C196-E096C

SHIMADZU
Excellence in Science

Ultra High Performance Liquid Chromatograph

Nexera series



Mobile Phase Monitoring
Auto-Diagnostics
FlowPilot
Maximizing
Throughput
Unattended
Operation
Integrated Lab
Compact Design

EXPERIENCE NEW BENCHMARKS

- A New Benchmark of Intelligence
- A New Benchmark of Efficiency
- A New Benchmark of Design

Shimadzu has long been advancing the analytical performance of HPLC systems. At the same time, we recognize that overall efficiency depends not only on the performance of one instrument, but on the management of all devices within a lab. This realization leads us to now, a time in which AI capabilities have been incorporated to allow devices to detect and resolve issues automatically. In addition, lab management has been integrated using the Internet of Things (IoT) and device networking, making it simple to review the status of instruments and optimize resource allocation.

Building upon 40 years of experience in LC technology, the Nexera series is a family of UHPLC systems that marries these AI and IoT enhancements to set new industry standards in terms of intelligence, efficiency, and design.

Nexera™ series

Key Features

Analytical Intelligence

ANALYTICAL INTELLIGENCE

- Automated support functions utilizing digital technology, such as M2M, IoT, and Artificial Intelligence (AI), that enable higher productivity and maximum reliability.

- Allows a system to monitor and diagnose itself, handle any issues during data acquisition without user input, and automatically behave as if it were operated by an expert.

- Supports the acquisition of high quality, reproducible data regardless of an operator's skill level for both routine and demanding applications.





Mobile Phase Monitor MPM-40

- Reservoir tray weight sensors monitor the remaining mobile phase in real time. P. 7

System Controller SCL-40, CBM-40

- Supports remote monitoring via a smart device.
- Mobile phases can be purged and baselines checked easily via the touch panel.

UV-VIS Absorbance Detector SPD-40 / SPD-40V Photodiode Array Detector SPD-M40

- Temperature control improves performance stability. P. 13
- Analytical data is linked to information about consumables to ensure traceability.

Solvent Delivery Unit LC-40 Series

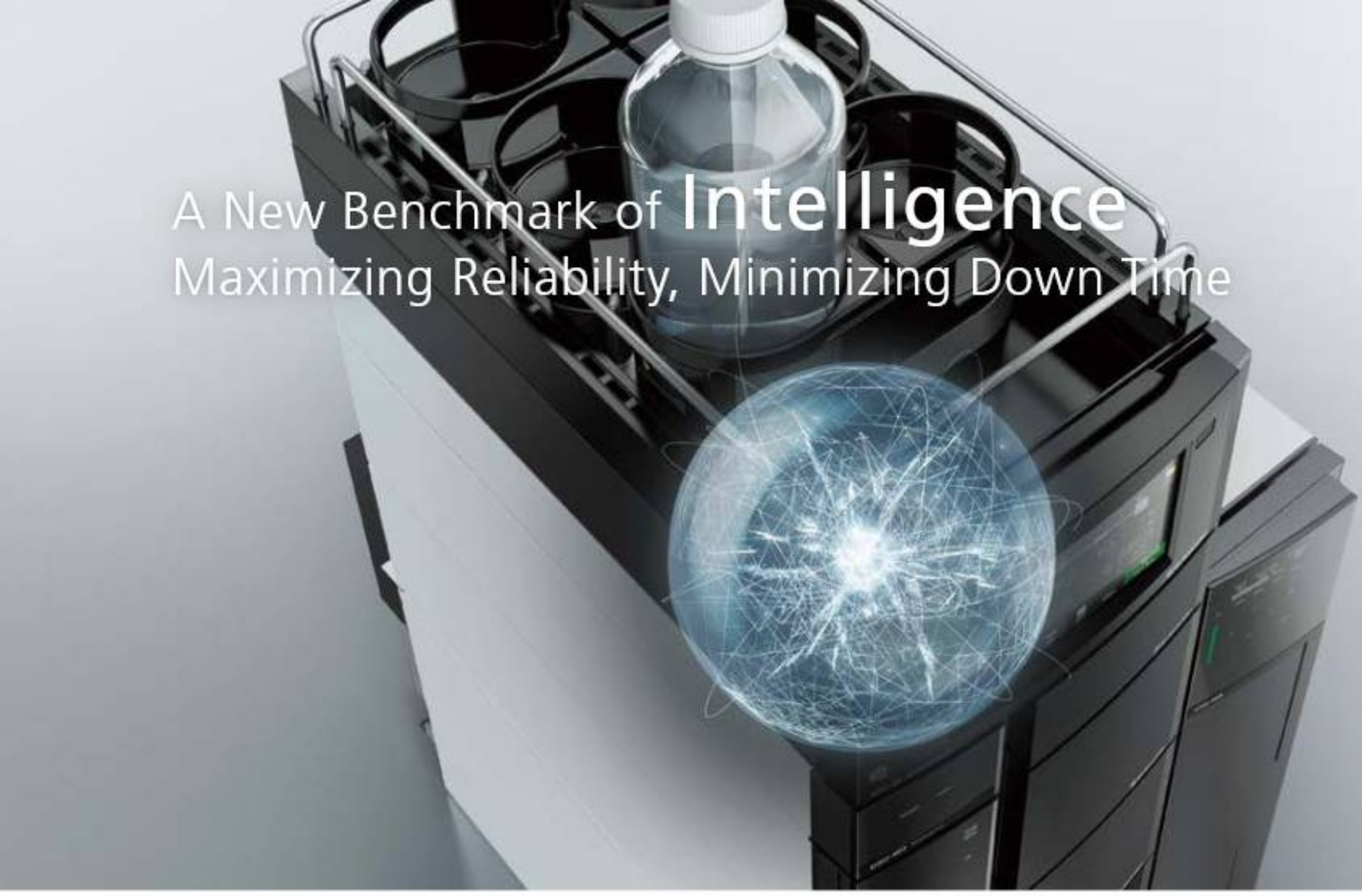
- Auto-diagnostics to detect problems during analysis, and an auto-recovery function. P. 6
- Reduces space requirements with a dual solvent delivery system. P. 12

Autosampler SIL-40 Series PLATE CHANGER

- The injection speed is twice as fast as previous models, shortening multi-analyte processing times. P. 10
- Can perform continuous analysis on up to 44 microtiter plates. P. 11
- High reproducibility and ultra-low carryover for micro-volume injections. P. 13
- Automated sample preparation functions such as diluting samples, adding internal standards, and performing derivatization reactions, reduce labor.

Column Oven CTO-40 Series

- Slim-type column oven with half the width of the previous model. P. 12
- Easy column attach/detach mechanism prevents peak broadening. (Nexlock™)
- Automatic management of column information such as number of injections and pressure during analysis.
- Monitoring of column degradation through usage history (when used with LabSolutions™).

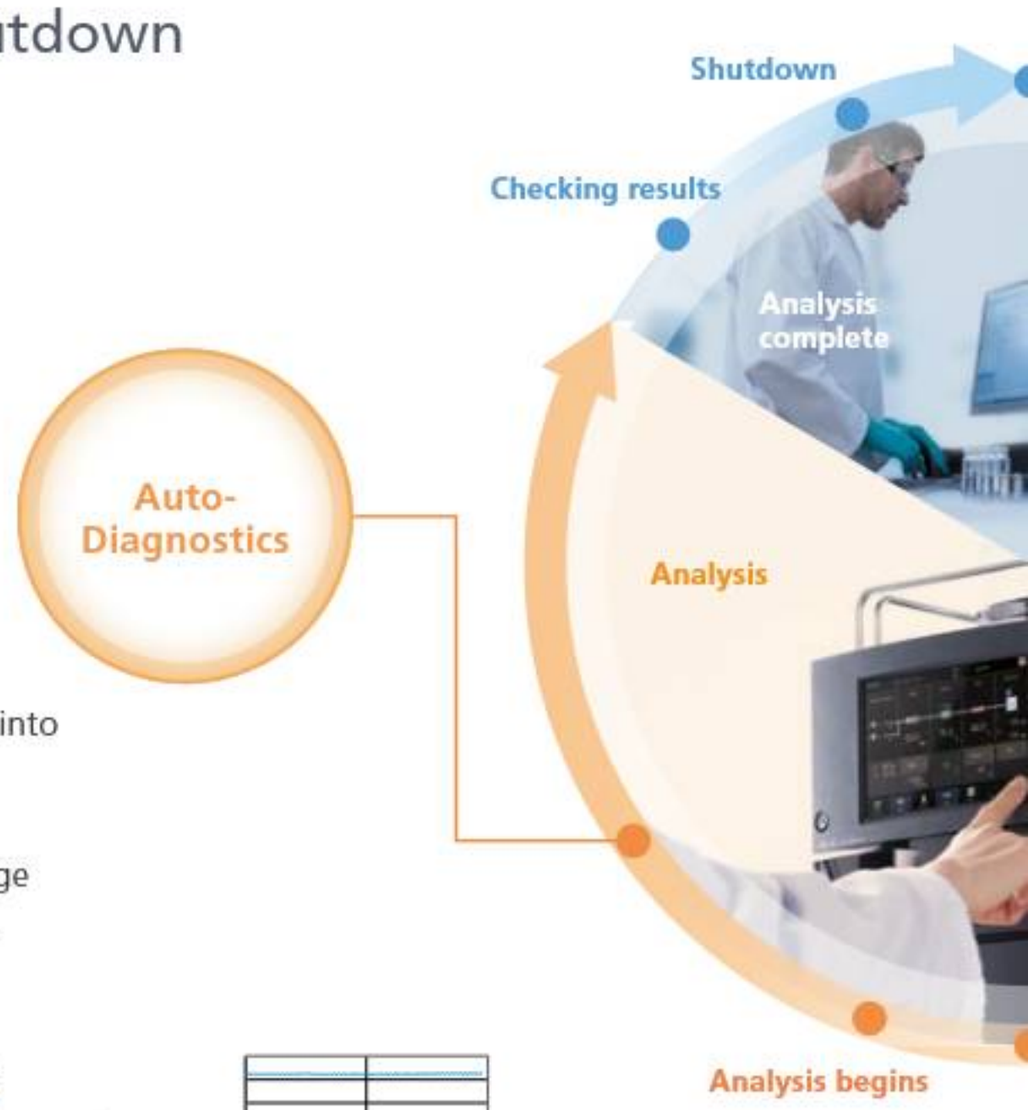


A New Benchmark of Intelligence
Maximizing Reliability, Minimizing Down Time

Fully Unattended Operation from Startup to Shutdown

The Nexera can be set to start up at a specified time, so that it can complete auto-purge, equilibration and baseline checks in advance, and be ready for analysis as soon as you arrive at the lab. Moreover, the system can be set up in advance to run without user intervention all the way from startup through analysis to shutdown.

You can view the status and predicted analysis completion time for multiple systems from any location via a smart device. None of these features requires any special software.



Auto-Diagnostics and Recovery

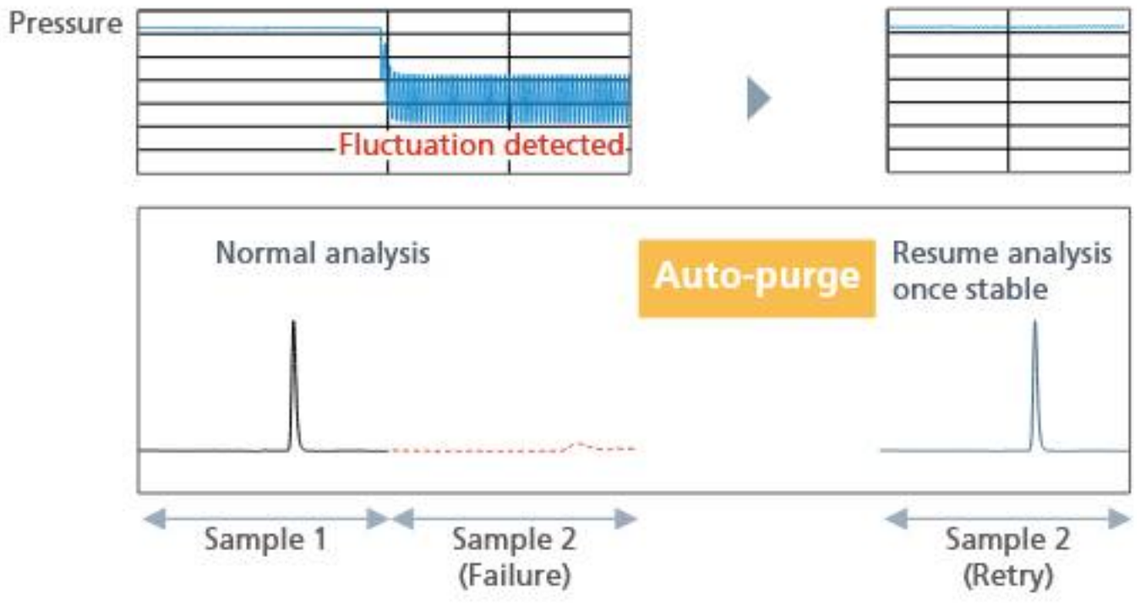
ANALYTICAL INTELLIGENCE

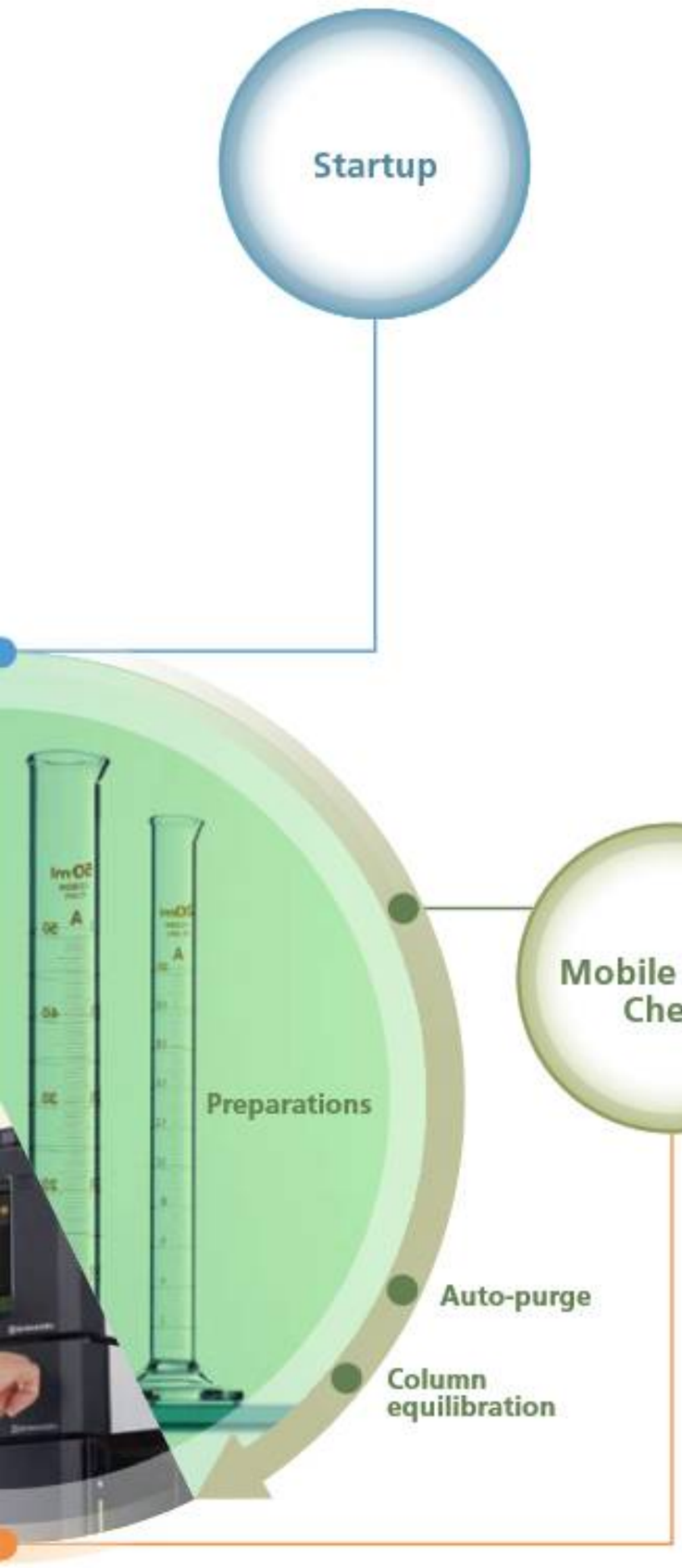
In rare cases, air bubbles can form in the mobile phase and cause problems if inhaled into the pump. The Nexera has the ability to monitor baseline changes and pressure fluctuations to check for abnormalities.

When it detects an unusual fluctuation, it can automatically pause the analysis, purge the flow path, and restart analysis once it has confirmed recovery to normal pressure.

Auto-Diagnostics for Trapped Bubbles (Patent Pending)

If an air bubble becomes trapped in the pump head, it causes an abrupt drop in pressure, after which periodic pressure changes (pulsations) will occur. This can be detected using Shimadzu's proprietary bubble detection algorithm which assesses these distinctive pressure fluctuations caused by trapped bubbles to distinguish them from any expected changes in pressure.

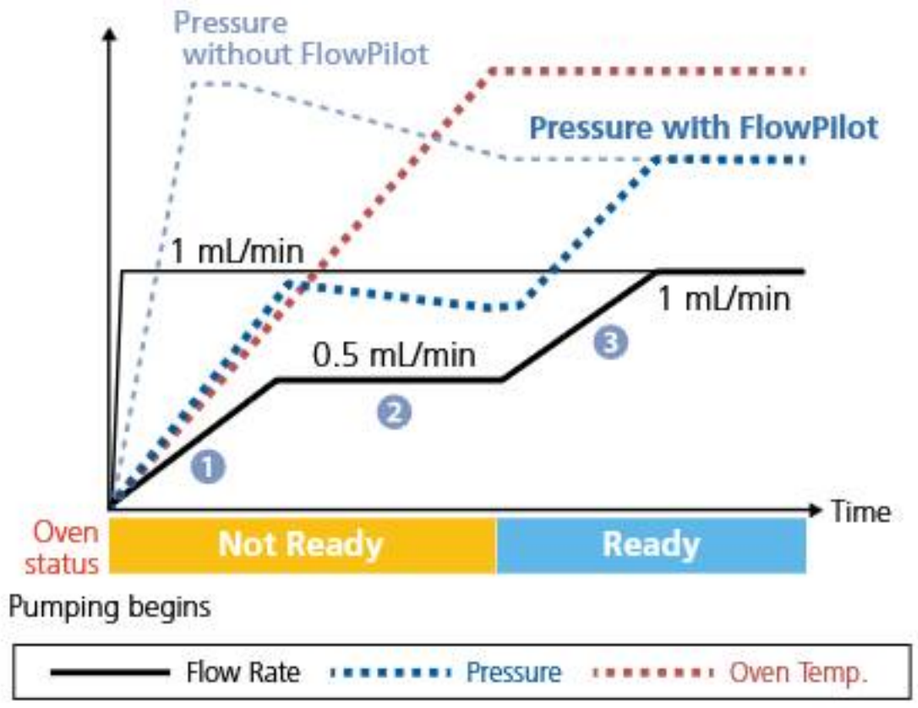




FlowPilot Protects Columns

ANALYTICAL INTELLIGENCE

HPLC columns can be damaged by sudden pump starts and stops or extreme gradient changes. The Nexera automatically uses FlowPilot (Smart Flow Control) to increase the flow rate gradually to the set point. There is no need to create startup protocols for each analysis.



FlowPilot (Patent Pending)

The pump controls the flow rate according to oven temparature. The flow rate is gradually increased up to half of the set value.() The flow rate is kept constant until the oven is ready.() The flow rate is gradually increased up to the set value.()

Mobile Phase Levels Measured in Real Time

ANALYTICAL INTELLIGENCE

Reservoir tray weight sensors (optional) can be used to monitor the volume of mobile phase or autosampler rinse solution in up to twelve containers. The containers can also be checked remotely from a smart device.

You will no longer need to worry about running out of mobile phase mid-analysis, because the device will notify you before starting the run if the volume remaining is too low.

Comparing Solvent Volume Measurements with Predicted Consumption (Patent Pending)

The required mobile phase volume is predicted at the start of analysis from the weight sensor's measurement data, the instrument configuration information (the mobile phase used and the rinsing liquid configuration), and the analysis method. If a shortage occurs, the user is notified.





A New Benchmark of Intelligence
Remote Monitoring and Integrated Lab Management

Reliably Track Column Usage* ANALYTICAL INTELLIGENCE

Columns used in analysis need to be traceable to investigate any influence they may have on results. With the Column Management Device (optional), each column is recognized by an individual ID, and stats such as pressure and injection number are automatically recorded in the database and linked to each measurement data file.The device can be linked to all columns regardless of their brand or type.

The condition of a column can be checked directly with the column management software, so that you can start analysis without having to test column performance in advance.

*To make use of this feature, a CMD compatible with the Nexera series and LabSolutions DB/CS are required.



Column Management Device (CMD) (Patent Pending)

The CMD (optional) compares the column information with the requirements of the analysis method and only begins analysis if they match. This device prevents mistakes in the choice of columns while at the same time storing the usage history of each column.



Step 1

Manage all your columns from the database, which can display usage status, injection count, etc. on one screen. Information about the column used is automatically linked to the analytical results.

Step 2

Deterioration of columns can be checked visually by examining peak shapes. Each compound listed in the compound table can be directly overlaid on the chromatogram.

Check Chromatograms Online

View the operating status of instruments from a web browser using a smart device. This allows you to confirm parameters such as oven temperature and pump status directly from the web, and to monitor chromatograms in real time without returning to the lab.

In addition, SHIMADZU LabTotal™ Smart Service Net (optional) saves operating data from your instruments in a cloud server. Error information, including the date and time the errors occurred, can be sent via email.





Check the operating status of your LC systems

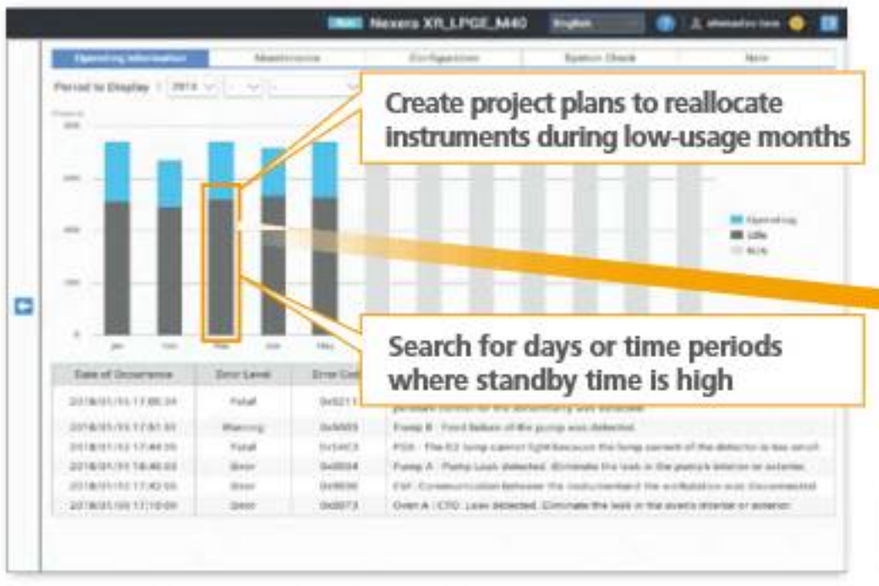
Select one system



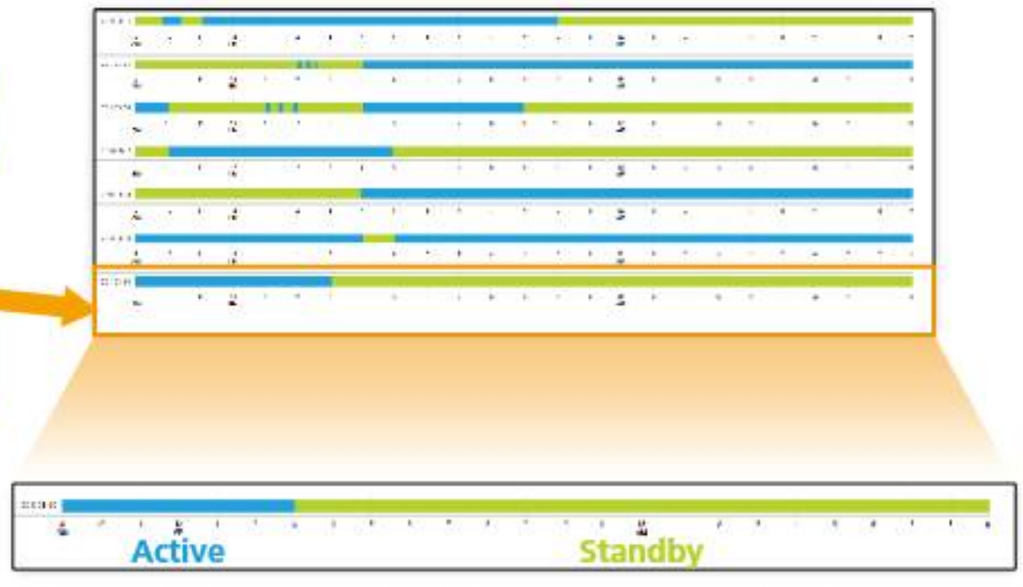
Monitor chromatograms currently being taken

Allocate Resources Efficiently

Manage the overall operation of your lab with SHIMADZU LabTotal Smart Service Net (optional). Review and compare instrument usage to maximize available analysis time, and manage shared consumables through a common system.
(Patent Pending)



View graphs of monthly operation status



Zoom in further to view the daily operation status of each instrument

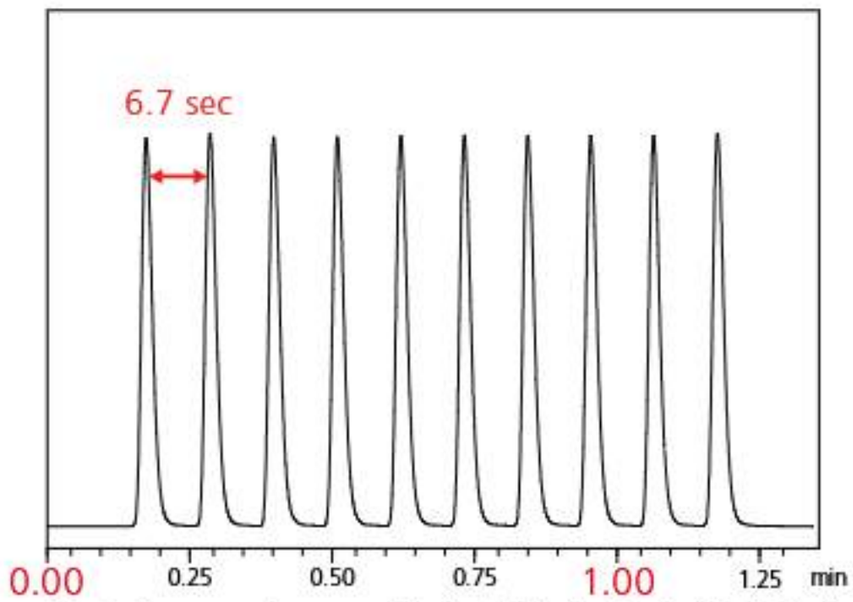


A New Benchmark of Efficiency

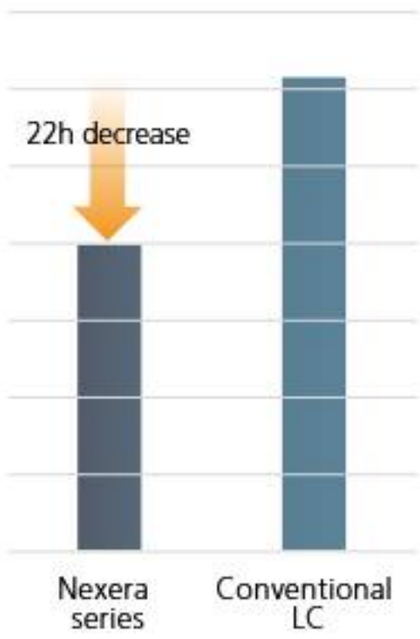
Automating Workflow, Maximizing Throughput

Analysis Cycle Time Less Than 10 Seconds

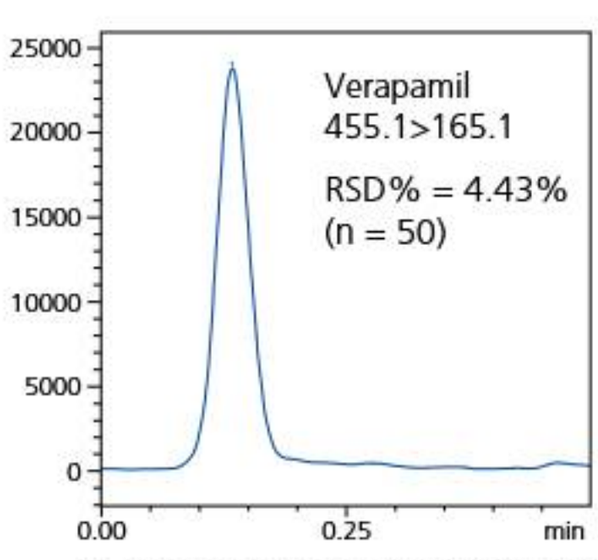
The SIL-40 autosampler can process the entire injection cycle time in as little as seven seconds, twice as fast as the previous model. In addition, continuous analysis can be carried out on up to 44 MTPs (using 3 PLATE CHANGERS). Together these features dramatically increase analysis throughput.



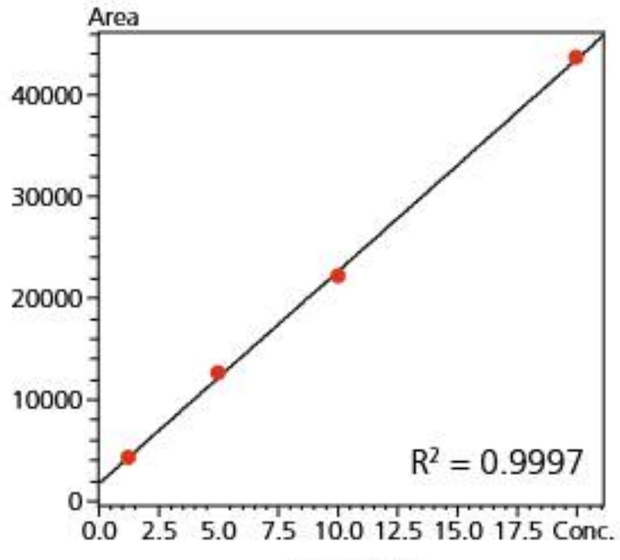
8 injections can be completed within 1 minute (Caffeine)



Pharmacokinetic analysis requires not only speed but also high reliability at low concentrations. With its ultra-fast injection and ultra-low carryover, the SIL-40 autosampler delivers high reproducibility and reliability, even during an ultra-fast 30-second analysis.



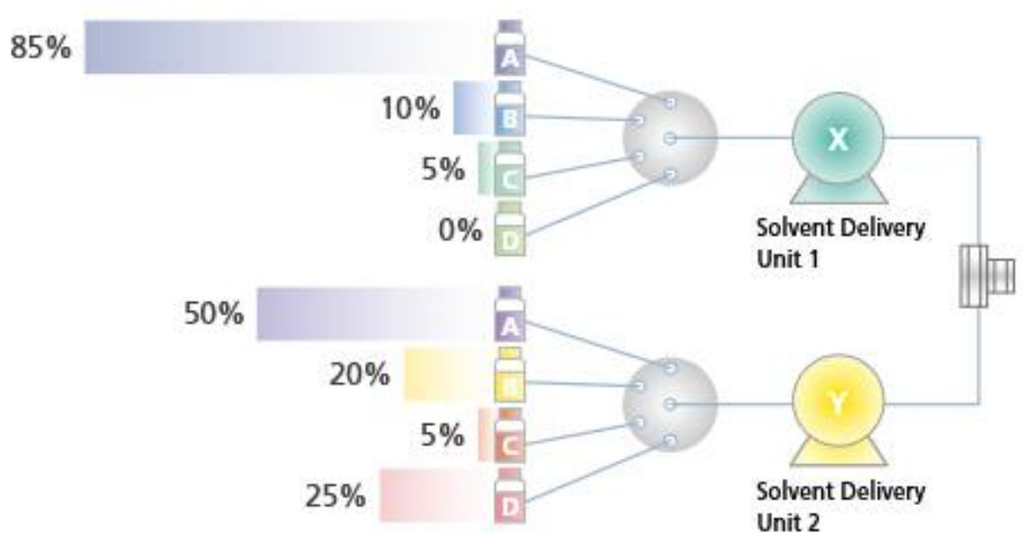
Verapamil in plasma (spiked 2.5 ppb)



Linearity

Quick and Reliable Mobile Phase Blending

The Nexera can automatically blend mobile phases at any set ratio. This speeds up the preparation of buffer solutions and the dilution of solvents, and can be used to easily prepare the exact amounts required for analysis, reducing waste as well as labor.

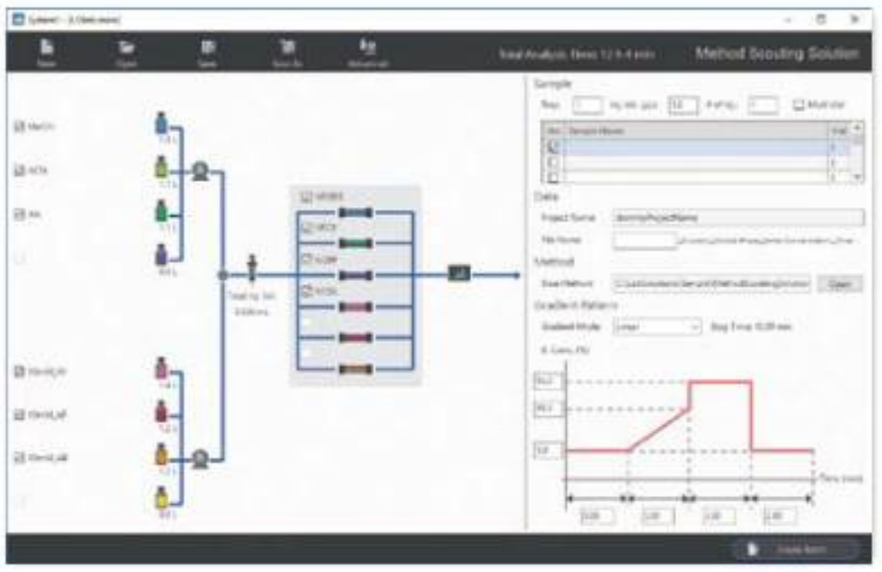


Mobile phases are automatically prepared using the pumps.

Binary Gradient

Simplified Method Development

The Nexera Method Scouting System is capable of automatically switching between combinations of up to 6 columns and 8 mobile phases. It can run unattended, maximizing available uptime. In addition, Method Scouting Solution Software can automatically create methods with different columns, mobile phases, and gradient conditions from a single base method.



Remote Instrument Maintenance Ensures Stable Operation



Each Nexera component automatically transfers the status of consumable parts, the traceability information of consumable parts after shipment from the factory, and various logs and error information to the SHIMADZU LabTotal Smart Service Net cloud system. Using this information, the system recommends the timing for consumable part replacement. Problems can be diagnosed remotely by Shimadzu service engineers. This means the system can be maintained in optimal condition and equipment management costs can also be reduced.



Usage display for consumable pump parts

Easy to replace consumables at the appropriate time
Improved lab efficiency



Lab manager

Balance maintenance schedule remotely
Easy to determine appropriate maintenance



Service engineer



A New Benchmark of Design
Compact and Inventive

Space-Saving Design

The Nexera frees up bench space with a compact design two thirds the size of Shimadzu's previous model.

Energy-Saving Standby Mode

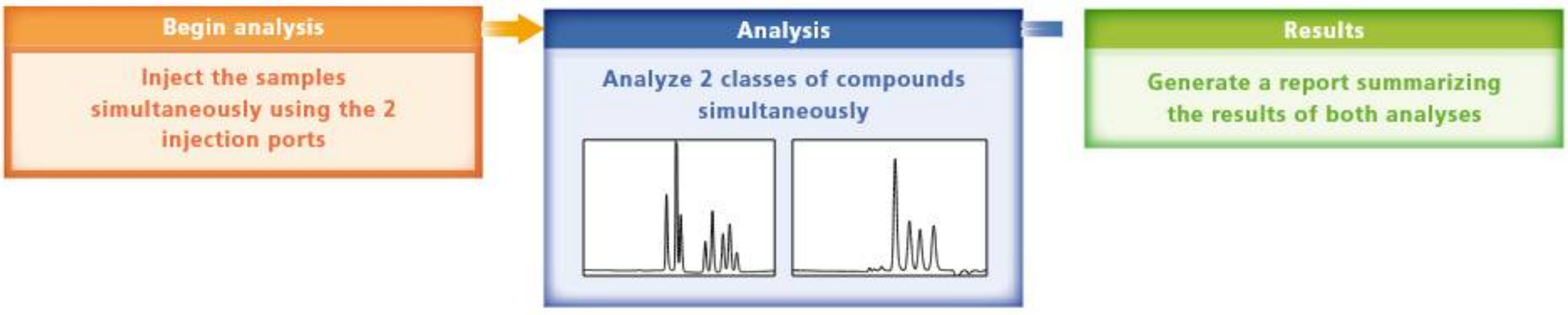
The Nexera uses over 80% less electricity when in standby mode, significantly reducing running costs and supporting an environmentally-friendly lab.





Dual Injection Enables Simultaneous Analysis

Injection ports for two separate flow paths can be installed, allowing two different types of analysis (such as analysis of amino acids, organic acids or vitamins) to be performed using one system.

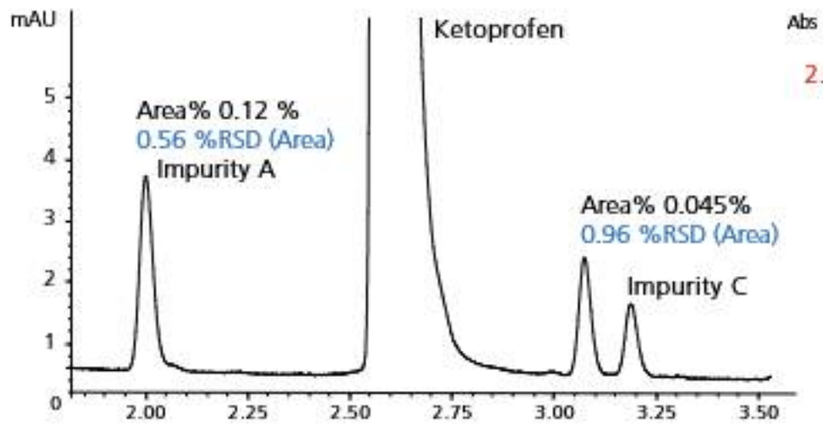


Dual Injection (Patent Pending)

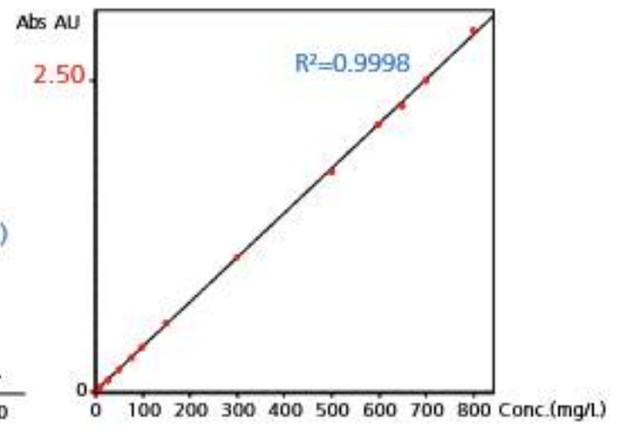
A second injection port and injection valve have been added. As a result, the sample can be injected independently into two analysis flow lines with a single needle, enabling the consolidation of a two-system analysis within a single system.

High-Sensitivity Impurity Analysis

The SPD-M40 detector achieves an extremely high level of sensitivity and linearity (up to 2.5 AU). This allows quantitation of very lowconcentration impurities even in high-concentration samples. The UV cut-off filter installed in the detector prevents sample degradation due to UV light, helping to maintain good linearity at low concentrations.



Example: Ketoprofen analysis reveals impurities of area% < 0.2%



Detector linearity for ketoprofen

Reduced Stray Light and Improved Measurement Circuits (Patent Pending)

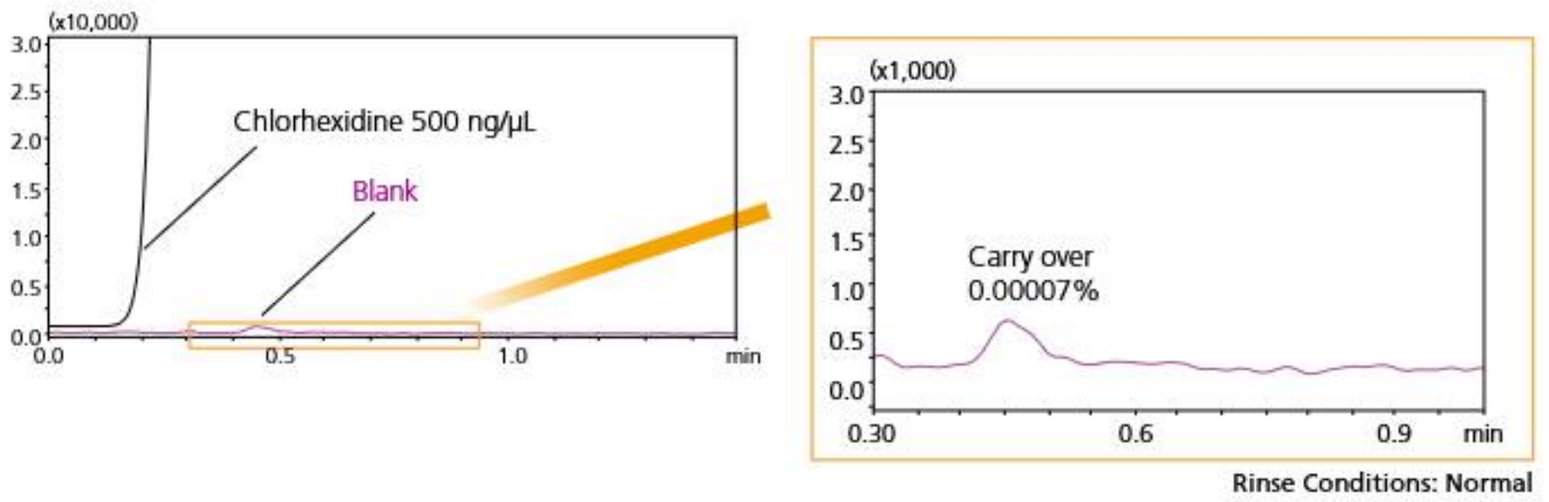
With the SPD-M40, the measurement circuits have been improved, and the amount of stray light in the optical system, a cause for linearity errors, has been reduced (to less than 1/3 of the usual amount). As a result, the absorbance linearity has been improved to at least 2.5 AU.

Ultra-low Carryover

The Nexera boasts ultra-low carryover, even on a high-sensitivity LC/MS/MS. This reduces time spent on rinsing, resulting in a shorter overall analysis time.

Elimination of Dead Volume (Patent Pending)

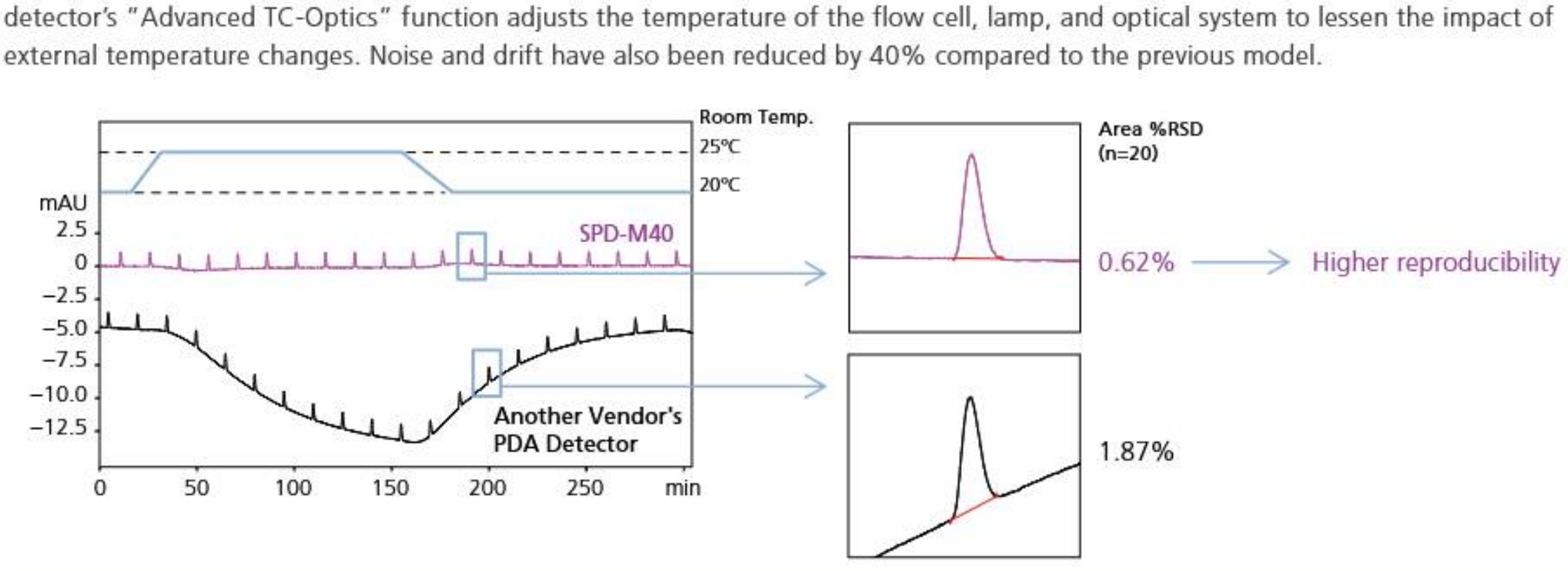
Dead volume in the flow line will lead to carryover from sample residue. In the SIL-40 series, the sample loop and needle are connected linearly, eliminating dead volume, and reducing carryover.



After analysis of Chlorhexidine, the carryover to a blank solution is negligible.

Stable Baseline

Baseline fluctuations can affect peak area calculation, reducing the accuracy of quantitative results. The SPD-M40 photodiode array detector's "Advanced TC-Optics" function adjusts the temperature of the flow cell, lamp, and optical system to lessen the impact of external temperature changes. Noise and drift have also been reduced by 40% compared to the previous model.



Advanced TC-Optics (SPD-M40) (Patent Pending)

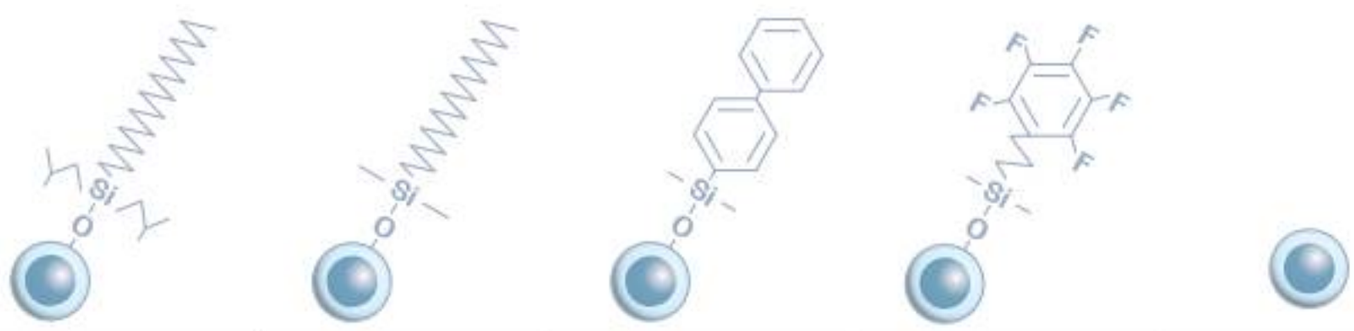
With the SPD-M40, in addition to conventional cell temperature regulation, the lamp and spectrometer, which are responsible for thermal effects on absorbance, are also thermally regulated, further reducing baseline fluctuations caused by the light source.

Faster Analysis Without Sacrificing Precision

It is important to use the most appropriate column in your LC system to achieve the highest efficiency and most accurate chromatograms. The Shim-pack series consists of a range of columns designed with the increased capabilities of the Nexera in mind. The superior ruggedness of Shim-pack columns ensures a long lifetime even with demanding sample matrices.

Shim-pack Velox™

The superficially porous particle (SPP) technology allows for optimum separation and analysis times. The range of column types available enables you to choose the most appropriate column for each application.



	SP-C18	C18	Biphenyl	PFPP	HILIC
USP classification	L1	L1	L11	L43	L3
Stationary phase	Sterically protected C18	C18	Biphenyl	Pentafluorophenyl propyl	None
Particle size (µm)	1.8, 2.7, 5	1.8, 2.7, 5	1.8, 2.7, 5	1.8, 2.7, 5	2.7

*To maximize column lifetime, columns with 1.8 µm particle size are recommended for use with a pressure under 80 MPa.

Shim-pack™ XR-ODS II & III

Although the Shim-pack XR-ODS II has a particle size of 2.2 µm, it can be used up to a pressure of 60 MPa, making it appropriate for a wide range of analyses. The particle size of the XR-ODS III column has been reduced to 1.6 µm. With a maximum pressure of 100 MPa, it achieves high separation even with a short column length.

These columns are suitable for shortening analysis times while taking full advantage of the high separation power of UHPLC.

	XR-ODS	XR-ODS
USP classification	L1	L1
Stationary phase	C18	C18
Particle size (µm)	2.2	1.6

Shim-pack™ GIS/GIST/GISS

The Shim-pack GIS/GIST/GISS series lineup includes columns with particle sizes ranging from 5 µm, appropriate for HPLCs, to 2 µm, appropriate for UHPLCs. With a variety of substrates available, they are ideal for method development.

GIS Series: HPLC columns packed with a high-purity silica gel material as a base. With high particle uniformity to secure the mobile phase path, these columns are ideal for low-pressure analysis.

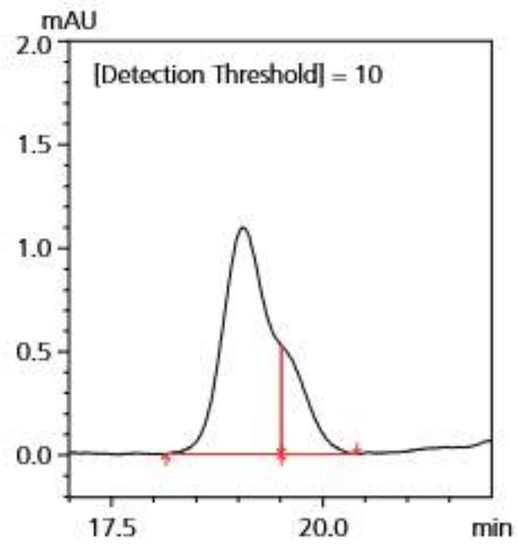
GIST Series: An increase in the inertness of the silica results in improved peak shapes and ruggedness. Can be used in pH 1–10 environments. Easy to use for a wide range of chemicals and environments.

GISS Series: Adding to the advantages of the GIST series, a faster elution time has been achieved to provide even sharper peaks.

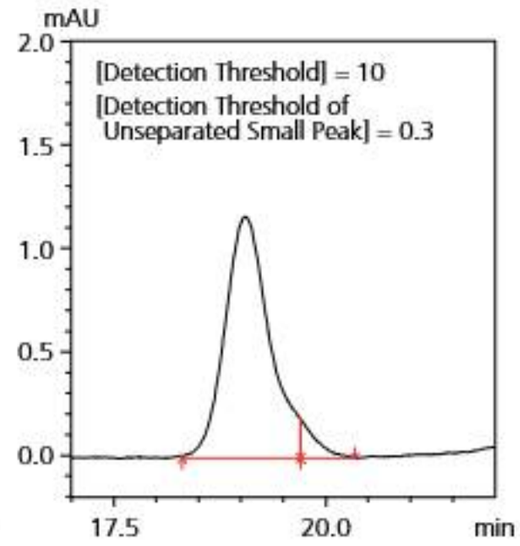
Extract the Smallest of Shoulder Peaks

The i-PeakFinder tool can automatically recognize peaks even in complex chromatograms with high noise, and accounts for baseline drift for higher integration accuracy. Adjustable parameters in i-PeakFinder, such as peak detection threshold, allow the user to detect smaller peaks.

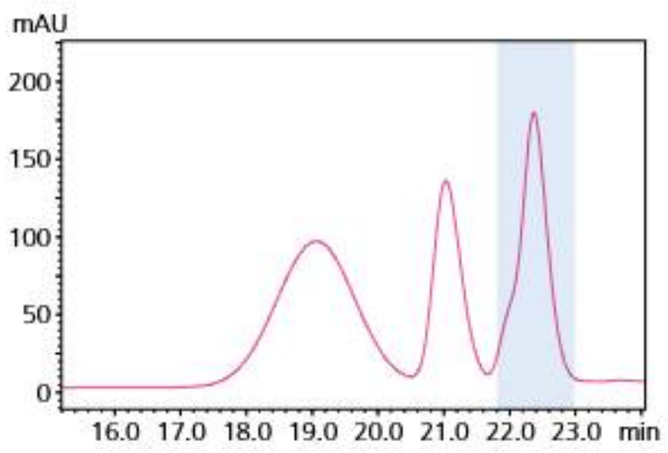
In addition, the i-PDeA II function can quantify peaks that cannot be completely separated by a column. Separate peaks by simply specifying the time and wavelength in LabSolutions.



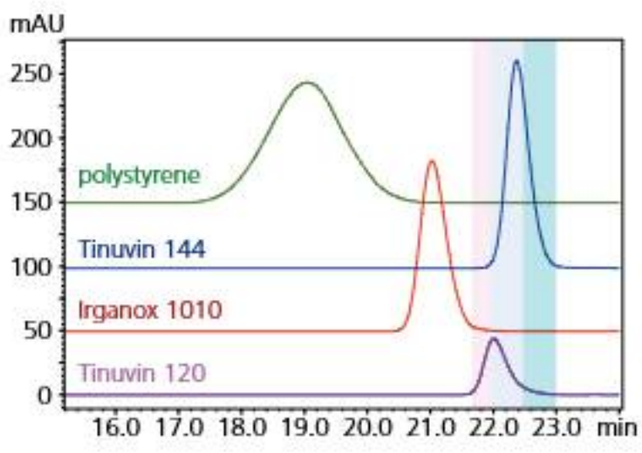
Shoulder peak detected automatically



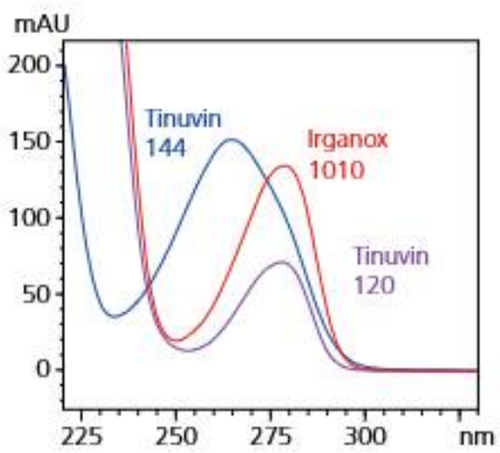
Smaller peak detected with parameter adjustment



The smaller peak is normally impossible to extract



i-PDeA II chromatogram identifies the two separate peaks

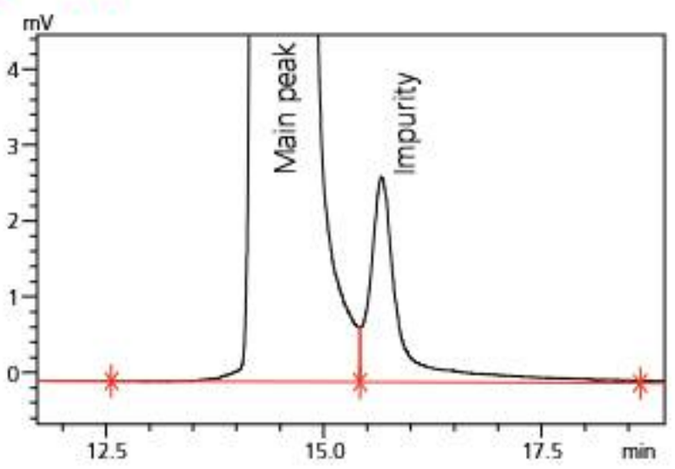


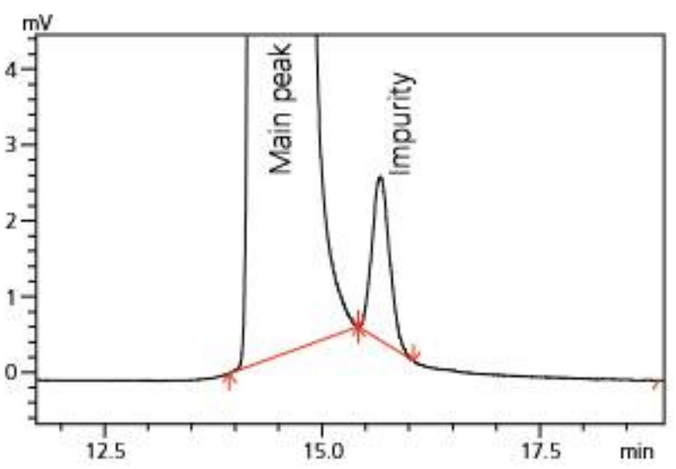
Spectrum analysis with i-PDeA II

Application example: i-PDeA II

Consistent Peak Splitting

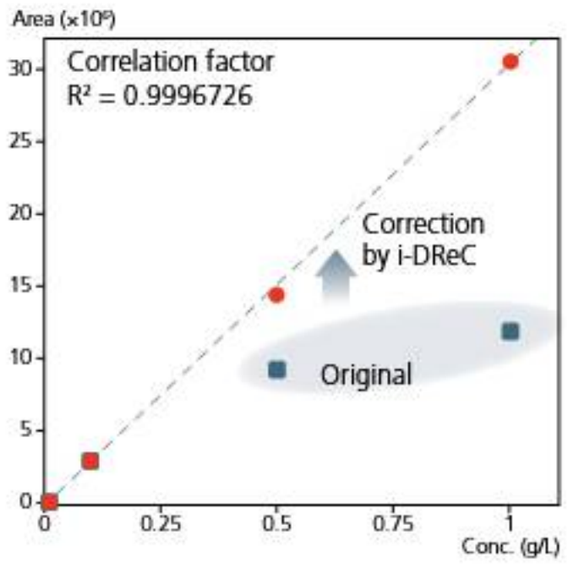
Manually setting the baseline for fused peaks is time-consuming, and the peaks may be split differently depending on the user. The i-PeakFinder has adjustable parameters for different analyses, allowing the consistent application of the best baseline in each situation.





Dynamic Range Extension Function for Accurate Calibration

i-DReC is a new analytical method that significantly extends the dynamic range. It enables the analysis of high-concentration compounds without diluting them, and ensures a correct calibration curve.



Application example: i-DReC

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SHIMADZU

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