GERSTEL certified SUPPLIES

# Cooled Injection System, CIS

# Automated Liner EXchange, ALEX

# GERSTEL® Cooled Injection System, CIS

## Universal inlet for gas chromatography

The GERSTEL CIS is a temperature programmable PTV-type GC inlet. The CIS offers septumless, cold injection of volumes of up to 1000 µl for liquid samples. The integrated split function enables the CIS to handle ultra-trace concentrations as well as undiluted samples. Programmed linear heating ensures quantitative, discrimination-free transfer of sample components to the GC column for best possible GC analysis results.

The CIS is a general purpose, universal GC inlet. When working with Thermal Desorption or Headspace techniques, the CIS is used for enrichment, focusing and quantitative transfer of analytes to the capillary column.

An integral part of the CIS is the GERSTEL MAS controller, which can be used to control all GERSTEL modules, thus ensuring easy, cost effective system upgrades. The CIS can be retro-fitted to existing Agilent Technologies/ HP gas chromatographs.

GERSTEL GRAPHPACK® technology and septumless sampling head are standard features. A choice of liquid $CO_2$, liquid $N_2$ or Peltier cooling is available. Available CIS models cover the temperature range from –180 to +650 °C. Compounds covering a wide boiling range can be efficiently trapped with subsequent discrimation-free analyte transfer to the capillary column. The CIS is compatible with all GERSTEL autosamplers - and with autosamplers from all major manufacturers.

| | Part No. |
|---|---|

## Septumless sampling head (SLH) for CIS 3/4/6

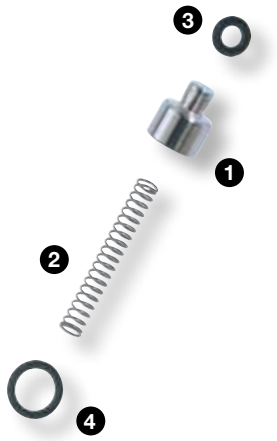
(for 23 gauge needles)
For manual or automated sample introduction

| | |
|---|---|
| **CIS 3** | **003089-064-00** |
| **CIS 4/6** | **007513-064-00** |

## Service kit for SLH

Complete — **009999-010-00**

Contains one unit each of the following items:



| | |
|---|---|
| ❶ **Plunger** | **004230-000-00** |
| ❷ **Spring** | **009999-014-00** |
| ❸ **Inner-O-Ring (Kalrez™)** | **009999-015-00** |
| ❹ **Outer-O-Ring (Viton™)** * | **009999-016-00** |

* When reordering only complete original package size is available (5 units).

## SLH cap

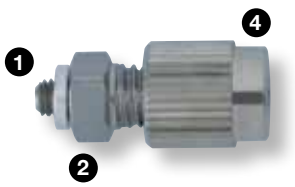
| | |
|---|---|
| 23 gauge needles | **006144-064-00** |

## Teflon™ needle guide for SLH

1 package (10 units)

| | |
|---|---|
| 23 gauge needles | **003091-064-00** |

## Carrier gas connection for SLH



| | |
|---|---|
| Complete kit | **005610-000-00** |

| | |
|---|---|
| ❶ **Aluminium seal for SLH** 1 package (5 units) | **004256-005-00** |
| ❷ **Carrier gas connection body for SLH** 1 package (1 units) | **001459-003-00** |
| ❸ **Teflon ferrule 1/16”** 1 package (10 units) | **001576-010-00** |
| ❹ **Knurled nut** 1 package (5 units) | **001117-005-00** |

Part No.

**The glass liners listed below are designed for the CIS 3 or CIS 4/6 and Agilent PTV respectively. Unless otherwise specified, the dimensions are:**

| | |
|---|---|
| **CIS 4/6 & Agilent PTV** | OD 3 mm (ID 2 mm); length 71 mm. |
| **CIS 3** | OD 2 mm (ID 1.5 mm); length 93 mm. |

**Note:**
With exception of the Siltek™ coated liners, the deactivation is only stable at temperatures up to 275 °C. Higher temperatures can be used, but this will create more active sites inside the liner.

**GERSTEL Headspace:**
For static headspace analysis we recommend a deactivated baffled liner. For splitless injection it may be necessary to refocus inside the liner. In this case liners filled with Tenax TA™, Carbotrap B™ or PDMS foam may be appropriate.

# CIS glass liners

## straight with notch
deactivated

For initial system evaluation. Recommended for splitless injection. Can be used for custom-packed liners.
Maximum temperature: 275 °C

1 package (10 units)

| | |
|---|---|
| **CIS 3** | **011708-010-00** |
| **CIS 4/6 & Agilent PTV** | **011709-010-00** |

## baffled
deactivated

For cold split injections, baffles create good mixing of sample and carrier gas. For liquid injections of moderate/high boilers and for labile compounds.

Maximum temperature: 275 °C

1 package (10 units)

| | |
|---|---|
| **CIS 3** | **011710-010-00** |
| **CIS 4/6 & Agilent PTV** | **011711-010-00** |

## for SPME ID 1 mm
deactivated

For SPME desorption. Due to the smaller inner diameter, the linear carrier gas velocity is increased, resulting in more efficient desorption. (For manual SPME or automated SPME using the GERSTEL MultiPurpose Sampler MPS)

Maximum temperature: 275 °C

1 package (10 units)

| | |
|---|---|
| **CIS 4/6 & Agilent PTV** | **011712-010-00** |

| | | Part No. |
|---|---|---|

### Siltek™ coated baffled liners
deactivated

For cold split injections, baffles create good mixing of sample and carrier gas. The Siltek™ coating withstands high temperatures up to 350 °C. It is also suitable for labile compounds.

| | | |
|---|---|---|
| 1 package (5 units) | **CIS 3** | **014758-005-00** |
| | **CIS 4/6 & Agilent PTV** | **014652-005-00** |

## CIS glass liners packed

### with silanized glass wool
deactivated

Suitable for large volume injections into the CIS. The large surface area helps retain analytes while solvent evaporates. Furthermore, the packing acts as a filter for particulates. For liquid injections of moderate/high boilers, stable compounds.

Maximum temperature: 275 °C

| | | |
|---|---|---|
| 1 package (10 units) | **CIS 3** | **010849-010-00** |
| | **CIS 4/6 & Agilent PTV** | **010850-010-00** |

### with quartz wool
deactivated

Suitable for large volume injections into the CIS. The large surface area helps retain analytes while solvent evaporates. Furthermore the packing can act as a filter for particulates. More inert than glass wool. For liquid injections of difficult compounds (acidic, alkaline etc.).

Maximum temperature: 275 °C

| | | |
|---|---|---|
| 1 package (10 units) | **CIS 3** | **008420-010-00** |
| | **CIS 4/6 & Agilent PTV** | **007519-010-00** |

### with glass beads
deactivated

Suitable for large volume injections into the CIS. Usage similar to the glass wool liner, but the glass beads provide a larger surface area and better retention of low boilers. The packing can also act as a filter for particulates.

Maximum temperature: 275 °C

| | | |
|---|---|---|
| 1 package (5 units) | **CIS 4/6 & Agilent PTV** | **011714-005-00** |

# CIS glass liners packed

| | | Part No. |
|---|---|---|
| **with Tenax TA™** | | |
| For PTV injection combined with solvent venting during large volume injections. Low affinity to methanol and water (Best water elimination at 40 °C). Usable for trapping from C5 to C26. Particularly suitable for headspace analysis. | | |
| Maximum temperature: 350 °C | | |
| 1 package (5 units) | **CIS 3** | **013249-005-00** |
| | **CIS 4/6 & Agilent PTV** | **013247-005-00** |
| **with Carbotrap B™** | | |
| For trapping of very volatile compounds in combination with large volume injections or headspace analysis. | | |
| Maximum temperature: 400 °C | | |
| 1 package (5 units) | **CIS 3** | **013250-005-00** |
| | **CIS 4/6 & Agilent PTV** | **013248-005-00** |
| **with glass beads and Carbotrap C™** | | |
| For trapping of analytes over a wide boiling point range in combination with large volume injections or headspace analysis. | | |
| Maximum temperature: 400 °C | | |
| 1 package (5 units) | **CIS 4/6 & Agilent PTV** | **011716-005-00** |
| **with PDMS foam** | | |
| For trapping of non polar analytes covering a wide range of volatility up to n-C40. Well suited for large volume injections. | | |
| Maximum temperature: 300 °C | | |
| Minimum temperature: -10 °C (glass transition temperature) | | |
| 5 mm packing length for semi volatiles | | |
| 1 package (10 units) | **CIS 4/6 & Agilent PTV** | **014594-010-00** |
| 10 mm packing length for intermediate volatiles | | |
| 1 package (10 units) | **CIS 4/6 & Agilent PTV** | **014595-010-00** |
| 30 mm packing length retains very volatile analytes | | |
| 1 package (5 units) | **CIS 4/6 & Agilent PTV** | **014596-005-00** |

Part No.

# CIS glass liner kits

## CIS glass liner kit
containing 2 of each of the following liner types:

straight with notch, deactivated
Baffled, deactivated
Packed with silanized glass wool, deactivated
Packed with Tenax™
Packed with Carbotrap B™

| | |
|---|---|
| **CIS 3** | **013543-003-00** |
| **CIS 4/6 & Agilent PTV** | **013543-004-00** |

## CIS PDMS glass liner kit
containing 2 of each of the following liner types:

Packed with PDMS foam, 5 mm packing length
Packed with PDMS foam, 10 mm packing length
Packed with PDMS foam, 30 mm packing length

| | |
|---|---|
| **CIS 4/6 & Agilent PTV** | **014601-104-00** |

## CIS glass liners packed
**with silanized glass wool**

Suitable for large volume injections into the PTV. The large surface area helps retain analytes while solvent evaporates. Furthermore the packing can act as a filter for particulates. For liquid injections of moderate/high boilers, stable compounds.

**Note:**
Glass body is not deactivated.

1 package (10 units)

| | |
|---|---|
| **CIS 3** | **002931-010-00** |
| **CIS 4/6 & Agilent PTV** | **014284-010-00** |

## Adsorbent properties

**Tenax TA™**
Tenax TA™ is a is a porous material based on 2,6-diphenylene oxide polymer, with a specific surface area of 35 $m^2/g$. The material has a low affinity for water and methanol and can be used to trap and thermally desorb compounds in the C5-C26 range. The particle size is 60/80 MESH.

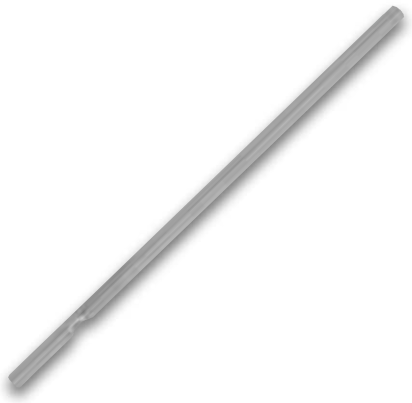
**Carbotrap B™**
Carbotrap B™ has a mesh size of 20/40 mesh, with a specific surface area of 100 $m^2/g$. This adsorbent is especially suited for trapping and thermally desorbing compounds in the range from C5 to C20 (depending on the structure of the molecule).

**Carbotrap C™**
Carbopack C™ has a mesh size of 20/40 mesh with a specific surface area of 10 $m^2/g$. This adsorbent is especially suited for trapping and thermally desorbing compounds in the range from C9 to C30 (depending on the structure of the molecule).

**PDMS**
The GERSTEL Polydimethylsiloxane (PDMS) foam has an open porous structure. It is suitable as a trap or “guard column”. The highly inert and non polar material is well suited for large volume injections with analytes covering a wide range of volatility. PDMS provides strong retention of non polar analytes. Can be used for analytes as high boiling as n-C40. Ideal packing if glass wool trapping is too weak and Tenax TA™ too strong. Allows trapping at moderate temperatures, reducing the need for cryogenic cooling compared to glass wool. Maximum temperature: 300 °C. Minimum temperature -10 °C (glass transition temperature).

Part No.

# CIS glass liners



## straight with notch
not deactivated

For an initial system evaluation. Recommended for splitless injection. Can be used for custom-packed liners.

Maximum temperature: 400 °C

**Note:**
Liner is not deactivated. Unstable compounds may decompose.

| | | |
|---|---|---|
| 1 package (10 units) | **CIS 3** | **013886-010-00** |
| | **CIS 4/6 & Agilent PTV** | **013881-010-00** |
| 1 package (100 units) | **CIS 3** | **013886-100-00** |
| | **CIS 4/6 & Agilent PTV** | **013881-100-00** |

## straight without notch
ID 2 mm, not deactivated

For special uses e.g. in combination with TDS. Enables analyte trapping on the column (For more information contact your local GERSTEL representative).

Maximum temperature: 400 °C

**Note:**
liner is not deactivated. Unstable compounds may decompose.

| | | |
|---|---|---|
| 1 package (10 units) | **CIS 4/6 & Agilent PTV** | **013910-010-00** |

## baffled
not deactivated

For cold split injections, baffles create good mixing of sample and carrier gas. For liquid injections of stable and unproblematic moderate/high boilers.

Maximum temperature: 400 °C

**Note:**
liner is not deactivated. Unstable compounds may decompose. (Primary use in combination with the Automated Liner Exchange (ALEX) system)

| | | |
|---|---|---|
| 1 package (10 units) | **CIS 3** | **013887-010-00** |
| | **CIS 4/6 & Agilent PTV** | **013882-010-00** |
| 1 package (100 units) | **CIS 3** | **013887-100-00** |
| | **CIS 4/6 & Agilent PTV** | **013882-100-00** |

# Quartz liners for CIS 4/6 & Agilent PTV

Part No.

## straight with notch

not deactivated

For an initial system evaluation. Recommended for splitless injection. Can be used for custom-packed liners.

Suitable for high temperature usage (up to 650 °C) with a CIS 6.

| | |
|---|---|
| 1 unit | **013238-000-00** |
| 1 package (5 units) | **013238-005-00** |

## packed with quartz wool

not deactivated

Suitable for large volume injections into the PTV. The large surface area helps retain analytes while solvent evaporates. Furthermore the packing can act as a filter for particulates More inert than glass wool. For liquid injections of difficult compounds (acidic, alkaline etc.). Suitable for high temperature usage (up to 650 °C) with a CIS 6.

| | |
|---|---|
| 1 unit | **013605-000-00** |
| 1 package (5 units) | **013605-005-00** |

## baffled

not deactivated

For cold split injections, baffles create good mixing of sample and carrier gas. For liquid injections of moderate/high boilers and for labile compounds. Suitable for high temperature usage
(up to 650 °C) with a CIS 6.

| | |
|---|---|
| 1 unit | **013148-000-00** |
| 1 package (5 units) | **013148-005-00** |

Part No.

## GRAPHPACK® 3D ferrules for glass liners

1 package (5 units)

| | |
|---|---|
| **CIS 3** | **002426-005-00** |
| **CIS 4/6; Agilent PTV** | **007541-005-00** |

1 package (10 units)

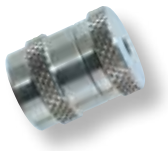
| | |
|---|---|
| **CIS 3** | **002426-010-00** |
| **CIS 4/6; Agilent PTV** | **007541-010-00** |

## GRAPHPACK® 3D Kalrez ferrules for glass liners

(not for use in conjunction with TDS / TDU)

1 package (2 units)

| | |
|---|---|
| **CIS 4/6; Agilent PTV** | **011868-002-00** |



## GRAPHPACK 3D mounting tool for glass liners

| | |
|---|---|
| **CIS 3** | **003079-000-00** |
| **CIS 4/6 & Agilent PTV** | **007542-000-00** |

## Septum head

without septum purge

| | |
|---|---|
| **CIS 3** | **002835-000-00** |
| **CIS 4/6 & Agilent PTV** | **007514-000-00** |

## Septum head

with septum purge

| | |
|---|---|
| **CIS 3** | **008577-000-00** |
| **CIS 4/6 & Agilent PTV** | **008584-000-00** |


### Spare parts

| | |
|---|---|
| ❶ **Septum cap** | **006460-000-00** |
| ❷ **Septum for CIS 3/4, white Silicone;** 1 package (25 units) | **008246-025-00** |
| ❸ **Teflon ferrule 1/16";** 1 package (10 units) | **001576-010-00** |
| ❹ **Knurled nut;** 1 package (5 units) | **001117-005-00** |

## GRAPHPACK® 2M adapter for CIS

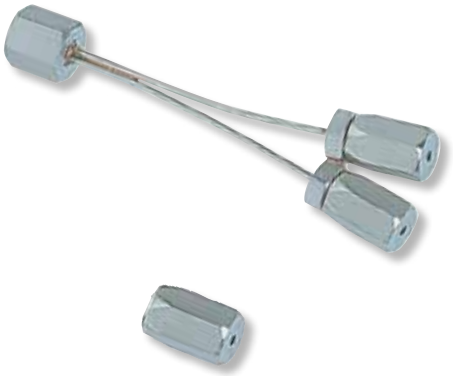
| | Column OD / ID | Part No. |
|---|---|---|
| CIS 3/4 (silver) | 0.31 mm / 0.20 mm | 007259-031-00 |
| | 0.45 mm / 0.32 mm | 007259-045-00 |
| | 0.70 mm / 0.53 mm | 007259-007-00 |
| CIS 6 (Stainless steel) | 0.31 mm / 0.20 mm | 013244-031-00 |
| | 0.45 mm / 0.32 mm | 013244-045-00 |
| | 0.70 mm / 0.53 mm | 013244-007-00 |

### Spare parts

| | |
|---|---|
| **Silver seal;** 1 package (5 units) | 002841-005-00 |
| **GRAPHPACK nut;** 1 package (5 units) | 001268-005-00 |

## GRAPHPACK® 2M dual column injector adapter

For the simultaneous connection of two capillary columns to a single CIS inlet.



| | |
|---|---|
| 0.31 mm / 0.20 mm | 007530-031-00 |
| 0.45 mm / 0.32 mm | 007530-045-00 |

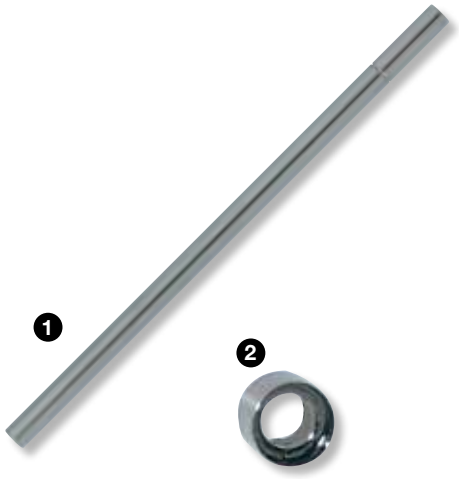
### Spare parts

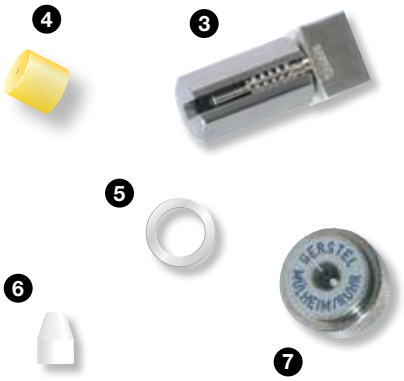
| | |
|---|---|
| **Silver seal;** 1 package (5 units) | 002841-005-00 |
| **GRAPHPACK nut;** 1 package (5 units) | 003714-005-00 |

## GRAPHPACK 2M ferrules

1 package (10 units)

| | |
|---|---|
| 0.20 mm /≤ 0.1 mm | 001805-020-00 |
| 0.25 mm /≤ 0.1 mm | 001805-025-00 |
| 0.31 mm / 0.20 mm | 001805-031-00 |
| 0.40 mm / 0.25 mm | 001805-040-00 |
| 0.45 mm / 0.32 mm | 001805-045-00 |
| 0.70 mm / 0.53 mm | 001805-007-00 |
| 0.80 mm / 0.27 mm | 001805-008-00 |

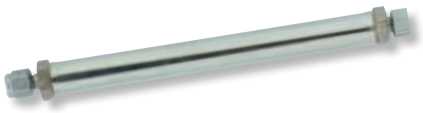



## On Column kit

On-Column insert converts CIS into On-Column injector.

| | | Part No. |
|---|---|---|
| | CIS 3 | 005533-000-00 |
| | CIS 4/6 | 008340-000-00 |
| 1 **On Column insert; single** | CIS 3 | 005532-000-00 |
| | CIS 4/6 | 008339-000-00 |
| 2 **GRAPHPACK 3D ferrule;** 1 package (5 units) | CIS 3 | 002426-005-00 |
| | CIS 4/6 | 007541-005-00 |
| 3 **GRAPHPACK 2M adapter** | CIS 3/4 | 007259-007-00 |
| | CIS 6 | 013244-007-00 |
| 4 **GRAPHPACK 2M ferrule;** 1 package (10 units) | | 001805-007-00 |
| 5 **Silver seal;** 1 package (5 units) | | 002841-005-00 |
| 6 **Teflon needle guide (0.47 mm);** 1 package (10 units) | | 003091-047-00 |
| 7 **Cap for SLH (0.47 mm)** | | 006144-047-00 |



## Adsorption trap

for split outlet

1/16“ inlet, 1/16“ outlet connection, filled with charcoal

005243-001-00

## Cryo tube

2 m

| | |
|---|---|
| CIS 4/6 | 006124-004-00 |
| with CIS adapter | |

## Microliter syringes

| injection / sampler | system | description | µL | units | Part No. |
|---|---|---|---|---|---|
| manual injection | CIS | needle-in-needle | 1 | 1 | **009999-041-00** |
| Autosampler | CIS | fixed needle | 5 | 1 | **009980-028-00** |
| HP 7673 / | | | 5 | 6 | **009980-029-00** |
| Agilent 7683/7693 | | | 10 | 1 | **022004-050-00** |
| | | | 10 | 6 | **009980-031-00** |
| Autosampler | CIS | replaceable needle | 25 | 1 | **009980-032-00** |
| HP 7673 / | | | 50 | 1 | **009970-013-00** |
| Agilent 7683/7693 | | | 100 | 1 | **009970-014-00** |
| | | **Spare** | | | |
| | | needle | | 2 | **022004-802-00** |
| Autosampler | CIS | fixed needle, | 10 | 1 | **009999-052-00** |
| HP 7673 / | | on-column-injection | | | |
| Agilent 7683/7693 | | | | | |

| injection type | system | description | µL | units | Part No. |
|---|---|---|---|---|---|
| manual injection | CIS | fixed needle | 5 | 1 | **022000-000-00** |
| | | | 10 | 1 | **022000-050-00** |
| | | | 25 | 1 | **022004-100-00** |
| | | | 50 | 1 | **009970-011-00** |
| | | | 100 | 1 | **022004-200-00** |
| manual injection | CIS | gastight | 100 | 1 | **009999-019-00** |
| | | | 250 | 1 | **009999-018-00** |
| | | | 500 | 1 | **009999-017-00** |
| | | | 1000 | 1 | **009999-021-00** |
| | | **Spare** | | | |
| | | TLL needle | | 3 | **009999-006-00** |

# GERSTEL®
# Automated Liner EXchange, ALEX

For routine GC analysis of samples that contain large amounts of solid material. Designed for use with the GERSTEL Multi-Purpose Sampler, MPS 2 and the GERSTEL Cooled Injection System, CIS. GC inlet liners can be replaced automatically at user-defined intervals in the sequence. A special ALEX liner tray holds up to 98 prepared liners, enabling routine analysis of large numbers of dirty samples.



Part No.

## Universal syringe holder
Version 2; compatible with ALEX

| | |
|---|---|
| 1 unit | **013822-000-00** |

## ALEX transport adapter
for CIS 4/6 Liner

| | |
|---|---|
| 1 unit | **013795-000-00** |
| 10 units | **013795-010-00** |

## O-ring kit for ALEX transport adapter
1 package (5 × 4 units)

| | |
|---|---|
| 1 package (5 × 4 units) | **013934-005-00** |

| | Part No. |
|---|---|

## Septa
for GERSTEL-ALEX transport adapter

| | |
|---|---|
| 10 units | **015608-010-00** |
| 100 units | **015608-100-00** |

## Allen wrench
for transport adapter screws, 4 mm

| | |
|---|---|
| 1 unit | **009999-204-00** |

## O-ring
for ALEX sampling head,
1 package (10 units)

| | |
|---|---|
| 10 units | **013931-010-00** |

## Glass inserts for ALEX sample tray

| | |
|---|---|
| 10 units | **013794-010-00** |
| 100 units | **013794-100-00** |

## O-ring for ALEX sample tray glass inserts

| | |
|---|---|
| 10 units | **014292-010-00** |
| 100 units | **014292-100-00** |


**GERSTEL GmbH & Co. KG**
Eberhard-Gerstel-Platz 1
45473 Mülheim an der Ruhr
Germany
☎ +49 (0) 208 - 7 65 03-0
🖷 +49 (0) 208 - 7 65 03 33
@ gerstel@gerstel.com
🌐 www.gerstel.com

## GERSTEL Worldwide

**GERSTEL, Inc.**
701 Digital Drive, Suite J
Linthicum, MD 21090
USA
☎ +1 (410) 247 5885
🖷 +1 (410) 247 5887
@ sales@gerstelus.com
🌐 www.gerstelus.com

**GERSTEL AG**
Wassergrabe 27
CH-6210 Sursee
Switzerland
☎ +41 (41) 9 21 97 23
🖷 +41 (41) 9 21 97 25
@ swiss@ch.gerstel.com
🌐 www.gerstel.ch

**GERSTEL K.K.**
1-3-1 Nakane, Meguro-ku
Tokyo 152-0031
SMBC Toritsudai Ekimae Bldg 4F
Japan
☎ +81 3 5731 5321
🖷 +81 3 5731 5322
@ info@gerstel.co.jp
🌐 www.gerstel.co.jp

**GERSTEL LLP**
10 Science Park Road
#02-18 The Alpha
Singapore 117684
☎ +65 6779 0933
🖷 +65 6779 0938
@ SEA@gerstel.com
🌐 www.gerstel.com

**GERSTEL Brasil**
Av. Pascoal da Rocha Falcão, 367
04785-000 São Paulo - SP Brasil
☎ +55 (11)5665-8931
🖷 +55 (11)5666-9084
@ gerstel-brasil@gerstel.com
🌐 www.gerstel.com.br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