

A Walk Around the Intuvo

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GC Application Scientist
February 13, 2019



Innovating a New Path to GC Productivity

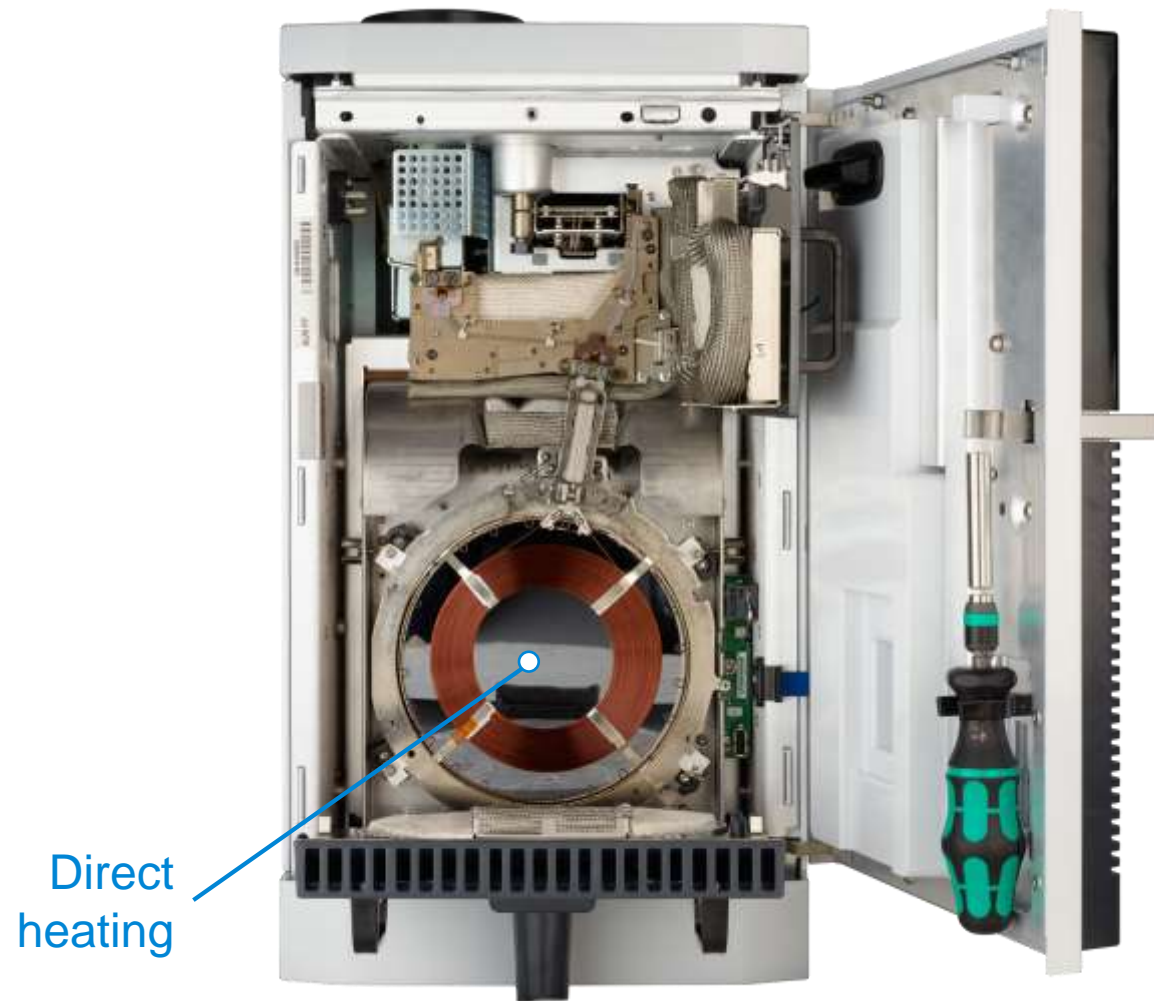
A whole new way to GC

- Easier
- Faster
- Smaller
- Smarter
- Greener



Innovating a New Path to GC Productivity

A whole new way to GC



Innovating a New Path to GC Productivity

A whole new way to GC



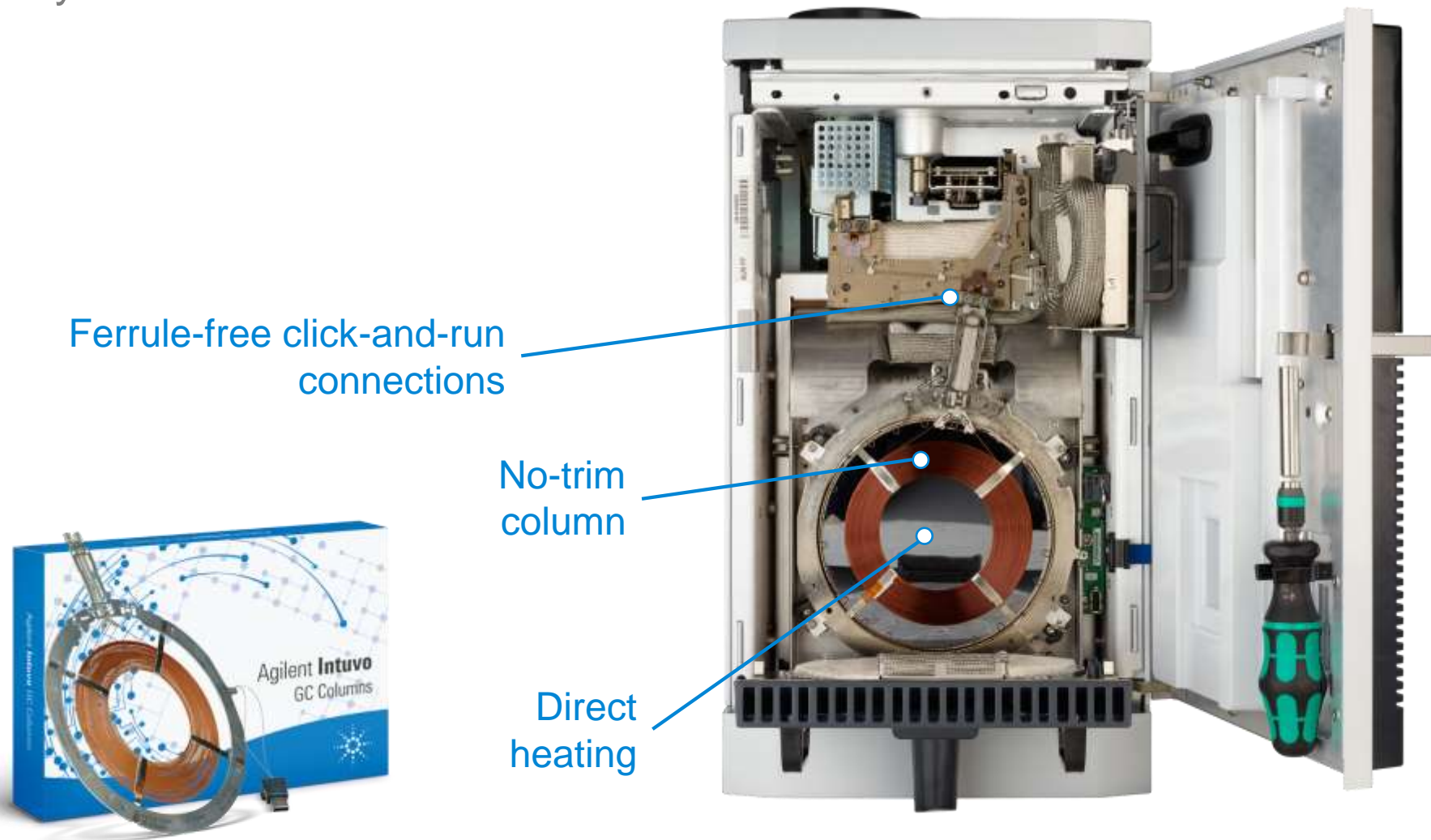
No-trim
column

Direct
heating



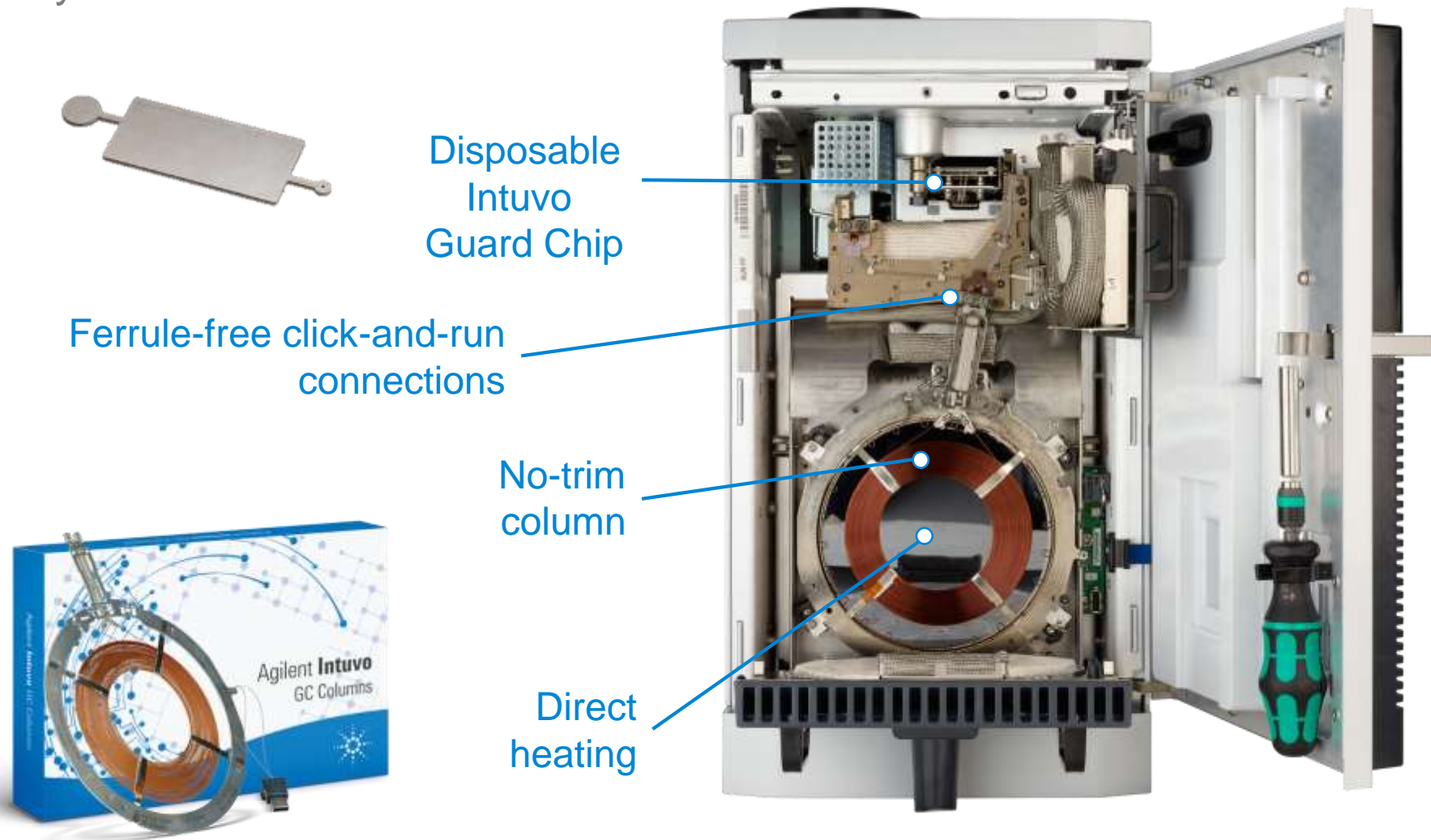
Innovating a New Path to GC Productivity

A whole new way to GC



Innovating a New Path to GC Productivity

A whole new way to GC



Disposable
Intuvo
Guard Chip

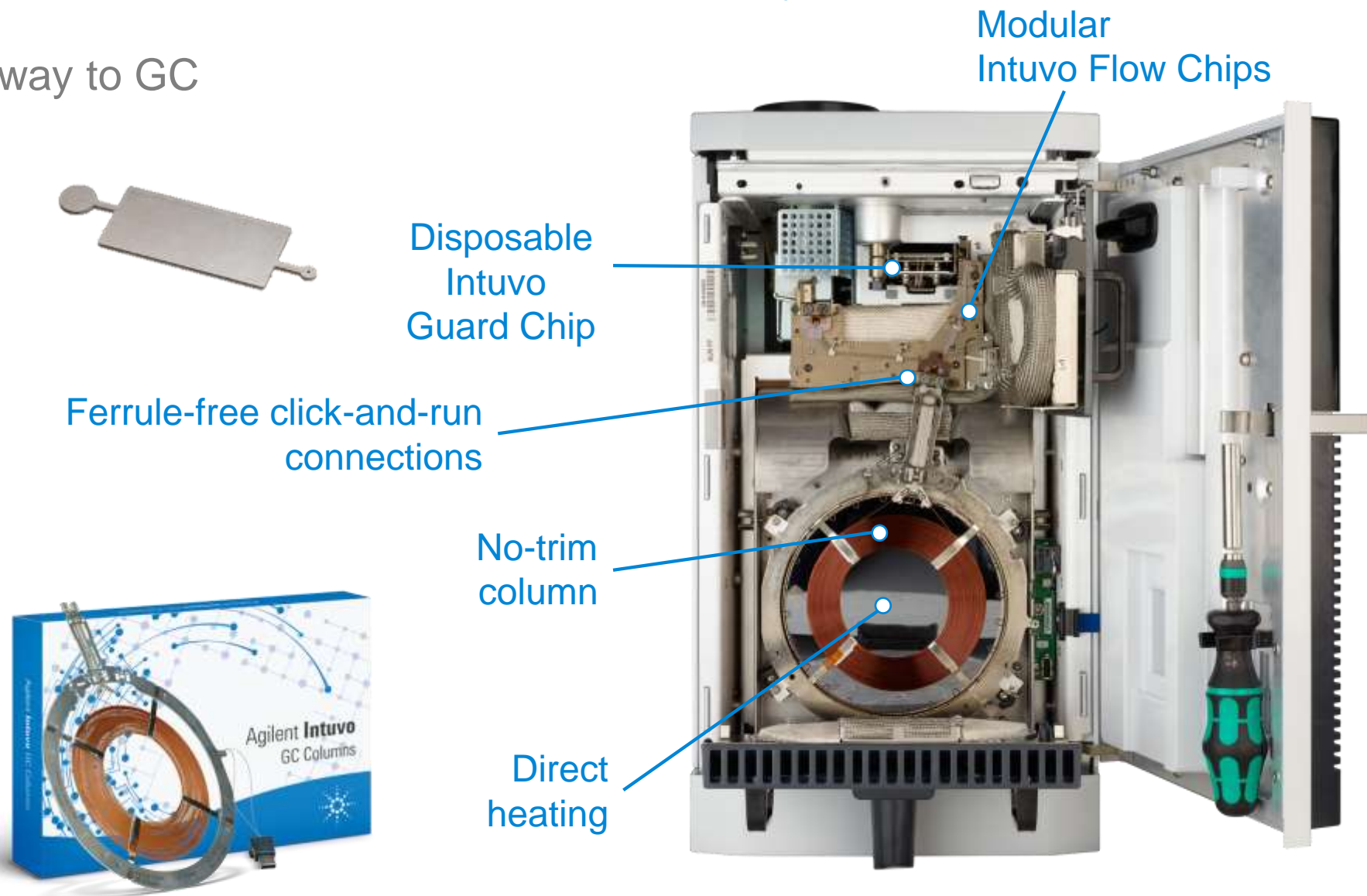
Ferrule-free click-and-run
connections

No-trim
column

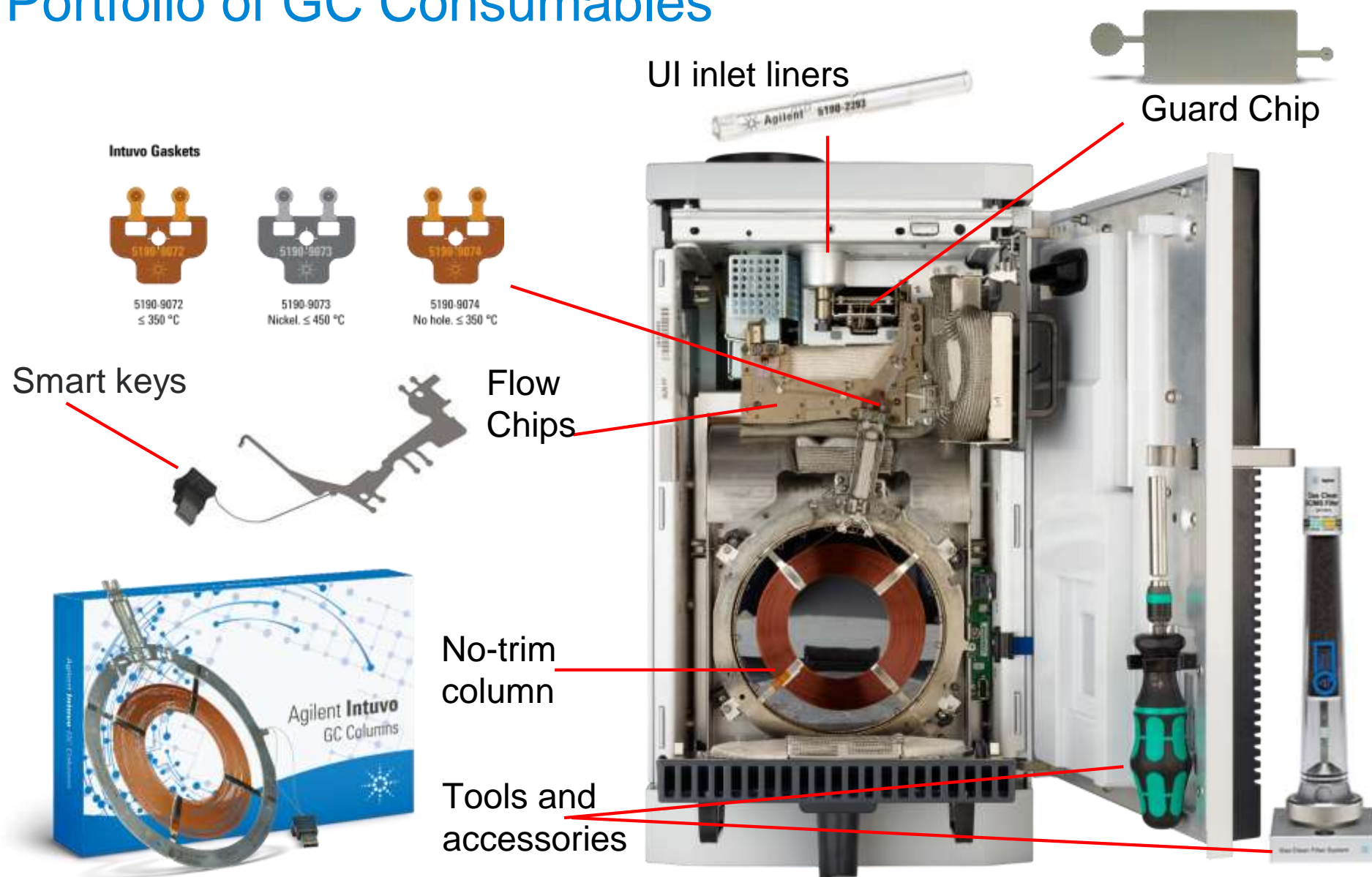
Direct
heating

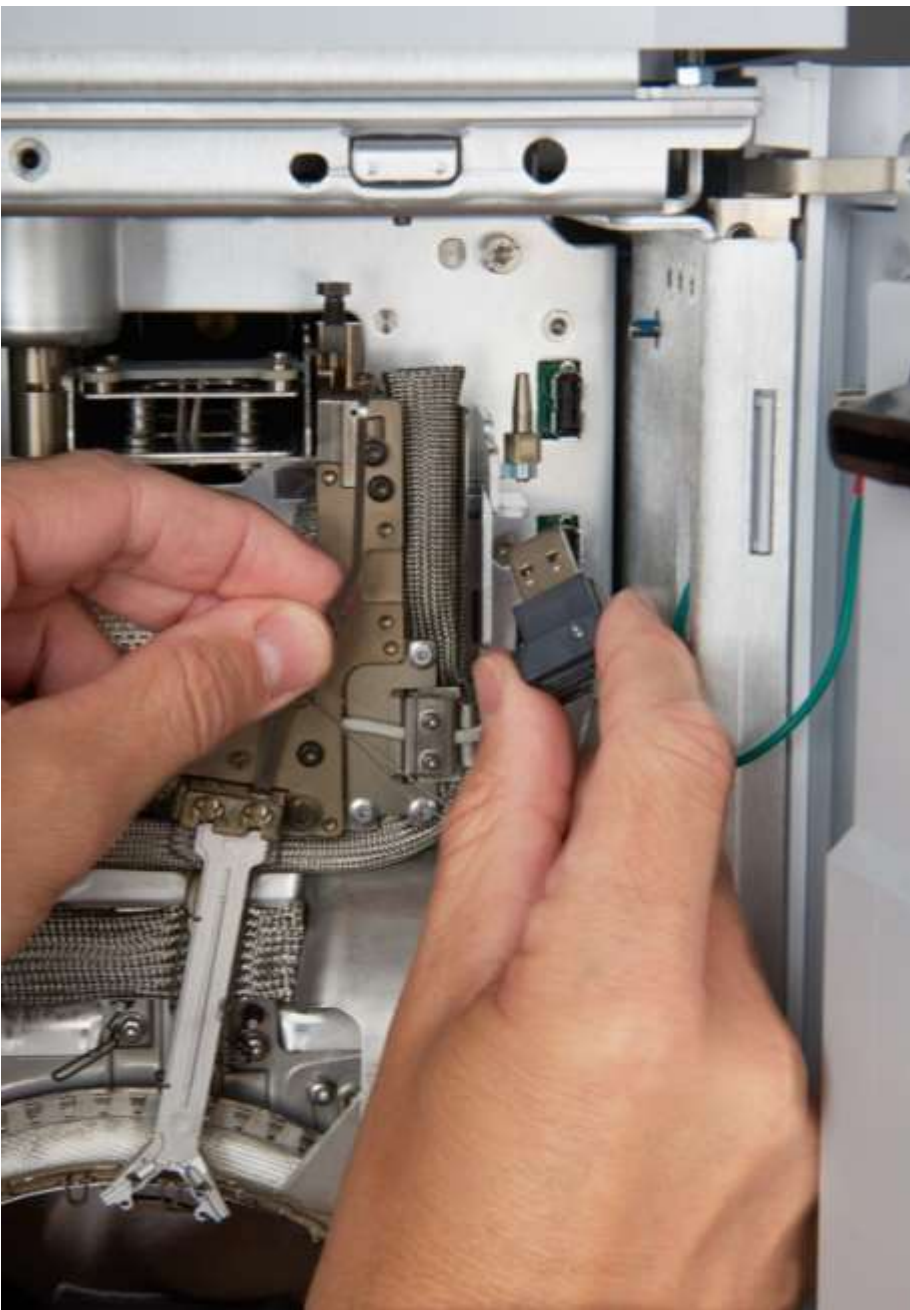
Innovating a New Path to GC Productivity

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 autoinjectors and trays
- Software: Agilent OpenLab and MassHunter

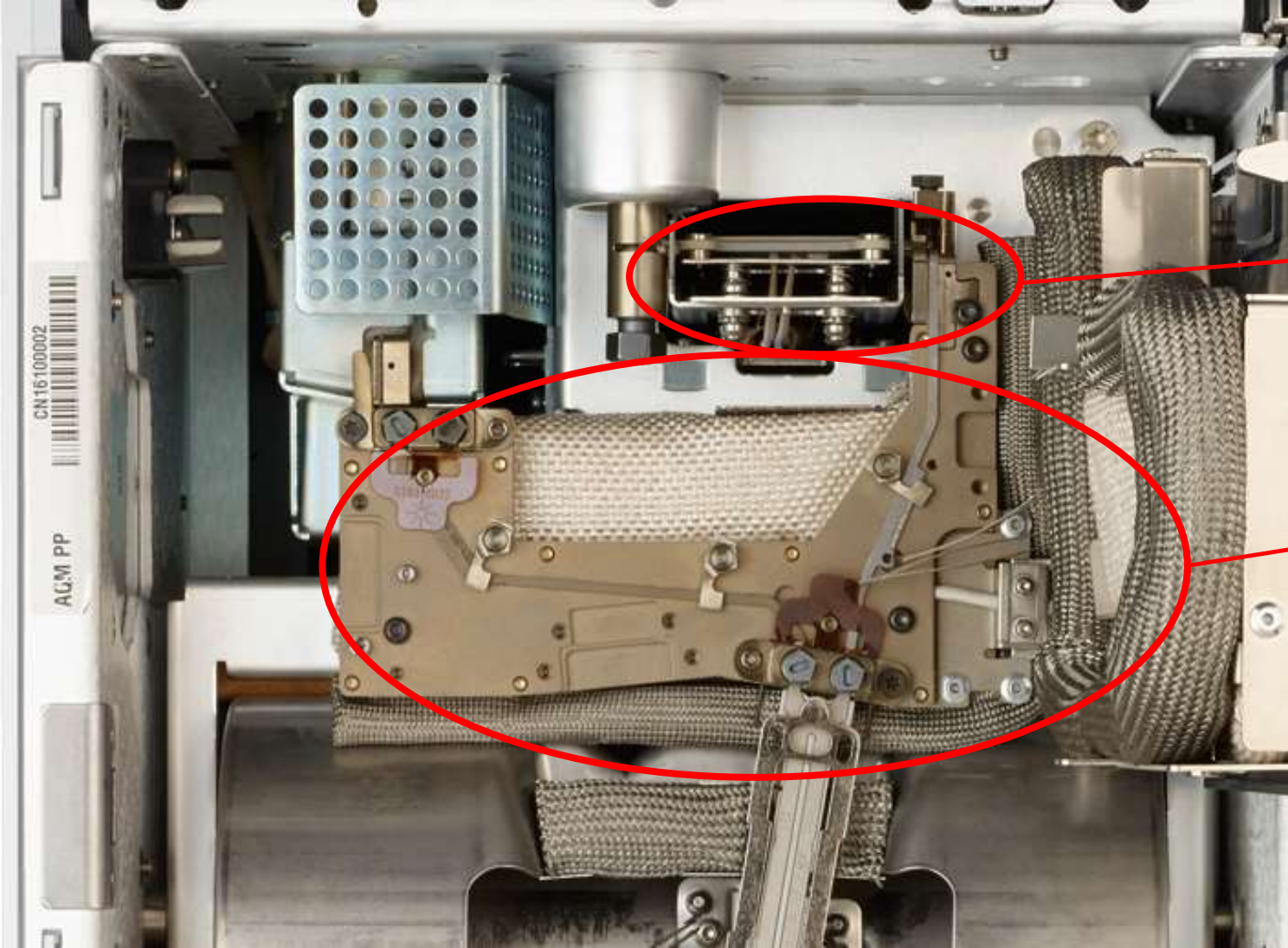
Comparing the Agilent 7890 GC with the Intuvo 9000 GC

	7890				Intuvo	
Footprint (H x W x D) in Inches	19.2 x 22.9 x 20.2				20 x 10.7 x 27.2	
Power Consumption	2,250 VA standard (2,950 VA /220)				1,296 VA standard (1,548 VA / 220)	
Oven Ramp Rate	Temperature Range (°C)	120 V Oven	Fast Oven	Fast oven with Pillow	Maximum achievable temperature ramp rate: 250 °C/min	
	50 to 70	75	120	120		
	70 to 115	45	95	120		
	115 to 175	40	65	110		
	175 to 300	30	45	80		
	300 to 450	20	35	65		
Oven Cooling Rate	Oven cool down (22 °C ambient) 450 to 50 °C in 4 minutes (3.5 minutes with oven insert accessory)				Oven cool down (22 °C ambient) 450 to 50 °C in less than 3 minutes	
Heat Dissipation	Standard oven ramp		7,681 BTU / hour maximum		120 V	4,424 BTU / hour maximum
	Fast oven ramp		10,071 BTU / hour maximum		200 to 240 V	5,285 BTU / hour maximum

Smaller Footprint



New Heated Zones

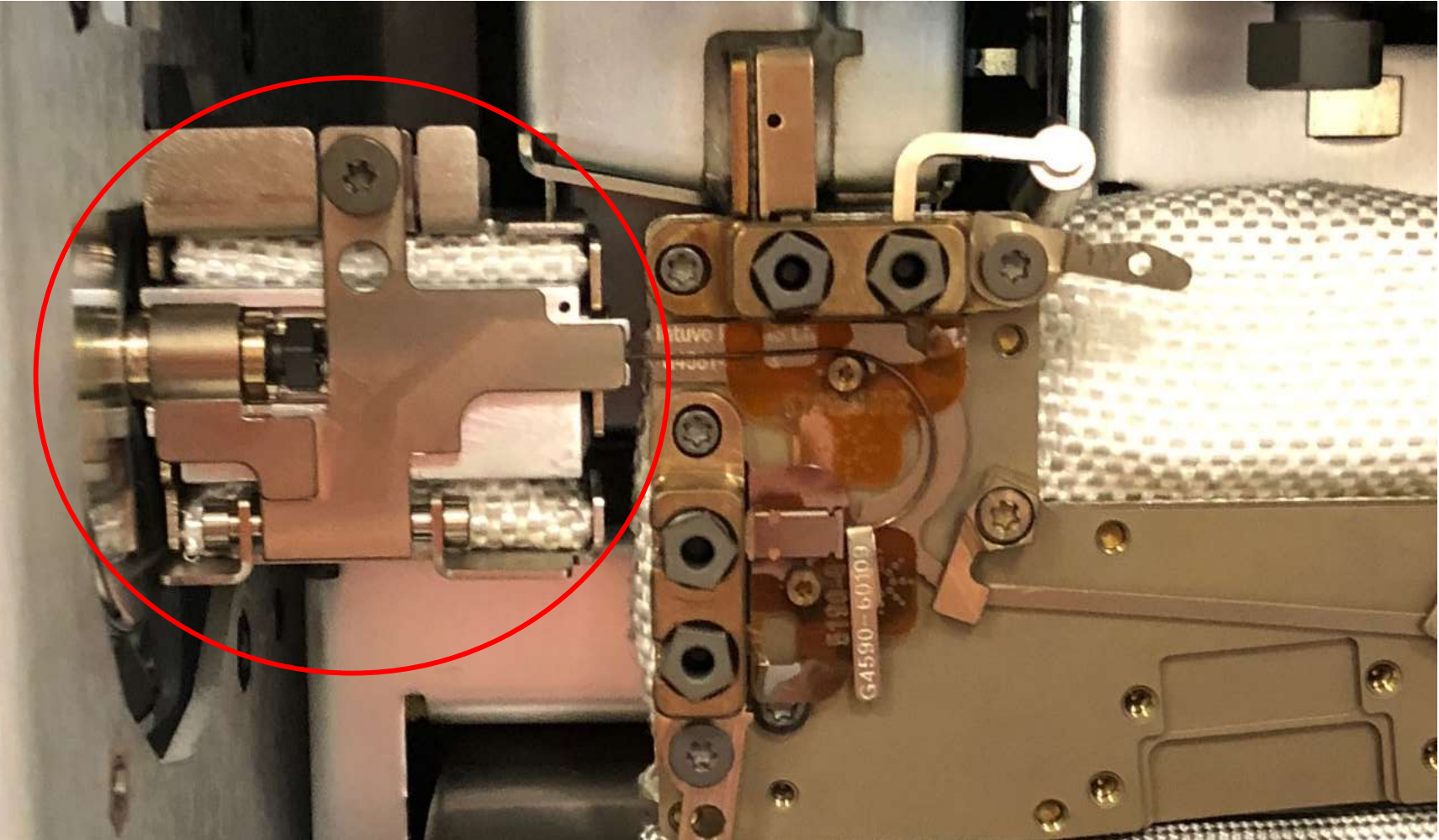


Guard Chip

Bus

Intuvo with MSD, FID, and Postcolumn Backflush

Mini-Bus



What 'Can' it Do?

One inlet (SSL or MMI)

Two detectors

can split 1:1 between detectors – including MSD

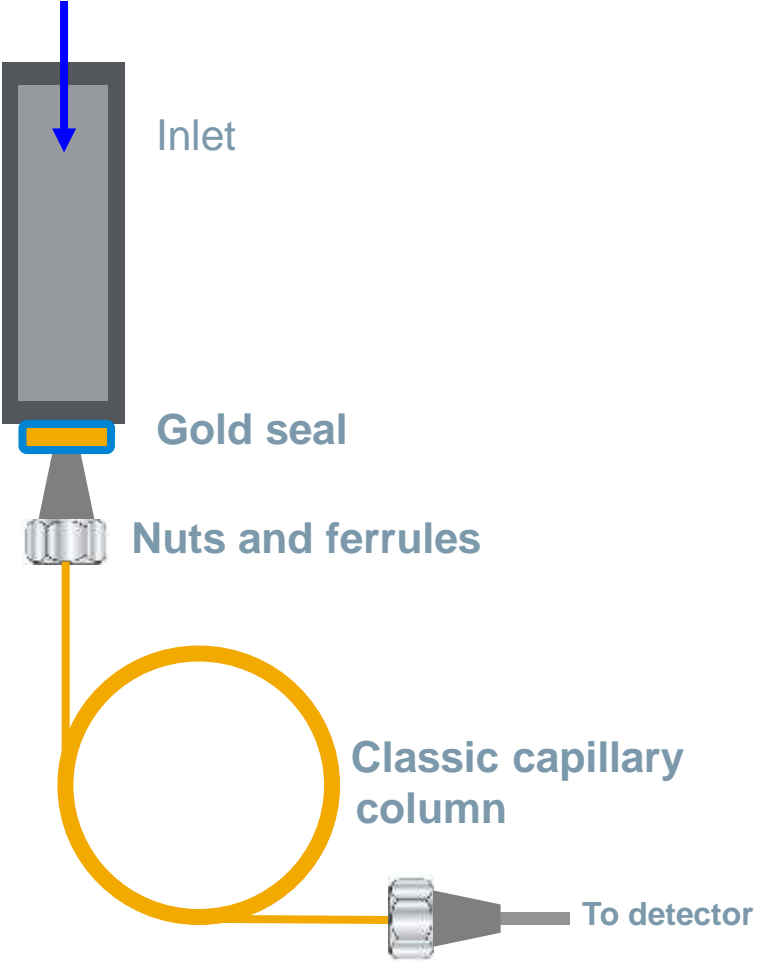
Column limitation of 60 m total, max ID of 0.32 mm

Midcolumn backflush

Postcolumn backflush

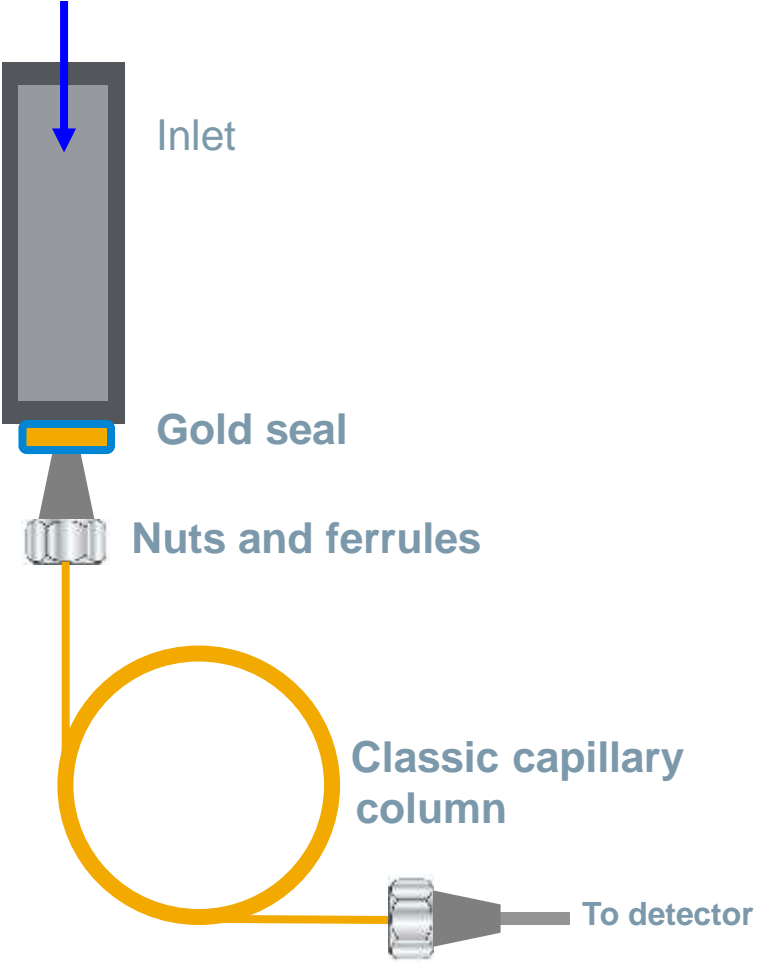
Innovating the GC Flowpath

Conventional flowpath

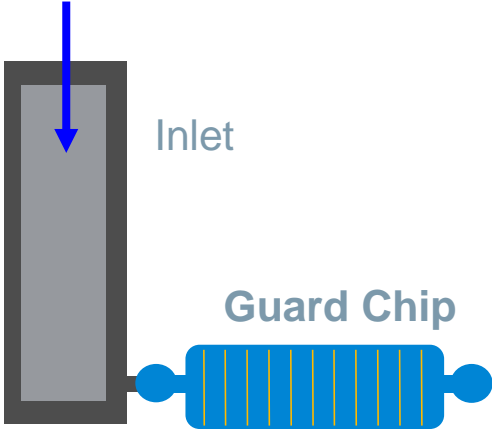


Innovating the GC Flowpath

Conventional flowpath

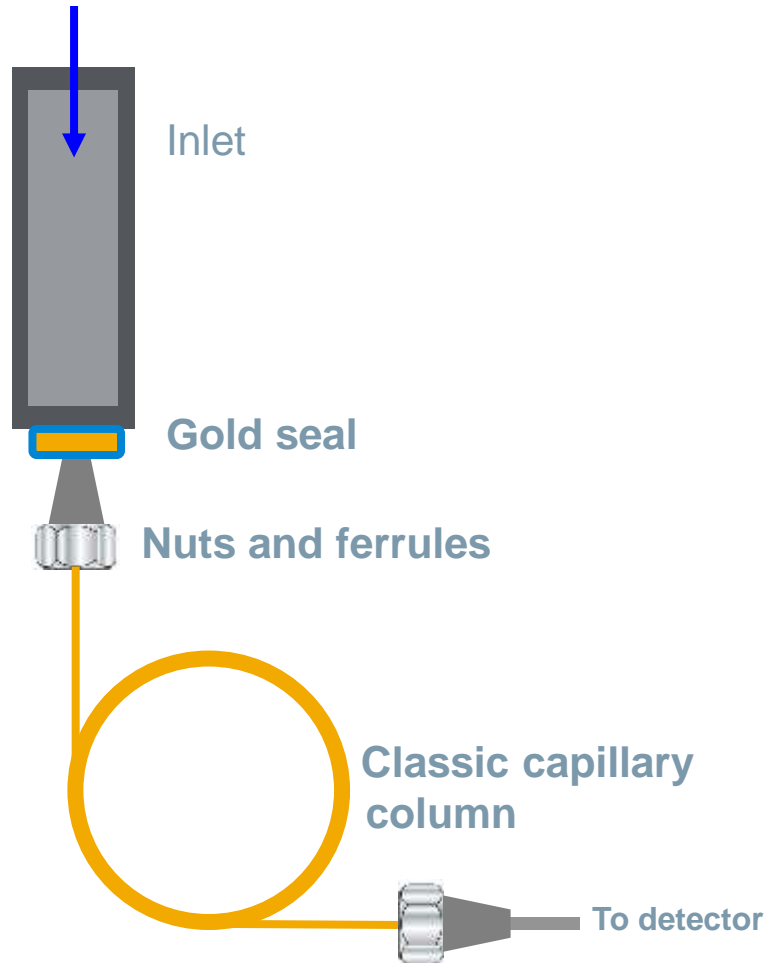


Intuvo flowpath

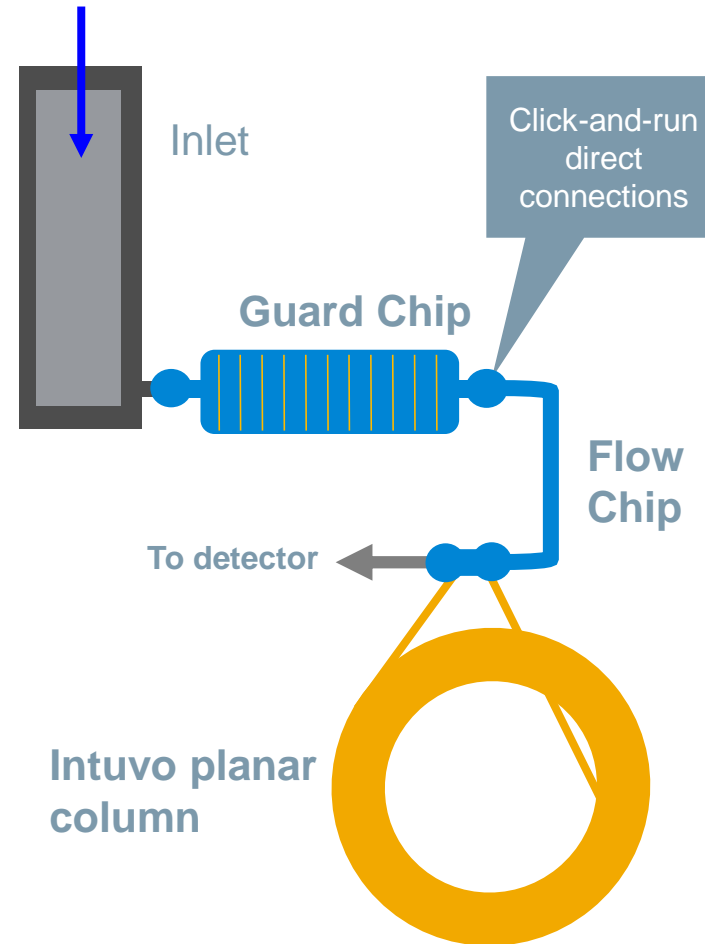


Innovating the GC Flowpath

Conventional flowpath

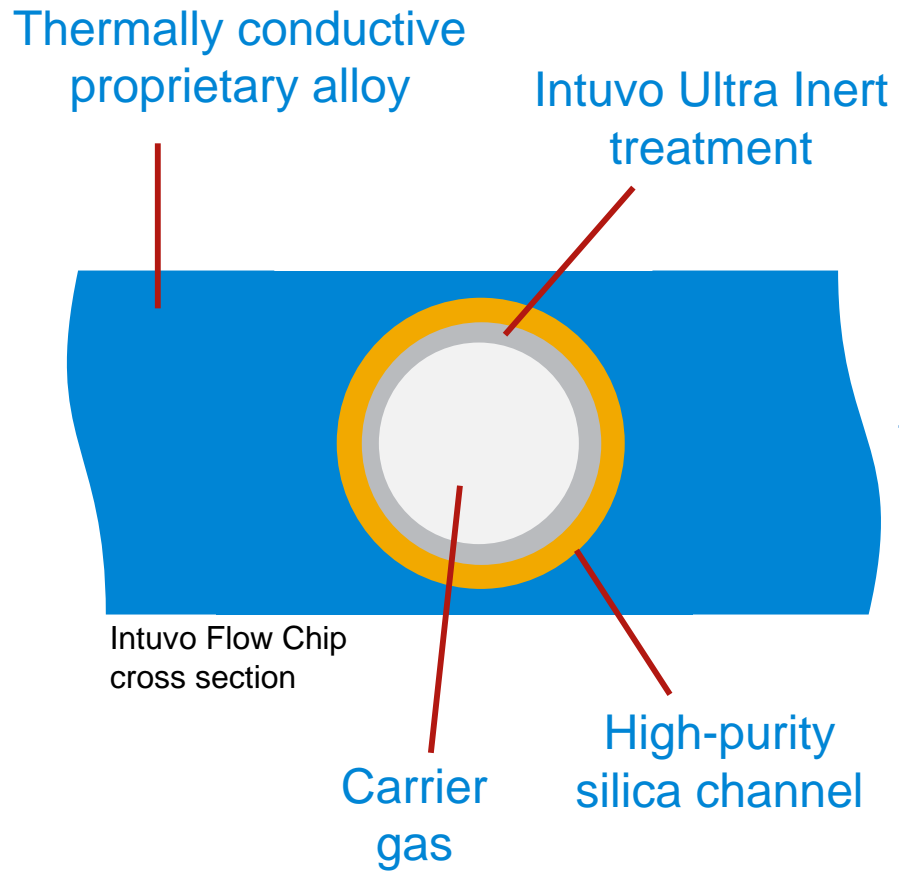


Intuvo flowpath



Modular Intuvo Flow Chips

High-purity inert silica flowpath



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



Guard/Jumper Chips

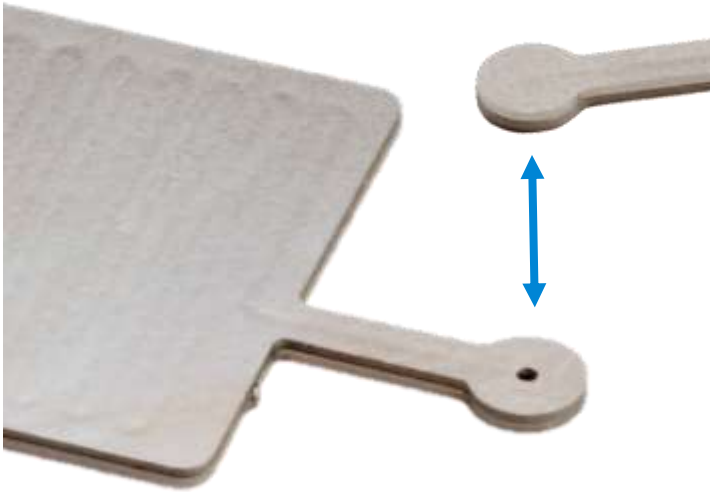


Roughly 0.75 m x 0.53 mm ID



Click-and-Run Direct Connections

Eliminating connection uncertainty

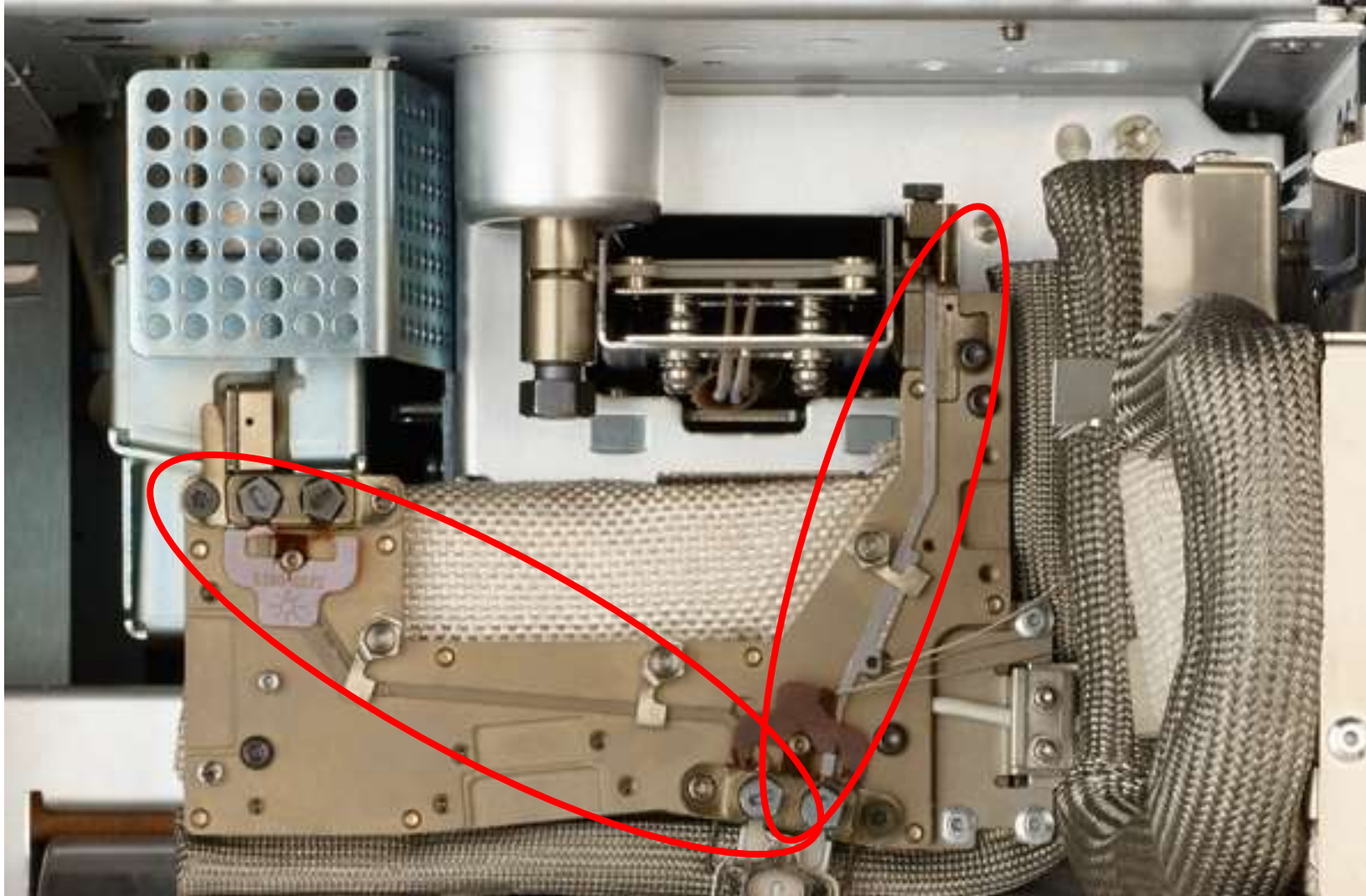


- No more ferrules
- Direct face seal connections
- Audible and tactile click lets you know connection is made



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

Intuvo Flow Chips – Installation Distance Always Perfect

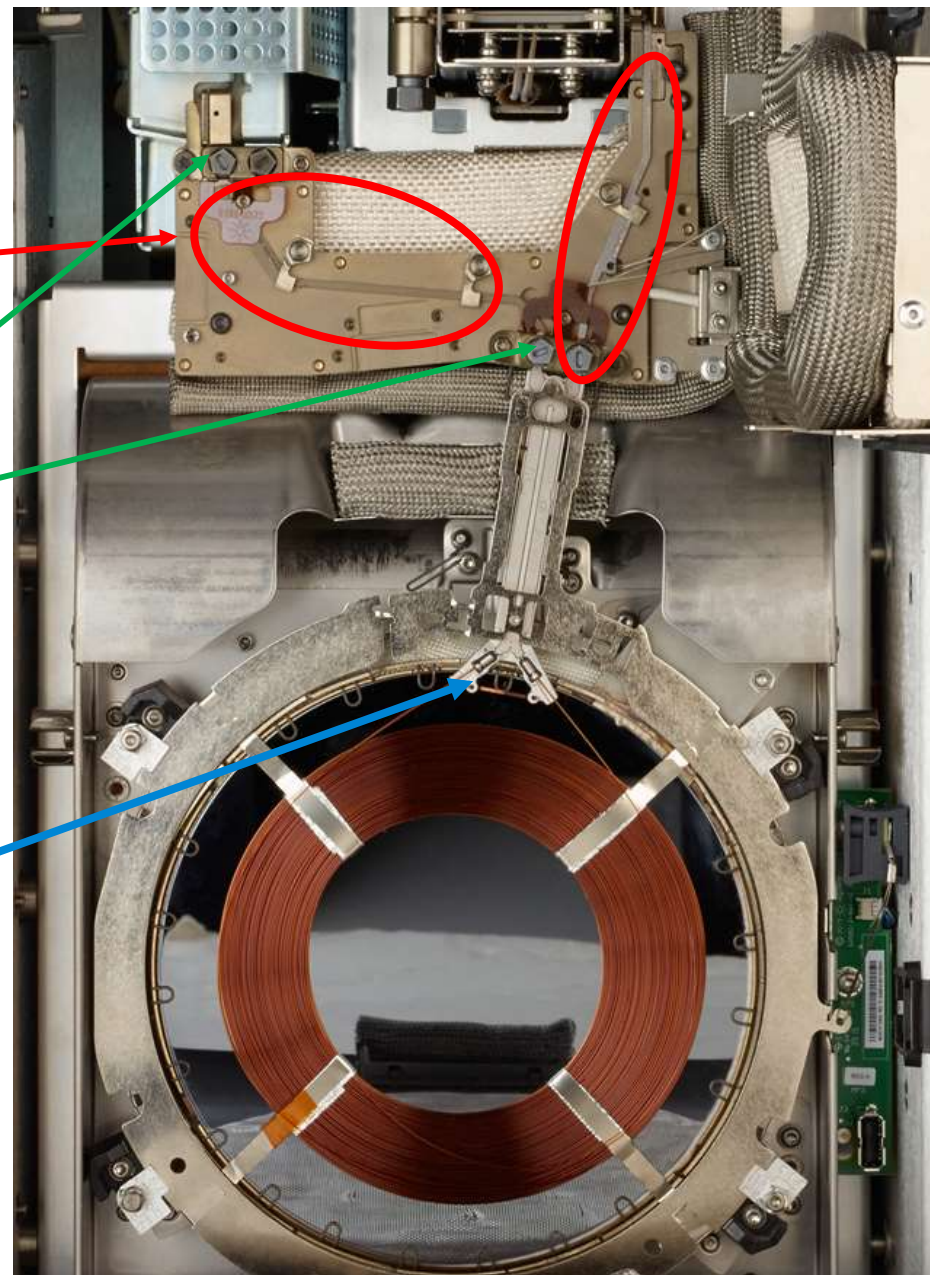


No more:

- measuring

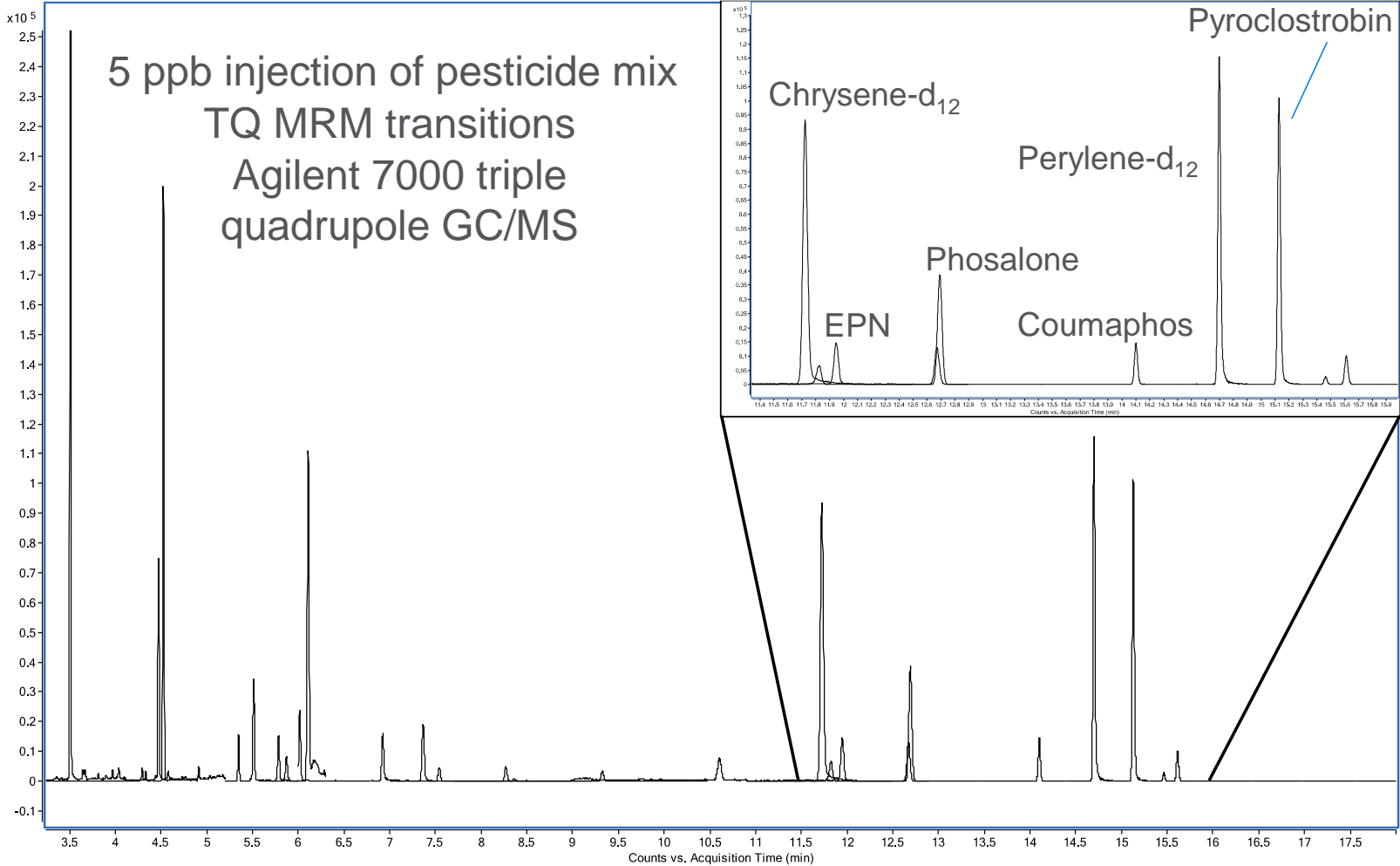
- overtightening

- trimming



Intuvo Inert Flowpath

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

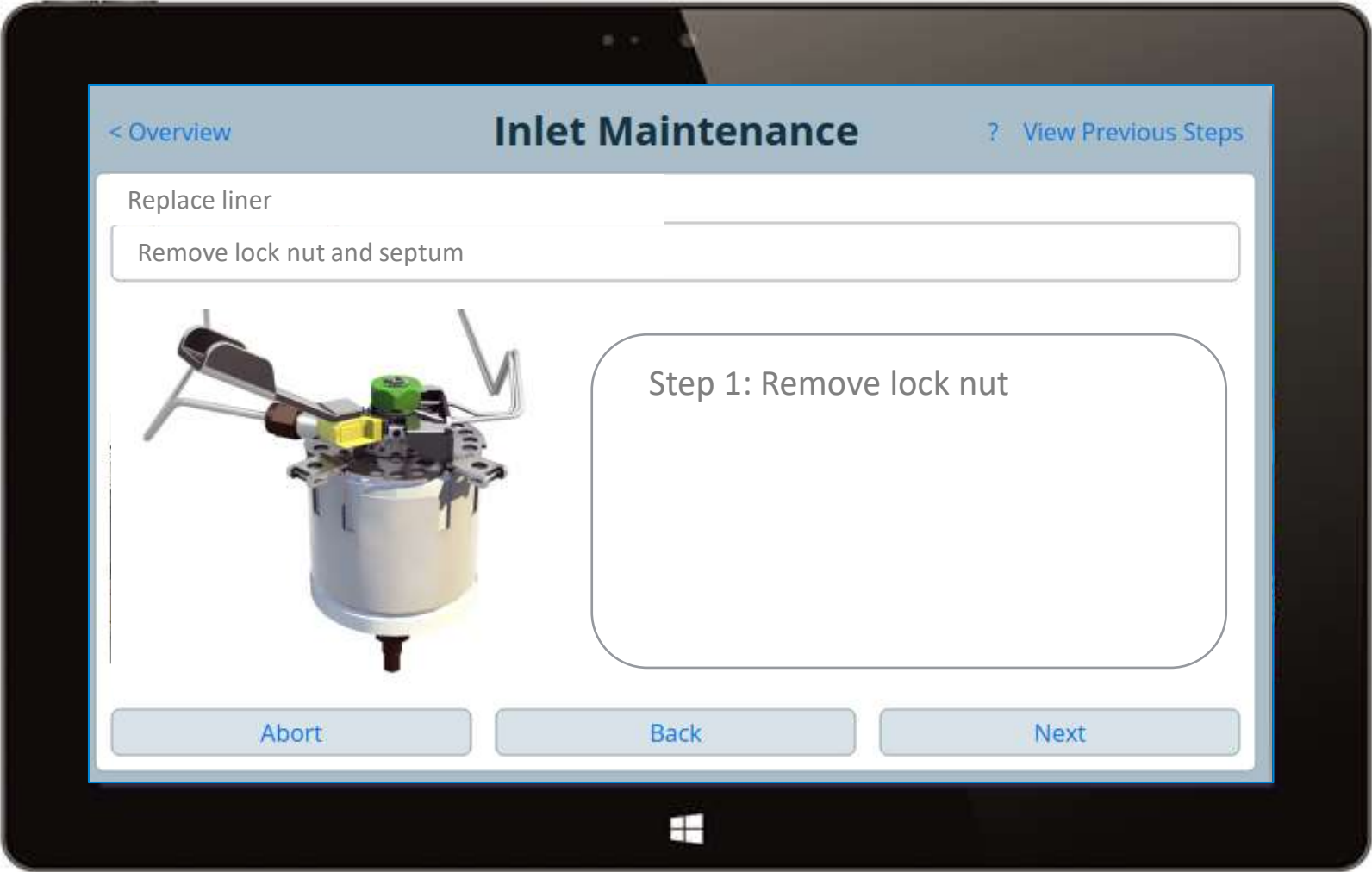
Avoiding unplanned downtime



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

Intuvo Graphical User Interface

Interactive maintenance

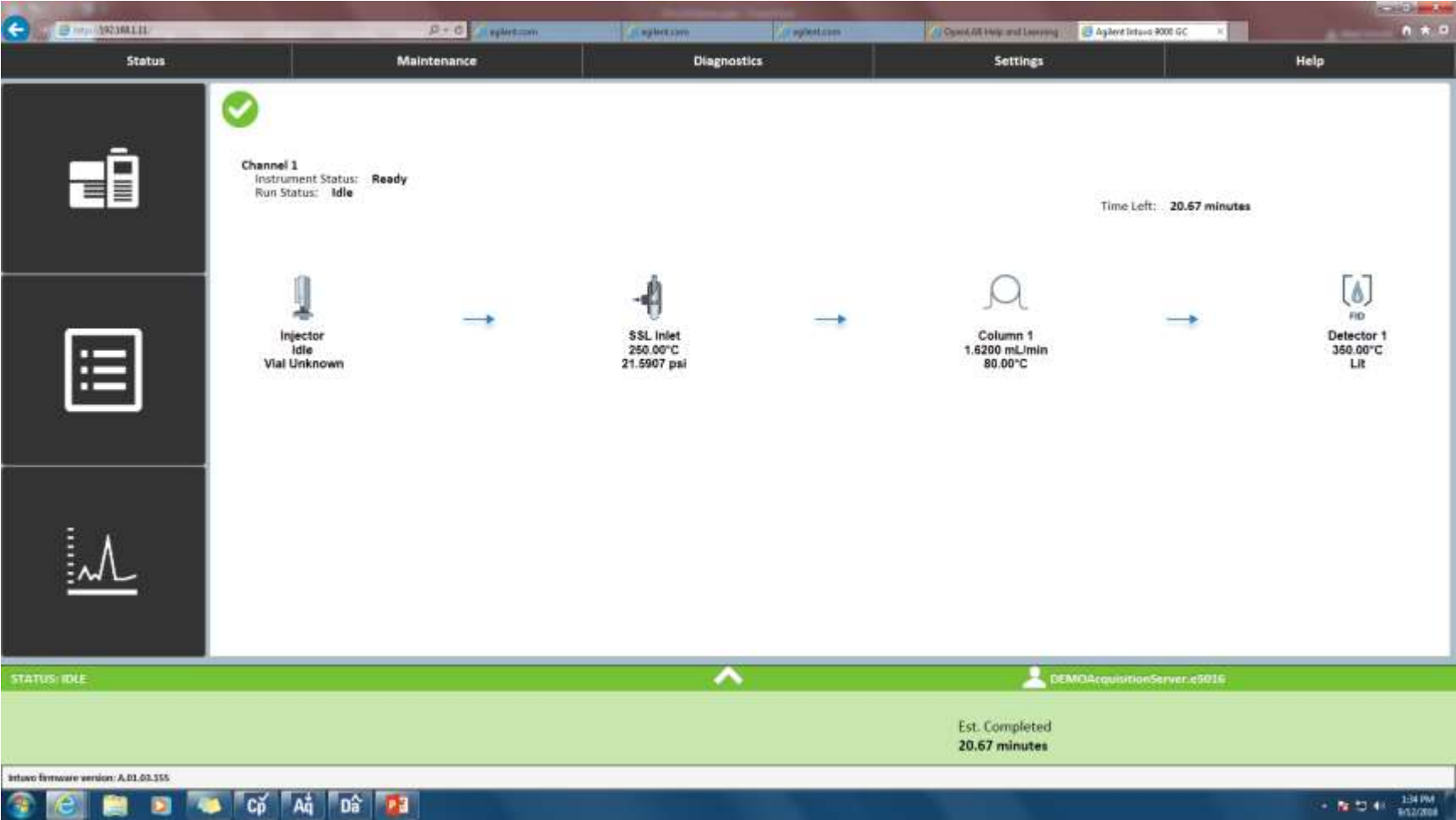


Maintenance?!

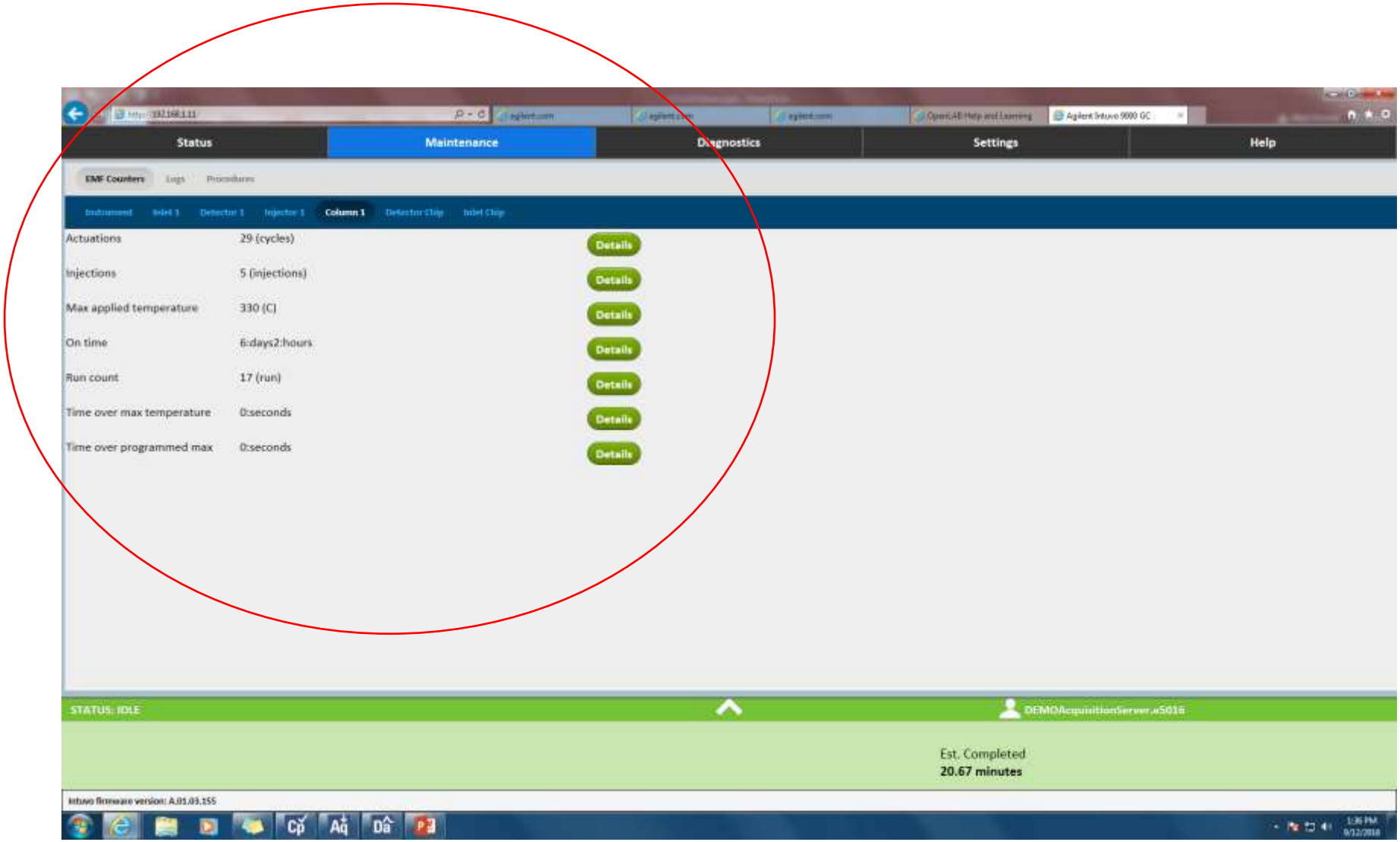
You lose the screen as soon as you open the door to do the maintenance!



Remote Access to Intuvo Screen



Access the Onscreen Tools Remotely



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 navigation bar with 'Status' and 'Maintenance' tabs. Under 'Maintenance', there are sub-tabs for 'EMF Counters', 'Logs', and 'Procedures'. A secondary navigation bar lists 'Instrument', 'Inlet 1', 'Detector 1', 'Injector 1', 'Column 1' (which is 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**

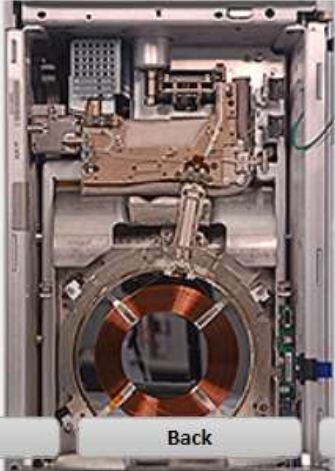
Column Maintenance

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

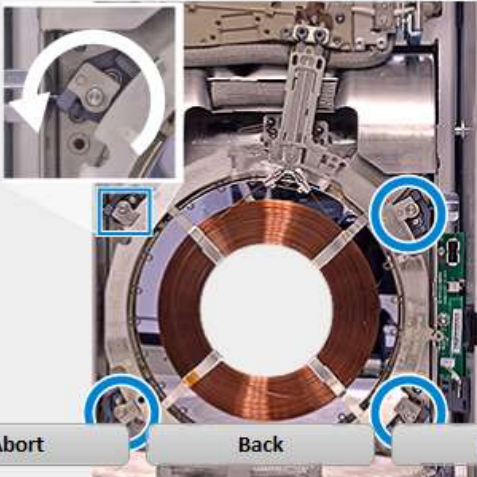
Column Maintenance

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

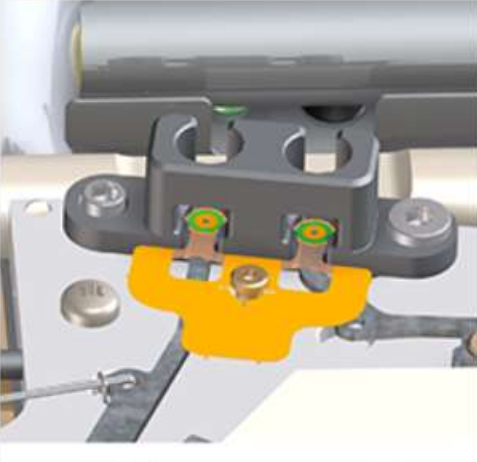
Column Maintenance

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

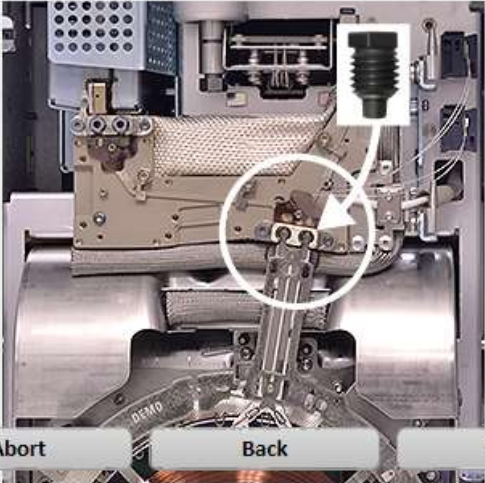
Description - Self guided procedures for performing column maintenance

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.



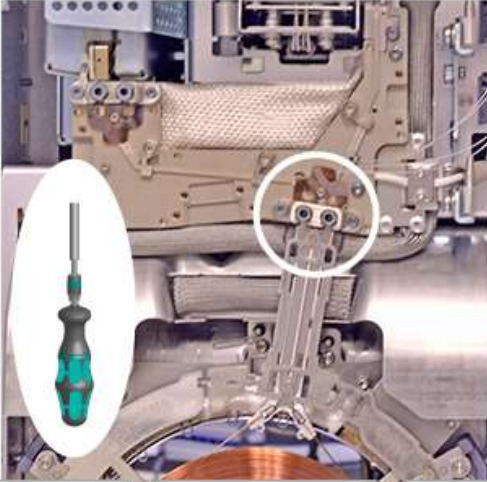
Column Maintenance

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

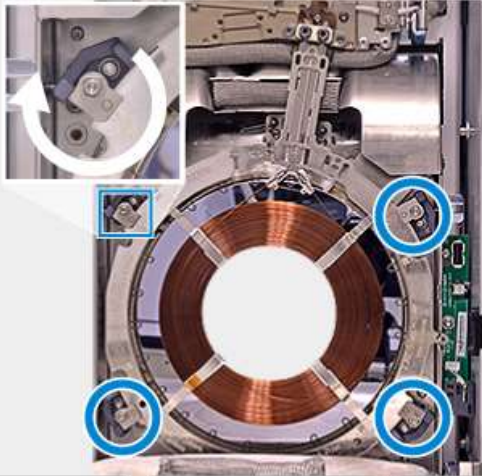
Column Maintenance

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

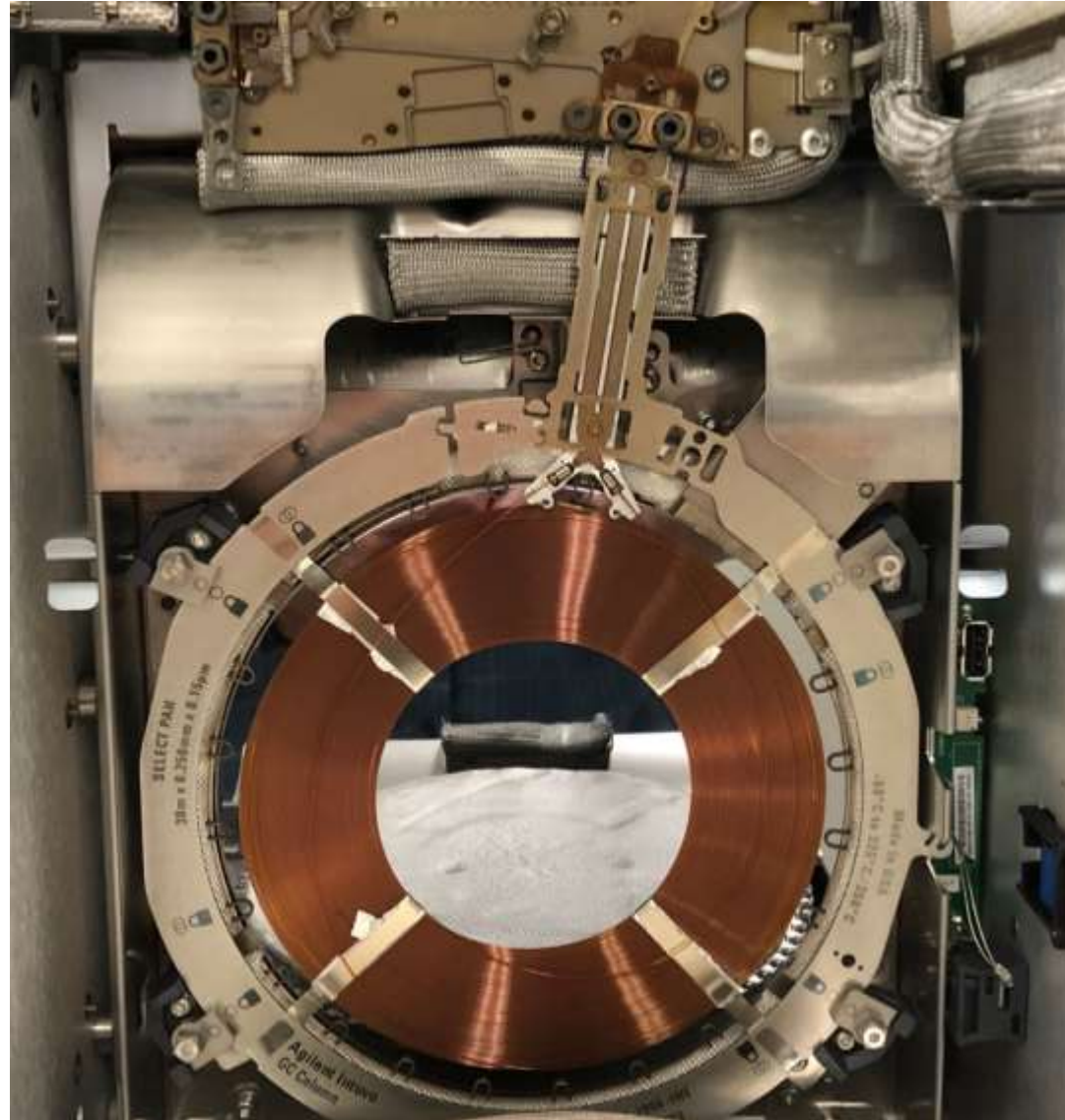
Test Details

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

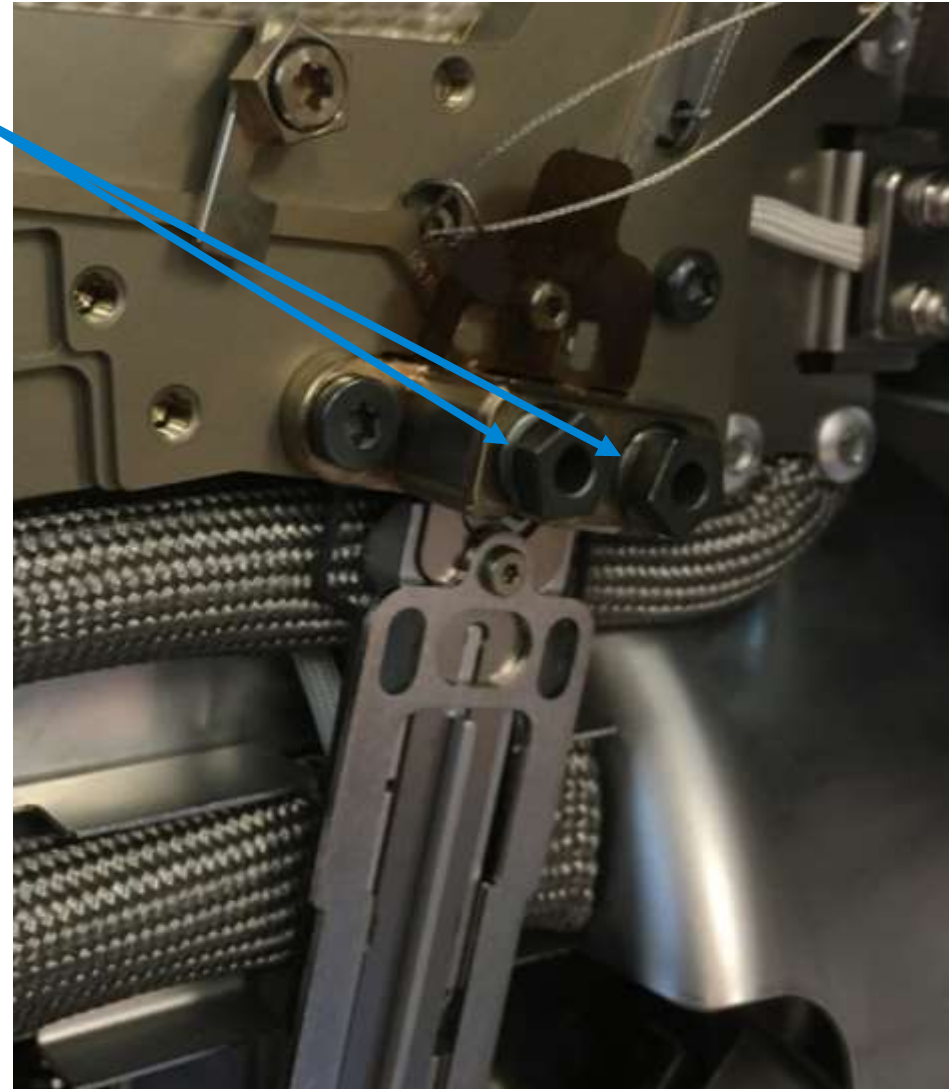
It is much easier to install the column, but there are still some 'Gotchas'!



Tips to Ensure a Good Column Installation

1. Finger tighten until only one thread on each of the two nuts is showing.

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



Tips to Ensure a Good Column Installation

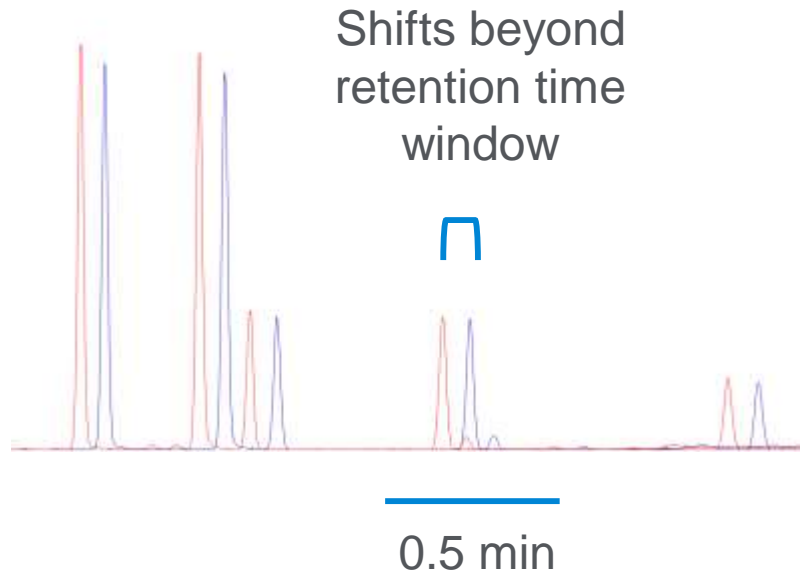
2. Check that the small integrated column nuts on the column are in form-fitted place on the heater in the instrument.
3. Click and run!



Intuvo Guard Chip and No-Trim Columns

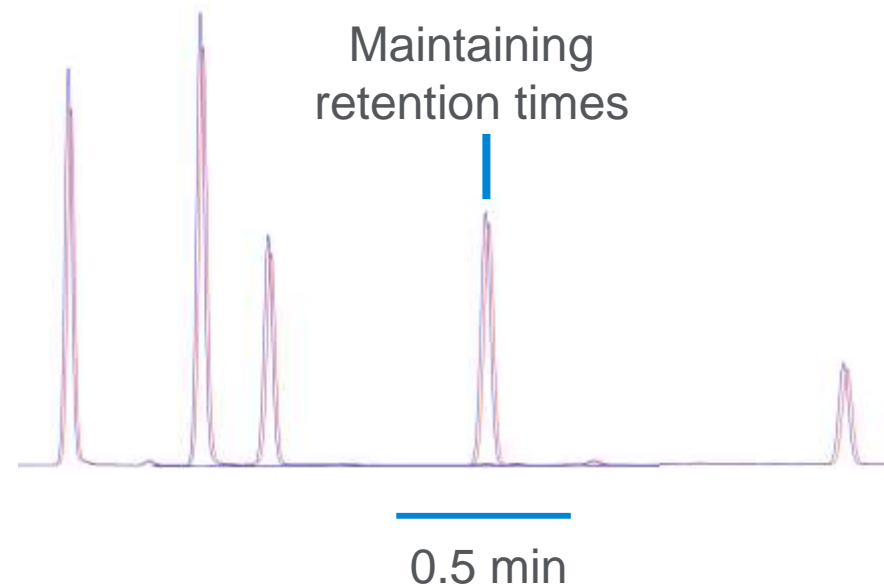
No retention time shifts after maintenance

Conventional Column



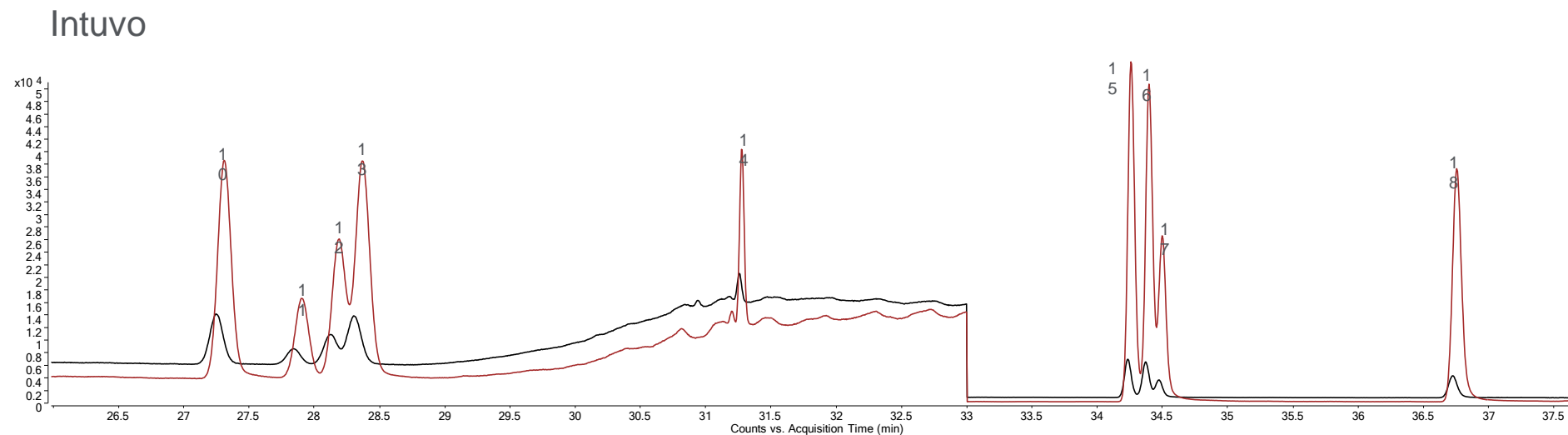
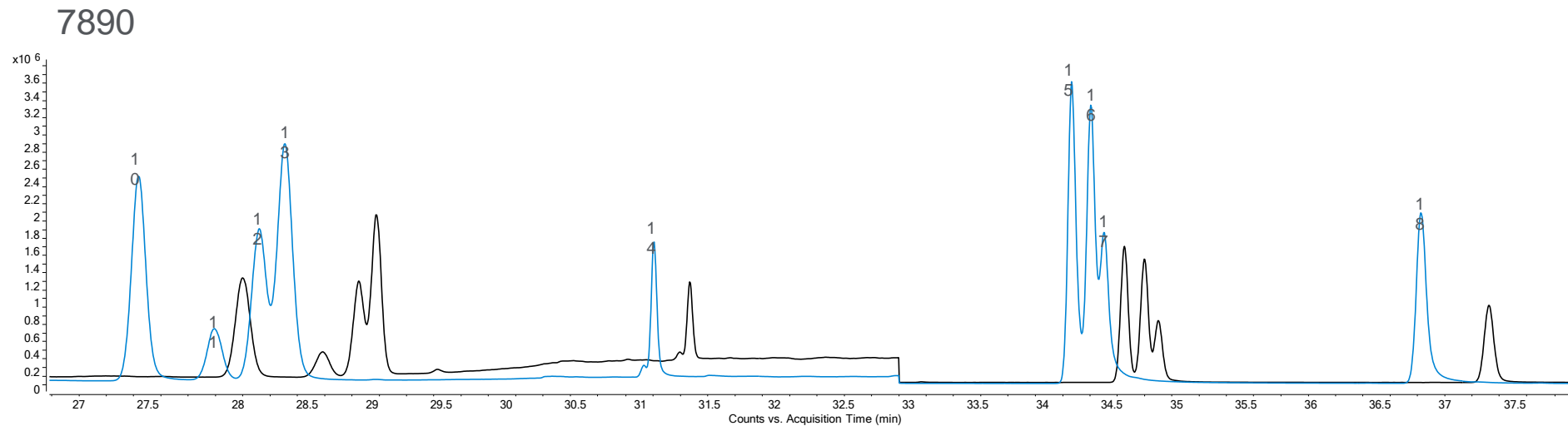
Pesticide mix injected before and after 300 mm column trim

Intuvo Column



Pesticide mix injected before and after Guard Chip change

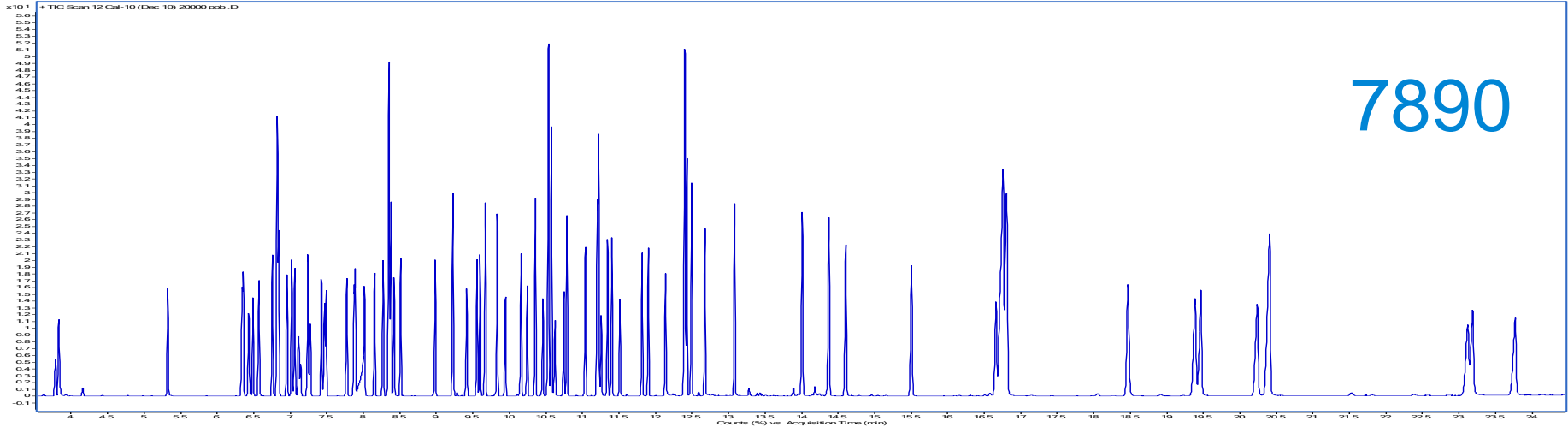
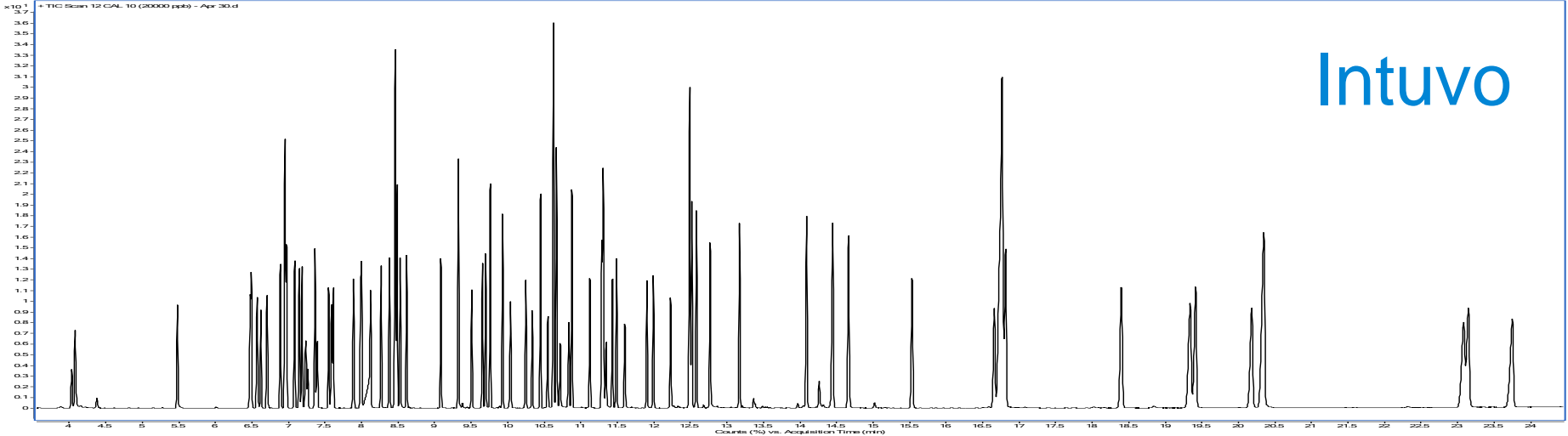
Guard Chip Versus Column Trimming



Seamless Method Migration to Intuvo

No business disruption

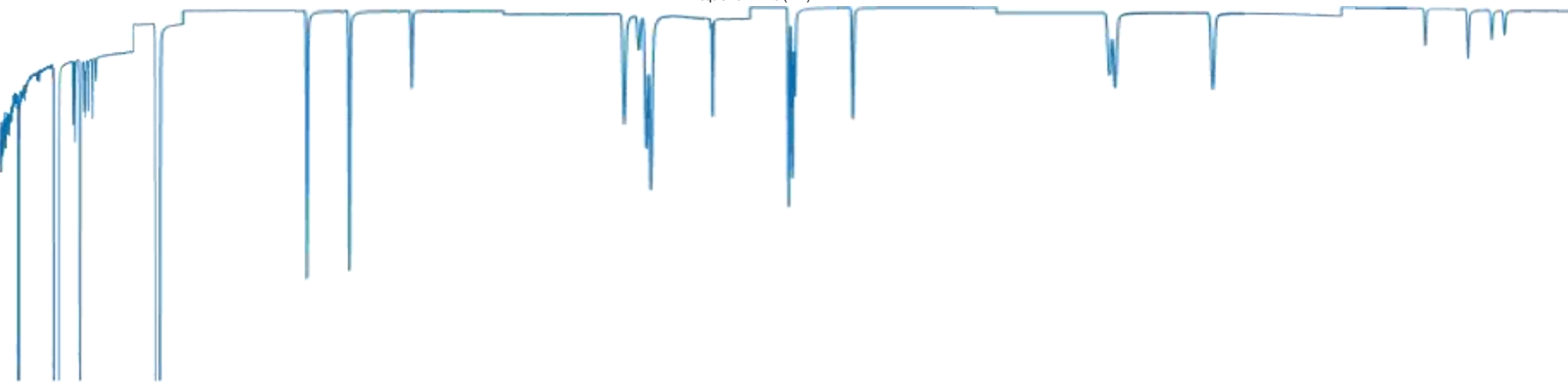
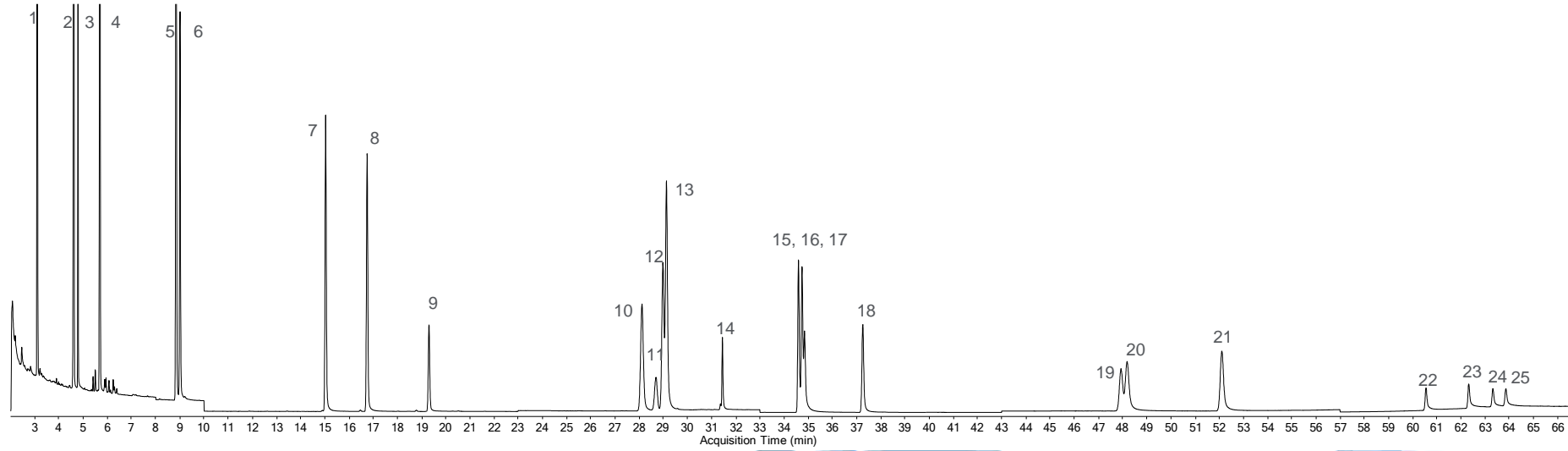
83 SVOC by US EPA 8270



How Does it Line Up?

7890 GC

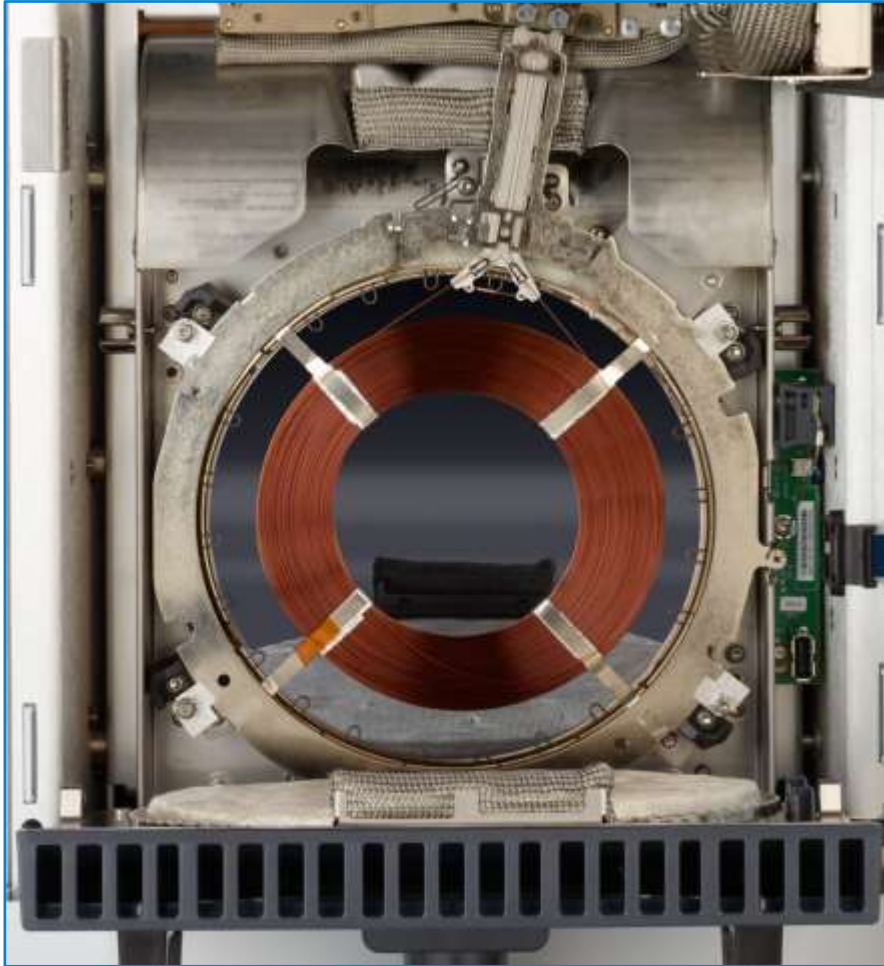
PAHs



Intuvo GC

Fast Direct Heating and Cooling

Every single minute counts



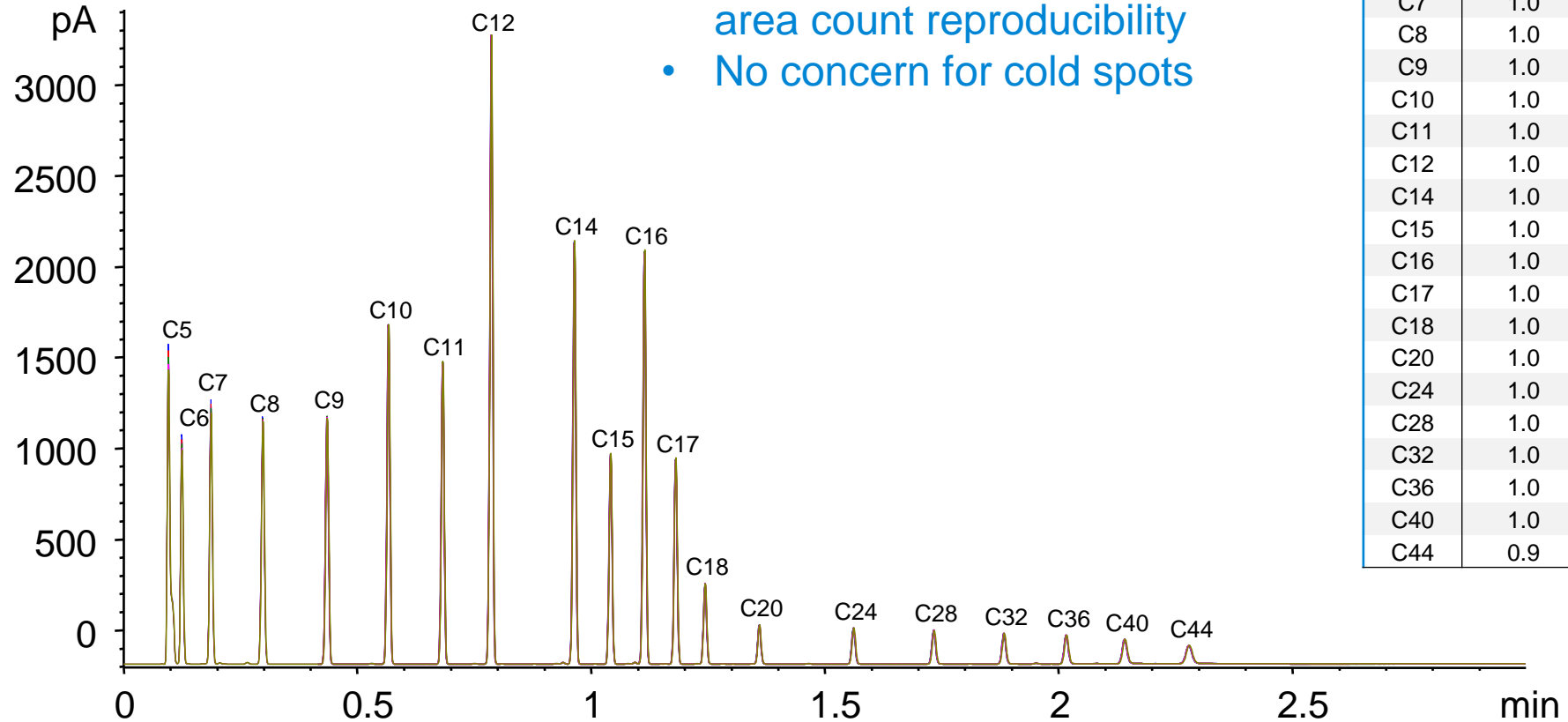
- Fast, efficient heating
- Ballistic cooling
- Smaller footprint

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

Ultra Fast GC

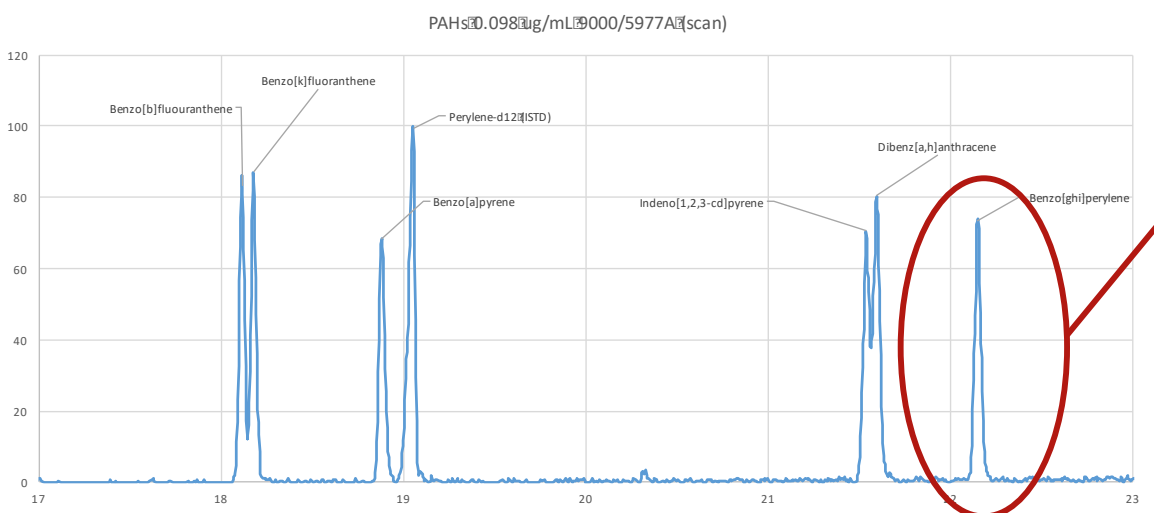
It's all about how well you do GC, fast

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

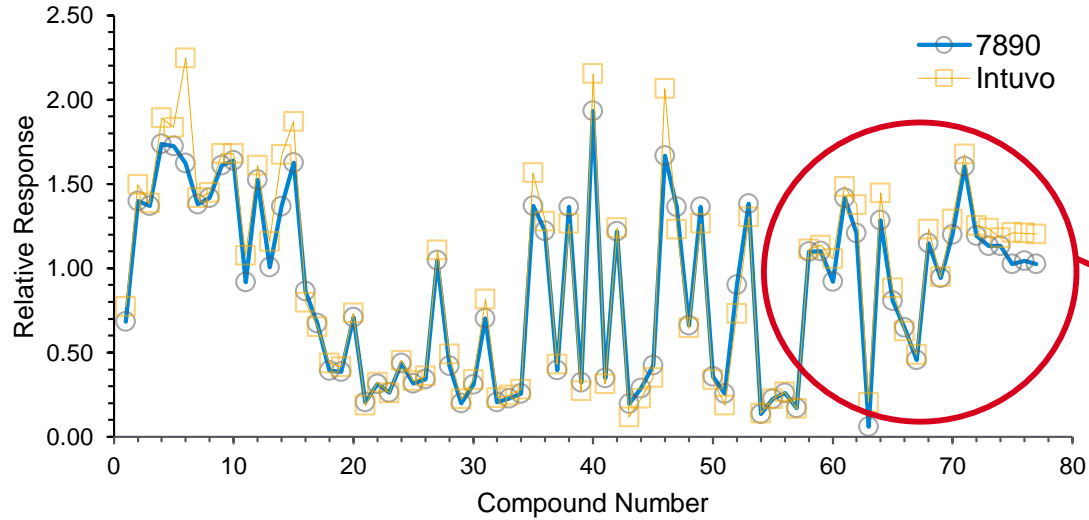
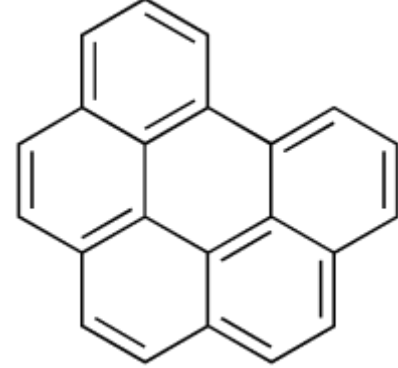


Five replicate overlay of ASTM D7798 SimDist standard mix

Efficient, Even, Direct Heating



Even high molecular weight compounds such as Benzo(ghi)perylene (molecular weight 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

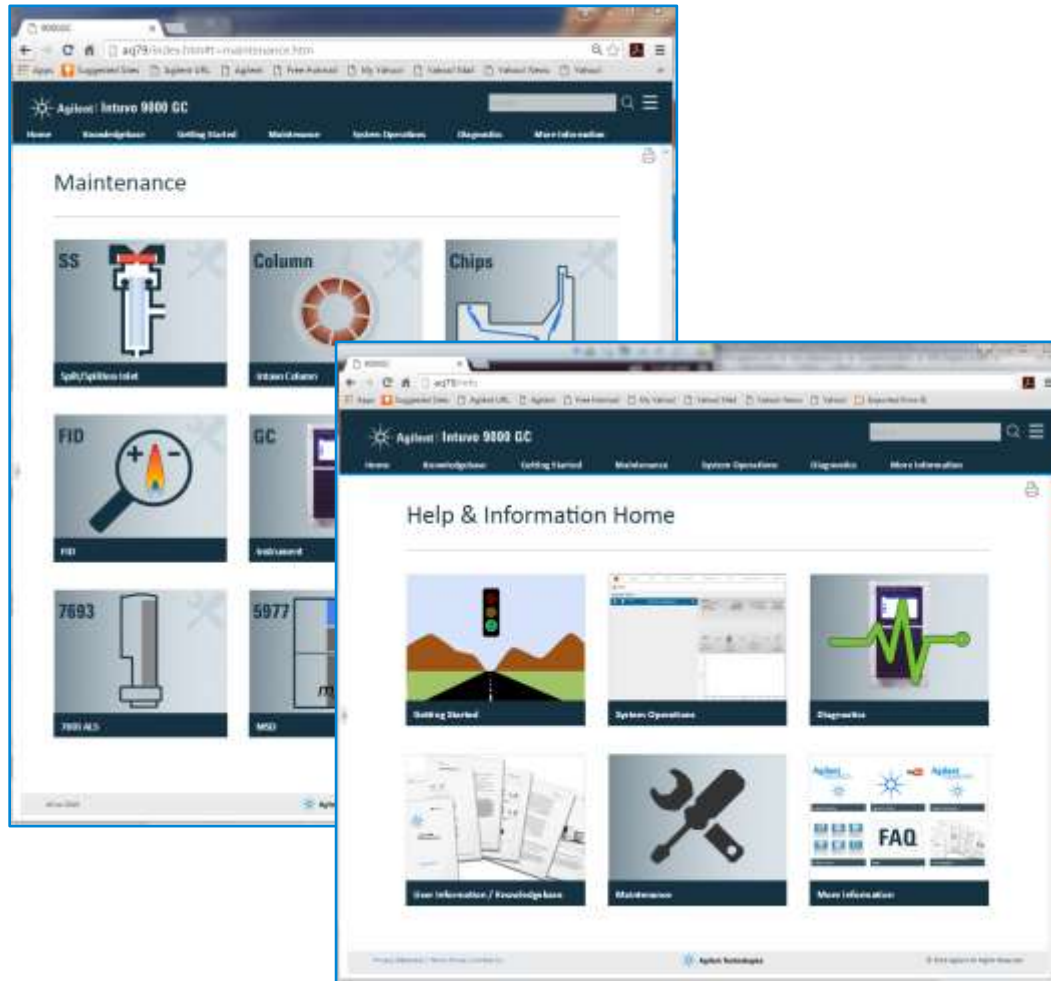
- Expectations of remote mobile connection
- Technology accessed through interactive graphic SW and apps

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

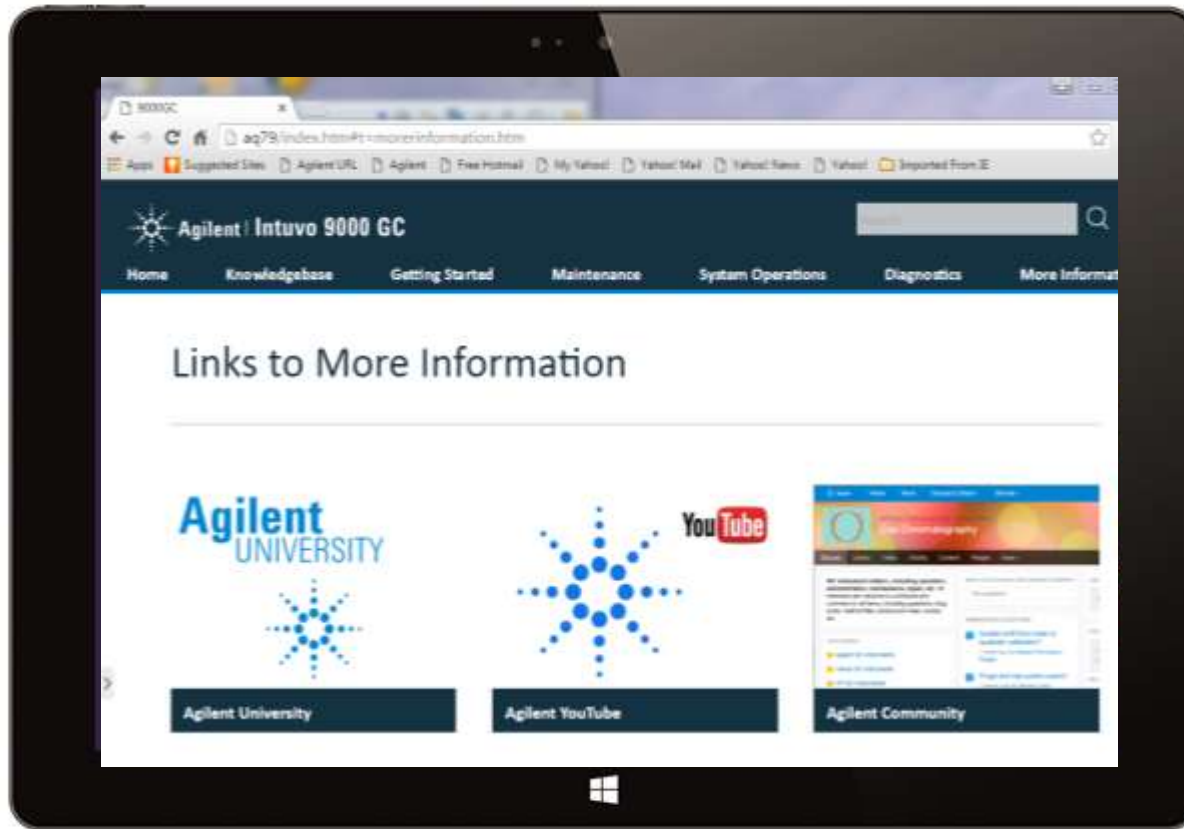
Confirm laboratory operations while out of the laboratory

Connect to any instrument with a single mobile device

Go Mobile

A Gateway of Information at Your Fingertips

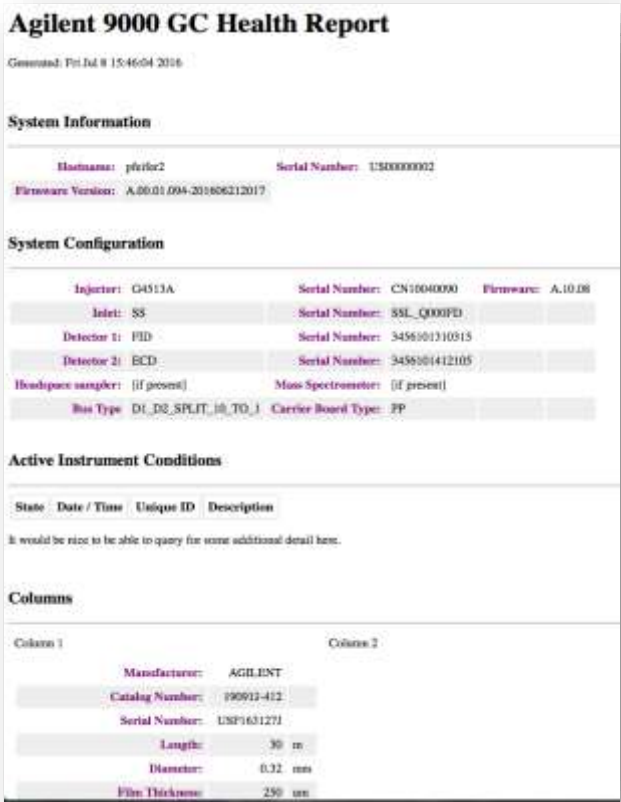
Whenever and wherever you are



- Online resources
- Agilent University
- YouTube
- Agilent.com
- Agilent GC community

Agilent CrossLab Services for Intuvo

A streamlined service experience



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



Intuvo 9000 GC 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

Questions



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