



**Spark Holland introduces
INTEGRITY™**

Resetting the standard in
LC autosampling

BETTER **SAMPLE** CARE

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Sample
Barcode
Identification



Injection
Performance
Monitoring

State-of-the-art injection technology is important, naturally. And rapid sample turn-around time is very helpful, of course. Certainly, large sample capacity is very convenient, no doubt. But this all becomes irrelevant if you have only the slightest doubts about the integrity of the samples that you injected! Yet, while injection technology and capacity have seen great advances over the last 30 years, measures to maintain and control sample integrity have had little attention from instrument manufacturers. Until now.

The new INTEGRITY™ autosampler from Spark sets a new standard in sample care.

- Sample and tray bar code reading
- < 20 sec injection cycle
- True 4 °C sample cooling of all samples
- Injection performance monitoring
- Vial bottom detection – efficient use of available sample volume
- Advanced wash capabilities to eliminate carryover
- Dual independent concentric needle concept
- Optimized for UHPLC
- Advanced reagent addition and derivatization
- Integrated on-line sample prep capabilities
- Up to 4 well plates or 216 standard sample vials

Sample care first

A number of innovative features ensure better and safer control of handling and tracking of samples – ensuring that you feel much more confident about the results.

SBI™ - Zero doubts on sample identity



1D and 2D sample and sample tray identification codes can be read, filed and linked to sample assay results. It is even possible to record an image of the vial during sampling for visual verification of the injection and the sample vial afterwards. Combined with positive feedback motion control for the sample tray positioning, the risk of assigning results to the wrong sample is zero.

IPM™ - Injection performance monitoring

Injecting the proper sample is one thing but how to verify that the injection itself has been performed correctly? The answer is pressure monitoring of the sample flow path during the entire injection cycle! Pressure profiles of injection cycles are recorded for every injection and by comparison with reference profiles, indications for malfuncio-



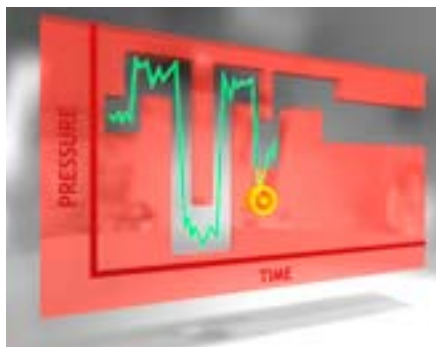
Sample
Temperature
Control



Pressure
Assisted
Sample
Aspiration



Power
Wash



ning caused by blockage, leakage, air bubbles, needle damage, valve problems, etc can be easily recognized in case of suspected erroneous results. The injection pressure profile (“pneumogram”) can be linked to assay reports for easy verification afterwards.

Obviously, preventing malfunction is better than correcting the con-

sequences. Therefore INTEGRITY™ also checks for needle obstruction and missing vials before injecting a sample. Plus, the injection pressure monitor prevents formation of air bubbles by adjusting the aspiration speed of the dispenser in case of viscous samples or partly blocked needle.

Improper injections have become virtually impossible, but if it happens – you will know it!

STC™ - Accurate sample temperature control - low and high!

Many biological samples require cooled storage during processing to avoid deterioration. Therefore, many autosamplers offer cooling, but very few autosamplers offer

adequate cooling across the entire sample space. INTEGRITY™ not only offers cooling, but also offers sample temperature control from 4°C up to 40°C for the entire sample tray and sample processing space. Actual readout of tray temperature shows when the autosampler is ready to accept new samples. Actual tray temperature can also be linked to sample assay results to verify correct sample temperature afterwards. And, in addition, the cooling device has been designed to reduce condensation in the sample area to a minimum.

Elevated sample temperature improves sample solubility and thus helps to prevent precipitation of poorly soluble analytes and adsorption of analyte to vial walls.

Proven injection technology perfected

Our robust concept of closed line sampling using pressure assisted sample aspiration (PASA™) directly from vial to valve, has proven its reliability in more than 25,000 autosamplers. Simplicity of the concept, the absence of a needle port and a syringe that is never in contact with the sample are the most prominent features contributing to its success. With special attention to handling small samples, carryover and compatibility with UHPLC, INTEGRITY™ now brings this concept to a new level of perfection!

PASA™ - Familiar injection modes with higher performance level

Our well known partial loop fill, full loop fill and microliter-pick-up modes are again available on INTEGRITY™. Plus, by reducing the volumes of needle and tubing, adding pressure feedback and refining the needle control, these modes now perform better than ever. Independent motion control for sample needle, piercing needle and

vial stripper provides maximum freedom for sampling, needle wash and vial types. Rigid seals can be pierced without risk of damaging or blocking the sample needle, while the sample needle can be optimized for volume and inertness. PEEK, steel, or even fused silica tubing can be selected to serve as sample needle for optimal sample compatibility. A snap-in needle mount allows needle exchange in seconds.

A built-in air pump provides air via the piercing needle, enabling the PASA™ injection concept for bubble free aspiration and assisting needle wash for the concentric needle pair. Pressure monitoring, plus feedback control during the injection cycle, enable self-adjustment of aspiration and dispensing speed and valve switching delay times in case of variation in sample viscosity, needle restriction, air bubbles, etc.



Micro
Injection



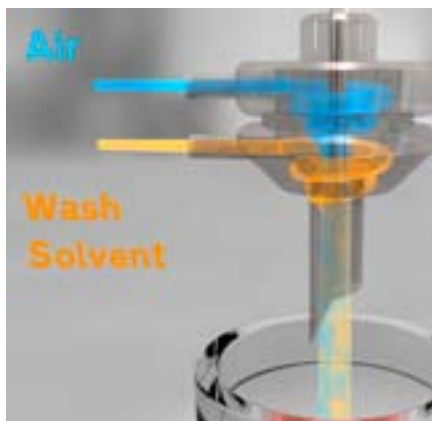
Full
UHPLC



Homogenizer
Mixer

Separate needle wash pump for better needle wash and faster injection cycles

A completely new concept for needle wash has been designed for INTEGRITY™. A separate built-in solvent pump provides wash solvents to the needle pair, and a smart combination of air pressure and solvent streams ensures thorough cleaning of the needle pair, inside and outside, in seconds. And also provided – jet-stream drying of the needles before entering the next sample! Multiple solvents can be selected by the wash pump for maximum clean-up ensuring zero carryover for the stickiest samples. Because the wash pump is much faster than the syringe-dispenser used for the injection, needle rinsing is not only better, but also much faster. INTEGRITY™ can do an entire injection-wash cycle in less than 20 seconds!



Micro injection volumes and micro sample waste

Using a micro syringe for accurate aspiration of small sample volumes, even nanoliter volumes of samples can be injected with high precision and accuracy. The microliter-pick-up mode reduces sample loss to zero and vial bottom detection enables INTEGRITY™ to position the sample needle at just a few tenths of a mm above the vial bottom to make sure

you get all your precious sample injected reliably, independent of size variations in vials. Injection cycle time is not compromised by the reduced syringe volume because of the separate wash pump taking care of wash solvent delivery!

UHPLC ready

A special injection valve and a new injection routine make INTEGRITY™ ready for injections into UHPLC systems up to 120 MPa (18,000 PSI). Ultra-fast valve switching reduces pressure shocks to a minimum for longer column life time. Combined with excellent micro injection capability and including the entire range of sample care and sample prep features, INTEGRITY™ adds unsurpassed performance to your UHPLC system.

Integrated sample prep features

Spark has always been leading in innovative integration of sample prep functionality into front-end sample handling systems. We introduced such capabilities as pre-column derivatization, column switching and on-line SPE as integrated functions of autosamplers and front-end systems. No doubt, INTEGRITY™ will strengthen our reputation further!

HoMix™ – Sample homogenizer/reagent mixer

HoMix™ is a separate device for mixing sample with reagents or for sample homogenizing prior to injection and is a unique innovation for HPLC autosamplers. Three separate mini pumps can provide different reagents from external reservoirs to

special self-cleaning overflow wells on the sample tray holder. Sample and reagent volumes are picked up and dispensed into destination vials using the sample needle and syringe dispenser. Destination vials are then picked up from the tray by HoMix™ and their contents mixed by a very efficient, tumbling-like movement.





Heated
Capillary



Integrated
Stream
Switch



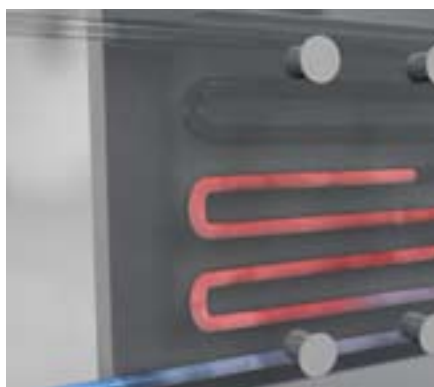
Double
Independent
Concentric
Needles

After placing it back into the tray, the mixture is injected using any of the three available injection modes. Mixing variables such as tumbling speed and duration can be programmed. Compared to the syringe aspirate/dispense actions offered by other autosamplers, mixing is much better and faster! Typical applications of this unique feature are internal standard addition, dilution, pre-column derivatization, homogenizing etc. Even in-vial liquid-liquid micro extraction is feasible.

HotCap™ - Individual heating of samples and reaction mixtures

Cooling helps to maintain sample integrity, but when deliberate changes of samples are required prior to injection, heat is our best help. HotCap™ is a piece of capillary tubing that can be heated up to 100°C. When used as sample loop or other position in the sampling line, samples or sample/reagent

mixtures can be heated before injection. Typical applications include pre-column derivatization, protein denaturing to reduce protein-analyte binding, disruption of cells, etc. HotCap™ heats up in seconds, has actual temperature read-out and a hardwired temperature limiter for maximum safety.



Controlled elevated temperature for sample trays

The entire sample tray of INTEGRITY™ can be thermostatted between 4 and

40°C to facilitate such applications as stability testing or to study degradation under physiological conditions at 37°C.

ISS™ - 2 Integrated Stream Switching Valves for on-line sample prep

Our favorite way of sample prep is becoming more and more popular! Spark pioneered on-line sample prep (solid phase extraction, column switching) and introduced on-line sample prep as an integrated option on an autosampler over 20 years ago. Today, on-line sample prep using high pressure stream switching is considered the best approach to obtain high assay quality and maximum automation. In addition, on-line sample prep using valve switching provides a closed sample processing system – another plus for sample integrity.

SparkLink: connecting INTEGRITY™ to the world

For comprehensive control of the extensive capabilities of INTEGRITY™, Spark provides a control software package running on our SparkLink™ software platform. This software allows maximum use of the entire INTEGRITY™ functionality in any order of events, to create even the most exotic methods. Methods are linked to samples in a run table for automated processing of sample batches. Both software I/O and hard-wired I/O enable communication with other software and hardware to create full PC control for your entire analytical system.

Drivers for third party software packages

Using the SparkLink communication protocol, INTEGRITY™ control can be integrated into most third party

software packages. Spark has extensive experience with integrating instrument control into the software packages of our OEM customers, and has assisted in the creation of

a number of drivers for our instruments in commercially available software products for system control and data acquisition. Please consult us for your particular application!

INTEGRITY^{Plus}: extended sample capacity

A special version of INTEGRITYTM, the INTEGRITY^{Plus} doubles the standard 2 well plate capacity. INTEGRITY^{Plus} accommodates 4 well plates or 216 standard 2ml vials. Special trays for micro-vials increase sample capacity even further! INTEGRITY^{Plus} also allows use of well plates in one tray set and (micro) vials in the other, or vice versa for sample reformatting, dilution, etc. Rapid tray positioning will keep your method fast, even when alternating between different trays of vials and wells. Plus... all trays are temperature controlled between 4°C and 40°C!

Spark Reliable OEM partner

Designing instruments for OEM business has become second nature to us. Few instrument companies are so dedicated to customization of hard- and software according to their customers' needs. We aim to be your partner all along the way – from designing the product to crea-

ting and integrating its driver in your software package. We have over 25 years experience in development and production of HPLC instruments and have delivered over 25,000 autosamplers. Reassuring numbers if you demand a reliable partner in HPLC instrumentation.





For more information:

Now interactively explore for yourself all the animated features of the INTEGRITY™ at www.bettersamplecare.com

This brochure is a pre-release announcement:
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