Installation Guide

The Agilent Ultimate Union (Figure 1) provides a high performance, easy to maintain connection method for capillary columns. The union connects two capillary columns such as a guard or retention gap and an analytical column.

The two available Ultimate Union kits are identical except that:

- The G3182-61580 kit contains a deactivated union. It is for use with columns and other areas that the sample passes through.
- The G3182-61581 kit contains a non-deactivated union. It is appropriate for gas supply lines or situations where metal activity is not a factor.
Agilent Ultimate Union Kits (G3182-61580 and G3182-61581)

**Parts Supplied**

The parts in the kits are listed in Table 1.

<table>
<thead>
<tr>
<th>Description</th>
<th>Part number</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Union</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Deactivated (G3182-61580 kit)</td>
<td>G3182-60580</td>
<td>1</td>
</tr>
<tr>
<td>• Non-deactivated (G3182-61581 kit)</td>
<td>G3182-60581</td>
<td>1</td>
</tr>
<tr>
<td>Oven wall clip</td>
<td>G3182-00100</td>
<td>1</td>
</tr>
<tr>
<td>Internal nut</td>
<td>G2855-20530</td>
<td>2</td>
</tr>
<tr>
<td>Swaging tool</td>
<td>G2855-60200</td>
<td>1</td>
</tr>
</tbody>
</table>

**Parts Not Supplied**

UltiMetal Plus Flexible Metal ferrules

**Tools Required**

Two 1/4-inch open-end wrenches
Column cutting tool
Swaging wrench
Safety

**WARNING**

Hydrogen gas is flammable and potentially explosive when accumulated inside the oven. For this reason, Hydrogen should not be used as a carrier gas with this product due to the possibility of tubing or column breakage.

Many areas of this GC operate at temperatures high enough to cause serious burns. This includes, but is not limited to the inside of the oven and the following components:

- The inlet
- The detectors
- Any nut attaching a column to an inlet, to a detector, or to a union
- An oven wall clip present to support a union

Cool these areas to room temperature before working on or around them.

GC inlets and detectors cool faster if you turn off their temperatures and set the oven to room temperature (which keeps the oven fan and exhaust flaps in operation). Turn the oven off when it reaches a safe handling temperature.

Also, be careful when working behind the instrument. During oven cool down, the GC emits hot air exhaust which can cause burns.

If you must perform maintenance on hot parts, use a wrench and wear heat-resistant gloves to avoid burns.
Preparing the Column Ends

Always wear safety glasses and clean, lint-free gloves when handling columns and ferrules.

UltiMetal Plus Flexible Metal ferrule packages are available to make connections to 0.1- to 0.25-mm, 0.32-mm, and 0.53-mm columns.

1. Order the appropriate UltiMetal Plus Flexible Metal ferrule package (not included) for your setup as listed in Table 2.

Table 2  Available UltiMetal Plus Flexible Metal ferrule packages

<table>
<thead>
<tr>
<th>Item</th>
<th>Part number</th>
<th>Ferrule description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>G3188-27501</td>
<td>0.1 – 0.25 mm column id, 10/pk</td>
</tr>
<tr>
<td>2</td>
<td>G3188-27502</td>
<td>0.32 mm column id, 10/pk</td>
</tr>
<tr>
<td>3</td>
<td>G3188-27503</td>
<td>0.45 – 0.53 mm column id, 10/pk</td>
</tr>
<tr>
<td>4</td>
<td>G3188-27504</td>
<td>Plug, 10/pk</td>
</tr>
<tr>
<td>5</td>
<td>G3188-27505</td>
<td>0.25 – 0.32 mm UltiMetal column id, 10/pk</td>
</tr>
<tr>
<td>6</td>
<td>G3188-27506</td>
<td>0.53 mm UltiMetal column id, 10/pk</td>
</tr>
</tbody>
</table>

Figure 2  UltiMetal Plus Flexible Metal ferrules

Each UltiMetal Plus Flexible Metal ferrule part number is uniquely designed to prevent inventory mix-ups, and to help you find the ferrule you need quickly. Color variations between ferrules are a normal result of the UltiMetal coating.
2 Pass the column end through the internal nut, the ferrule, and the swaging wrench (Figure 3).

![Figure 3](image1.jpg)  Thread the column through the internal nut, ferrule, and swaging wrench

3 Thread the internal nut into the swaging wrench with the column protruding out of the back of the wrench (see Figure 4).

![Figure 4](image2.jpg)  Thread the internal nut onto the swaging wrench
4 Begin to swage the ferrule to the column using a 1/4-inch open-ended wrench.

The design of UltiMetal Plus 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. Also, compressing the flexible ferrule less minimizes damage to fittings.

To swage the ferrule to the column:

a Find your ferrule type in Table 3 and note the range of degrees to tighten the internal nut.

b Tighten the internal nut clockwise to the lower end of your 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).

**Table 3**  Degrees to tighten the internal nut for proper swaging

<table>
<thead>
<tr>
<th>Ferrule part number</th>
<th>Degrees to tighten internal nut</th>
</tr>
</thead>
<tbody>
<tr>
<td>G3188-27501</td>
<td>50 – 100 degrees</td>
</tr>
<tr>
<td>G3188-27502</td>
<td>30 – 70 degrees</td>
</tr>
<tr>
<td>G3188-27503</td>
<td>20 – 50 degrees</td>
</tr>
<tr>
<td>G3188-27504</td>
<td>60 degrees</td>
</tr>
<tr>
<td>G3188-27505</td>
<td>40 – 90 degrees</td>
</tr>
<tr>
<td>G3188-27506</td>
<td>20 – 50 degrees</td>
</tr>
</tbody>
</table>
5 Using the 1/4-inch open-ended wrench, turn the internal nut an additional 15 to 20 degrees clockwise to assure the ferrule is properly swaged onto the column (see Figure 6).

6 Using the 1/4-inch open-ended wrench, remove the internal nut from the swaging wrench and column.
Using the column cutter, trim the column at the small end of the ferrule leaving approximately 0.3 mm of the column extending from the ferrule (Figure 7). The minimum size of the column head extending from the ferrule is 0.1 mm and the maximum is 0.5 mm. It is important to have 0.5 mm or less column head to prevent column conflict in the union.

Figure 7  Properly-trimmed column and ferrule

Swaging Quality Inspection

Figure 8 shows both an incorrect and correct swaging symmetry.

Figure 8  Incorrect and correct swaging symmetry

If your column and ferrule appear like the incorrect example in Figure 8 above, it is possible that your swaging wrench is defective or worn out. Try swaging with a new wrench or new nut.
Connecting Columns

To connect columns to the union using internal nuts and pre-swaged UltiMetal Plus Flexible Metal ferrules:

1. Finger-tighten the internal nuts.
2. Use a 1/4-inch open-end wrench to tighten the internal nuts another 15 to 20 degrees (Figure 9).

Installing the Union to the Oven Wall

Use the oven wall clip to support the weight of the union by attaching it to an opening in the oven wall, as shown in Figure 10.
Disconnecting Columns

Loosen and remove the internal nut. If the ferrule does not release from the fitting, do not try to pull the column free. Insert a pointed object (such as a thumb pin or a paper clip) into the ferrule release hole (see Figure 11) and press firmly. You will hear a click as the ferrule releases.

![Figure 11 Releasing the ferrule](image-url)