

## 11 Maintaining the FID

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## Consumables and Parts for the FID

See the Agilent catalog for consumables and supplies for a more complete listing, or visit the Agilent Web site for the latest information ([www.agilent.com/chem/supplies](http://www.agilent.com/chem/supplies)).

**Table 27** Nuts, ferrules, and hardware for capillary columns

Column id (mm)	Description	Typical use	Part number/quantity
.530	Ferrule, Vespel/graphite, 0.8-mm id	0.45-mm and 0.53-mm capillary columns	5062-3512 (10/pk)
	Ferrule, graphite, 1.0-mm id	0.53-mm capillary columns	5080-8773 (10/pk)
	Ferrule, graphite, 0.8-mm id	0.53-mm capillary columns	500-2118 (10/pk)
	Column nut, finger-tight (for 0.53-mm columns)	Connect column to inlet or detector	5020-8293
.320	Ferrule, Vespel/graphite, 0.5-mm id	0.32-mm capillary columns	5062-3514 (10/pk)
	Ferrule, graphite, 0.5-mm id	0.1-mm, 0.2-mm, 0.25-mm, and 0.32-mm capillary columns	5080-8853 (10/pk)
	Column nut, finger-tight (for .100- to .320-mm columns)	Connect column to inlet or detector	5020-8292
.250	Ferrule, Vespel/graphite, 0.4-mm id	0.1-mm, 0.2-mm, and 0.25-mm capillary columns	5181-3323 (10/pk)
	Ferrule, graphite, 0.5-mm id	0.1-mm, 0.2-mm, 0.25-mm, and 0.32-mm capillary columns	5080-8853 (10/pk)
	Column nut, finger-tight (for .100- to .320-mm columns)	Connect column to inlet or detector	5020-8292
.100 and .200	Ferrule, Vespel/graphite, 0.37-mm id	0.1-mm and 0.2-mm capillary columns	5062-3516 (10/pk)
	Ferrule, Vespel/graphite, 0.4-mm id	0.1-mm, 0.2-mm, and 0.25-mm capillary columns	5181-3323 (10/pk)
	Ferrule, graphite, 0.5-mm id	0.1-mm, 0.2-mm, 0.25-mm, and 0.32-mm capillary columns	5080-8853 (10/pk)
	Ferrule, graphite, 0.4-mm id		500-2114 (10/pk)
	Column nut, finger-tight (for .100- to .320-mm columns)	Connect column to inlet or detector	5020-8292
All	Ferrule, no-hole	Testing	5181-3308 (10/pk)
	Capillary column blanking nut	Testing—use with any ferrule	5020-8294
	Column nut, universal	Connect column to inlet or detector	5181-8830 (2/pk)

**Table 27** Nuts, ferrules, and hardware for capillary columns (continued)

Column id (mm)	Description	Typical use	Part number/quantity
	Column cutter, ceramic wafer	Cutting capillary columns	5181-8836 (4/pk)
	Pencil, diamond tipped	Cutting capillary columns	420-1000
	Ferrule tool kit	Ferrule installation	440-1000

**Table 28** FID parts and subassemblies

Description	Part number/quantity
Screw, M4 × 25 mm, Torx, T20	0515-2712 (3/pk)
PTFE chimney (optional)	19231-21050
Collector assembly	G1531-60690
FID/NPD capillary column adapter	19244-80610
FID/NPD 1/8-inch packed column adapter	19231-80520
FID/NPD 1/4-inch packed column adapter	19231-80530
Insulation	19234-60715 (1/pk)
Insulation cup assembly	19234-60700
Nut, 1/4-inch, brass, for packed column adapters	5180-4105 (10/pk)
Ferrule, Vespel, 1/4-inch, for packed column adapters	5080-8774 (10/pk)

**Table 29** Jets for capillary adaptable fittings

Jet type	Part number	Jet tip id	Length
Capillary	19244-80560	0.29 mm (0.011 inch)	61.5 mm
Capillary, high-temperature (use with simulated distillation)	19244-80620	0.47 mm (0.018 inch)	61.5 mm
Packed	18710-20119	0.46 mm (0.018 inch)	63.6 mm
Packed, wide-bore (use with high-bleed applications)	18789-80070	0.76 mm (0.030 inch)	63.6 mm

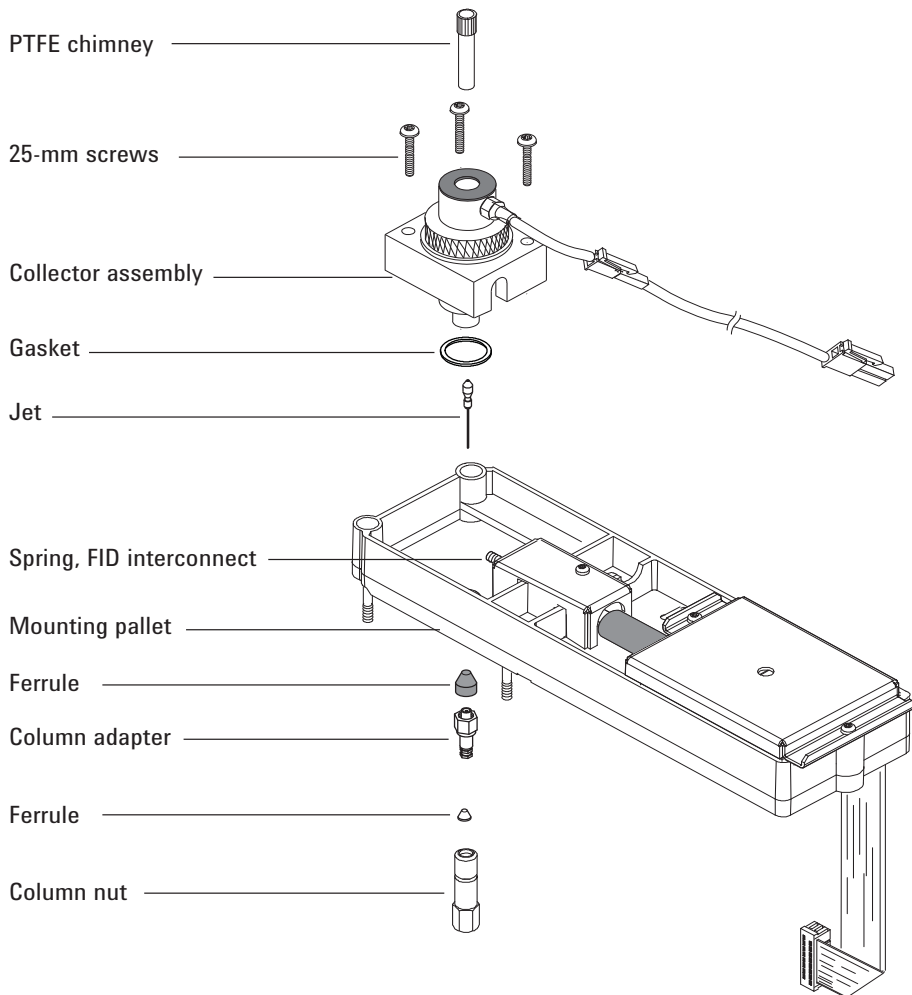
**Table 30** Jets for capillary optimized fittings

Jet type	Part number	Jet tip ID	Length
Capillary	G1531-80560	0.29 mm (0.011 inch)	43 mm
High-temperature (use with simulated distillation)	G1531-80620	0.47 mm (0.018 inch)	48 mm

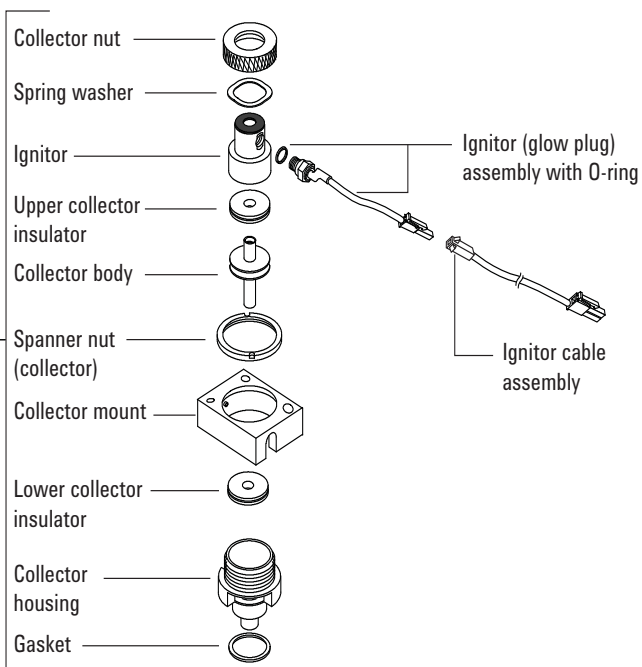
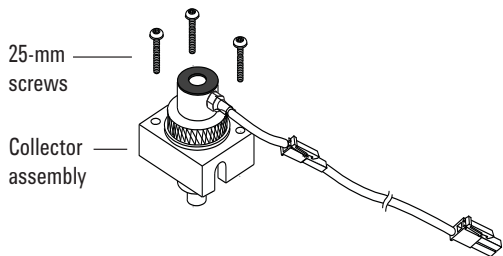
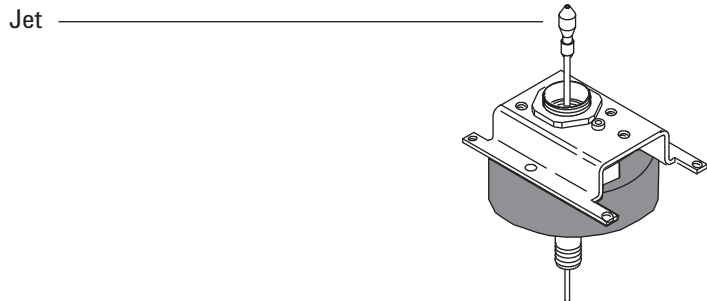
**Table 31** FID collector assembly parts

<b>Description</b>	<b>Part number/quantity</b>
Screw, M4 × 25 mm, Torx, T20	0515-2712 (3/pk)
Collector assembly	G1531-60690
Collector nut	19231-20940
Spring washer	3050-1246
Ignitor castle	19231-20910
Ignitor castle, Hastelloy	19231-21060
Upper/lower collector insulator	G1531-20700
Collector body	G1531-20690
Collector body, Hastelloy	G1531-21090
Spanner nut (collector)	19231-20980
Collector mount	G1531-20550
Collector housing	G1531-20740
Gasket	5180-4165 (12/pk)
Ignitor (glow plug) assembly with O-ring	19231-60680

## Exploded Parts Views of the FID



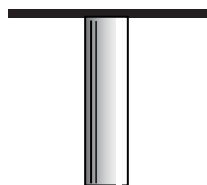
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## Selecting an FID Jet

Open the oven door and locate the column connection fitting at the base of the detector. It will look like either a capillary optimized fitting or an adaptable fitting.

Capillary optimized fitting



Adaptable fitting



- If you have an application that tends to clog the jet, select a jet with a wider tip id.
- When using packed columns in high column-bleed applications, the jet tends to clog with silicon dioxide.
- In simulated distillation applications, the high-boiling hydrocarbons tend to clog the jet.

For capillary optimized fittings, select a jet from [Table 32](#). For adaptable fittings, select a jet from [Table 33](#).

**Table 32** Jets for capillary optimized fittings

Figure 1 ID	Jet type	Part number	Jet tip id	Length
1	Capillary	G1531-80560	0.29 mm (0.011 inch)	43 mm
2	High-temperature (use with simulated distillation)	G1531-80620	0.47 mm (0.018 inch)	48 mm



**Figure 3** Capillary optimized jets

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**Table 33** Jets for capillary adaptable fittings

Figure 2 ID	Jet type	Part number	Jet tip id	Length
1	Capillary	19244-80560	0.29 mm (0.011 inch)	61.5 mm
2	Capillary, high-temperature (use with simulated distillation)	19244-80620	0.47 mm (0.018 inch)	61.5 mm
3	Packed	18710-20119	0.46 mm (0.018 inch)	63.6 mm
4	Packed, wide-bore (use with high-bleed applications)	18789-80070	0.76 mm (0.030 inch)	63.6 mm



**Figure 4** Capillary adaptable jets



## To Attach a Capillary Column Adapter on an Adaptable FID

- 1 Gather the following materials:
  - Adapter (See “Consumables and Parts for the FID” on page 196.)
  - 1/4-inch brass nut
  - 1/4-inch Vespel/graphite ferrule
  - Column cutter
  - 1/4-inch wrench
  - 9/16-inch open-end wrench
  - Lint-free gloves
- 2 Load the [GC maintenance method](#) and wait for the GC to become ready.

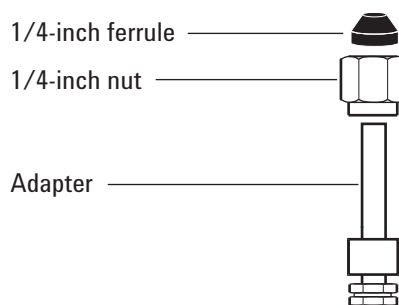
### WARNING

**Be careful! The oven, inlet, and/or detector may be hot enough to cause burns. If the oven, inlet, or detector is hot, wear heat-resistant gloves to protect your hands.**

### CAUTION

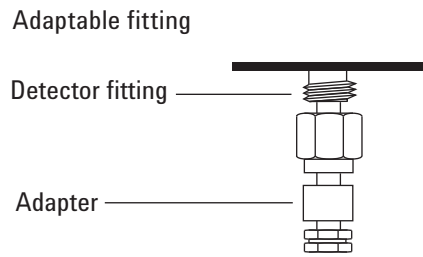
Wear clean, lint-free gloves to prevent contamination of parts with dirt and skin oils.

- 3 Assemble the nut and ferrule onto the adapter.



- 4 Insert the adapter straight into the detector base as far as possible.
- 5 Hold the adapter in this position and finger-tighten the nut.

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**6** Tighten an additional 1/4 turn with a wrench.

## To Install a Capillary Column in the FID

- 1 Gather the following materials (see [“Consumables and Parts for the FID”](#) on page 196.):
  - Column
  - Ferrule(s)
  - Column nut
  - Column cutter
  - 1/4-inch open-end wrench
  - Septum
  - Isopropanol
  - Lab tissue
  - Lint-free gloves
- 2 Load the [GC maintenance method](#) and wait for the GC to become ready.

**WARNING**

**Be careful! The oven, inlet, and/or detector may be hot enough to cause burns. If the oven, inlet, or detector is hot, wear heat-resistant gloves to protect your hands.**

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**WARNING**

**Wear safety glasses to protect your eyes from flying particles while handling, cutting, or installing glass or fused silica capillary columns. Use care in handling these columns to prevent puncture wounds.**

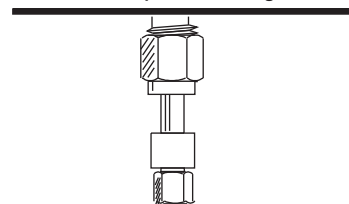
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- 3 If using the adaptable detector, verify that the adapter is installed. (See [“To Attach a Capillary Column Adapter on an Adaptable FID”](#) on page 203.)

Capillary optimized fitting



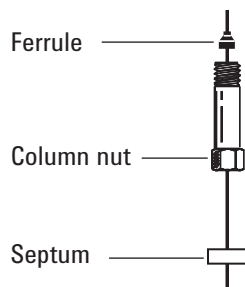
Adaptable fitting



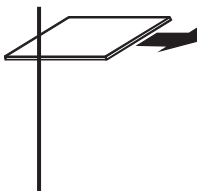
**CAUTION**

Wear clean, lint-free gloves to prevent contamination of parts with dirt and skin oils.

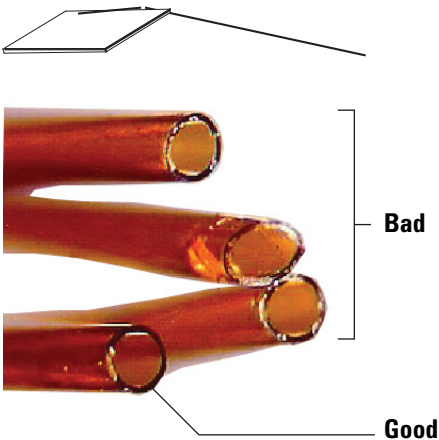
- 4 Place a septum (if the column id is  $\leq 0.1$  mm), capillary column nut, and ferrule on the column.



- 5 Score the column using a glass scribing tool. The score must be square to ensure a clean break.



- 6 Break off the column end by supporting it against the column cutter opposite the scribe. Inspect the end with a magnifying loupe to make certain there are no burrs or jagged edges.

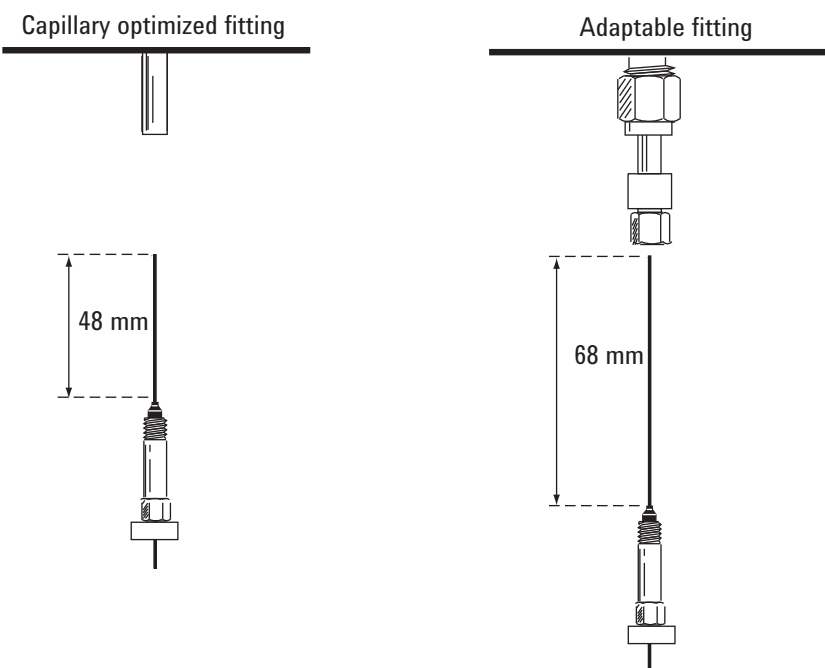


- 7 Wipe the column walls with a tissue dampened with isopropanol to remove fingerprints and dust.
- 8 Install the capillary column.

If the column id is greater than 0.1 mm:

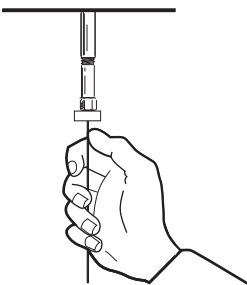
- a Gently insert the column into the detector until it bottoms; do not attempt to force it further.
- b Finger-tighten the column nut, then withdraw the column about 1 mm. Tighten the nut an additional 1/4 turn with a wrench.

If the column id is 0.1 mm or less position the column so it extends above the ferrule by 48 mm (*capillary optimized fitting*) or 68 mm (*adaptable fitting*). Slide the septum up to hold the column nut and ferrule at this fixed position.



- c Insert the column into the detector. Slide the nut and ferrule up the column to the detector base. Finger-tighten the column nut until it grips the column.
- d Adjust the column (*not* the septum) position so that the septum is even with the bottom of the column nut. Tighten the nut an additional 1/4 turn with a wrench.

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## To Replace the FID Collector Assembly

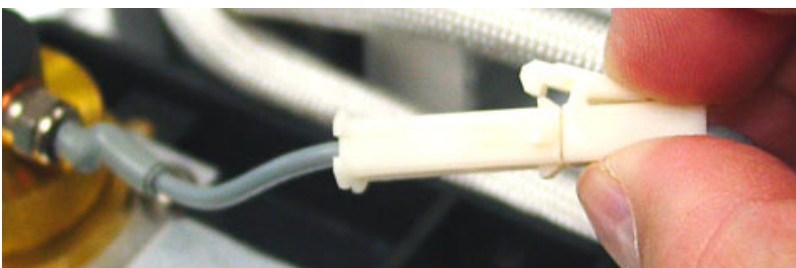
- 1 Gather the following:
  - New FID collector assembly. (See “Consumables and Parts for the FID” on page 196.)
  - T-20 Torx screwdriver
  - 1/4-inch nut driver
  - Tweezers
  - Lint-free gloves

**CAUTION**

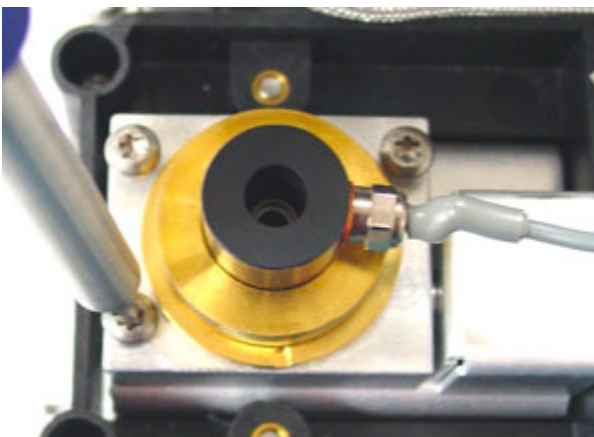
To avoid contaminating the FID, wear clean, lint-free gloves when handling the collector assembly.

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- 2 Load the [GC maintenance method](#) and wait for the GC to become ready.
- 3 Disconnect the ignitor cable assembly.



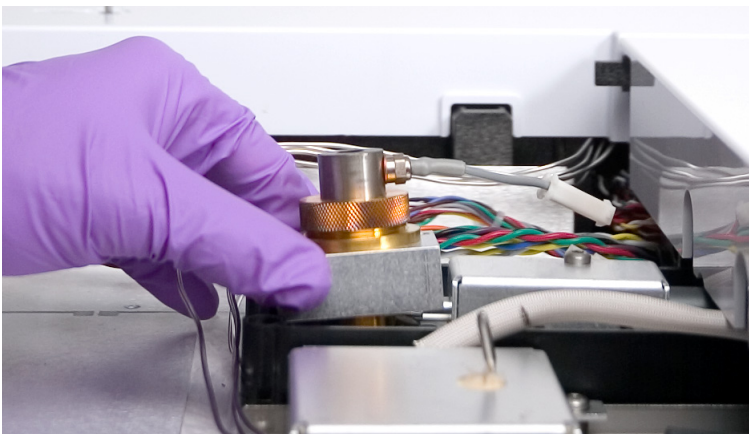
- 4 Remove the three screws holding the collector assembly to the mounting pallet.



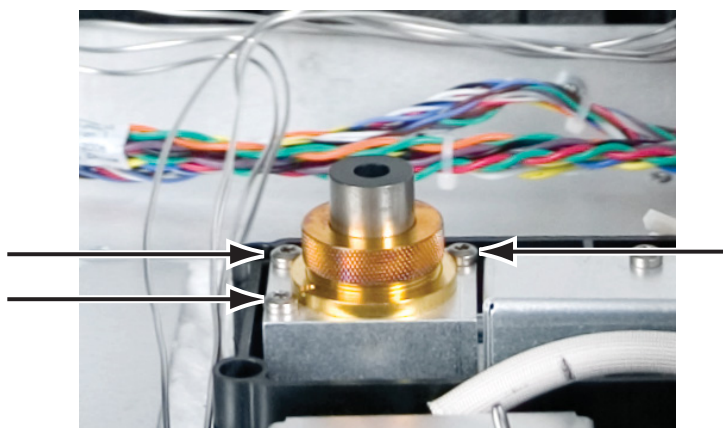
**CAUTION**

This step exposes the interconnect spring. Be careful not to touch or disfigure the spring while working on the FID. Any dirt or bending will reduce the sensitivity of your detector.

- 5 Lift and remove the assembly from the pallet.



- 6 Remove the ignitor cable assembly from the new collector assembly, if present.
- 7 Remove any protective caps from the new collector assembly, if present.
- 8 Lower the new collector assembly into the housing.
- 9 Insert the three screws and tighten (to 18 inch-pounds).



- 10 Connect the ignitor extension cable.
- 11 Verify assembly:
  - a Check the FID leakage current. (See [“To Check the FID Leakage Current”](#) on page 224.)
  - b Check the FID baseline. (See [“To Check the FID Baseline”](#) on page 225.)



- 12 Reset the EMF counter. See [To Reset an EMF Counter](#) in the *Operation Manual*.

## To Replace an FID Jet

- 1 Gather the following:
  - Replacement jet (See [“Selecting an FID Jet”](#) on page 201.)
  - T-20 Torx screwdriver
  - 1/4-inch nut driver
  - Tweezers
  - Compressed, filtered, dry air or nitrogen
  - Solvent that will clean the type of deposits in your detector
  - Clean cloth
  - Cotton swab
  - Lint-free gloves
- 2 Load the [GC maintenance method](#) and wait for the GC to become ready.

**WARNING**

**Be careful! The oven and/or detector may be hot enough to cause burns. If the detector is hot, wear gloves to protect your hands.**

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**WARNING**

**Wear safety glasses to protect your eyes from flying particles while handling, cutting, or installing glass or fused silica capillary columns. Use care in handling these columns to prevent puncture wounds.**

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- 3 If installed, remove the capillary column from the detector.

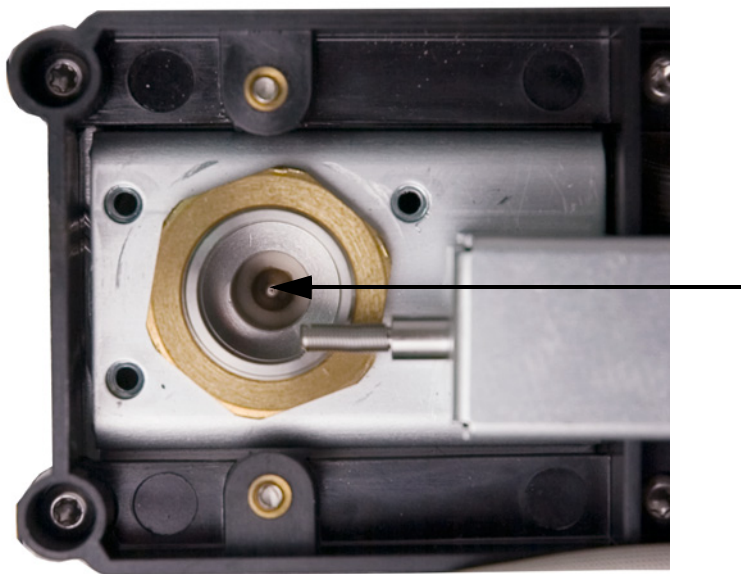
**CAUTION**

Wear clean, lint-free gloves to prevent contamination of parts with dirt and skin oils.

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- 4 Remove the FID collector assembly and place it on a clean cloth. (See [“To Replace the FID Collector Assembly”](#) on page 209.)

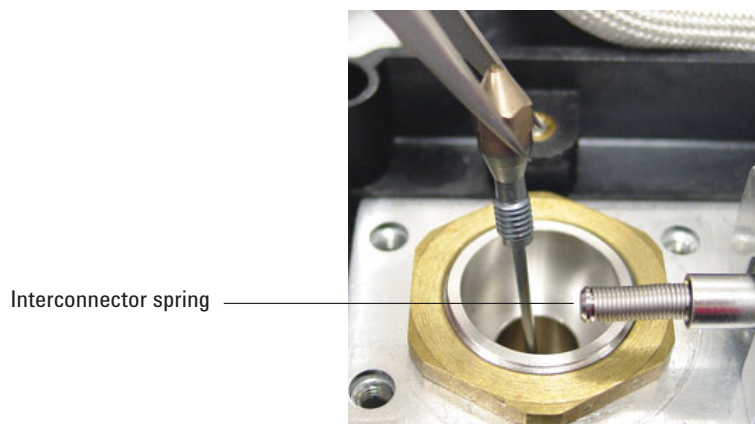
- 5 Locate the jet inside the housing.



**CAUTION**

Handle the clean or new jet only with tweezers, or wear gloves.

- 6 Loosen the jet, then lift it out of the housing with tweezers.

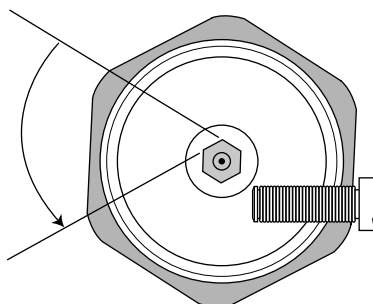
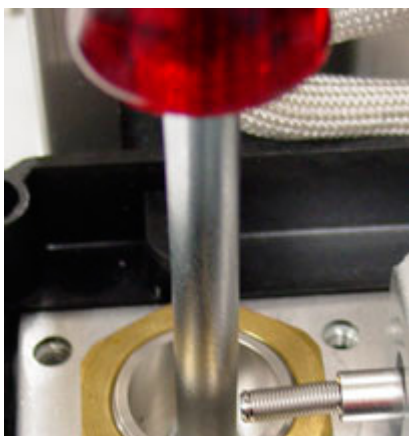


- 7 Clean the detector base cavity using solvent, a swab, and compressed air or nitrogen.
- 8 Use tweezers to lower the new jet into the housing.

### CAUTION

Do not overtighten the jet! Overtightening may permanently deform and damage the jet, the detector base, or both. The torque specification is 10 inch-pounds.

- Carefully screw the jet into the housing. Tighten 1/6-turn past finger-tight (1/6-turn is one “flat” on a typical screwdriver handle, or the jet head).



- Install the collector assembly. (See [“To Replace the FID Collector Assembly”](#) on page 209.)
- Reset the jet counter. See [To Reset an EMF Counter](#) in the *Operation Manual*.
- Attach the capillary column to the detector.
  - Install the column in the detector. (See [“To Install a Capillary Column in the FID”](#) on page 205.)
  - After the column is installed at both inlet and detector, establish a flow of carrier gas and purge as recommended by the column manufacturer.
  - Check the FID leakage current. (See [“To Check the FID Leakage Current”](#) on page 224.)
  - Bakeout the detector. (See [“To Bakeout the FID”](#) on page 229.)
  - Restore the analytical method.

### WARNING

Be careful! The oven, inlet, and/or detector may be hot enough to cause burns. If the oven, inlet, or detector is hot, wear heat-resistant gloves to protect your hands.

- f** Allow the oven, inlet, and detector to equilibrate at operating temperature, then retighten the fittings.
- 13** Check the FID baseline. (See [“To Check the FID Baseline”](#) on page 225.)

## To Perform Maintenance on the FID Collector Assembly

**NOTE**

Perform only the steps and gather only the parts that apply to the desired maintenance task(s).

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**1** Gather the following:

- Replacement ignitor assembly (See “Consumables and Parts for the FID” on page 196.)
- Replacement ignitor castle
- Two collector insulators
- Collector
- Spring washer
- Gasket
- T-20 Torx screwdriver
- 1/4-inch nut driver
- Tweezers
- 5/16-inch wrench
- Lint-free gloves
- Clean cloth

**CAUTION**

To avoid contaminating the FID, wear clean, lint-free gloves when handling the collector assembly.

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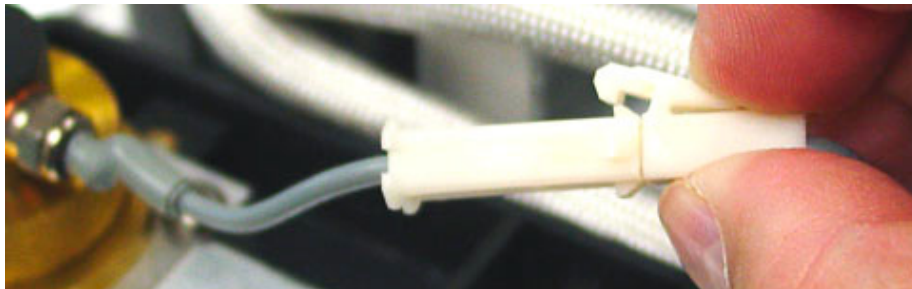
- 2** Load the [GC maintenance method](#) and wait for the GC to become ready.

**WARNING**

**Be careful! The oven and/or detector may be hot enough to cause burns. If the detector is hot, wear gloves to protect your hands.**

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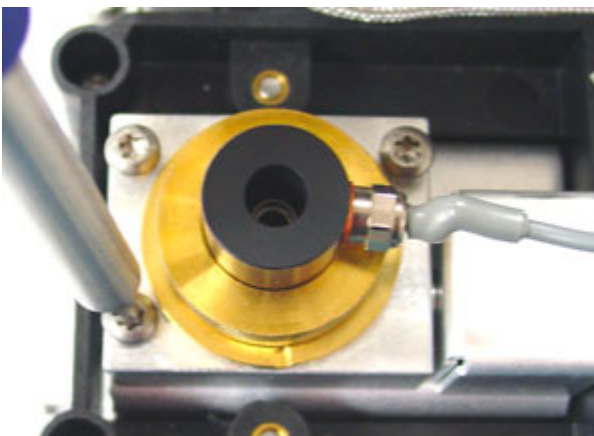
- 3 Remove the FID ignitor.
  - a Disconnect the ignitor cable assembly.



- b Loosen the ignitor with a wrench.



- c Turn the nut counterclockwise by hand. Remove the ignitor and copper washer.
- 4 If replacing only the FID ignitor assembly with copper washer, skip to [step 16](#) for assembly.
- 5 Remove the three screws that hold the collector mount to the FID thermal strap.

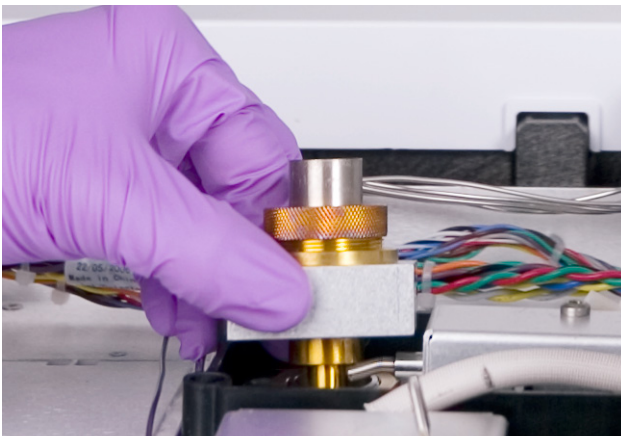


### CAUTION

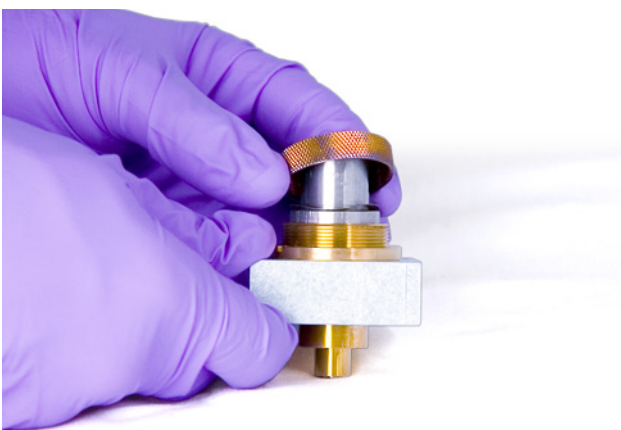
This step exposes the interconnect spring. Be careful not to touch or disfigure the spring while working on the FID. Any dirt or bending will reduce the sensitivity of your detector.

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- 6 Remove the collector assembly. Place it on a clean cloth for additional disassembly.



- 7 Remove the gasket from the bottom of the assembly, if necessary.
- 8 Remove the FID ignitor castle.
  - a Loosen the collector nut.
  - b Remove the collector nut and the spring washer.



- c Lift the castle out of the collector housing. When removing the castle, some of the collector parts may be attached. Set these on a clean cloth to protect from scratches or dirt.





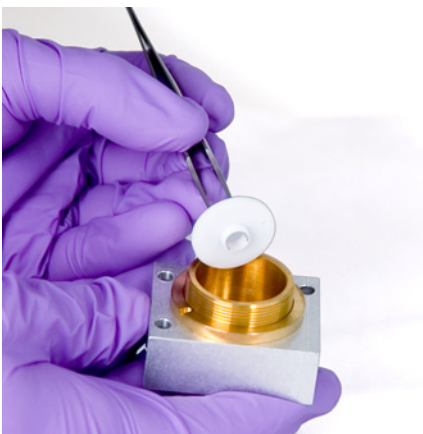
**9** If only replacing the FID castle, skip to [step 15](#) for reassembly.

**10** Remove the collector and insulators.

- a** If needed, remove the collector and upper insulator from the FID housing. The lower insulator may come out with the collector, but often remains in the FID housing. Place the parts on a clean cloth.



- b** Remove the lower insulator with tweezers and place the parts on a clean cloth.

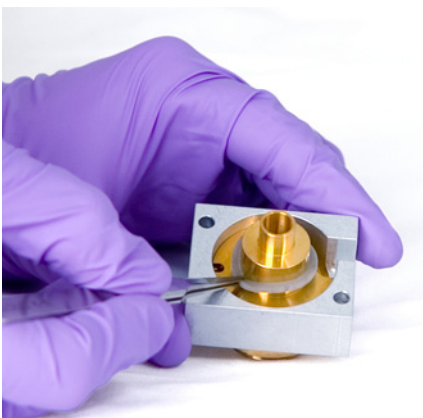


**11** Remove the collector housing from the mount, if necessary.

**12** Use tweezers to remove the gasket from the bottom of the housing.

The collector assembly is now completely disassembled.  
Reassemble as follows:

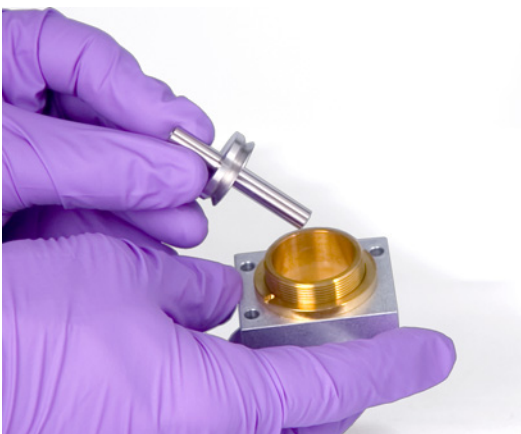
**13** Use tweezers to install a new gasket onto the housing, being sure that it lays flat on the brass surface.



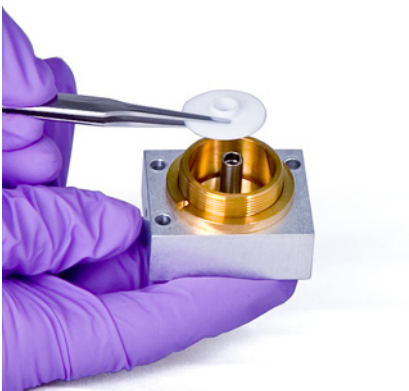
**14** Install the collector insulators.

**a** Insert one of the insulators into the base of the housing. Seat the insulator with the flat surface facing out of the housing.

**b** Insert the long end of collector into the housing and lower insulator.



- c Insert the other insulator onto the top of the collector, with the flat surface facing towards the housing.



**15** Install the FID ignitor castle.

- a Orient the castle so that the threaded hole for the ignitor faces toward the electronics.



- b Insert the FID castle into the collector housing.
- c Install the spring washer over the castle.

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- d** Install the collector nut over the castle and tighten firmly. The seal should be airtight. Maintain the orientation of the ignitor hole with the base as shown below.

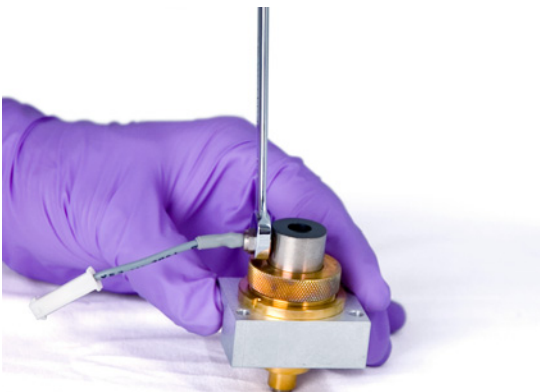


### 16 Install the FID ignitor.

- a** Insert the ignitor and copper seal into the threaded hole of the castle. Keep the mating threads clean.

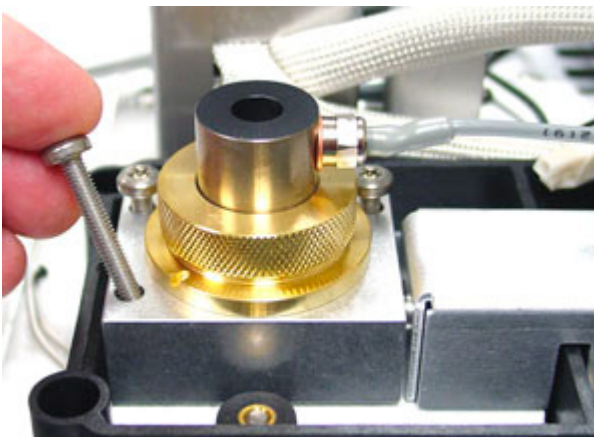


- b** Tighten the ignitor with a wrench. Ignition requires a good electrical contact that is free of any dirt.



**17** Lower the collector assembly into the housing.

**18** Insert the three screws and tighten (to 18 inch-pounds).



**19** Connect the ignitor extension cable.

**20** Verify assembly:

- a** Check the FID leakage current. (See [“To Check the FID Leakage Current”](#) on page 224.)
- b** Bakeout the detector. (See [“To Bakeout the FID”](#) on page 229.)
- c** Check the FID baseline. (See [“To Check the FID Baseline”](#) on page 225.)

**21** Reset the EMF counters. See [To Reset an EMF Counter](#) in the *Operation Manual*.

## To Check the FID Leakage Current

- 1 Load the analytical method.
  - Make sure flows are acceptable for ignition.
  - Heat the detector to operating temperature or 300 °C.
- 2 Turn off the FID flame.
- 3 Press **[Front Detector]** or **[Back Detector]**, then scroll to **Output**.
- 4 Verify that the output is stable and  $< 1.0$  pA.

If the output is unstable or  $> 1.0$  pA, turn off the GC and check for proper assembly of the upper FID parts and contamination. If this contamination is confined to the detector, bakeout the FID. (See “[To Bakeout the FID](#)” on page 229.)

- 5 Turn on the flame.

## To Check the FID Baseline

- 1 With the column installed, load your checkout method.
- 2 Set the oven temperature to 35 °C.
- 3 Press [**Front Detector**] or [**Back Detector**], then scroll to **Output**.
- 4 When the flame is lit and the GC is ready, verify that the output is stable and < 20 pA.

If the output is not stable or > 20 pA, the system or gas may be contaminated. If this contamination is isolated to the detector, then bakeout the FID. (See [“To Bakeout the FID”](#) on page 229.)

## To Install the FID Insulation Cup Assembly (Adaptable FID Only)

- 1 Gather the following:
  - Insulation (See “Consumables and Parts for the FID” on page 196.)
  - Insulation cup assembly
- 2 Load the [GC maintenance method](#) and wait for the GC to become ready.

**WARNING**

**Be careful! The detector may be hot enough to cause burns. If the detector is hot, wear heat-resistant gloves to protect your hands.**

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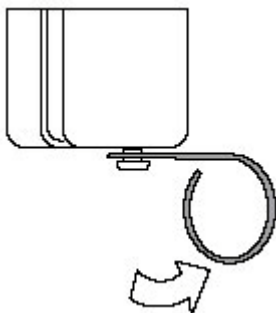
- 3 Assemble the insulation in the cup. Line up the slots in the insulation with the slot in the cup.

Capillary columns should be attached to the detector before installing the cup. When attaching a packed column to the detector, cap the detector fitting before installing the cup to prevent insulation contamination of the detector.

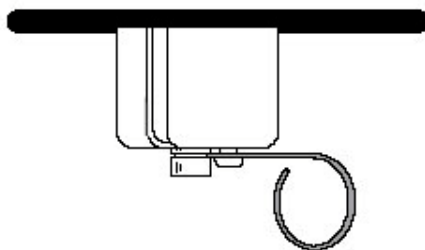




- 4 Push the wire spring lever to the right to uncover the hole.



- 5 From inside the oven with the column installed, pass the column through the slot in the cup. Move the cup up over the detector fitting so that the cup touches the top of the oven. You should be able to see the groove in the fitting.
- 6 Release the spring into the groove of the fitting.



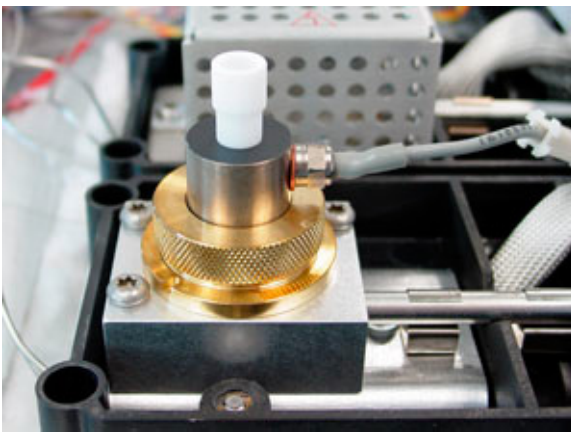
## To Install the Optional FID PTFE Chimney Insert

**WARNING**

Be careful! The detector may be hot enough to cause burns. If the detector is hot, wear heat-resistant gloves to protect your hands.

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- 1 Light the FID flame.
- 2 Insert the PTFE chimney into the FID castle.



**NOTE**

When installed, the PTFE chimney insert prevents ignition.

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## To Bakeout the FID

**WARNING**

If using hydrogen as a carrier gas, turn off the hydrogen supply and cap the end of the column to prevent an oven explosion.

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- 1 Bakeout the FID with the column installed or uninstalled. If uninstalled, gather the following (see “[Consumables and Parts for the FID](#)” on page 196):
  - Capillary adapter (adaptable FID only)
  - Column nut
  - No-hole ferrule
- 2 Load the [GC maintenance method](#) and wait for the GC to become ready.

**WARNING**

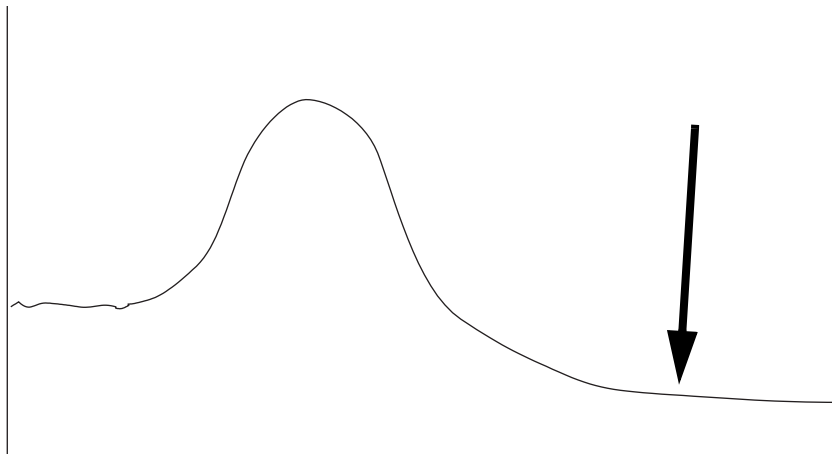
Be careful! The detector may be hot enough to cause burns. If the detector is hot, wear heat-resistant gloves to protect your hands.

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- 3 If the column is uninstalled, plug the detector connection with the capillary adapter, column nut, and no-hole ferrule.

Maintain inert carrier gas flow through the column, or remove the column from the GC.
- 4 Set the detector temperature at 350 to 375 °C.
- 5 Set normal operating flows.
- 6 Light the FID flame.
- 7 Set the oven temperature to 250 °C or 25 °C above the normal maximum operating temperature. Do not exceed the column’s temperature limit.

- 8 Hold at temperature for 30 minutes or until the baseline settles at a lower value. The baseline will typically rise, then fall to a final value lower than the initial baseline.



- 9 Restore the analytical method and allow the FID to equilibrate.
- 10 Check the FID output value. It should be lower than the first reading. If it is not, contact your Agilent service representative.
- Without a column installed, a clean system baseline should be  $<20$  pA.
- 11 If the column is not installed in the FID, install it. (See [“To Install a Capillary Column in the FID”](#) on page 205.)