



Instant Connect Helium Saver Module

Eastern Analytical Symposium 2014

The History of Gas Chromatography from Thermo Fisher Scientific (1956–1980)

Carlo Erba brand

At Museum of
Perfumes Grasse (F)



Fractovap Model B
(1959)

CROMATOGRAFI DA LABORATORIO

FRACTOVAP LINEA G

"Dual Column"

- Iniezione diretta in colonna
- Solo colonna dall'iniettore al rivelatore
- Operazioni multi-column
- Operazioni multi-detector
- Iniettore automatico di campioni solidi
- Gas cromatografi analitici e contemporaneamente preparativi

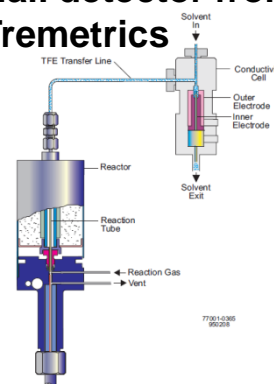
Per maggiori informazioni, richiedere DT 50/10 e DT 50/8

"Single Column"

- Iniezione diretta in colonna
- Solo colonna dall'iniettore al rivelatore
- Colonne capillari o ad impaccamento, in vetro o metallo
- Operazioni multi-column
- Rivelatori intercambiabili a ionizzazione
- 2 rivelatori in parallelo
- Iniettore automatico di campioni solidi

Per maggiori informazioni, richiedere DT FV GI

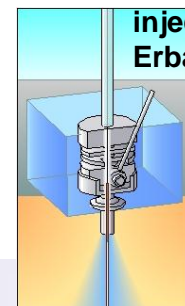
Hall detector from
Tremetrics



First Microprocessor
Controlled Programmable
GC Model 560

Model 700A Hall
Detector Introduced

Cold on-column
injector from Carlo
Erba Instruments



First Multi-Injector for
Capillary Columns, Including
Programmable Temperature
Mode, PTV, Introduced

Model 570 GC Introduced
with 7" CRT Display

1956 Introduction of the First
Commercial GC in Europe

1962 Commercialized first
Split Mode Injector for
Capillary Columns

Model 222 Gas
Chromatograph
with ECD Detector
Introduced in USA

1968

Commercialized
First Splitless
Mode Injector for
Capillary Columns

1971

1975

First Worldwide
Dedicated Capillary GC
with Multiple Detectors

1978

First Worldwide Cold-
on-Column Injector
for Capillary Columns

1981

The History of Gas Chromatography from Thermo Fisher Scientific(1980–2004)

HT SimDist from Carlo Erba Instruments



UltraFast solution



1983 Large Sample Volume Via Cold-on-Column Injection Introduced

1984 UltraSonic Detector Commercialized

1984 First Worldwide High Temperature Capillary GC System

1986 OFID Introduced for Oxygenates in Gasoline

1987 Discharge Ionization Detector Introduced for PPB Detection of Fixed Gases

1988 First Worldwide On-line Coupled HPLC Capillary GC System: Dualchrom



1991 Variable Geometry SSL Injector Introduced to Eliminate Discrimination

1993 First Worldwide Liquid Autosampler for Conventional and Large Sample Volume Injection

1997 Column Characterization Introduced for Improved Carrier Gas Flow Control

1997 1998 TRACE™ GC: First Integrated, Fully Automated GC for Conventional and Large Sample Volume Injection

2002 First UltraFast Chromatograph Shortens Analysis Time >30X

2002 Large Sample Volume Splitless Introduced

2004 Comprehensive GCxGC Introduced on Finnigan TRACE GC ULTRA Platform

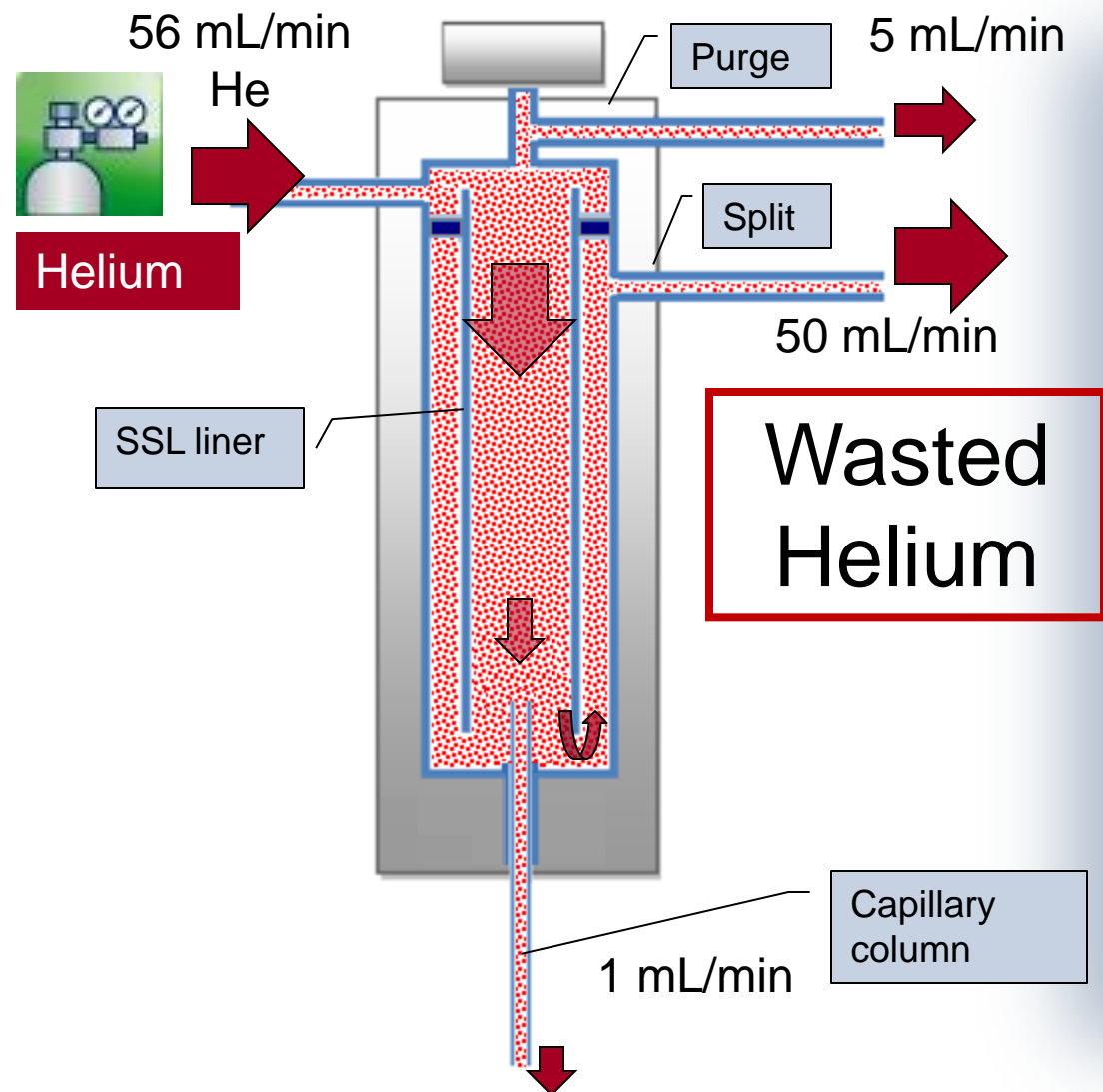
2004 TriPlus™ Family of Robotic Autosamplers for Conventional and all Large Sample Volume Injection Techniques



1990

2000

The Helium Waster: Split/Splitless Injector



- Same gas used in the carrier, septum purge and split paths
- Only ~1/10–1/50 of the total flow enters the column
- Purge and split flows cannot be reduced beyond a certain limit without introducing contamination into the column/detector:
 - Sample matrix accumulated in liner and lines
 - Septa particles
 - Air diffusing from septa
 - Seals outgassing

The Helium Saver

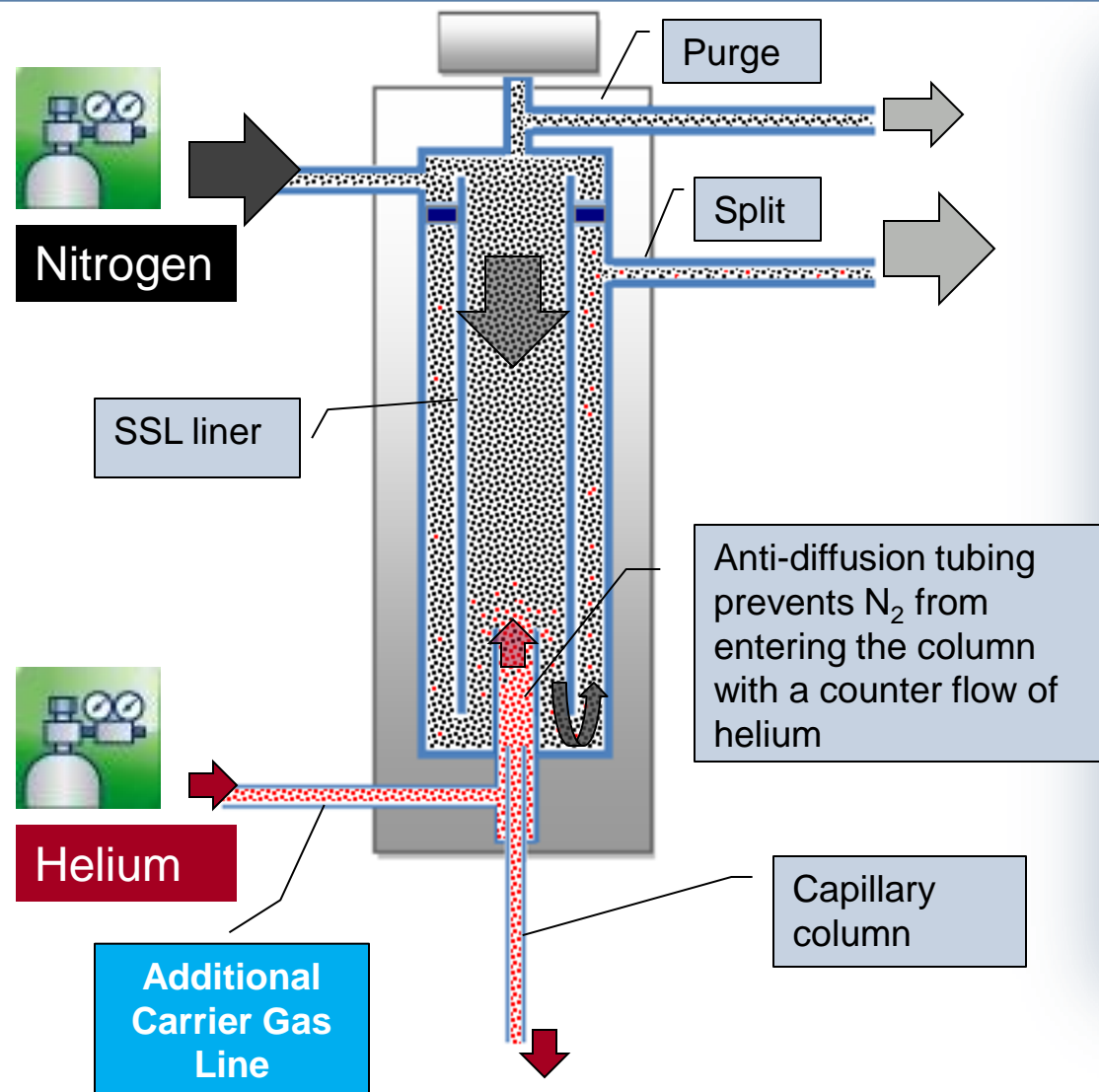
The **revolutionary** Thermo Scientific™ Instant Connect Helium Saver Module for chromatographers seeking freedom from the helium supply crisis, offers a GC & GC-MS instrument **lifetime helium carrier gas solution** while **keeping existing methodology**. Unlike others, the Helium Saver is a module that is **always ready** and works **while your instrument is running**, as well as when it is idle, providing **up to 14 years** of GC & GC-MS operation from a *single helium cylinder*.

- **Maintain your Methods**
- **Prolong your Supply**
- **Save your Budget**



www.thermoscientific.com/heliumsaver

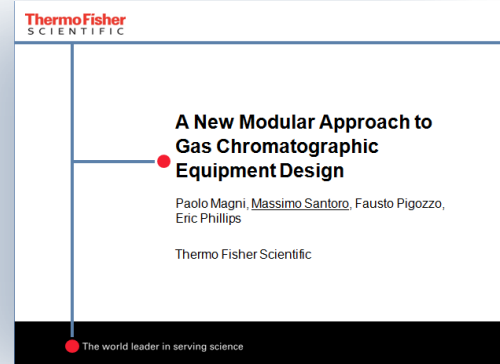
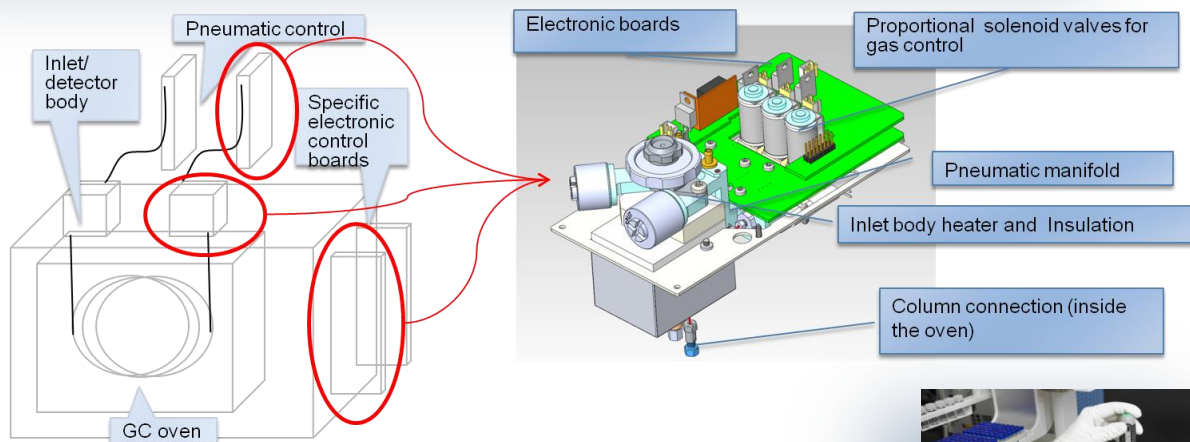
Instant Connect Helium Saver Module



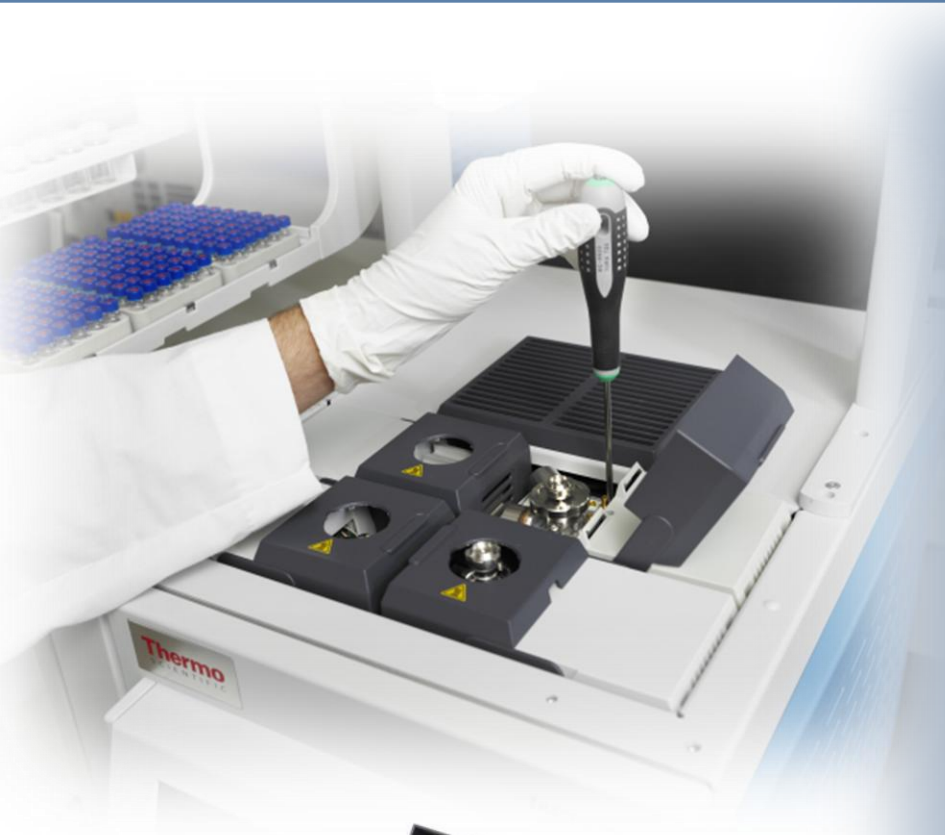
- Inlet is supplied with 2 different gases
 - **Nitrogen** is used for septum purge and split flows
 - **Helium** only feeds the analytical column; its consumption is drastically reduced
- **Nitrogen** column head pressure settings regulate **Helium** flow
- Available as user-installable Instant Connect module

Benefits of Instant Connect Modularity

- Presented at Pittcon 2012, Instant Connect user-installable modules incorporate
 - Injector (or detector) body and heater
 - Gas control valves
 - Gas control valves
 - Electronics for temperature and gas control for signal amplifier and A/D conversion



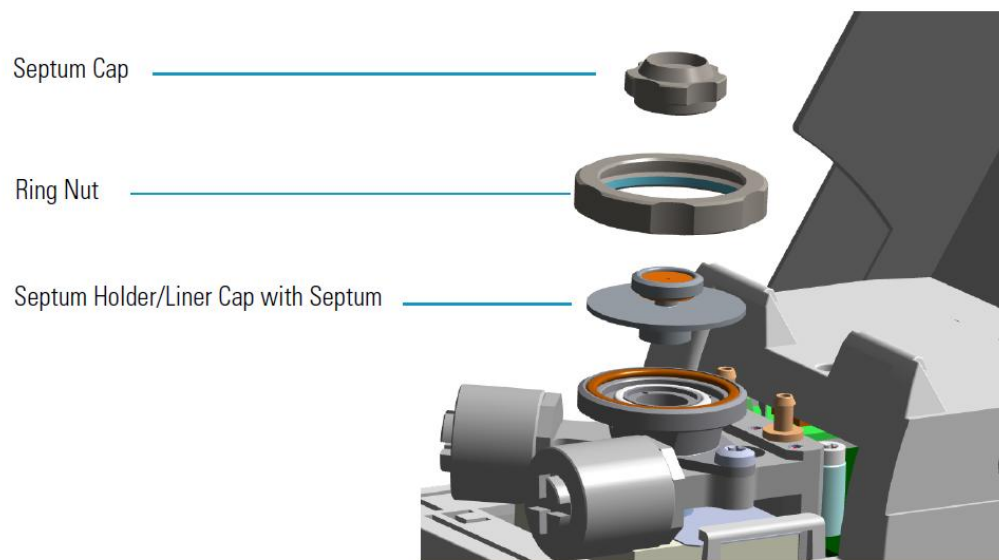
Tailor Instrument Configuration with GC Modularity



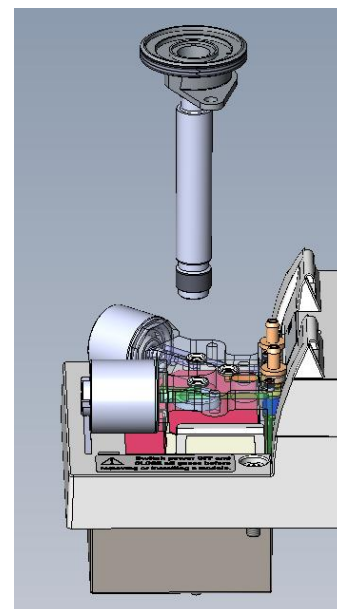
- **Thermo Scientific™ TRACE™ 1300 Series GC**
 - Instant Connect modules are user-installable in less than two minutes
- **Instant Connect injector and detector modularity**
 - Tailor GC configuration to the application
 - Adopt a future-proof GC platform
 - Ease and scale up investments
 - Maximize instrument uptime and resume operations quickly
 - Ensure constant response time
 - Reduce capital investments
 - Make troubleshooting easy

SSL Inlet for TRACE 1300 Series GC

- Remove the top parts of the SSL Injector
 - Simple and Fast Septa & [Liner](#) Replacement

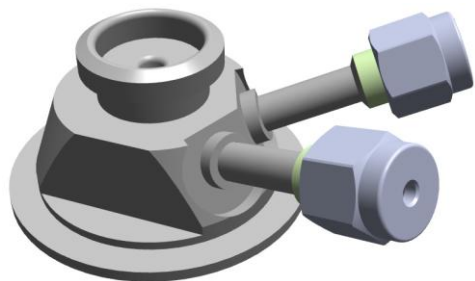


SSL Injector Body Removal
for best practice in cleaning



Purge & Trap and Head Space Adapter for TRACE 1300 GC

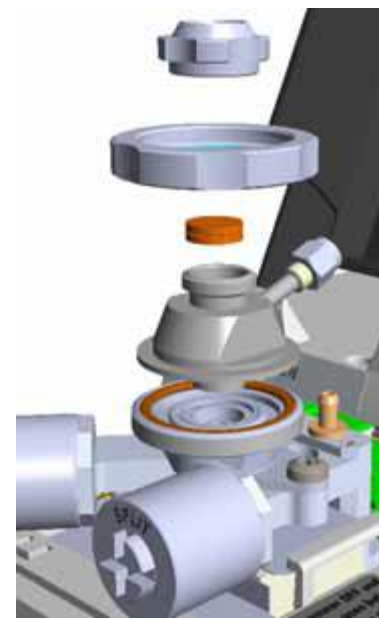
- These adapters are a modification to the 1300 SSL Module
- Adapters allow direct coupling of the Purge and Trap or Head Space (HS) transfer line to the heated inlet
 - Reduces potential cold spot
- No cut or unions are required in the carrier gas pathway
- Adapters available for thermal desorption and pyrolysis



Purge & Trap Adapter

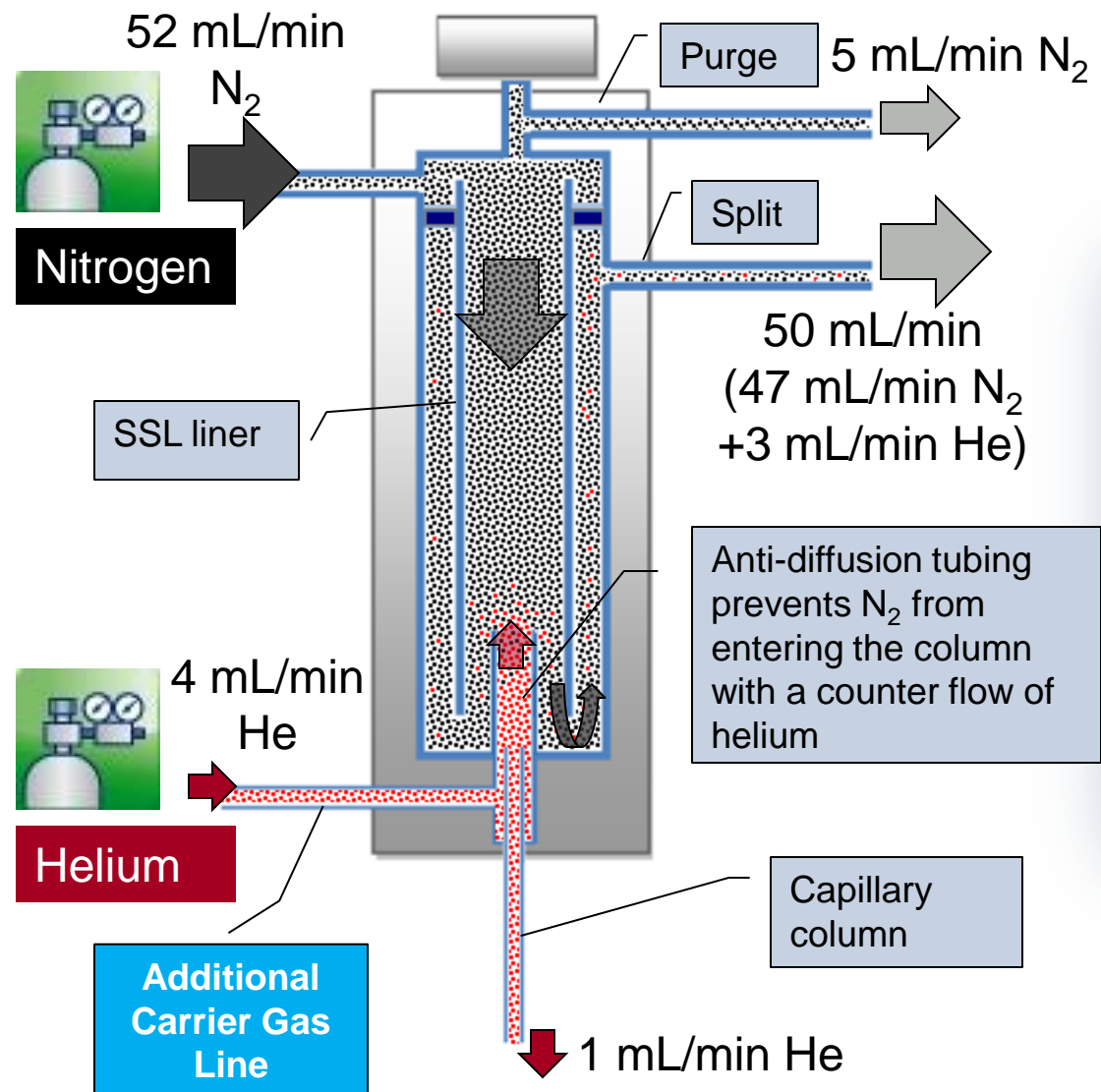


Head Space Adapter



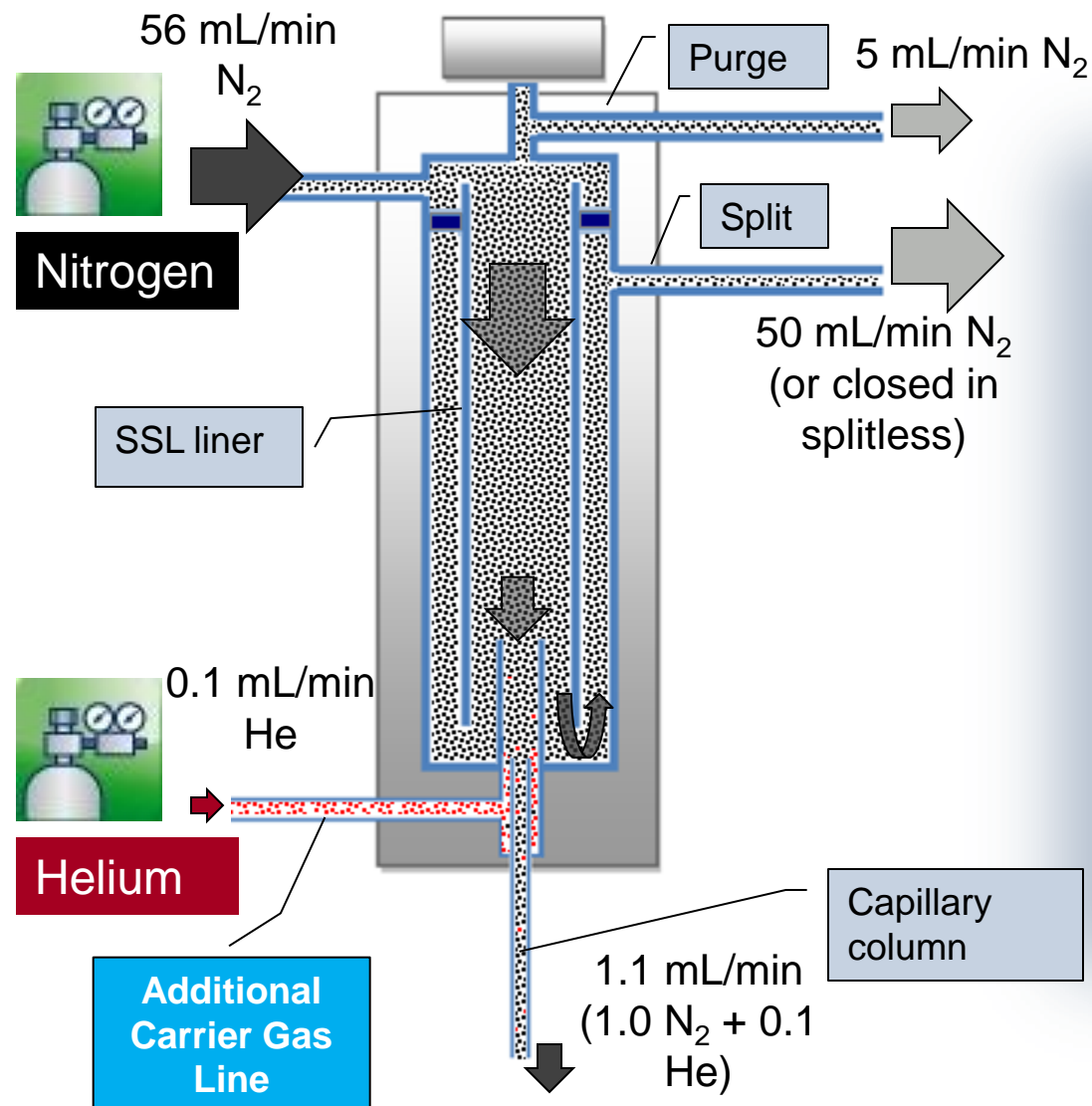
Simple Installation

How the Helium Saver Module Works: Operation



- During all “non-injection” periods, helium is supplied with a flow slightly higher than the column flow
- Helium consumption is only 1/15 – 1/20 of standard Split/Splitless injector

How the Helium Saver Module Works: Injection



- During the injection period, nitrogen flows into the column for sample introduction
- Helium is supplied at 0.1 mL/min to keep the connection swept and avoid dead volumes
- When GC is in stand-by, can be left in this condition with zero consumption of helium
- Separation done in helium

Helium Saver Enables a Cylinder of Helium to Last...

3.5 years continuously used 24/7/365 for GC-MS analysis

and up to

14.6 years shutting helium off or to N₂ on weekends and overnight

For a *Thermo Scientific™ TRACE 1300 Series GC, ISQ™ Series GC-MS* and *TSQ™ 8000 GC-MS/MS* with the *Helium Saver Module*,

it means this could be the **last and only** helium cylinder that will be needed for the lifetime of the instrument



Helium Saver Module Example

GC Flow Conditions		EPA 8270 Standard
He carrier gas flow	mL/min	1
He split flow	mL/min	60
Gas saver flow	mL/min	20
Gas saver on	min	3
Purge flow	mL/min	5
Run time	min	25
He volume in cylinder	L	7,300
Runs per Day		57
He cylinder cost	USD	\$300
N ₂ cylinder cost	USD	\$60

- **Example:** U.S. EPA Method 8270 (semi-volatiles analysis with GC-MS)
- **Total analysis time:** 25 minutes
- **Around-the-clock analyses per day:** 57

Helium cylinder life time was extended from 5 months to 3.5 years of continuous uninterrupted use

Helium Savings: 7 times
(continuous uninterrupted use)

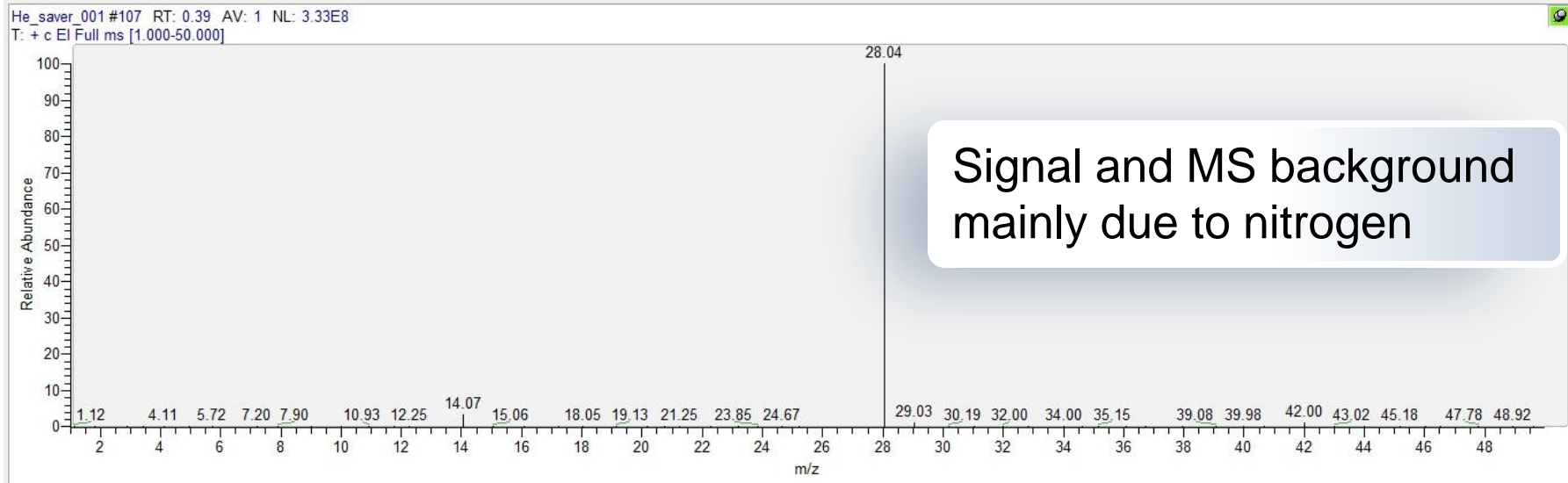
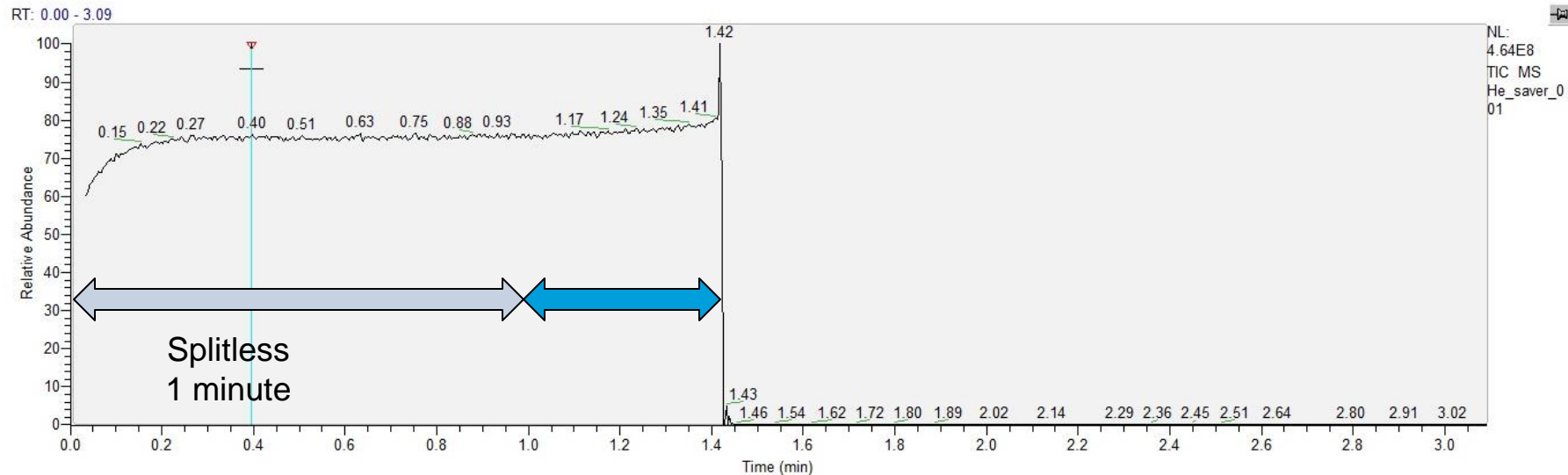
Monetary Savings: 3 times

		Standard He Consumption	Helium Saver Consumption
Daily He Usage	Liters	46.56	5.76
He Cylinder Life	Days	157	1,267
Daily N ₂ Usage	Liters	0	40.8
N ₂ Cylinder Life	Days	0	179
Total Annual Cost		\$688	\$205
Total Savings			\$483

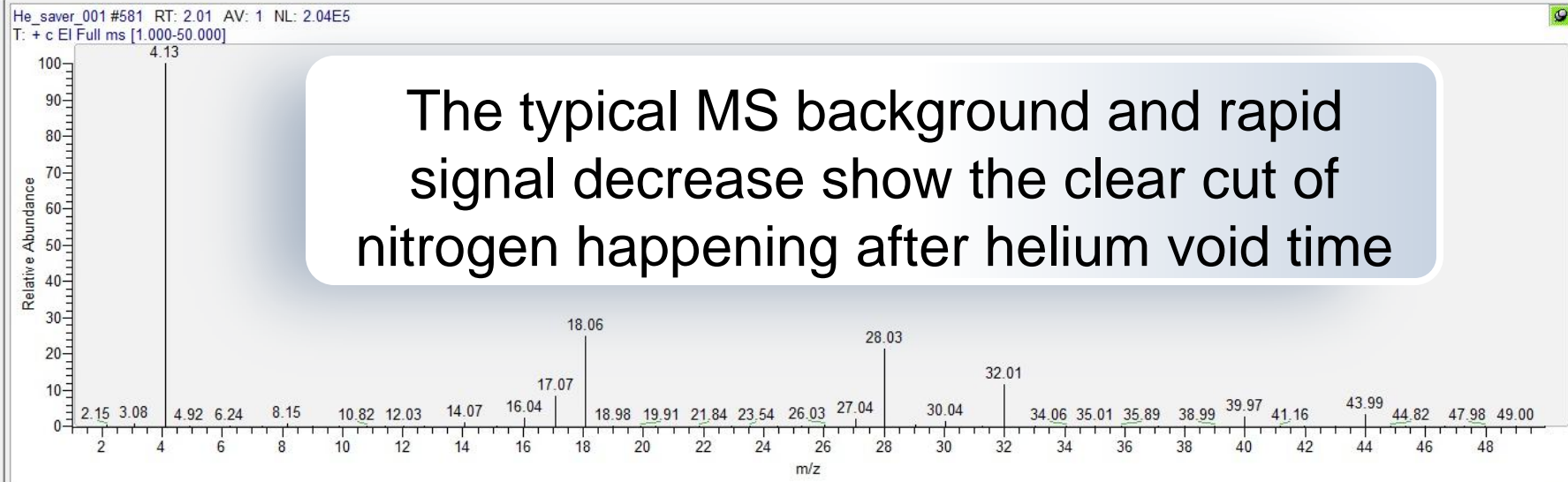
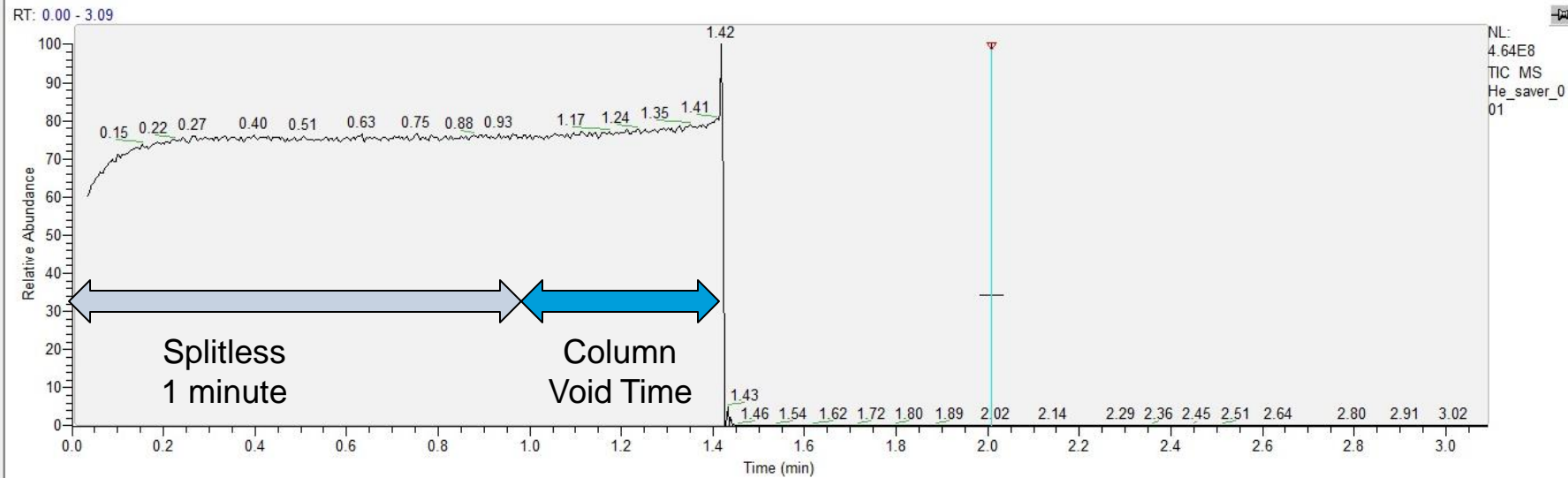
Helium Saver Module vs. Conventional SSL

Helium Saver Module	Conventional SSL
Contains the SSL as a subsystem	Industry standard injector
Uses exactly the same methods	Used for > 80% methods
Preserves your methods and saves helium	Wastes most of the helium

Rapid and Efficient Gas Exchange



Rapid and Efficient Gas Exchange



Thank You for Your Attention!



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