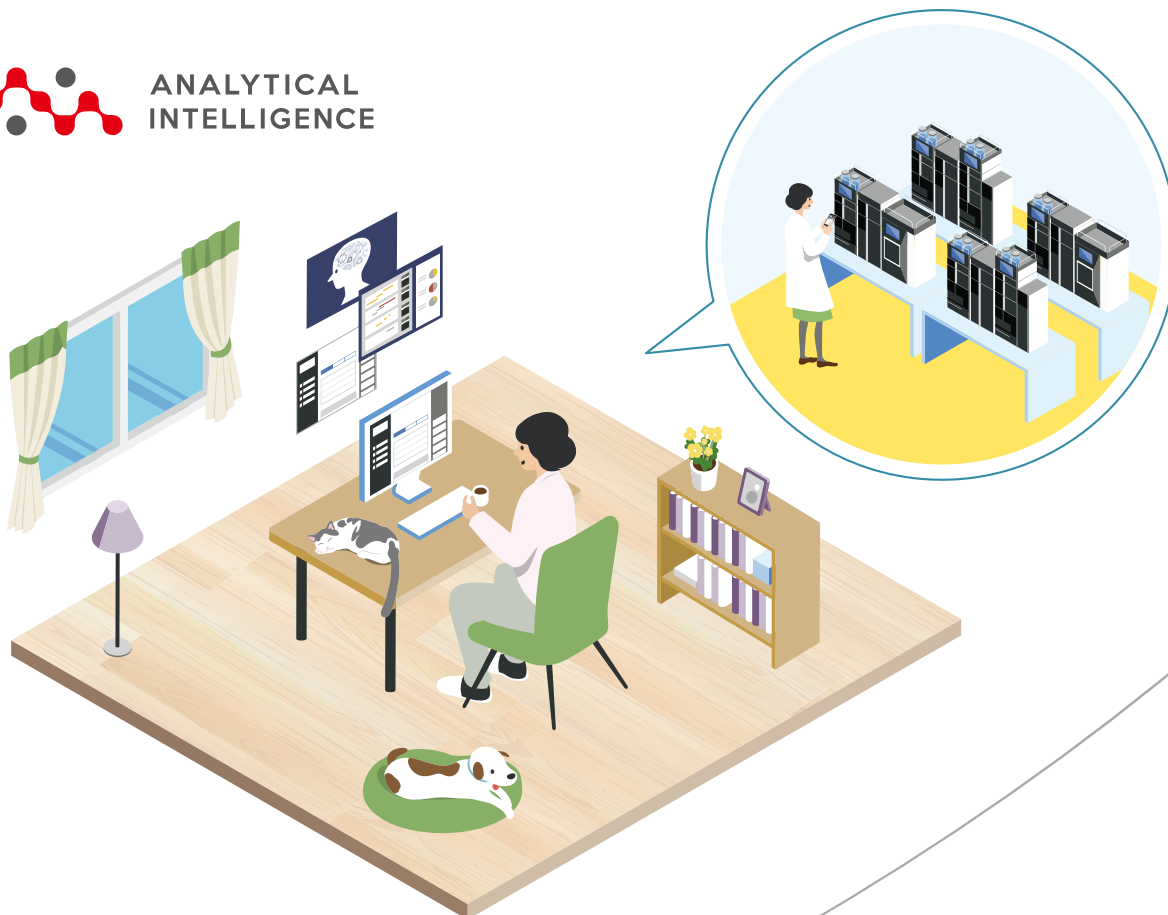


High Performance Liquid Chromatograph

A Proposal of “Flexible Workplace”

 ANALYTICAL
INTELLIGENCE



Is Shimadzu's Flexible Workplace Right for Your Analytical Lab?

The COVID-19 pandemic has dramatically changed daily routines in both our work and our personal lives. Telecommuting and remote work have become widespread in many workplaces, and efforts are underway to devise safer and more efficient workflows.

- *How is your lab managing workplace challenges resulting from the COVID-19 pandemic ?*
- *What is the best way to minimize potential worker exposure while maximizing laboratory productivity ?*
- *What is the best way to make use of telecommuting and remote work strategies ?*

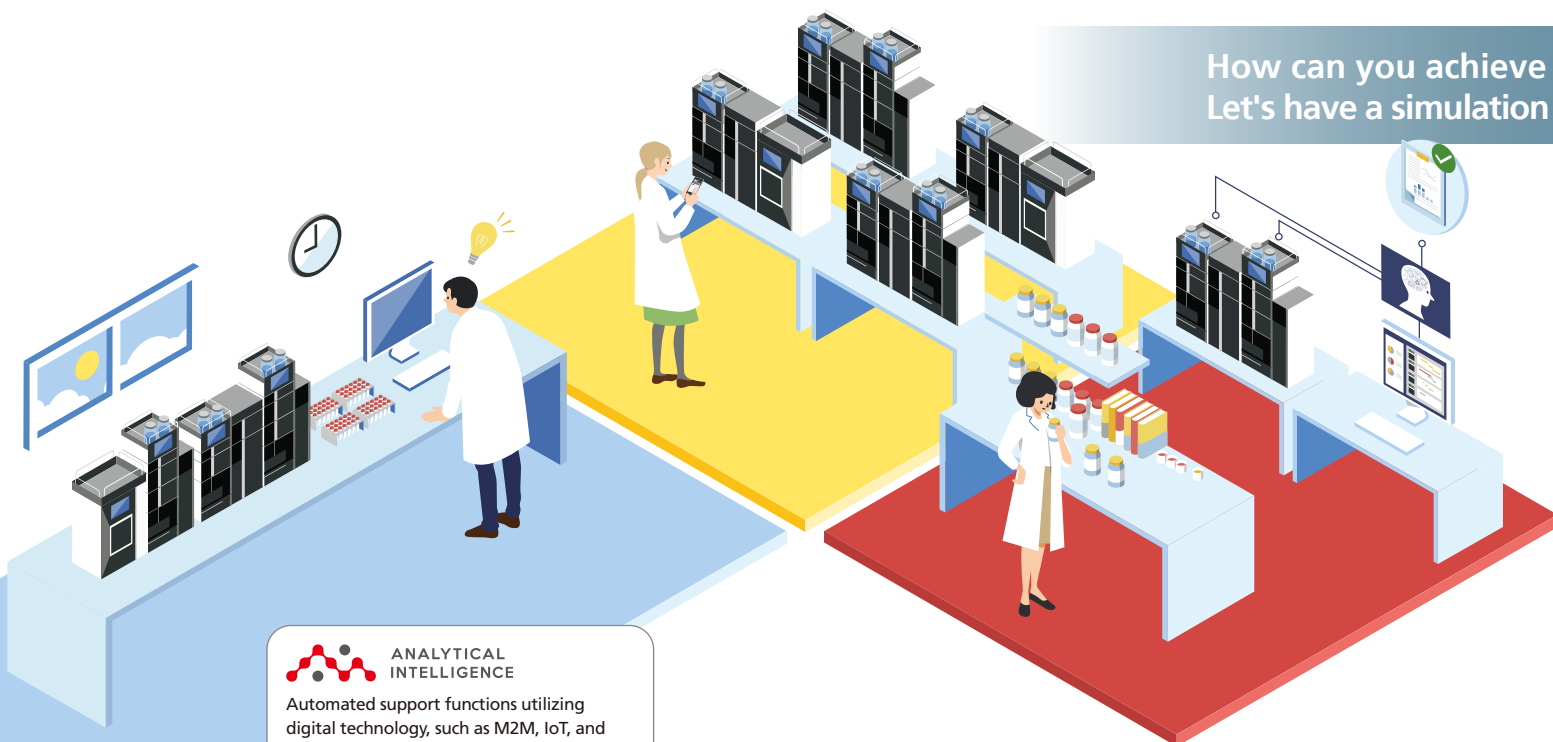
Shimadzu LC, Nexera™ and i-Series (LC-2050/2060), and Analytical Intelligence provide you with a Flexible Workplace, enabling 'the New Normal' for the analytical laboratories, improving Flexibility, Security, Safety and Efficiency.

Shimadzu has long championed workflow efficiency through the introduction of instruments possessing 'Analytical Intelligence', tools that can enable more flexible, safer, more efficient and more productive workflows. During the COVID-19 pandemic, Shimadzu 'work from home' functions for remote operation of analytical instrumentation are being widely used in many laboratories.

Read on to learn how your lab can implement Shimadzu's telecommuting and remote work features to develop safer, more efficient and more productive workflows.



How can you achieve
Let's have a simulation



ANALYTICAL
INTELLIGENCE

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

Intelligent Systems for the Shimadzu Flexible Workplace



Remote operation enables device startup, system balancing, LC analysis, instrument shutdown... and more

Shimadzu's Analytical Intelligence features oversee the operation and control of your LC system. Remote operation allows the analyst to perform nearly all work functions that used to require physical presence in the laboratory. Instrument control can be performed remotely from a networked PC, laptop or smart device from a nearby office, from home or even from across the globe.



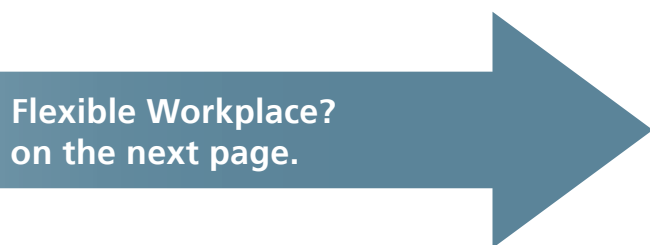
Intelligent continuous analysis

Flexible Workplace tools reduce the need for physical interaction with the instrument. Up to 44 microplates or 1,242 1.5 mL vials can be loaded into the instrument at one time, minimizing the need for frequent visits to the laboratory. In addition, the change of columns and mobile phases is completely automated, with intelligent baseline monitoring and equilibration algorithms allowing smooth switching between methods. Maintain social distancing in your laboratory by minimizing the time that your team spends working in common instrument areas.



Data analysis and reporting

The full suite of Flexible Workplace data analysis and reporting tools can be accessed remotely. Now you can process and analyze data, create reports, and apply specialized data analysis algorithms and software tools, all from the comfort of your office, home, or maybe even the beach!





Minimize in-person laboratory visits

Maintain social distancing in the laboratory and reduce opportunities for virus transmission by reducing the time spent setting up and operating instruments to an absolute minimum.



Preconfigured tasks can be performed automatically

Configure your instrument for automatic start, stop and shutdown.



- 1. Preparation & installation of standard solutions and QC samples
- 2. Sample pretreatment and installation

For instance, with Nexera and PLATE CHANGER, a maximum of 44 conventional microplates, 23 deep-well microplates or 1,242 1.5 mL vials can be loaded at once, enabling less-frequent addition of samples to the instrument.



1. Start of analysis

Execution of the HPLC analysis can be started remotely at any time, allowing most operations of the instrument to be performed from outside the laboratory.



- 2. System suitability test execution
- 3. Blank, Standard Analysis (calibration curve preparation)
- 4. Sample analysis
- 5. Monitoring Analysis Progress
- 6. Edit method based on analysis results
- 7. Add or remove samples depending on analysis results



1 Sample preparation

2 System Preparation



3 Data Acquisition



1. Confirmation of mobile phase level



2. Preparation and installation of mobile phase

3. Column installation (* Not necessary with column switching system)

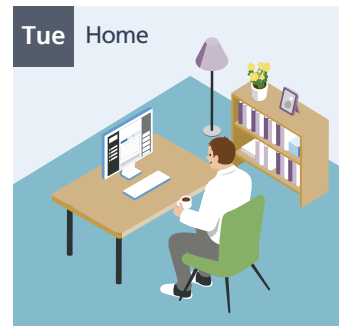
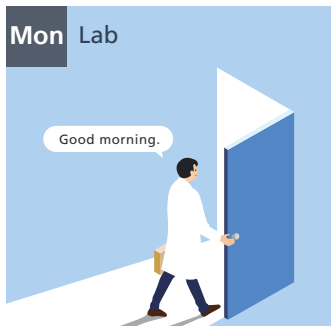
Prepare and set the new mobile phases. Also, don't forget to install columns. These must be done in a lab but with the minimum time to stay there. The use of a column switching system also eliminates manual removal of columns. You can use automatic startup feature or LabSolutions™ timer feature to activate your system at a set date and time and place it in a pending analysis state. You do not need to stay in the lab while preparing the equipment. In addition, the remaining amount of mobile phase required for LC analysis can be checked from outside the lab.



- 4. System turn-on
- 5. Mobile phase purge
- 6. System check
- 7. Column & system equilibration



Flexible WorkPlace with Nexera, i-Series & Analytical Intelligence





Many tasks can be remotely performed on PC

Operate and monitor the system from your PC over the network. Data processing is also possible through dedicated software, maintaining security.



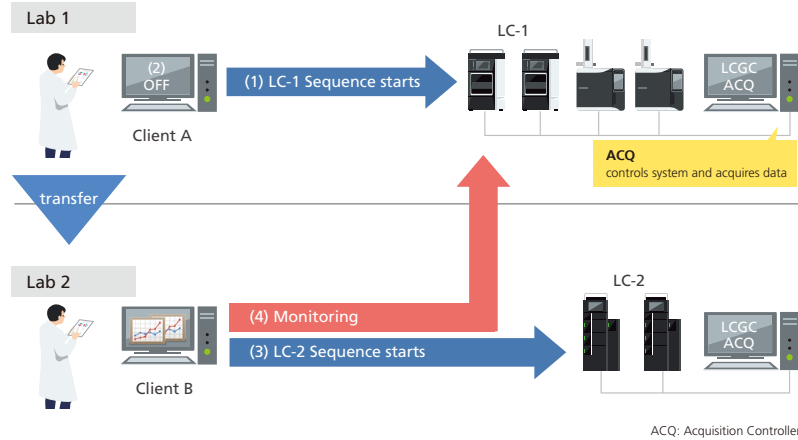
Work can be executed remotely at the terminal

Operate and monitor from a smartphone or tablet over a network.



1.Data processing and saving 2.Preparing reports

Data can be analyzed, processed, and reported from outside the instrument lab, whether from the workplace, home, or from mobile devices. Now you have the freedom to access servers, examine individual data files, experiment with improved data processing algorithms and prepare specialized reports, all from the comfort of a safe and secure location. We at Shimadzu are dedicated to helping you maintain the highest levels of data security.



4 System turn-off

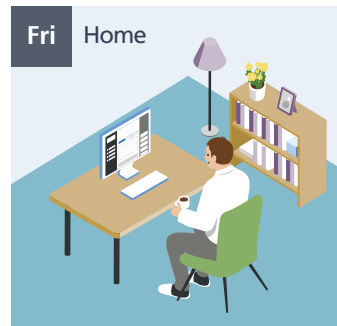
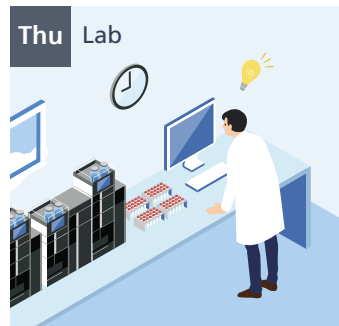


5 Data processing



1.Column & system cleaning 2.System turn-off

After a continuous analysis, the system executes an automated cleaning protocol, cools down, then performs a preconfigured automated shutdown to conserve solvent and energy. Flexible Workplace allows you to maintain a safe and efficient laboratory without the need for workers to remain in the laboratory any longer than needed.



Remote Operations of Nexera and i-Series with Smart Devices

LabSolutions Direct

LabSolutions Direct is a new LabSolutions series remote access tool that enables control and monitoring of HPLC instrument from off-the-shelf smartphones and tablet PCs through a simple user interface. Since the HPLC feed unit and oven controlled by LabSolutions can be turned ON/OFF, analysis can be started, and chromatograms can be monitored, it is possible to perform analysis while checking the condition of the equipment in an environment away from the instrument room.



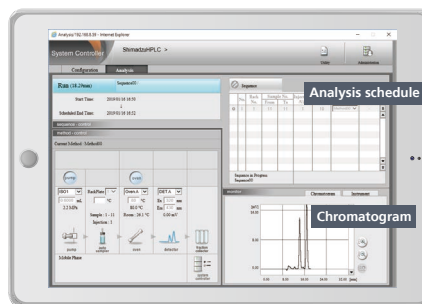
Directly access the HPLC in a laboratory from a smartphone or tablet PC.

- After login, select the instrument to be used.
- Download the selected method.
- Start instrument operation. In addition, the autosampler can be rinsed and the rinsing solution can be purged.
- Pump pressure values and column oven temperature can be monitored to check that the instrument has stabilized. The flow rate and oven temperature can also be changed.
- Select the batch file and execute data acquisition.
- Monitor Chromatogram. Monitor pump pressure.

During data acquisition, chromatograms, pump pressure values, etc. can be monitored.

Web monitor

You can check the operation status of the LC system on the network from the web browser. The ability to remotely monitor the progress of continuous analysis and the chromatogram being acquired enables efficient operation even in environments remote from the analysis room. You can also receive a message from LabSolutions when an error occurs or when the analysis is complete.

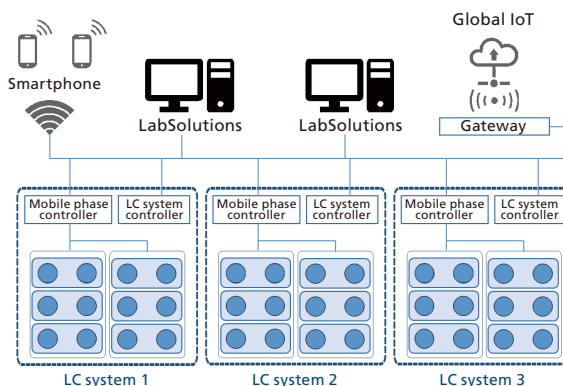
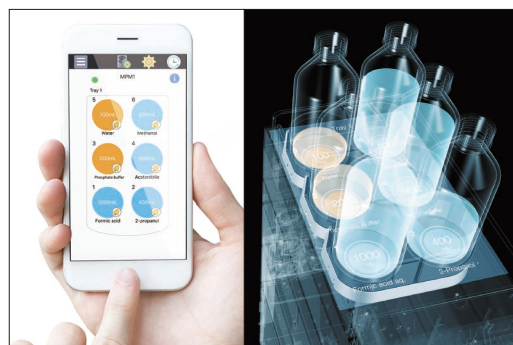


Monitor chromatograms currently being taken

Mobile phase monitor / MPMChecker™



The remaining amount of mobile phase and sensing solvent of the autosampler is monitored in real-time by weight sensors. Up to 12 L bottles or 4 large bottles (up to 5L) can be installed. At the start of the analysis sequence, LabSolutions software tells you if the remaining amount of solvent is sufficient. MPMChecker is another tool to monitor the solvent level via your smart device even you're outside of the lab, helping you to avoid running out of mobile phase and thus helping to maintain column lifetime.



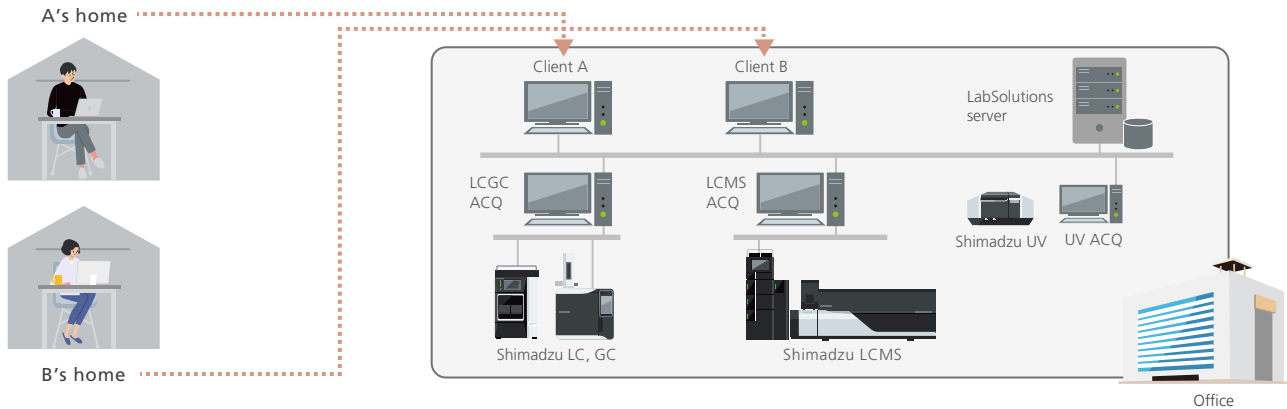
Technical Report (PDF)

Full-Remote Working with LabSolutions CS

LabSolutions CS: Shimadzu's analysis data system compliant with ER/ES regulations working on the networking environment

<https://www.shimadzu.com/an/labsolutions/cs/1.html>

LabSolutions CS Case #1: Remote Desktop Connection

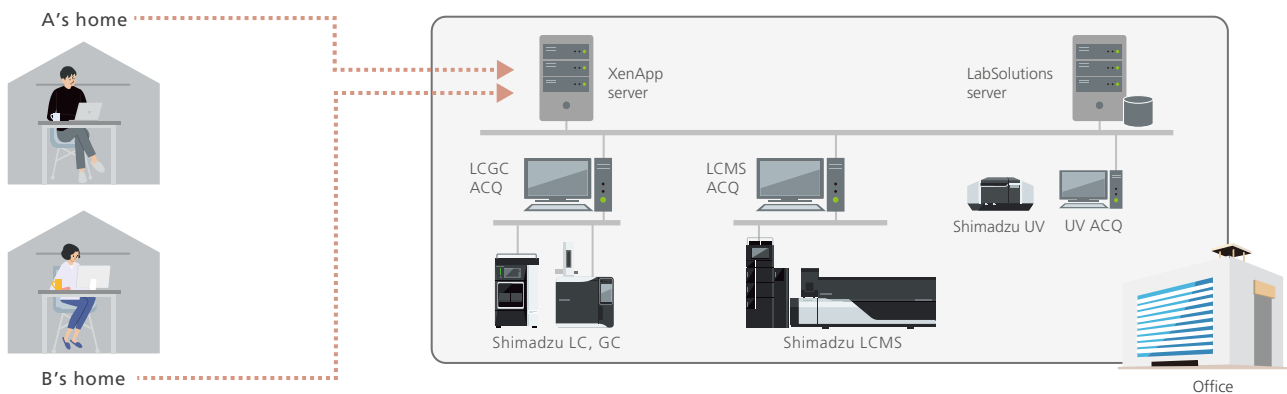


- ✓ No need to install software on business PC
- ✓ Analysis instructions, monitoring, re-analysis and report creation for all LC, GC and LCMS instruments.
- ✓ All the results are stored in the LabSolutions server.
- ✗ Since multiple PCs are connected from the outside, it takes time and effort for security measures.

*1: It is assumed that you can connect with a VPN.

*2: For equipment other than chromatography, connect to the corresponding ACQ via remote desktop.

LabSolutions CS Case #2: Citrix XenApp Connection



- ✓ No need to install software on business PC
- ✓ Analysis instructions, monitoring, re-analysis and report creation for all LC, GC and LCMS instruments.
- ✓ All the results are stored in the LabSolutions server.
- ✓ Regarding LC, GC and LCMS instruments, only XenApp server can be connected externally.

*1: It is assumed that you can connect with a VPN

*2: For equipment other than chromatography, connect to the corresponding ACQ via remote desktop.

The Analytical Intelligence logo, Nexera, LabSolutions and MPMChecker are trademarks of Shimadzu Corporation.
Citrix and XenApp are trademarks of Citrix Systems, Inc. and/or one or more of its subsidiaries, and may be registered in the United States Patent and Trademark Office and in other countries.



Shimadzu Corporation
www.shimadzu.com/an/

For Research Use Only. Not for use in diagnostic procedures.

This publication may contain references to products that are not available in your country. Please contact us to check the availability of these products in your country.

Company names, products/service names and logos used in this publication are trademarks and trade names of Shimadzu Corporation, its subsidiaries or its affiliates, whether or not they are used with trademark symbol "TM" or "®".

Third-party trademarks and trade names may be used in this publication to refer to either the entities or their products/services, whether or not they are used with trademark symbol "TM" or "®".

Shimadzu disclaims any proprietary interest in trademarks and trade names other than its own.

The contents of this publication are provided to you "as is" without warranty of any kind, and are subject to change without notice. Shimadzu does not assume any responsibility or liability for any damage, whether direct or indirect, relating to the use of this publication.