

Getting to Know the Intuvo 9000 GC

Mark Sinnott
GC Application Scientist



Innovating a New Path to GC Productivity

A whole new way to GC

- Easier
- Faster
- Smaller
- Smarter
- Greener



Innovating a New Path to GC Productivity

A whole new way to GC



Torque Driver

Innovating a New Path to GC Productivity

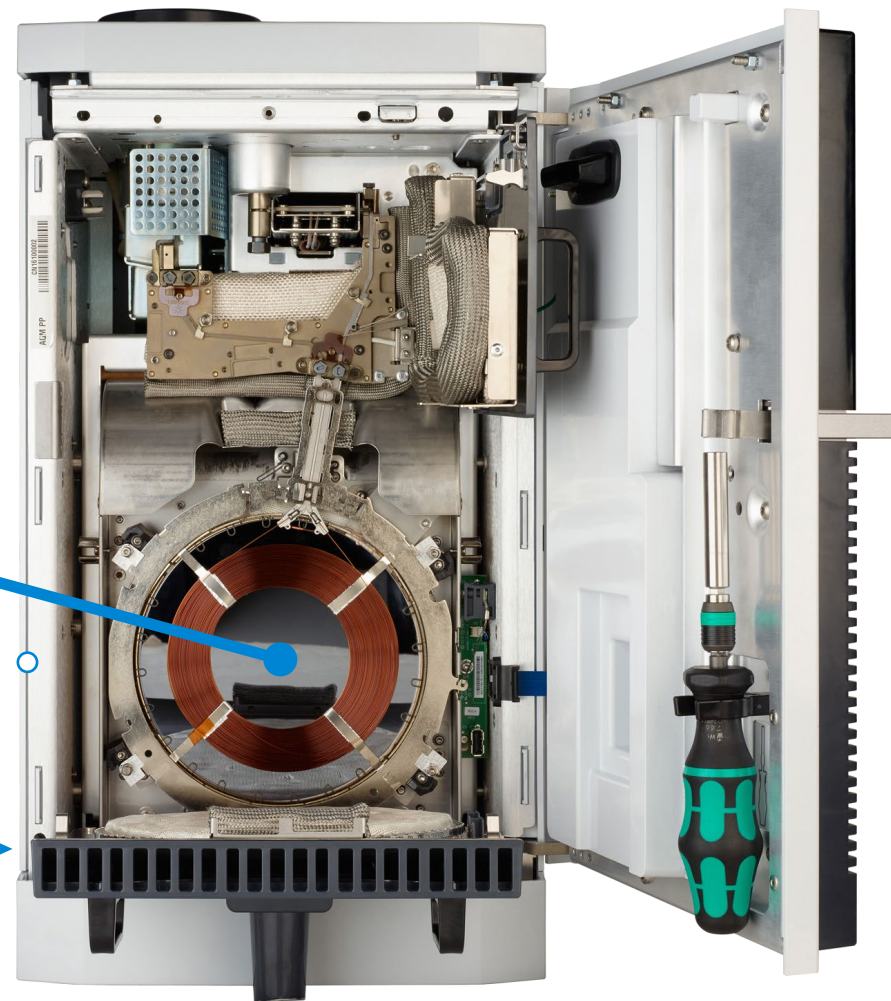
A whole new way to GC



Bus Door Opened

Direct heating

Door Swings down



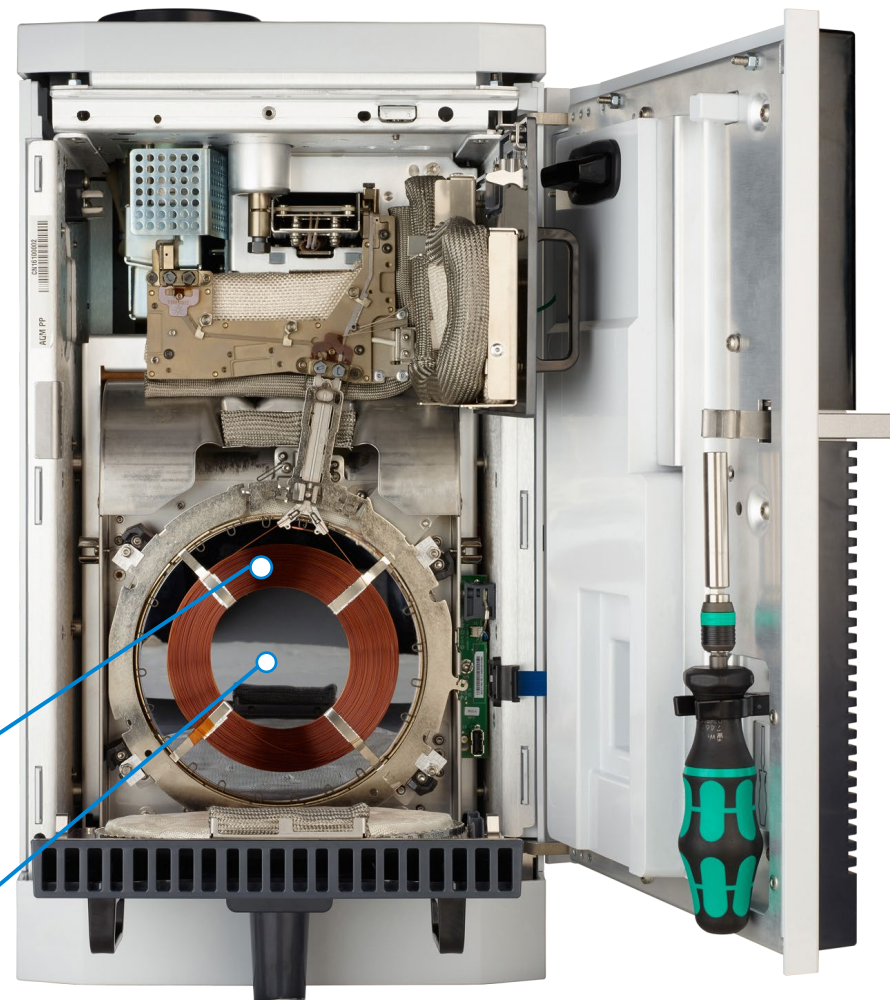
Innovating a New Path to GC Productivity

A whole new way to GC



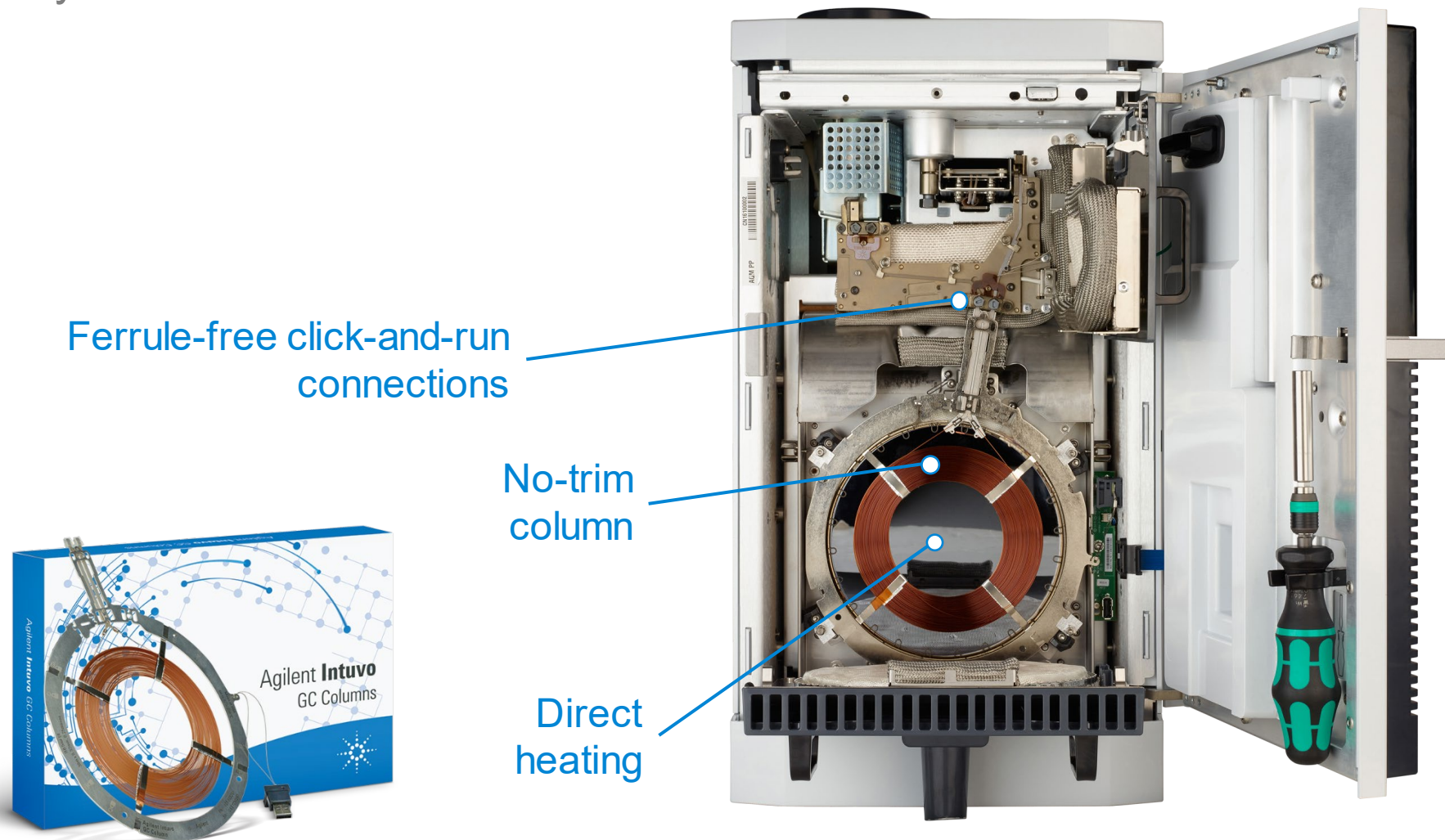
No-trim
column

Direct
heating



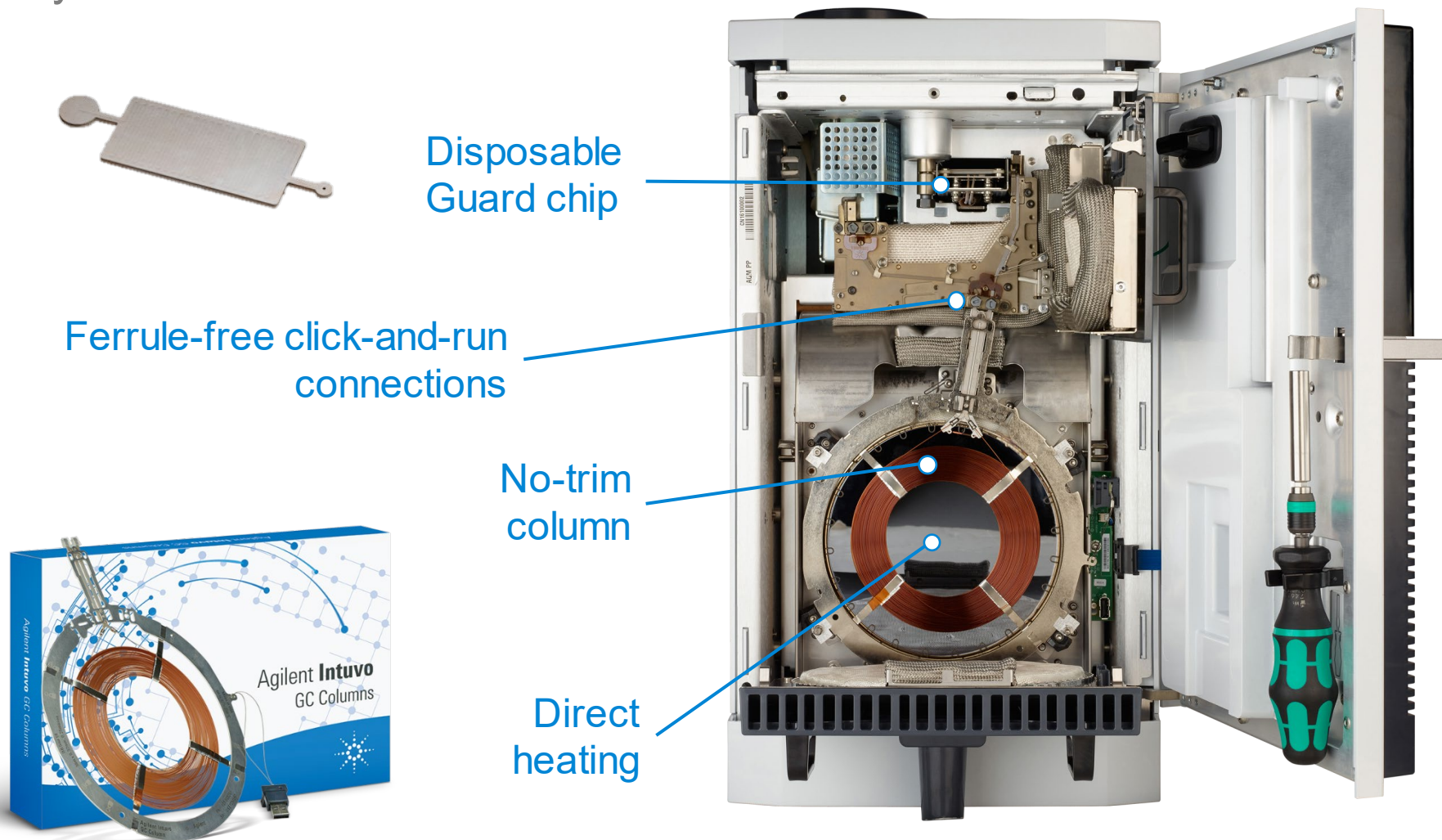
Innovating a New Path to GC Productivity

A whole new way to GC



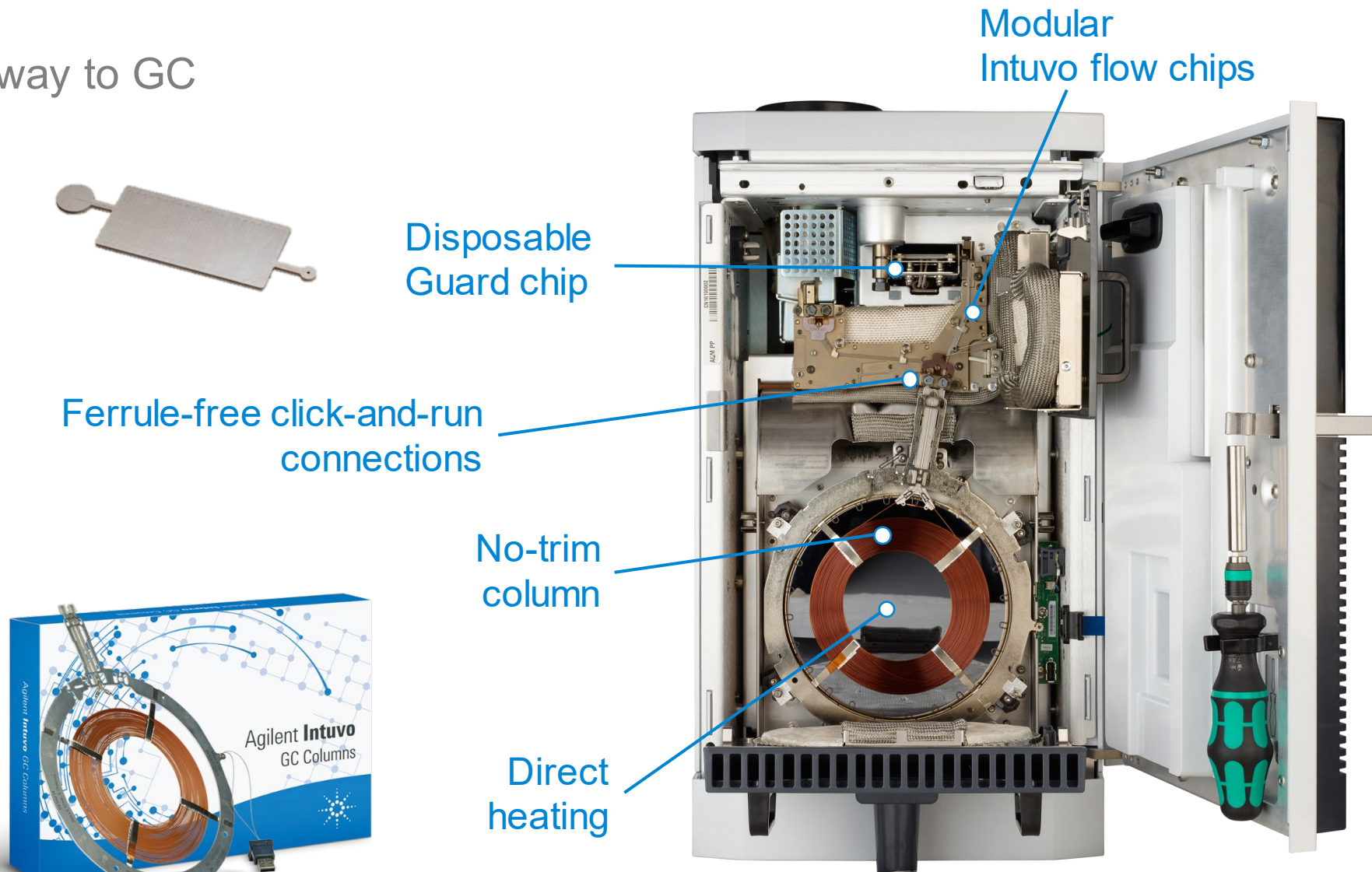
Innovating a New Path to GC Productivity

A whole new way to GC

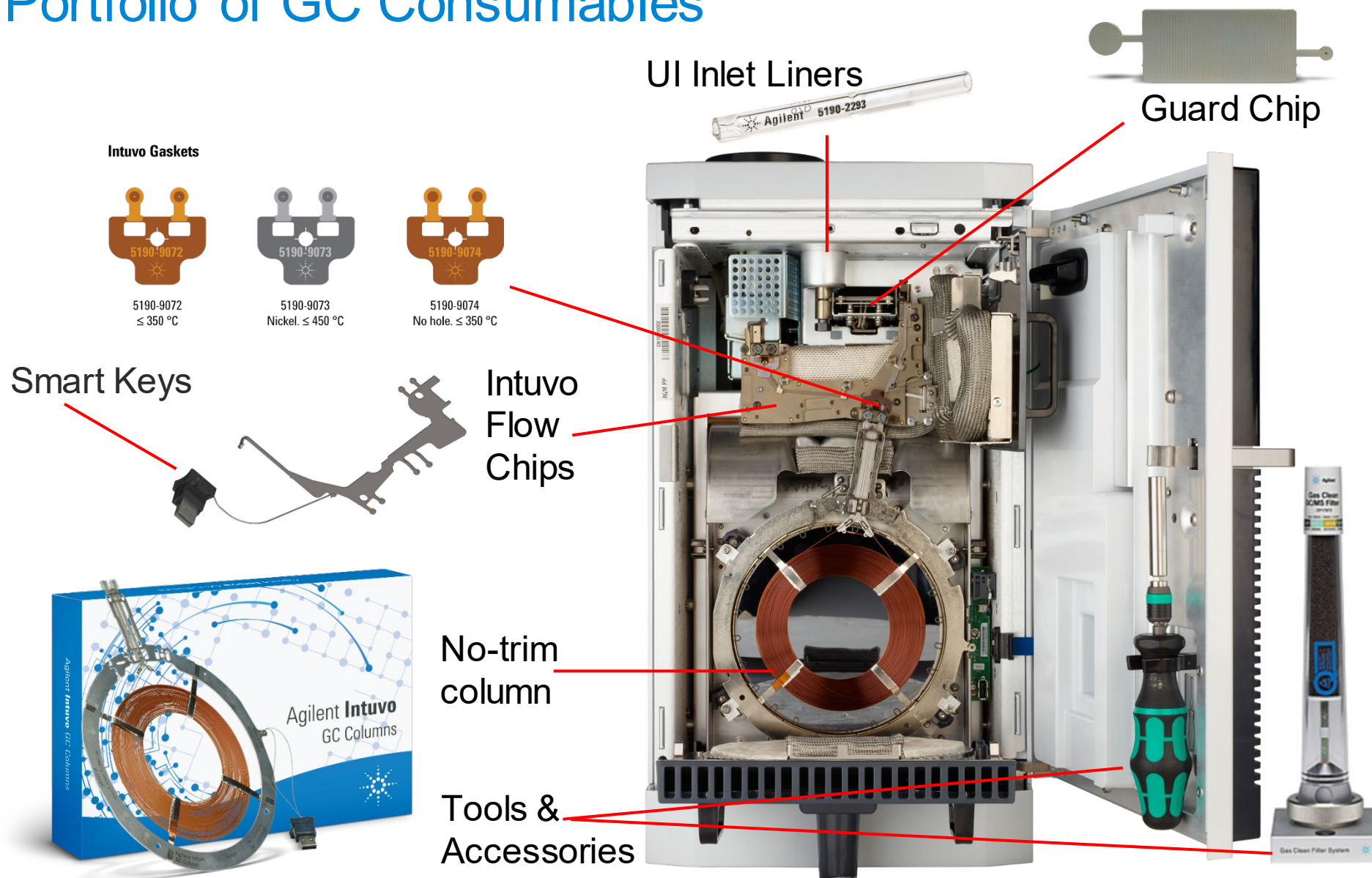


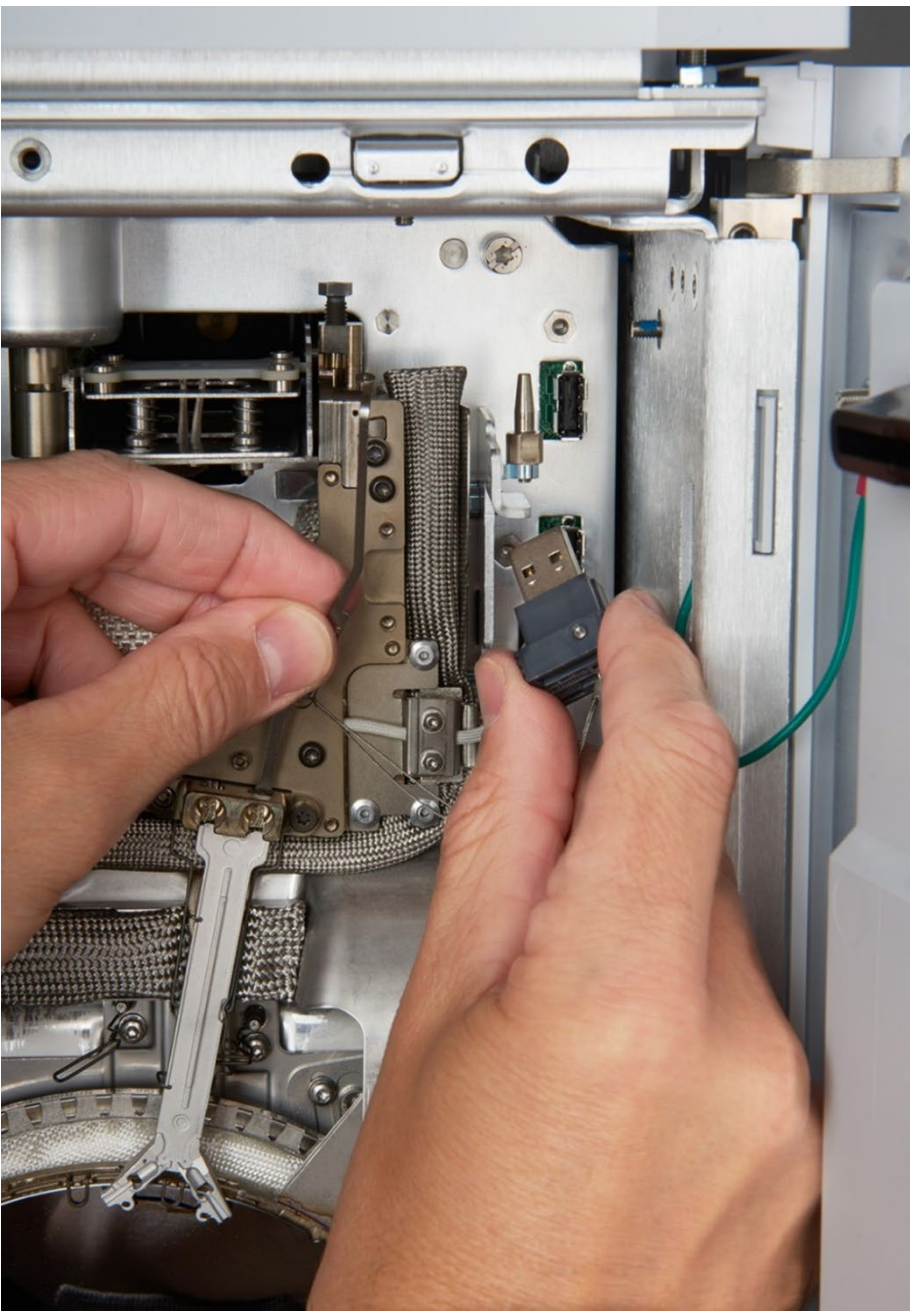
Innovating a New Path to GC Productivity

A whole new way to GC



A New Portfolio of GC Consumables





Intuvo Smart Keys

Self aware

- Flow Chips and Columns
- Smart: Informs how Intuvo is configured
- Easy: Sets method context and parameter defaults – no complex calculators needed

Flexible Compatible Design

Configurable to many applications



- SSL, MMI, GSV, LSV inlets
- FID, TCD, ECD, NPD, FPD, NCD, SCD detectors
- SQ and TQ mass spectrometers
- Headspace, thermal desorption, purge and trap samplers
- 16-, 50-, 150-position auto-injectors and trays
- Software: OpenLAB and MassHunter

Comparing the 7890 to the Intuvo (9000)

	7890				Intuvo	
Foot Print (H x W x D) inches	19.2 x 22.9 x 20.2				20 x 10.7 x 27.2	
Power Consumption	2250 VA standard (2950 VA /220)				1296 VA standard (1548 VA / 220)	
Oven Ramp Rate	Temperature Range	120 V oven	Fast Oven	Fast oven with Pillow	Maximum achievable temperature ramp rate: 250 °C/min across all temperature ranges	
	50-70	75	120	120		
	70-115	45	95	120		
	115-175	40	65	110		
	175-300	30	45	80		
	300-450	20	35	65		
Oven Cooling Rate	Oven cool down (22 °C ambient) 450 to 50 °C in 4 minutes, (3.5 with oven insert accessory)				Oven cool down (22 °C ambient) 450 to 50 °C in less than 3 minutes	
Heat Dissipation	Standard oven ramp		7681 BTU / hour maximum		120V	4424 BTU / hour maximum
	Fast oven ramp		10,071 BTU / hour maximum		200V - 240V	5285 BTU / hour maximum

Smaller Footprint

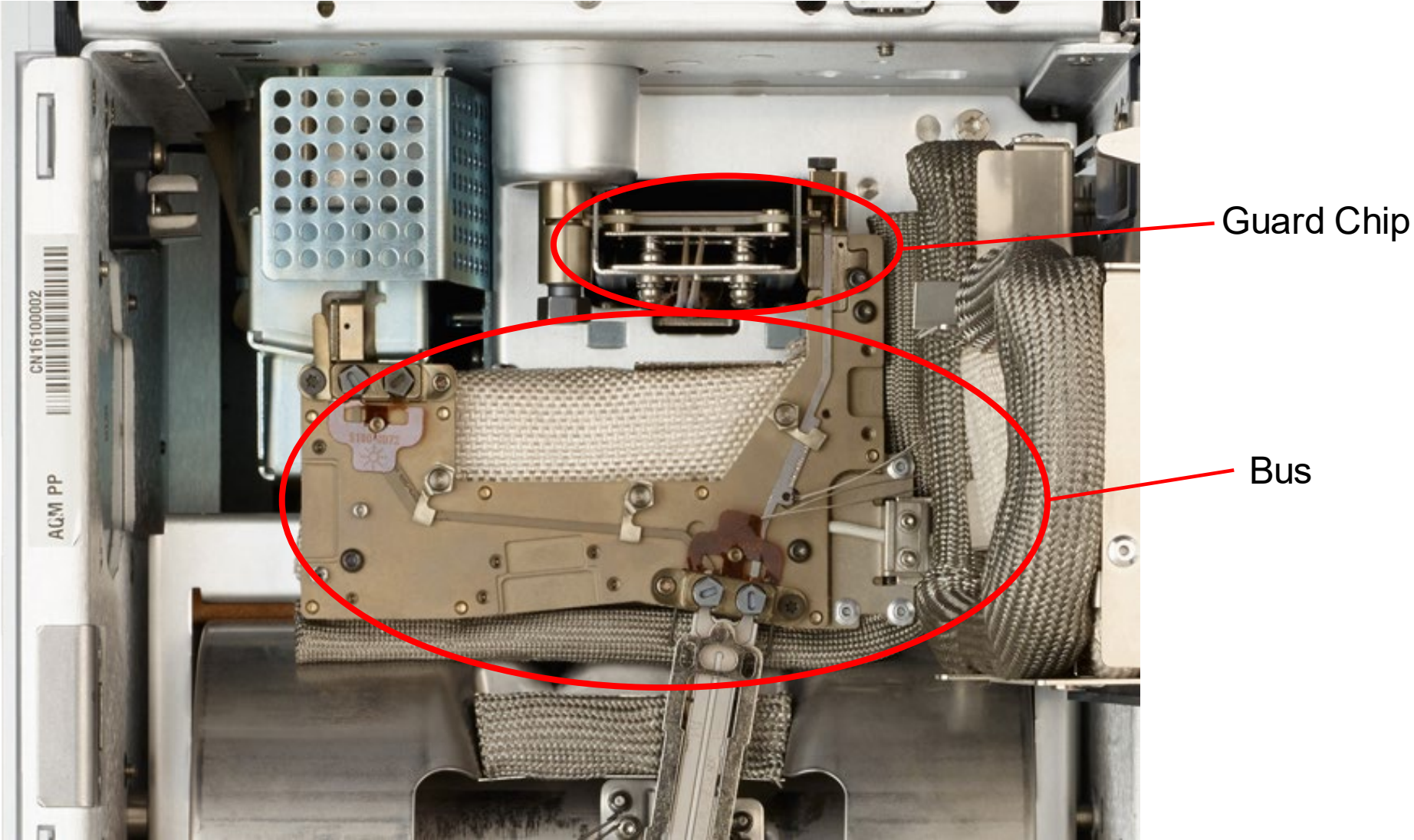


10.7"

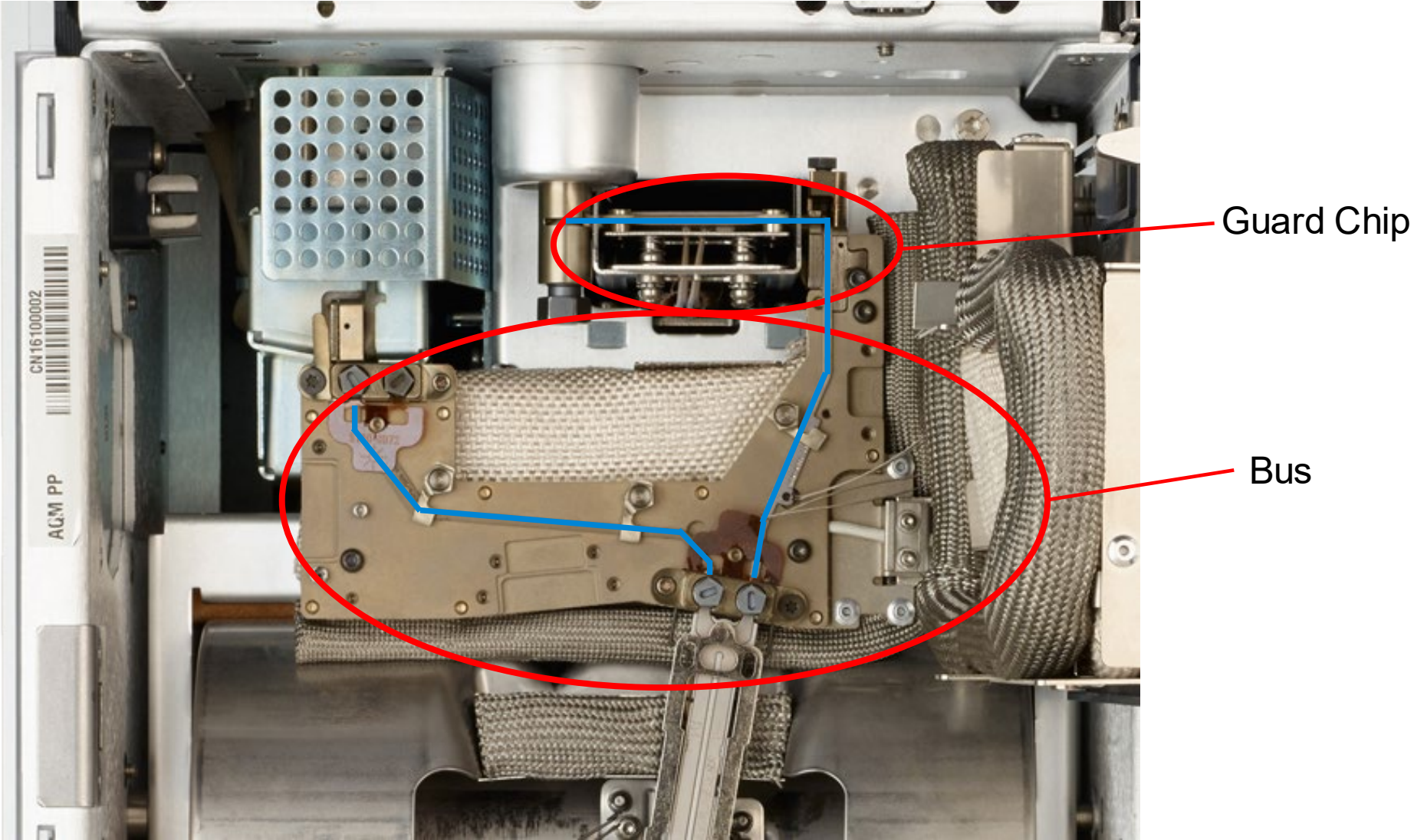


22.9"

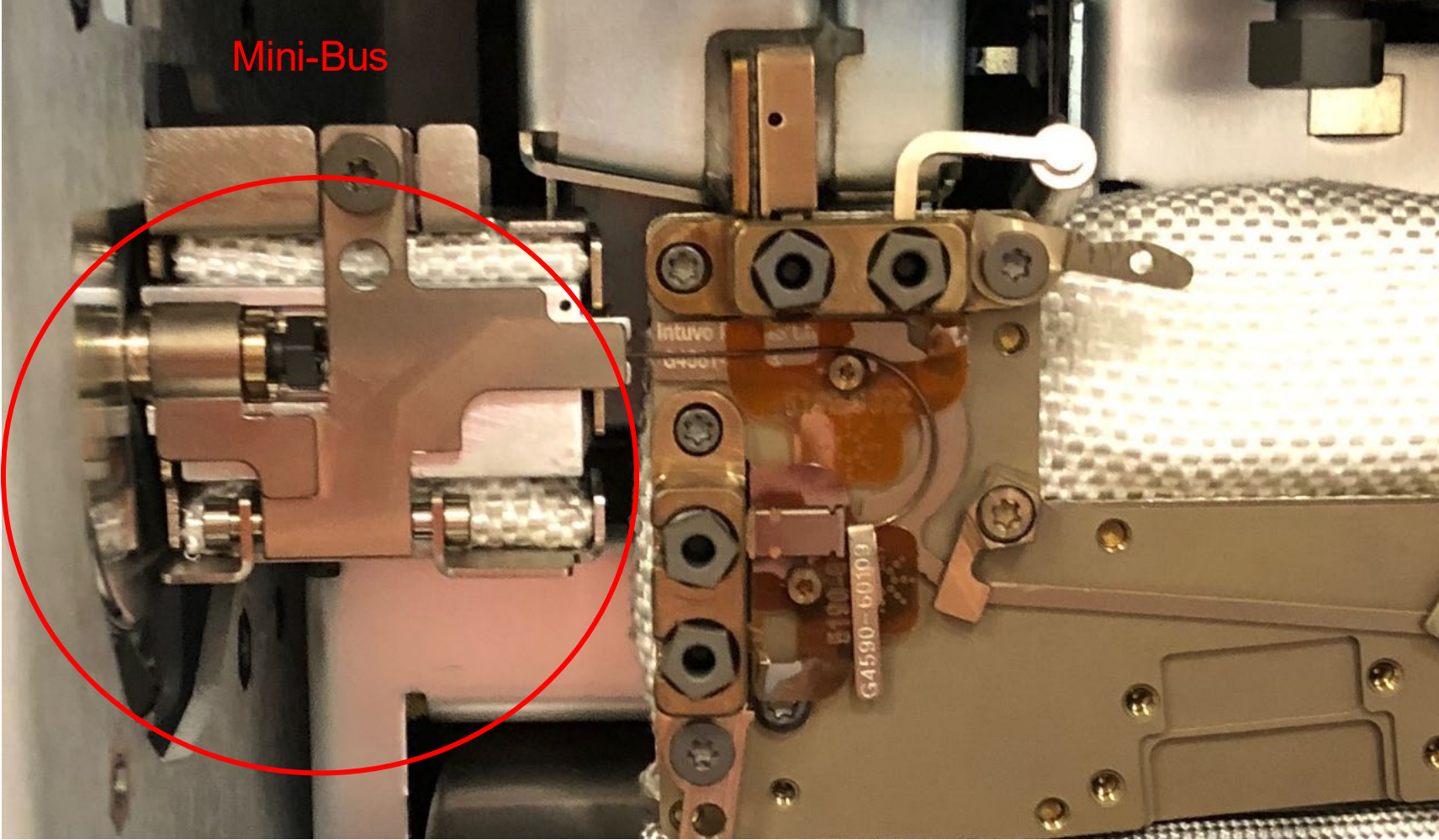
New Independently Heated Zones



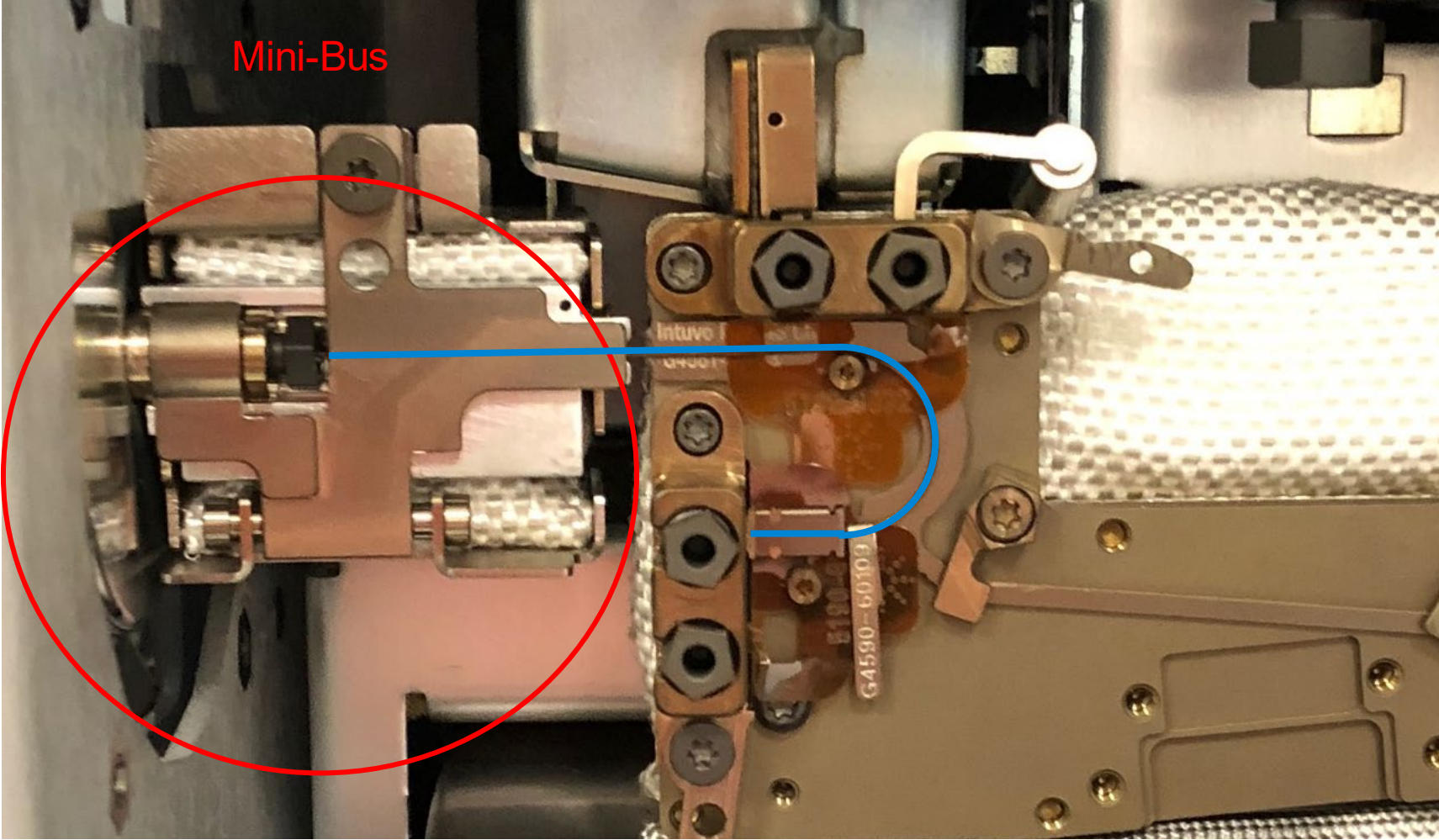
New Independently Heated Zones



Intuvo with MSD, FID and post-column Backflush



Intuvo with MSD, FID and post-column Backflush



What 'Can' it do?

One Inlet (SSL or MMI)

Two Detectors

can split 1:1 between detectors – including MSD

Column limitation of 60 meters total, max ID of 0.32 mm

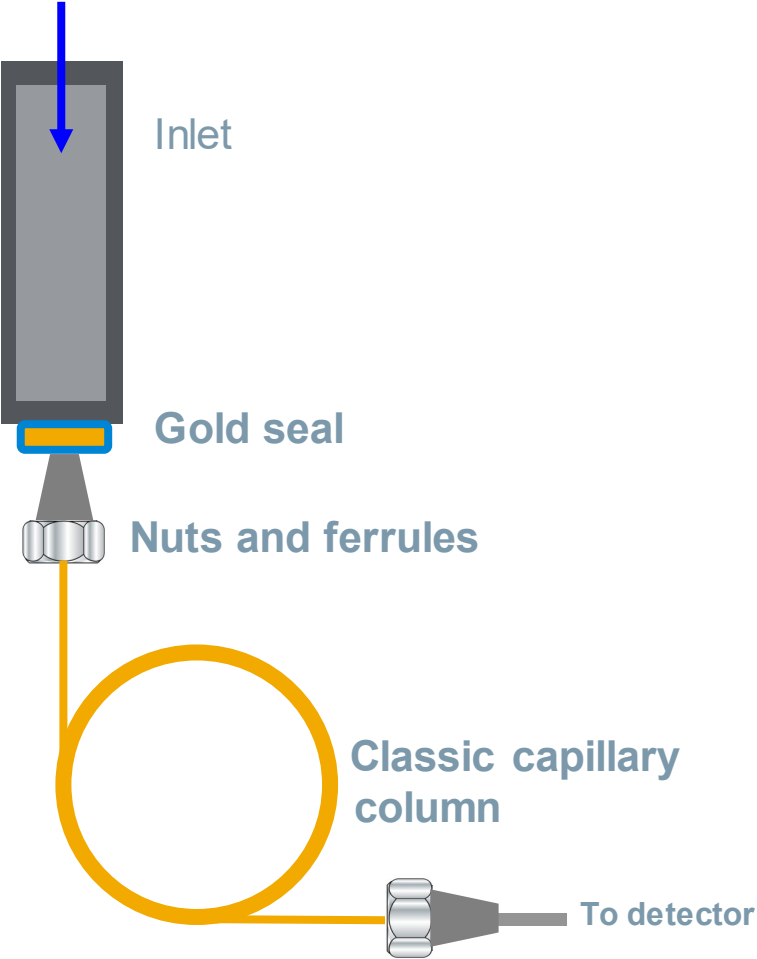
1 x 60m....or..... 2 x 30m

Mid-Column Backflush

Post Column Backflush

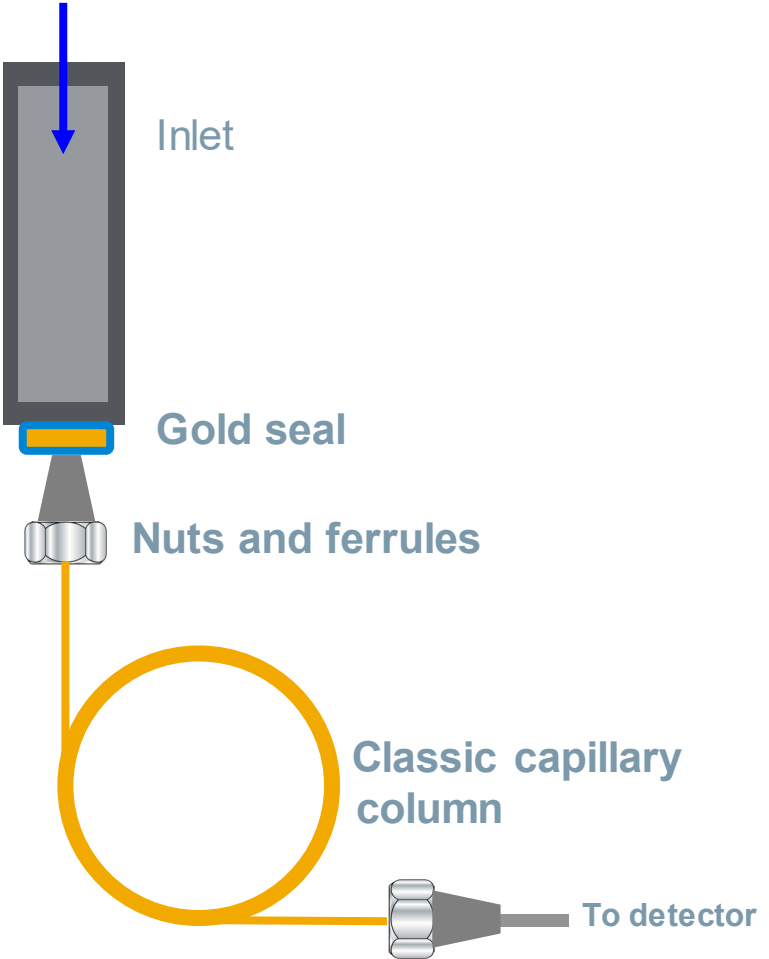
Innovating the GC Flow Path

Conventional flow path

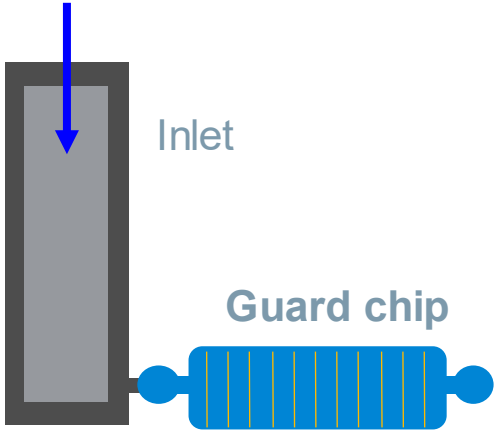


Innovating the GC Flow Path

**Conventional
flow path**

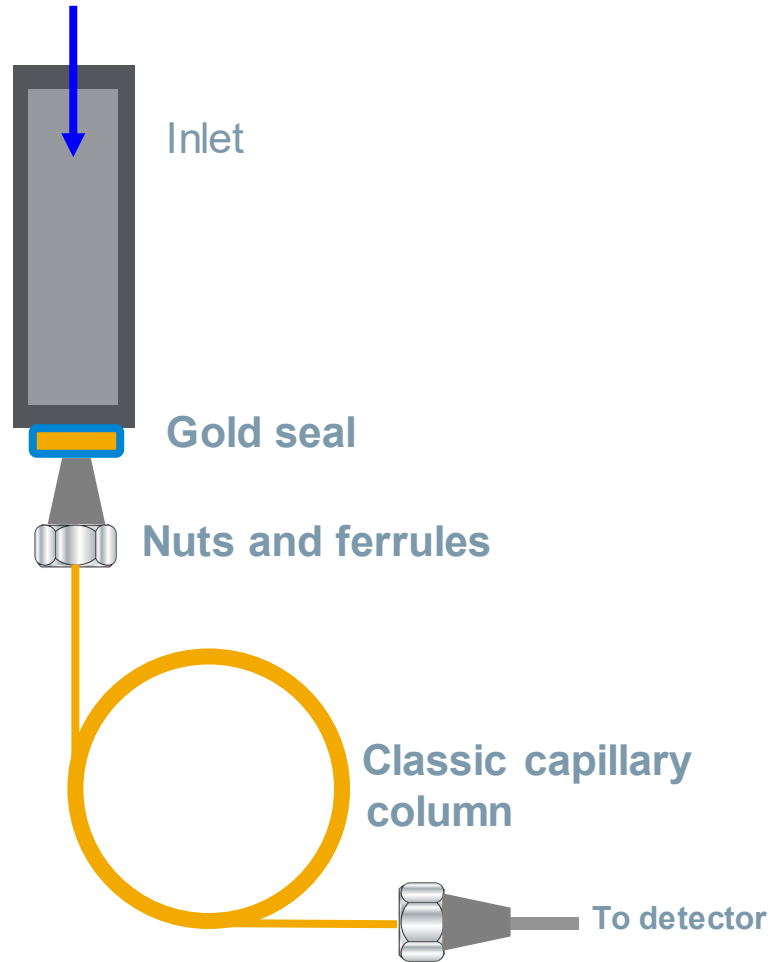


**Intuvo
flow path**

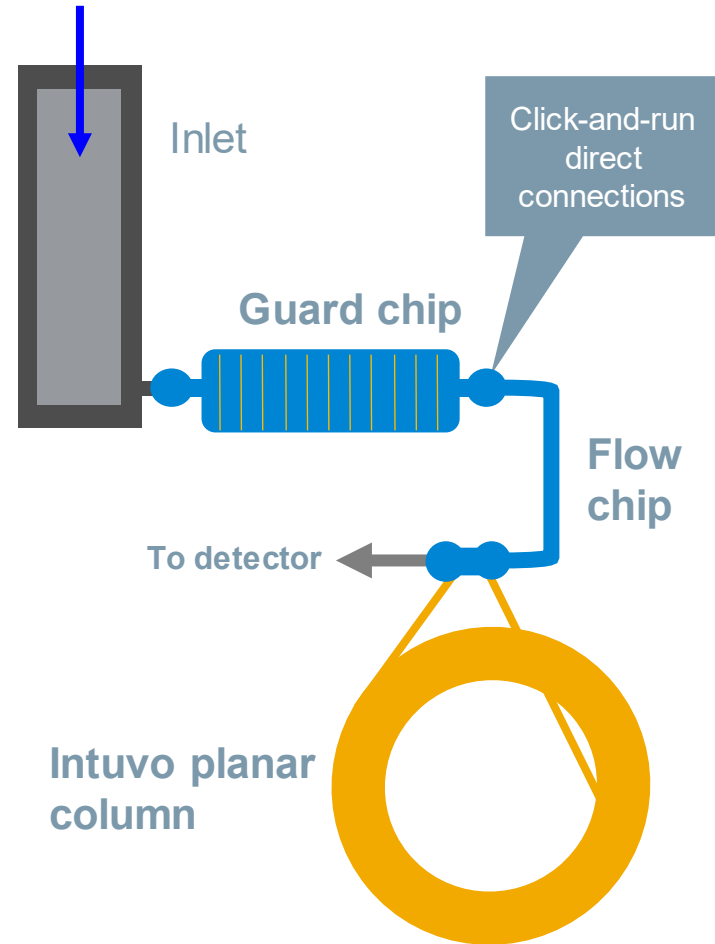


Innovating the GC Flow Path

Conventional flow path






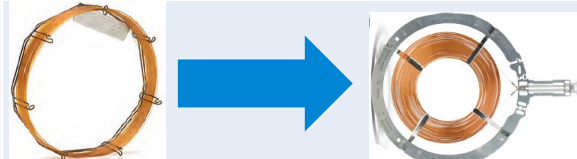


Intuvo flow path



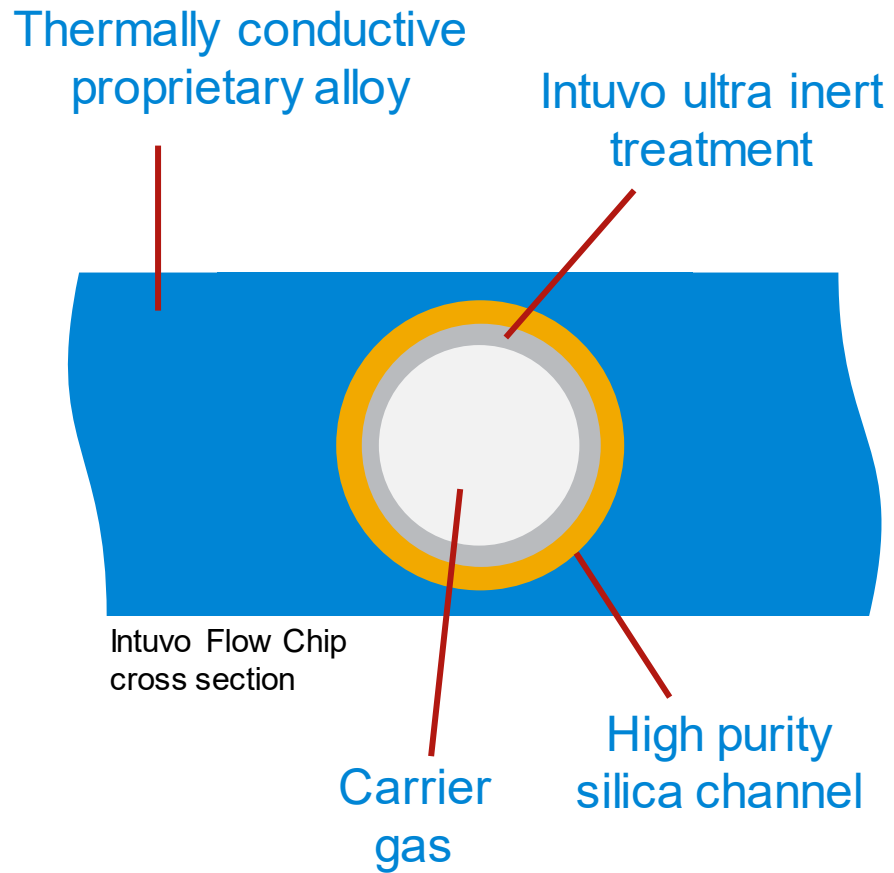
GC Flow Path Comparison



Consumable	5890 / 6890 / 7820 / 7890 / 8860 / 8890	INTUVO 9000	
Septum →	Same	Same	
Liner →	Same	Same	
Ferrules →	Graphite / Graphite-Vespel	Gaskets	
Gold-seal →	Standard or UI	Guard Chip	
Guard Column / Column Trim	Fused silica	Guard Chip	
Column	Standard 7 “ cage	Unique	

Modular Intuvo Flow Chips

High purity inert silica flow path



- Inert
- Modular, configurable
- Click-and-run connections



Guard / Jumper Chips



Roughly 0.75 metetrs x 0.53 mm ID →



Guard / Jumper Chips

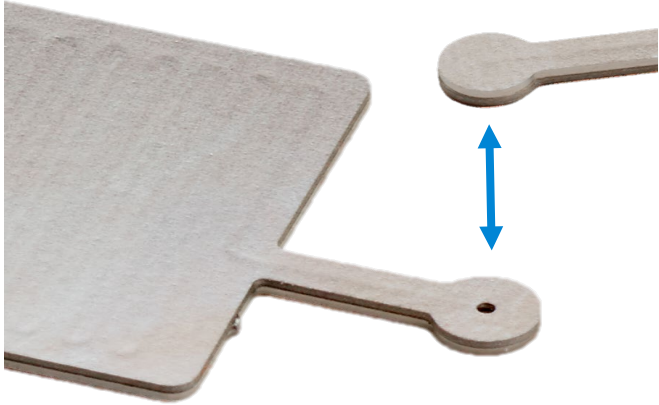


Roughly 0.75 metetrs x 0.53 mm ID →



Click-and-Run Direct Connections

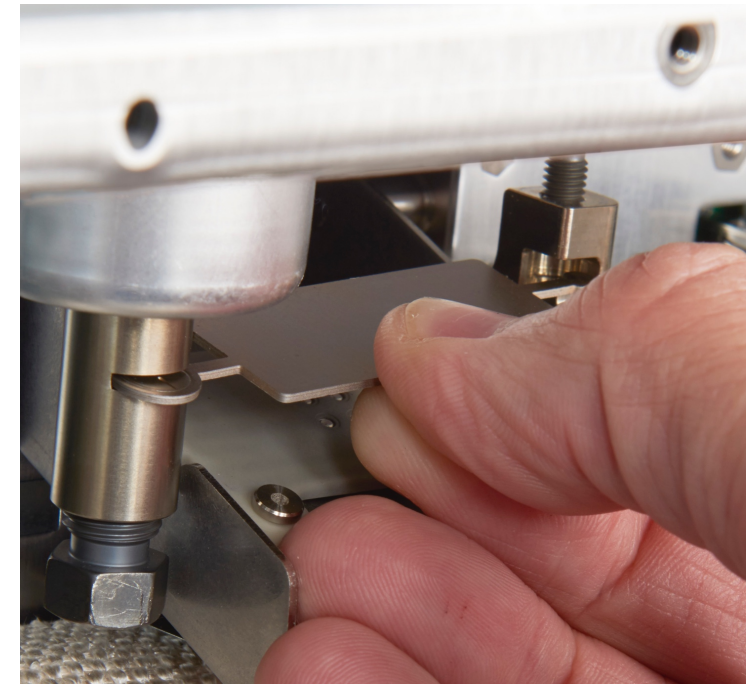
Eliminating connection uncertainty



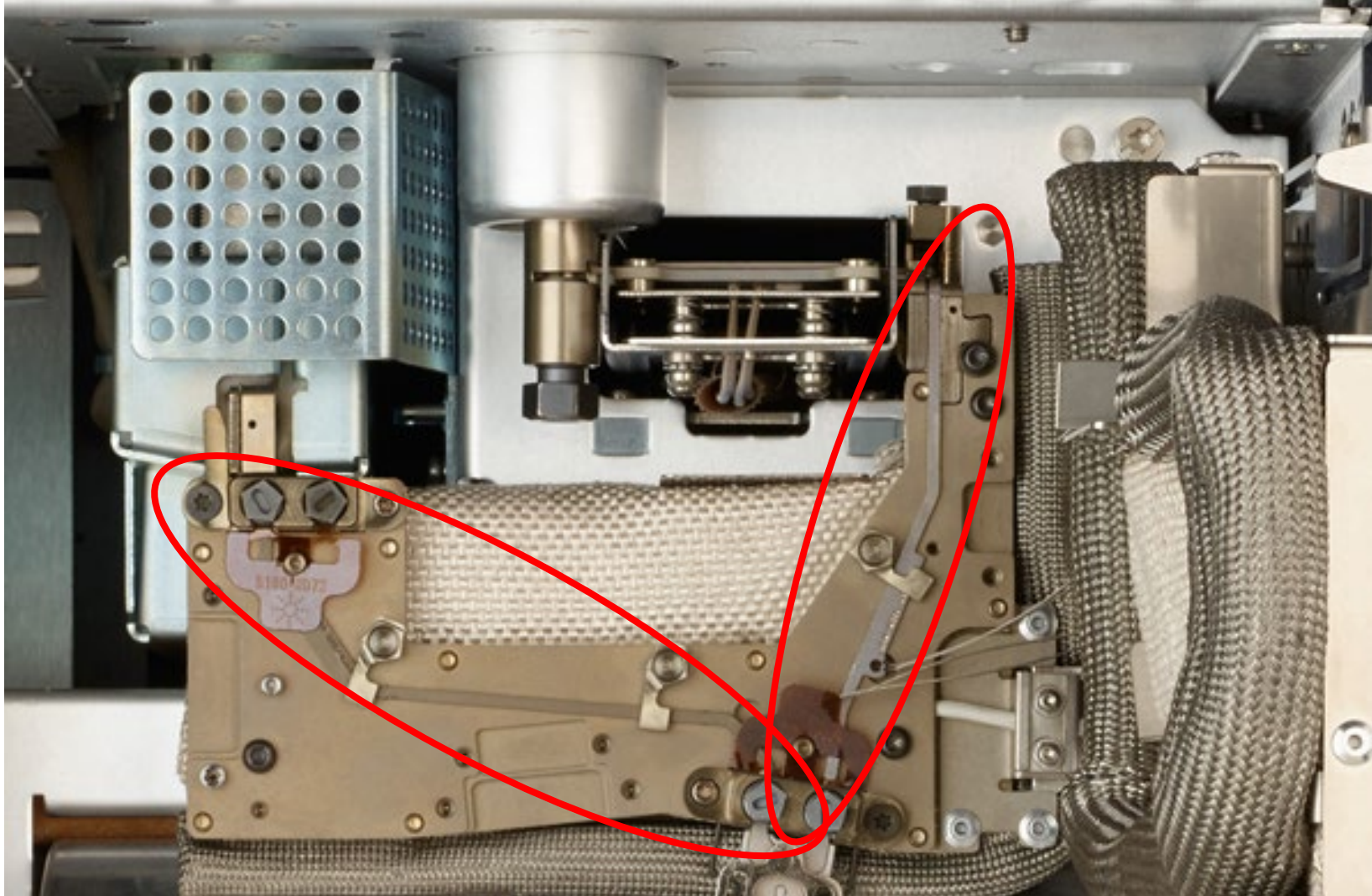
- No more ferrules
- Direct face seal connections
- Audible and tactile click lets you know connection is made



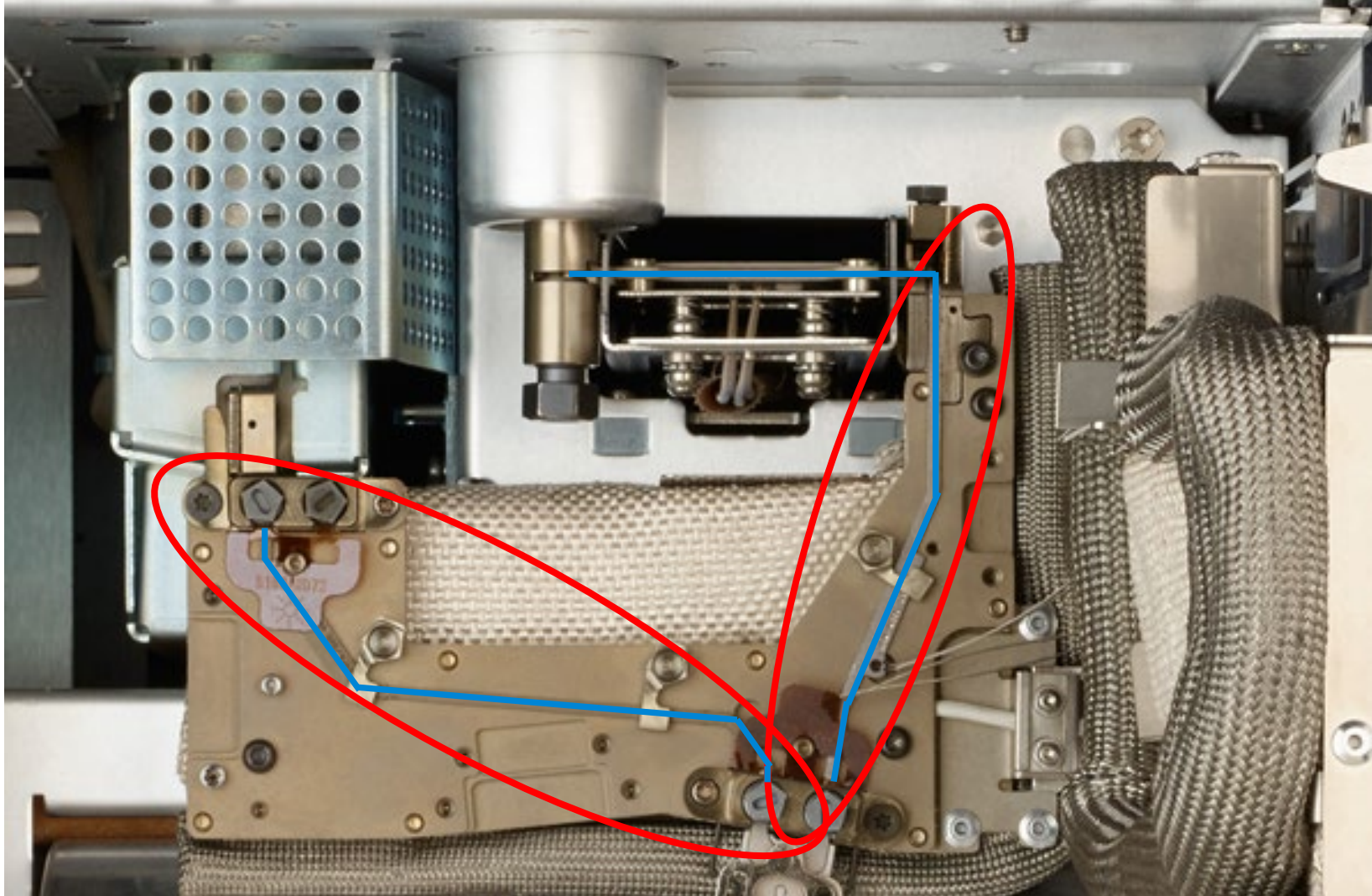
- Easier to train
- Less unplanned downtime
- Fewer batch reruns and precious samples lost



Intuvo Flow Chips – Installation distance perfect always



Intuvo Flow Chips – Installation distance perfect always



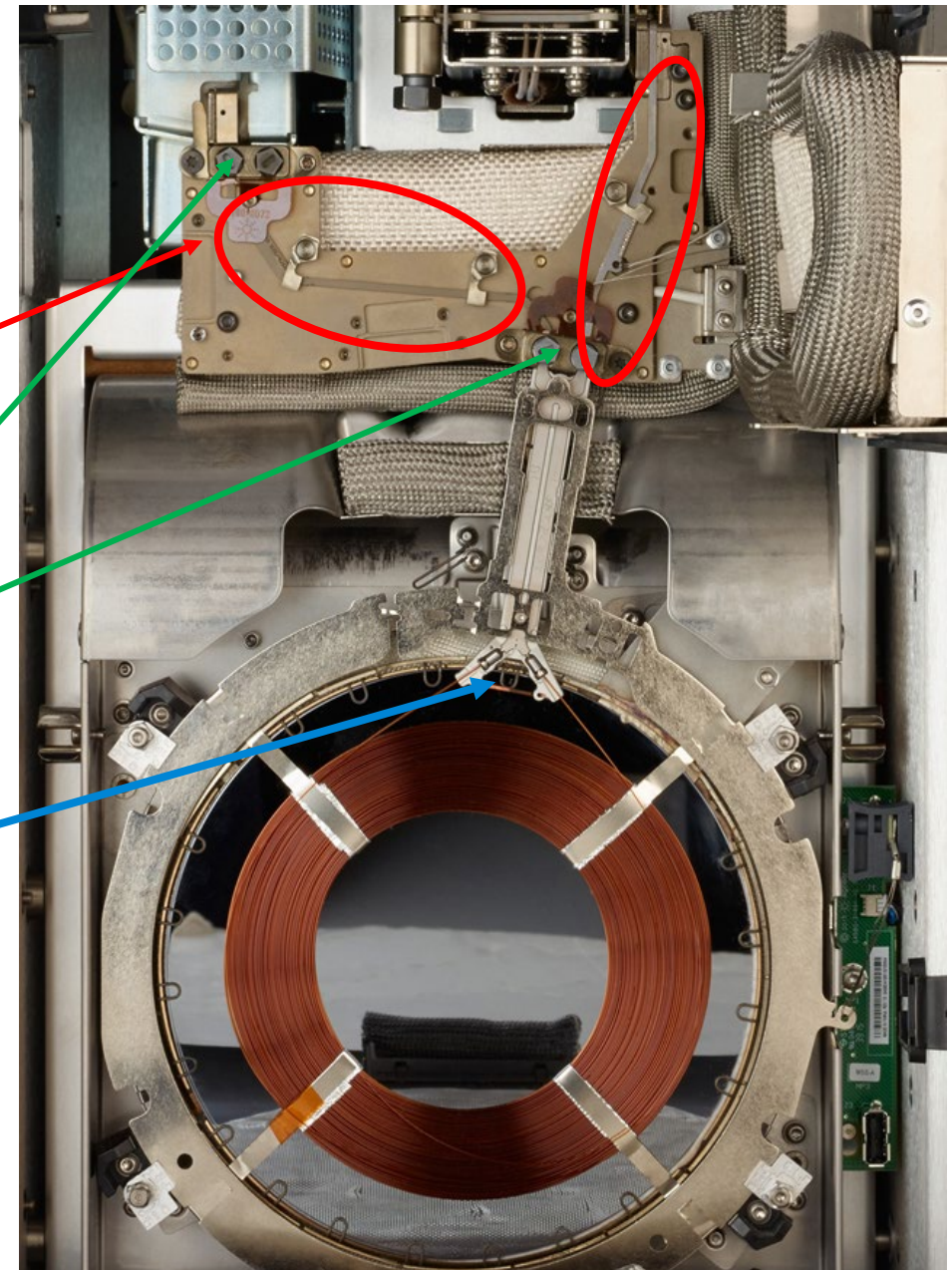
Column Measuring/Trimming is Now a Thing of the Past!

No More....

- measuring

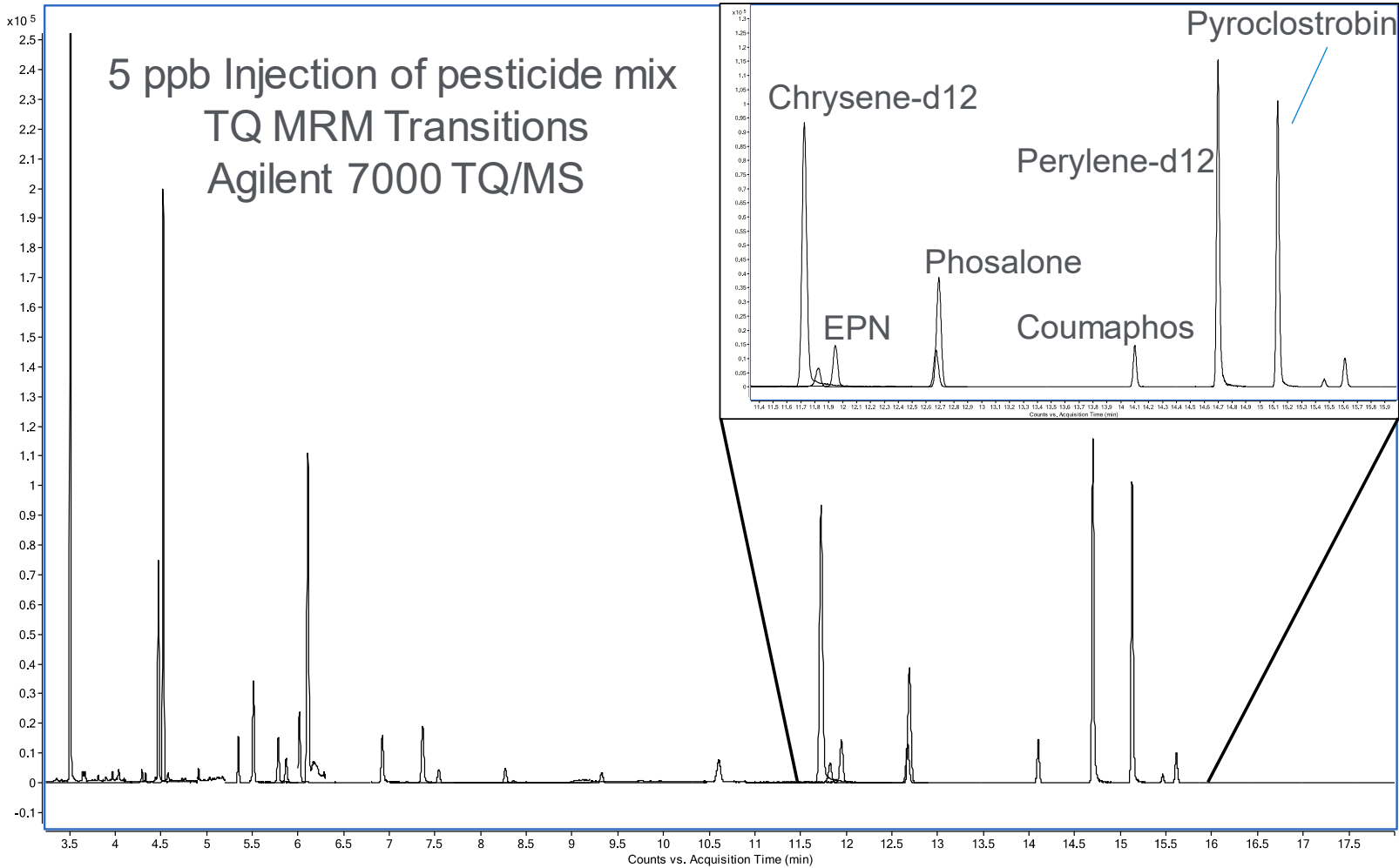
- over-tightening

- trimming



Intuvo Inert Flow Path

Optimized for active compounds



Intuvo Graphical User Interface

- System status



Intuvo Graphical User Interface

- System status
- Real-time chromatograms



Intuvo Graphical User Interface

- System status
- Real-time chromatograms
- Finding parts fast



Intuvo Graphical User Interface

- System status
- Real-time chromatograms
- Finding parts fast
- Step-by-step user maintenance and troubleshooting



Autonomous Leak Checking

Avoiding unplanned downtime

The image displays the software interface for an Agilent EPC module. The top navigation bar includes 'Methods', 'Sequences', 'Diagnostics' (with a red '2' notification), 'Maintenance' (with a red '2' notification), 'Logs', and 'Settings'. The main display area shows a schematic for 'SIMPLE_D1' with a hand icon pointing to a '50°C' temperature node. Below this, 'MMI 50.01°C' and 'FID 50°C' are shown. A green status bar at the bottom indicates 'STATUS: IDLE' and 'N/A' for sequence and method. A table at the bottom provides details for the current sequence:

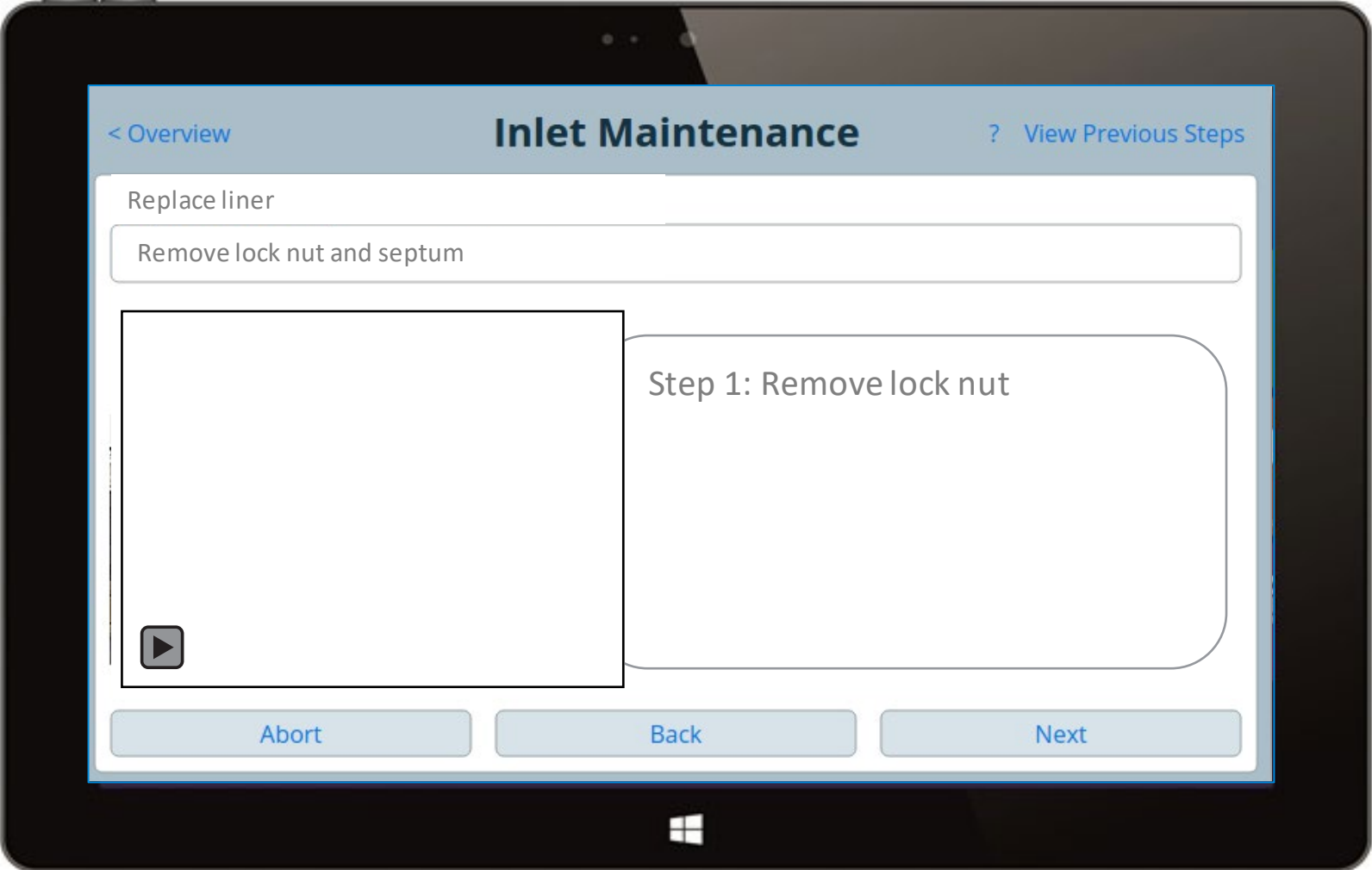
Sequence	Method	Est. Remaining	Controls
N/A	N/A	00:06	▶ ■

To the right is a photograph of the physical hardware module, a silver metal enclosure with a green PCB. It features a QR code and labels: 'G4585-60515' and 'H2C H2160803'. Two gas inlets are visible: a blue one labeled 'He' and a red one labeled 'H2'.

Microfluidic-enabled 6th generation EPC modules allow hands-free leak checking to confirm and document leak-free operation autonomously.

Intuvo Graphical User Interface

Interactive maintenance



Remote Access to Intuvo Screen

The screenshot displays the Agilent Intuvo 9000 GC web interface. The browser address bar shows `http://192.168.1.11/`. The interface has a top navigation bar with tabs for Status, Maintenance, Diagnostics, Settings, and Help. On the left, there is a vertical sidebar with three icons: a document, a list, and a chromatogram. The main content area features a green checkmark icon and the following text: **Channel 1**, Instrument Status: **Ready**, Run Status: **Idle**, and Time Left: **20.67 minutes**. Below this is a process flow diagram with four components: **Injector** (Idle, Vial Unknown), **SSL Inlet** (250.00°C, 21.5907 psi), **Column 1** (1.6200 mL/min, 80.00°C), and **Detector 1** (FID, 350.00°C, Lit). A green status bar at the bottom indicates **STATUS: IDLE** and **Est. Completed 20.67 minutes**. The footer shows the Intuvo firmware version: **A.01.03.155**. The Windows taskbar at the bottom includes icons for Internet Explorer, File Explorer, and several application windows, along with the system clock showing 1:34 PM on 9/12/2018.

Counters give you quick system information

The screenshot shows a web browser window with the URL <http://192.168.1.11/> and the Agilent logo. The interface has a top navigation bar with 'Status' and 'Maintenance' tabs. Below this is a sub-menu with 'EMF Counters', 'Logs', and 'Procedures'. A secondary navigation bar lists 'Instrument', 'Inlet 1', 'Detector 1', 'Injector 1', 'Column 1' (selected), 'Detector Chip', and 'Inlet Chip'. The main content area displays a table of counters for 'Column 1' with 'Details' buttons for each row.

Instrument	Inlet 1	Detector 1	Injector 1	Column 1	Detector Chip	Inlet Chip	
Actuations		29 (cycles)					Details
Injections		5 (injections)					Details
Max applied temperature		330 (C)					Details
On time		6:days2:hours					Details
Run count		17 (run)					Details
Time over max temperature		0:seconds					Details
Time over programmed max		0:seconds					Details

Column Maintenance

Description

Column 1 Maintenance
Description - Self guided procedures for performing column maintenance

Replace Column
Collect tools needed to perform the maintenance

Tools
Intuvo torque driver
Tweezers

Abort **Next**

Column Maintenance

Description

Column 1 Maintenance
Description - Self guided procedures for performing column maintenance

Replace Column
Preparing for maintenance, cooling down the heated zones...

Procedure

 **Caution:** These zones are hot and are not being cooled:
Detector 1 Tail
Detector 1

Waiting for these zones to cool. Estimated Time Remaining :
18.4 minutes

Zone	Threshold	Actual
Inlet	50 C	117.09 C 
Guard Chip	50 C	46.72 C
Bus	50 C	151.41 C 
Little Bus	50 C	130.93 C 
Column Connector 1	50 C	54.17 C 
Oven	40 C	35.71 C

Abort **Ignore Ready**

Column Maintenance

Description

Column 1 Maintenance
Description - Self guided procedures for performing column maintenance

Replace Column
Open the column oven

Procedure
Open the GC front door.
Remove the bus door.
Lower the oven door.



Abort Back Next

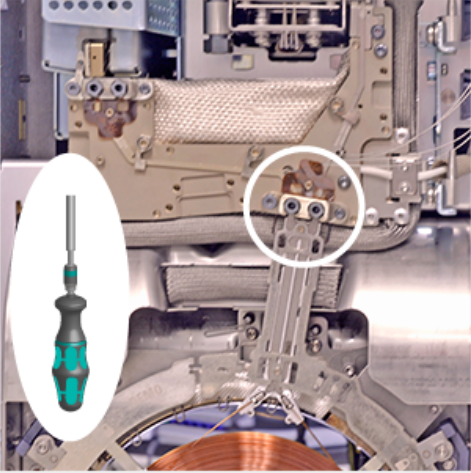
Column Maintenance

Description

Column 1 Maintenance
Description - Self guided procedures for performing column maintenance

Replace Column
Remove compression bolts

Procedure
Remove compression bolts and store for later use.



Abort Back Next

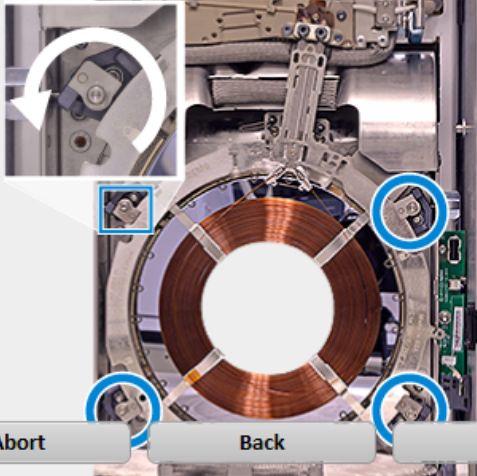
Column Maintenance

Description

Column 1 Maintenance
Description - Self guided procedures for performing column maintenance

Replace Column
Open column clamps and remove column

Procedure
Open clamps.
Unplug column Smart Key.
Remove column.



Abort Back Next

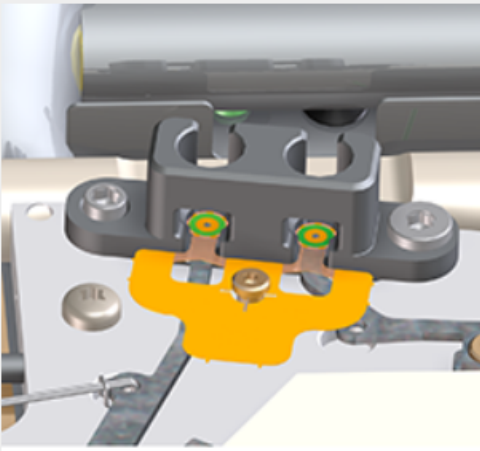
Column Maintenance

Description

Column 1 Maintenance
Description - Self guided procedures for performing column maintenance

Replace Column
Replace gasket

Procedure
Remove old gasket using tweezers.
Install new gasket.



Abort Back Next

Column Maintenance

Description

Column 1 Maintenance

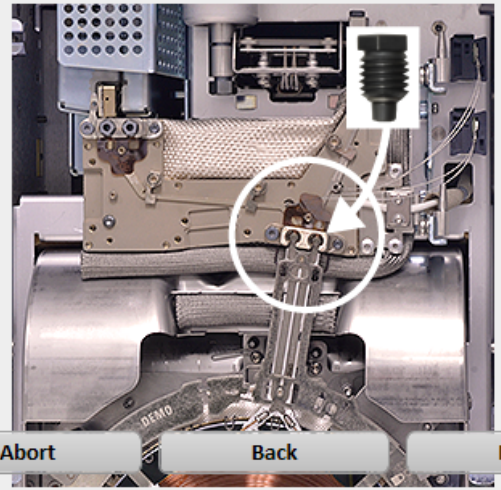
Description - Self guided procedures for performing column maintenance

Replace Column

Place the column

Procedure

Place the column on the bottom clamps.
Tilt the column up so the click and run connectors mate into the bus fitting.
Loosely install the compression bolts.



Abort Back Next

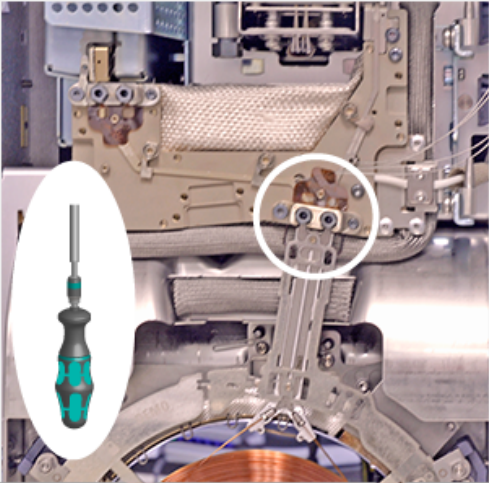
Column Maintenance

Description

Column 1 Maintenance
Description - Self guided procedures for performing column maintenance

Replace Column
Check column placement and tighten compression bolts

Procedure
The click and run connectors should sit flat against the gasket.
Tighten the compression bolts until you hear one click.



Abort Back Next

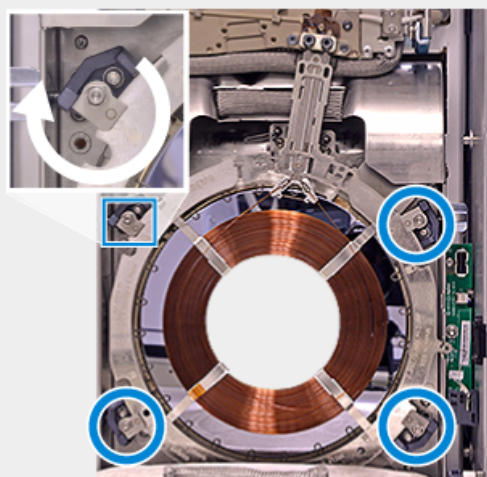
Column Maintenance

Description

Column 1 Maintenance
Description - Self guided procedures for performing column maintenance

Replace Column
Secure column

Procedure
Close the column clamps.
Install the bus door.



Abort Back Next

Column Maintenance – Automatic leak checks!

Description

Column 1 Maintenance
Description - Self guided procedures for performing column maintenance

Verify Inlet Control Pressurizing Inlet	Test Details State Time Remaining Inlet Pressure Target Inlet Pressure Actual	In Progress 36 seconds 32.091 psi 33.161 psi
---	--	---

Abort

Column Maintenance – Automatic leak checks!

Description

Column 1 Maintenance
Description - Self guided procedures for performing column maintenance

Execute Splitless Leak Test
Controlling inlet in Splitless mode at Constant Flow

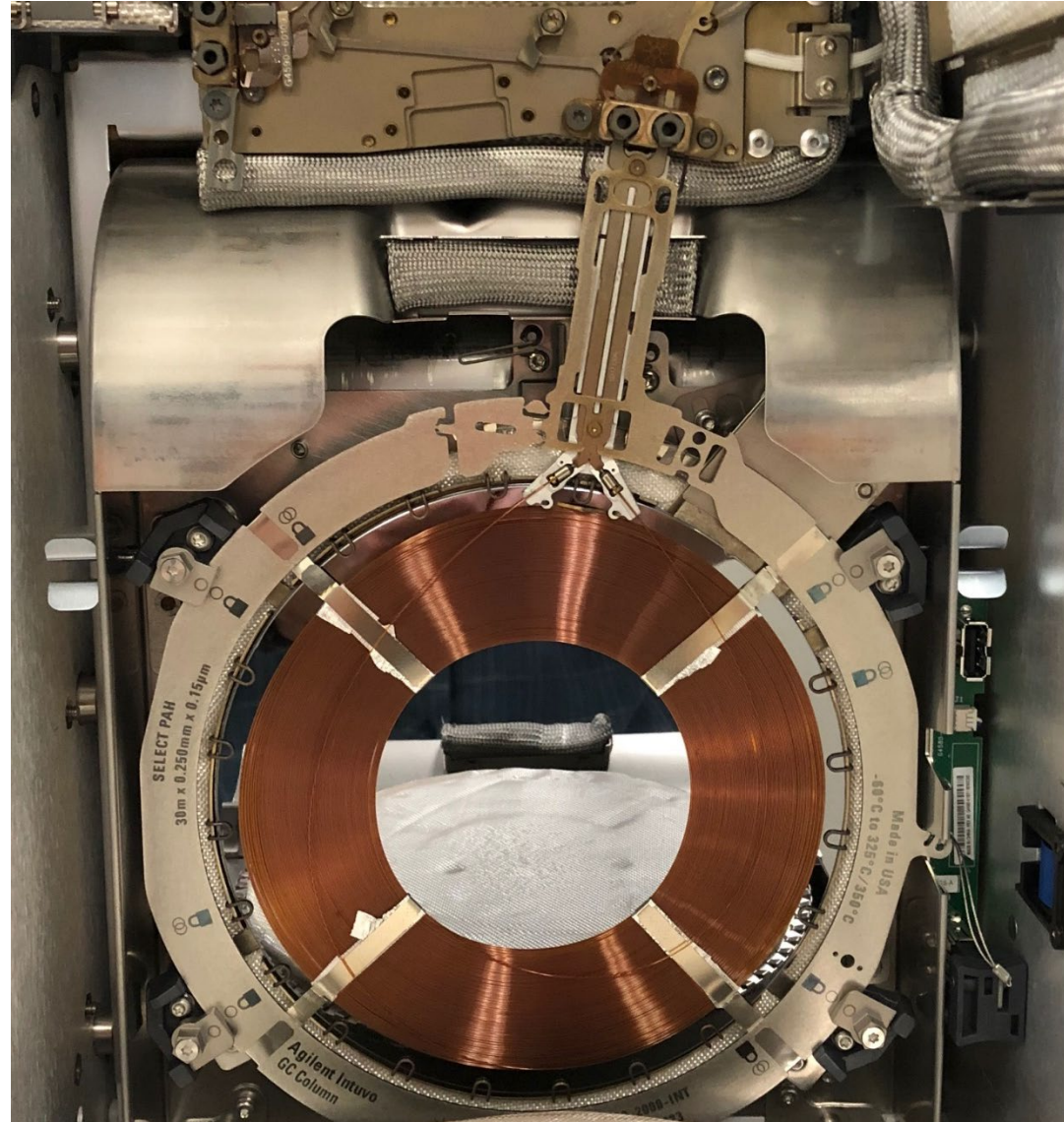
Test Details

State	In Progress
Time Remaining	10 seconds
Total Flow Target	4.000 +/- 2.000 mL/min
Total Flow Actual	3.212 mL/min
Restriction Rate	0.788 mL/min

Abort

Column Installation

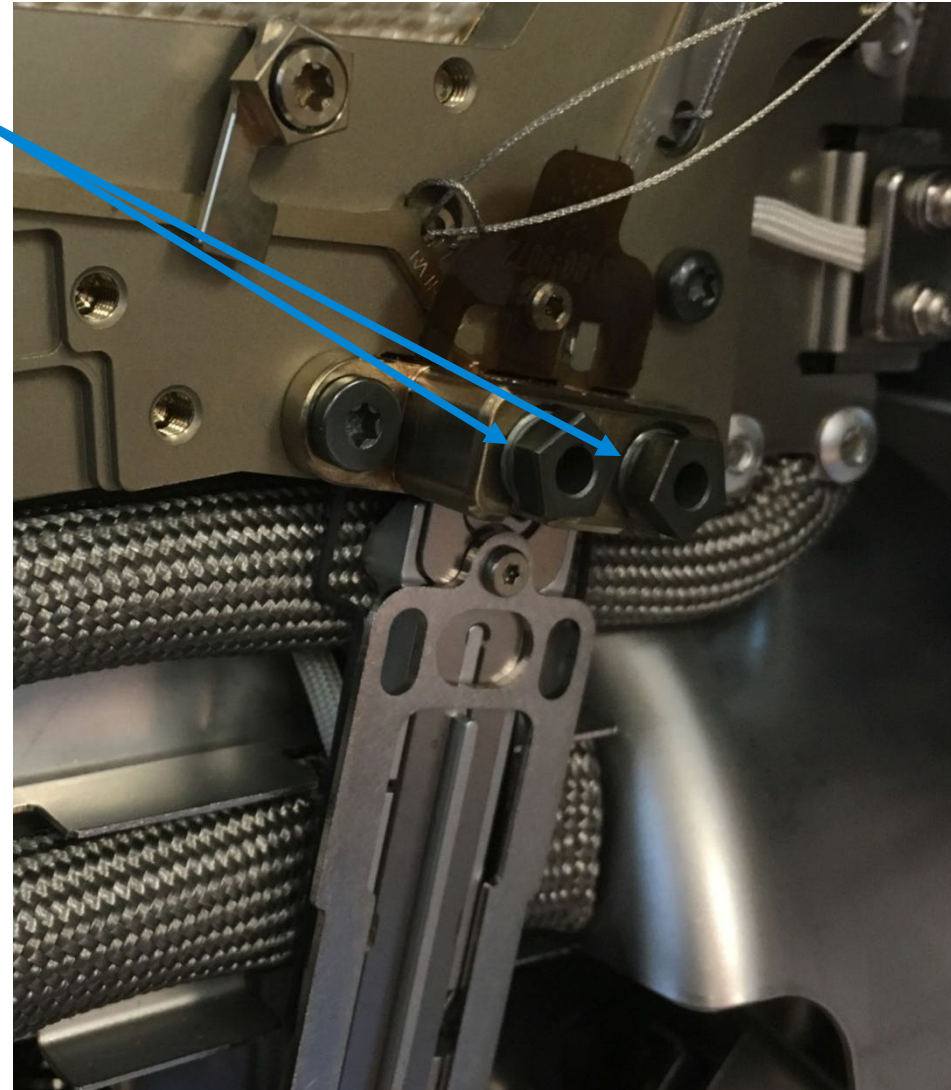
It is much easier to install the column, but there are still some 'Gotchas'!!



Tips to Assure a Good Column Installation

1. Finger tighten until only 1 thread on each of the two nuts is showing and that “pucks” are seated properly

If more than 1 thread is showing, wiggle or re-position the column into place to further finger tighten the nuts to 1 thread.



Tips to Assure a Good Column Installation

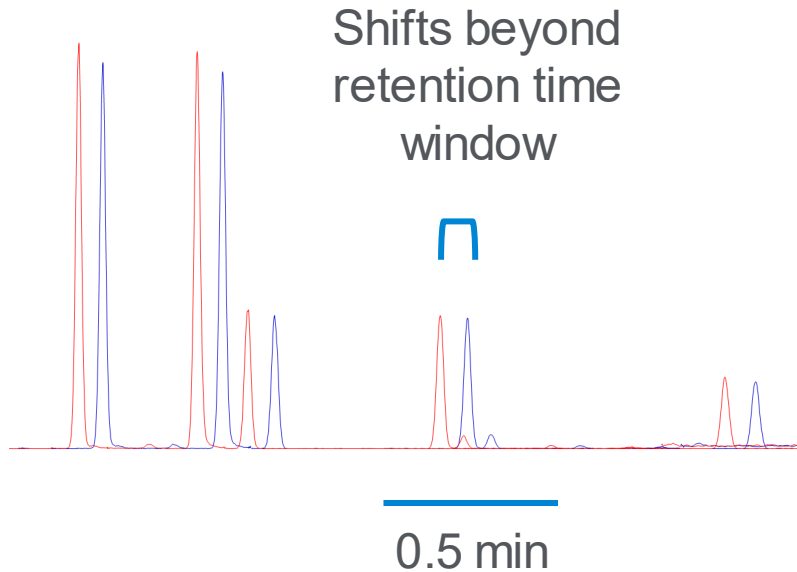
2. Check that the small integrated column nuts on the column are in form fitted place on the heater in the instrument.
3. Click and Run!!



Intuvo Guard Chip and No-trim Columns

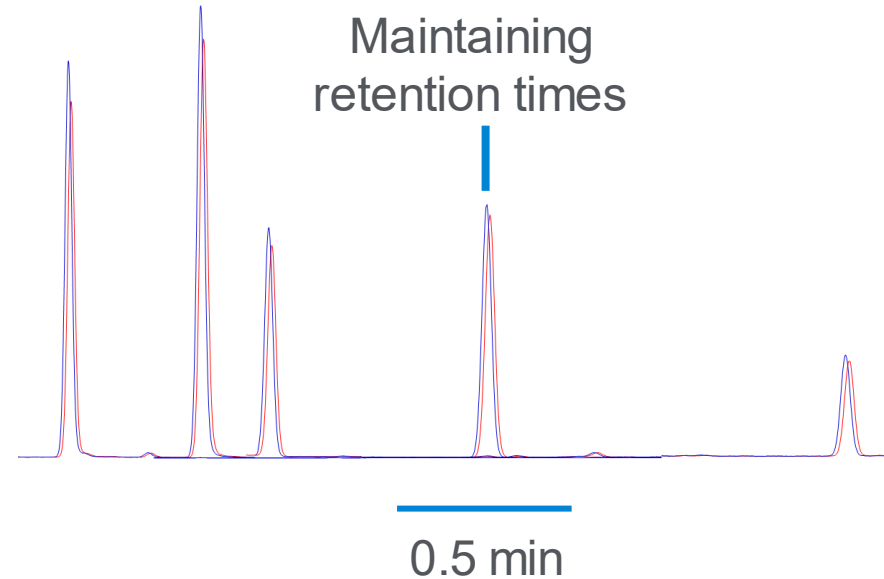
No retention time shifts after maintenance

Conventional Column



Pesticide mix injected before and after 300 mm column trim

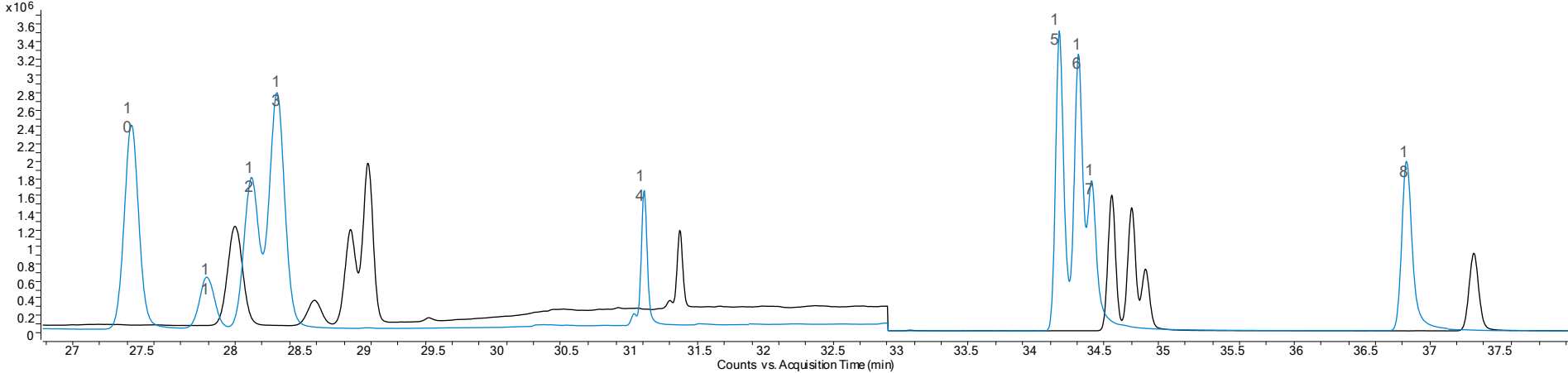
Intuvo Column



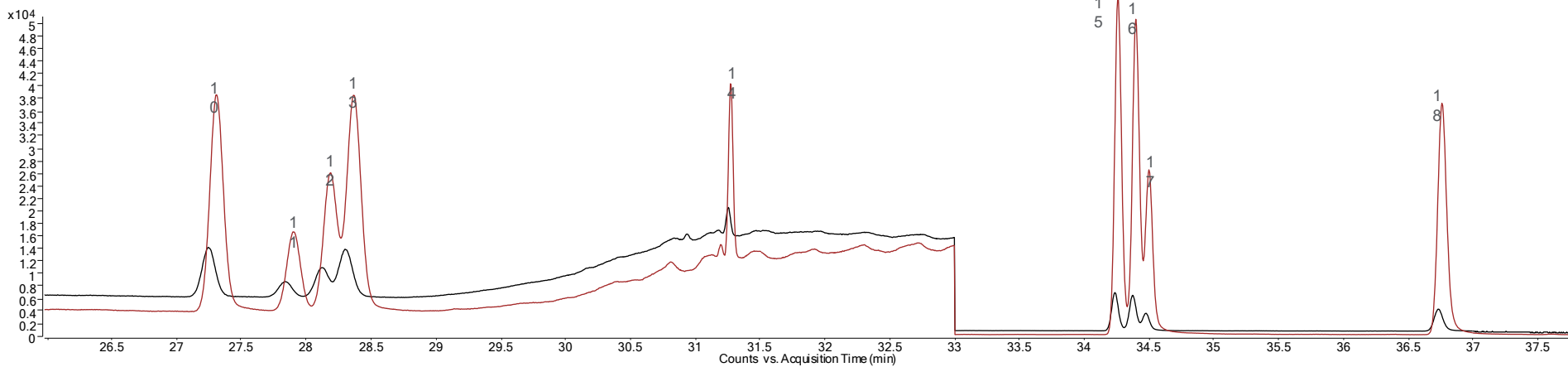
Pesticide mix injected before and after guard chip change

Guard Chip vs Column Trimming

7890



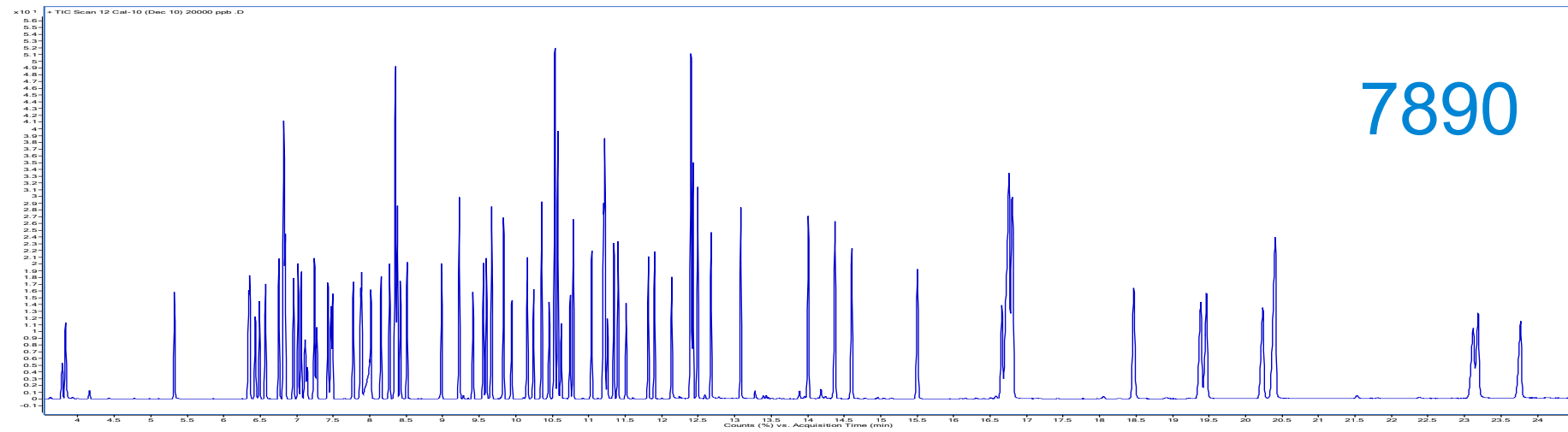
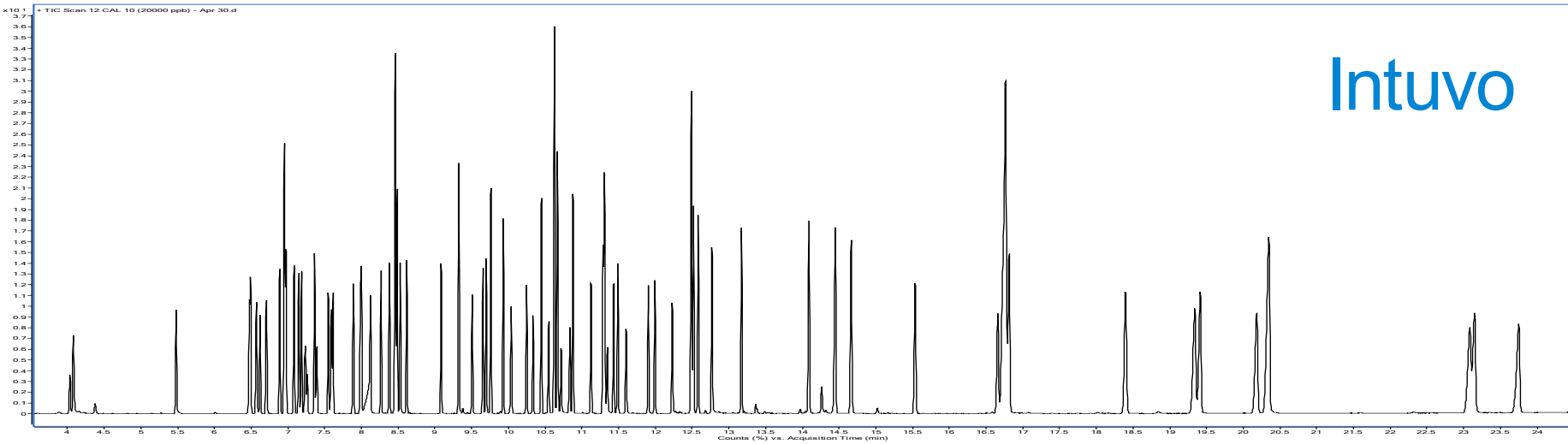
Intuvo



Seamless Method Migration to Intuvo

No business disruption

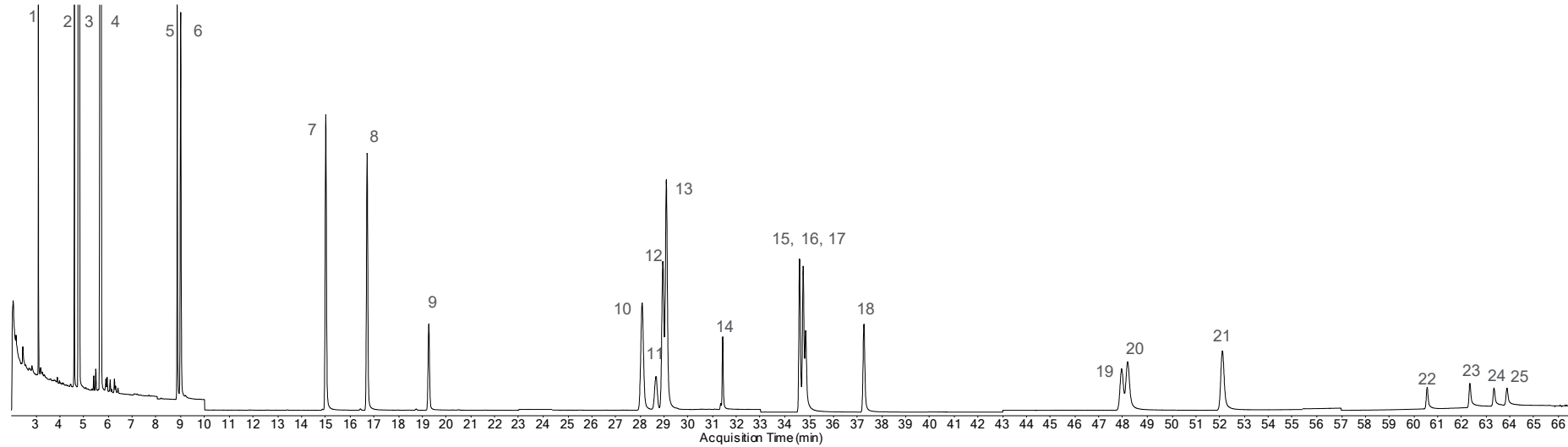
83 SVOC by US EPA 8270



How Does it Line Up?

7890 GC

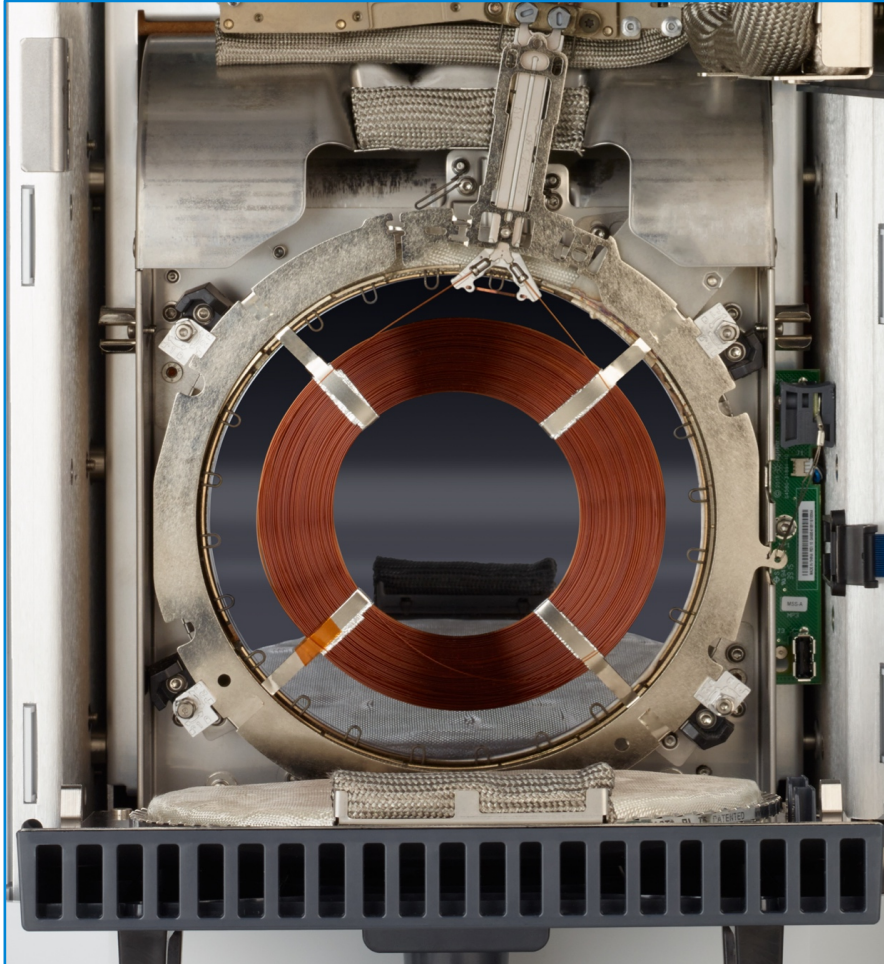
PAH's



Intuvo GC

Fast Direct Heating and Cooling

Every single minute counts



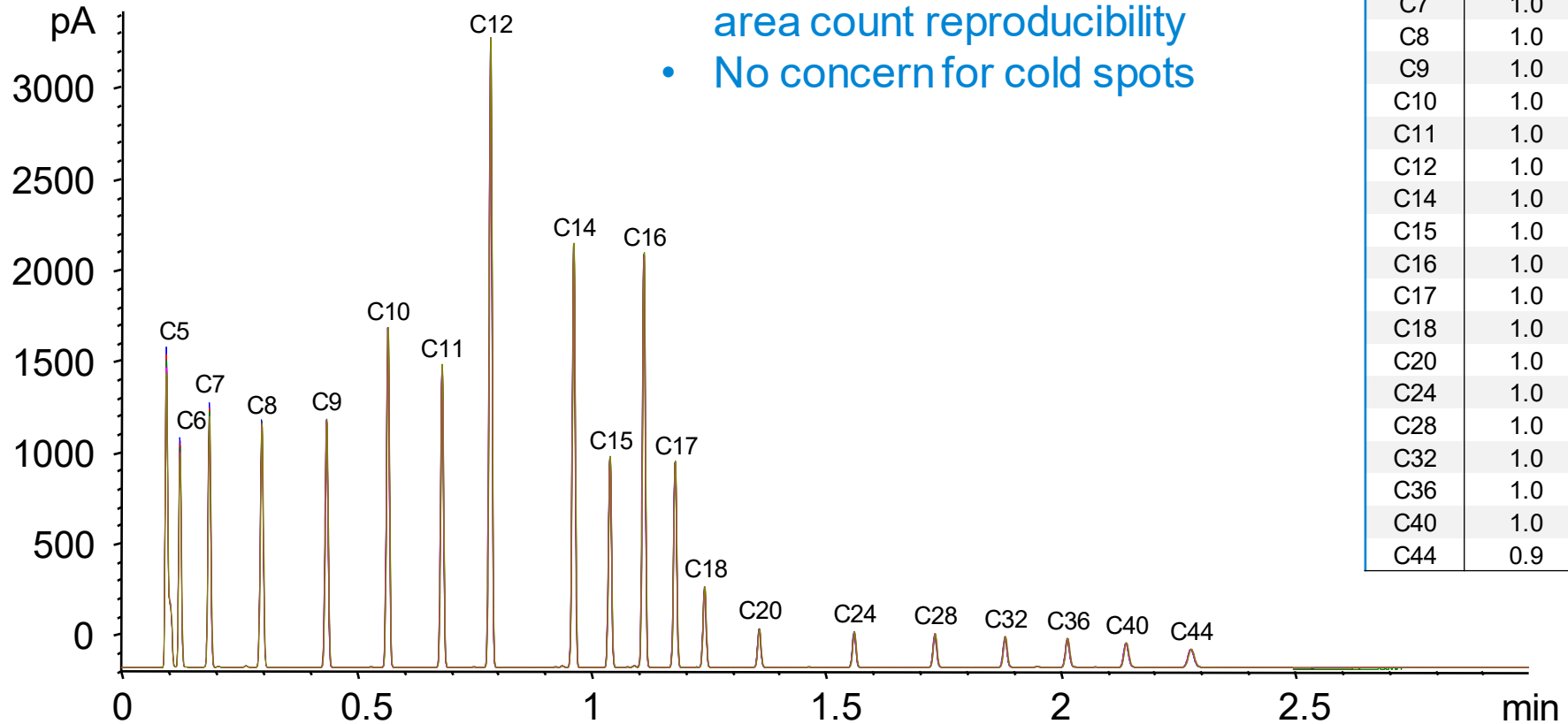
- Fast, efficient heating
- Ballistic cooling
- Smaller footprint

“We are the police – we need answers fast. Even 1 minute faster cool-down would be valuable...”

Ultra Fast GC

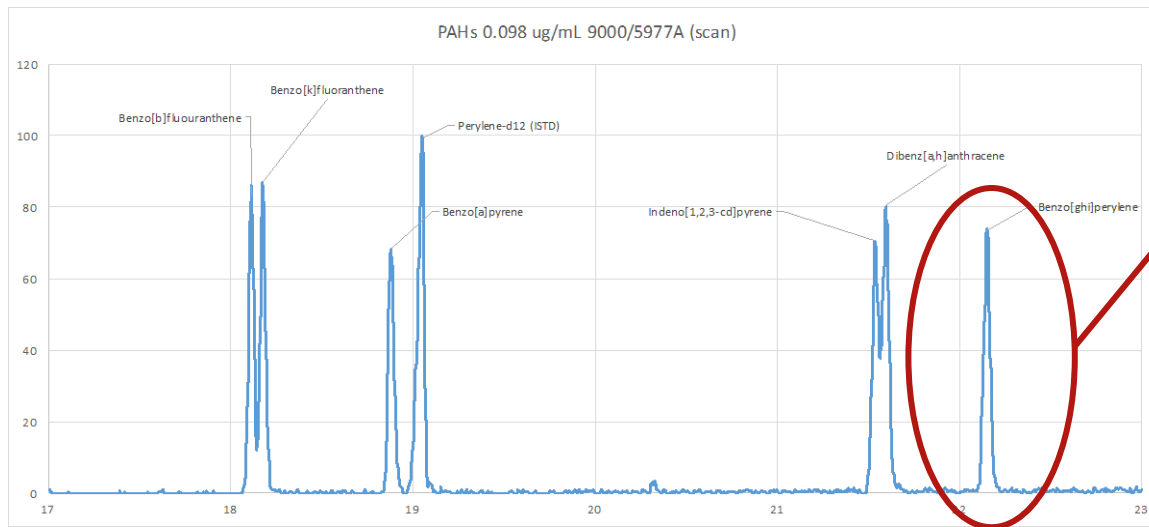
It's All About How Well You GC Fast

- Excellent retention time and area count reproducibility
- No concern for cold spots

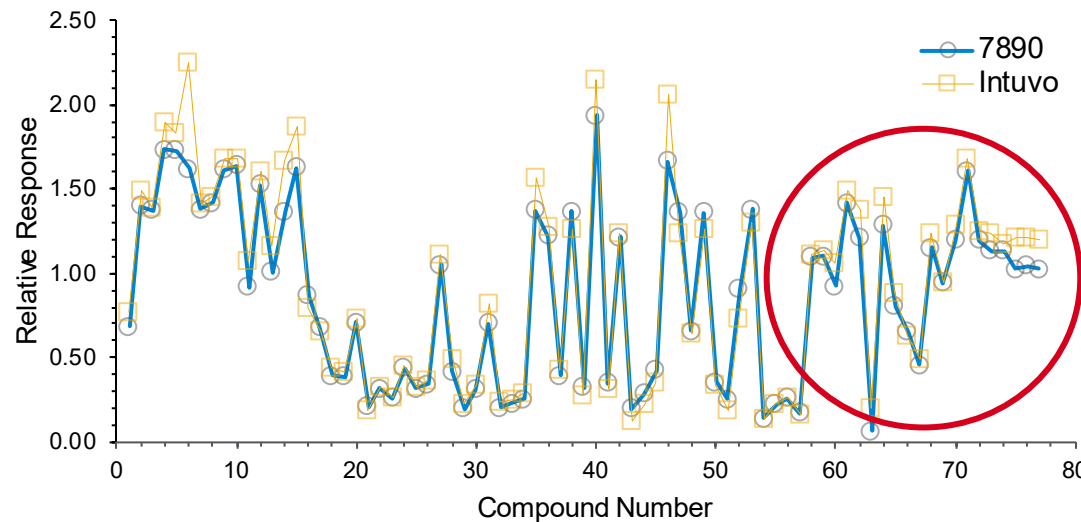
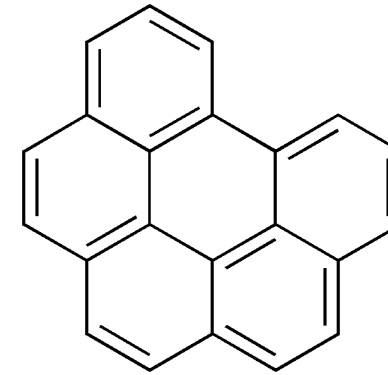


5 replicate overlay of ASTM D7798 SimDist standard mix

Efficient, Even Direct Heating



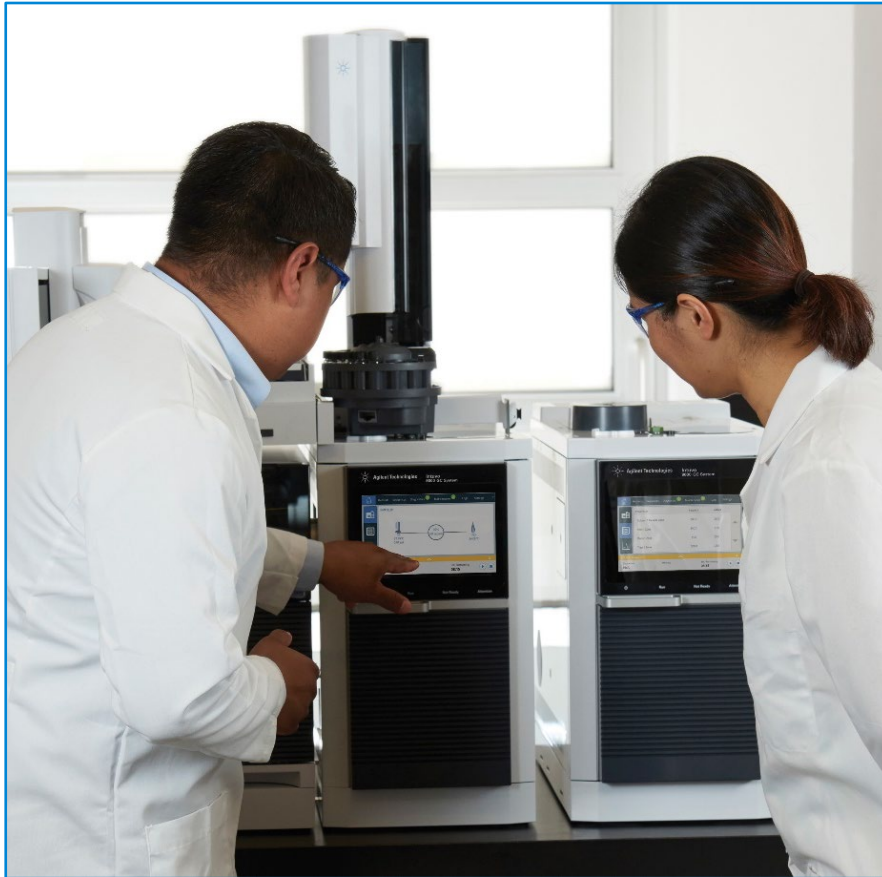
Even high molecular weight compounds such as Benzo(ghi)perylene (mol wt 276 amu) have excellent peak shape



High molecular weight PAH compounds also have largely identical response factors

Optimizing Lab Space

Supporting lean laboratory thinking



Less than half:

- Power consumption
- Heat output into laboratory
- Laboratory bench footprint

- Lower operating costs
- Higher efficiency
- Greener

Accessing the Power of Innovation

Transforming the user experience



New mobilized generation

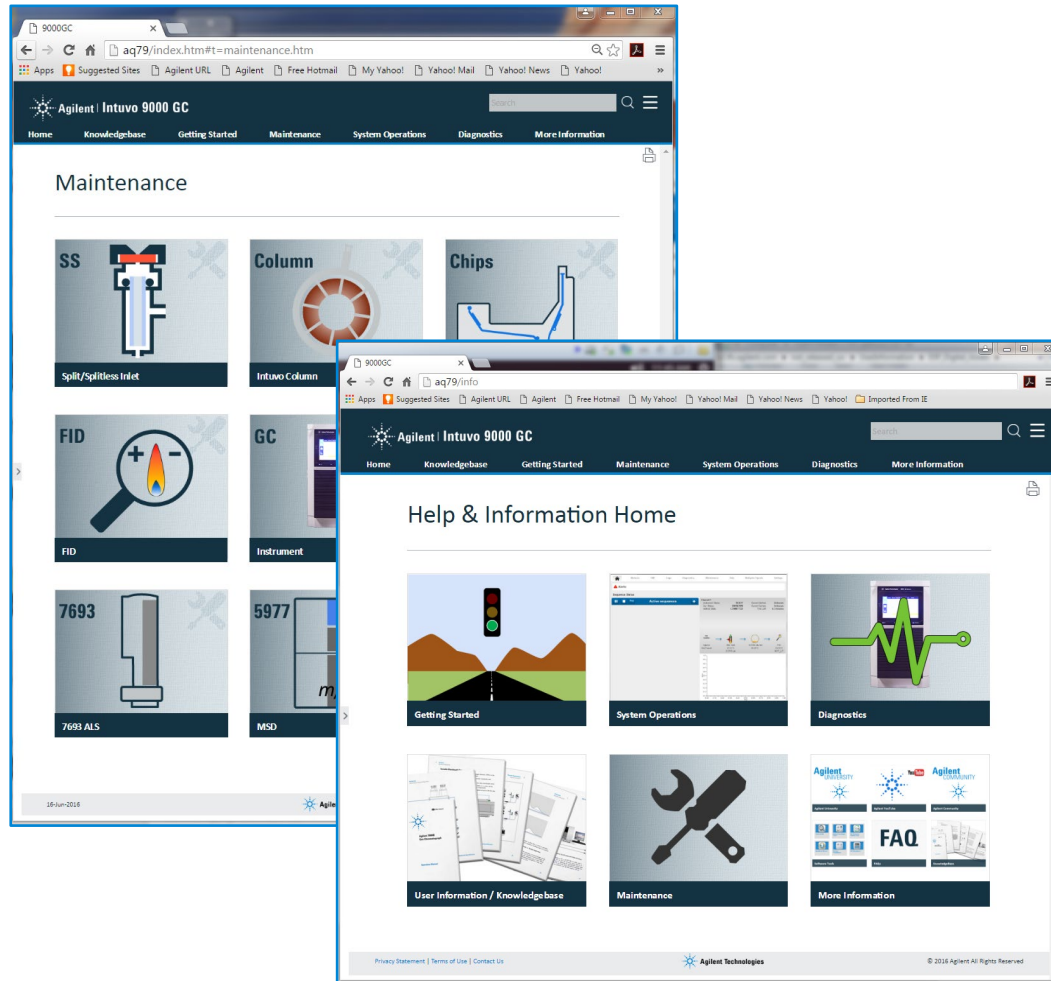
- Expectations of remote mobile connection
- Technology accessed through interactive graphic SW and apps

Make technology accessible

- Interface meeting today's expectations

Internet of Things

A full suite of customer support



- Intuvo serves up a web homepage
- User help for Maintenance, troubleshooting and diagnostics
- Accessible through any approved PC or mobile device securely on internal network

Keep Connected

Tablet or phone connectivity

Check instrument and batch status remotely

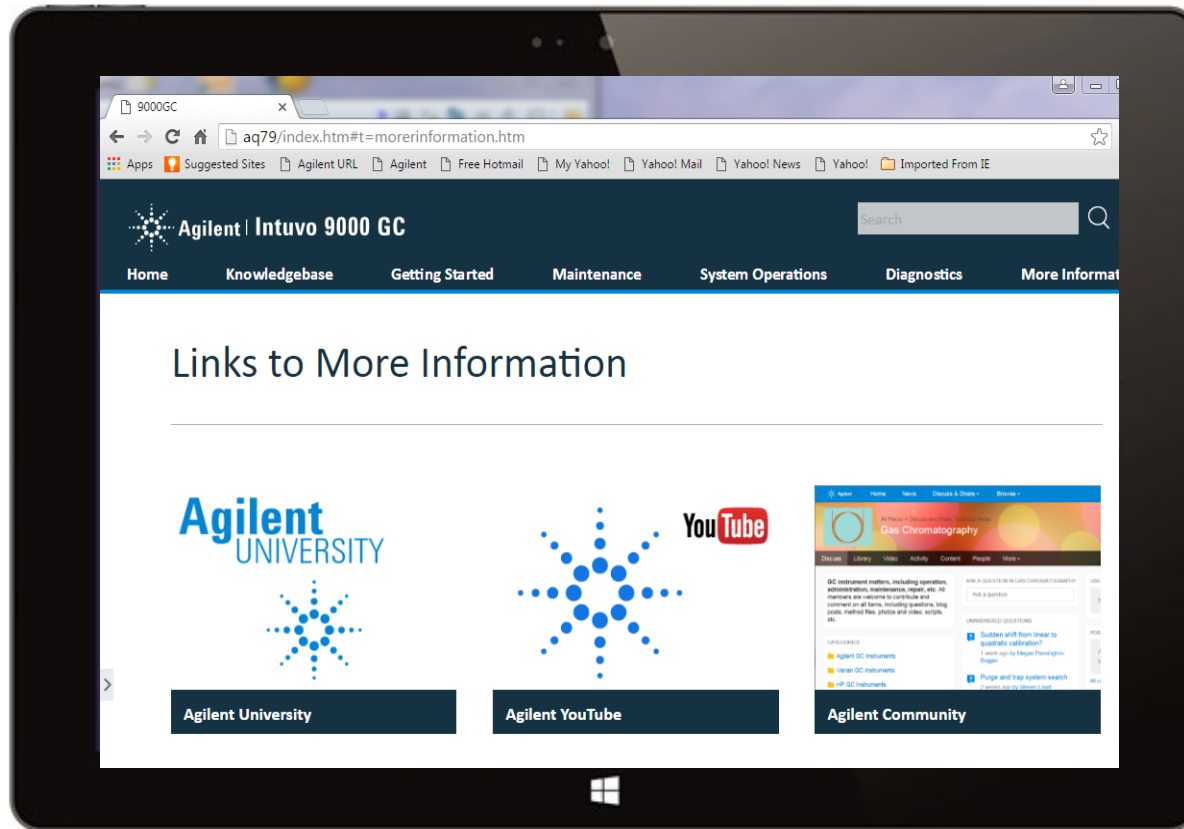
Confirm laboratory operations while out of the laboratory

Connect to any instrument with a single mobile device

Go Mobile

A Gateway of Information at Your Fingertips

Whenever and wherever you are



- On-line resources
- Agilent University
- YouTube
- Agilent.com
- Agilent GC community

Agilent CrossLab Services for Intuvo

A streamlined service experience

Agilent 9000 GC Health Report
Generated: Fri Jul 8 15:46:04 2016

System Information

Hostname:	pfeifer2	Serial Number:	US00000002
Firmware Version:	A.00.01.094-201606212017		

System Configuration

Injector:	G4513A	Serial Number:	CN10040090	Firmware:	A.10.08
Inlet:	SS	Serial Number:	SSL_Q000FD		
Detector 1:	FID	Serial Number:	3456101310315		
Detector 2:	ECD	Serial Number:	3456101412105		
Headspace sampler:	[if present]	Mass Spectrometer:	[if present]		
Bus Type:	D1_D2_SPLIT_10_TO_1	Carrier Board Type:	PP		

Active Instrument Conditions

State	Date / Time	Unique ID	Description
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It would be nice to be able to query for some additional detail here.

Columns

Column 1	Column 2
Manufacturer:	AGILENT
Catalog Number:	19091J-412
Serial Number:	USF163127J
Length:	30 m
Diameter:	0.32 mm
Film Thickness:	250 um

Intuvo 9000 GC Health Report

Installation and familiarization

Compliance services

Education

An Ideal Partner for Mass Spectrometry

- Guard chip protection of column and MS ion source
- Retention time stability after changing guard chip
- Easy and reliable backflush
- Leak-free click-and-run connections
- Fast direct heating and cooling



Agilent Intuvo 9000 Videos:

[The Agilent Intuvo 9000 GC System – Environmental Science Corporation \(ESC\)](#)

Discover higher GC productivity with the Agilent Intuvo 9000 GC system.

Playing Time: 4:00

[The Agilent Intuvo 9000 GC System Story](#)

Learn more about the Agilent Intuvo 9000 GC System

Playing Time: 2:21

[The Agilent Intuvo 9000 GC System: Return on Investment. Return on Innovation](#)

A testimonial regarding the return on investment on the Agilent Intuvo 9000 GC System

Playing Time: 4:17

Contact Agilent Chemistries and Supplies Technical Support



1-800-227-9770 Option 3, Option 3:

- Option 1 for GC/GCMS Columns and Supplies
- Option 2 for LC/LCMS Columns and Supplies
- Option 3 for Sample Preparation, Filtration and QuEChERS
- Option 4 for Spectroscopy Supplies



- gc-column-support@Agilent.com
- lc-column-support@agilent.com
- spp-support@agilent.com
- spectro-supplies-support@agilent.com

Questions

