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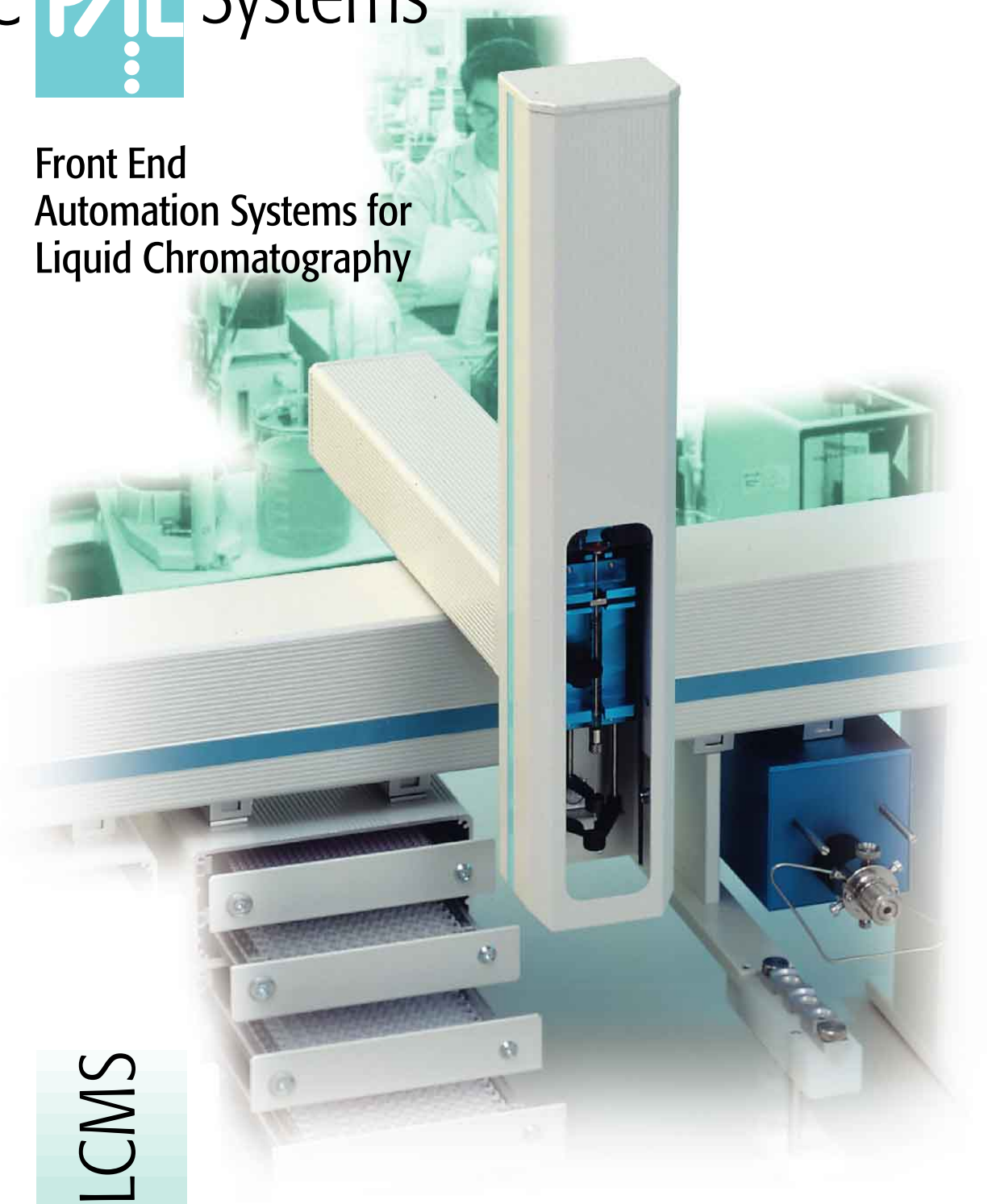
HPLC PAL Systems

Front End Automation Systems for Liquid Chromatography



Drug Discovery LCMS

- **High Throughput Screening**
- **Combinatorial Chemistry**
- **Flow Injection Analysis**
- **Preclinical Research**
- **Pharmaco-kinetic studies**

- Syringe only concept, no tubing in sample path for transparent sample injection
- Reliability and ruggedness for unattended 24 hour/day chromatography
- High sample capacity combined with fast injection cycles
- Temperature controlled sample storage from 4iC up to 70iC
- Third party instrument drivers for Micromass Masslynx[a] PE SCIEX Analyst[a] Agilent ChemStation[a] TMQ Xcalibur[a]

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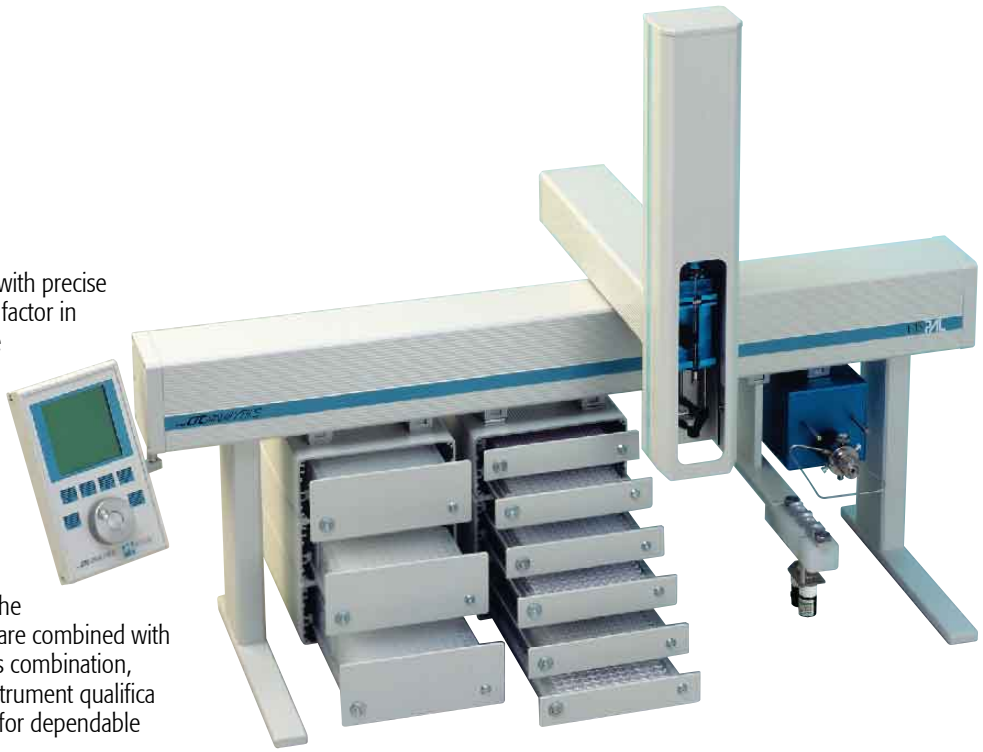
HTS PAL



Reliability is standard

Automated pretreatment operations combined with precise injection of sample sequences is certainly a key factor in increased laboratory productivity. Today, require ments in a sample injection system include high precision and accuracy, random access to individual samples and task-oriented program ming along with options and accessories for additional sample handling routines. CTC Ana lyticsÕ experience in the design and manufac ture of automated GC and LC injection systems is reflected in their range of the PAL series of Prep and Load Systems. In all PAL instruments the latest electronic and mechanical developments are combined with a unique, stepper motor driven XYZ design. This combination, together with complete protocols for IQ/OQ instrument qualifica tion, ensures you precise, fast sample handling for dependable analysis results.

Specifications HTS PAL

Syringe size:
100µl standard
(Optional syringe sizes 10, 25, 250, 1000, 2500, 5000µl)

Injection volume range:
0.1µl - 5000µl

Injection speed:
0.01µl/sec. - 250µl/sec

LC Injector:
1 electrically actuated fast switching 6-port valve
(optional second injection valve available)

Sample capacity:
up to 6 00 1ml micro vials
□2ml 9 72 ndard vials
□1 96 0ml or 20ml vials
□deepw 1 ell plates (96 or 384 wells)
□standa 2 d microplates (96 or 384 wells)

Needle, Syringe and Valve cleaning:
Fast Wash Station for 2 different solvents

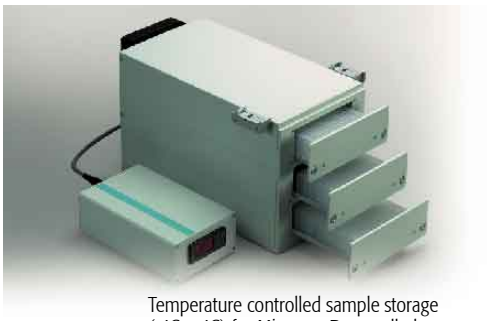
Remote control:
Cycle Composer Windows 9x/NT4/2000¨ based PC software

Electrical control:
2 RS 232C ports / 3 TTL Input / 3 TTL Output /
2 Opto Coupler Input / 2 Relay Output

Dimensions:
L: 828mm D:385mm H: 648mm

Weight:
10kg (without accessories)

HTS PAL Options:
Thermostatted Trayholders (4iC Ð 70iC)
Thermostatted Microplate Stacks (4iC Ð 40iC)
4-port and 10-port electrically actuated fast switching injection valves
Barcode Reader
PAL Dilutor for Dilutions / Derivatisations



Temperature controlled sample storage
(4iC-40iC) for Micro- or Deepwell plates

Additional capabilities using
the PAL Dilutor

Barcode reading ensures positive
sample identification

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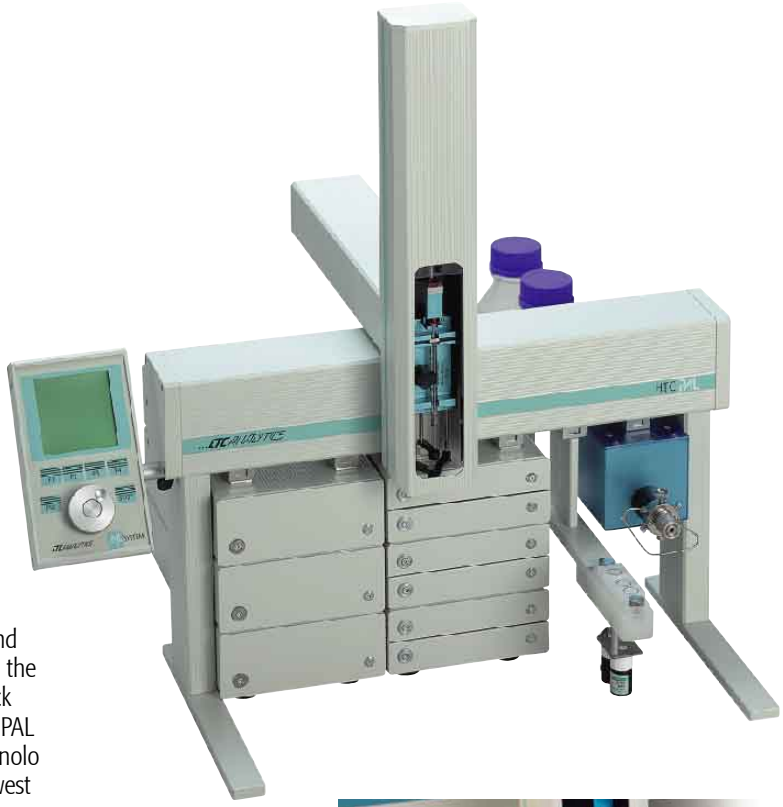
HTC PAL



Advanced performance

The PAL series of LC sample loaders provide outstanding performance and maximum flexibility for your HPLC sample processing system. Sample capacity of up to 24 microplates within 50cm benchspace are unmatched in the industry. Temperature controlled sample storage makes it easy to cool down samples to prevent degradation or heat samples for kinetic studies. Using the optional 4-port or 10-port injection valves enables complex column switching procedures such as pre-column sample enrichment or internal loop configura tions.

Maintenance

CTCÕs PAL instrument design provides worry-free operation and low maintenance costs. An open architecture for easy access to the injection valves, sample trays and syringes, guarantees the quick exchange of sample loops, trays and different syringe sizes. All PAL liquid handling systems are equipped with Flash EEPROM technolo gy, for problem-free update of every installed unit with the newest enhancements and capabilities.

Specifications HTC PAL

Syringe size:
100µl standard
(Optional syringe sizes 10, 25, 250, 1000, 2500, 5000µl)

Injection volume range:
0.1µl - 5000µl

Injection speed:
0.01µl/sec. - 250µl/sec

LC Injector:
1 electrically actuated fast switching 6-port valve

Sample capacity:
up to 400 2ml micro vials
□ 1 64 0ml or 20ml vials
□ deep well (12 96 or 384 wells)
□ standard microplates (24 96 or 384 wells)

Needle, Syringe and Valve cleaning
Fast Wash Station for 2 different solvents

Remote control
Cycle Composer Windows 9x/NT4/2000 based PC software

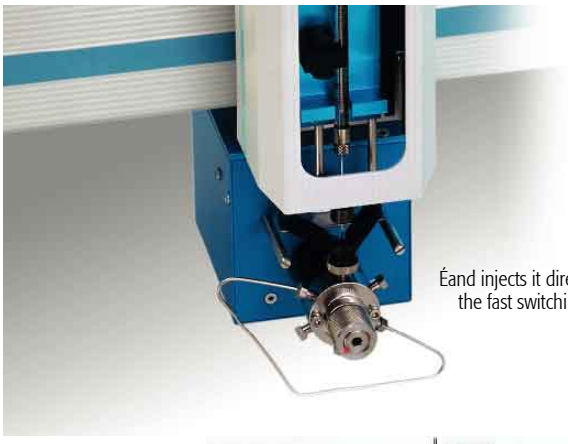
Electrical control
2 RS 232C ports / 3 TTL Input /
1 Opto Coupler Input / 2 Relay Output

Dimensions
L: 534mm D:385mm H: 648mm

Weight
8kg (without accessories)

HTC PAL Options
Thermostatted Trayholders (4iC Ð 70iC)
Thermostatted Microplate Stacks (4iC Ð 40iC)
4-port and 10-port electrically actuated fast switching injection valves
Barcode Reader
Diluent Reservoirs for Dilutions / Derivatisations

The HTC/HTS PAL automatically opens a stack drawer and aspirates the sample from the microplateÉ



Éand injects it directly into the fast switching LC valve

Fast Wash Station for high throughput applications

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LC PAL

Syringe only technology

The syringe only concept of the PAL series of LC sample loaders combines the manual sample injection proce dure with the precision and throughput of a robotic liq uid handling system. Samples are aspirated with a con ventional liquid syringe and are transferred directly into the sample loop. No error prone teflon tubing or trans fer lines are involved during the sample loading process. Before and after each injection the syringe and syringe needle (needle inside and outside) are rinsed in a dedicated Fast Wash Station containing two different cleaning solvents. This unique design virtually eliminates sample carryover and adsorption problems.

Large sample capacity combined with fast cycle time

You expect an autosampler to provide not only precision, but also re liable, fast injections to enhance laboratory productivity. CTCÕs unique XYZ mechanism allows for fast sampling (2-3 injections per minute) or rapid vial to vial transfers. Fast injection cycles coupled with a large sample capacity, makes the PAL series of LC sample loaders ideal for high throughput screening, QA/QC appplications or LCMS Flow
Injection Analysis (FIA).

Choose from a wide variety of syringe sizes

Specifications LC PAL

Syringe size:
100µl standard
(Optional syringe sizes 10, 25, 250, 1000, 2500, 5000µl)

Injection volume range:
1.0µl - 5000µl

Injection speed:
0.01µl/sec. - 250µl/sec

LC Injector
1 electrically actuated fast switching 6-port valve

Sample capacity
up to 216 2ml vials
4 deepwell or standard microplates (96 or 384 wells)

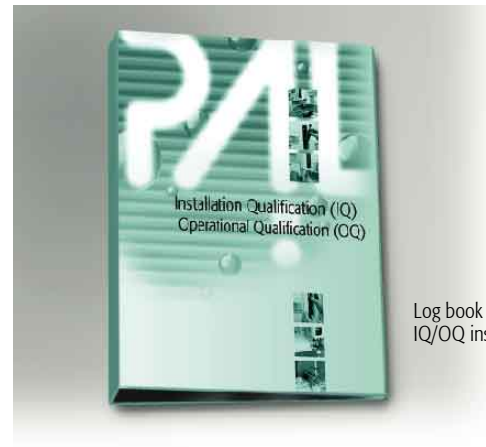
Needle, Syringe and Valve cleaning
Wash Station for 2 different solvents

Remote control
Cycle Composer Windows 9x/NT4/2000¨ based PC software

Electrical control
2 RS 232C ports / 3 TTL Input /
1 Opto Coupler Input / 2 Relay Output

Dimensions
L: 534mm D:385mm H: 545mm

Weight
8kg (without accessories)



Log book with protocols for IQ/OQ instrument qualification

4- 6- and 10 port Injection Valves used for different applications

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PAL Cycle Composer

Intelligent Automation

The Windows 9x/NT4/2000® software Cycle Composer provides remote control for the PAL series of LC sample loaders. The Cycle Composer software allows the operator to easily setup, edit and run HTS / HTC and LC PAL methods for even very complex "Prep and Load" applications.

Easy to use

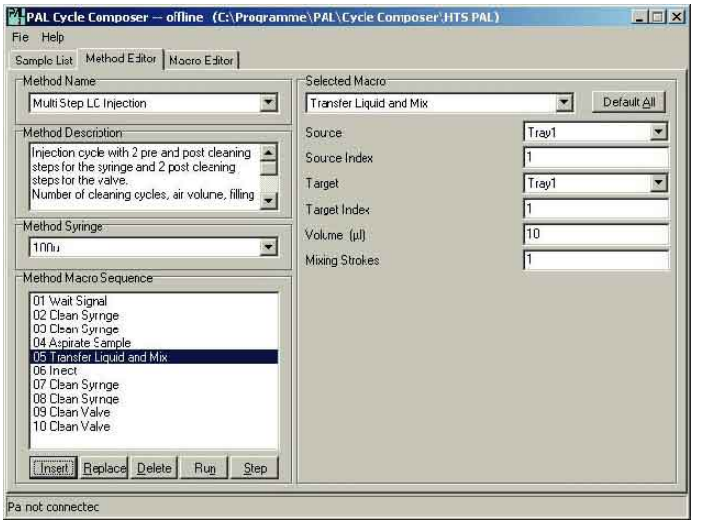
The Cycle Composer has a graphical workspace editor that allows the user easily to configure the workspace, accepting various microplates (96 and 384 wells), 1ml microvials or 2ml standard vials. These various formats may be matched or mixed within the workspace. Samples can be selected serially or randomly for processing. The "Point and click" operation quickly directs the user through programming steps that configure instrument setup, methods and sample lists. For routine daily use, no special programming skills are needed. The Cycle Composer contains a library of common liquid handling procedures including sample transfer, reagent/standard addition, mixing and dilution steps.

Customize your HPLC PAL

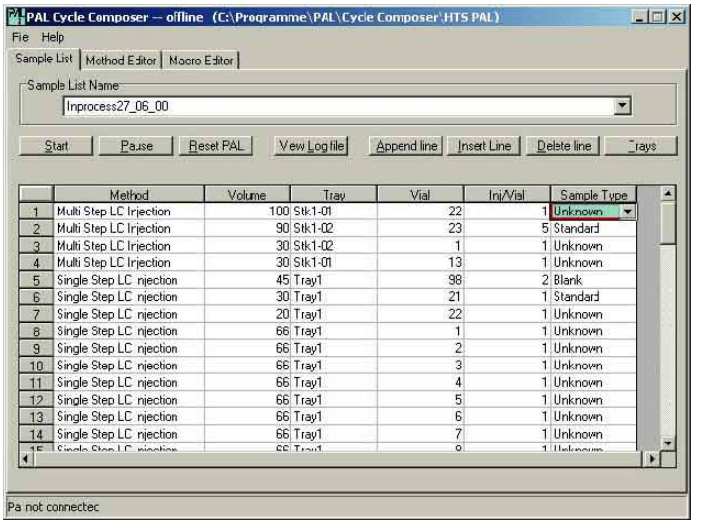
As with the PAL hardware concept the Cycle Composer is already prepared for individual application requirements. Additional flexibility can be assigned to sample prep procedures by using the powerful Cycle Composer macro language, which expands the application range of every HTS / HTC or LC PAL System.

Third party data acquisition drivers:

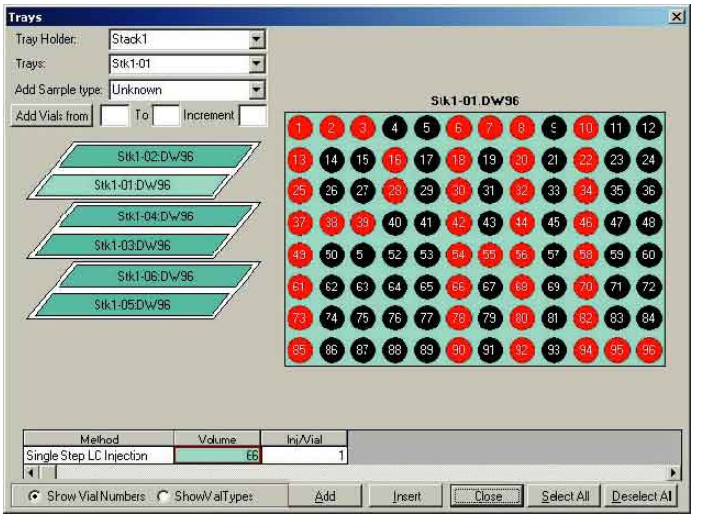
For "single keyboardÓ operation, various third party data acquisition drivers are available. This enables the complete integration of all Cycle Composer capabilities into one single LC processing system.



Method editor: Setup and edit customized injection cycles



Sample list: Setup and run injection sequences



Trays: Graphical sample list generator

Cycle Composer specifications:

Min. PC requirements:

Pentium processor >90MHz
32 MB RAM
1 serial interface
1 3.5" floppy drive
1 CD ROM drive
installed Windows 9x/NT 4.0/2000® or higher
10 MB free Harddisk space

Compatible PAL Instruments:

HTS PAL, HTC PAL, LC PAL
(including PAL Firmware 2.2 or higher)

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HTC PAL LC PAL HTS PAL

General Specifications

System type:
XYZ robot with syringe only concept, no tubing in sample path

Local user interface:
Control panel with 4 function keys, graphical LCD display, unique scroll knob for teach functions

Remote control:
Cycle Composer control software Windows 9x/NT4/2000

Maintenance:
Accessibility to all maintenance parts from front
Preventative maintenance kits available

Power Requirements:
97.5 Ð 264 VAC, 45-66 Hz

Environment:
10°C - 40°C constant temperature,
< 80% humidity (non condensing)

Injection Parameter Control

- Injection volume
- Pre - injection syringe wash strokes for two different solvents
- Post - injection syringe wash strokes for two different solvents
- Pre injection syringe wash strokes with sample
- Plunger speed used to aspirate / eject sample
- Air gap after sample aspiration
- Number of filling strokes to aspirate s ample
- Delay time between sample pull-up and ejection
- Injector selection used for injection
- Plunger speed used during s ample injection
- Delay time prior and after s ample injection
- Valve cleaning wash strokes

Specifications are subject to change without notice

...other PAL sample injection systems

COMBI PAL Front End Automation for Gaschromatography

Distributed by:

CTC Analytics has dedicated the last 10 years to the continued development and high reliability of advanced sample injection technology. To learn more about the unique PAL Series of LC/LCMS sample handling systems or any of our GC/GCMS sample injectors contact your CTC Analytics distributor.

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Where design meets performance

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