![SHIMADZU — Excellence in Science]

Ultra High Performance Liquid Chromatograph

Nexera series
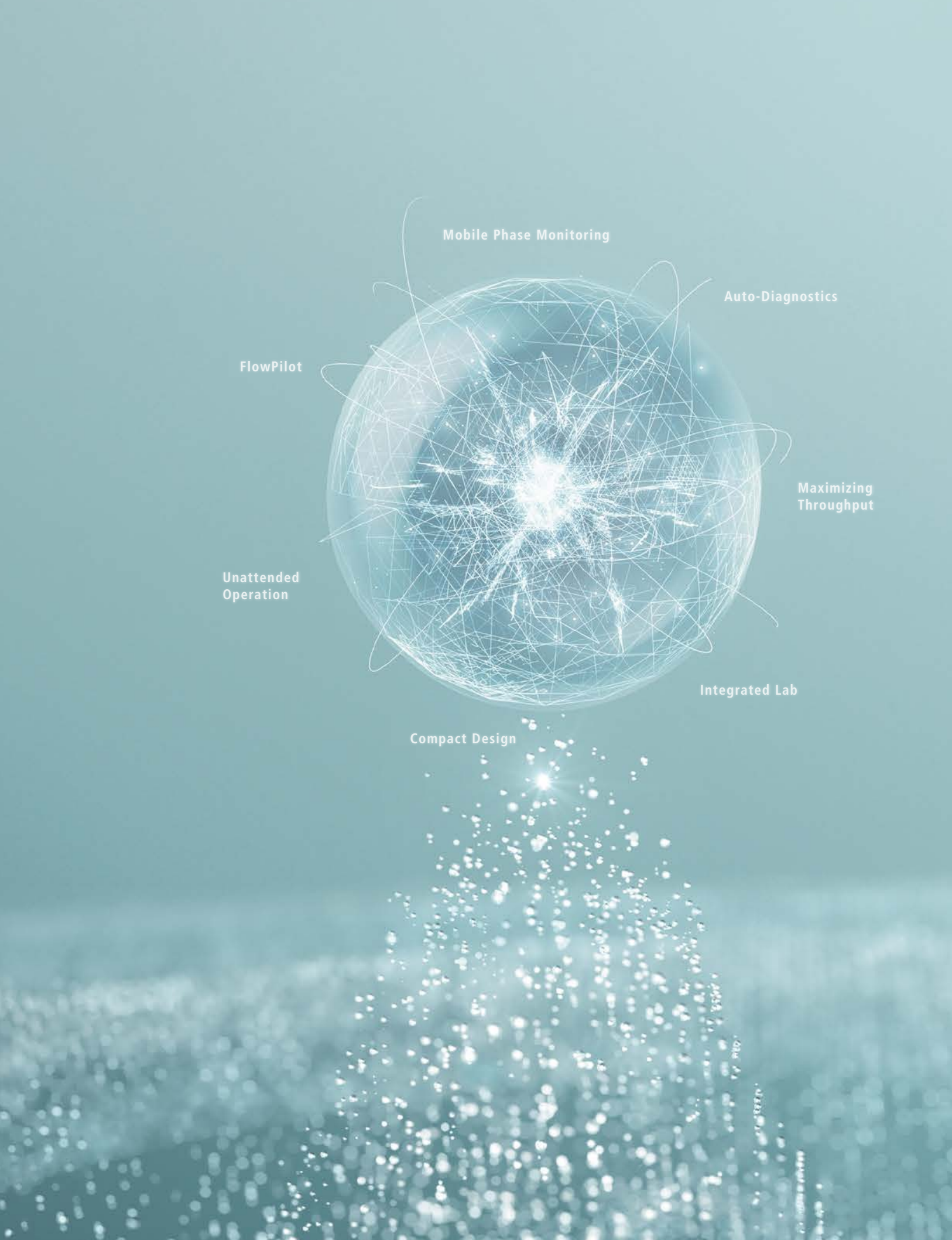
Mobile Phase Monitoring

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
HPLC systems that marries these AI and IoT enhancements to set new industry standards
in terms of intelligence, efficiency, and design.

Nexera™ series

Key Features

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

- Temperature control improves performance stability. `P13`
- 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. `P6`
- Reduces space requirements with a dual solvent delivery system. `P12`

Autosampler SIL-40 Series / PLATE CHANGER

- The injection speed is twice as fast as previous models, shortening multi-analyte processing times. `P10`
- Can perform continuous analysis on up to 44 microtiter plates. `P11`
- High reproducibility and ultra-low carryover for micro-volume injections. `P13`
- Automated sample preparation functions such as diluting samples, adding internal standards, and performing derivatization reactions, reduce labor.

Mobile Phase Monitor MPM-40

- Reservoir tray weight sensors monitor the remaining mobile phase in real time. `P7`

System Controller SCL-40, CBM-40

- Supports remote monitoring via a smart device. `P9`
- Mobile phases can be purged and baselines checked easily via the touch panel.

Column Oven CTO-40 Series

- Easy column attach/detach mechanism prevents peak broadening.

A New Benchmark of Intelligence
Maximizing Reliability, Minimizing Down Time

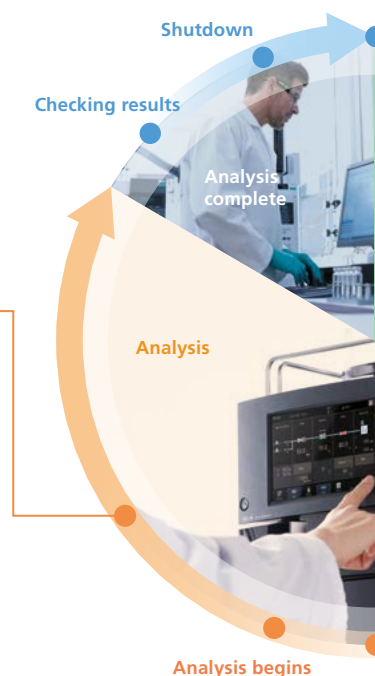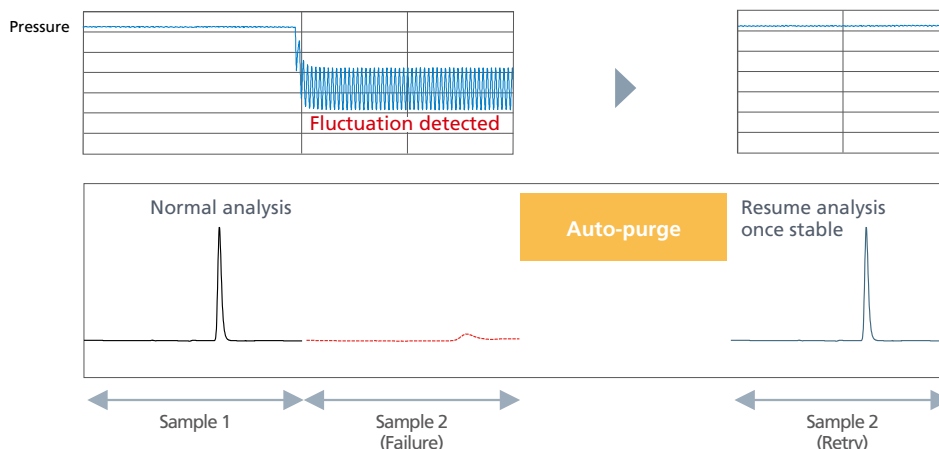## Fully Unattended Operation from Startup to Shutdown

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

In rare cases, air bubbles can form in the mobile phase and cause problems if inhaled into the pump. Nexera has the ability to monitor baseline changes and pressure fluctuations to check for abnormalities.
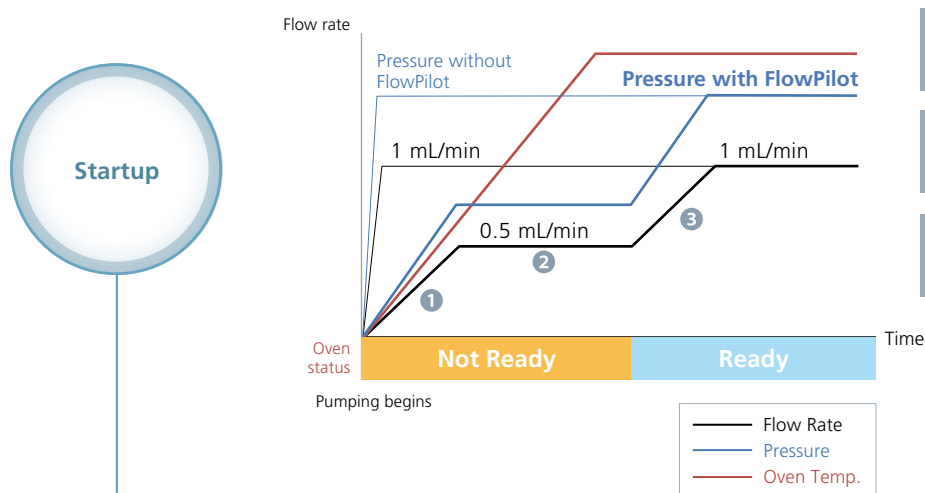
When it detects an unusual fluctuation, it can automatically pause the analysis, purge the flow path, and restart analysis once it has confirmed recovery to normal pressure. (Pat. Pending)

Shutdown

Checking results

Analysis complete

Auto-Diagnostics

Analysis

Analysis begins

Pressure

Fluctuation detected

Normal analysis

Auto-purge

Resume analysis once stable

Sample 1

Sample 2 (Failure)

Sample 2 (Retry)

FlowPilot Protects Columns

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.
(Pat. Pending)

Startup

Flow rate

Pressure without FlowPilot

Pressure with FlowPilot

1 mL/min

1 mL/min

0.5 mL/min

❶

❷

❸

Oven status

Not Ready

Ready

Time

Pumping begins

— Flow Rate
— Pressure
— Oven Temp.

❶ The flow rate is gradually increased up to half of the set value.

❷ The flow rate is kept constant until the oven is ready.

❸ The flow rate is gradually increased up to the set value.

Mobile Phase Check

Preparations

Auto-purge

Column equilibration

Mobile Phase Levels Measured in Real Time

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.
(Pat. Pending)

A New Benchmark of Efficiency
## Automating Workflow, Maximizing Throughput

Analysis Cycle Time Less Than 10 Seconds

The SIL-40 autosampler can inject samples in as little as 5 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.

7 injections can be completed within 1 minute
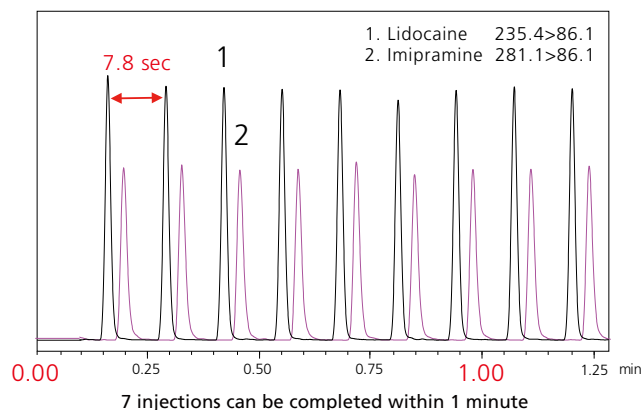
Pharmacokinetic analysis requires not only speed but also high reliability at low concentrations. With its ultra-fast injection and ultra-low carryover, the SIL-40 autosampler delivers high reproducibility and reliability, even during an ultra-fast 30-second analysis.
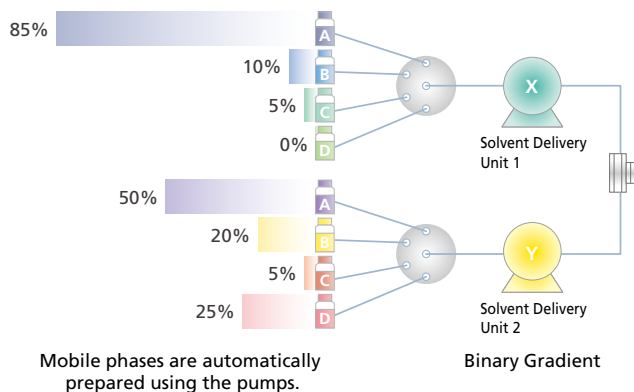

Verapamil in plasma (spiked 2.5 ppb)

Linearity
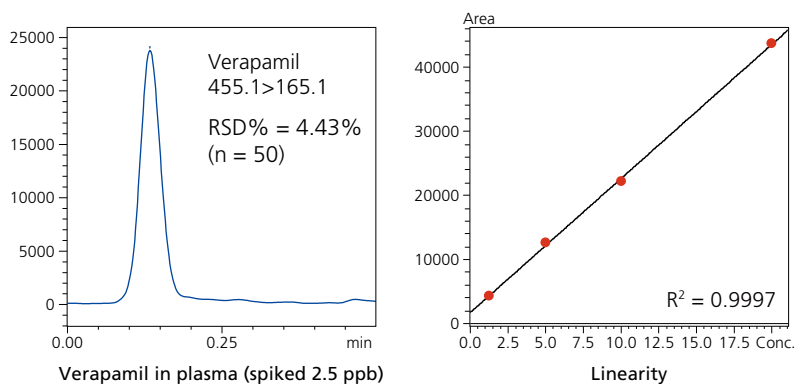
Automated Analysis of Thousands of Samples

Non-stop temperature-controlled analysis of thousands of samples is now possible with the SIL-40's optional plate changers. Set all your samples in advance with up to 14 MTPs or vial racks in each PLATE CHANGER. The autosampler's excellent temperature control also allows the insertion of additional vials and MTPs during analysis.

Quick and Reliable Mobile Phase Blending

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.

85%   A
10%   B
5%   C
0%   D

X   Solvent Delivery Unit 1

50%   A
20%   B
5%   C
25%   D

Y   Solvent Delivery Unit 2

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.
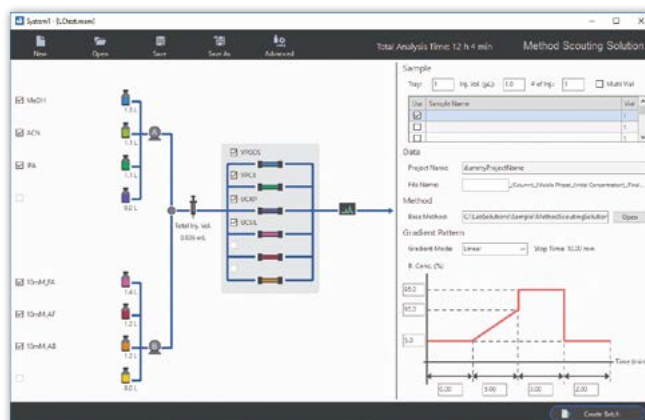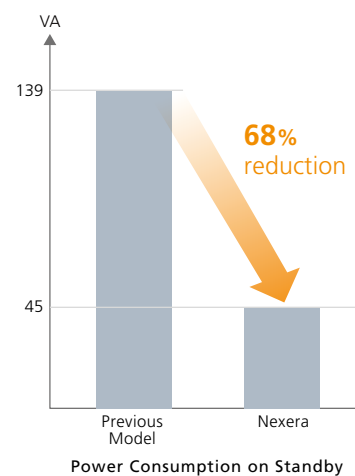
A New Benchmark of Design
Compact and Inventive

Space-Saving Design

Nexera frees up bench space with a compact design two thirds the size of Shimadzu's previous model.
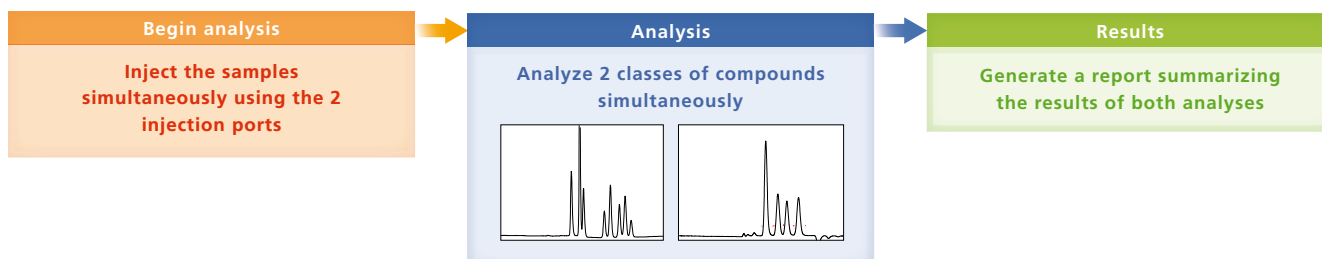
Energy-Saving Standby Mode

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

Previous System

770 mm

390 mm

Nexera Series
Standard Model

VA

139

45

68%
reduction

Previous
Model

Nexera

Power Consumption on Standby

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.
(Pat. Pending)

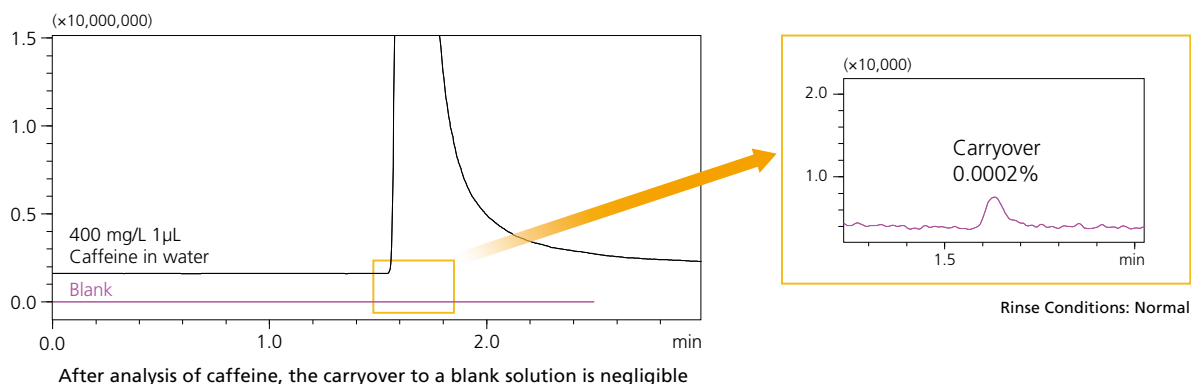| Begin analysis	Analysis	Results
Inject the samples simultaneously using the 2 injection ports	**Analyze 2 classes of compounds simultaneously**	**Generate a report summarizing the results of both analyses**

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.
(Pat. Pending)

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

Detector linearity for ketoprofen
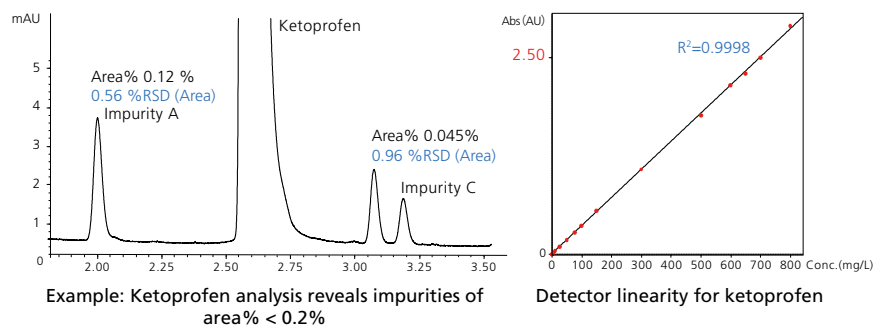
Ultralow Carryover

Nexera boasts ultralow carryover, even on a high-sensitivity LC/MS/MS. This reduces time spent on rinsing, resulting in a shorter overall analysis time.
(Pat. Pending)

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

Rinse Conditions: Normal

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.
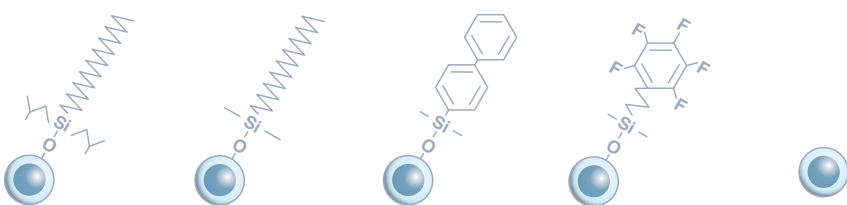(Pat. Pending)
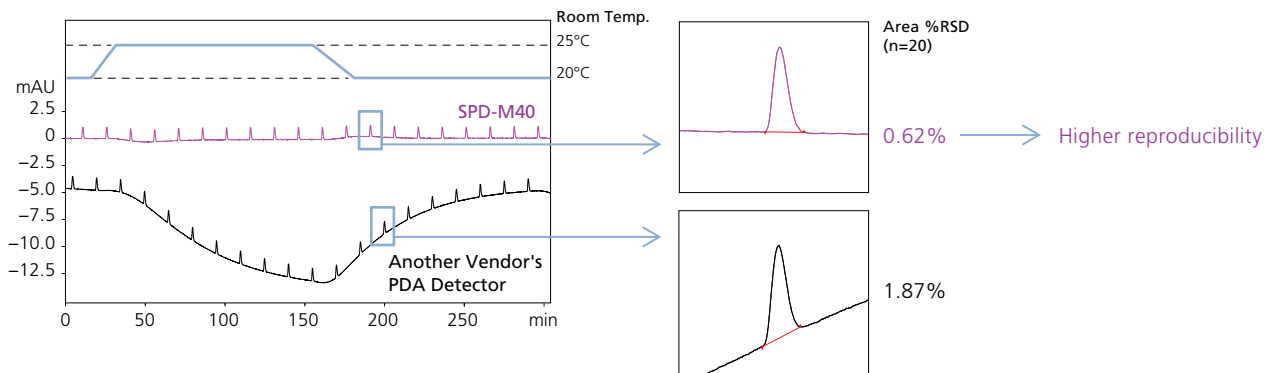
Faster Analysis Without Sacrificing Precision

It's 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 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 Ⅱ	XR-ODS Ⅲ
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.

LabSolutions Chromatography Software

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
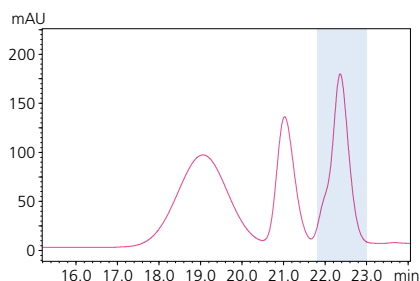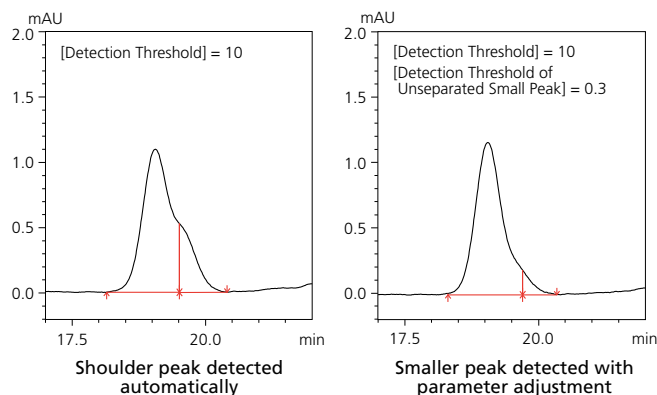
The smaller peak is normally impossible to extract
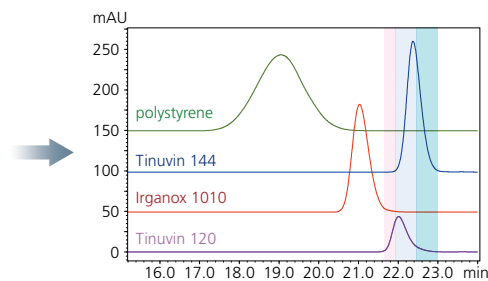
i-PDeA II chromatogram identifies the two separate peaks
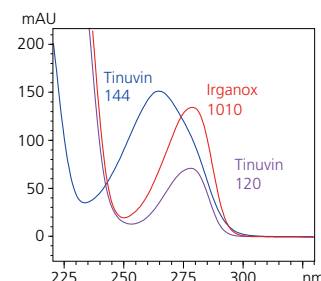
Spectrum analysis with i-PDeA II

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.
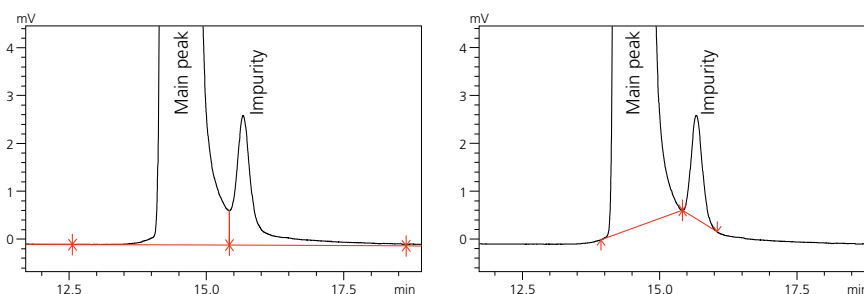
Dynamic Range Extension Function for Accurate Calibration

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
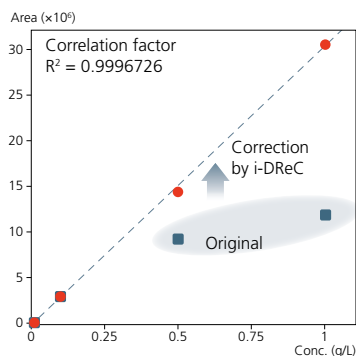
Nexera, LabSolutions, SHIMADZU LabTotal and Shim-pack are trademarks of Shimadzu Corporation.

SHIMADZU

Shimadzu Corporation

www.shimadzu.com/an/