

# Servo with Simple Penetrator

## Instructions

This servo features a Simple Penetrator for connecting to your enclosure or device (this is the barbed brass fitting on the bottom of the servo). The Simple Penetrator is intended to be used in conjunction with Blue Trail Engineering 8 mm or 3/8" polyurethane tubing to create a waterproof cable conduit. **The servo is not waterproof until properly connected to your enclosure or device with polyurethane tubing.** Without tubing installed on the Simple Penetrator, water can enter the servo case through the Simple Penetrator.

The end of the polyurethane tubing needs to expand to fit over the barbed portion of the Simple Penetrator. This requires heating the end of tubing using a heat gun. Experiment with a short length of tubing to find the correct temperature. The goal is to soften the tubing without melting it. Wear gloves and exercise caution to avoid burns.

1. Prepare a clean work space. Lint, hair, or other contaminants can compromise sealing surfaces on the Simple Penetrator.
2. Cut the polyurethane tubing to the desired length.
3. If the servo wires protruding from the bottom of the servo are not long enough, splice on additional wires (20 AWG wires are recommended) using solder and heat-shrink tubing. When splicing, stagger the three splices so that the splices do not overlap. This will make it possible to slip the spliced area through the polyurethane tubing. Ensure that the total length of the wires is longer than the length of the polyurethane tubing.
4. Push the tubing over the wires, up to the Simple Penetrator on the bottom of the servo.
5. Using a heat gun, carefully heat the end of the tubing until soft (typically 10-20 seconds).
6. While the tubing is still hot, push the tubing all the way onto the Simple Penetrator. It may be necessary to push the tubing on at an angle to get it "started."



### Install a Simple Penetrator onto the enclosure or device

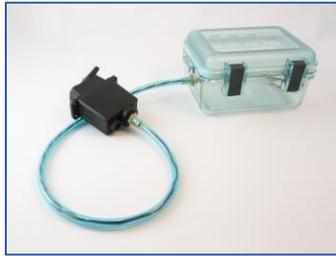
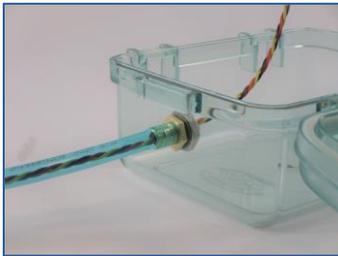
If you are using another Simple Penetrator on the enclosure or device to which the servo will be connected, follow these installation steps.

1. Mark the desired location on the enclosure/device for the Simple Penetrator. The surface of the enclosure/device must be flat and smooth at this location.

2. Drill a 6-mm or 10-mm hole (depending on the size of Simple Penetrator) in the desired location on the enclosure, or alternatively, drill and tap the hole with the appropriate size of tap.
3. Ensure that the area surrounding the hole is completely free of scratches and contamination.
4. Ensure that the O-ring (included) is completely free of tears and contamination.
5. Install the O-ring in the groove on the Simple Penetrator. It is recommended to lubricate the O-ring with a lubricant such as Dow Molykote 111 before installation.
6. Install the Simple Penetrator onto the enclosure using either the included nut or by screwing the Simple Penetrator into the tapped hole in the enclosure. Use threadlocker if desired. Do not overtighten.



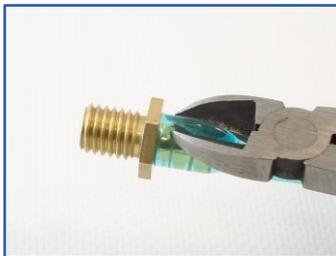
7. To connect the servo to the enclosure/device, heat the other end of the polyurethane tubing with a heat gun and push it onto the Simple Penetrator on the enclosure/device.



## Removing tubing from the Simple Penetrator

Removing tubing from the Simple Penetrator requires a pair of wire cutters with flush-cutting jaws. The goal is to cut the tubing without allowing the wire cutters to make contact with the Simple Penetrator. If contact is made, it's possible to scratch the surface of the Simple Penetrator and cause a leak.

1. Pinch the tubing with the wire cutters as shown. The jaws of the wire cutters should NOT be on the centerline of the tubing, but rather above the centerline. As you pinch the tubing, the wire cutters should slide upwards, further away from the tubing centerline. Continue squeezing to cut through the tubing, without the jaws of the wire cutters touching the Simple Penetrator.



2. There may be a portion of un-cut tubing remaining. If so, make a second cut to completely remove the tubing.

