

Flexible Metal Ferrules Swaging Guide for UltiMetal Plus and Gold-Plated Ferrules

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Parts supplied

The available UltiMetal Plus and Gold-plated Flexible Metal ferrule packages are listed in **Table 1**, **Figure 1**, and **Figure 2**.

Table 1 Available UltiMetal Plus and Gold-plated Flexible Metal ferrule packages.

| Item | Compatible Column id | UM+ FMF part number | Gold-Plated FMF part number |
|------|---------------------------|---------------------|-----------------------------|
| 1 | 0.1 to 0.25 mm | G3188-27501 | G2855-28501 |
| 2 | 0.32 mm | G3188-27502 | G2855-28502 |
| 3 | 0.45 to 0.53 mm | G3188-27503 | G2855-28503 |
| 4 | Plug | G3188-27504 | N/A |
| 5 | 0.25 to 0.32 mm UltiMetal | G3188-27505 | G2855-28505 |
| 6 | 0.53 mm UltiMetal | G3188-27506 | G2855-28506 |



Figure 1. UltiMetal Plus Flexible Metal ferrules.

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Tools required



Figure 2. Gold-Plated Flexible Metal ferrules.

Each Flexible Metal ferrule part number is uniquely designed to prevent inventory mixups, and to quickly help find the needed ferrule. Color variations between UltiMetal Plus ferrules are a normal result of the UltiMetal coating.

NOTE

Gold ferrules are only suited for CFT usage and should not be used in the inlet or detector. UltiMetal Plus ferrules are recommended for inlet and detector fittings, and are not appropriate for CFT usage.

Tools required

- Two 1/4-inch open-end wrenches
- Column cutting tool
- Swaging wrench for capillary columns, p/n G3440-80227
- Swaging wrench for metal columns, p/n G3400-80247

Preparing the column ends

NOTE

If transitioning from UltiMetal Plus to Gold-Plated ferrules for CFT connections, blow out the CFT fitting to avoid any grit and scratches caused by the UM+ coating. This will help avoid leaks.

- 1 Pass the column end through the internal nut and the ferrule (**Figure 3**), then trim the column with a ceramic column cutter and verify that the cut is straight across and even.

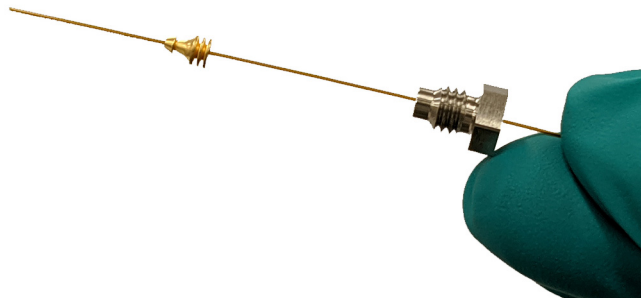


Figure 3. Thread the column through the internal nut and ferrule.

- 2 Using the column cutter trim the column and inspect the end to ensure a smooth cut with no jagged edges. The swage tool has been designed to ensure an accurate depth of 0.1 to 0.5mm.
- 3 Thread the internal nut into the swaging wrench and finger tightening. The swaging tool has been designed to automatically set the column length to desired measurement. (See **Figure 4**.)



Figure 4. Thread the internal nut into the swaging wrench.

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Preparing the column ends

- 4 Begin to swage the ferrule to the column using a 1/4-inch open-ended wrench.

The design of the Flexible Metal ferrules reduces the probability of column breakage and minimizes the damage to the thread of the corresponding fittings.

Unlike other ferrule designs, a reliable leak-free seal is best made by tightening the internal nut to a recommended number of degrees, not by applying more force. Applying excessive force will not provide a better seal and will lead to damaged parts. Also, compressing the Flexible Metal ferrule less minimizes damage to fittings.

To swage the ferrule to the column:

- a Find the ferrule type in **Table 2** on page 4 and note the range of degrees to tighten the internal nut.
- b Tighten the internal nut clockwise to the lower end of the ferrule's range.
- c Check if the ferrule is gripping the column. If yes, stop. If not, continue to tighten the internal nut in small 5- to 15-degree increments. Check after each increment to see if the ferrule is gripping the column. Stop as soon as gripping occurs (see **Figure 5** on page 4).

Table 2 Degrees to tighten the internal nut for proper swaging

| UM+ FMF part number | Gold-Plated FMF part number | Degrees to tighten internal nut |
|---------------------|-----------------------------|---------------------------------|
| G3188-27501 | G2855-28501 | 50 to 100 |
| G3188-27502 | G2855-28502 | 30 to 70 |
| G3188-27503 | G2855-28503 | 20 to 50 |
| G3188-27504 | N/A | 60 |
| G3188-27505 | G2855-28505 | 40 to 90 |
| G3188-27506 | G2855-28506 | 20 to 50 |

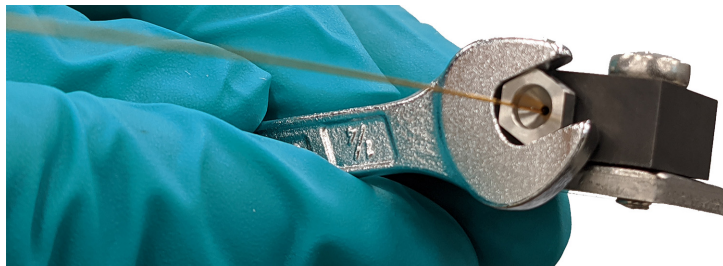


Figure 5. Tightening the internal nut

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Swaging quality inspection

- Using the 1/4- inch open- ended wrench, turn the internal nut an additional 10 to 15 degrees clockwise to assure the ferrule is properly swaged onto the column (see **Figure 6**).

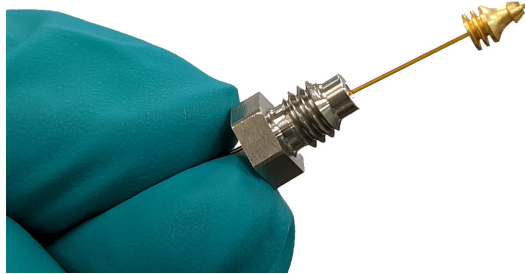


Figure 6. Ferrule swaged to column and internal nut.

- Using the 1/4- inch open-ended wrench, remove the internal nut from the swaging wrench and column.

Swaging quality inspection

Figure 7 shows both an incorrect and correct swaging symmetry.



Figure 7. Incorrect and correct swaging symmetry.

If the column and ferrule appear like the incorrect example in **Figure 7**, it is possible that the swaging wrench is defective or worn out. Try swaging with a new wrench or new nut.

How to run a leak test

Allow the carrier gas to flow for 10 to 30 minutes to flush out the column.

A gas leak detector (G3388B) can be used to check CFT fittings for leaks, when using any GC detectors, whether MS and non-MS detectors.

Leak checking on MS system:

- 1 After allowing carrier gas to flow for approximately 10 to 30 minutes, pump down the MSD for approximately one hour. If the MS system has been open to atmosphere for more than one day, allow MSD to pump down for two hours or longer.
- 2 Access the manual tune function in the acquisition software and select the **Profile** tab.
- 3 An electronics duster (typically a polyhalogenated compound WITHOUT the bitter additive) can be a useful way to test for leaks. Enter the m/z values for the compound, such as 69 and 83 m/z for 1,1,1,2-tetrafluoroethane, into the **Profile** tab.
- 4 Spray a short burst of the dusting compound at the vent valve and watch for changes in the profile abundances. Repeat for the side door of the MS and the transfer line connection in the GC oven.
 - If the abundances increase significantly just after spraying that location, tighten the vent valve or transfer line nut by small increments until no significant changes in ion abundances are observed.
 - If a leak is identified at the analyzer (side) door of the MS, the MS must be vented and the O-ring checked on the door.
- 5 When the MS is leak-free, check the CFT connections.

Checking the CFT connections:

- 1 Using a small piece of paper around the CFT fitting can help to focus the spray onto that specific fitting.
- 2 Spray a short burst of duster. Depending on the system design (column or restrictor lengths and carrier gas flow rate), it may take 30 to 60 seconds for the duster compound to reach the MSD. For example, with a 15 m × 15 m column setup with a purged Ultimate union at the midpoint (column 1 flow rate of 1.2 mL/min and column 2 flow rate of 1.4 mL/min), it takes approximately 40 seconds for the duster compound to reach the MSD.

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How to run a leak test

- 3 If a large increase in the m/z abundances is observed (at least a double in signal and obvious peak appears across all m/z ratios), tighten the CFT nut by a small wrench turn (approximately 10 degrees).
- 4 Repeat the short spray bursts and wrench turns, until the m/z abundances do not show large changes.
- 5 Repeat for the leak checking process (steps 1 through 4) for each CFT fitting.

NOTE

A small CO₂ canister could be used instead of the electronics duster; however, there will be a natural background of CO₂ and the user will need to understand the background abundance of 44 m/z and then watch for increases in the abundance with leak checking.

Table 3 Additional tools for installation

| Tool description | Part number |
|---|-------------|
| GC column installation preswaging tool, for Flexible Metal ferrules | G3440-80227 |
| CFT Metal Column preswaging tool for GC | G3440-80247 |
| Ferrule preswaging tool | G2855-60200 |
| Ceramic scribe column cutter, 4/pk | 5181-8836 |
| Wrench, open-ended, 1/4 inch and 5/16 inch | 8710-0510 |
| Internal nut, CFT capillary fitting | G2855-20530 |

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