purpose of crimping is to crush the body assembly onto the crimp insert so that the outer stands are sandwiched between the two. This makes sure the connector is strongly mechanically bonded to the outer strands. Do not crimp the end where the connector is going to mate. It is important that the position of the crimp insert or the cabling does not shift while you load the connector into the crimping tool. Most university electronics workshops will have a suitable crimping tool. If no crimping tool is available, an inferior solution is to use a pair of pliers or small clamps to crush the body assembly around where the crimp insert is.

Test the connector

The final step is to test whether the connector you just installed operates correctly. Make sure the connector is well attached to the cable. Make sure there is a high resistance between the inner and the outer. Make sure that it makes a good electrical connection when it is plugged into another connector. When the stress or strain cell is plugged into the capacitance bridge does it read a reasonable capacitance (refer to the device datasheet)? If all of these question are satisfied, your connector is correctly installed and ready to use.