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Agilent 7890B Gas Chromatograph

Getting Started

Agilent Technologies

Notices

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Safety Notices

CAUTION

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

WARNING

A WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

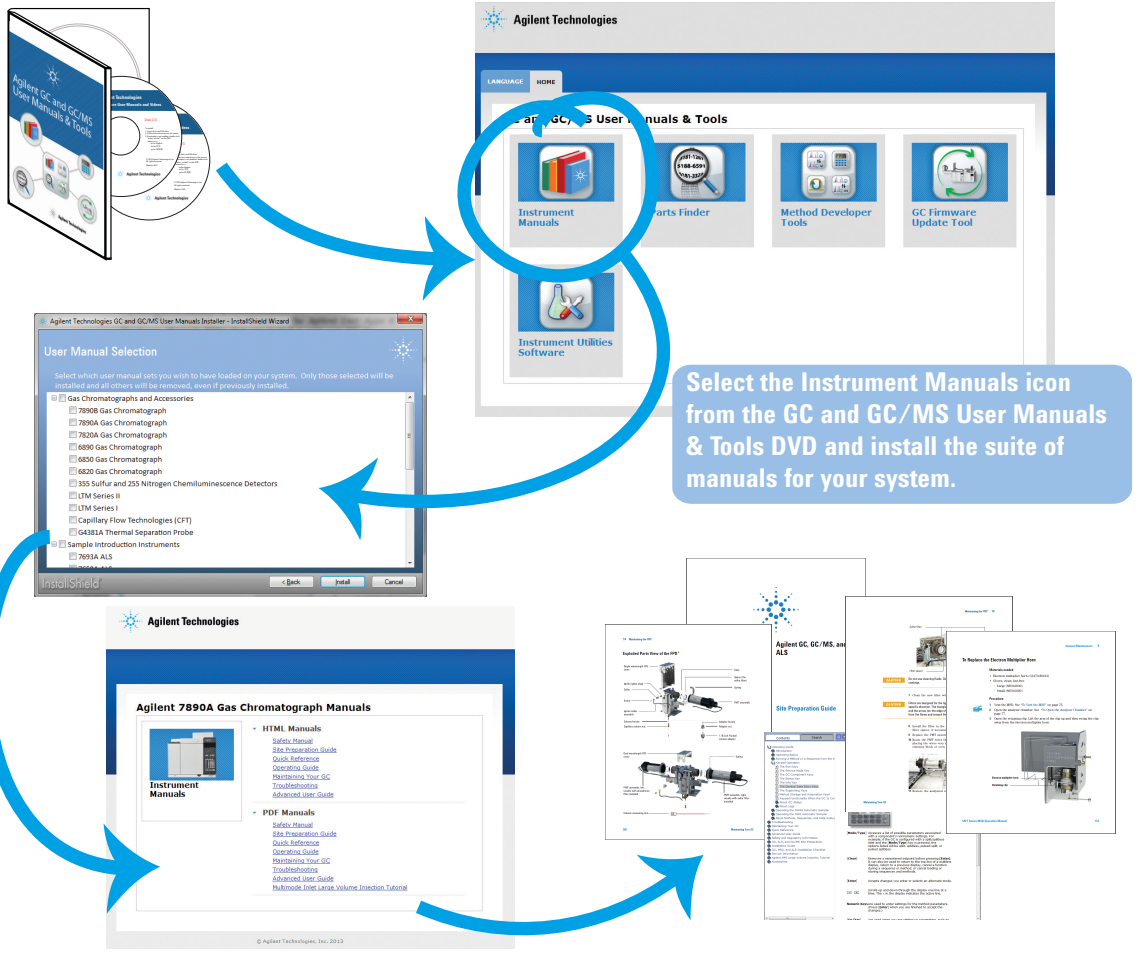
Contents

1
Manuals, Information, Tools and Where to Find Them

GC Manuals, Tools, and Online Help

In addition to this manual, Agilent provides several learning products that explain how to install, operate, maintain and troubleshoot the 7890B GC system. These manuals can be found on the *Agilent GC and GC/MS User Manuals & Tools* DVDs that are included with your GC shipment.

Installing your manuals provides for a much richer user experience by providing the ability to install the manuals you want, in the language you want. Install HTML and PDF versions.



Available manuals

Table 1 7890B GC Learning Products

Learning Product	Contents	When to use this documentation
Getting Started (this manual)	Overview of the manuals. Where to find information. How to install the manuals. Overview of the GC.	
Safety Manual	Lists safety and regulatory information. Precautions for using hydrogen carrier (or fuel) gas. Precautions for performing maintenance tasks.	• Before installation, to prepare for a safe installation process. • Before maintenance.
GC, GC/MS, and ALS Site Prep Guide	Requirements for: space and weight for the lab bench, power, heat dissipation, exhaust venting, laboratory conditions (expected local environment), gas and reagent gas purity, gas supplies, gas plumbing (including filters, regulator types, and tubing needs), and cryogenic cooling supplies (if used). Recommended supplies to purchase before installation.	• Before installation, to prepare the laboratory site. • Before installation, to find what supplies are needed for successful installation (such as gases, installation kits, gas purifiers, regulators, tubing, fittings, consumable parts, and so on). • At any time, to refer to expected requirements for gas supplies, regulators, cryogenic cooling supplies, supply pressures, and so on.
Installation and First Startup	How to install the GC on the laboratory bench. How to check GC performance after installation.	• During installation. • Whenever you need to verify performance of the instrument against factory standards, for example, after certain maintenance procedures.
Operation Manual	Common keyboard functions. Using the keyboard to start runs and sequences. Using the keyboard when connected to an Agilent data system. Methods and sequences overview. Startup and shutdown. Energy conservation (sleep/wake). Early Maintenance Feedback.	• To learn common operating tasks (making a run, loading a method, running a series of samples). • To learn how to use the GC keyboard when under data system control. • Before a short-term or long-term shutdown. • When starting up the GC after a period of inactivity.

Table 1 7890B GC Learning Products (continued)

Learning Product	Contents	When to use this documentation
Advanced Operation Manual	Procedures and theory of operation not normally required for daily use: programming; configuration; detailed information about methods and sequences; inlet (column) flow and pressure modes; inlet, detector, valve, oven, and other setpoint details; cabling pinouts; and output signal settings.	• When developing methods. • When running the GC standalone (no data system). • To learn details about settings. • To learn how to properly configure GC components, especially when newly installed.
Maintaining Your GC	Procedures to maintain the GC, including procedures for all standard inlet and detector options. Replacement parts information. Instructions for using Early Maintenance Feedback (EMF).	• To look up a replacement part or consumable part. • Before performing any maintenance on the GC.
Troubleshooting	Procedures for resolving GC issues. Symptoms and resolutions for resolving GC or chromatographic or hardware issues. Procedures to determine whether an issue is hardware-related, software-related, or related to other factors (such as sample preparation).	• When trying to isolate the cause of unexpected performance issues.
GC Software Familiarization	Introduction to the data system control software user interface for the GC. Introduces concepts for EMF and configuration, and other new features.	• To locate settings in the data system user interface.
Data system help	Topics and tasks for creating and editing methods for the GC.	• To answer questions about using the software to control the GC.

Language Versions

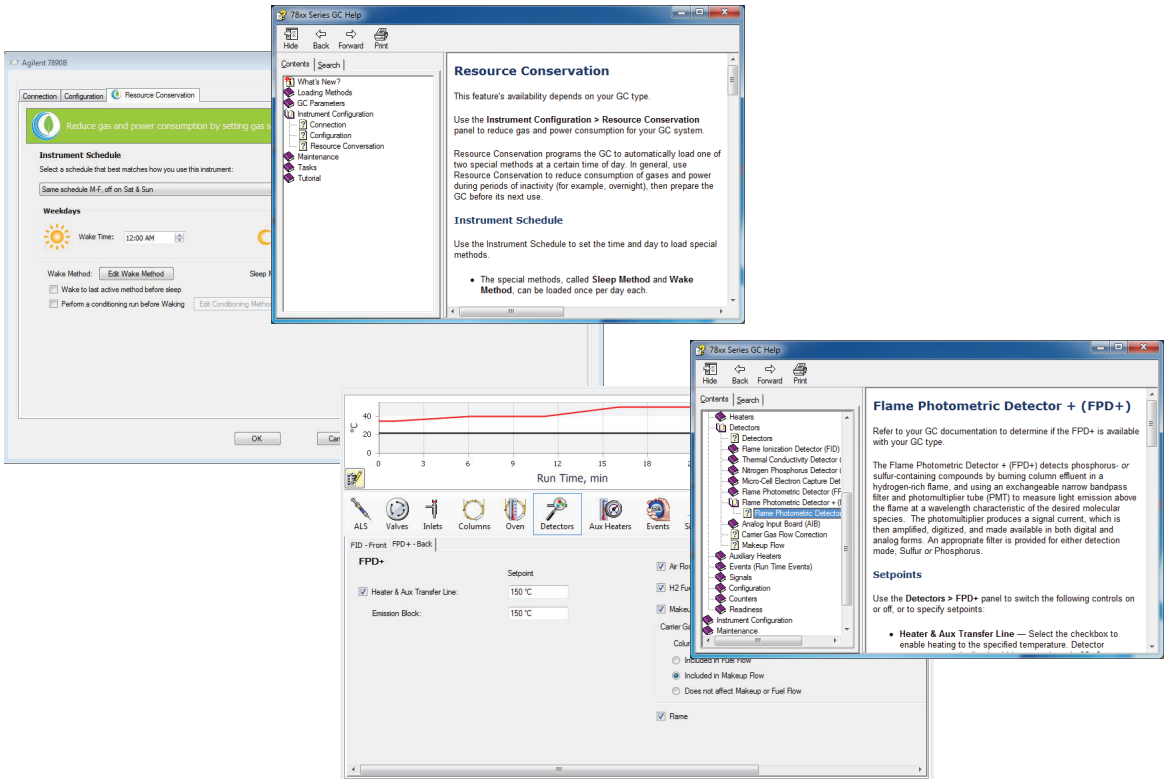
Agilent provides the 7890B learning products in several languages. Table 2 below lists the manuals and the languages available for each manual format (print, Adobe PDF, or HTML).

Table 2 Languages available for GC manuals

		Language								
Manual	**Format**	**English**	**Chinese**	**French**	**German**	**Italian**	**Japanese**	**Brazilian Portuguese**	**Russian**	**Spanish**
Getting Started	Print	✓	✓				✓	✓		
	HTML	✓	✓				✓			
	PDF	✓	✓	✓	✓	✓	✓	✓	✓	✓
Safety Manual	HTML	✓	✓				✓			
	PDF	✓	✓	✓	✓	✓	✓	✓	✓	✓
Installation and First Startup	HTML	✓	✓				✓			
	PDF	✓	✓	✓	✓	✓	✓	✓	✓	✓
GC, GC/MS, and ALS Site Prep Guide	HTML	✓	✓				✓			
	PDF	✓	✓	✓	✓	✓	✓	✓	✓	✓
Maintaining Your GC	HTML	✓	✓				✓			
	PDF	✓	✓	✓	✓	✓	✓	✓	✓	✓
Troubleshooting	HTML	✓	✓				✓			
	PDF	✓	✓	✓	✓	✓	✓	✓	✓	✓
Operation Manual	HTML	✓	✓				✓			
	PDF	✓	✓	✓	✓	✓	✓	✓	✓	✓
Advanced Operation Manual	HTML	✓								
	PDF	✓								
Software Familiarization	HTML	✓	✓				✓	✓		
	PDF	✓	✓				✓	✓		

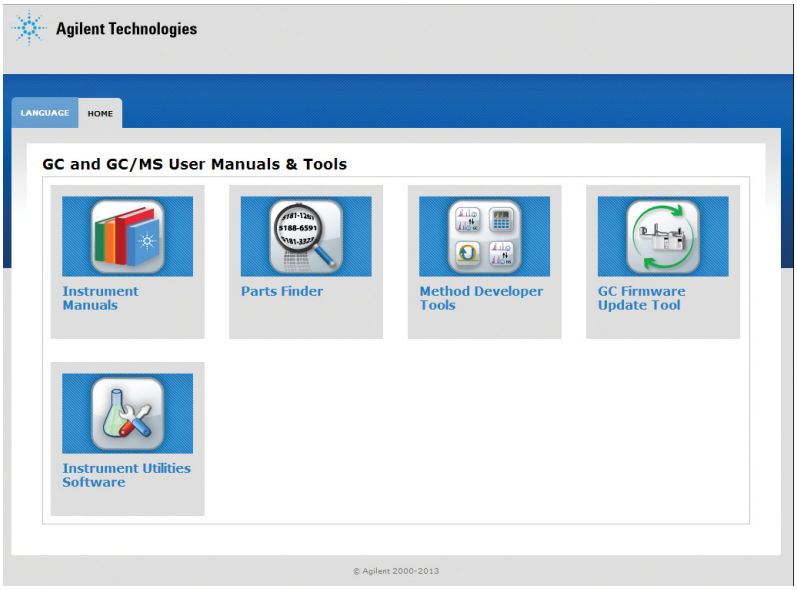
Online help

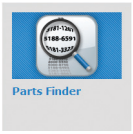
In addition to hardware manuals, your GC data system also includes an extensive online help system with detailed information, common tasks, and video tutorials on using the software.



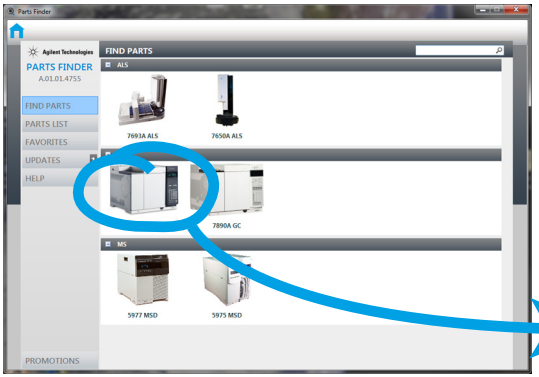
User Apps

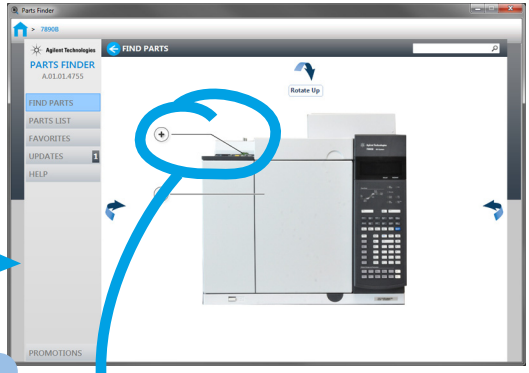
In addition to the Hardware Manuals, you will also find several User Apps on the Agilent GC and GC/MS User Manuals & Tools DVDs. See below for a list of available Apps, such as Parts Finder, the GC Firmware Update Tool, Instrument Utilities, and a variety of Method Developer Tools.



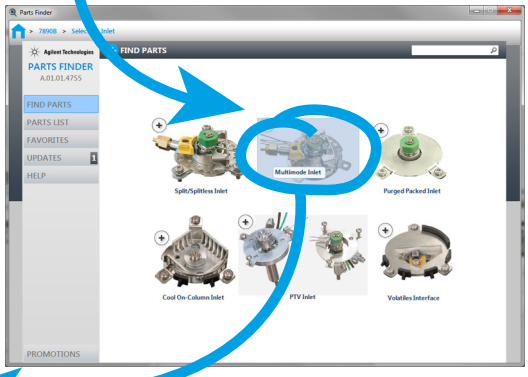


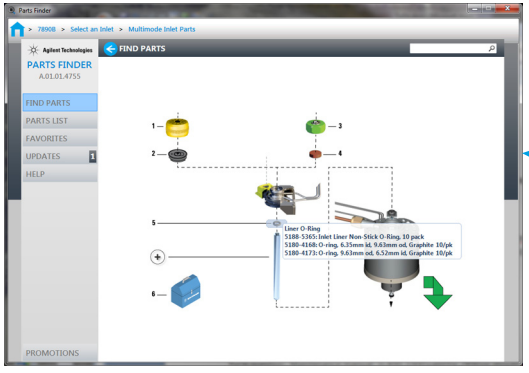
Install Parts Finder to quickly find replacement and consumable parts by clicking though images of the instrument.





Instead of thumbing through a catalog or manual, you can quickly click on photos and artwork to isolate the instrument components of interest (a specific type of inlet or detector, ion source, or sampler tray, for example), then visually browse to the parts you need.

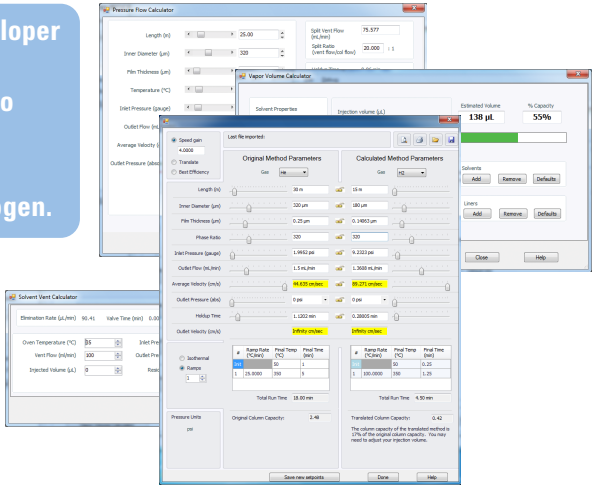




Not only does Parts Finder save time when ordering parts, but it also updates itself from the internet so you can always access the latest parts list for all of your instruments.

Install the GC Firmware Update tool to install the latest firmware onto your GC and sampler systems.

Install Method Developer Tools, such as the Method Translator, to help you convert a helium carrier gas method to use hydrogen.



Install Instrument Utilities, a suite of tools and utilities for your Agilent 7890 Series GC.

Education Opportunities

Agilent has designed customer courses to help you learn how to use your GC to maximize your productivity while learning about all of the great features of your new system:

R1778A — Agilent 7890 Series GC and OpenLAB ChemStation Operation

R1914A — Agilent 7890 Series GC Maintenance

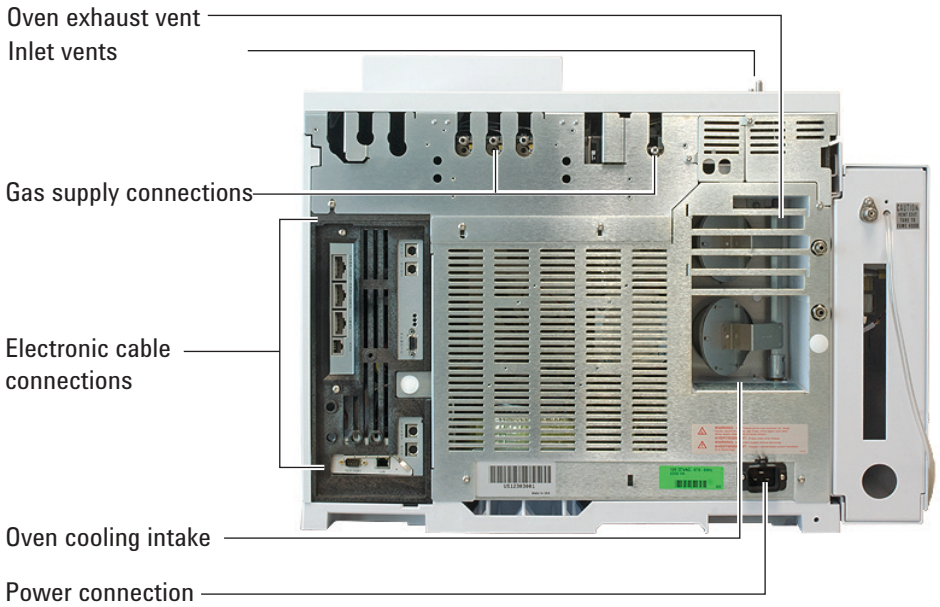
R2255A — Agilent 7890 Series GC and OpenLAB EZChrom Operation

For course details and education opportunities, visit http://www.agilent.com/chem/education, or call you local Agilent sales representative.

2
Overview of the 7890B GC

The 7890B Gas Chromatograph

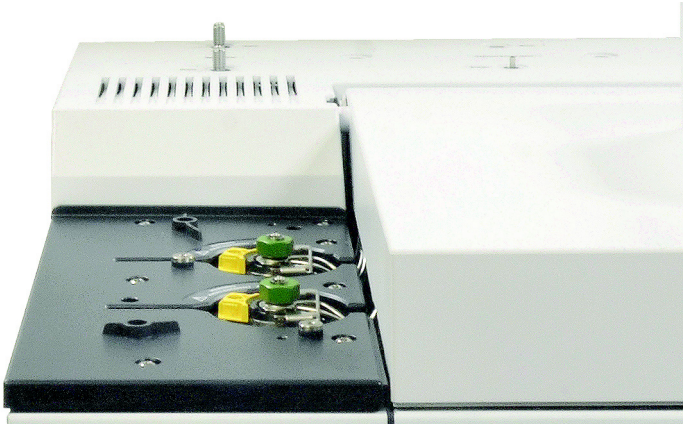

Detector cover
Detectors
Inlets
Valves
Display
Keypad
Power switch
Oven Latch


Oven exhaust vent
Inlet vents
Gas supply connections
Electronic cable connections
Oven cooling intake
Power connection

The inlets

Inlets inject samples into the GC. The 7890B GC can have a maximum of two inlets, identified as **Front Inlet** and **Back Inlet**.

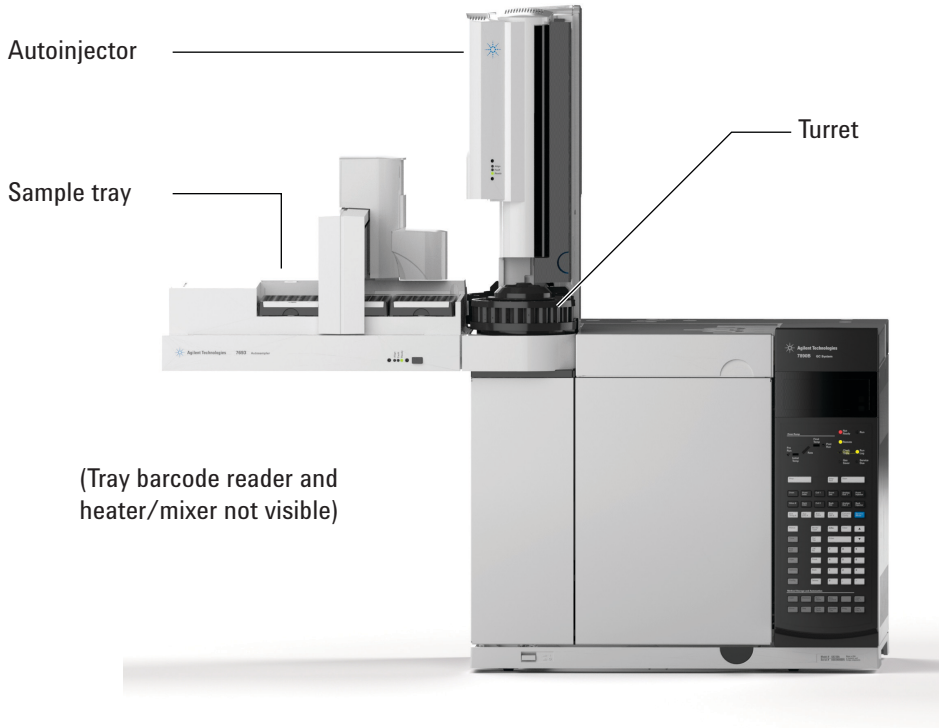
A complete selection of inlets—split/splitless [0–100 psi and 0–150 psi], multimode, purged packed, cool on-column, programmed temperature vaporization, and volatiles interface—are available.



Samples can be injected into the inlets by an automatic sampling device (such as an Agilent Automatic Liquid Sampler or Agilent Headspace Sampler), or by hand using a syringe.

Automatic injectors

The optional Agilent 7693A automatic liquid sampler (ALS) with a sample tray and bar code reader automates liquid sample processing, including basic sample preparation. The modular design allows the autoinjector to be easily moved from one inlet to another or from one GC to another. The modular design also permits easy inlet maintenance. Also available is the Agilent 7650 ALS injector, which provides similar injection capabilities (without sample preparation).



Automatic gas sampling valves

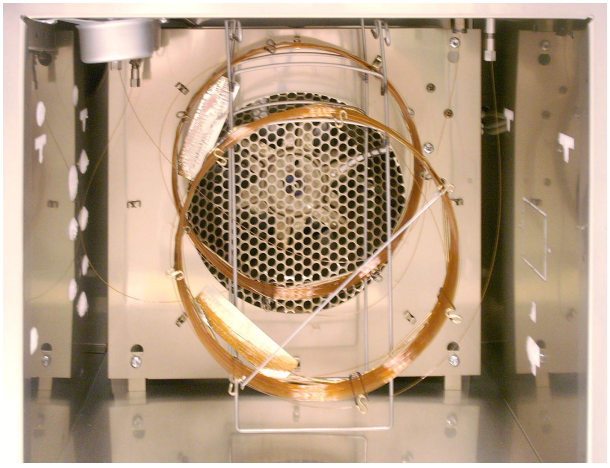
The sampling valves are simple mechanical devices that introduce a sample of fixed size into the carrier gas stream. Valves are most frequently used to sample gases or liquids in constantly flowing streams.

The GC column and oven

GC columns are located inside a temperature-controlled oven. Generally, one end of the column is attached to the inlet, while the other end is attached to the detector.

Columns vary in length, diameter, and internal coating. Each column is designed for use with different compounds.

The purpose of the column and the oven is to separate the injected sample into individual components as the sample travels through the column. To aid this process, the GC oven can be programmed to speed the sample flow through the column.

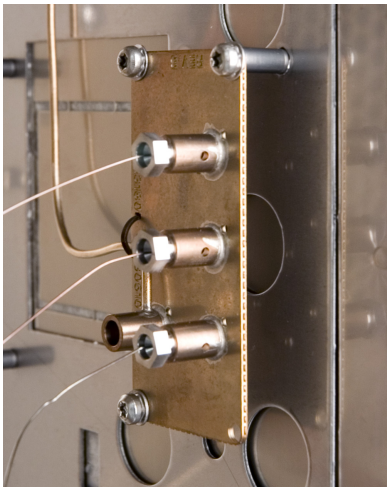


Agilent also offers Low Thermal Mass (LTM) columns. These columns mount in a special oven door and provide fast heat-up and cooldown cycles.

Capillary Flow Technology

Agilent Capillary Flow Technology (CFT) devices are used for splitting, heart cutting, backflushing, and reliable zero dead volume connections. The features of the capillary flow technology make traditionally difficult connections simple, reliable, and leak free.

The optional CFT switches, splitters, and union accessories install on the inside of the oven walls. They allow the chromatographer to design very efficient sample paths using multiple columns or detectors. When used with Agilent's Backflush Wizard technology, CFT devices can also provide increased productivity by flushing unwanted compounds backwards off the column, thereby shortening run times and preventing column contamination.



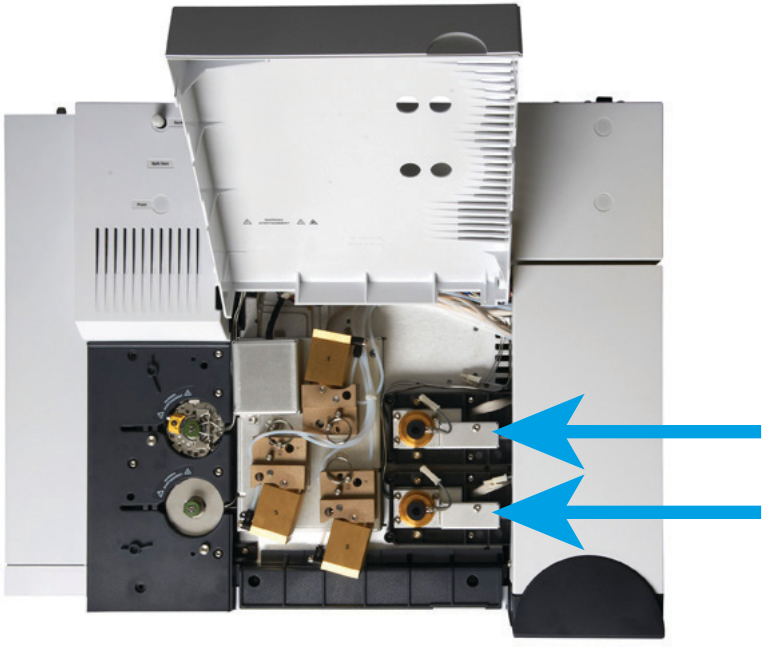
Detectors

Detectors identify the presence of compounds as they exit the column.

As each compound enters the detector, the detector generates an electrical signal proportional to the amount of compound present. This signal is generally sent to a data analysis system where it shows up as a peak on a chromatogram.

The 7890B GC can accommodate up to three internal detectors, identified as **Front Det**, **Back Det**, and **Aux Det.**

A complete selection of internal and external detectors (FID, TCD, NPD, FPD^{+}, FPD, µECD, MSD, Triple Quadrupole MS, Q-TOF MS, Ion Trap MS, SCD, and NCD) are available.



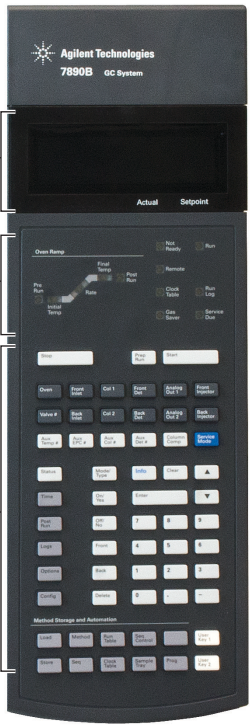
The operating panel

The operating panel consists of the display, status lights, and keyboard. See the *Operating Manual* for more information.

Display
Shows status, setpoints, current activity, and messages.

Status lights
LEDs indicate general status, run state, program state, external control, and maintenance due.

Keyboard
Use to enter settings and program the GC.



3 New Features

This section introduces some of the new features available on the 7890B GC.

New Features

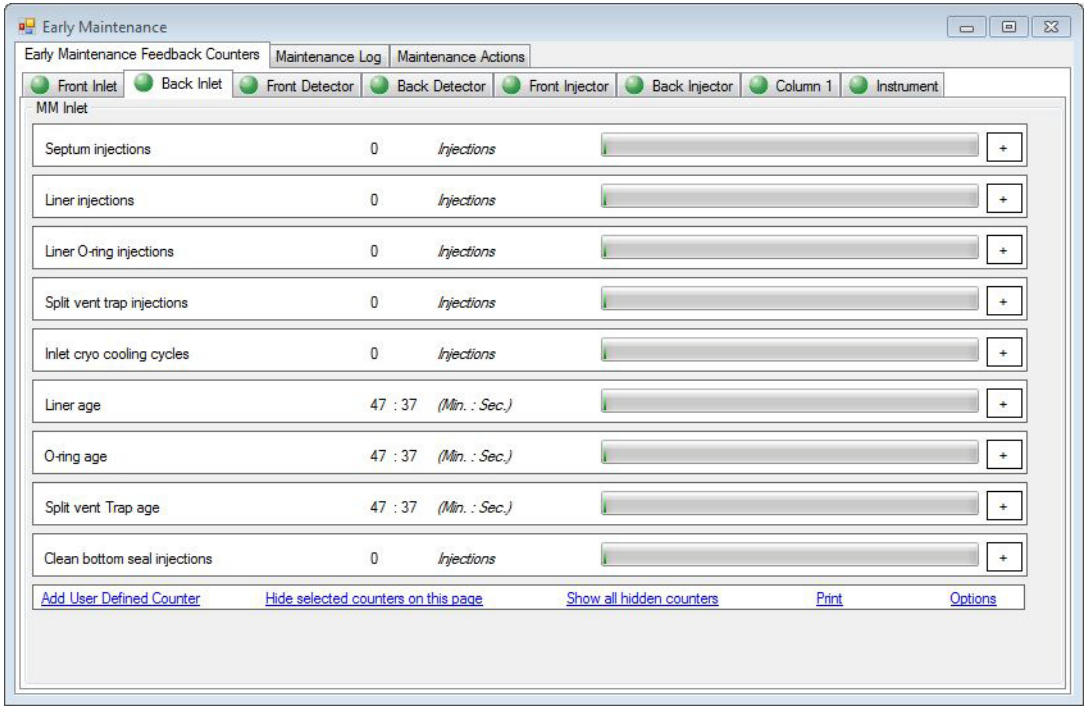
Smart Technologies

Agilent's Smart Technologies enable the 7890B and a Smart Technology-enabled instrument such as the 5977 MSD to directly interact. Each instrument communicates with and reacts to the other, allowing actions such as:

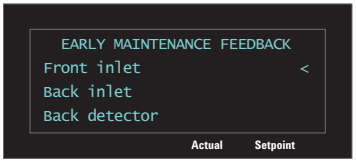
- Fast Vent — The GC and MSD work together to safely vent the MSD with the press of a button.
- Safety shutdowns — In the event the GC or MSD enter a shutdown state (for example, if you run low on carrier gas), both instruments react to mutually prevent column and source damage.
- Shared messages — The GC receives and displays various MSD messages, allowing you to more easily see the system status.

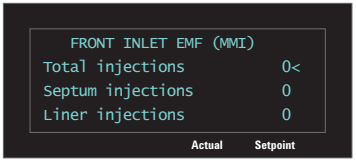
Improved Early Maintenance Feedback (EMF)

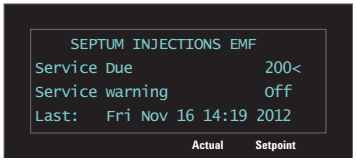
The 7890B GC now offers improved EMF handling, making it easier to track consumables usage. EMF now provides more tracking counters, including 5 user-defined counters, all accessible from the GC front panel. When used with an Agilent data system, the counters are easily set, monitored, and reset from a new user interface in the control software.



You can also use the GC keyboard.





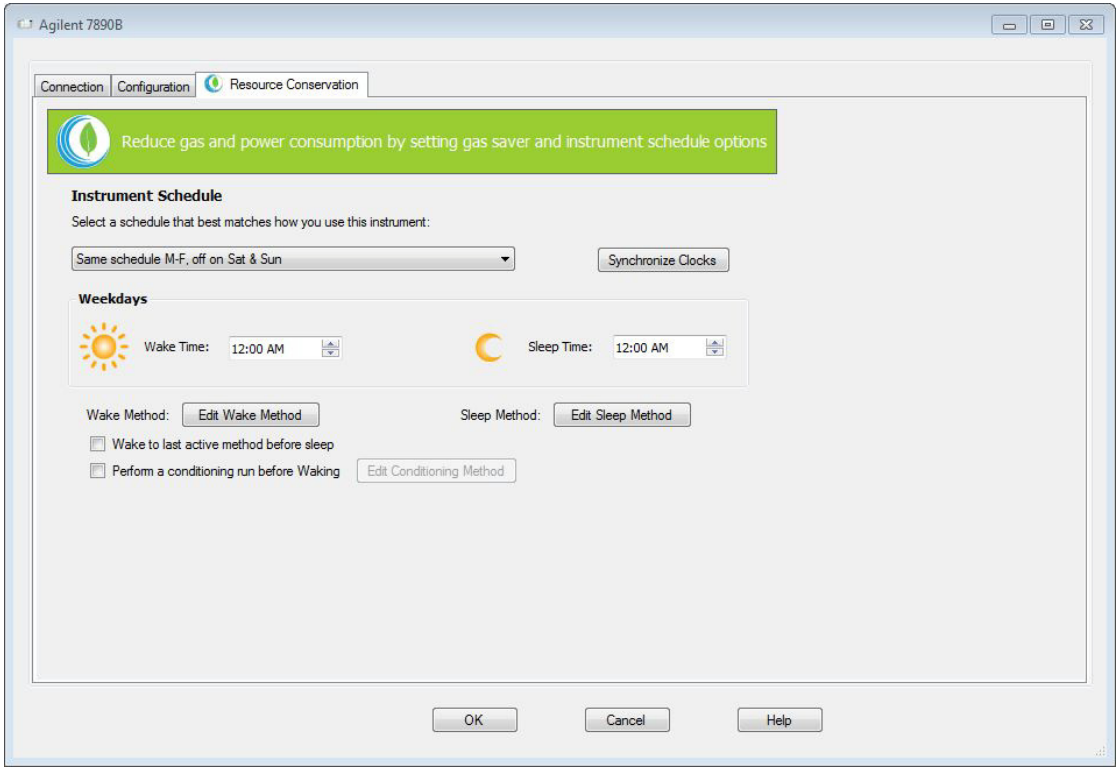


Access to Agilent's Method Calculators

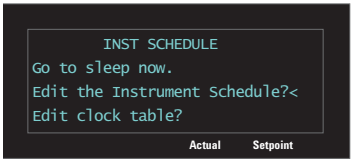
Users of Agilent data systems can now access the method calculator, method translator, vapor volume calculator, and solvent vent calculators directly from the control software.

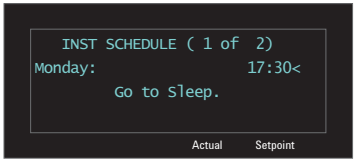
Energy- and Gas-saving features

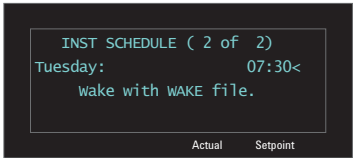
The 7890B GC incorporates resource conservation features that allow you to schedule reduced power and gas usage during periods of inactivity. In addition, you can schedule the GC to automatically restore its normal operating conditions so it is ready when needed. Access this feature from the data system.



You can also use the GC keyboard.

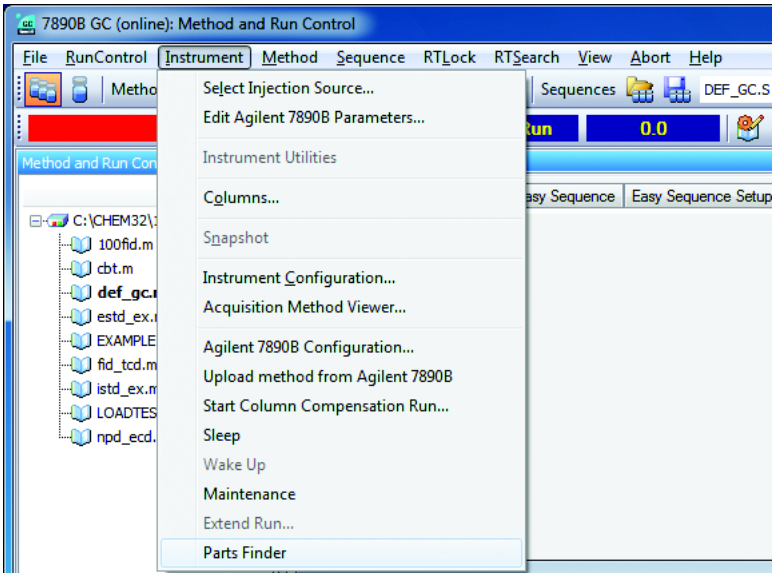






Find parts from your data system

Users of Agilent data systems who install Parts Finder can now find replacement parts and consumables without leaving the data system.



FPD+

Flame photometric detector (FPD) users can order the new FPD+ detector, which offers increased sensitivity, higher operating temperature, and increased performance compared to the 7890A FPD.

Increased detector sensitivity

The 7890B GC FID, µECD, and NPD with Blos bead now perform better than similar detectors on the 7890A.

4
Using Hydrogen Carrier Gas

Using Hydrogen Carrier Gas

The 7890 Series GCs support use of alternative carrier gases to helium, such as hydrogen and nitrogen. Agilent provides a set of resources for translating your methods to use alternate carrier gases and to improve performance of these methods. See the Agilent web site at http://www.agilent.com/chem/heliumupdate.

If using nitrogen carrier gas, nitrogen poses no safety concerns, and requires no special hardware, compared to helium carrier gas.

If using hydrogen carrier gas, read the recommendations below. Also be sure to read the *GC, GC/MS, and ALS Site Preparation Guide* for important hardware requirements and safety tips, and also read the *7890 Series Safety Manual* for important information about handling hydrogen safely.

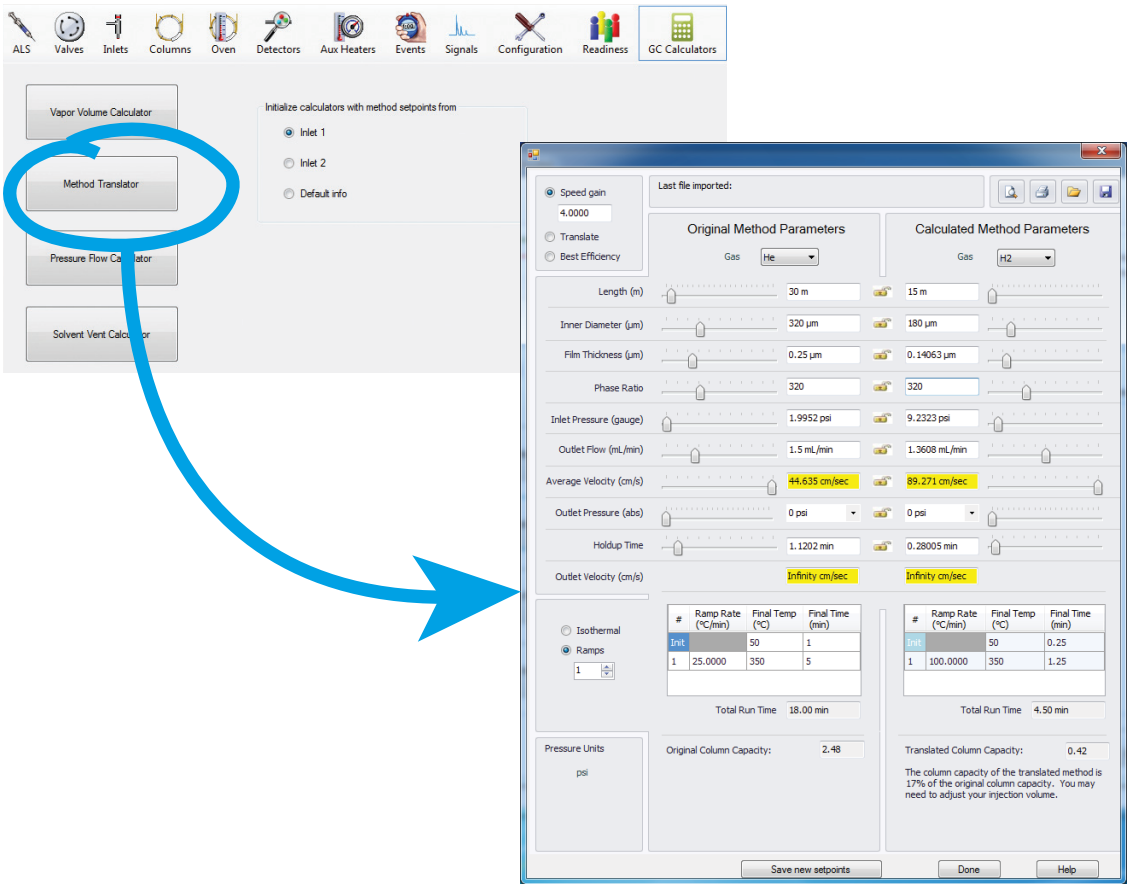
Special considerations

When using hydrogen carrier gas:

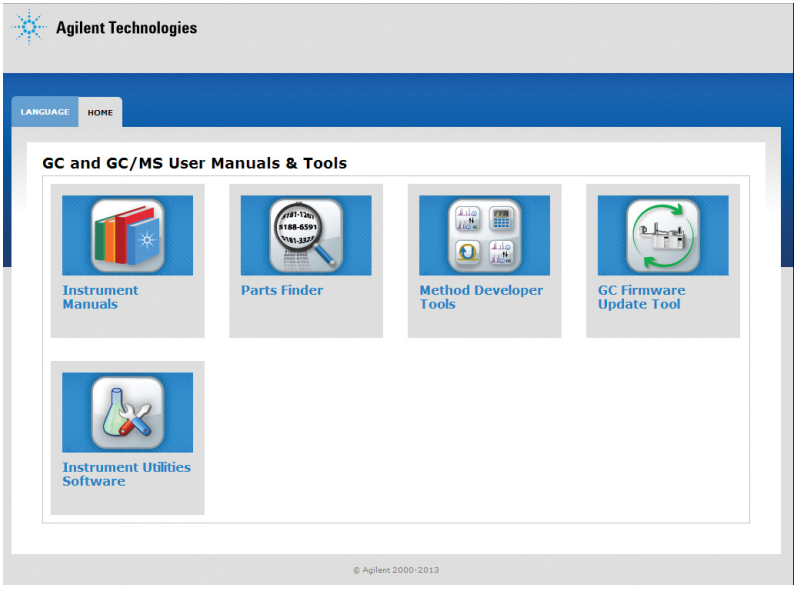
- Use stainless steel tubing.
- Do not reuse old tubing. Contaminants left behind by helium and nitrogen will be carried by hydrogen into the GC.
- Check all instruments for compatibility with hydrogen. Some instruments, for example Q-TOF MS, cannot use hydrogen carrier gas.
- Read the *7890 Series Safety Manual* for hydrogen warnings and precautions.
- See the *GC, GC/MS, and ALS Site Preparation Guide* for recommendations on good hydrogen sources.
- Always connect split vent, inlet purge vent, uncombusted detector exhaust, and other hydrogen sources to a fume hood or similar exhaust system.
- Use a good electronic leak detector, such as the Agilent G3388B, to check plumbing connections for leaks.

Method translation tools

Agilent's Method Translator helps you migrate your helium-based methods to use hydrogen or nitrogen carrier gas.



If not using an Agilent data system, Agilent also provides the method translation utility on the *Agilent GC and GC/MS User Manuals & Tools* DVDs.



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