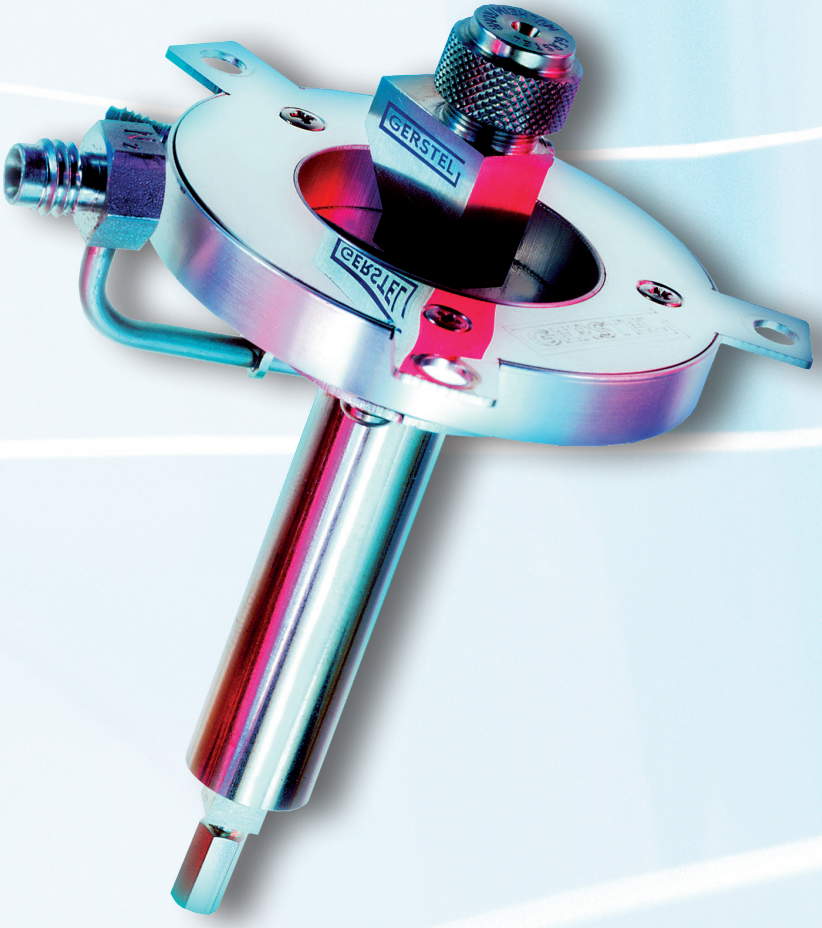
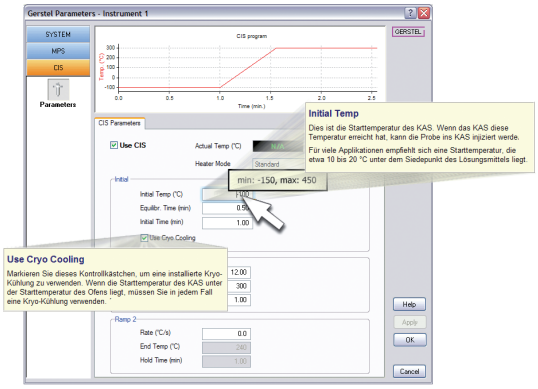
GERSTEL

# Cooled Injection System
# CIS




**Universal inlet**
**for all injection techniques**
**used in GC- and GC/MS**

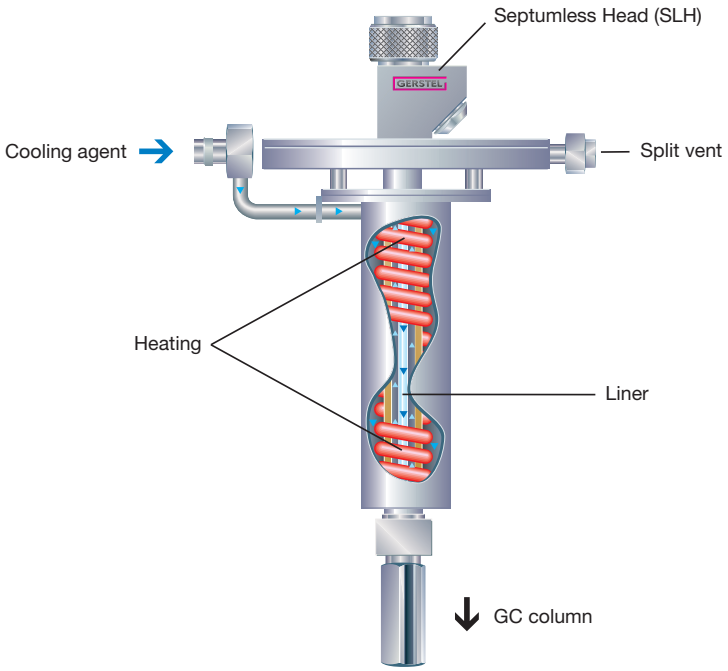
# GERSTEL Cooled Injection System CIS




## Universal inlet for all injection techniques used in GC and GC/MS

The GERSTEL Cooled Injection System is the most widely sold PTV-type universal inlet in the world. The CIS combines high performance with unique flexibility. The CIS readily adapts to all liquid injection techniques used in GC and GC/MS: Split & Splitless, On Column and Large Volume Injection (LVI). Thanks to the CIS and its Septum-Less Head (SLH), detection limits are lowered and the effort required for sample preparation is reduced. Due to the controlled programmed heating rate, analyte transfer to the GC column is performed without overheating, in an accurate and reproducible manner, and without analyte discrimination even across a wide boiling range. Temperature programming is performed reliably up to 650 °C. The patented heating system and efficient liner geometry of the CIS ensure a uniform heating profile and highly controlled and reproducible compound vaporization. In addition, the CIS is widely used as a high-performance analyte trap for thermal desorption techniques including Dynamic Headspace (DHS). A wide range of cooling options are available to suit any application. The programmed temperature vaporization of trapped analytes leads to discrimination-free transfer of analytes, narrow peaks for improved separation, best possible detection limits, and accurate results.

The CIS is easily controlled through GERSTEL MAESTRO Software in stand-alone mode or integrated with the Agilent Technologies MassHunter or ChemStation software - thanks to an intuitive user interface: Context sensitive on-line help functions are always at your fingertips. All data entry fields have pop-up information windows available that provide valid parameters ranges as well as practical tips. The compact C200 Controller offers the possibility to control the CIS independent of other GERSTEL systems, either using MAESTRO software or through the controller keypad to generate, store and set up multiple methods.
In combination with the Automated Liner EXchange (ALEX) option, the GERSTEL MultiPurpose Sampler (MPS) can exchange contaminated CIS liners at a user defined frequency, enabling the automated analysis of a large number of dirty samples overnight or during the weekend without operator intervention and without matrix effects. Examples are QuEChERS extracts of food as well as cell extracts for metabolomics studies.
The GERSTEL CIS is compatible with all standard GC and GC/MS systems.

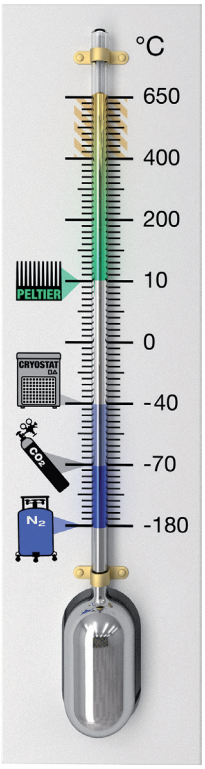


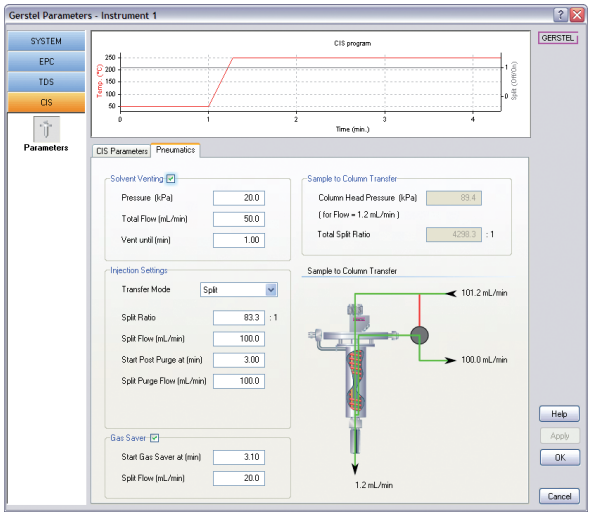

## Cryofocusing

The CIS is ideally suited for cryofocusing of volatile compounds and is a key component in many GERSTEL systems, which incorporate thermal desorption:

- Thermal Desorption using the GERSTEL Thermal Desorption Unit (TDU), Thermal Desorption System (TDS) or TD 3.5+
- Thermal Extraction in µ-vials (ATEX)
- Desorption of GERSTEL Twisters® after Stir Bar Sorptive Extraction (SBSE)
- Dynamic Headspace (DHS) and DHS$^{large}$

Following thermal desorption, analytes are refocused using the CIS as cryotrap and subsequently transferred to the GC/MS system using programmed temperature vaporization. This approach ensures sharp peaks, excellent separation and best possible recovery and detection limits over a wide boiling range.
The „Hot Injection and Trapping“ (HIT) technique enables multiple Headspace or SPME injections into the hot TDU combined with trapping in the cold CIS and splitless transfer to the GC column for best possible recovery and limits of detection. The number of injections is simply selected by mouse-click in the method.

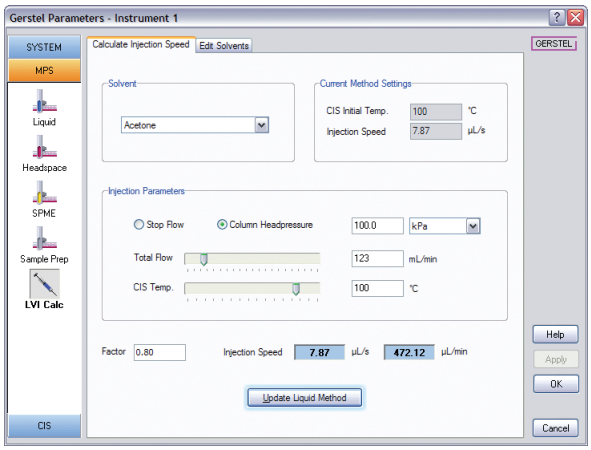





*If the CIS is operated with GERSTEL ePneumatics, the MAESTRO Method screen provides an "at-a-glance" graphical display of all parameters including split ratio and resulting flows.*

## Large Volume Injection

Whenever limits of detection need to be improved, a simple approach is to increase the injected sample volume. This only works when the inlet and column are not overloaded, the solvent must be steadily evaporated during the injection phase while retaining analytes in the GC inlet liner. To accomplish this goal, the injection speed, inlet temperature and gas flows must be adapted to the solvent used and the analytes to be determined, and must be tightly controlled for best possible recovery and accuracy. The GERSTEL LVI Calculator makes it a breeze to pick the optimal LVI parameters for rugged and reliable injections up to 1000 µL.




The LVI Calculator is an integral part of the MAESTRO Software. After selecting the solvent from a pull-down menu and entering the injection volume and column flow, a set of optimized method parameters are suggested, which can be transferred to the method by mouse click.

*Optimal cooling for every task: GERSTEL offers maximum cooling using liquid nitrogen ($LN_2$) as well as $CO_2$ cooling. In addition, cost-efficient cryostatic cooling (GERSTEL CCD) and peltier cooling (GERSTEL UPC plus) are available.*

# Important features and benefits of the CIS

## Maximum flexibility

- One inlet for all GC & GC/MS injection techniques
- A range of cooling options to meet all user requirements: $LN_2$, $LCO_2$, Cryostatic and patented Peltier cooling
- Temperature range up to 650 °C enables the reliable determination even of the highest boiling compounds
- Pyrolysis of liquid samples, for example polymer solutions or suspensions, at up to 650 °C after solvent venting
- Operation independent of the GC/MS system using GERSTEL ePneumatics (EPC)

## Rugged analysis, reliable results

- No interference from septum bleeding, particles, or coring when using the GERSTEL Septum-Less Head (SLH)
- Optimized transfer, even of thermally labile compounds without overheating thanks to the patented heating system and user defined programmable heating rates.
- Reliable analysis of dirty samples thanks to manual Easy Liner Exchange (eLEX) and Automated Liner Exchange (ALEX). Liners can be replaced at user defined intervals to keep the system clean and running.

## Improved separation and lowest limits of detection

- Cryofocusing and concentration of trace analytes
- Analyte transfer as narrow band improves peak shape
- Large Volume Injection (LVI) up to 1000 µL
- Improved quantification and elimination of analyte discrimination achieved through controlled evaporation

## Simple operation

- Intuitive and efficient operation using GERSTEL MAESTRO Software both in stand-alone mode and fully integrated with Agilent ChemStation or MassHunter software. MAESTRO operates integrated with the sequence table of other software such as Thermo Scientific® Xcalibur™.
- Context-sensitive online help in MAESTRO enables fast and error-free method generation and set-up.
- The LVI Calculator enables fast and reliable optimization and set-up of Large Volume Injection parameters with the GERSTEL CIS.

## Reliable and efficient routine analysis of matrix laden samples

# GERSTEL Automated Liner EXchange ALEX


Dirty Matrix samples can lead to significant contamination of the GC inlet liner after just a few injections. Peak broadening, analyte discrimination and other matrix build-up effects can be the result of such contamination. This causes the quality of the analytical data to suffer. In order to avoid this, the inlet liner should be exchanged regularly. Liner exchange is a task that requires several manual steps, and the interruption of the analysis sequence, making it impossible to run longer automated sequences without manual intervention. In such cases, GERSTEL Automated Liner Exchange (ALEX) increases overall system efficiency by removing contaminated liners at user defined intervals and enabling the automated sequence to be completed and system productivity to be maintained. The ALEX Liner tray for the MPS holds 40 prepared clean liners in sealed compartments to eliminate contamination. Liners are transported by the MPS using transport adapters fitted with 3 mm replaceable septa, which enable liquid injection into the CIS.

Liner Exchange
the easy way

**GERSTEL-
easy Liner EXchange
eLEX**

Exchanging a GC inlet liner is typically performed manually after pausing or stopping the analysis sequence. There is an easier way: Using GERSTEL eLEX, the liner and transport adapter can be released by pressing a button. This makes it extremely simple to pick up the dirty liner and replace it with a prepared clean liner pre-mounted in a transport adapter. The seal is locked pneumatically and automatically held in position. If required, eLEX is easily upgraded to an Automated Liner EXchange (ALEX) system.

# Features and benefits of ALEX

## Reliable results

- Reliable analysis of matrix-containing samples thanks to replacement of contaminated liners at user defined frequency
- Septum bleeding is eliminated through heat-decoupled septa without the need for septum purge.
- Contamination-free storage of inlet liners in 40 position trays.

## Rugged operation - highest productivity and throughput

- High throughput and improved ROI for the complete analysis system through Automated Liner Exchange in the running sequence – overnight and on weekends.
- Faster, more efficient analysis of dirty samples with less sample preparation
- Highest system reliability through proven pneumatic sealing technology

## Simple operation and method development

- Intuitive and efficient operation using GERSTEL MAESTRO Software in stand-alone mode or fully integrated with Agilent ChemStation or MassHunter software. MAESTRO operates integrated with the sequence table of other software such as Thermo Scientific® Xcalibur™.
- Context-sensitive online help in MAESTRO enables fast and error-free method generation and set-up.
- Simple method development and setup through use of different liner types in one sequence.


**www.gerstel.de**

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