



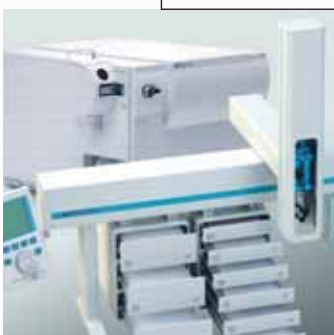
The new **x**-Type Syringe

HTS PAL - LC/LC-MS Sample Injector
High Throughput Applications

Real zero carry-over Syringe
Lifetime >100'000 Cycles

Interfaces with any major LC/LC-MS System

Software Control by
Agilent ChemStation
Thermo Xcalibur
Shimadzu LCMSsolution
Waters Masslynx
Applied Biosystems Analyst
Bruker Compass
Dionex Chromeleon



- Adjustable plunger, protects plunger tip from squeezing
- Colour coded flange indicating needle gauge and internal diameter
- Plunger stem sealed with temperature and solvent stable material
- Glass barrel inner surface polished and sealed for inertness. Stable against organic solvents, acids and base (brine)
- New inert plunger tip Polymer with significant longer lifetime
- Needle fixation to barrel. No sample contact with glue or cement
- Deactivated needle by extremely smooth inorganic glass layer, prevents metal contact. Stable against organic solvents, acids and base (brine)

Features

- Parallel Injection for MUX™
- Column Switching Modules
- Cooled Sample Stacks
- Nanoliter Injection Valves
- < 20 Seconds Cycle Time
- 24 Microplates 96/384 wells

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The new X-Type Syringe

CTC Analytics has developed a new generation of microliter syringes. The main features are zero carry-over and a long-lasting plunger. Tests with critical samples like phospholipids, basic molecules and peptides have shown that carry-over can be reduced by a factor of 10 depending on the sample. The life cycle of the plunger is improved by a factor of at least 10 compared to today's standard syringe.

The dramatic changes in the HPLC application field, driven by the life science, proteomics and screening market segments, forced the manufacturers to take a second look at the established devices. In these application segments as many injection cycles are gone through in one night as used to be done in a month or more. An injection every 30 seconds is not just one syringe plunger cycle. Including the fill strokes and wash cycles, there are 5 to 10 cycles per sample. One can imagine that such a pace is very stressful for a device that was invented 60 years ago – in the good old days when everything was a little slower...

One of the contributing factors here is that LC-MS systems have become a part of routine lab work within the last few years. Today's LCMS systems are not only extremely sensitive but also show a dynamic linearity to a degree which was unknown with common detectors. Working with a linear dynamic range of 10^5 with a UV detector was widely accepted and produced satisfactory results. Today's LC-MS system can handle a linear dynamic range of 10^6 or even more. This feature right away suggested a new approach to measuring carryover. A highly concentrated standard is injected (upper limit of quantification, ULOQ), followed by a blank. The carry-over measured or detected should be less than 20% of the lower limit of quantification (LLOQ). This comparison gives the analyst an indication as to whether the results in the lowest-level range can be reliably used for quantification.

One problem that is often overlooked is the saturation of the HPLC system caused by injecting such high concentrations. Looking at the flow path from top to bottom, this problem can occur in the syringe, valve inlet, valve rotor, all tubing connections, rotor, stator or tubing material, column inlet frit (clogging – maybe only partially), column packing, and finally also the detector. From this listing, one realizes that highly concentrated standard or sample solutions can be difficult to handle. In practice, not every carry-over test performed necessarily saturates an HPLC system, either partially or completely. Experienced users are careful to select the concentration within a manageable range. The first device listed in the flow path above is the syringe. Clearly, any project to improve the syringe has to include the challenging task of eliminating carry-over as much as possible.



Together with Hamilton Switzerland, CTC developed a new generation of syringes, the X-Syringe product line.

The eXtra features are

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Discussing carry-over, one always has to specify the class of compounds or the product itself. Often where tests have been done in research labs, compound-related information was not revealed for secrecy reasons.

Tests using our new syringes in various laboratories over the past year showed that carry-over with critical compounds like phospholipids, proteins or basic molecules could be reduced by a factor of 5 to 10. These results are outstanding. Any remaining carry-over cannot be attributed directly to the syringe. Too many other critical points may have an influence – as described earlier. The claim in the name "zero carry-over syringe" is in all probability true; but as every scientist can guess, we could not test all possible combinations or compounds. The feedback from various labs shows that the new syringes lasted for several weeks, not just days.

Cases were reported where the current standard syringes had lasted only a few days in a high throughput application. The new X-Syringes have already been in use for several weeks and are still going strong. Our own tests showed that 100,000 cycles could be reached without any loss of seal.

X-Syringes are exclusively available through CTC Analytics AG in 25ul and 100ul volume sizes.

...CTC ANALYTICS
Where design meets performance

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