PAL SYSTEM
Ingenious sample handling

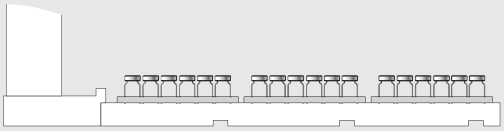


PAL LSI - Robust and Reliable Sample Handling

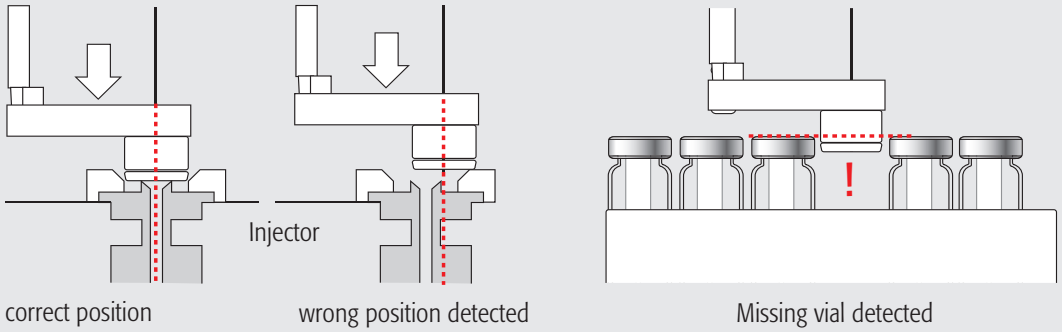


PAL LSI: Enhanced productivity due to innovative technology

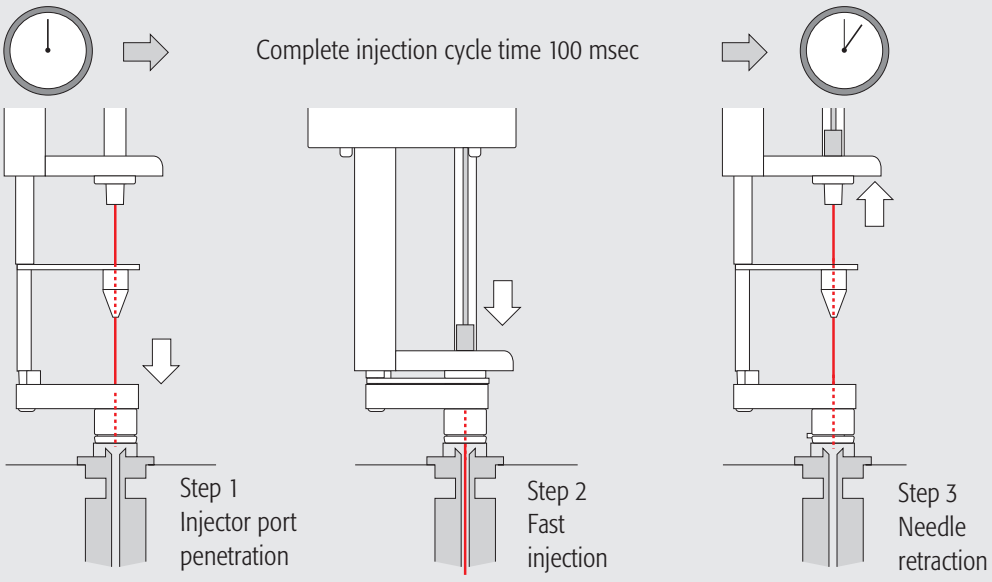
Large Sample Capacity: 162 x 2 mL-vials can be stored on one tray holder. The standard length PAL LSI can hold 648 x 2 mL-vials on four tray holders. With the optional Peltier stack samples can be stored at a controlled temperature.



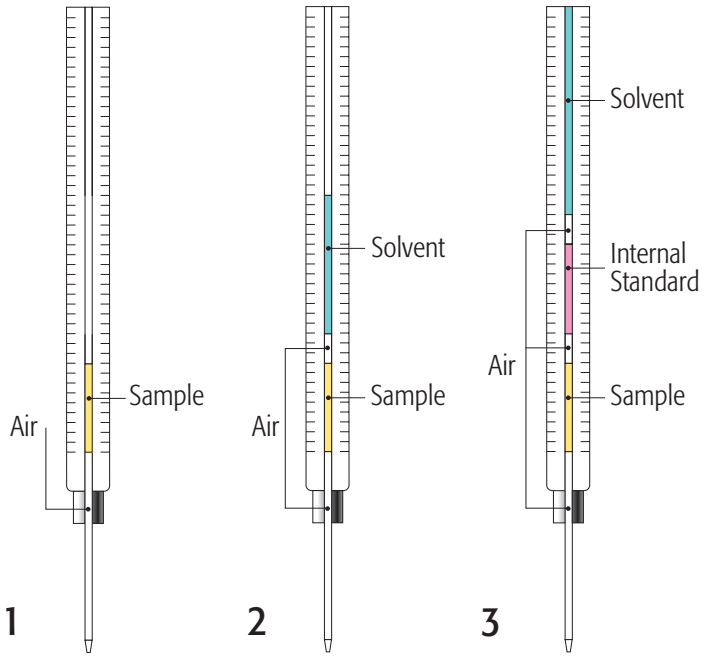
Process Safety: Proprietary drive technology enables the detection of missing vials and the correct position of the syringe needle in the injector port. Bending of syringe needles is excluded.



Fast injections: Injections as fast as 100 ms reduce discrimination in GC down to C40/C20 > 0.98.



Reproducible results thanks to optimized injection handling



Only perfect injection handling gives reproducible results. From a simple injection (1) to sandwiching an internal standard (3): The PAL LSI is designed for the precise and accurate handling of liquid samples of up to 100 µL in volume. In combination with the PAL Sample Control software all parameters of aspirating and dispensing of liquid samples can be fully controlled. This is crucial for perfect injections. A range of syringes from 1.2 µL to 100 µL is available. In example (3) an aliquot of an internal standard is sandwiched between transport solvent and the sample. Air gaps in between the liquids preclude mixing of the different liquids. The accurate control of these steps is the basis of reproducible methods.

Vial Transport

The PAL LSI is a robot that can reach any three dimensional position within its working area. It is able to transport vials, either to read barcodes or to transfer the vials into temperature controlled modules like the Agitator for heating samples or a Peltier Stack for cooling them down up to 4 °C.





Configure your PAL LSI for the jobs you want done

Flexibility: A wide range of optional modules for the PAL LSI

Additional Tray Plates increase the **sample capacity**. Supported vial formats are 1, 2, 10 and 20 mL, as well as 96 / 384 well micro titer plates and deep well plates. Up to 648 x 2 mL vials or 12 MTPs can be stored.



Temperature controlled Peltier stacks for 2 or 6 sample trays or plates can be added to cool samples preventing degradation or to heat samples for derivatization reactions or kinetic studies.



The Standard Wash Module is ideal for **washing the syringe with up to four different solvents** (4 x 10 mL solvent vial, 1 x 10 mL waste vial). An optional waste tube is available.
The Large Wash Module is ideal for **large volume injections** (2 x 100 mL glass solvent container, waste port with tubing olive)



The Fast Wash Module is preferred when **low carry-over** is required. It also cleans syringes incl. the outside of the needle (gauge 19 – 26) with 2 different solvents.



The Solvent Module allows **adding liquids** (with three 100 mL solvent containers)



The Vortex Mixer Module offers **efficient mixing** for dilution / extraction.
- Standard vial sizes: 2 mL / 10 mL / 20 mL
- 1 additional slot for custom specific vials
- Provides efficient mixing with up to 2000 rpm



The Agitator Module provides 6 positions for 20 mL vials for **incubation and agitation** of samples.
- Temperature range 40 – 200 °C
- Agitation speed 250 – 750 rpm
- Optional adapters for 2 mL or 10 mL vials



The Barcode Reader Module **reads horizontal 1D barcodes labels** on 2 mL, 10 mL and 20 mL vials. The two scanners allow the identification of vials irrespective of the position of the barcode on the vials. Therefore it ensures highest process safety and traceability.



With the Valve Drive Module **different injection or switching valves** can be configured. A wide variety of different valve types can be used.



For more options/modules please contact your local Value Added Reseller or visit www.palsystem.com.

Ingenious Master Software

PAL Sample Control

Easy to use routine software

PAL Sample Control software is the user-friendly tool for the daily routine jobs. Just a few clicks and sample lists are generated or imported. Now PAL Sample Control starts the operation and the data acquisition. Since PAL Sample Control interfaces seamlessly with major chromatographic or MS data systems only one sample list has to be handled. Different user levels ensure process safety.

Productivity

PAL Sample Control allows overlapping of multiple sample procedures. It optimizes automatically the timing of various steps in a sample preparation process and generates a schedule that minimizes the runtimes of sequences. This increases sample throughput greatly and boosts productivity.

Powerful Method Editor

While PAL Sample Control is straightforward to use in the daily operations it is also a powerful tool for the generation of tailored methods. A set of tested methods that comes with every system can be used as templates and optimized or tailored for specific workflows. Furthermore a large number of building blocks (tasks) for method development are part of the software. These building blocks make it easy to generate new methods, even for complex workflows.

PAL Sample Control is the common platform for PAL RTC, PAL RSI, and PAL LSI, and is shipped with every PAL System.

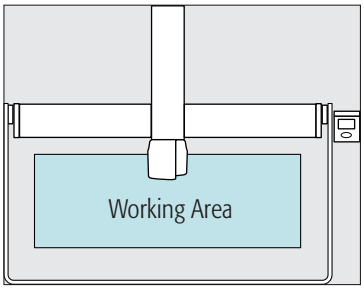
Supported CDS and MS-Data Systems

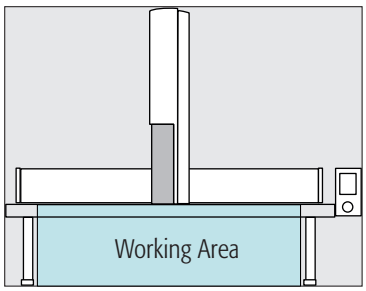
- Analyst
- ChemStation LC/GC/MSD
- Chromcard
- ChromPerfect
- ChromQuest
- Clarity
- Empower 2
- EZChrom
- MassHunter GC/MS, LC/MS
- Master Lab
- QuanLab
- Xcalibur

Dimensions

	PAL LSI compact x-axis length	PAL LSI standard x-axis length
Working Area	Width: 420 mm (16.8 inches) Depth: 255 mm (10.0 inches) Height: 420 mm (16.8 inches)	Width: 735 mm (28.9 inches) Depth: 255 mm (10.0 inches) Height: 420 mm (16.8 inches)
Footprint Instrument dimensions with standard legs	Width: 600 mm (24.0 inches) Depth: 795 mm (31.8 inches) Height: 770 mm (30.8 inches)	Width: 915 mm (36.6 inches) Depth: 795 mm (31.8 inches) Height: 770 mm (30.8 inches)

Footprint from above





Front View

Sample Capacity	2 Tray Plates Up to 420 x 1 mL vials 324 x 2 mL vials 90 x 10 / 20 mL vials 6 x MT / DW plates	4 Tray Plates Up to 840 x 1 mL vials 648 x 2 mL vials 180 x 10 / 20 mL vials 12 x MT / DW plates

Application Specifications*

Type	Specifications	Comment
Injection volume	0.1 - 100 µL	Depending on syringe, available syringes are 1.2 / 5 / 10 / 25 and 100 µL, needle length 57 mm
LC Liquid injection, repeatability (UV)	Full loop < 0.1 % RSD Partial loop < 0.15 % RSD	20 µL loop, 4 x overfill, 100 µL syringe 10 µL in 20 µL loop, 100 µL syringe
LC Liquid injection, linearity (gravimetrical)	R > 0.9999	20, 40, 60, 80, 100 µL, n=3 each level
GC liquid injection, repeatability	< 0.60 % RSD	Alkanes C14, C15, C16, 1 µL, split mode
GC liquid injection, linearity (gravimetrical)	R > 0.9999	20, 40, 60, 80, 100 µL, n=3 each level
GC needle discrimination	C40 / C20 > 0.98	Restek Florida Mix 1 µL, 100 ms fast split / splitless injection

*Detailed conditions for the determination of specifications upon request

PAL SYSTEM

Ingenious sample handling



Distributed by:

The PAL System is one of the most used and successful sample preparation and handling platforms.

- 40'000 systems worldwide are proof of the PAL Systems' reliability and flexibility. PAL Systems are developed and manufactured under an ISO 9001 / 13485 quality management system. Every PAL System has passed a performance test before leaving the factory.
- The PAL LSI is designed for the accurate and precise handling of liquid samples.
- The PAL LSI can transport objects, like vials from and to any position within its working area.
- The PAL LSI is available with compact or standard x-axis length.
- The PAL LSI, like all members of the PAL family, can be upgraded if the need for more functionality or sample capacity arises.

For more information on the PAL System visit:

www.palsystem.com

PAL is a registered trademark of CTC Analytics AG, Switzerland

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