



GC AND GC/MS

Your Essential Resource for Columns & Supplies

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15/16



Agilent Technologies

Capillary Column Ferrules and Nuts

Using the wrong ferrule or a worn-out ferrule to seal your column connection can result in inconsistent and unreliable chromatography. An improper ferrule can cause leaks, which allow air and other contaminants to enter the instrument through the column seal, causing major interference with column and detector performance.

For optimum performance, ferrules should be replaced every time the column is replaced and when performing column maintenance.

To minimize problems, follow these general techniques for ferrule installation:

- Don't overtighten – finger tighten the column nut, then use wrench to tighten
- Maintain cleanliness
- Bake out ferrules prior to use (polyimide and polyimide/graphite only)
- Avoid contamination, such as fingerprint oils
- Inspect used ferrules with magnifier for cracks, chips, or other damage before reusing them
- Change ferrules when new columns or injector/detector parts are installed

TIPS & TOOLS



Use Self Tightening column nuts with graphite/polyimide ferrules to provide a leak-free column connection, without the risk of overtightening.

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Self Tightening column nut

Ferrule Selection Recommendations

Ferrule Type	Upper Temp. Limit	Usages	Advantages	Limitations
Graphite (100%)	450 °C	<ul style="list-style-type: none"> • General purpose for capillary columns • Suitable for FID and NPD • Recommended for high temperature and cool on-column applications 	<ul style="list-style-type: none"> • Easy-to-use stable seal • Higher temperature limit • Can be removed easily 	<ul style="list-style-type: none"> • Not for MS or oxygen-sensitive detectors • Soft, easily deformed or destroyed • Possible system contamination
Polyimide/graphite (85%/15%)	350 °C	<ul style="list-style-type: none"> • General purpose for capillary columns • Recommended for MS and oxygen-sensitive detectors • Most reliable leak-free connection 	<ul style="list-style-type: none"> • Mechanically robust • Long lifetime 	<ul style="list-style-type: none"> • Not reusable • Flows at elevated temperature • Must re-tighten frequently
Polyimide (100%)	280 °C	<ul style="list-style-type: none"> • Isothermal operation • Can be reused or removed easily • Excellent sealing material when making metal or glass connections 	<ul style="list-style-type: none"> • Mechanically robust • Long lifetime • Can be reused or removed easily 	<ul style="list-style-type: none"> • Leaks after temperature cycle • Flows at elevated temperature • Must re-tighten frequently
UltiMetal Plus Flexible Metal Ferrules	450 °C	<ul style="list-style-type: none"> • Designed for Capillary Flow Technology fittings • Compatible with Agilent inlet and detector fittings • Suitable with MS interface using the swaging nut G2855-20555 	<ul style="list-style-type: none"> • Inert surface • Robust seal • Pre-swaged for precise height into fitting 	<p>Overtightening of stainless steel nut can damage fitting</p>

TIPS & TOOLS

Look for the following signals that indicate ferrule damage:

- Background noise from oxygen diffusing into the system
- Column bleed catalyzed by oxygen
- Sample degradation
- Sample loss
- Increase in detector signal/noise
- Poor retention time reproducibility



Short and Long Ferrules

Short Ferrules (height 3 mm)



Polyimide/graphite ferrules, 5181-3323



Universal column nut, 5181-8830

Standard fitting for Agilent GC inlet and detectors (FID, NPD, ECD) column connections use short ferrules and the Universal nut

Long Ferrules (height 3.6 mm)



Pre-conditioned long ferrule for MSD connection, 5062-3508



MS interface column nut, 05988-20066

Pre-conditioned graphite/polyimide ferrules are recommended with MSD Interface nut



Column nut for long or long two-hole ferrules, 05921-21170

Alternative nut for Agilent standard inlet or detector fittings used with long graphite/polyimide ferrules

TIPS & TOOLS

Agilent's Self Tightening column nut eliminates the need for retightening once and for all

This unique, self tightening stainless steel GC column nut delivers a tight connection – without expensive upgrades or adapters – and gives you the advantages of:

- Reliable performance
- Less wasted time
- Ease of use
- Faster maintenance

Learn how to install a column using the Self Tightening column nut, visit www.agilent.com/chem/STnut



Capillary Column Ferrules – for use with most brands of column, including DB, HP, CP, VF and Select columns

Column ID (mm)	Ferrule Nom ID	UltiMetal Plus Flexible Metal Ferrule Part No.	Graphite Short Ferrule Part No.	Polyimide Short Ferrule Part No.	85% Polyimide/15% Graphite Short Ferrule Part No.	Pre-Conditioned Long Ferrule 85% Polyimide/15% Graphite for MSD connection Part No.
0.025-0.05	0.4		500-2114	5062-3515	5062-3516	5062-3507
0.075	0.4		500-2114	5062-3515	5062-3516	5062-3507
0.1-0.25	0.4	G3188-27501	500-2114	5181-3322	5181-3323	5062-3508
0.1-0.25*	0.5		5080-8853	5062-3513	5062-3514	5062-3508
0.32	0.5	G3188-27502	5080-8853	5062-3513	5062-3514	5062-3506
0.45	0.8	G3188-27503	500-2118	5062-3511	5062-3512	5062-3538
0.53	0.8	G3188-27503	500-2118	5062-3511	5062-3512	5062-3538

*FactorFour, CP and VF brand columns made prior to 2013 have a larger od and require a 0.5 mm ferrule. The column test chromatogram confirms the ferrule size needed.

Specialty Application Capillary Column Ferrules

Column ID (mm)	Ferrule Nom ID	UltiMetal Plus Flexible Metal Ferrule Part No.	Graphite Short Ferrule Part No.	Polyimide Short Ferrule Part No.	85% Polyimide/15% Graphite Short Ferrule Part No.	Pre-Conditioned Long Ferrule 85% Polyimide/15% Graphite for MSD Part No.
0.32 CP-SilicaPLOT	0.8		500-2118	5062-3511	5062-3512	5062-3538
0.25 and 0.32 UltiMetal Plus column tubing		G3188-27505				
0.53 UltiMetal Plus column tubing		G3188-27506				
No hole					5190-4054	5181-3308

For additional capillary column ferrule selection, please refer to our CrossLab portfolio. **Turn to page 195.**



UltiMetal Plus Flexible Metal ferrules, G3188-27501



Polyimide ferrule, 5181-3322



Polyimide/graphite ferrules, 5181-3323



Graphite ferrules, 5080-8853



Polyimide/graphite ferrule, 5062-3514

Recommended MS Interface Connections

Description	Part No.
Recommended	
Nut	
Self Tightening column nut, for MS interface	5190-5233
Ferrule	
250 µm Polyimide/graphite ferrule, 10/pk	5181-3323
320 µm Polyimide/graphite ferrule, 10/pk	5062-3514
Tools	
MS interface column installation tool	G1099-20030
Column installation tool for 5975T	G3880-20030
Traditional	
Nut	
MS interface column nut, female	05988-20066
Ferrule	
0.4 mm Polyimide/graphite ferrule, 10/pk	5062-3508
0.5 mm Polyimide/graphite ferrule, 10/pk	5062-3506
Tools	
MS interface column installation tool	G1099-20030
Column installation tool for 5975T	G3880-20030
Alternative	
Nut	
Swaging nut, for MS interface with Flexible Metal ferrules	G2855-20555
Ferrule	
UltiMetal Plus Flexible Metal ferrule with 0.4 mm id, 10/pk	G3188-27501
UltiMetal Plus Flexible Metal ferrule with 0.5 mm id, 10/pk	G3188-27502
Tools	
Ferrule pre-swaging tool	G2855-60200

TIPS & TOOLS

Tips and tricks for making better connections...



Watch the animation that shows how to make better column connections in a GC or GC/MS, at www.agilent.com/chem/mbcvideo



Recommended Inlet Connections

Description	Part No.
Recommended	
Nut	
Self Tightening column nut, for inlet/detector	5190-6194
Ferrule	
250 μ m Polyimide/graphite ferrule, 10/pk	5181-3323
320 μ m Polyimide/graphite ferrule, 10/pk	5062-3514
Tools	
Column installation pre-swaging tool, graphite ferrules	G3440-80217
Traditional	
Nut	
Universal column nut, 2/pk	5181-8830
Ferrule	
250 μ m Polyimide/graphite ferrule, 10/pk	5181-3323
320 μ m Polyimide/graphite ferrule, 10/pk	5062-3514
Tools	
Column installation pre-swaging tool, graphite ferrules	G3440-80217
Inert Flow Path	
Nut	
Column nut for long or long two-hole ferrules	05921-21170
Ferrule	
UltiMetal Plus Flexible Metal ferrule with 0.4 mm id, 10/pk	G3188-27501
UltiMetal Plus Flexible Metal ferrule with 0.5 mm id, 10/pk	G3188-27502
Tools	
Column installation pre-swaging tool, metal ferrules	G3440-80218



TIPS & TOOLS

Ensuring an inert GC flow path has never been more critical. Access IFP resources here:
www.agilent.com/chem/inertflowpath



GC Column Connection Supplies

The correct tools and supplies make proper GC column installation easier and ensure consistent, robust, leak-free connections and reliable results.

New Self Tightening column nuts have a unique, stainless steel design that delivers a tight connection – without expensive upgrades or adapters. An innovative spring-driven piston continuously presses against the short graphite/polyimide ferrule – maintaining a leak-free seal even after hundreds of injections. It is especially well suited for oxygen sensitive detectors, such as mass spec and ECD.



Self Tightening column nut



Self Tightening column nut, for MS interface, 5190-5233



Universal column nut, 5181-8830



MS interface column nut, 05988-20066



Column installation pre-swaging tool, metal ferrules, G3440-80218



Column installation pre-swaging tool, graphite ferrules, G3440-80217

Column Nuts

Description	Part No.
Short Nuts	
Self Tightening column nut, for MS interface	5190-5233
Self Tightening column nut, for inlet/detector	5190-6194
Universal column nut, 1/16 in hex, 2/pk	5181-8830
Finger tight column nut for 530 µm columns*	5020-8293
Finger tight column nut for 320 µm columns and smaller*	5020-8292
Blanking plug, finger tight style	5020-8294
6850 column nut, 2/pk	5183-4732
Extended column nut, VI inlet	G3504-20504
High Temperature SimDis PTV inlet, 4 mm hex	5188-5312
Long Nuts	
MS interface column nut, female	05988-20066
Column nut for long or long two-hole ferrules	05921-21170
Accessories	
Swaging nut, for MS interface with Flexible Metal ferrules	G2855-20555
Open end wrench, 1/4 and 5/16 in	8710-0510
Column installation pre-swaging tool, metal ferrules	G3440-80218
Column installation pre-swaging tool, graphite ferrules	G3440-80217

*For use with graphite ferrules only

Specialty Ferrules, 85% Polyimide/15% Graphite

Ferrule ID (mm)	Column ID (mm)	Unit	Part No.
Two Hole			
0.5	0.1	10/pk	5181-3388
0.5	0.10, 0.20, 0.25	10/pk	5062-3580
0.5	0.32	10/pk	5062-3581
No Hole			
Capillary column long ferrule		10/pk	5181-3308
Capillary column short ferrule		10/pk	5190-4054
High Temperature PTV Inlet SS/Graphite			
0.4	0.32	10/pk	5188-5315
0.4	0.53	10/pk	5188-5314

Straight Ferrules

Description	Unit	Part No.
1/4 in PTFE	10/pk	0100-1378
1/4 in Graphite	10/pk	0100-1324
1/8 in PTFE	10/pk	0100-1365
1/8 in Graphite	10/pk	0100-1325
1/8 in 85% Polyimide/15% graphite	10/pk	0100-1332
1/16 in PTFE	10/pk	0100-1375
1/16 in Graphite	10/pk	0100-1326
1/16 in VG-2 Polyimide/40% graphite	10/pk	0100-1379
1/4 in 85% Polyimide/15% graphite	10/pk	0100-1331



1/8 in 85% Polyimide/15% graphite, 0100-1332

Reducing Ferrules

Description	Unit	Part No.
1/8 to 1/16 in Polyimide	10/pk	0100-1342
1/8 to 1/16 in VG-1 Polyimide, 15% graphite	10/pk	0100-1344
1/16 in to 0.4 mm VG-2 Polyimide, 40% graphite	10/pk	0100-1381

Ferrules for LTM Rapid Heating/Cooling System

Description	Original Design (5/pk)	2010+ Ultimate Union (10/pk)
For use with 0.25-0.4 mm id LTM columns	5190-1437	G3188-27501
For use with 0.4-0.5 mm id LTM columns	5190-1438	G3188-27502
For use with 0.5-0.8 mm id LTM columns	5190-1439	G3188-27503



UltiMetal Plus Flexible Metal ferrules, G3188-27501

Ferrules and Nuts for NCD and SCD

Description	Part No.
Spare column nut and ferrule kit	G6600-80018

Capillary Flow Technology Supplies

Agilent offers a family of GC accessories based on our proprietary Capillary Flow Technology. These accessories increase system productivity and performance:

- Deans switch device simplifies the analysis of complex samples
- Purged Effluent Splitter for inert, leak-free column effluent splitting



Ultimate Union

Ultimate Union

The Ultimate Union is part of Agilent's Capillary Flow Technology family, providing extremely low dead volume column connections. Like the QuickSwap, Deans Switch and Purged Effluent Splitter, the Ultimate Union uses special fittings and SilTite ferrules to create an inert, leak-free and robust seal that doesn't need re-tightening after temperature cycles.

Each Agilent Ultimate Union kit contains:

- 1 Union (your choice of UltiMetal Plus deactivated, or non-deactivated)
- 1 Oven wall clip
- 2 Internal nuts, p/n G2855-20530
- 1 Swaging nut, p/n G2855-20555
- 1 5/pk of UltiMetal Plus Flexible Metal ferrules for 0.25 mm column

Ultimate Union Kits, Fittings and Ferrules

Description	Part No.
Ultimate union kit, deactivated	G3182-61580
Ultimate union kit, non-deactivated	G3182-61581



TIPS & TOOLS

UltiMetal Plus ferrules can be used to install columns in the Split/Splitless inlet using the long column nut, p/n 05921-21170

Fittings, Ferrules and Supplies

For leak-free, low dead volume and inert column connections with capillary flow accessories, such as the Deans Switch or QuickSwap MS Interface, use SilTite ferrules and specified nuts. For Capillary Flow devices, use deactivated fused silica tubing. Do not use tubing that has been coated with stationary phase.

Fittings, Ferrules and Supplies

Description	Unit	Part No.
Internal nut		G2855-20530
Swaging nut, for MS interface with Flexible Metal ferrules		G2855-20555
Tee, inert		G3184-60065
Column storage fitting		G2855-20590
UltiMetal Plus Flexible Metal ferrule with 0.4 mm id	10/pk	G3188-27501
UltiMetal Plus Flexible Metal ferrule with 0.5 mm id	10/pk	G3188-27502
UltiMetal Plus Flexible Metal ferrule with 0.8 mm id	10/pk	G3188-27503
Ferrule pre-swaging tool		G2855-60200

Column/Retention Gap Installation Supplies

Description	Part No.
250 µm retention gap, one 5 m piece	160-2255-5
320 µm retention gap, one 5 m piece	160-2325-5
530 µm retention gap, 5 m length	160-2535-5
Fused silica, deactivated, 0.15 mm x 1 m	160-2625-1
Fused silica, deactivated, 0.15 mm x 5 m	160-2625-5
Fused silica, deactivated, 0.15 mm x 10 m	160-2625-10



Internal nut, G2855-20530



Swaging nut, G2855-20555



Tee, inert, G3184-60065



UltiMetal Plus Flexible Metal ferrules, G3188-27501



Ferrule pre-swaging tool, G2855-60200

Press-fit Capillary Column Connectors

In the past it was necessary to use press-fit connectors with specific dimensions to connect columns of those dimensions. Modern press-fit connectors are "laser-milled" to provide highly reproducible taper angles throughout the length of the press-fit, ensuring an excellent seal. Agilent's Press-fit capillary column connectors are treated with Agilent Ultra Inert deactivation to provide a robust and inert flow path.



Ultra Inert universal press fit connector, 5190-6979



Ultra Inert universal press fit Y-splitter, 5190-6980

Ultra Inert Press-fit Column Connectors

Description	Unit	Part No.
Ultra Inert universal press fit connector	10/pk	5190-6979
Ultra Inert universal press fit Y-splitter		5190-6980

Graphpak Capillary Connectors

Graphpak Capillary Column Connectors (2.5 mm)*

Column ID (mm)	Connector ID (mm)	Part No.
Capillary Detector Port Connector		
0.32/0.25	0.4	5021-7166
0.53	0.7	5021-7164
Capillary Divider for Simultaneous Sampling		
0.32/0.25	0.53	5021-7148
0.53	0.7	5021-7146
Capillary Injection Port Connector		
0.2	0.3	5021-7169
0.32/0.25	0.4	5021-7170
0.53	0.7	5021-7168

*The 2.5 mm Graphpak is not compatible with the Graphpak 2M used for the PTV.

Note: Order ferrules in addition to the connector to fit your column. Ferrules must be ordered separately.

Ferrules for Connectors

Column ID (mm)	ID (mm)	Unit	Part No.
0.2	0.3	10/pk	5021-7136
0.32/0.25	0.4	10/pk	5021-7137
0.53	0.7	10/pk	5021-7134
Graphpak plug ferrule		10/pk	5021-7133
Replacement Graphpak column nut		5/pk	5062-3525



Graphpak connector for Agilent capillary detectors



Graphpak divider for simultaneous sampling



Capillary injection port connector, 5021-7170