

**SYSTEM CONTROLLER
FOR SHIMADZU HIGH PERFORMANCE
LIQUID CHROMATOGRAPH
CBM-20A/20Alite
INSTRUCTION MANUAL (detailed manual)**

Read the instruction manual thoroughly before you use the product.
Keep this instruction manual for future reference.



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Instruction Manuals

There are 2 instruction manuals for this instrument.

Use the appropriate one depending upon your specific needs.

■ CBM-20A Instruction Manual (brief manual)

First read through this.

This volume contains the basic methods of use, warnings, and maintenance notices.

■ CBM-20A Instruction Manual (detailed manual) [PDF Instruction Manual]

This document (PDF file format). The detailed Instruction Manual contains information on application operations, error messages, installation, validation, etc. For the detailed operation method, information concerning a particular error message, or any information not contained in the brief manual, please refer to the detailed Instruction Manual in PDF form.

■ Model Names

- The autosampler for LC-20A (Prominence) series includes models with model names ending in HT or other letters (such as SIL-20AHT and SIL-20ACHT UFLC). These models are the same as their normal version (such as SIL-20A and SIL-20AC), but with some of their functionality or specifications modified. However, unless an exception is specifically indicated, the CBM-20A/20Alite Instruction Manual will refer to them by the model name of their respective normal versions. For example, models SIL-20A, SIL-20AHT, and SIL-20AHT UFLC are collectively referred to as model SIL-20A.

Model names indicated in windows including the system configuration window or method settings window are also referred to by their respective normal version model names. For example, if a system includes model SIL-20AHT, the model name indicated in the system configuration window will be SIL-20A.

- The autosampler for LC-20A (Prominence, Nexera XR) series includes models SIL-20A, SIL-20AC, SIL-20AXR, and SIL-20ACXR. The CBM-20A/20Alite Instruction Manual may refer to these autosamplers as "LC-20A series autosamplers" or "SIL-20A series autosamplers".
- The solvent delivery pump for LC-20A (Prominence, Nexera XR) series includes models LC-20AB, LC-20AD, LC-20ADXR, LC-20AT, LC-20AP, LC-20AR and LC-20Ai. The CBM-20A/20Alite Instruction Manual may refer to these pumps as "LC-20A series pumps".
- The autosampler for LC-30A (Nexera X2, Nexera UC) series includes models SIL-30AC, SIL-30ACMP, and SFE-30A. The CBM-20A/20Alite Instruction Manual may refer to these autosamplers excluding the SFE-30A as "LC-30A series autosamplers" or "SIL-30A series autosamplers".
- The solvent delivery pump for LC-30A (Nexera X2, Nexera UC) series includes models LC-30AD and LC-30ADSF. In the CBM-20A/20Alite Instruction Manual, "LC-30A series pumps" refers to the LC-30AD (excluding the LC-30ADSF).

Introduction

Read this manual thoroughly before using the instrument.

Thank you for purchasing this instrument. This manual describes: the installation, operation, hardware validation, cautions for use, and details on the accessories and options. Read the manual thoroughly before using the instrument. Use the instrument in accordance with the manual's instructions. Also, keep this manual for future reference.

Original version is approved in English.

IMPORTANT

- If the user or usage location changes, ensure that this Instruction Manual is always kept together with the product.
- If this manual or a product warning label is lost or damaged, immediately contact your Shimadzu representative to request a replacement.
- To ensure safe operation, read all **Safety Instructions** before using the product.
- To ensure safe operation, contact your Shimadzu representative if product installation, adjustment, or re-installation (after the product is moved) is required.

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Warranty and After-Sales Service

Warranty

1. Validity

Please consult your Shimadzu representative for information about the extent of the warranty.

2. Term

The manufacturer will provide free replacement parts for, or repair free of charge, any instrument that fails during the warranty period, if the cause can be attributed to a defect in manufacturing.

3. Limitation of Liability:

- 1) In no event will Shimadzu be liable for any lost revenue, profit or data, or for special, indirect, consequential, incidental or punitive damages, however caused regardless of the theory of liability, arising out of or related to the use of or inability to use the product, even if Shimadzu has been advised of the possibility of such damage.
- 2) In no event will Shimadzu's liability to you, whether in contract, tort (including negligence), or otherwise, exceed the amount you paid for the product.

4. Items Not Covered by the Warranty

The warranty does not cover malfunctions that result from:

- 1) misuse;
- 2) repairs or modifications made by any company other than the manufacturer or an approved company;
- 3) external factors;
- 4) operation under severe conditions such as environments, with high temperature, high humidity, corrosive gas, vibration, etc.;
- 5) fire, earthquake or other forces of nature;
- 6) moving or transporting the instrument after its initial installation;
- 7) the consumption of items or parts that can be regarded as consumable. (For example, the service life of an LCD display panel depends on the actual operating conditions.)

After-Sales Service

If any problem occurs with this instrument, inspect it and take appropriate corrective action as described in the Section "[6 Troubleshooting](#)". If the problem persists, or symptoms not covered in the Troubleshooting section occur, contact your Shimadzu representative.

Replacement Parts Availability

Replacement parts for this instrument will be available for a period of seven (7) years after the discontinuation of the product. Thereafter, such parts may cease to be available. Note, however, that the availability of parts not manufactured by Shimadzu shall be determined by the relevant manufacturers.

Hardware Validation

Each LC component and the entire LC system should be checked periodically to ensure that they function normally, or the analysis data may not be reliable. To this end, it is necessary to carry out periodic hardware validation and keep records of the validation. There are two types of hardware validation - component validation and system validation. The purpose of component validation is to check that the individual components of the system function normally, while the system validation checks that the system as a whole (the several components in combination) functions normally.

Before shipment from the factory, this instrument was rigorously inspected. The results are summarized in the Inspection Certificate accompanying the instrument. To inspect the instrument performance after installation, repeat the Hardware Validation as described in "[7 Hardware Validation](#)".




 ["7 Hardware Validation" P. 7-1](#)

Hardware Validation Contract


This is a contract under which a qualified Shimadzu-approved engineer performs periodic component and system validation, and provides reports of the results. Details of the contract can be obtained from your Shimadzu representative.

Safety Instructions

- To ensure safe operation of the instrument, read these Safety Instructions carefully before use.
- Observe all of the WARNINGS and CAUTIONS described in this section. They are extremely important for safety.
- In this manual, warnings and cautions are indicated using the following conventions;

 WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in serious injury or possibly death.
 CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor to moderate injury or equipment damage.
	Emphasizes additional information that is provided to ensure the proper use of this product.

■ Application Precautions

 WARNING This instrument is system controller for use with a high performance liquid chromatography system. Use this instrument ONLY for the intended purpose. Using this instrument for any other purpose could cause accidents.
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■ Installation Site Precautions

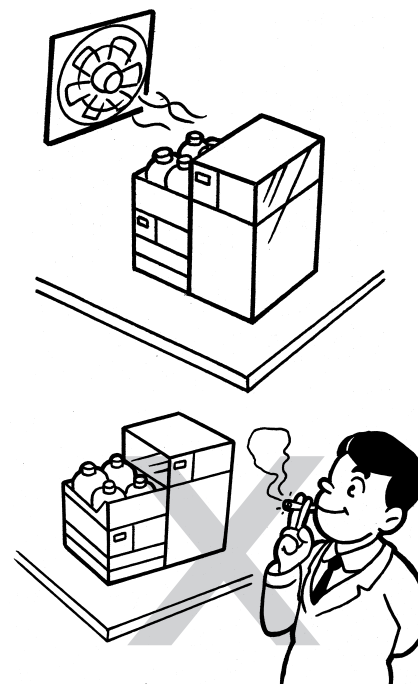
⚠ WARNING

- **The solvents used in high performance liquid chromatograph are flammable and toxic. The room where the instrument is installed should be well ventilated;** otherwise, solvent vapors could cause poisoning or ignite and cause a fire.
- **High performance liquid chromatograph uses large amounts of flammable organic solvents. Use of open flame in the vicinity of this instrument must be strictly prohibited. Do not install the instrument in the same room with any other equipment that emits or could potentially emit sparks, since sparks could cause a fire.**

Provide fire extinguishers for use in case of fire.

- **Provide protective equipment near the instrument.**

If solvent gets into the eyes or on the skin, it must be flushed away immediately. Provide equipment, such as eye wash stations and safety showers, as close to the instrument as possible.



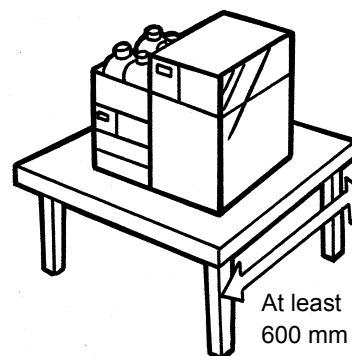
⚠ CAUTION

- **The weight of the CBM-20A is 5.5 kg. During installation, consider the entire weight combined with other LC components.**

The lab table on which this instrument is installed should be strong enough to support the total weight of the LC system. It should be level, stable and have depth of at least 600 mm. Otherwise, the instrument could tip over or fall off the table.

- **Keep at least 100 mm between the rear of the instrument and the wall.**

This allows for sufficient air circulation and ventilation from the grille to provide cooling and prevent the instrument from overheating and impairing the performance.



CAUTION

- **Avoid installation sites that are exposed to corrosive gases or excessive dust.**

These adverse conditions may be detrimental to maintaining the instrument performance and may shorten its service life.

■ Installation Precautions

To ensure safe operation, contact your Shimadzu representative if product installation, adjustment, or re-installation (after the product is moved) is required.

WARNING

- **Take measures to prevent the instrument from falling in the event of an earthquake or other disaster.**

Strong vibrations could cause the instrument to fall over, resulting in injury.

- **The power supply voltages and power consumptions of this instrument are listed below. The power supply voltage of the instrument is indicated on the label on the back of the instrument. Connect the instrument to a power supply that complies with the capacity and use a power cord that complies with the capacity;**

otherwise, fire or electric shock could result. Check that the power supply voltage is stable and that its current capacity is sufficient to operate all the components of the system. If not, the instrument will not operate at its rated performance.

●CBM-20A

Part No.	Power Supply Voltage (indicated on the instrument)	Power Consumption	Frequency	Rated Breaking Capacity ²
S228-45012-31 /41	AC 100-120 V (100-120 V~)	400 VA ¹	50-60 Hz	40A
S228-45012-32 /42	AC 100-120 V (100-120 V~)	400 VA ¹	50-60 Hz	40A
S228-45012-38 /46/48/58	AC 220-240 V (220-240V~)	400 VA ¹	50-60 Hz	40A

1: 100 VA, if AC OUT is not used.

2: Connect the instrument to a power outlet that is equipped with a circuit breaker that shuts off the current at the described value or less.

WARNING

- **Ground the instrument.**

Grounding is necessary to prevent electric shock in the event of an accident or electrical discharge, and important for ensuring stable operation.

- **To prevent electric shock and to maintain stability in operation of the product, be sure to ground the product.**

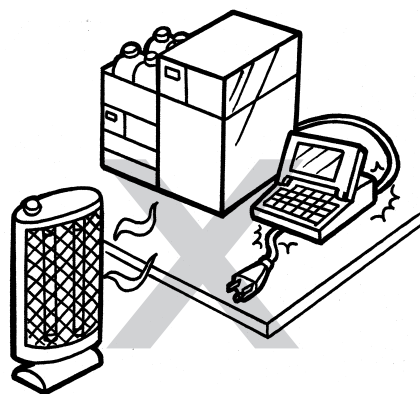
The product will be grounded when the provided 3-wired power plug is inserted into a 3-wired power socket equipped with a ground terminal.

- **Do not place heavy objects on the power cord, and keep any hot items away.**

The cord could be damaged, resulting in fire, electrical shock or malfunction. If the cord becomes damaged, contact your Shimadzu representative immediately.

- **Do not modify the cord in any way. Do not bend it excessively or pull on it.**

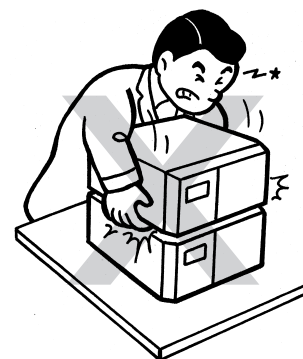
The cord could be damaged, resulting in fire, electrical shock or malfunction. If the cord becomes damaged, contact your Shimadzu representative immediately.



CAUTION

- **When installing the instrument, be careful not to pinch your fingers between the system components, as this could result in injury.**

- **When opening the doors, be careful not to pinch your fingers as this could result in injury.**



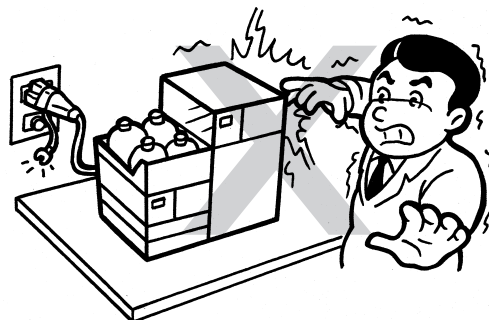
■ Operation Precautions

WARNING

- **Take thorough measures to prevent buildup of static electricity.**

 *"Static Electricity Precautions" P. XI*

Static electricity could result in fires or explosions.



- **Always wear protective gloves and protective goggles when handling solvents and samples.**

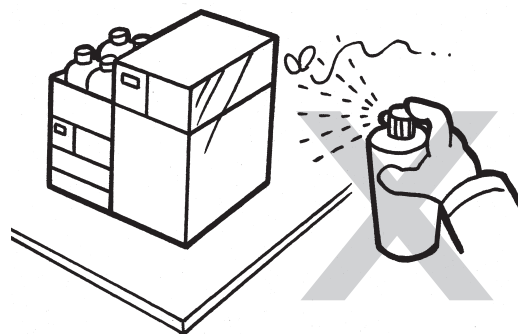
If solvent gets into the eyes, blindness could result. Should solvent get into the eyes, flush immediately with large amounts of water and get medical attention.



- **Always wear protective gloves when handling any toxic or biologically infectious samples.**

- **Never use a cracked reservoir bottle.**

If a helium degassing unit is used, pressure is exerted on the reservoir bottles and may cause cracks in the bottles. It could break the reservoir bottles and cause injury.



- **Do not use flammable sprays (hair sprays, insecticide sprays, etc.) near the instrument.**

They could ignite and cause a fire.

- **Be careful not to apply water to office equipment such as the PC as well as the instrument.**

- **Install the low-pressure Hg (Mercury) lamp before turning on the power of the lamp.**

Looking straight at the lamplight could damage eyes.

■ Precautions for Instrument Inspection, Maintenance, Adjustment and Care

⚠ WARNING

- **Unplug the instrument before inspection, maintenance, or parts replacement.**

Otherwise, electrical shock or short-circuit accidents could occur.

- **Never remove the main cover.**

This may cause injury or malfunction of the instrument.

The main cover does not need to be removed for routine maintenance, inspection and adjustment. Have your Shimadzu representative perform any repairs requiring removal of the main cover.

- **Replace fuses only with fuses of the proper type and capacity.**

Any other fuses could cause a fire.

- **If the power cord plug gets dusty, remove the plug from the power outlet and wipe away the dust with a dry cloth.**

If dust is allowed to accumulate, fire could result.

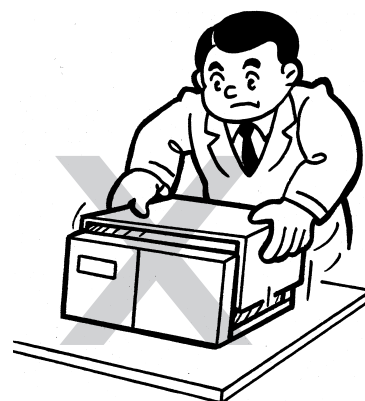
- **Replacement parts must be of the specifications given in "1.2 Component Parts" or "9.6 Maintenance Parts".**

Use of any other parts may result in instrument damage and malfunction.

- **If any water gets onto the instrument, wipe it away immediately to prevent rust. Never use alcohol or thinner solvents for cleaning the instrument.**

They could cause discoloration.

- **Dispose of the waste liquid properly and in accordance with the instruction by your administrative department.**



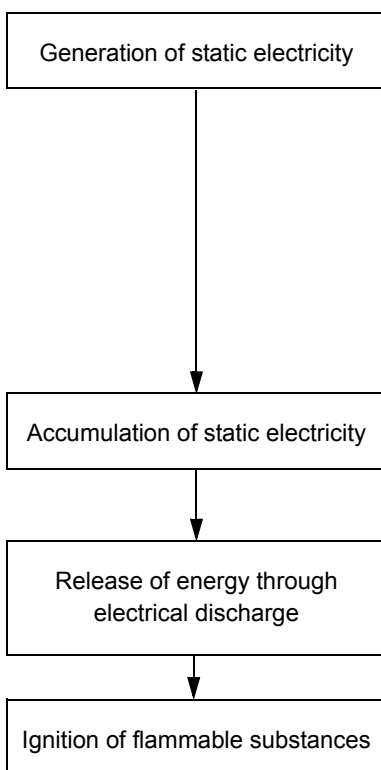
Static Electricity Precautions

A liquid chromatograph (LC) uses flammable organic solvent(s) as the mobile phase. LC systems are also often used where large amount of flammable substances are present. Thus, an accident can produce large scale damage. Operators must be constantly on guard against accidents involving fire or explosion.

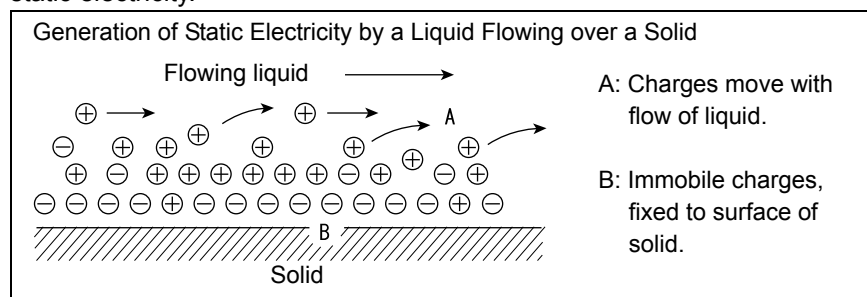
The major cause of these accidents is static electricity. Devising preventative measures for static can be difficult, because the symptoms before an accident vary and can be hard to detect, since such accidents occur as a result of several simultaneous coincidences. Recommended methods for preventing static electricity accidents are provided below. Take thorough safety measures based on this information.

■ Typical Cause of Static Electricity Accidents

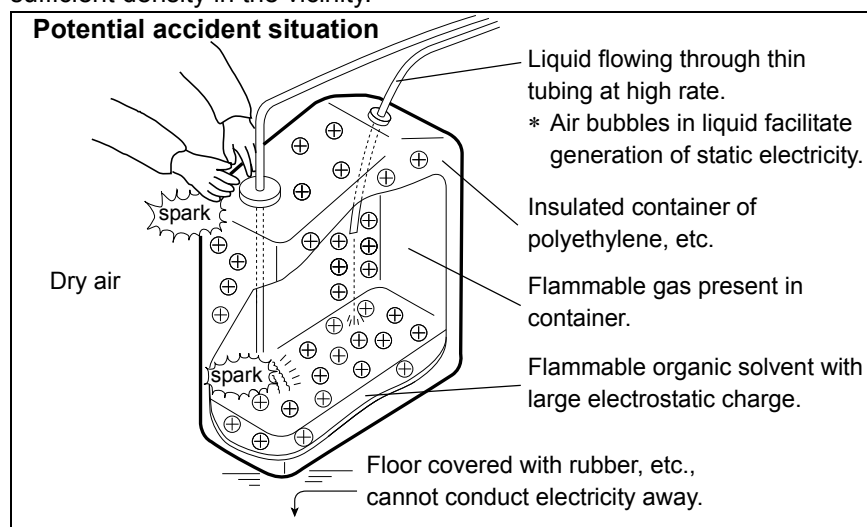
Static electricity accidents are generally caused by this sequence of events:



When liquid is passed through thin tubing at high flow rates, as in liquid chromatograph, the electrostatic charges of the flowing matter generate static electricity.



If electrostatically charged liquid is allowed to accumulate in an electrically insulated container, the charge will gradually increase, and can eventually reach several thousand volts. If this happens and an electrical conductor is brought within a certain distance of the container, electrical discharge will occur, releasing thermal energy which will ignite any flammable gas of sufficient density in the vicinity.



■ Preventing Static Electricity Accidents

The best way to prevent static electricity accidents is simply to prevent the occurrence and accumulation of electrostatic charges.

CAUTION

- It is important to take multiple preventive measures simultaneously.
- If large amounts of flammable solvents are collected in a large container, implement preventative measures 1, 2, and 3 below.

Preventive Measure 1

Use a metal container for the waste liquid, and ground the container.

This will ensure that the electrical charges of the container and liquid pass to the ground.

Accessories for this measure

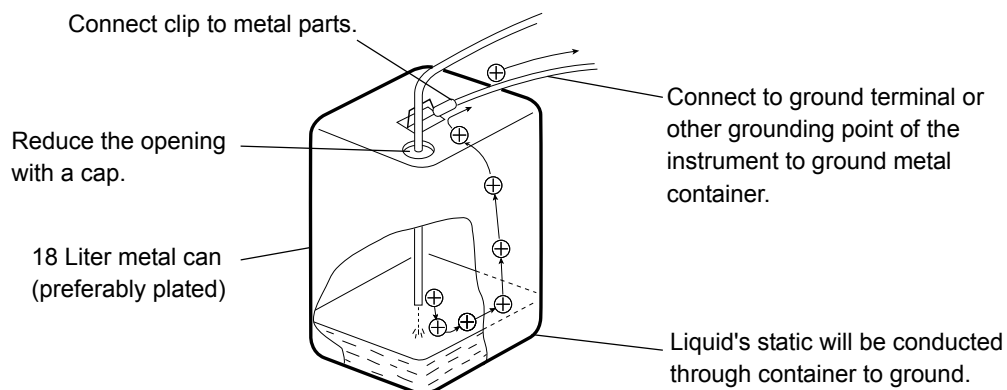
- | | |
|------------------------------|------------------------|
| (1) Grounding wire with clip | Part No. S228-21353-91 |
| (2) 18 Liter metal container | Part No. S038-00044 |
| (3) 4 Liter metal container | Part No. S038-00043-01 |

CAUTION

- **Be sure to ground the metal waste container properly.**
If the grounding wire is not properly attached or connected to the ground, static electricity can build up in the container.
- **Some metal containers have surfaces that are laminated or oxidized, and therefore do not conduct electricity. After grounding the metal container, use a tester to verify that electricity is conducted to the ground.**
- **If the liquid to be drained into the waste container is virtually non-conductive (10^{-10} S/m or less), it will be necessary to add properly conductive, and therefore safe, liquid to the tank.**

This conductive liquid may be added to the waste container beforehand.

Preventive Measures for Static



Preventive Measure 2

Cover the spaces between the tubing and the sides of the inlet and outlet openings of the waste container with caps or other protective covering. This will prevent any sparks generated outside the container from getting inside.

Accessories for this measure

Caps for 18 liter or 4 liter containers (with three covering 3 mm diameter openings)
Part No. S228-21354-91

Preventive Measure 3

Keep electrostatically charged objects, including the human body, away from the waste liquid container. To prevent electrostatic charging of the human body, take the following precautions:

- Wear anti-static clothing and shoes.
- Ground the human body with anti-static wrist straps. (For safety, the wrist strap should be connected to the ground using an intervening resistor of about 1 M Ω .)
- Spread anti-static matting or the like on the floor, to make the floor conductive.

CAUTION

- **Persons who have not taken anti-static precautions should touch some grounded metal object before coming near the waste liquid container, in order to drain static charges.**

Preventive Measure 4

Use tubing with an inner diameter of at least 2 mm for drain lines with high flow rates.

CAUTION

- **Periodically check the tubing connections for leaks.**
Air bubbles in liquid can multiply the electrostatic charge by a factor of 20, 30 or more.

Preventive Measure 5

If it is not possible to use a conductive waste liquid container, take the following precautions:

- Ensure that the end of the inflow tubing is always submerged inside the container. Also, place some type of grounded metal object, such as a ground wire connected to the instrument, into the liquid.

CAUTION

The above precaution will be ineffective for low conductivity (less than 10^{-10} S/m) liquids.

- **Use as small a container as possible to minimize damage in the event of fire.**
- **Keep the room at a proper humidity.**

Ambient humidity exceeding 65 % will prevent static.

For Reference

Anti-static equipment (anti-static clothing, shoes and matting) and charge measurement equipment (potentiometer) are sold by specialty manufacturers.

■ In Case of Emergency

 **WARNING**

If any problem is detected, such as a burning smell, take the following action:

Procedure

- 1** Turn the power to the instrument OFF.
- 2** Disconnect the power cable at the rear of the instrument.

When the instrument is used again, inspect the instrument and, if necessary, contact your Shimadzu representative to request servicing.

■ In Case of Power Outage

 **CAUTION**

Take the following measures in the event of a power outage.

Procedure

- 1** Turn the power to the instrument OFF.
- 2** After confirming all related items in this section "Installation Precautions" and "Operation Precautions", use the standard startup procedure to start the instrument.

Maintenance, Inspections, and Adjustment

In order to maintain the instrument's performance and obtain accurate measurement data, daily inspection and periodic inspection/calibration are necessary.

For daily maintenance, inspection, and replacement parts, see the ["8 Maintenance"](#) section of this Instruction Manual.

- Periodic inspection/calibration should be requested to your Shimadzu representative.
- Replacement cycles described for periodic replacement parts are rough estimate.
- Replacement may be required earlier than the described replacement cycles depending on usage environment and frequency.

Precautions for Mobile Phase Selection and Use

CAUTION

- **Do not use resin parts for the high-pressure tubing while pumping at high pressures.**
Pumping at high pressure may cause resin tubing to be ruptured or disconnected, which could result in mobile phase leaks. Please note the maximum withstand pressure of each part when resin parts are used for the high-pressure tubing.
- **If PEEK resin parts are used in the plumbing, do not use the following mobile phases. These mobile phases weaken the PEEK resin, which could result in cracked plumbing and mobile phase leaks.**

Concentrated sulfuric acid, concentrated nitric acid, dichloroacetic acid, acetone, tetrahydrofuran (THF), dichloromethane, chloroform, dimethyl sulfoxide (DMSO).

Note: Briefly using a weak solution of less than 0.5 % acetone in water (e.g. in order to check gradient performance) will present no problems.

- **Regardless of the material used in the plumbing, tubing connections are made of resin. Therefore, do not use any mobile phases containing hexafluoroisopropanol (HFIP), which could weaken or damage the resin and result in mobile phase leaks.**



- Use only HPLC grade or comparable mobile phase, and filter it with a filter of 0.45 µm mesh or finer before use to remove particulates and foreign matter.
- Halogen ions can corrode the stainless steel material (SUS316L) used in the plumbing, so if such materials are used for the wetted parts of the equipment, avoid, as much as possible mobile phases that contain halogen ions - such as KCl, NaCl and NH₄Cl or mobile phases that generate halogen ions in certain reactions. If such mobile phases must be used, clean all flow lines thoroughly with distilled water immediately after analysis.
- When SPD or a similar UV detector is used for high-sensitivity analysis, be sure to use HPLC grade mobile phases that have a low absorptivity of UV rays.
- Always degas the mobile phase, as air bubbles may tend to form during solvent mixing or during temperature or pressure changes. Air bubbles may cause pump malfunctions and detector signal noise.
- Understand the properties, including boiling points, firing point and viscosities, of the mobile phase.

 ["9.8 Mobile Phase Characteristics" P. 9-56.](#)

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1

Configuration

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1.1 Overview

The CBM-20A/CBM-20Alite is a system controller that connects to and controls the components in Shimadzu's LC-30A/20A/10Avp/10A-series High-performance Liquid Chromatograph. It can be used for a number of different purposes, from centralized control to fully automated operation of liquid chromatography systems with various component configurations.

1.1.1 Features

- This system controller is equipped with networking capability as a standard feature. By using the Web-server function, it is possible to set analysis conditions, execute analysis, and monitor the system from a PC. It is also possible to process the data at the Chromatopac by linking the system controller to a Chromatopac.
- Connecting to a Shimadzu data-processing workstation allows the user to set analysis conditions, execute analysis, monitor the system and process the data all from a remote PC.
- The special optical-link interface enables the connection and control of the LC-30A/20A/10Avp/10A-series Solvent Delivery Module (Pump), Autosampler, Column Oven, Detector, and Fraction Collector. It is also possible to connect and control the SPD-M20A/M30A Photodiode Array Detector from the system controller as a 4-wavelength detector via the network.

System Configuration Example

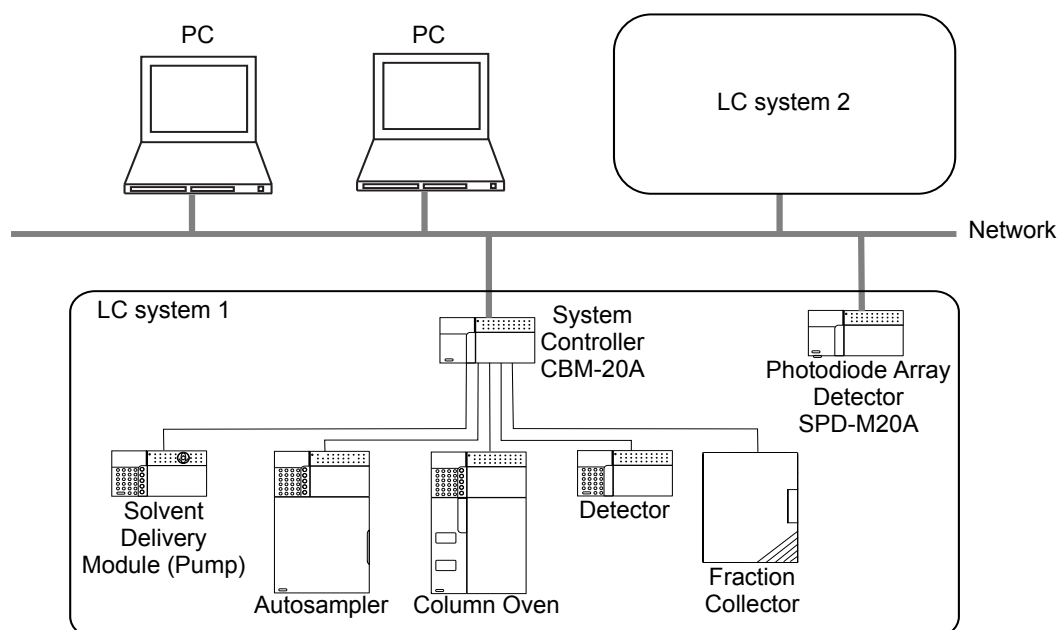


Fig. 1.1

1.1.2 Equipment Required for Connecting to the Network

This system controller is network ready. This makes it possible to set HPLC system parameters and to create and execute analysis schedules from a Web browser. The system controller can also be connected to a Shimadzu workstation using the TCP/IP protocol. The hardware requirements for using the Web browser and connecting to the network are described below.

■ PC

Name	Remark
PC	CPU : Intel Celeron 800 MHz or higher
	Memory : 256 MB min.
	LAN adapter : 100Base-TX compatible
	Display : 1024 × 768 or higher
	OS : Windows2000/XP/Vista/7
	Other : Internet Explorer 6.0 SP1 or later /7/8/9

- The CPU specification is only a recommendation.
- The memory and LAN specifications are necessary requirements.
- The OS must be one for which correct operation has been confirmed. Correct operation cannot be assured with Windows 95, 98, Me, or NT.

■ Network Cables and Devices

Network Configuration Example

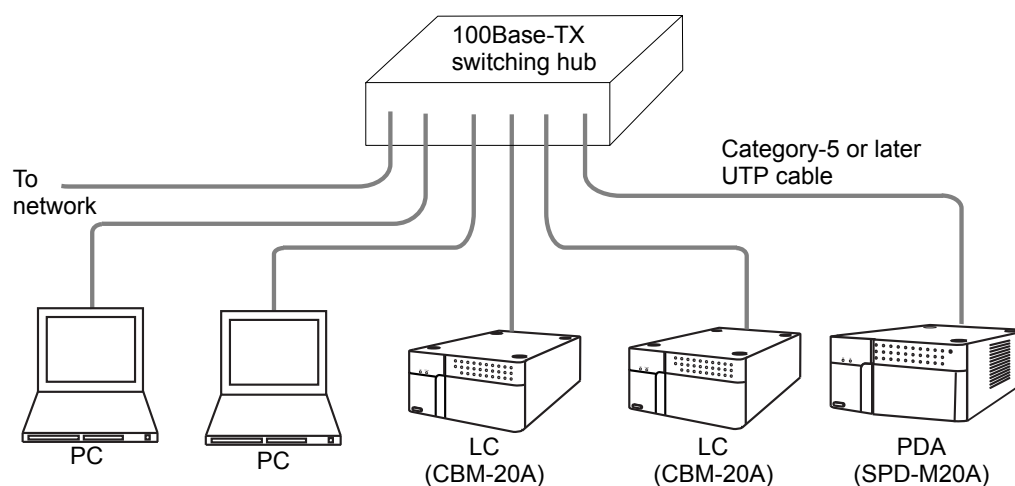


Fig. 1.2

Name	Remark
Straight LAN cable	Category-5 or later UTP straight cable
Switching hub	100Base-TX compatible
Cable holder	Required when routing the LAN cable along the floor or across a wall.

1. Configuration

- Use commercial products satisfying the specifications given in the remark column.
- One LAN cable is required for every PC, CBM-20A/20Alite, and SPD-M20A/M30A.
- If the total number of PCs, CBM-20A/20Alite System Controllers, and SPD-M20A/M30A Photodiode Array Detectors is greater than the number of ports on the switching hub, increase the number of ports as appropriate using cascade connections.
- Before connecting to the network, consult the network administrator of the department or office where the system will be used.

1.2 Component Parts

This instrument consists of the standard parts listed below. Check the parts against this list after unpacking.

The standard parts provided depend on the power supply voltage. (See below.) After unpacking, verify that the correct types and quantity of parts have been provided.

For S228-45012, the 2-digit numbers in the remark column in the table below indicate the power supply voltages for the part. -31, -41 indicates use with a 100 V power supply, -32, -42 is a 120 V power supply, and -38, -48, -58 a 220-240 V power supply.

These 2-digit figures refer to the last two digits in the product number of the instrument. -31, -41 is for products destined for Japan, while -32, -42 and -38, -48, -58 are for use in other countries.

■ CBM-20A (S228-45012)

Part	Part No.	Q'ty	Remark
CBM-20A	-		
Instruction manual	S228-30846	1	-31, -41 only
Instruction manual	S228-30847	1	-32, -42, -38, -48, -58 only
Bus cable	S228-41977	1	
Power cable	S071-60821-08	1	-31, -41, -32, -42 only
Power cable	S071-60825-51	1	-38, -48, -58 only
AC Power cable (for China)	S465-06046	1	-46 only
LAN cable	S228-61083-91	1	Straight cable -31, -32, -38 only
	S228-61083-41	1	Straight cable -41, -42, -48, -58 only
AC remote cable	S228-35071-91	1	For multiple terminal box
CD-ROM	S228-42654-91	1	

■ CBM-20Alite (S228-45011)

Part	Part No.	Q'ty	Remark
CBM-20Alite	-		
Instruction manual	S228-30846	1	-31, -41 only
Instruction manual	S228-30847	1	-38, -48, -58 only
Control cable	S228-41797-91	1	
LAN cable	S228-61083-91	1	Straight cable -31, -32, -38 only
	S228-61083-41	1	Straight cable -41, -42, -48, -58 only
CD-ROM	S228-42654-91	1	

1.3 Optional Parts

Optional units available for this instrument are listed below.

For information about other optional units not listed below, contact your Shimadzu representative

■ Optional Boards

Part	Part No.	Remark
CBM-OPT4 Optical-connector Expansion Board	S228-45652-48	For optical-connector expansion (CBM-20A only)
PC-55N A/D Board	S223-03507-91 S228-35327-91	A/D conversion board used when connected to the LC Workstation (CBM-20A only)

■ Optical Cables

Part	Part No.	Remark
Optical cable, 1 m	S070-92025-51	
Optical cable, 2 m	S070-92025-52	
Optical cable, 3 m	S070-92025-53	
Optical cable, 5 m	S070-92025-54	

- Each LC-30A/20A/LC-10Avp/LC-10A-series component comes with a 1m optical cable for use in connecting to the system controller. The 2 m optical cables (not included) may be used in place of the 1 m optical cables. Do not use an optical cable that is longer than 2 m.
- To connect the system controller to the Chromatopac, use one of the optical cables described in the above table. It is also possible to use an RS-232C cable instead of an optical cable.

■ RS-232C Cables

Part	Part No.	Remark
RS-232C cable for PCs, 2 m	S228-35397-92	9-pin to 9-pin crossover cable for connecting to PC or C-R8A
RS-232C cable for PCs, 3 m	S228-35397-93	9-pin to 9-pin crossover cable for connecting to PC or C-R8A
RS-232C cable for PCs, 5 m	S228-35397-95	9-pin to 9-pin crossover cable for connecting to PC or C-R8A
RS-232C cable for PCs, 10 m	S228-35397-90	9-pin to 9-pin crossover cable for connecting to PC or C-R8A
RS-232C cable, 2 m	S228-35398-92	9-pin to 25-pin crossover cable for connecting to Chromatopac other than C-R8A
RS-232C cable, 3 m	S228-35398-93	9-pin to 25-pin crossover cable for connecting to Chromatopac other than C-R8A
RS-232C cable, 5 m	S228-35398-95	9-pin to 25-pin crossover cable for connecting to Chromatopac other than C-R8A
RS-232C cable, 10 m	S228-35398-90	9-pin to 25-pin crossover cable for connecting to Chromatopac other than C-R8A

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2

Parts Identification and Function

This chapter provides details on the names and functions of the various parts on the front and back of the system controller and also describes commonly used windows.

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2.1 Front Cover

■ CBM-20A

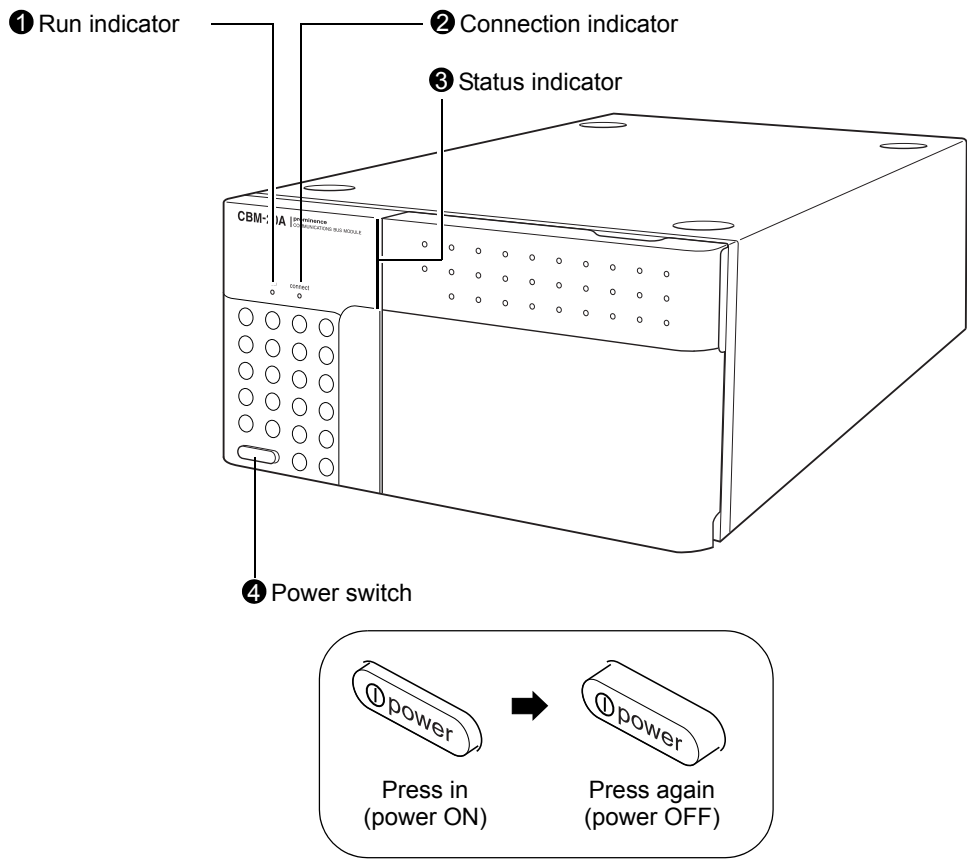


Fig. 2.1

	Name	Description
①	Run indicator	Turns ON when analysis starts and turns OFF when analysis stops.
②	Connection indicator	Turns ON when the system controller is controlled from PC (Internet Explorer, LC Workstation) or Chromatopac. Flashes during execution of the "Group settings" or "System Check" application.
③	Status indicator	Indicates the system status using different colors. Green: Power ON Red: Error Orange: Shut down status or sleep status
④	Power switch	Used to turn power ON/OFF. Press the switch in to turn power ON. Press again to turn power OFF.

2.2 Back

■ CBM-20A

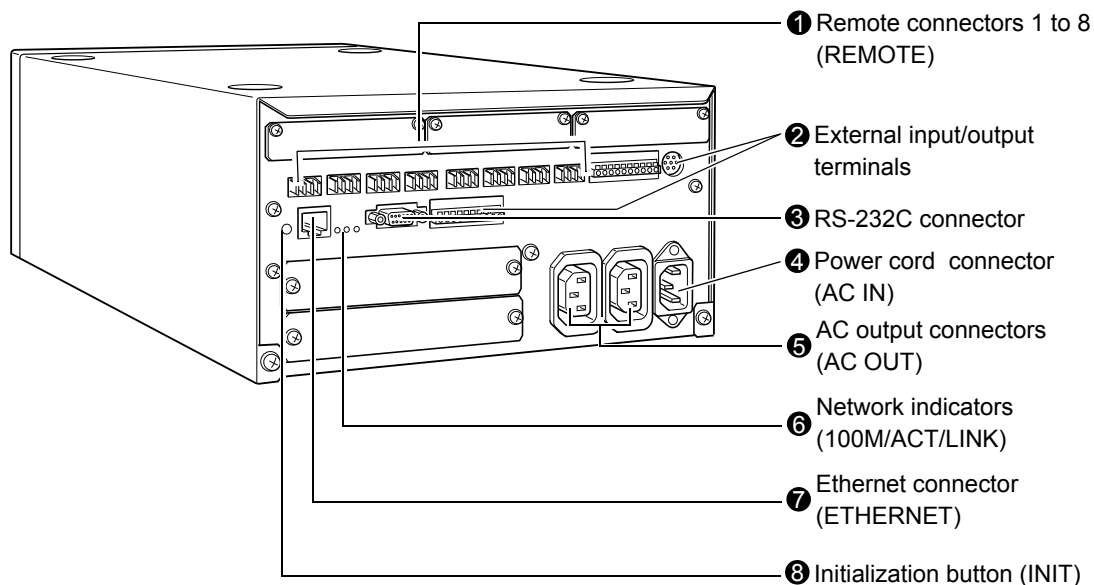



Fig. 2.2

	Name	Description
①	Remote connectors 1 to 8 (REMOTE)	Connectors for connecting to LC-30A/20A/10Avp/10A-series components.
②	External input/output terminals	Terminals for exchanging input/output signals with external devices, such as manual injectors.  "9.2.1 Types of Connector" P. 9-7
③	RS-232C connector	Connector for exchanging data with a PC or Chromatopac. Mainly used to connect to a PC.
④	Power cord connector (AC IN)	Connector for connecting the power cable.
⑤	AC output connectors (AC OUT)	These connectors are for AC power output and are operationally linked to the power switch. They can be used to supply power to Shimadzu HPLCs (SIL-10A Series, FRC-10A, Sub-controllers). Do not use them for any other application.
⑥	Network indicators (100M/ACT/LINK)	Display the status of connection to the network using LED indicators. 100M : Turns ON when operating at 100 Mbps. ACT : Turns ON when exchanging data. LINK : Turns ON when linked to the network.
⑦	Ethernet connector (ETHERNET)	Connector for connecting to the network.
⑧	Initialization button (INIT)	Push to initialize the system controller or clear errors.

2. Parts Identification and Function

■ CBM-20Alite

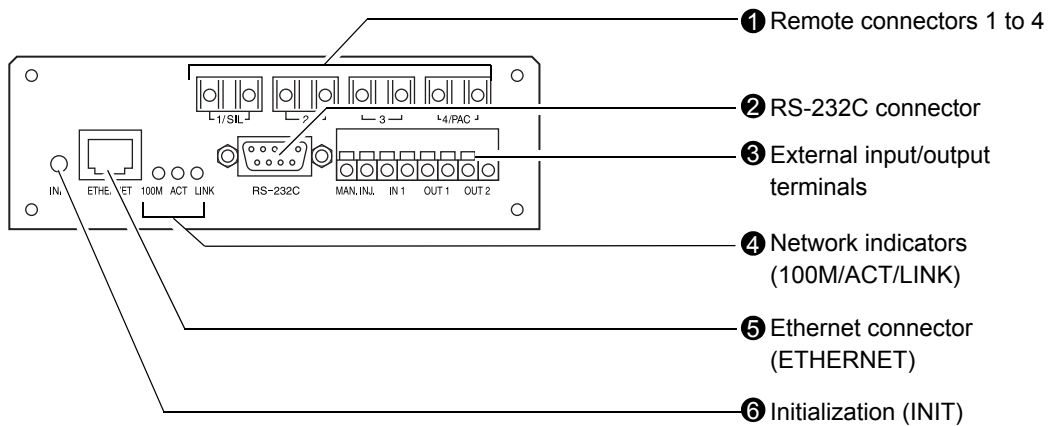


Fig. 2.3

	Name	Description
①	Remote connectors 1 to 4 (REMOTE)	Connectors for connecting to LC-30A/20A/10Avp/10A-series components.
②	RS-232C connector	Connector for exchanging data with a PC or Chromatopac. Mainly used to connect to a PC.
③	External input/output terminals	Terminals for exchanging input/output signals with external devices, such as manual injectors. 👉 "9.2.1 Types of Connector" P. 9-7
④	Network indicators (100M/ACT/LINK)	Display the status of connection to the network using LED indicators. 100M : Turns ON when operating at 100 Mbps. ACT : Turns ON when exchanging data. LINK : Turns ON when linked to the network.
⑤	Ethernet connector (ETHERNET)	Connector for connecting to the network.
⑥	Initialization button (INIT)	Push to initialize the system controller or clear errors.

2.3 Optional Parts

■ Back View of Optional Parts for CBM-20A

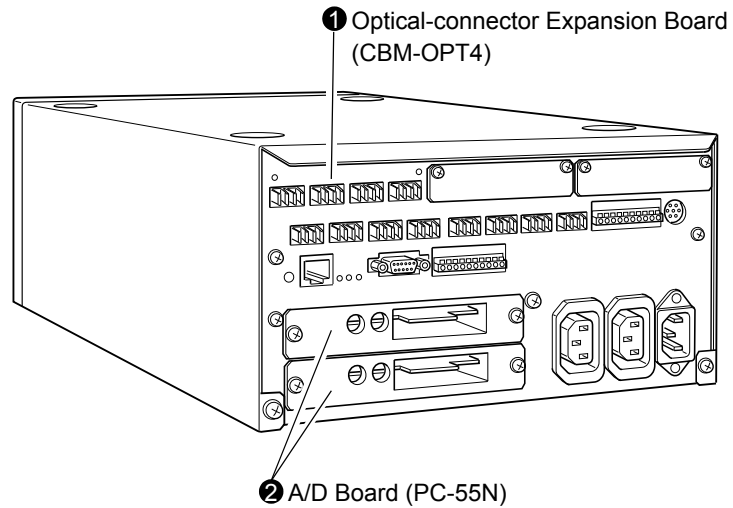


Fig. 2.4

	Name	Description
①	Optical-connector Expansion Board (CBM-OPT4)	Board for optical-connector expansion.
②	A/D Board (PC-55N)	Board for analog-digital conversion for connecting a detector that uses the analog output.


2.4 Applications and Windows

The components in an LC system can be controlled from Internet Explorer running on a PC by accessing the system controller's Web server.

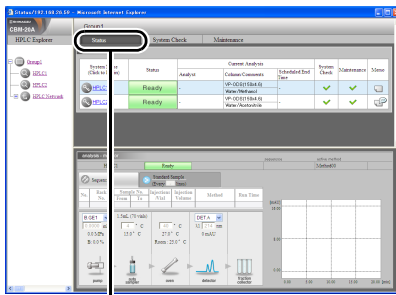
There are four basic applications (programs) that can be executed from the system controller's Web server: the "Group Monitor" application, the "Analysis Execution" application, the "System Check" application, and the "Group Settings" application.

Each application consists of a main window divided into sections with tab pages and sub-windows that are opened from inside the application.

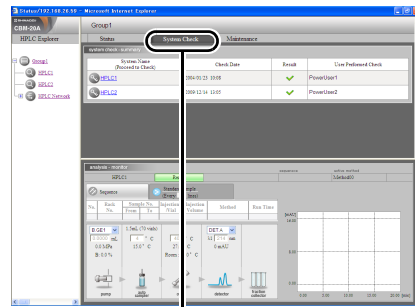
The windows for the "Group Monitor" and "Analysis Execution" applications as well as the "Login" and "Error" windows that are displayed when operating the system controller are described in the following section.


 Refer to ["8.1 Checking the System" P. 8-2](#) for the system check application. Refer to ["5.9 Managing Groups" P. 5-39](#) for the group management.

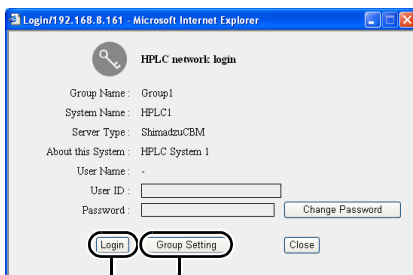
"Group Monitor" application  P.2-9



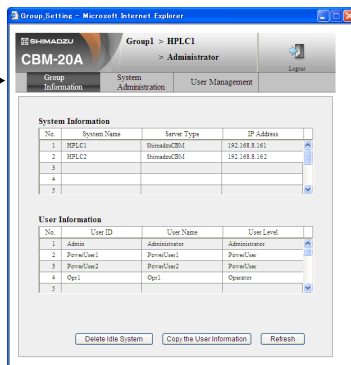
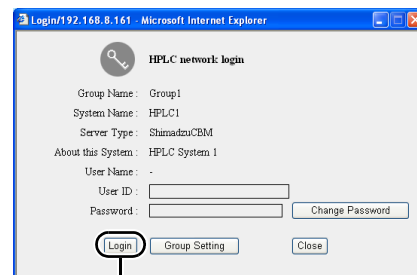
"Group Monitor" application  P.2-9




"Login" window  P.2-16

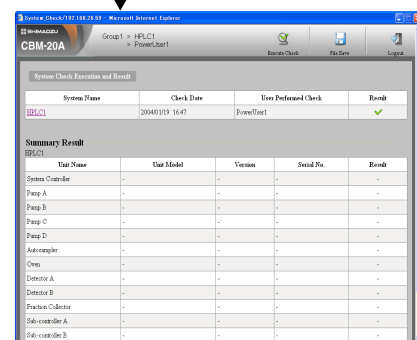


"Login" window  P.2-16



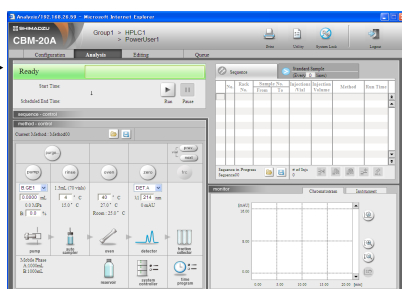
"Group Settings" application

 P.5-39




"System Check" application

 P.8-2



"Analysis Execution" application

 P.2-17

2. Parts Identification and Function

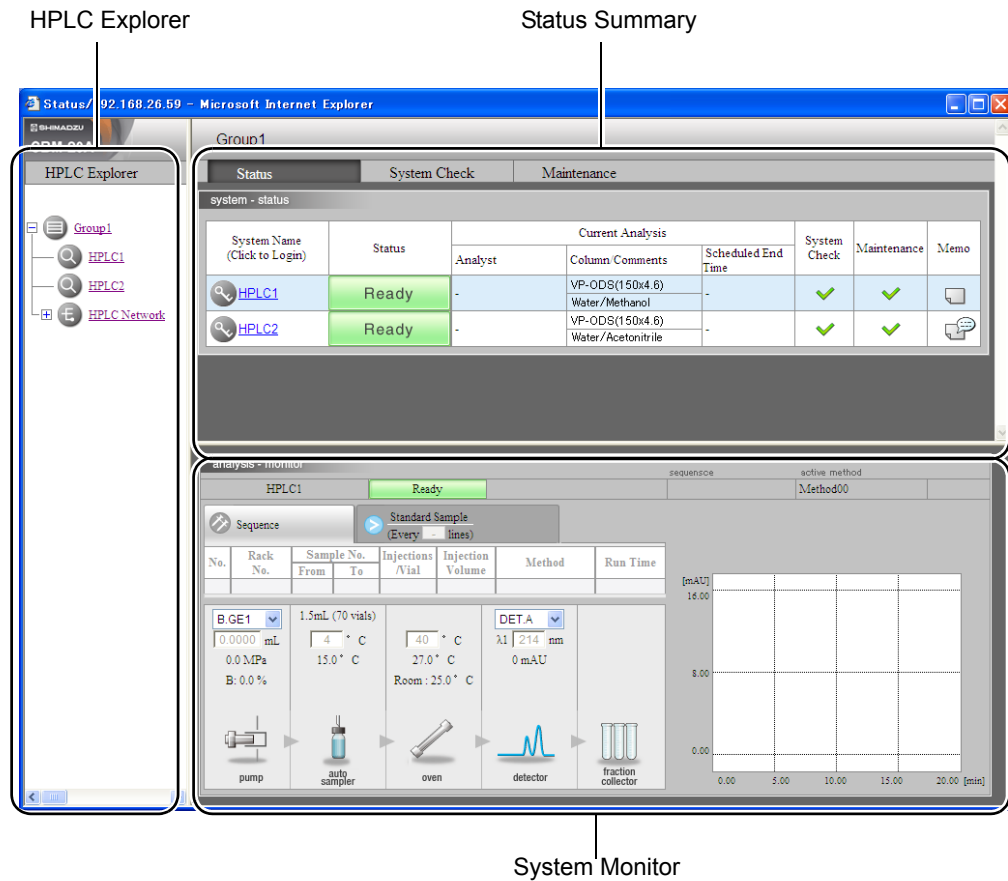
■ List of Windows

Application	Main sub-windows
Window for tab page (including windows that are divided into frames)	
"Group Monitor" application	"Login" window
"HPLC Explorer" section	
"Status Summary" section	
"Status" tab page	
"System Check" tab page	
"Maintenance" tab page	
"System Monitor" section	
"Analysis Execution" application	"Print", "Utility" and "Error" windows
"Configuration" tab page	
"Analysis" tab page	"Autopurge" window, "Mobile Phase Reserve Volume Setting" window, "Method Parameter" window, "Time Program" window, "Gradient Curve" window, "Load File" window, "Save File" window, "Chromatogram Setting" window
"Editing" tab page	"Method Parameter" window, "Time Program" window, "Gradient Curve" window, "Load File" window, "Save File" window
"Queue" tab page	"Advanced Shutdown Settings" window, "Startup Advanced Settings" Window
"System Check" application	"Error" window
"Group Settings" application	
"Group Information" tab page	
"System Administration" tab page	"Advanced Settings" window
"User Management" tab page	

2.5 "Group Monitor" Application

This is the first application that is started when the Web server is accessed. The Group Monitor application window consists of three sections: "HPLC Explorer", "Status Summary", and "System Monitor".

2

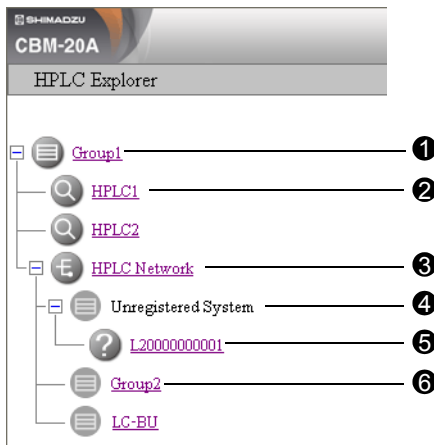









2. Parts Identification and Function

2.5.1 "HPLC Explorer" Section

The systems in the group (up to a maximum of 10) and other systems are displayed in a tree format.

 Refer to "3.1 Managing Several Systems as One Group" P. 3-2 for the group.



	Display item	Description
①	Group name	The group name is displayed next to the group icon. Click  /  in front of the icon to display/hide the systems in the group. Click the group icon or the group name to perform a search for other systems in the group.
②	System name	System names are displayed next to system icons. Click on the system icon or the system name to re-display or update the "Monitor" section for that system.
③	HPLC network	The HPLC network is displayed next to the "HPLC network" icon. Click  /  in front of the icon to display/hide the groups in the network. Click the icon to search the HPLC network. If there are other groups in the network, the group names are displayed next to "other group" icons.
④	Unregistered systems	The "unregistered systems" icon is displayed if there are systems in the group that are not registered. Click  /  in front of the icon to display/hide the unregistered systems.
⑤	Unregistered system name	The names of unregistered systems in the group are displayed next to "unregistered system" icons. Click to display the "Group Settings" application's "Login" window and register the system to the group.  Refer to "5.9 Managing Groups" P. 5-39 for the registration to a group.
⑥	Name of other group	The names of other groups are displayed next to "other group" icons. These icons are used to display other groups in a tree format. Click on an "other group" icon or a group name to change the information displayed in the "HPLC Explorer" section and "Status Summary" section to the information for that group.

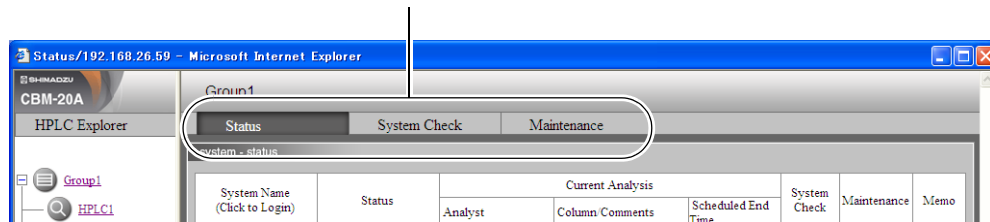
2.5.2 "Status Summary" Section

The "Status Summary" section consists of the following three tab pages.

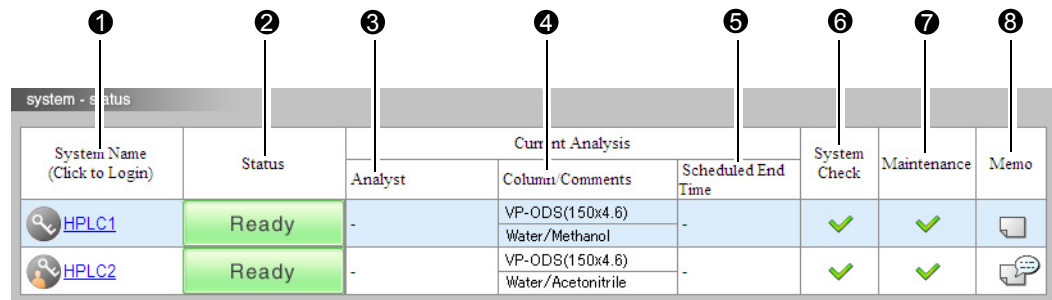
- "Status" tab page
- "System Check" tab page
- "Maintenance" tab page


All pages are accessible by clicking the tabs. The "Status" tab page remains visible when accessing via the Web server.

"Status" Tab Page







■ "Status" Tab Page



	Display item	Description
①	System Name (Click to Login)	Name of the system configured with the system controller. Click on the icon or the system name to display the "Login" window for that system.
②	Status	Displays a summary of the information displayed in the "Analysis" tab page for the system.  "Status Display" P. 2-19
③	Analyst	Displays the name of the user registered for the current analysis.
④	Column/Comments	Displays the column-oven information read by the CMD (Column Management Device) that is connected to the column oven. The mobile phase name that was specified in the screen used for setting the mobile phase reserve volume is also displayed. The column name and size are displayed in the upper field and the mobile-phase name is displayed in the lower field. If a CMD is not connected to the column oven, the comments for the current analysis method are displayed.

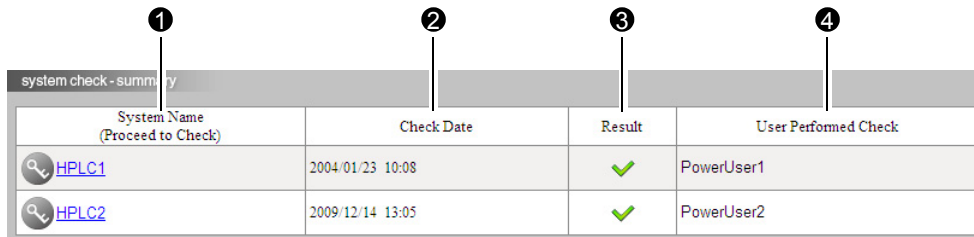
2. Parts Identification and Function



	Display item	Description
⑤	Scheduled End Time	If the analysis sequence is being performed with the use of an autosampler, the scheduled end time for the analysis sequence is displayed. This end time is displayed only while the sequence is running. At other times [-] is displayed.
⑥	System Check	Displays the results of the system check.  "8.1.1 System Check Results" P. 8-4
⑦	Maintenance	Displays the maintenance information.  "8.2.2 "Maintenance" Tab Page Display" P. 8-9
⑧	Memo	It is possible to attach a memo containing system-related information. Indicates that a memo  is provided and indicates that a memo  has not been provided.

■ "System Check" Tab Page

The "System Check" tab page displays the results of system checks for all the systems.

 ["8.1 Checking the System" P. 8-2](#)



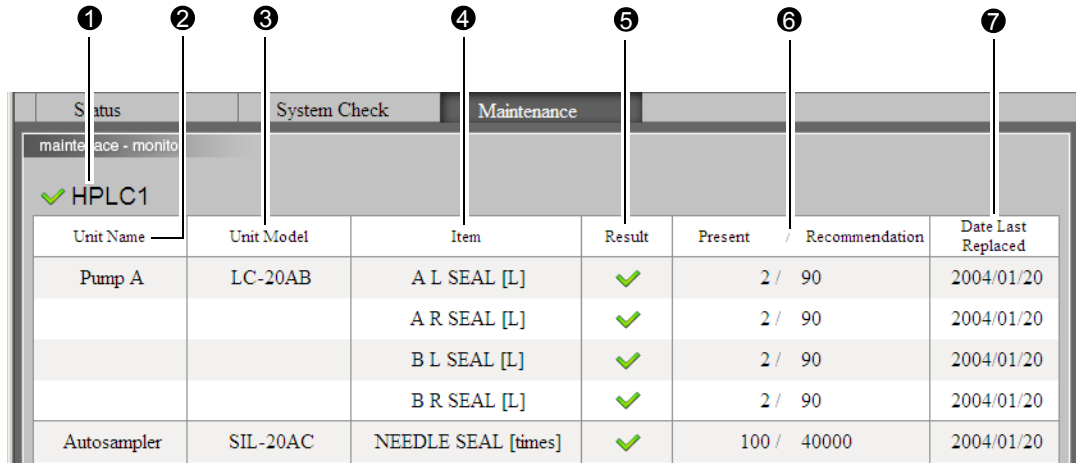
System Name (Proceed to Check)	Check Date	Result	User Performed Check
 HPLC1	2004/01/23 10:08	✓	PowerUser1
 HPLC2	2009/12/14 13:05	✓	PowerUser2

	Display item	Description
①	System Name (Proceed to Check)	Displays the name of the system configured with the system controller. Click on the icon or the system name to display the "Login" window for the "System Check Execution and Result" window.
②	Last Date	Displays the date and time of the last system check.
③	Result	Displays the result of the last system check.
④	User Performed Check	The user name that performed the last system check.

■ "Maintenance" Tab Page

The "Maintenance" tab page displays the maintenance items for all the systems.

 ["8.2 Checking Maintenance Information" P. 8-9](#)



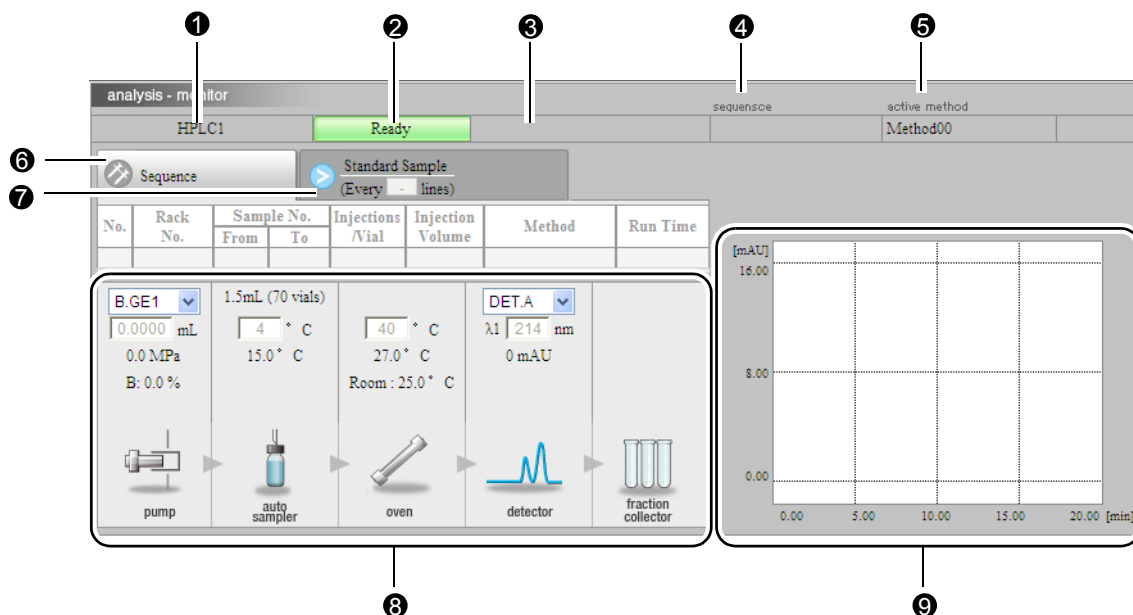
Unit Name	Unit Model	Item	Result	Present / Recommendation	Date Last Replaced
✓ HPLC1					
Pump A	LC-20AB	A L SEAL [L]	✓	2 / 90	2004/01/20
		A R SEAL [L]	✓	2 / 90	2004/01/20
		B L SEAL [L]	✓	2 / 90	2004/01/20
		B R SEAL [L]	✓	2 / 90	2004/01/20
Autosampler	SIL-20AC	NEEDLE SEAL [times]	✓	100 / 40000	2004/01/20

	Display item	Description
①	System Name	The name of the system configured with the system controller is displayed next to an icon indicating the result of a check on consumable parts.
②	Unit Name	Displays the names of the components connected to the system.
③	Unit Model	Displays the model names of the connected components.
④	Item	Displays maintenance items.
⑤	Result	Displays results related to the recommended replacement values.
⑥	Present/ Recommendation	Displays the present values and the recommended replacement values.
⑦	Date Last Replaced	Displays the dates when the corresponding parts were last replaced.

2. Parts Identification and Function

2.5.3 "System Monitor" Section

Click a system name in the "HPLC Explorer" section to change the system information displayed in the "Monitor" section.

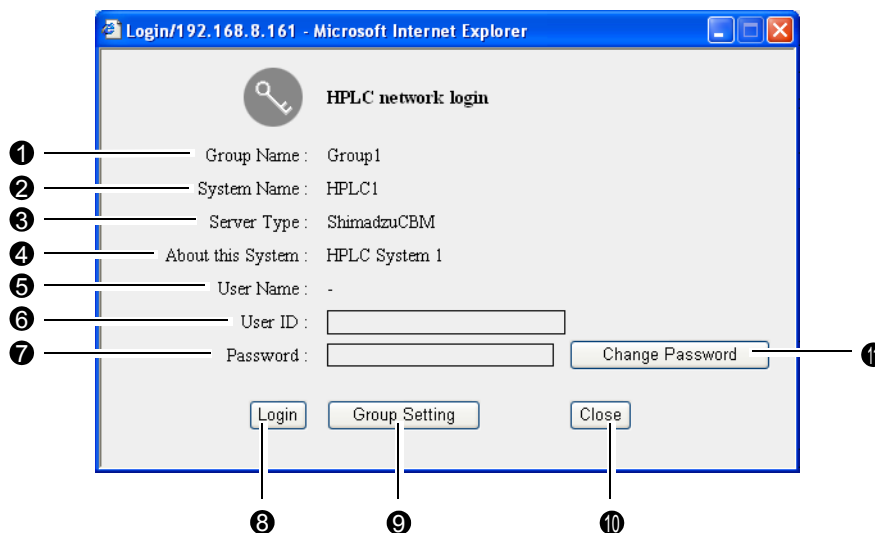


	Display item	Description
①	System Name	Displays the name of the currently selected system.
②	Status	Displays the current status of the system. If "Run" is displayed (indicating that analysis is being executed), the time that has elapsed since the start of analysis is also displayed. 👉 "2.5.2 "Status Summary" Section" P. 2-11
③	Analyst	Displays the name of the user performing the current analysis.
④	Sequence	Displays the name of the sequence file used for the current analysis.
⑤	Active Method	Displays the name of the method file used for the current analysis.
⑥	Sequence	If this tab page is active, the line of the analysis sequence that is currently being analyzed is displayed. The following information is displayed from the left, line number, rack number, vial number, number of injections, injection volume, name of the method file, and run time.
⑦	Standard Sample (repeat injection)	If this tab page is active, the line of the analysis sequence for the current standard injection is displayed. The following information is displayed from the left, line number, rack number, vial number, number of injections, injection volume, name of the method file, and run time.
⑧	Monitor	Displays the set values for the LC system components, such as solvent delivery modules, autosamplers, column ovens, and detectors.

	Display item	Description
⑨	Chromatogram	<p>Displays the chromatogram of the detector selected from the monitor's pull-down menu, and the pump pressure.</p> <p>Place the cursor on the chromatogram view and click the left mouse button: the following key operations will become effective.</p> <ul style="list-style-type: none">→ (and + of ten-key): Zoom in the chromatogram of the detector← (and – of ten-key): Zoom out the chromatogram of the detector↑ : Shift up↓ : Shift downHome : Return to the standard size <p>When the cursor is moved outside the chromatogram or when the "Analysis Execution" application is logged in, these operations become ineffective. These operations are effective for the chromatogram of the detector.</p>

2.6 "Login" Window

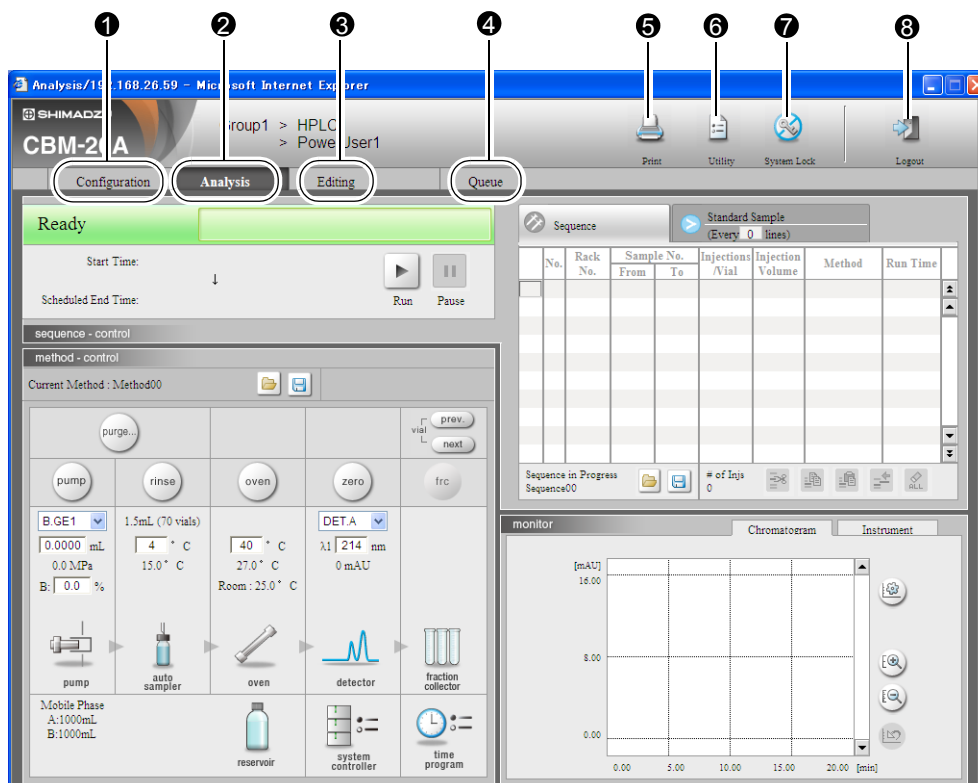
The "Login" window is displayed when the system name on the "Status" tab page (["2.5.2 Status Summary" Section P. 2-11](#)) is clicked. It is possible to log into the "Analysis Execution" application and the "Group Settings" application from this window. To log in, enter a previously registered user ID and password.



	Display item	Description
①	Group Name	Displays the name of the group to which the system belongs.
②	System Name	Displays the name of the system configured by the solvent delivery module, autosampler, column oven, detector, and other components. The system name is set by the administrator.
③	Server Type	Displays the Web server type ([ShimadzuCBM] in this case).
④	About this System	Displays the description about the system. The description is set by the administrator.
⑤	User Name	Display the name of user if there is already a user logged in.
⑥	User ID	Enter a user ID. (The initial setting for the user ID is "Admin".)
⑦	Password	Enter a password. (The initial setting for the password is "Admin".)
⑧		Click to login to the "Analysis Execution" application.
⑨		Click to login to the system controller's "Group Settings" application. "5.9 Managing Groups" P. 5-39
⑩		Click to close the "Login" window without logging in.
⑪		Click to change the password. "5.10 Changing Passwords" P. 5-55






2.7 "Analysis Execution" Application

The "Analysis Execution" application window is displayed after login. The "Configuration", "Analysis", "Editing", and "Queue" tab pages are contained in this application. Click the tabs to change tab pages. The "Analysis" tab page is always displayed while the user is logged in.



	Display item	Description
①	[Configuration] tab	Click to display the "Configuration" tab page. "3.4 Determine the System Configuration" P. 3-7
②	[Analysis] tab	Click to display the "Analysis" tab page. The "Analysis" tab page is described briefly on P.2-18 . "4.2 Creating Method Files" P. 4-10
③	[Editing] tab	Click to display the "Editing" tab page. "4.2 Creating Method Files" P. 4-10
④	[Queue] tab	Click to display the "Queue" tab page. "5.4 Analysis Using Queues" P. 5-10 , "5.5 Shutdown and Startup Settings" P. 5-14
⑤	Print button	Click to display the "Print" window. "4.6 Printing Files" P. 4-36

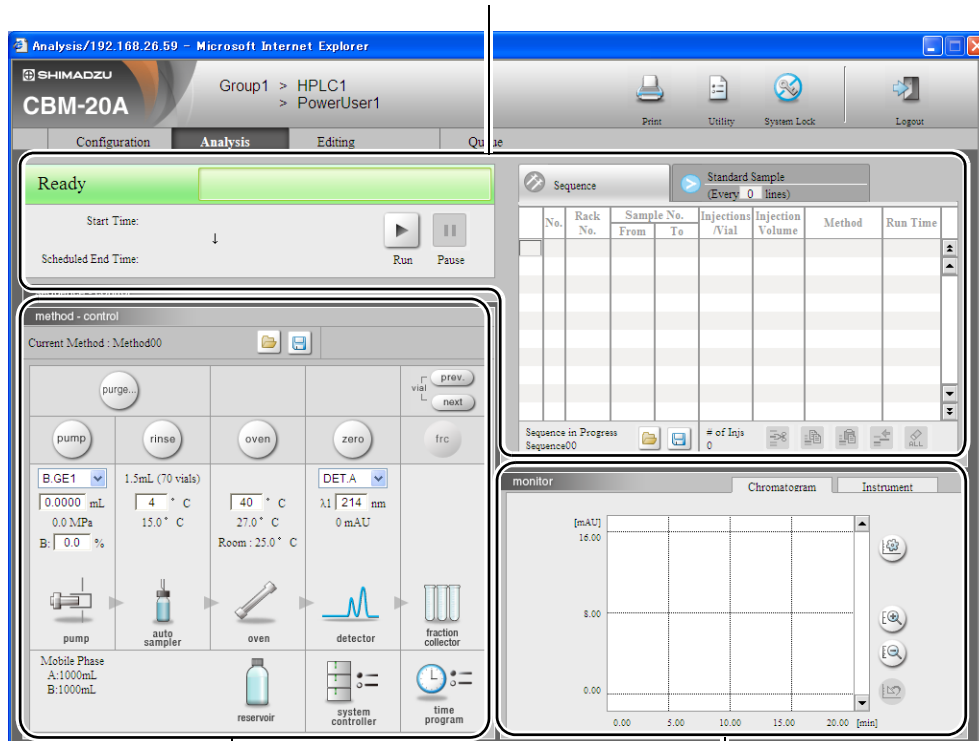
2. Parts Identification and Function

	Display item	Description
⑥	 Utility button	Click to display the "Utility" window. This window can be used to initialize settings or save all of the parameter settings at once.  "5.8 Managing Component Parameters" P. 5-33
⑦	 System-lock button	Click to retain control over the system even after logging out. Other users cannot log in to the system while the system lock is activated.  "5.11 Locking Systems" P. 5-56
⑧	 Logout button	Click to log out of the "Analysis Execution" application and return to the "Group Monitor" application.

2.7.1 "Analysis" Tab Page

This page is used to start the analysis sequence, edit the selected method or sequence files, control the system components, and display chromatograms. The "Analysis" tab page consists of three sections: "Sequence", "Method", and "Monitor".

"Sequence" section

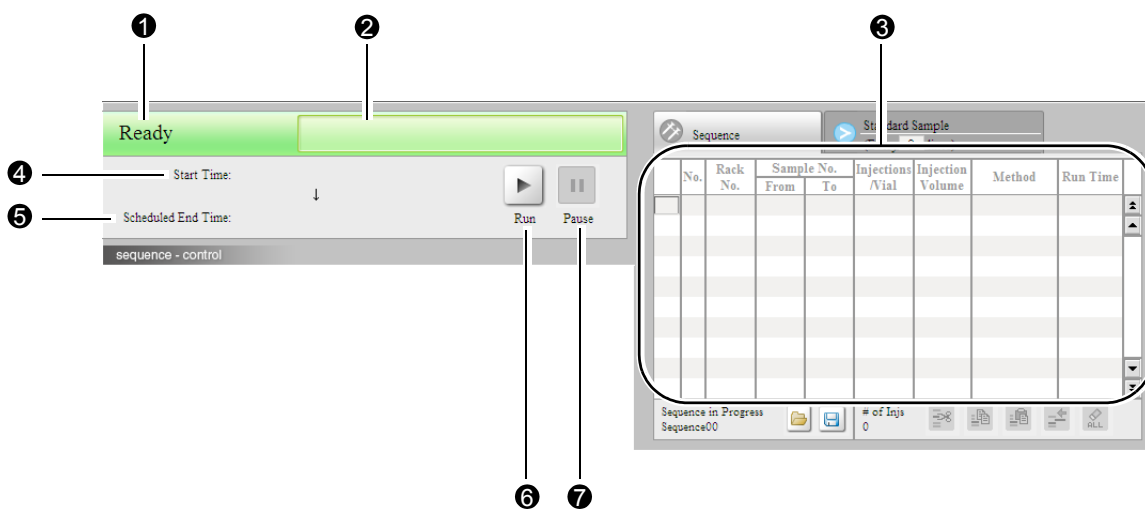





"Method" section

"Monitor" section

■ "Sequence" Section

This section is used to edit the sequence file and start the analysis sequence.






	Display item	Description
1	Status	Displays the system's status information. "Status Display" P. 2-19
2	Sequence Name and User Name	Displays the name of the sequence file for the analysis and the user name. Nothing is displayed if no sequence file has been added to the analysis queue.
3	Sequence Table	Displays the settings of the sequence file. "4.3 Creating Sequence Files" P. 4-22
4	Start Time	Displays the time at which analysis was started.
5	Scheduled End Time	Displays the scheduled end time for the current sequence.
6	 Start button	Click to start analysis. The "run" symbol changes to the "stop" symbol.
	 Stop button	Click to terminate analysis. The "stop" symbol changes to the "run" symbol.
7	 Pause button	Click to temporarily stop analysis. Analysis will temporarily stop when the current injection is complete. Click again to resume analysis.

■ Status Display

The system's status is displayed in the [Status Display] field.

"Sequence" section display	"Status" tab page display	Description
Ready	Ready	Analysis can be performed.


2. Parts Identification and Function

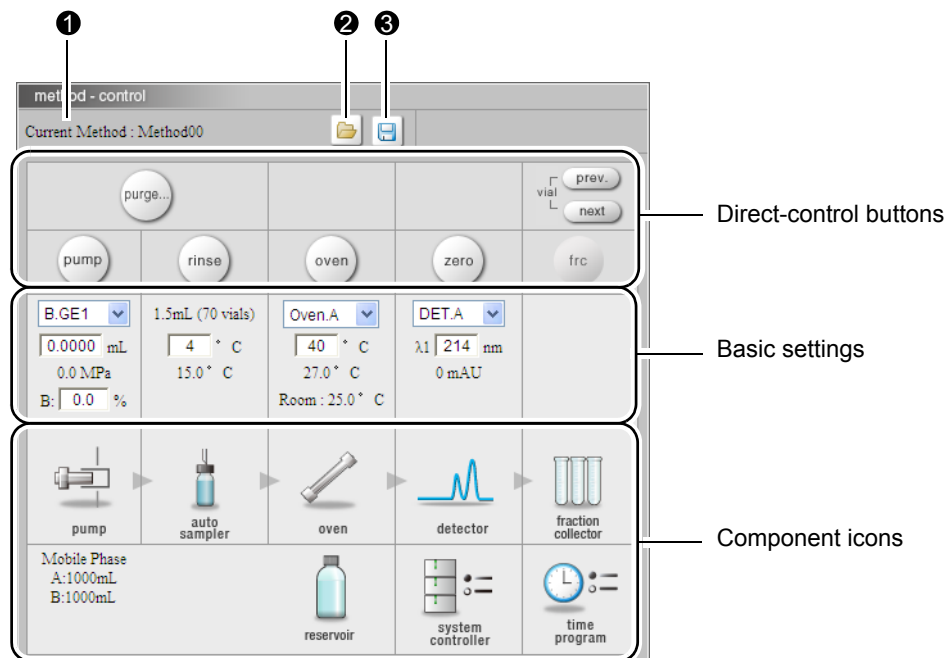
"Sequence" section display	"Status" tab page display	Description
Run	Run	Analysis is being executed.
Transmit	Run	Analysis sequence data is being transmitted to the autosampler.
Pretreat	Run	The autosampler is performing pretreatment.
Posttreat	Not Ready	The autosampler is running after the analysis is completed.
Pause	Run	Analysis has been temporarily stopped by clicking  .
WaitSeq	Run	The analysis queue is in waiting status.
CoolingDown	Run	The system is shutting down.
WaitDP	Run	The data processor is in waiting status.
ChangingRack	Run	The changer is changing racks.
Stop	Not Ready	The autosampler has stopped operation because  was clicked or an error occurred. Resume operation by clicking  .
SILDoorOpen	Not Ready	The autosampler's door is open.
SafetyLock	Not Ready	The autosampler is not operating and the safety lock is activated.
Rinse	Not Ready	The autosampler's needle is being rinsed.
SILPurge	Not Ready	Autopurge is being performed for the autosampler.
Z.Home	Not Ready	The autosampler's needle is at the home position.
A.Purge/B.Purge/ C.Purge/D.Purge	Not Ready	Autopurge is being performed for the solvent delivery module.
InitConcFlow	Not Ready	The mobile phase is being replaced at the method's initial concentration after execution of autopurge for the solvent delivery module.
WaitCTO	Run or Not Ready	The system is waiting for temperature control of the column oven to stabilize.
CTODoorOpen	Not Ready	The column oven door is open.
StackOpen	Not Ready	The rack changer stack is open.
InitializingChanger	Not Ready	The rack changer is initializing.
WaitSIL	Not Ready	The autosampler is not ready.
DetectingRack	Not Ready	The changer is performing rack detection.

"Sequence" section display	"Status" tab page display	Description
Error	Error	An error has occurred.
PowerDown	PowerDown	The system is powering down.
WarmUp	StartUp or PowerDown	The system is warming up.
No Rack Plate L	Not Ready	Sample rack is not set correctly on rack plate L.
No Rack Plate M	Not Ready	Sample rack is not set correctly on rack plate M.
No Rack Plate R	Not Ready	Sample rack is not set correctly on rack plate R.
No Rack CtrlRack	Not Ready	Control vial rack is not set correctly.
SILCtrlDoorOpen	Not Ready	Autosampler's door in front of control vial rack is open.
SILFrontPanelOpen	Not Ready	Autosampler's front panel is not installed correctly.
-	Off	Not connected or power is OFF.

■ "Method" Section



The selected method file can be edited and the systems can be controlled directly from the "Method" section.

 If there are components that are not connected to the system controller, the buttons and display/settings items for those components are displayed in gray.

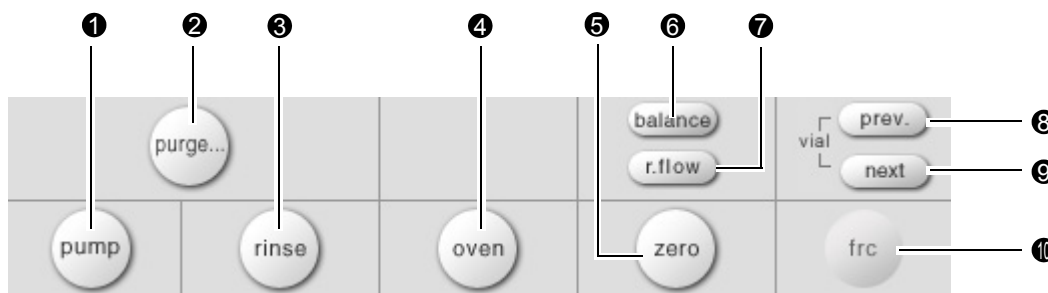



	Display item	Description
❶	Current Method	Displays the name of the current method file.

2. Parts Identification and Function

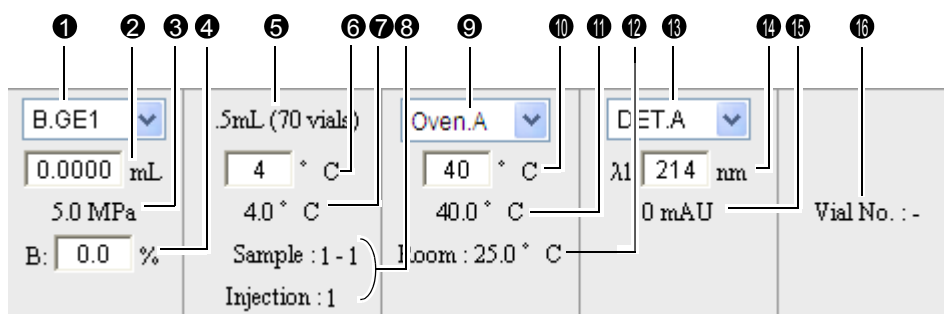
	Display item	Description
②	 Load button	Click to display the "Load File" window. Used to switch between method files. ☞ "4.2 Creating Method Files" P. 4-10
③	 Save button	Click to display the "Save File" window. Used to save the currently selected method file to the PC or copy it to another file. ☞ "4.2 Creating Method Files" P. 4-10


•Direct Control Buttons



	Name	Description
①	Pump button	Turns the pump ON/OFF. If there are two or more pumps connected, they are all turned ON/OFF simultaneously. If at least one pump is ON, the button is displayed in blue.
②	Purge button	Displays the "Autopurge" window for the pump and autosampler. ☞ "4.1.7 Executing Autopurge" P. 4-6
③	Rinse button	Rinses the autosampler's needle.
④	Column-oven button	Turns the column oven ON/OFF from the system controller. If multiple ovens are connected, they are turned ON/OFF at the same time. The  button lights up blue when any oven is turned ON.
⑤	Zero button	Zeros the selected detector's signal.
⑥	Balance button	Performs balance calibration of the refractive index detector.
⑦	Reference-flow button	Turns the refractive index detector reference flow ON/OFF.
-	Cancel zero button (free button)	Cancels zero calibration on the optional A/D boards.
⑧	Previous-vial button	Used to return to the fraction collector's previous vial.
⑨	Next-vial button	Used to advance to the fraction collector's next vial.
⑩	Fraction-collector button	Turns fraction collector operation ON/OFF.

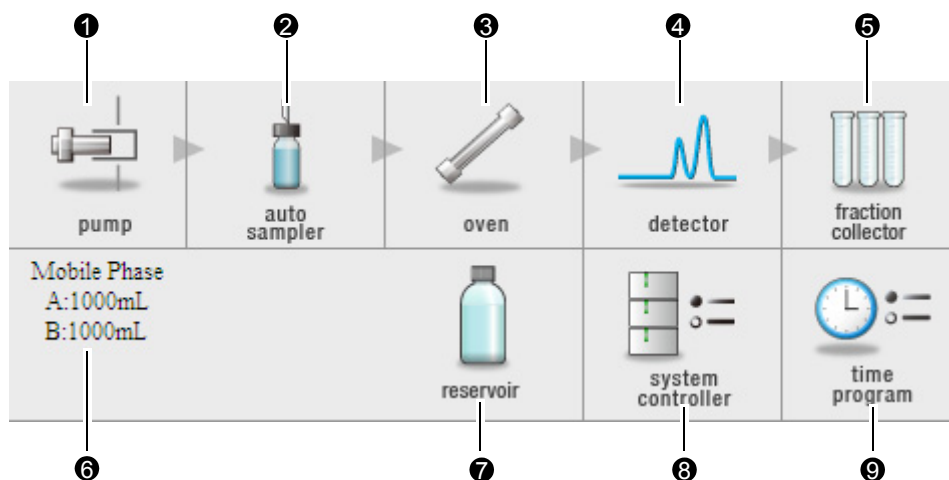
● Basic Settings





Name		Description
Basic pump settings	❶	Select the pump from the pull-down menu.
	❷	Set the pump's flow rate.
	❸	The pressure monitor value is displayed.
	❹	Set the concentration of mobile phase for gradient analysis. Please set the Concentration D in the "Method Parameter" window, as concentration D cannot be set in this window.
Basic autosampler settings	❺	The autosampler's rack type is displayed. The displayed rack name varies depending on the rack type and the version of the system controller.  In the case of SIL-30ACMP, select the rack position from the pull-down menu. When analysis is started, the rack position for analysis is automatically selected. According to the selected rack position, the monitor value of cooler temperature is displayed at ❷ and the rack type is displayed at ❸.
	❻	Set the cooler temperature for autosamplers with a cooler.
	❼	The monitor value for autosamplers with a cooler is displayed.
	❽	The sample number and number of injections for the sequence currently analyzed are displayed.
Basic column-oven settings	❾	Select an oven from the pull-down menu.
	❿	Set the oven temperature.
	⓫	The monitor value for the oven temperature is displayed.
	⓬	The monitor value for room temperature is displayed. (Depending on the oven type, this may not be displayed.)
Basic detector settings	⓭	Select the detector from the pull-down menu.
	⓮	Set the wavelength.
	⓯	The data value is displayed. (The item that can be set and displayed vary with the detector type.)
Basic fraction-collector settings	⓰	The vial number undergoing fractionation is displayed.

2. Parts Identification and Function

●Component Icons



	Name	Description
①	Pump icon	Click to display the "Pump" tab page in the "Method Parameter" window. The method parameters and configuration parameters for the pump used in the current analysis can be set from this page. ☞ "4.2.3 Parameters for the Solvent Delivery Module" P. 4-13
②	Autosampler icon	Click to display the "Autosampler" tab page in the "Method Parameter" window. The method parameters and configuration parameters for the autosampler used in the current analysis can be set from this page. ☞ "4.2.4 Parameters for the Autosampler" P. 4-16
③	Column-oven icon	Click to display the "Oven" tab page in the "Method Parameter" window. The method parameters and configuration parameters for the column oven used in the current analysis can be set from this page. ☞ "4.2.5 Parameters for the Column Oven" P. 4-17
④	Detector icon	Click to display the "Detector" tab page in the "Method Parameter" window. The method parameters and configuration parameters for the detector used in the current analysis can be set from this page. ☞ "4.2.6 Parameters for the Detector" P. 4-19
⑤	Fraction-collector icon	Click to display the "Fraction Collector" tab page in the "Method Parameter" window. The method parameters and configuration parameters for the detector used in the current analysis can be set from this page. ☞ "5.6.2 Parameters for the Fraction Collector" P. 5-21
⑥	Mobile-phase monitor display	Displays the reserve volumes of the pump's mobile phase and the autosampler's rinse solution. The mobile phase display is for the pump selected in the pull-down menu of the basic pump settings. (There is no display if the reserve volume is not set or if the pump or autosampler are not "30A" or "20A" models.)
⑦	Mobile-phase icon	Click to display the "Mobile Phase Reserve Volume Setting" window. The mobile phase name and reserve volume can be set from this window. ☞ "5.2 Setting the Mobile Phase Reserve Volume" P. 5-5

	Name	Description
⑧	System-controller icon	Click to display the "System Controller" tab page in the "Method Parameter" window. The method parameters and configuration parameters for the system controller can be set from this page.  "4.2.7 Parameters for the CBM-20A" P. 4-20
⑨	Time-program icon	Click to display the "Time Program" window. The time program can be edited from this window.  "4.4 Gradient Analysis Using Time Programs" P. 4-28

■ "Monitor" Section

The "Monitor" section displays the chromatogram of the selected detector as well as monitor values for the other system components.

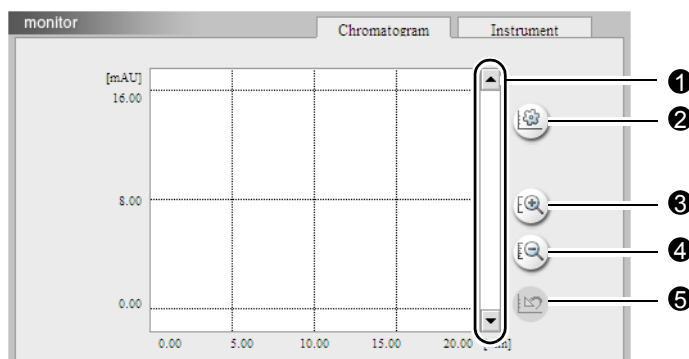
● "Chromatogram" Tab Page

Click the [Chromatogram] tab to display the "Chromatogram" tab page.



If the detector is set to dual mode, the chromatograms for channels 1 and 2 are drawn in black and red respectively. However, chromatograms of the PDA detector cannot be displayed.

When [Pump Pressure] is set to ON in the "Chromatogram Setting" window, the monitor value is drawn in blue.

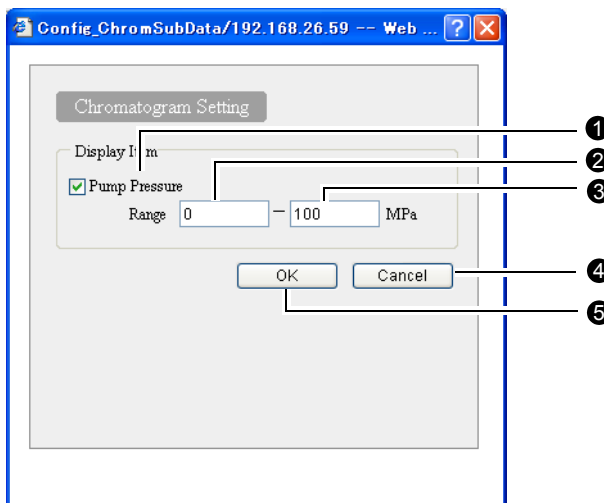


	Name	Description
①	Scroll bar	Used to shift the displayed chromatogram up or down.
②	Chromatogram Setting button	Used to display the "Chromatogram Setting" window. Set whether or not to show the pump pressure and set the maximum and minimum pressure values.
③	Zoom-in button	Used to enlarge the chromatogram in the vertical direction.
④	Zoom-out button	Used to reduce the chromatogram in the vertical direction.
⑤	Initialize button	Used to return an enlarged/reduced chromatogram to the standard size.

2. Parts Identification and Function

● "Chromatogram Setting" Window

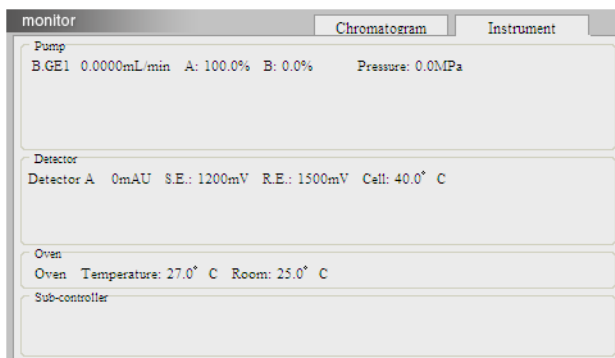
Click the chromatogram setting button to display the "Chromatogram Setting" window.



	Name	Description
①	Pump Pressure	Check the box to show the pump pressure in the chromatogram.
②	Range (minimum)	Set the minimum value for the pump pressure display range.
③	Range (maximum)	Set the maximum value for the pump pressure display range.
④	Cancel button	Click to cancel the settings and close the window.
⑤	OK button	Click to validate the settings and close the window.

● "Instrument" Tab Page

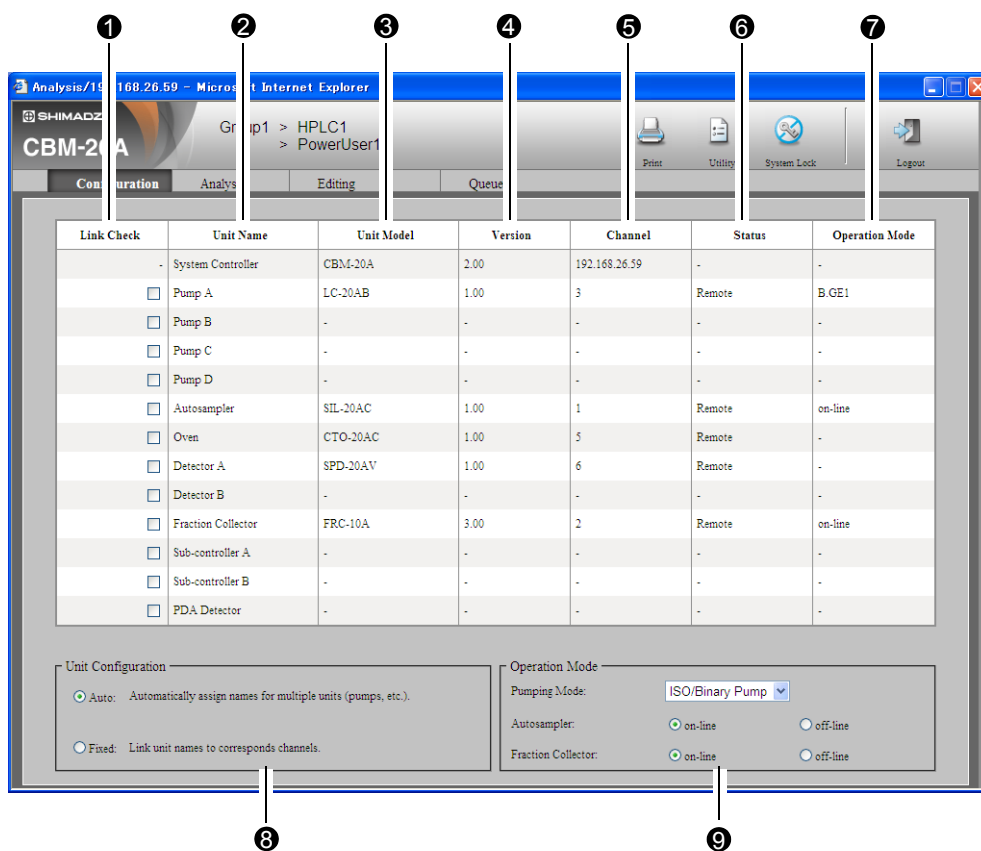
Click the [Instrument] tab to display the "Instrument" tab page. The monitor values for the components are displayed.



The display contents vary depending on the components associated with the system.

2.7.2 "Configuration" Tab Page

The system configuration can be set and checked from the "Configuration" tab page.

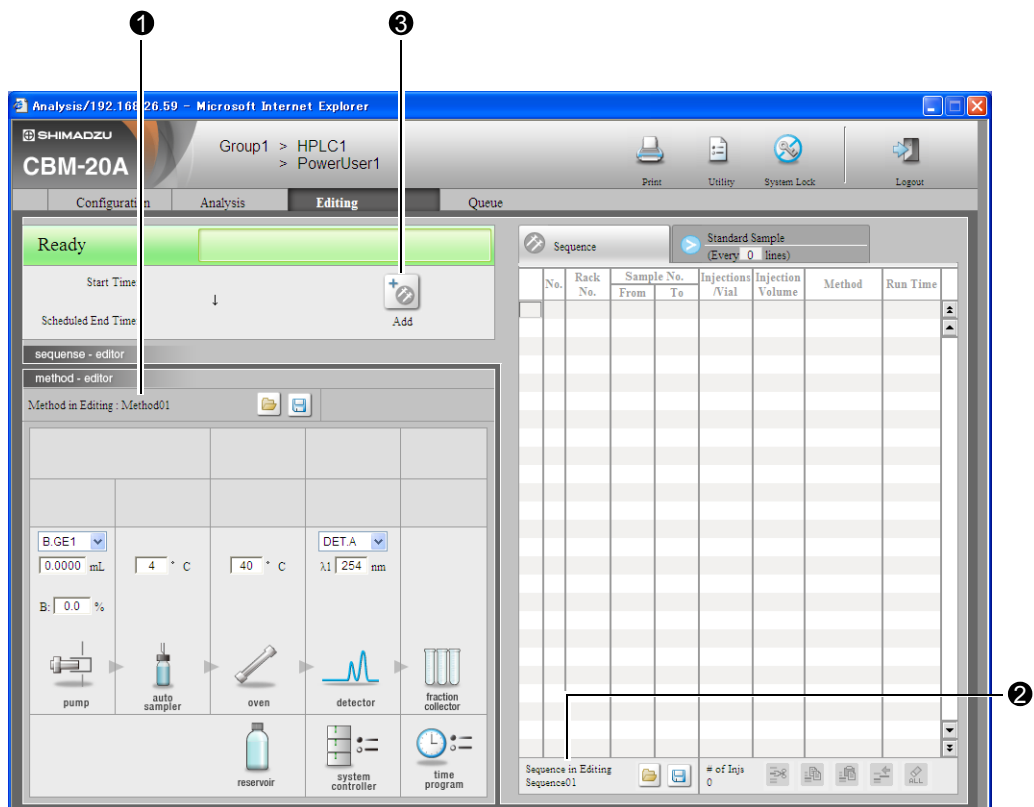


	Display item	Description
①	Link Check	Click the corresponding box to perform error processing if the system controller and a component become disconnected.
②	Unit Name	Displays the names of the components connected to the system controller (and the system controller itself).
③	Unit Model	Displays the model names of the connected components.
④	Version	Displays the versions of the connected components.
⑤	Channel	Displays the channel numbers of the remote connectors by which the components are connected to the system controller. IP addresses are displayed for the system controller and the SPD-M20A/M30A.
⑥	Status	Displays the connection statuses of the connected components.
⑦	Operation Mode	Used to select the pumping mode for the solvent delivery module and the operation mode for the autosampler and fraction collector.
⑧	Unit Configuration	Used to select the method for assigning unit names.
⑨	Operation Mode	Used to select the pumping mode for the solvent delivery module and the operation mode for the autosampler and fraction collector.


2. Parts Identification and Function

2.7.3 "Editing" Tab Page

Method files can be edited and sequence files can be assigned to the analysis queue from the "Editing" tab page.




	Display item	Description
①	Method filename	Displays the name of the currently edited method file.
②	Sequence filename	Displays the name of the currently edited sequence file.
③	Add-analysis button	Used to assign the edited sequence to the analysis queue.

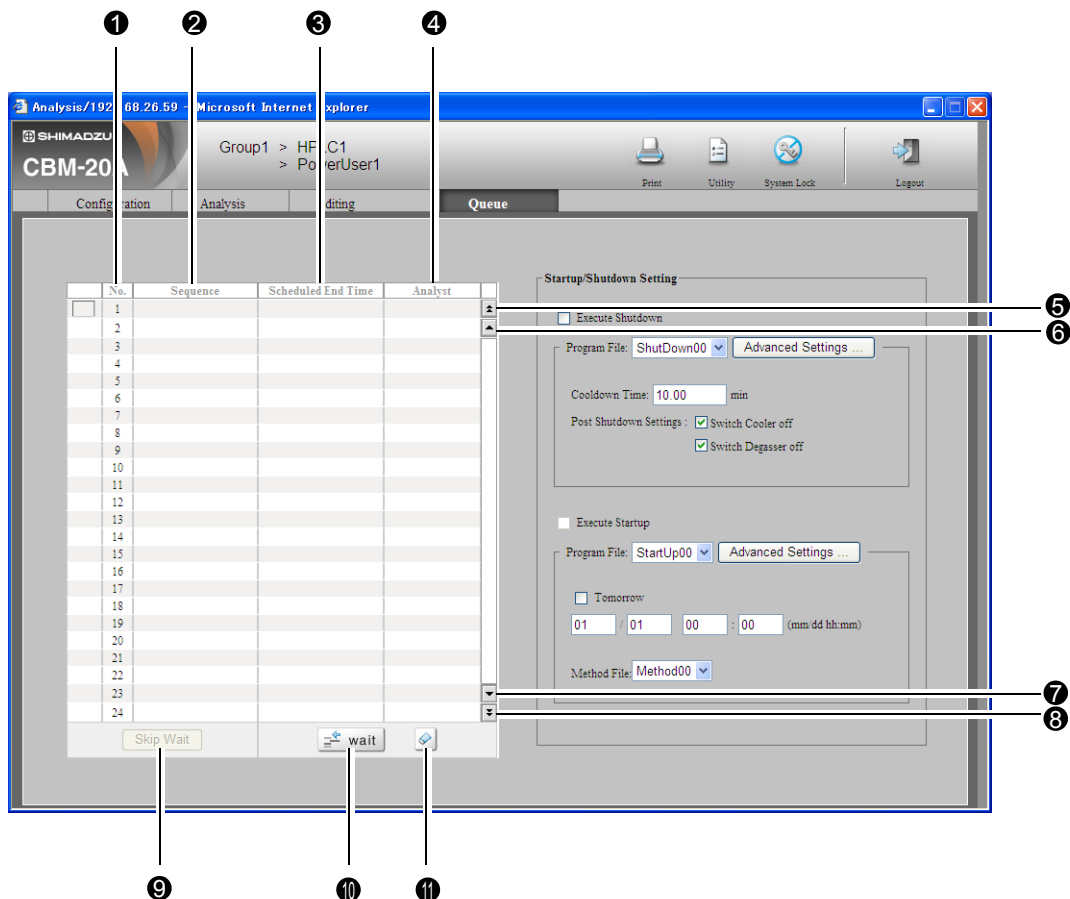
 The file selected in the "Analysis" tab page cannot be edited from this page.




 Refer to "2.7.1 "Analysis" Tab Page" P. 2-18 for details on other operations.

2.7.4 "Queue" Tab Page


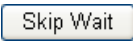


The analysis sequences assigned to the analysis queue can be reviewed and the startup/shutdown settings can be set in the "Queue" tab page.

 Refer to "5.5 Shutdown and Startup Settings" P. 5-14 for details on the "Startup/Shutdown Setting" section on the right of the page.



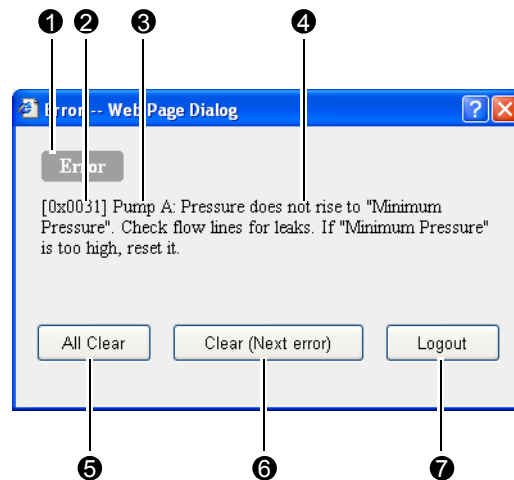
	Display item	Description
①	No.	Indicates the line number of the analysis sequence. During analysis, the current line number is 1, the line that was analyzed immediately before the current line (1) is 0, and lines analyzed before line 0 are displayed using negative numbers.
②	Sequence	Displays the sequence files registered in the "Editing" tab page.
③	Scheduled End Time	Displays the scheduled end time for only the current line.
④	Analyst	Displays the name of the user that registered the analysis.
⑤		Used to scroll the table up 24 lines.
⑥		Used to scroll the table up 1 line.
⑦		Used to scroll the table down 1 line.

2. Parts Identification and Function

	Display item	Description
8		Used to scroll the table down 24 lines.
9		Used to skip a WaitSeq line. Click this button when the analysis queue comes to a WaitSeq line to cancel the wait and advance to the analysis on the next line.
10		Used to insert WaitSeq lines. A WaitSeq line is inserted above the selected line.
11		Used to delete sequence lines and WaitSeq lines. Two or more lines can be selected for deletion in one operation.

2.8 "Error" Window

The "Error" window is displayed when an error occurs.



	Display item	Description
1	Classification	Depending on the type of error, "Warning", "Error" or "Fatal Error" may be displayed.
2	Error code	Displays a 6-digit alphanumeric error code.
3	Unit name	Displays the name of the component for which the error occurred.
4	Error message	Displays the description of the error.
5	All-clear button	Click to clear all errors except fatal errors.
6	Clear button	Click to clear the currently displayed (non-fatal) error. The window closes when all errors are cleared.
7	Logout button	If a fatal error occurs, in accordance with the message, click the button, close all windows, and reset the power to the system controller.



It is also possible to clear all errors except fatal errors by pressing the initialization button on the back of the system controller.

2.9 Precautions Related to Internet Explorer Operations

Note the points described below when making settings and performing other operations for the system controller using Internet Explorer.

■ Popup Blocker

When pop-up blocker software such as a security software or a toolbar for a browser is installed in the PC, Internet Explorer may not open the CBM-20A's Web application window. Please invalidate the pop-up block function for the URLs of the CBM or change the setting of the PC to disable the pop-up block function. After invalidating the pop-up block function, delete temporary files by selecting [Tools] - [Internet Options] - [Delete Files] in Internet Explorer.

■ Internet Explorer Settings

In order to use Internet Explorer, select [Tools] and [Internet Options] and configure the following settings. Internet Explorer 6 (IE6) to Internet Explorer 9 (IE9) can be used; note that some setting items and methods are different.

I [General]

Click the [Settings] button for "Temporary Internet Files" (for IE7, IE8 or IE9, [Settings] button for "Browsing history") and set the "Amount of disk space to use" (for IE7, IE8 or IE9, "Disk space to use") to 100 MB. (*1)

II [Security]

- (1) Select [Local intranet] and click the [Sites] button. Set the Local Internet zone to include the system controller URLs. Specifically, add the system controller's URL in the [Advanced] screen.

Example: `http://192.168.*.*` or `http://192.168.200.99`

(To use the system name for access in IE7, IE8 or IE9, add `http://"system name".`)

- (2) Click the [Customize Level] button and configure the following settings.

- Select "Enable" under "Run ActiveX controls and plug-ins" in "ActiveX controls and plug-ins".
- Select "Enable" under "Script ActiveX controls marked safe for scripting" in "ActiveX controls and plug-ins".
- Select "Enable" under "Active scripting" in "Scripting".
- Select "Enable" or "Prompt" under "Access data sources across domains" in "Miscellaneous". (*2)
- Select "Enable" under "File download" in "Downloads". (*3)

III [Security]

Click the [LAN Settings] button and view the "Use a proxy server for your LAN" check box. If it is checked, configure the following settings. (*4)

- Check the "Bypass proxy server for local addresses" check box.

- Click [Advanced] button and add the system controller's URL in "Exceptions".
Example: 192.168.*.* or 192.168.200.99

IV [Advanced]

- Check the "Display a notification about every script error" check box in "Browsing". (*5)
- Check the "Print background colors and images" check box in "Printing". (*6)

(*1) If the "Amount of disk space to use" is too large, the following problems may occur.

- 1) The update speed of the Web screen becomes slow when the temporary files folder is full.
- 2) When the temporary files folder is full and free disk space decreases, the PC operation becomes unstable.

(*2) Used for "Group Settings" application.

(*3) Set to download method and sequence files.

(*4) This setting is unnecessary if no proxy server is used.

(*5) When script error occurs in Web application, the screen update stops. This setting is necessary to recognize this error.

(*6) Used for printing parameters in "Print" windows.

■ Entering and Confirming Parameter Settings

During data entry using Internet Explorer, settings are confirmed either by using the [Tab] key or by moving the cursor to another location and clicking the mouse button. Settings are not confirmed with the [Enter] key.

Although the [Tab] key can be used to move the cursor to the next field when entering data for some parameters, in some windows, such as the windows used for editing sequence tables, the [Tab] key will not move to the next field. In these instances the mouse must be used to move to a different location.

■ Out-of-range Data

If data that is out of the acceptable range is entered, the data returns to its original value and is highlighted. Input a value that is within the acceptable range.

■ Screen Printout

The screen contents such as maintenance information and system configuration can be printed from Internet Explorer by pressing [Ctrl] [P]. Enter the appropriate printer settings in the "Print" window. If the on-screen printout range is larger than the default paper size, change the paper size and scaling settings as necessary. Note that, even if the paper size or scaling settings are changed, it may still not be possible to print out all the displayed contents on one sheet of paper.

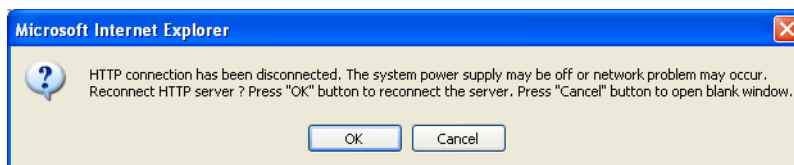
■ Continuous Operation

Leaving Internet Explorer open for extended periods with the system controller connected may cause PC operation to become unstable. To avoid this;

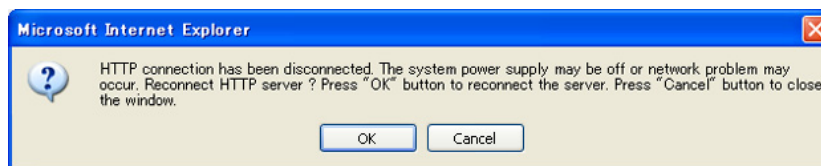
- Shut down Internet Explorer once every day or so when running the system controller continuously. To suppress the consumption of PC resources, the Web application screen of CBM shuts and opens again automatically at midnight (4 a.m - 5 a.m).
- Avoid leaving three or more Web application windows opened for extended periods. Usually, limit use to one "Group Monitor" application and one "Analysis Execution" application.

■ Message during Operation


When the network load grows with the CBM-20A Web application opened, the following message may appear.



- (1) Click the button to continue using the application. The Web application stops when the button is clicked, and the screen is not updated.



- (2) Click the button to continue using it. The Web application exits when the button is clicked.

-  The [Analysis Execution] application recognizes that the user is still logging in for five minutes after the communication is disconnected. After five minutes have passed, the application recognizes that the user has logged out. Therefore, if five minutes have passed since communication was terminated, the application logs out when is pressed. When pressing the button, relogin is not possible within five minutes after the communication was terminated.

■ Shortcut keys

Don't press the shortcut keys such as the F5 (Refresh) key, the F11 (Full-screen) key. An error may occur or the screen layout may be disrupted.

■ The Cache of Internet Explorer

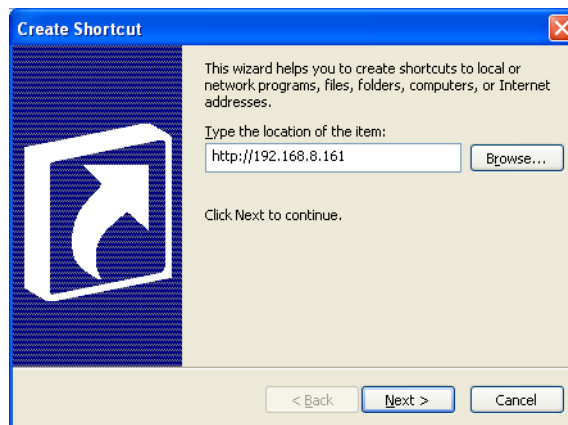
In Internet Explorer, when accessing CBM contents on the same IP address, the cache becomes operational from the second access (meaning that previous accesses are stored on the hard drive and this hard drive copy is referenced in future accesses). For example, if a CBM in a system configuration is replaced by another CBM with a lower version number but

the IP address remains the same, the cache memory for the previous CBM (with a higher version number) is referenced when an access is made to the second CBM (with the lower version number). In such a case, the PC may not operate or display correctly. To avoid this problem, please delete temporary files (cache) by selecting [Tools]-[Internet Options]-[Delete Files] in Internet Explorer when making this type of change in a system configuration.

 ["Browser \(Internet Explorer\)" P. 6-4](#)

■ Creating Shortcuts

Right click on the desktop, select [New] and [Shortcut] to create a shortcut to the system controller's URL.



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3

Preparation

This chapter explains the settings that are required to allow several users to efficiently use several systems connected to the network.

Contents

3.1	Managing Several Systems as One Group	3-2
3.2	Managing Several Users	3-4
3.3	Starting the CBM-20A	3-6
3.4	Determine the System Configuration	3-7

3.1 Managing Several Systems as One Group

CBM-20A/20Alite controller can monitor several system controllers via the network. More specifically, the following operations are possible.

- The status of analysis execution for several systems can be monitored.
- System checks can be executed and the results can be viewed.
- Information on consumable parts in several systems can be displayed in list format and managed centrally.
- All the systems in one workplace or one group can be managed together.
- Management of system users is possible in group units.

Groups are created to use these functions. One group can contain a combined total of up to 10 CBM-20A/20Alite System Controllers and SPD-M20A/M30A PDA Detectors.

Intranet Configuration Example

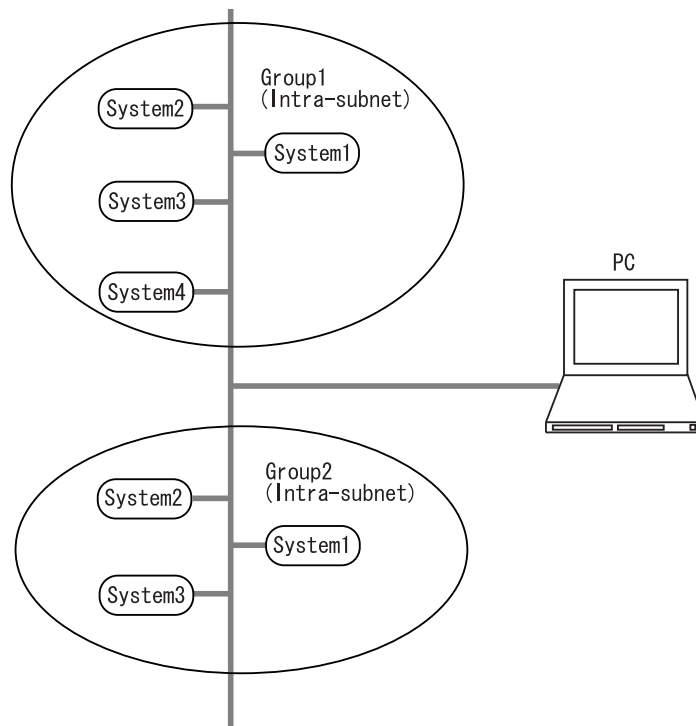
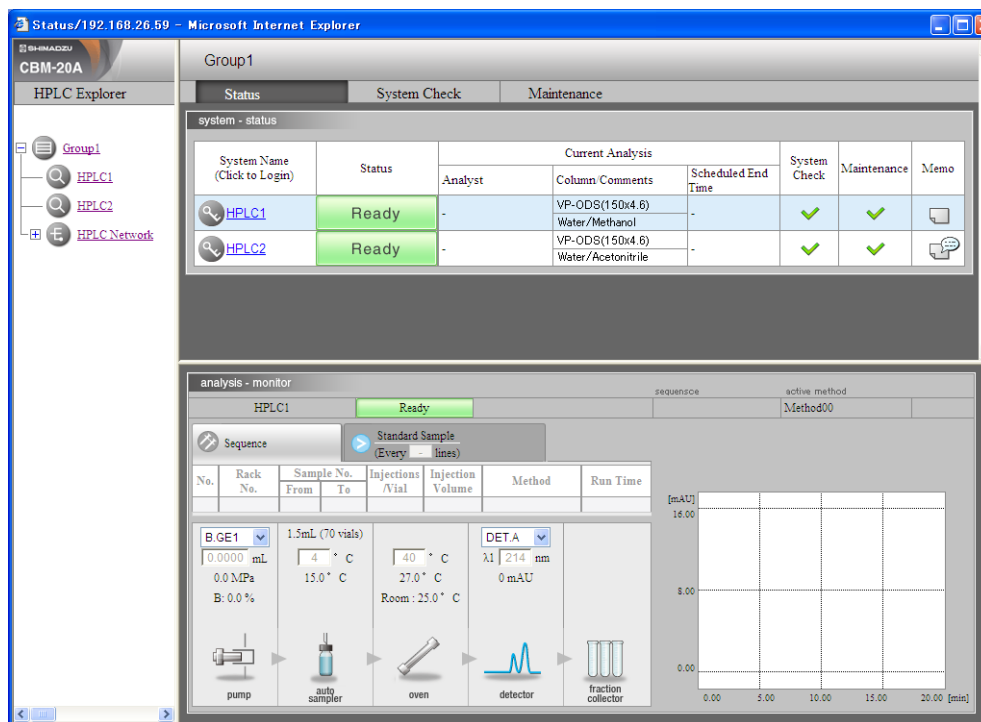


Fig. 3.1



3

In order to configure group settings, all the CBM-20A/20Alite System Controllers and SPD-M20A/M30A PDA Detectors must be in the same subnet, and the same group name must be set in the "Group Settings" application window. Consider factors such as the number of users for each system when deciding the group configuration.

Both network and group settings are required in order to use the system controller.

When changing network settings without connecting to the network, use the [Calibration] menu of the LC-20AB/20AD/20AT, SIL-20A/20AC, SPD-20A/20AV or by using terminal software via an RS-232C connection.

 ["5.9 Managing Groups" P. 5-39](#)

3.2 Managing Several Users

This system controller makes it possible for different users to create 12 sequence files, register them to the analysis queue, and execute them consecutively. It is also possible to restrict the system controller functions that are used by making the appropriate user level settings.

Although system controller settings can be made from any PC in the network, it is important to restrict the access by users other than those controlling the system controller. The creation and management of user information in cases where there are several systems must also be considered.

In general, user information (user ID, user name, password, user level) is managed separately for each CBM-20A/20Alite System Controller. Up to 20 users can be registered per system.

CBM-20A/20Alite, however, has a group settings function for copying (overwriting) all the user information for a system to other systems. If this function is used, the maximum number of users is 20 for the whole group.

 ["5.9 Managing Groups" P. 5-39](#)

3.2.1 User Level and Access Level

■ User Level

The CBM-20A/20Alite System Controller has the user levels shown in the following table.

User level	Description
Administrator	Authorized to perform group settings (e.g., adding/removing components and users to/from the group and changing settings) in addition to the operations for which a Power User is authorized. Also authorized to forcibly log out users logged into the "Analysis Execution" application window ^{*1} , and to disable system locks.
PowerUser	Authorized to perform all the operations related to analysis (e.g., editing methods and sequences, executing, adding, and stopping analyses, and executing system checks) and to change system configurations. Also authorized to clear errors or forcibly stop analysis being performed by other users.
Operator	Authorized to edit analysis sequences, execute, add, and stop analyses, and execute system checks. When editing methods, can only edit flow rate of pump and cooler temperature of autos ampler. Not authorized to clear errors or forcibly stop analysis being performed by other users.

*1 A user can only be forcibly logged out from a PC other than that on which they are logged in.


■ Access Level

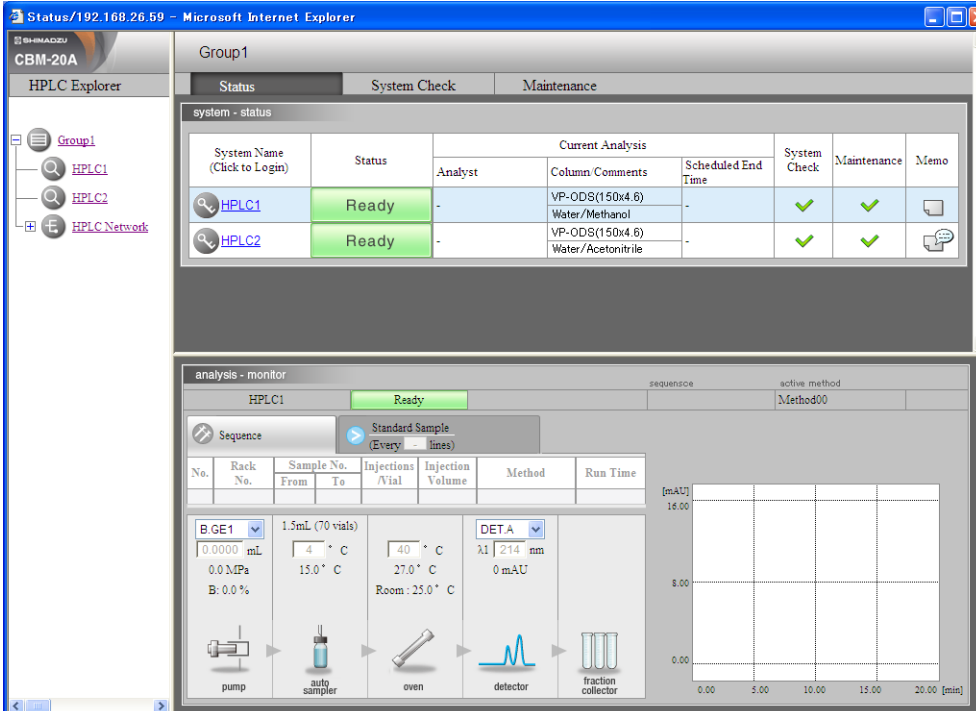
The access levels are set for each system in a group and determine which users can log into each system. The Administrator is always authorized for access and all other users are authorized for access according to the default settings. Deny access if necessary.

 ["5.9 Managing Groups" P. 5-39](#)

3.3 Starting the CBM-20A

Use the following procedure to start the CBM-20A.

- 1 Turn ON the power to the system controller and the components connected to it.
 -  Either turn ON the power to the system controller and the components simultaneously or turn ON the power to system controller last.
- 2 Turn ON the power to the PC used to control the system controller.
- 3 Start Internet Explorer.
- 4 Input the system controller's URL in the address bar. (<http://<IP address>/>)
The "Status" tab page is displayed.




The screenshot shows the HPLC Explorer web interface in Microsoft Internet Explorer. The browser address bar shows 'Status/192.168.26.59'. The interface has a sidebar with 'HPLC Explorer' and a tree view containing 'Group1', 'HPLC1', 'HPLC2', and 'HPLC.Network'. The main content area has three tabs: 'Status', 'System Check', and 'Maintenance'. The 'Status' tab is active, displaying a table for 'system - status'.

System Name (Click to Login)	Status	Analyst	Column Comments	Scheduled End Time	System Check	Maintenance	Memo
HPLC1	Ready	-	VP-ODS(150x4.6) Water/Methanol	-	✓	✓	
HPLC2	Ready	-	VP-ODS(150x4.6) Water/Acetonitrile	-	✓	✓	

Below the status table is the 'analysis - monitor' section for HPLC1, which is in a 'Ready' state. It shows a 'Standard Sample' sequence and a table for the analysis run:

No.	Rack No.	Sample No. From To	Injections /Vial	Injection Volume	Method	Run Time
B GE1		1.5mL (70 vials)			DETA	

Parameters for the analysis include: 0.0000 mL, 0.0 MPa, B: 0.0%, 4 °C, 15.0 °C, 40 °C, 27.0 °C, Room: 25.0 °C, 214 mm, 0 mAU. A diagram shows the flow from pump to auto sampler to oven to detector to fraction collector. A chromatogram plot is shown on the right with a y-axis of [mAU] from 0.00 to 16.00 and an x-axis of [min] from 0.00 to 20.00.

-  The system name of the system controller can be input instead of an IP address if the PC and the system controller are in the same subnet (<http://<system Name>/>).

 Appendix "Name Solution Using NetBIOS over TCP/IP" P. Appendix-15

3.4 Determine the System Configuration

Determine the system configuration by setting the pumping mode for the solvent delivery module and the operation mode for the autosampler.

Also set the operation mode for the fraction collector, if there is one connected.




The system configuration must be set by an Administrator or a Power User.

1

Click the appropriate icon or system name in the [System Name] column on the "Status" tab page in the "Status Summary" section.

The "Login" window is displayed.

Login/192.168.8.161 - Microsoft Internet Explorer

 **HPLC network login**

Group Name : Group1
System Name : HPLC1
Server Type : ShimadzuCBM
About this System : HPLC System 1
User Name : -
User ID :
Password :

2

Input the user ID in the [User ID] field.

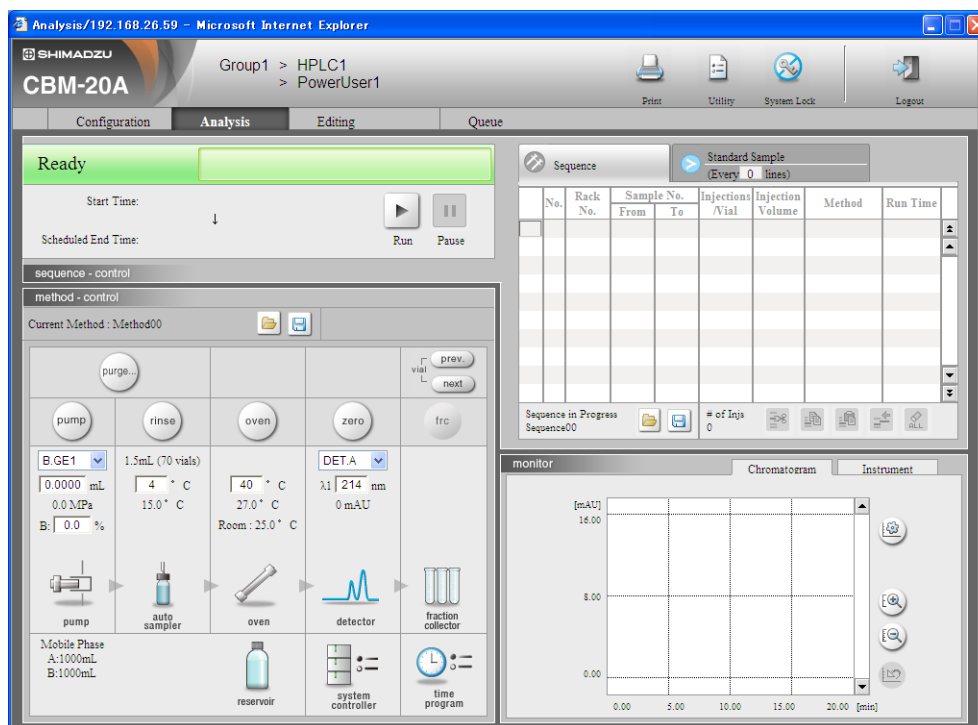
3

Input the password in the [Password] field.

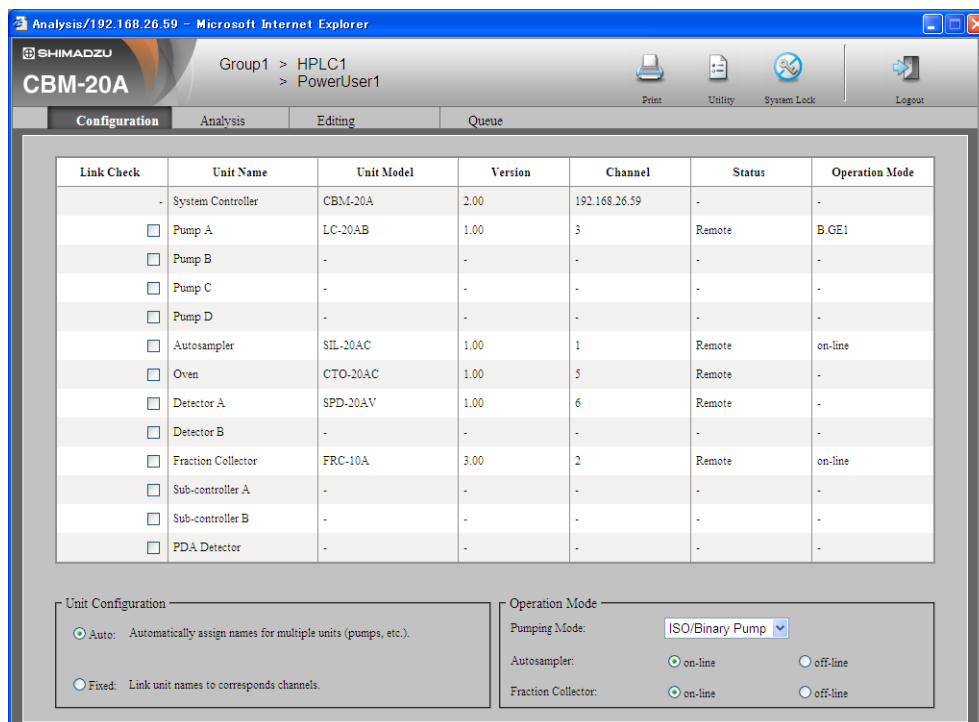
3

3. Preparation

- Click **Login**.
- The "Analysis Execution" application window is displayed.



- Click the [Configuration] tab.
- The "Configuration" tab page is displayed.



3.4.1 Checking Connections between the System Controller and Components

Check that the link status ("Status") for each of the components connected to the system controller is "Remote".

If the model name ("Unit Model"), version, and link status are not displayed, check the power supply of the component and verify that the link address setting ("LINK ADRS") and the remote-connector channel number agree for each component.

If the link status is "Local", verify that the local setting ("LOCAL") for each component is set to "Remote".



Changing the local setting ("LOCAL") for each component to "Local" makes it possible to use some of the functions that cannot be controlled by the system controller. Return this setting to "Remote" when using the system controller to control the component.

3.4.2 Selecting the Pumping Mode

Link Check	Unit Name	Unit Model	Version	Channel	Status	Operation Mode
-	System Controller	CBM-20A	2.00	192.168.26.59	-	-
<input type="checkbox"/>	Pump A	LC-20AB	1.00	3	Remote	B.GE1
<input type="checkbox"/>	Pump B	-	-	-	-	-
<input type="checkbox"/>	Pump C	-	-	-	-	-
<input type="checkbox"/>	Pump D	-	-	-	-	-
<input type="checkbox"/>	Autosampler	SIL-20AC	1.00	1	Remote	on-line
<input type="checkbox"/>	Oven	CTO-20AC	1.00	5	Remote	-
<input type="checkbox"/>	Detector A	SPD-20AV	1.00	6	Remote	-
<input type="checkbox"/>	Detector B	-	-	-	-	-
<input type="checkbox"/>	Fraction Collector	FRC-10A	3.00	2	Remote	on-line
<input type="checkbox"/>	Sub-controller A	-	-	-	-	-
<input type="checkbox"/>	Sub-controller B	-	-	-	-	-
<input type="checkbox"/>	PDA Detector	-	-	-	-	-

Unit Configuration:
 Auto: Automatically assign names for multiple units (pumps, etc.).
 Fixed: Link unit names to corresponds channels.

Operation Mode:
 Pumping Mode: ISO/Binary Pump
 Autosampler: off-line
 Fraction Collector: off-line

Specify the pumping mode for the solvent delivery module. The 5 modes described in the following table are available.

Select the pumping mode from the [Pumping Mode] pull-down menu in the "Operation Mode" section at the bottom right of the "Configuration" tab page.

Pumping mode	Description
ISO/Binary Pump	Select this mode to use the isocratic pump connected to "Pump A" in isocratic flow mode or use the LC-20AB Binary Pump to "Pump A".
B.GE	Select this mode to use the binary gradient mode in combination with 2 isocratic pumps connected to Pump A and B. This enables the high-pressure gradient pumping of 2 solvents.

3. Preparation

Pumping mode	Description
T.GE	Select this mode to use the ternary gradient mode in combination with 3 isocratic pumps connected to Pump A, B, and C. This enables the high-pressure gradient pumping of 3 solvents.
LP.GE	Select this mode to use the low-pressure gradient mode with an isocratic pump connected to Pump A. This enables the low-pressure gradient pumping of 4 solutions.
B.GEx2	Select this mode to use binary gradient with 2 flow lines and a combination of 2 isocratic pumps for each flow line. In this case, 4 pumps are required.



The "Isocratic pump" refers to a pump used in the LC-30A/LC-20A series except LC-20AB.

The pumping-mode selection is reflected in the [Operation Mode] column of the configuration table in the following way.

Pump	Pumping mode				
	ISO/Binary Pump	B.GE	T.GE	LP.GE	B.GEx2
Pump A	ISO1/B.GE1	B.GE1	T.GE1	LP.GE	B.GE1
Pump B	ISO2/B.GE2	B.GE1	T.GE1	ISO2/B.GE2	B.GE1
Pump C	ISO3/B.GE3	ISO3/B.GE3	T.GE1	ISO3/B.GE3	B.GE3
Pump D	ISO4/B.GE4	ISO4/B.GE4	ISO4/B.GE4	ISO4/B.GE4	B.GE3



Pump allocation:

- Allocate isocratic pumps to the gray boxes in the table. Do not allocate different pump models.
- If isocratic pumps are allocated to the white boxes in the table, operation will be in ISO mode, and if binary pumps are allocated to these boxes, operation will be in B.GE mode.



The LC-20AB can only be used as a binary pump. It cannot be used in place of an isocratic pump. More specifically, correct operation is not possible in the following cases.

- The LC-20AB is connected as pumps A and B in B.GE mode.
- The LC-20AB is connected as pumps A, B, and C in T.GE mode.
- The LC-20AB is connected as pump A in LP.GE mode.
- The LC-20AB is connected as pumps A, B, C, and D in B.GEx2 mode.



Even if a pump which is not compatible with a low-pressure gradient (such as the LC-10AS) is connected in LP.GE mode, it will not operate properly.

3.4.3 Selecting the Autosampler Control Method

Select whether or not the autosampler is controlled by the system controller. Select either [on-line] (i.e., controlled) or [off-line] (i.e., not controlled) for [Autosampler] in the "Operation Mode" section at the bottom right of the "Configuration" tab page.

If this setting is changed, reset the power to the system controller and the autosampler.

3.4.4 Selecting the Fraction-collector Control Method

Select whether or not the fraction collector is controlled by the system controller. Select either [on-line] (i.e., controlled) or [off-line] (i.e., not controlled) for [Fraction Collector] in the "Operation Mode" section at the bottom right of the "Configuration" tab page.

If this setting is changed, reset the power to the system controller.

3.4.5 Selecting the Unit-name Allocation Method

Set the relationship between the unit names and link addresses (remote-connector channel numbers) used for the components connected to the system (e.g., pumps, detectors, and ovens). This can be done by selecting either [Auto] or [Fixed] in the "Unit Configuration" section at the bottom left of the "Configuration" tab page. In normal circumstances, select [Auto] before creating a new configuration and then select [Fixed] after the configuration has been created.



Some functions will not operate properly if the configuration is changed with [Fixed] selected. The setting can be changed to [Auto] by initialization button.

["9.2.6 Detector, Column Oven, and Solvent Delivery Module Connection and Setup" P. 9-16](#)

3. Preparation


■ Allocation with [Auto] Selected

The pumps are given letters A, B, C, and D in order of increasing link address. The detector and oven names are also assigned in the same way. If the CBM-20Alite is incorporated in an LC-30A/20A-series solvent delivery module, this delivery unit will always be pump A.

■ Allocation with [Fixed] Selected

Select [Fixed] to fix the relationship between all the components in the system. For example, with [Auto] selected, if there are 2 detectors and the power to detector A is turned OFF, then detector B is automatically recognized as detector A. In the same way, if there are 3 pumps used and the power to pump A is turned OFF, then pumps B and C are automatically recognized as pumps A and B. This makes it necessary to change existing parameter and program settings.

With [Fixed] selected, however, detector B continues to be recognized as detector B even if the power to detector A is turned OFF. In the same way, pumps B and C continue to be recognized as pumps B and C even if the power to pump A is turned OFF. The oven names are also assigned in the same way as pumps or detectors.

 The default setting is [Auto].

Allocation when power to Pump.A and DET.A is turned OFF during control

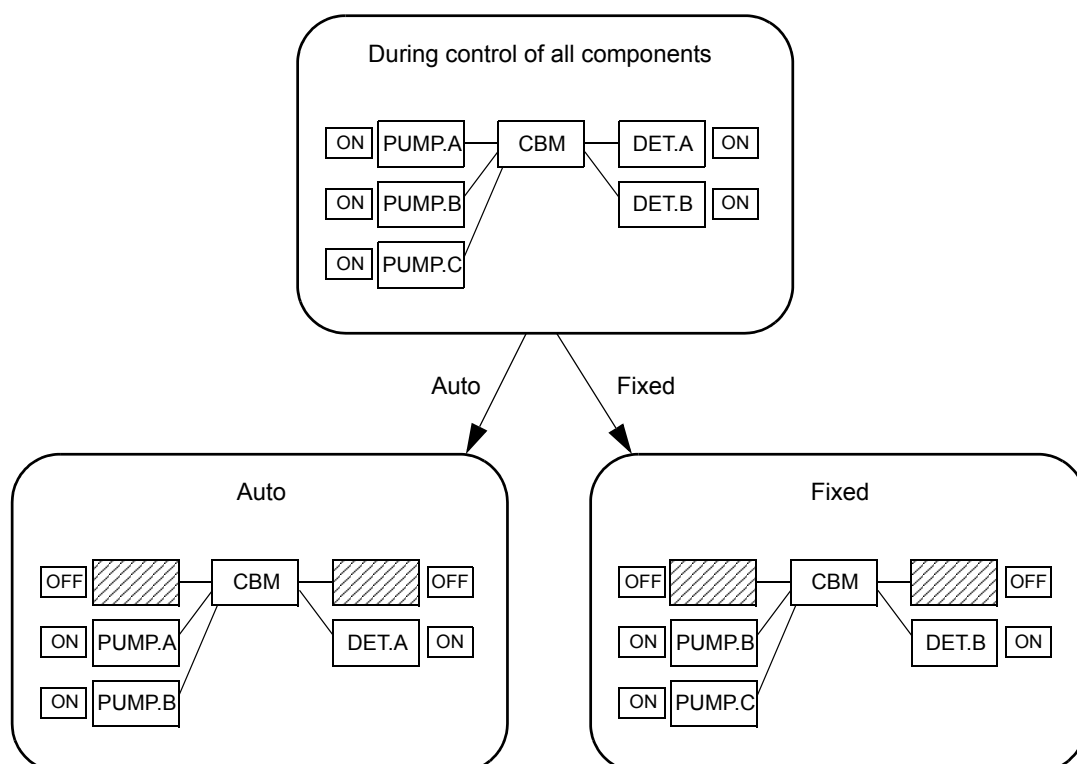


Fig. 3.2

3.4.6 Making the Link Check Settings

Link Check	Unit Name	Unit Model	Version	Channel	Status	Operation Mode
<input type="checkbox"/>	System Controller	CBM-20A	2.00	192.168.26.59	-	-
<input type="checkbox"/>	Pump A	LC-20AB	1.00	3	Remote	B_GE1
<input type="checkbox"/>	Pump B	-	-	-	-	-
<input type="checkbox"/>	Pump C	-	-	-	-	-
<input type="checkbox"/>	Pump D	-	-	-	-	-
<input type="checkbox"/>	Autosampler	SIL-20AC	1.00	1	Remote	on-line
<input type="checkbox"/>	Oven	CTO-20AC	1.00	5	Remote	-
<input type="checkbox"/>	Detector A	SPD-20AV	1.00	6	Remote	-
<input type="checkbox"/>	Detector B	-	-	-	-	-
<input type="checkbox"/>	Fraction Collector	FRC-10A	3.00	2	Remote	on-line
<input type="checkbox"/>	Sub-controller A	-	-	-	-	-
<input type="checkbox"/>	Sub-controller B	-	-	-	-	-
<input type="checkbox"/>	PDA Detector	-	-	-	-	-

Click the "Link Check" boxes of the components for which detection of connection errors is required.



The link check is used to perform error processing of connection failures between the system controller and a component. If the check box for a component is checked, an error will occur and the current analysis will be stopped when the following operations are performed:

- Link to the component is interrupted.
- The power to the component is turned OFF.



To prevent an error occurring when power to the system is turned OFF, either turn OFF the power to the system controller and the components simultaneously or turn OFF the power to the system controller first. (If an SPD-M20A/M30A PDA Detector is used, however, turn OFF the power to the system controller or the detector and then turn OFF the power to the other within 10 seconds.)

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4

Basic Operation

This chapter explains the basic operations required to perform analysis with the system controller. It provides a basic overall flow of operations handled by the system controller and describes how to create the method and sequence files required for analysis as well as time-program tables.


Contents

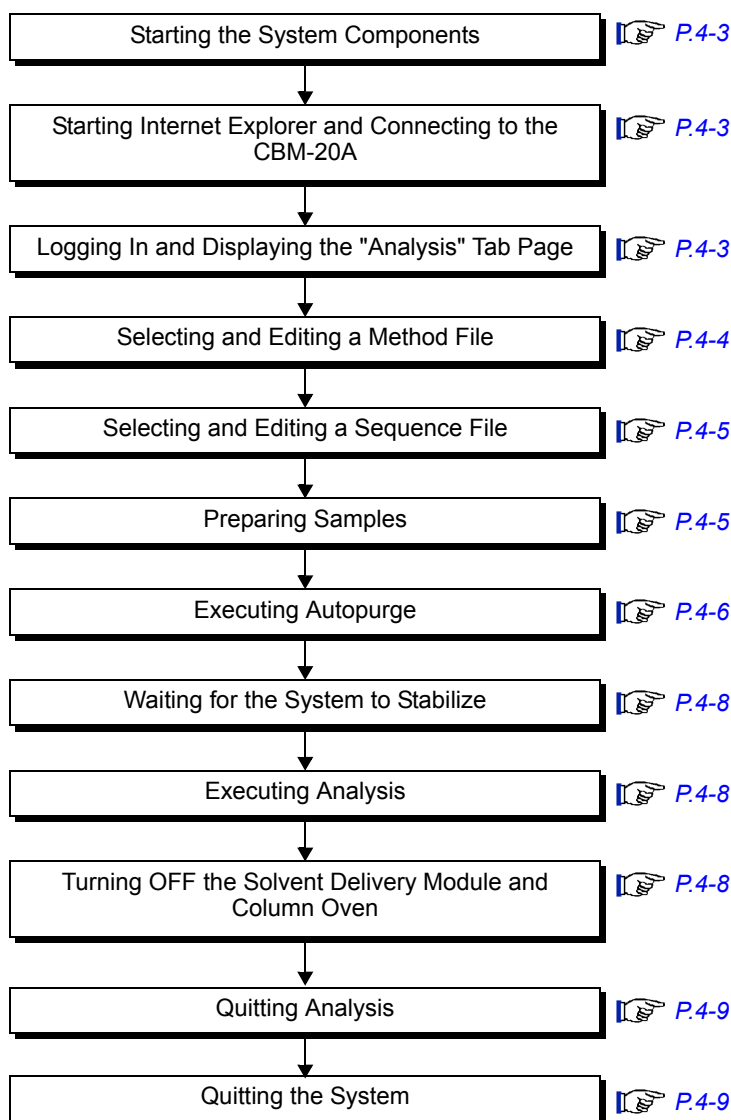
4.1	Overall Flow of Operation	4-2
4.2	Creating Method Files	4-10
4.3	Creating Sequence Files	4-22
4.4	Gradient Analysis Using Time Programs	4-28
4.5	Starting Analysis	4-34
4.6	Printing Files	4-36


4.1 Overall Flow of Operation

The basic overall flow of operations for the following typical system configuration is described below.

- Pump : LC-20AB
- Autosampler : SIL-20AC
- Column oven : CTO-20AC
- Detector : SPD-20AV

 There is no fraction collector connected in this system configuration.



 If a fraction collector is used, refer to "5.6 Analysis Using Fraction Collectors" P. 5-21.

4.1.1 Starting the System Components

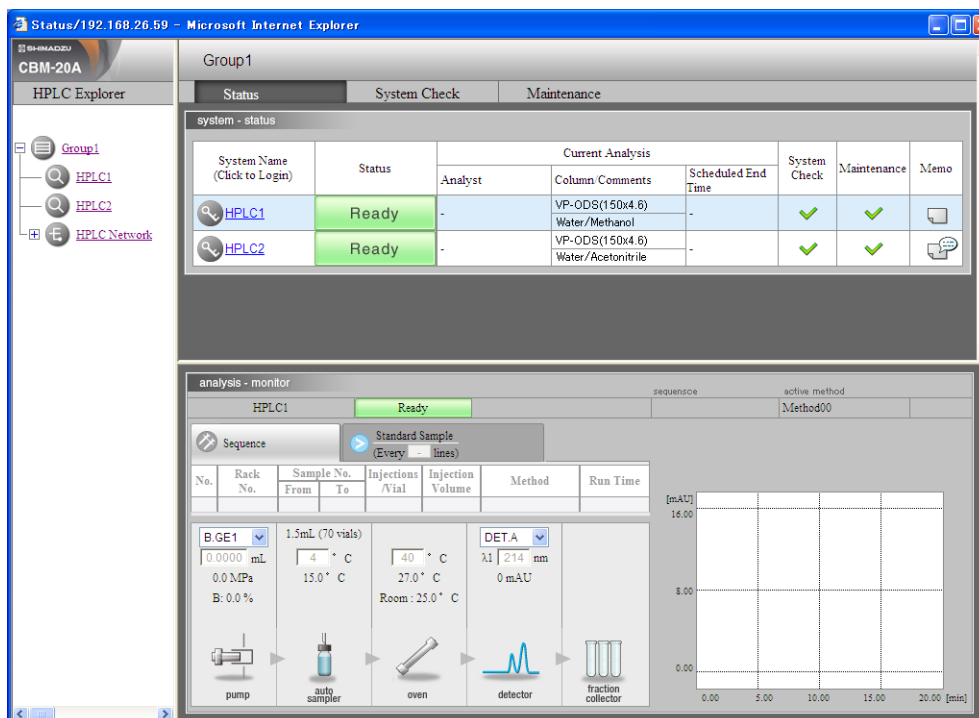
Turn ON the power to the solvent delivery module, autosampler, column oven, detector, system controller, and PC.

4.1.2 Starting Internet Explorer and Connecting to the CBM-20A

Start Windows Internet Explorer and connect to the system controller.

 "3.3 Starting the CBM-20A" P. 3-6

The "Status" tab page is displayed.



System Name (Click to Login)	Status	Analyst	Column	Comments	Scheduled End Time	System Check	Maintenance	Memo
HPLC1	Ready	-	VP-ODS(150x4.6)	Water/Methanol	-	✓	✓	
HPLC2	Ready	-	VP-ODS(150x4.6)	Water/Acetonitrile	-	✓	✓	

4.1.3 Logging In and Displaying the "Analysis" Tab Page

Login to the system that will be used to perform analysis. The "Analysis Execution" application window is displayed.



Login is not possible if, for example, another user is logged in or the system is connected to LC Workstation.


Login is not possible for 5 minutes if Internet Explorer is aborted while logged in. Login after 5 minutes have passed or login from another PC as an Administrator.

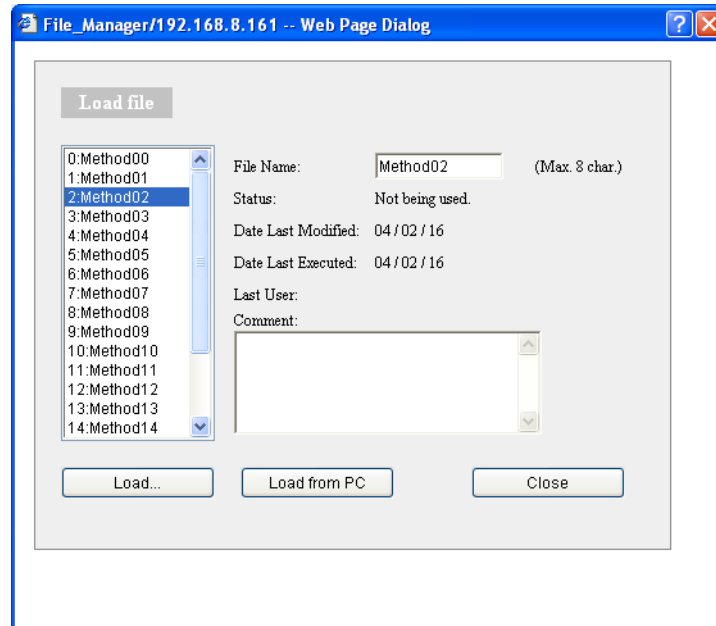
4. Basic Operation

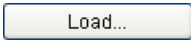
4.1.4 Selecting and Editing a Method File

Select the method file to be used for analysis. The method file contains settings for component parameters.

 ["4.2 Creating Method Files" P. 4-10](#)

- 1 Click  in the "Method" section.
The "Load File" window is displayed.




- 2 Select the method file used for analysis and click .
The window closes and the name of the selected file is displayed as the current method.

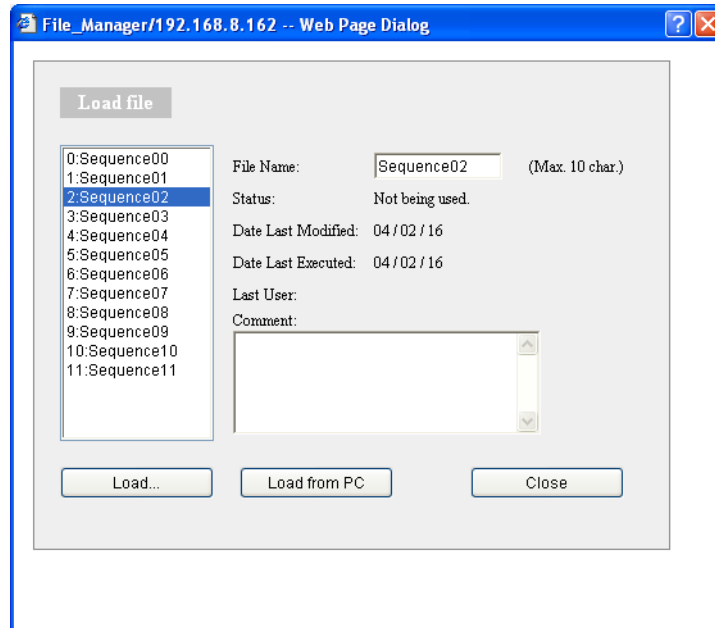
 ["4.2 Creating Method Files" P. 4-10](#)

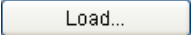
4.1.5 Selecting and Editing a Sequence File

Select the sequence file to be used for analysis. The sequence file contains settings such as the number of injections and the injection volume.

 ["4.3 Creating Sequence Files" P. 4-22](#)

- 1 Click  in the "Sequence" section.
The "Load File" window is displayed.



- 2 Select the sequence file used for analysis and click .
The window closes and the name of the selected file is displayed as the current sequence.

 ["4.3 Creating Sequence Files" P. 4-22](#)

4.1.6 Preparing Samples


Place the samples to be analyzed in the autosampler rack and close the door.



4. Basic Operation

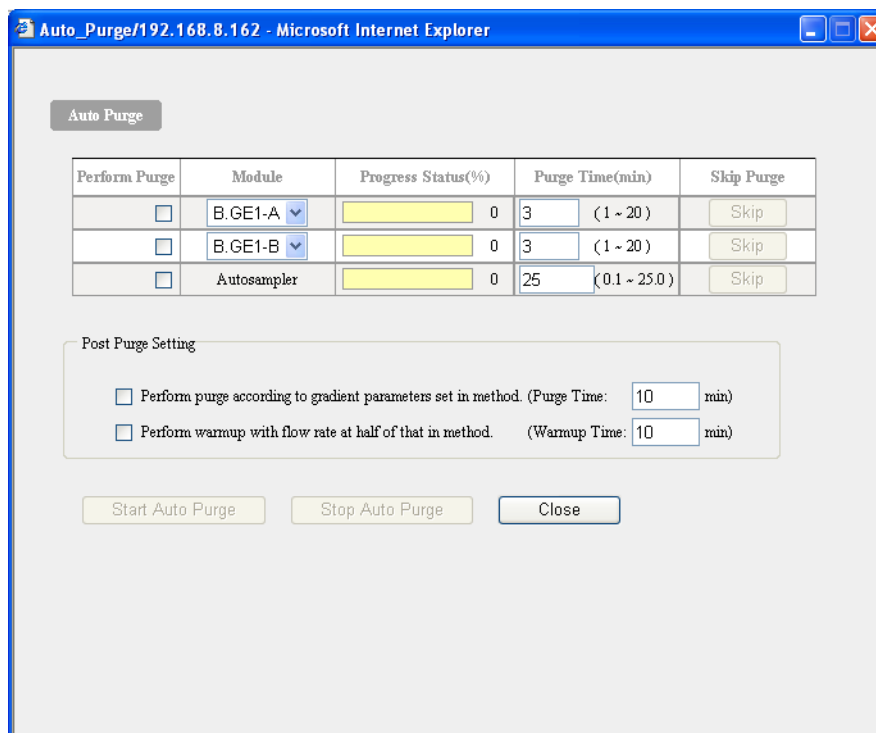
4.1.7 Executing Autopurge

The Autopurge function replaces the solvents in the flow line from the suction filter to the autosampler and in the autosampler's measuring pump with the mobile phase used for analysis and the rinse solution.

CAUTION

Be sure to confirm that temperature control for the column oven is OFF before executing autopurge. If it is ON, click  to turn temperature control OFF.

- 1 Click  in the "Method" section.
The "Autopurge" window is displayed.
 The displayed items vary with the system configuration.




Perform Purge	Module	Progress Status(%)	Purge Time(min)	Skip Purge
<input type="checkbox"/>	B.GE1-A	0	3 (1 - 20)	Skip
<input type="checkbox"/>	B.GE1-B	0	3 (1 - 20)	Skip
<input type="checkbox"/>	Autosampler	0	25 (0.1 - 25.0)	Skip

Post Purge Setting


Perform purge according to gradient parameters set in method. (Purge Time: 10 min)

Perform warmup with flow rate at half of that in method. (Warmup Time: 10 min)

Start Auto Purge Stop Auto Purge Close

- 2 Confirm that the boxes in the [Perform Purge] column corresponding to the mobile phase to be purged and the autosampler are selected. If they are not, click on the appropriate boxes.
- 3 Input the appropriate purge time (in minutes) for the solvent delivery module in the [Purge Time] column.
 The setting range is 1 to 20 minutes. (The setting unit is 1 minute and the default setting is 3 minutes.)

4 Input the appropriate purge time (in minutes) for the autosampler in the [Purge Time] column.

 The setting range varies depending on the connected autosampler.


SIL-30AC/30ACMP : 0.0 to 25.0 (The setting unit is 0.1 minutes and the default setting is 10 minutes.)

Other than SIL-30AC/30ACMP (such as SIL-20A/20AC) : 0.1 to 25.0 (The setting unit is 0.1 minutes and the default setting is 25 minutes.)


If the connected autosampler is the SIL-30AC/30ACMP, set the purge execution time for each rinse solution because purge operation with multiple rinse solutions is possible. For the rinse solution not used for purge operation, set "0" for the purge execution time.

5 To purge the flow line at the flow rate and concentration set in the method file after autopurge is completed, click the [Perform purge according to gradient parameters set in method.] box.


In this case, the mobile phase is discharged from the autosampler's drain.

 The setting range for [Purge Time] is 1 to 120 minutes. (The setting unit is 1 minute and the default setting is 10 minutes.)

6 To pump the mobile phase under the conditions set in the method file after autopurge is completed, click the [Perform warmup with flow rate at half of that in method.] box. In this case, half of the value set in the method file is used.


 The setting range for [Warmup Time] is 1 to 120 minutes. (The setting unit is 1 minute and the default setting is 10 minutes.)

7 Click .
The progress of the purge operation is indicated in the [Progress Status] column.

 The purge is not executed if the door of the autosampler is open.
Settings cannot be changed during purge execution.

Click to stop purge operation for the corresponding component and execute the next step. Click to forcibly stop autopurge operation.

8 Click .
The "Autopurge" window closes.



 Autopurge operation will continue even if the "Autopurge" window is closed during execution.


During autopurge, the status display in the "Analysis" tab page changes in the following order: [A.Purge], [B.Purge], [SILPurge], [InitConcFlow], [WarmUp]. It returns to [Ready] when autopurge is completed. (The status display varies with the autopurge settings.)


 ["2.7.1 "Analysis" Tab Page" P. 2-18](#)

4. Basic Operation

4.1.8 Waiting for the System to Stabilize




After autopurge is completed, click  and  in the "Method" section to start solvent delivery with the solvent delivery module and temperature control with the column oven.


 If warmup is executed as part of the autopurge process, the pump will already be ON.

Look at the chromatogram in the "Monitor" section and ensure that the baseline of the detector as well as pump pressure is stable. Click  in the "Method" section to set the data to zero (the baseline of the detector to "0").

 ["Method" Section" P. 2-21](#)

 ["Monitor" Section" P. 2-25](#)

Click the  or  button at the chromatogram to enlarge or reduce the chromatogram of the detector in the Y-axis direction. Click the  button to display the "Chromatogram Setting" window, and you can set whether or not to show the pump pressure and change the maximum and minimum pressure values.


 The default length of the chromatogram's time axis is 20 minutes. When analysis starts, however, it changes to a value in the range 1 to 120 minutes in accordance with the analysis time (as determined by the "Run Time" setting or the time program's STOP command).




 ["Chromatogram" Tab Page" P. 2-25](#)

 ["Chromatogram Setting" Window" P. 2-26](#)

4.1.9 Executing Analysis

Start analysis of the samples.

1 Click . [Run] changes to [Stop] and analysis is performed in accordance with the sequence settings. When analysis is completed, the status display changes to [Ready].


 Click  to stop analysis. If the status is [Stop], rinse the autosampler's needle by clicking .

4.1.10 Turning OFF the Solvent Delivery Module and Column Oven

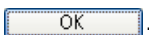


When analysis is completed, click  and  in the "Method" section to stop solvent delivery and temperature control.

4.1.11 Quitting Analysis

Log out from the "Analysis Execution" application, then close "Group Monitor" application.

- 1 Click  in the "Analysis Execution" application window.
The following window is displayed.



- 2 Click .
The "Analysis Execution" application window closes.
- 3 Click  at the top right of the "Group Monitor" application window.
 If the "Group Monitor" application window is not displayed, display it by selecting [Group Monitor] from the task bar at the bottom of the window.
The "Group Monitor" application and Internet Explorer windows are closed.

4.1.12 Quitting the System

Turn OFF the power to the components and quit windows.



- 1 Turn OFF the power to the system controller, solvent delivery module, autosampler, column oven, and detector.
- 2 Close Windows.

4.2 Creating Method Files

Parameters for all the components are set and saved as method files. To start analysis, retrieve an appropriate method file to be used as a basis for the analysis procedure. Method files can be created in either the "Analysis" tab page or the "Editing" tab page of the "Analysis Execution" application. Although the creation method is the same for both pages, the functions of the pages differ in the following way.

- The method file displayed in the "Analysis" tab page is the file that is currently used. The method-file contents configure on this page are applied directly to all the components.
- In the "Editing" tab page, method files that are not currently being used can be selected and edited.

This section describes the method for creating a new method file from the "Analysis" tab page below.

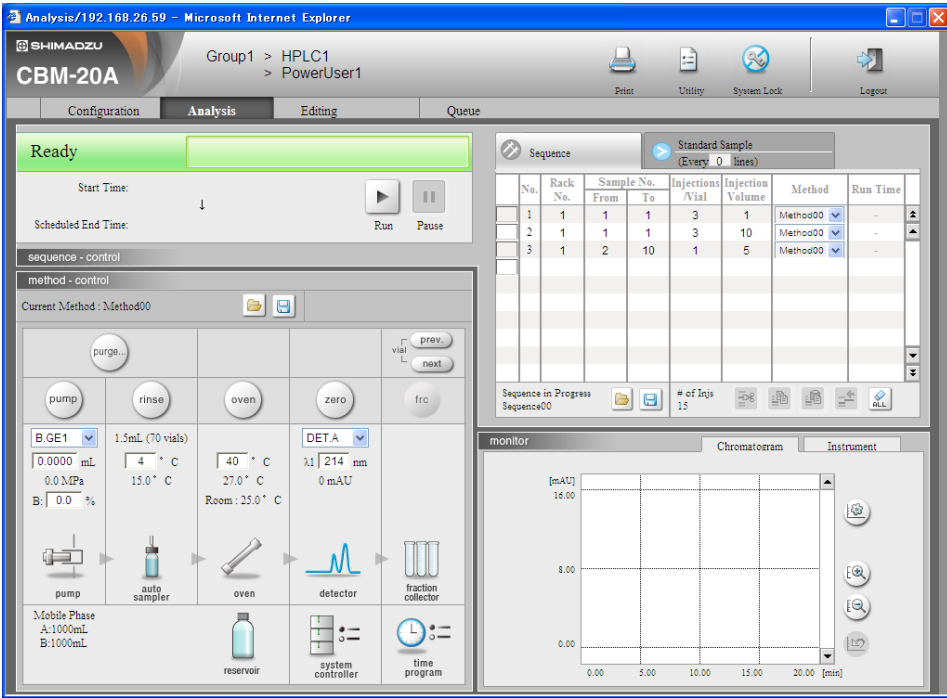
-  Configuration parameters are not included in method parameters.
-  Among the autosampler's method parameters, the parameters that depend on the sample rack are common to all method files. If these parameters are changed in one method file, these changes are applied to all other files (No. 0 to 19).

 ["5.12.2 Autosampler" P. 5-74](#)

4.2.1 Selecting Method Files

In order to create a new method file, it is first necessary to select a method file and load it.


- 1 Click the [Analysis] tab in the "Analysis Execution" application window. The "Analysis" tab page is displayed.

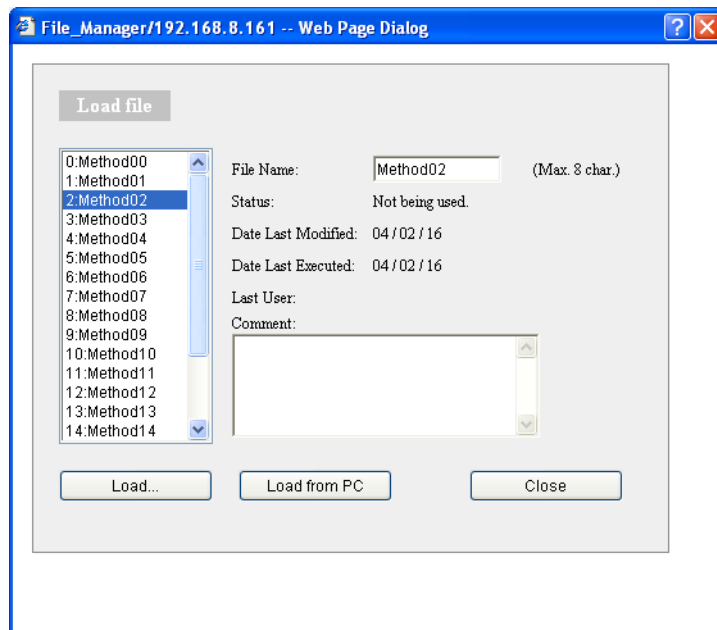


The screenshot displays the Shimadzu CBM-20A software interface in the "Analysis" tab. The top status bar shows "Ready" and "Standard Sample (Every 0 lines)". The "Sequence" table is visible, containing the following data:


No.	Rack No.	Sample No. From	To	Injections /Vial	Injection Volume	Method	Run Time
1	1	1	1	3	1	Method00	-
2	1	1	1	3	10	Method00	-
3	1	2	10	1	5	Method00	-


The control panel shows the current method as "Method00" and includes parameters for the pump (B.GE1, 0.0000 mL, 0.0 MPa), auto sampler (1.5 mL (70 vials), 4 °C, 15.0 °C), oven (40 °C, 27.0 °C, Room: 25.0 °C), detector (DETA, 214 nm, 0 mAU), and fraction collector. A chromatogram monitor is also visible at the bottom right.

- 2 Click  on the right of the current method filename.
The "Load File" window is displayed.





- 3 Select a file from the list on the left of the window.
The name of the selected file is displayed in the [File Name] field.


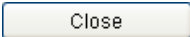
 Up to 20 method files can be saved. "Method00" to "Method19" are used as the default filenames. (The numbers in front of the files are the file numbers; file numbers 0 to 19 are allocated to the files.)

 Changing filenames:
The names of the method files can be changed. Select the [File Name] field and input a filename of no more than 8 characters.

- 4 Input a comment if necessary.

 Comments can contain up to 250 characters.

- 5 Click  .
The window closes and the name of the selected file is displayed in the "Analysis" tab page as the current method.

 Click  to close the window without loading a file.

 For details on  , refer to "5.7 Managing Files" P. 5-25.

4. Basic Operation

4.2.2 Editing the "Method Parameter" Window

Method files are edited from the "Analysis" tab page using the "Pump", "Autosampler", "Oven", "Detector", "Fraction Collector", and "System Controller" tab pages in the "Method Parameter" window.

■ Displaying the "Method Parameter" Window

Click a component icon in the "Analysis" tab page to display the tab page in the "Method Parameter" window for that component. If the tab page for another component is displayed, click the tab for the desired component in the same window.

There is also a "Configuration Parameter" window containing tab pages for each component except the fraction collector. Click in the tab page of the "Method Parameter" window to display the tab page for that component in the "Configuration Parameter" window. The "Fraction Collector" tab page does not have a button.



If a value that is out of the acceptable range is entered, the data returns to its original value and is highlighted. Input a value that is within range.

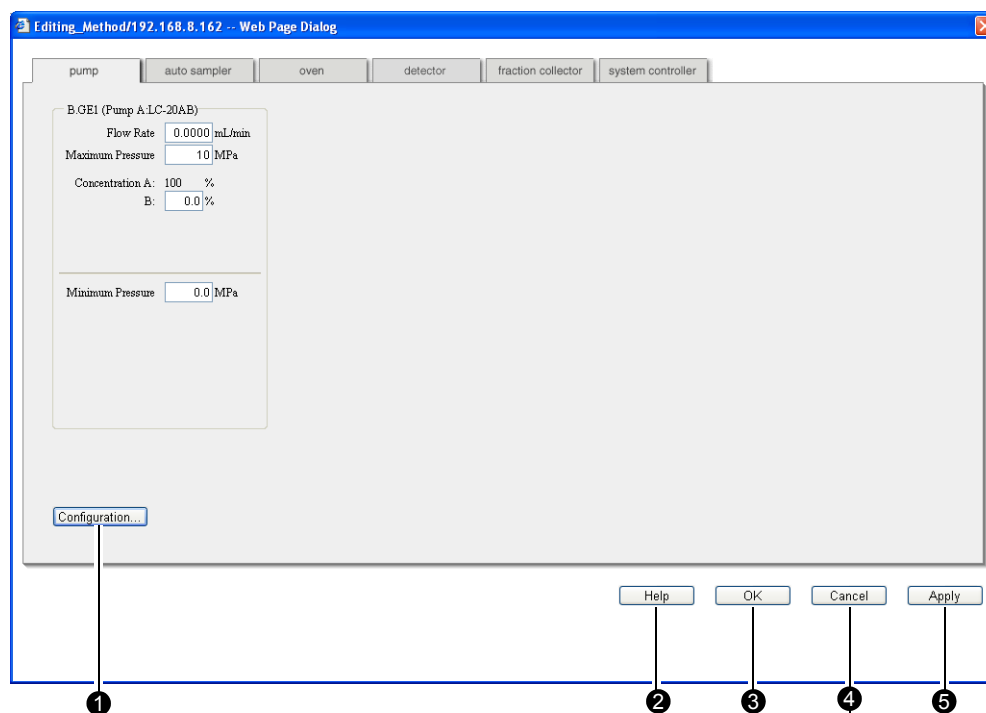
Descriptions on the buttons common to the tab pages and the methods for setting component parameters are provided below.

■ Buttons Common to "Method Parameter" and "Configuration Parameter" Windows

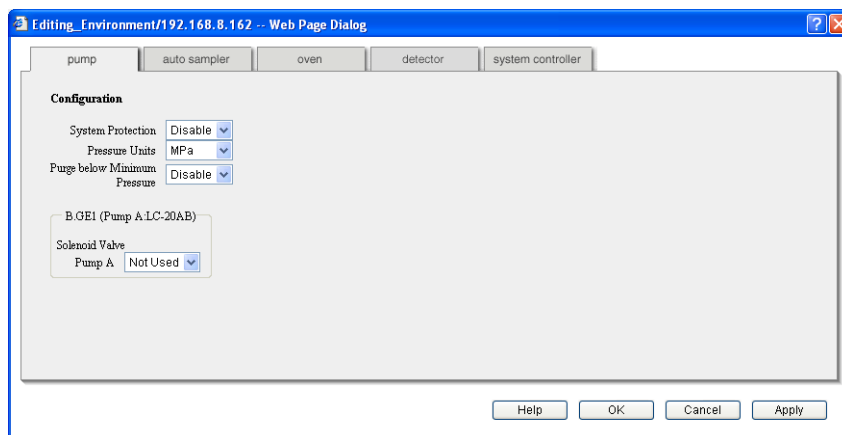
The "Pump" tab pages in the "Method Parameter" window and the "Configuration Parameter" window are used here as examples.

Click the tab for a different component to display the tab page for that component.

● "Pump" tab page in "Method Parameter" Window



● "Pump" Tab Page in "Configuration Parameter" Window



4

	Button	Description
①		Click to display the tab page for that component in the "Configuration Parameter" window. (Available in "Analysis" tab page only. In "Editing" tab page, this button is disable.)
②		Click to display help on the procedures for setting parameters.
③		Click to save the parameter settings and close the window.
④		Click to cancel the setting of parameters and close the window.
⑤		Click to save the parameter settings without closing the window.

, , , and also appear on the tab pages in the "Configuration Parameter" window and have the same functions. The "Configuration Parameter" window closes when or is clicked.


4.2.3 Parameters for the Solvent Delivery Module

Enter the solvent delivery module parameters, such as flow rate and minimum/maximum pressure.

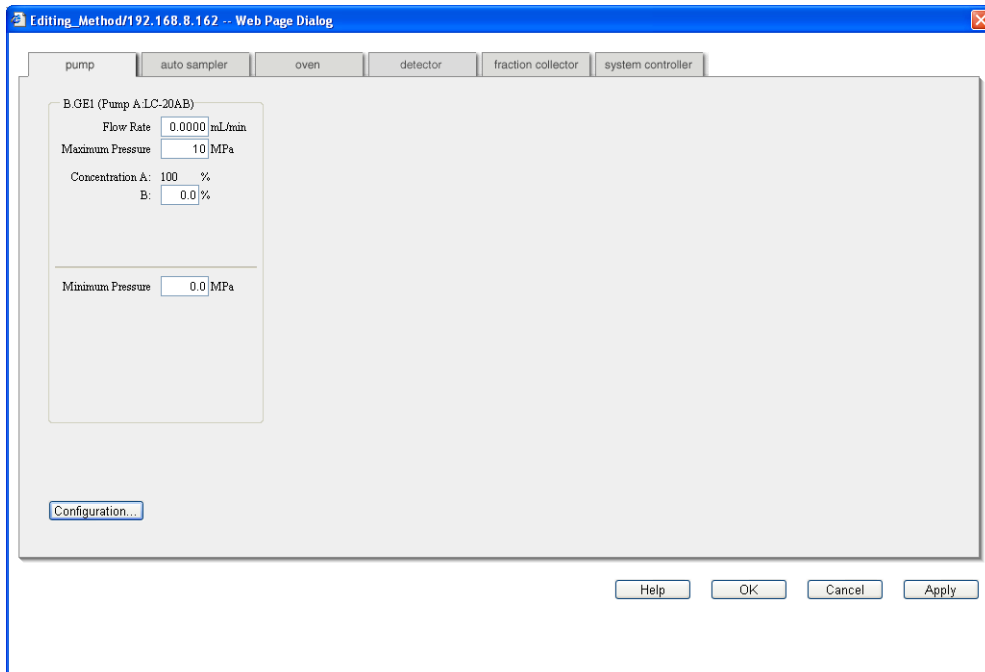
The displayed parameters may vary with the type of solvent delivery module and the pumping mode set in the "Configuration" tab page in the "Analysis Execution" application window.


For details on the various parameters and the setting ranges, minimum units, units, and default values for the parameters, refer to "5.12.1 Pump" P. 5-57.


4. Basic Operation

- 1 Click  in the "Analysis" tab page.

The "Pump" tab page in the "Method Parameter" window is displayed.

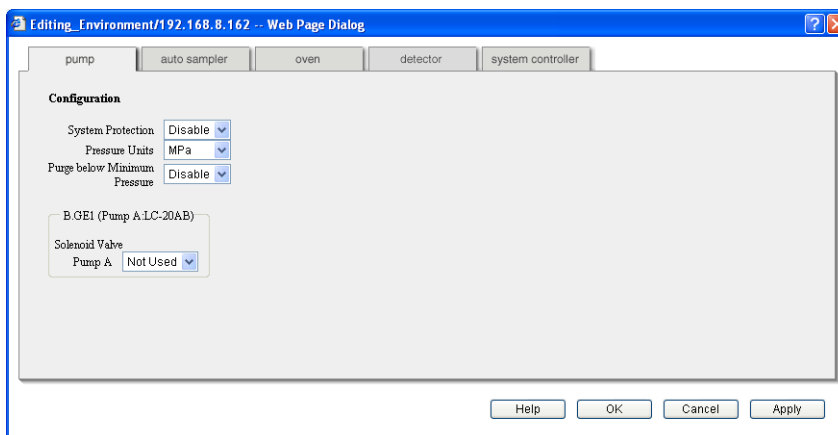




 The contents of the "Pump" tab page vary depending on the pumping mode and the number of solvent delivery modules that are connected.

 If a pressure unit other than MPa is to be used, refer to ["Selecting the Pressure Unit for the Pump" P. 4-15](#) before selecting the unit or setting the parameters.

- 2 Set the method parameters for the pump.

- 3 Click .
The "Pump" tab page in the "Configuration Parameter" window is displayed.

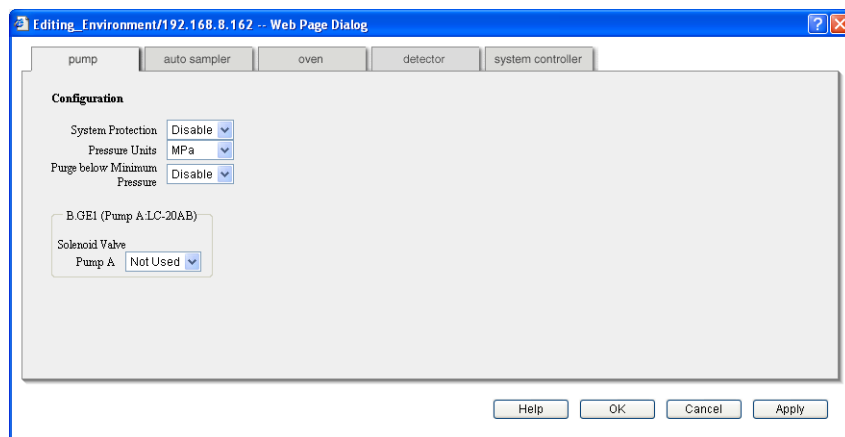


- 4 Set the configuration parameters for the pump.
 -  If [Used] is selected for [Solenoid Valve] and is clicked in the "Pump" tab page of the "Configuration Parameter" window, the solenoid valve PSV is displayed in the "Pump" tab page of the "Method Parameter" window.
- 5 Click when setting is complete. The display returns to the "Method Parameter" window.
- 6 Click . The "Analysis" tab page is displayed.
 -  To set parameters for another component, click the tab for that component instead of clicking . The corresponding tab page is displayed.

■ Selecting the Pressure Unit for the Pump

The default pressure unit setting for the pump is MPa. To select a unit other than MPa (i.e., kgf/cm², psi, or bar), use the following procedure.

- 1 Click in the "Pump" tab page in the "Method Parameter" window. The "Pump" tab page in the "Configuration Parameter" window is displayed.






- 2 Select the required unit ([kgf/cm²], [psi], [MPa], or [bar]) from the [Pressure unit] pull-down menu.
- 3 Click . The "Configuration Parameter" window closes and the selected pressure unit is displayed in the [Maximum Pressure] and [Minimum Pressure] fields.

4. Basic Operation

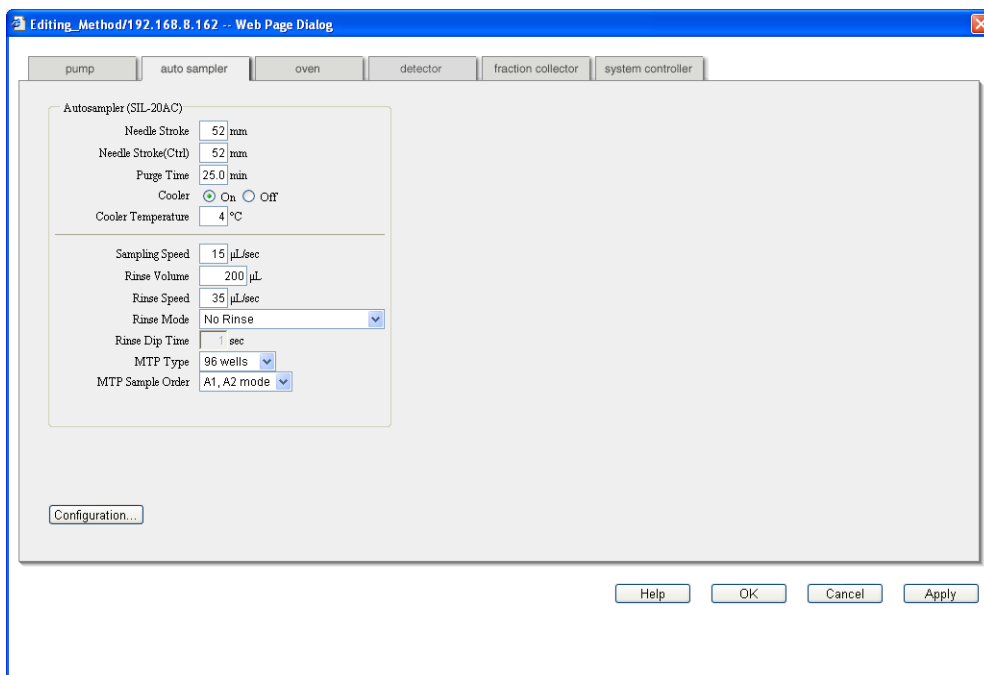
4.2.4 Parameters for the Autosampler

Enter the autosampler parameters, such as the needle stroke and the sampling speed. The displayed parameters vary with the type of autosampler connected.

 For details on the various parameters and the setting ranges, minimum units, units, and default values for the parameters, refer to "5.12.2 Autosampler" P. 5-74.

1  Click  in the "Analysis" tab page.

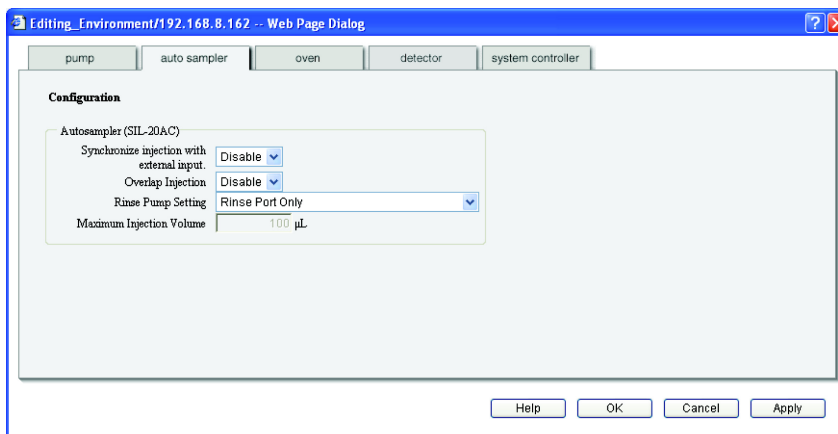
The "Autosampler" tab page in the "Method Parameter" window is displayed.



2 Set the method parameters for the autosampler.

3 Click  .


The "Autosampler" tab page in the "Configuration Parameter" window is displayed.



4 Set the configuration parameters for the autosampler.

5 Click when setting is complete.
The display returns to the "Method Parameter" window.


6 Click .


 To set parameters for another component, instead of clicking , click the tab for that component. The corresponding tab page is displayed.

4.2.5 Parameters for the Column Oven

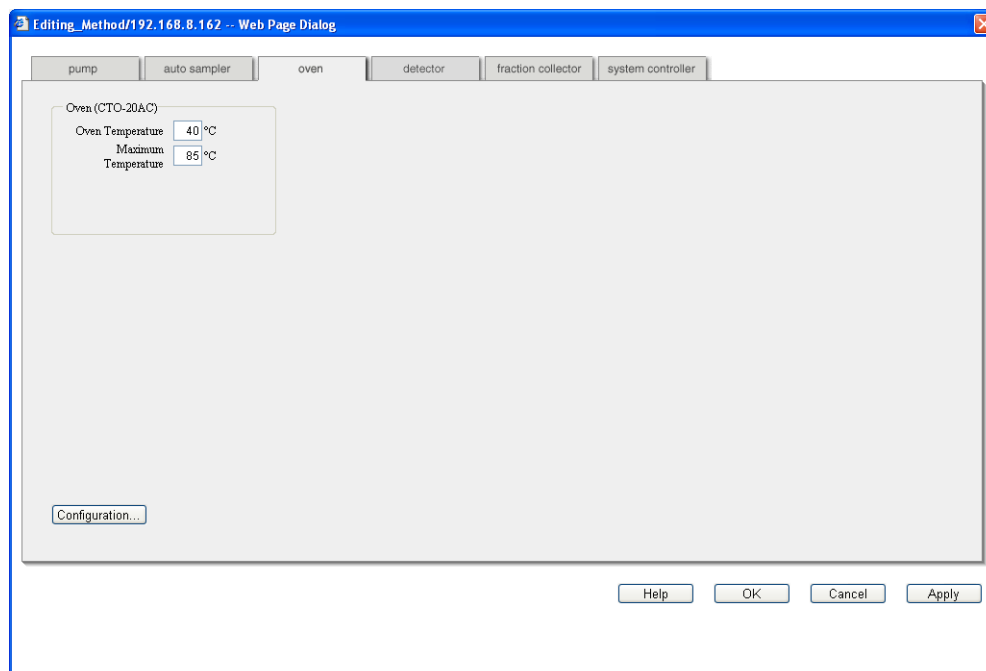
Set the temperature and maximum temperature for the column oven.

The displayed parameters vary with the type of column oven connected.

 For details on the various parameters and the setting ranges, minimum units, units, and default values for the parameters, refer to "5.12.3 Column Oven" P. 5-93.

1 Click  in the "Analysis" tab page.

The "Oven" tab page in the "Method Parameter" window is displayed.

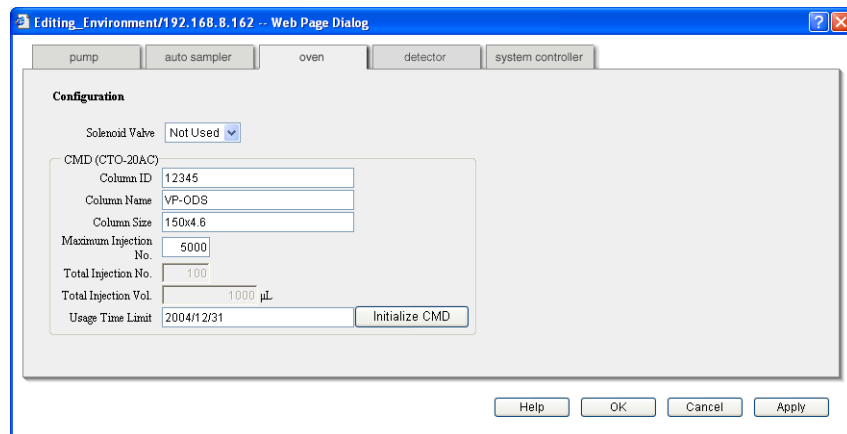




2 Set the method parameters for the column oven.

3 Click .

The "Oven" tab page in the "Configuration Parameter" window is displayed.

4. Basic Operation





- 4 Set the configuration parameters for the column oven.
 -  If [Used] is selected for [Solenoid Valve] and is clicked in the "Configuration Parameter" window, the "Oven" window displays [2 position L], [2 position R], [6 position L], or [6 position R], depending on the type of valve connected.
- 5 Click when setting is complete.
The display returns to the "Method Parameter" window.
- 6 Click .
The "Analysis" tab page is displayed.
 -  To set parameters for another component, click the tab for that component instead of clicking . The corresponding tab page is displayed.

4.2.6 Parameters for the Detector

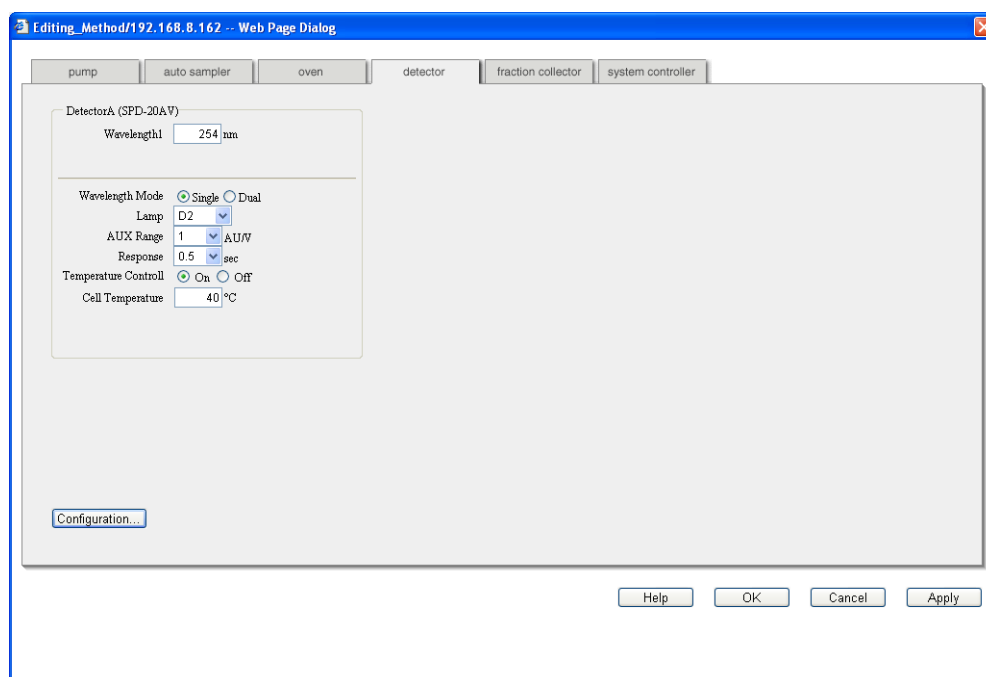
Enter the detector parameters, such as the wavelength and response.

The displayed parameters may vary with the type of detector that is connected.

 For details on the various parameters and the setting ranges, minimum units, units, and default values for the parameters, refer to "5.12.4 Detector" P. 5-96.

- 1 Click  in the "Analysis" tab page.

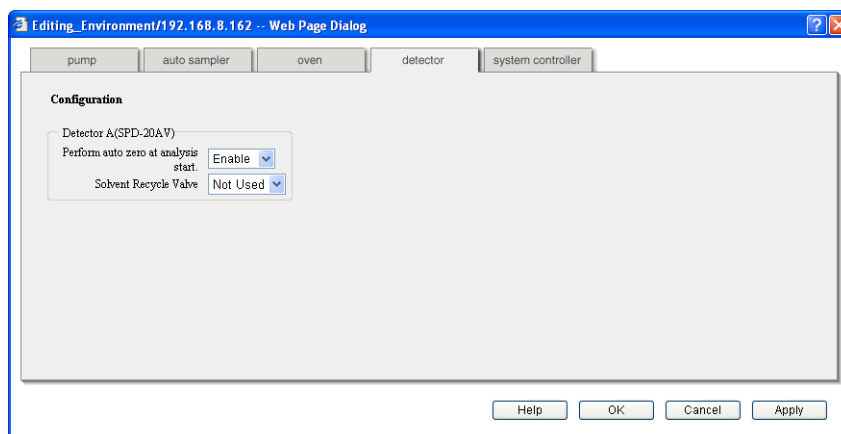
The "Detector" tab page in the "Method Parameter" window is displayed.




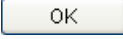

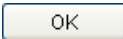
- 2 Set the method parameters for the detector.

- 3 Click .

The "Detector" tab page in the "Configuration Parameter" window is displayed.





4. Basic Operation

- 4 Set the configuration parameters for the detector.
- 5 Click  when setting is complete.
The display returns to the "Method Parameter" window.
- 6 Click .
The "Analysis" tab page is displayed.
 To set parameters for another component, instead of clicking , click the tab for that component. The corresponding tab page is displayed.

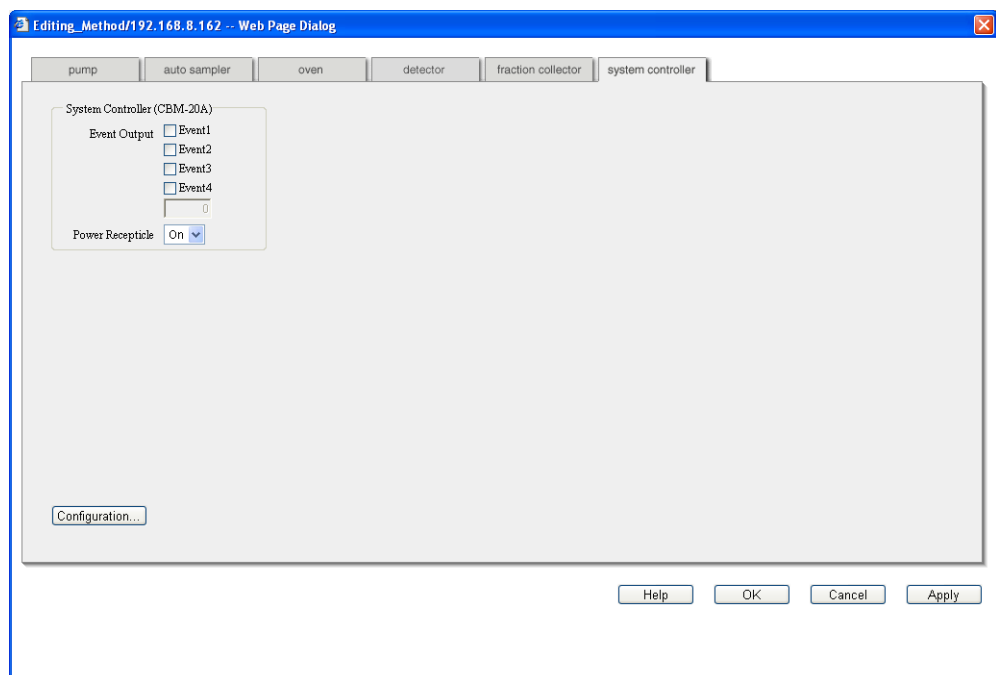
4.2.7 Parameters for the CBM-20A

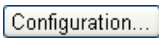
Enter the CBM-20A parameters, such as the event output and serial interface.

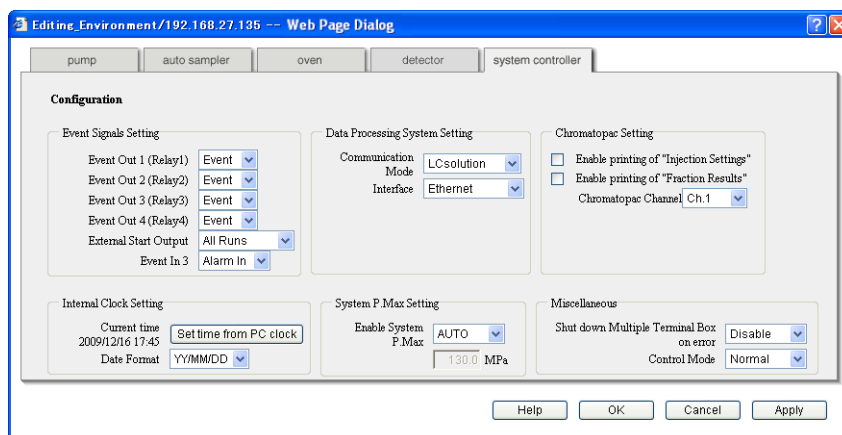
-  For details on the various parameters and the setting ranges, minimum units, units, and default values for the parameters, refer to ["5.13.6 System Controller" P. 5-139](#).

- 1 Click  in the "Analysis" tab page.

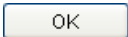
The "System Controller" tab page in the "Method Parameter" window is displayed.

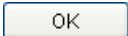



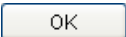
- 2 Set the method parameters for the system controller.
- 3 Click .
The "System Controller" tab page in the "Configuration Parameter" window is displayed.



4 Set the configuration parameters for the system controller.

5 Click  when setting is complete.
The display returns to the "Method Parameter" window.

6 Click .
The "Analysis" tab page is displayed.

 To set parameters for another component, click the tab for that component instead of clicking . The corresponding tab page is displayed.

4.3 Creating Sequence Files

Analysis sequences are set and stored as sequence files, which are used when performing analysis.

Sequence files can be created in either the "Analysis" tab page or the "Editing" tab page of the "Analysis Execution" application. Although the creation sequence is the same for both pages, the functions of the pages differ in the following way.

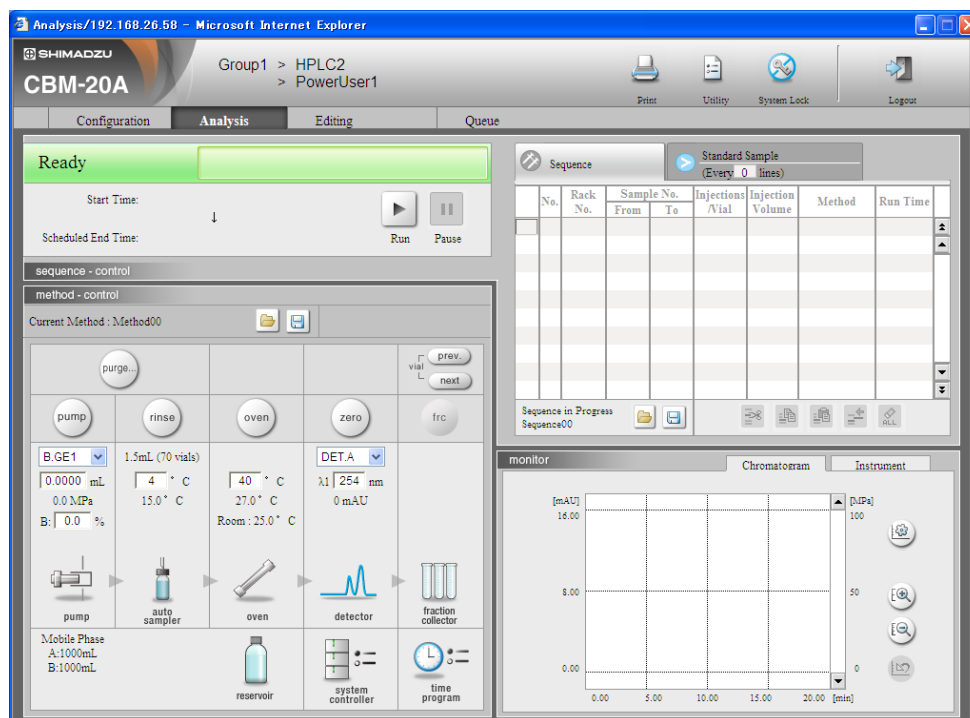
- The sequence file displayed in the "Analysis" tab page is the file that is currently used. When analysis starts, it runs in accordance with the contents of the sequence file specified in this screen.
- In the "Editing" tab page, sequence files that are not currently being used can be selected and edited.


This section describes the method for creating a new sequence file from the "Analysis" tab page.

4.3.1 Selecting Sequence Files

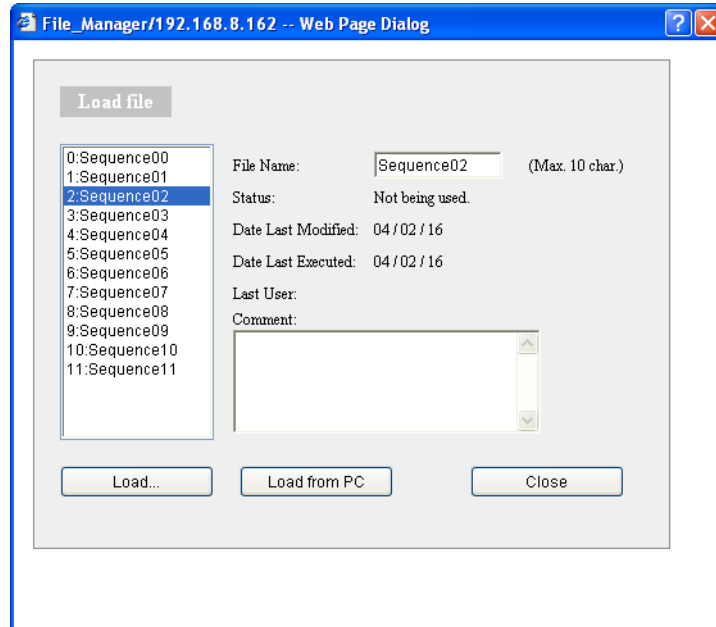
In order to create a new sequence file, it is first necessary to select a sequence file and load it.

- 1 Click the [Analysis] tab in the "Analysis Execution" application window. The "Analysis" tab page is displayed.





- 2 Click  on the right of the current sequence filename.

The "Load File" window is displayed.




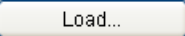
- 3 Select a file from the list on the left of the window.
The name of the selected file is displayed in the [File Name] field.


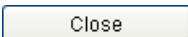
 Up to 12 sequence files can be saved. "Sequence00" to "Sequence11" are used as the default filenames. (The numbers in front of the files are the file numbers; file numbers 0 to 11 are allocated to the files.)

 Changing filenames:
The names of the sequence files can be changed. Select the [File Name] field and input a filename of no longer than 10 characters.

- 4 Input a comment if necessary.

 Comments can contain up to 250 characters.

- 5 Click  .
The window closes and the name of the selected file is displayed in the "Analysis" tab page as the current sequence.

 Click  to close the window without loading a file.

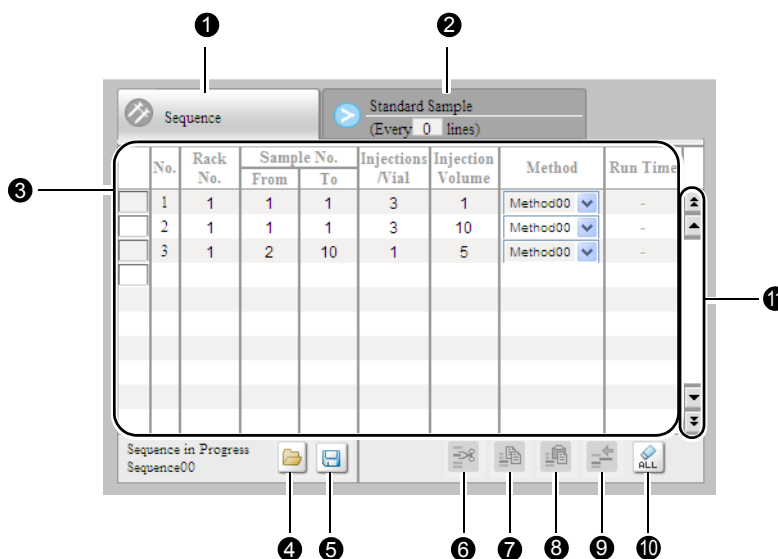
 For details on  , refer to "5.7 Managing Files" P. 5-25.

4. Basic Operation












4.3.2 Table and Buttons Used for Analysis Sequences

Configure the settings required for one analysis (e.g., sample numbers, and injection volumes) in the sequence table. This section explains the setting items for the sequence table and the functions of the buttons.

● Sequence Table







Setting item	Description	
① [Sequence] tab	Click to display the table for the sequence file.	
② [Standard Sample (Every n/ lines)] tab	Click to display the table for the standard sample injection (repeat injection).	
③ Sequence in Progress	Displays the currently selected filename.	
No.	Displays the line number. The system controller automatically allocates numbers 1 to 100 in order.	
Rack No.	Input the number of the rack used. This setting is not possible if a model other than the SIL-30A/20A series is connected.	
Sample No.	From	Input the vial number of the first sample to be analyzed.
	To	Input the vial number of the last sample to be analyzed. For details on rack and sample numbers, refer to "5.14 List of Rack Numbers" P. 5-147.
Injections/Vial	Input the number of injections for each vial. The setting range is 1 to 99 and the default setting is 1.	


	Setting item	Description
③	Injection Volume	Input the volume (μL) for each injection. The default value and setting range vary with the autosampler model.
	Method	Select the method file used for analysis. "Method00" to "Method19" can be selected as the method file. If [-] is selected, analysis is performed with the settings for the current method. The default setting is [-].
	Run Time	If no method file is used, or if [-] is selected under [Method], input the analysis time. Setting range: 0.01 to 9999.90 (minutes) Setting unit: 0.01 Default setting: 1.00
④	 Load button	Click to display the "Load File (File_Manager)" window. Used to switch between sequence files.
⑤	 Save button	Click to display the "Save File (File_Manager)" window. Used to save the currently selected sequence file to the PC or copy it to another file.
⑥	 Cut button	Click to remove the selected line and temporarily save the data for that line to the clipboard.
⑦	 Copy button	Click to temporarily save the data for the selected line to the clipboard.
⑧	 Insert/Paste button	Click to insert the data saved to the clipboard (i.e., with the cut or copy button) between the selected line and the line before.
⑨	 One-line insertion button	Click to insert a copy of the selected line between the same line and the line before.
⑩	 All-clear button	Click to delete the input data for all lines.
⑪		Used to scroll the table up 10 lines.
		Used to scroll the table up 1 line.
		Used to scroll the table down 10 lines.
		Used to scroll the table down 1 line.

4.3.3 Creating Sequence Tables

Create a sequence table using a sequence file. Input analysis conditions, such as vial numbers and injection volumes, in the sequence table.





- 1** If the connected autosampler is the SIL-30A/20A series, input the rack number in the [Rack No.] column and press the [Tab] key.
The default settings [1], [1], [1], [10], [-], and [1.00] are displayed respectively in the [From] and [To] columns under [Sample No.], the [Injections/Vial] column, the [Injection Volume] column, the [Method] column, and the [Run Time] column.
 -  The default setting for [Injection Volume] varies depending on the connected autosampler.
 -  If the connected autosampler is the SIL-10ADvp/10A/10Ai/10AXL/10AF/10AP, no value is displayed in the [Rack No.] column.
 -  It is possible to set [-] in the [Rack No.] and [From] columns. In this case, analysis operation is performed in accordance with the [Method] setting for that line but injection operation is not performed by the autosampler.

- 2** Make corrections as required.
When using a time program for analysis, select the required method file from the pull-down menu. When a method file is selected, the setting shown in the [Run Time] column changes to [-]. When a method file is not selected, enter the analysis time in the [Run Time] column.
 -  Two or more method files can be selected for one analysis sequence.

- 3** The input method for line 2 and subsequent lines is the same as for line 1.
Note that the values displayed in the [To] column under [Sample No.], the [Injection/Vial] column, the [Injection Volume] column, the [Method] column, and the [Run Time] column are the same as the input values for the previous line.
 -  Up to 100 lines can be input in a sequence table. The sequence is composed in order starting from line 1. It is not possible to skip lines.

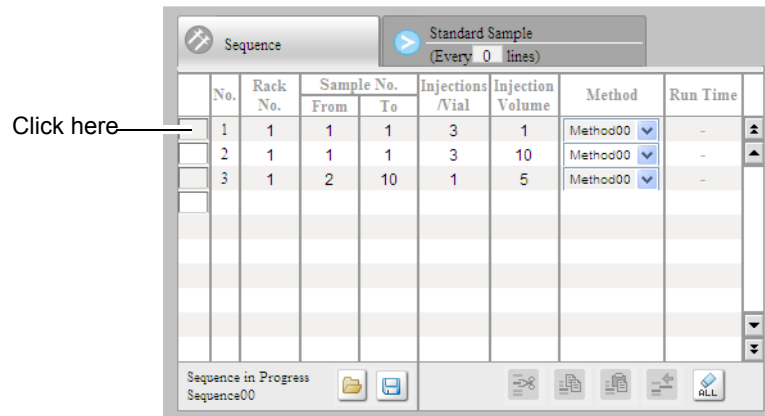
- 4** When the required settings have been made in the sequence table, the table is saved as a sequence file.

4.3.4 Editing Sequence Tables

Once created, sequence tables can be edited using the , , , and  buttons.


■ Cutting and Copying

- 1 In the sequence table, click the cell in front of the first line to be cut or copied. The selected line turns light blue.





- 2 To cut or copy multiple lines, click the cell in front of the last line. The selected line turns light blue.

- 3 Click the  or  button.

 Line selections can be cancelled for the first and last lines selected, but not for the lines in between. Cancel the line selections for each line in turn, starting from the first or last line selected.

■ Inserting, Pasting, or Inserting One Line

- 1 In the sequence table, click the cell in front of the first line to be cut or copied. The selected line turns light blue.

- 2 Click the  or  button. When inserting or pasting, this inserts the lines that were copied by cutting or copying. When inserting one line, the contents of the selected line are inserted.

4.4 Gradient Analysis Using Time Programs

With this system controller, the functions (e.g., parameters and commands) of components can be set as time programs. Creating a time program enables control that is dependent on the elapsed analysis time. Each line of a time program includes data on the time, the functions for each component, and other settings. Time programs are stored as part of method files.

Be sure to use a time program with gradient analysis.

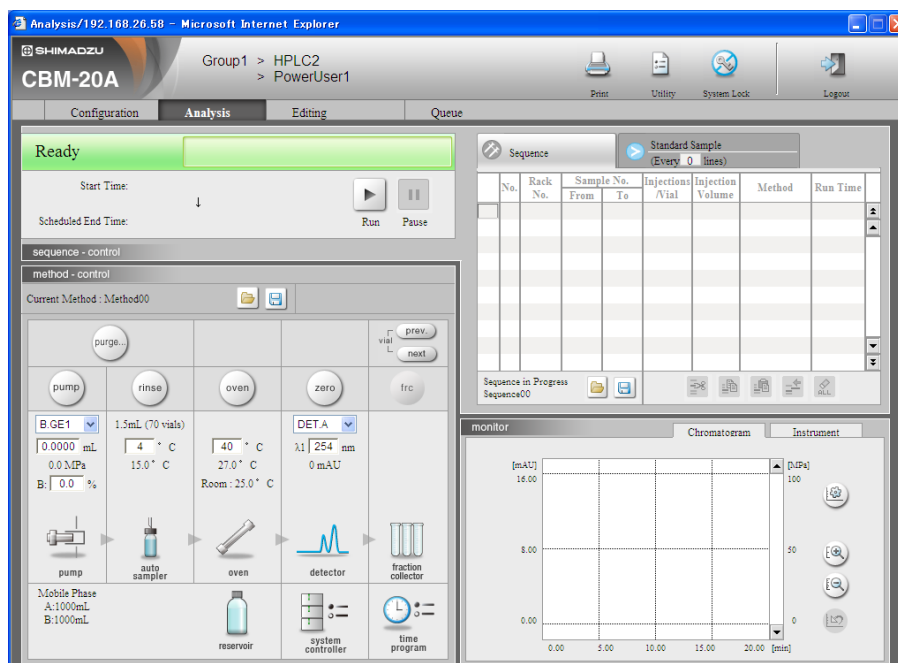
Time programs can be created in either the "Analysis" tab page or the "Editing" tab page of the "Analysis Execution" application. The creation method is the same for both pages.

This section describes the method for creating a new time program from the "Analysis" tab page.

4.4.1 Displaying the "Time Program" Window

Use the following procedure to display time programs.

- 1 Click the [Analysis] tab in the "Analysis Execution" application window. The "Analysis" tab page is displayed.

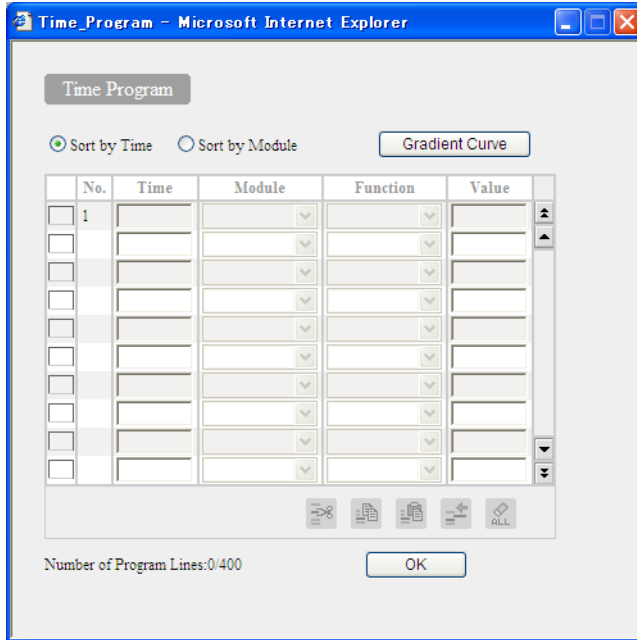


- 2 Select the method file for which the time program is to be created.
 - The selection method is the same as the one described in "Selecting Method Files".

["4.2 Creating Method Files" P. 4-10](#)

3 Click  in the "Method" section.

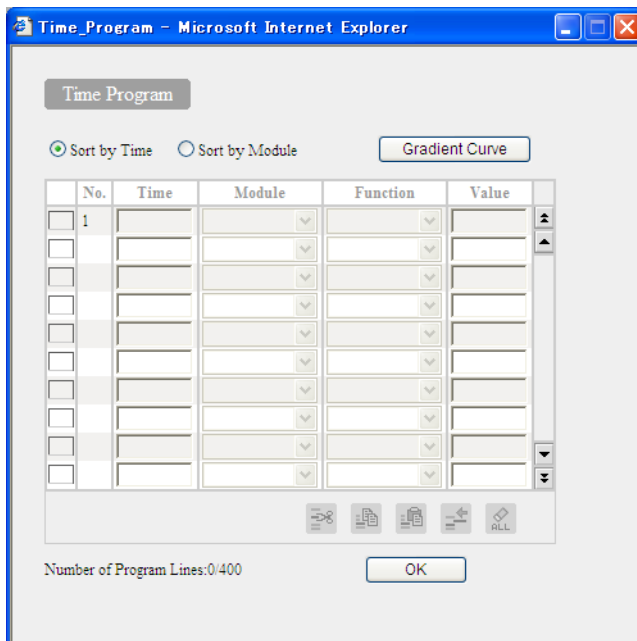
The "Time Program" window is displayed.










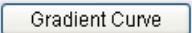
4

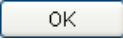




4.4.2 Table and Buttons Used for Time Programs

The component function parameters are entered in the time-program table and analysis is performed according to these set times. This section explains the time-program table and the functions of the buttons.



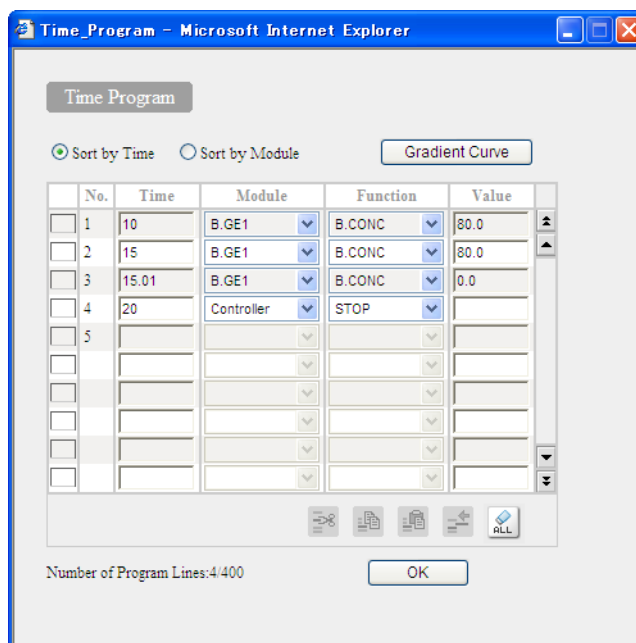
4. Basic Operation

Setting item/button	Description
No.	Displays the line number. The system controller automatically allocates numbers 1 to 400 in order. Up to 400 time-program lines can be input in each method file.
Time	Set the time program's run times. The setting range is 0.01 to 9999.9 (minutes). Note that when the Fraction Collector (FRC) is selected for [Module], the setting range is 0.33 to 9999.9 (minutes).
Module	Select the component for which the corresponding line is executed from a pull-down menu. Any of the currently connected components can be selected.
Function	Select the function for the component selected in the [Module] column from a pull-down menu.
Value	There are 2 types of functions: functions requiring a value (parameters) and functions not requiring a value (commands). If a parameter is selected in the [Function] column, input the required value in the [Value] column. If a command is selected in the [Function] column, no value can be entered.  For details on available functions and default values, refer to "5.13 List of Time-program Commands" P. 5-115.
 Cut button	Click to remove the selected line and temporarily save the data for that line to the clipboard.
 Copy button	Click to temporarily save the data for the selected line to the clipboard.
 Insert/Paste button	Click to insert the data saved with the cut or copy button between the selected line and the line before.
 One-line insertion button	Click to insert a copy of the selected line between the same line and the line before.
 All-clear button	Click to delete the input data for all lines.
[Sort by Time] and [Sort by Module] buttons	Click [Sort by Time] to rearrange the lines of the time-program table into order of increasing run time. Click [Sort by Module] to rearrange the lines of the time-program table into the following order: solvent delivery module ("ISO", "B.GE", "T.GE", "LP.GE"), detector ("Detector"), CBM-20A ("Controller"), autosampler ("Autosampler"), column oven ("Oven"), sub-controller ("Subc") and Fraction Collector (FRC).  The original order cannot be restored after one of these sorting operations has been executed.
 Gradient Curve	Click to open the "Gradient Curve" window. On the "Gradient Curve" window, the gradient curve of the selected module is drawn.

Setting item/button	Description
Number of Program Lines	The number of lines input out of the maximum 400 is displayed. The number displayed represents the total number of time-program lines for that method file.
	Click to save the set time program and close the "Time Program" window.
	Used to scroll the table up 10 lines.
	Used to scroll the table up 1 line.
	Used to scroll the table down 10 lines.
	Used to scroll the table down 1 line.








4.4.3 Creating Time-program Tables

Create a time-program table using the "Time Program" window. Input program settings, such as run times and functions, in the time-program table.



- 1 Input the run time for the first line in the [Time] column and press the [Tab] key. It becomes possible to make selections from the pull-down menus in the [Module] and [Function] columns. If input is required in the [Value] column, the default value for that parameter is displayed.

4. Basic Operation

- 2 Select a component from the pull-down menu in the [Module] column.
- 3 Select a function from the pull-down menu in the [Function] column.
- 4 If the function is a parameter (i.e., a value is required), input a value within the setting range for the parameter.
 ["5.13 List of Time-program Commands" P. 5-115](#)
- 5 The input method for line 2 and subsequent lines are the same as for line 1.
Note that the default values displayed in the [Module], [Function], and [Value] columns are the same as the input values for the previous line.
 -  Up to 400 lines can be input in a time program.
 -  When editing a time program, if the system configuration has changed since the time program was created, functions for components that no longer exist cannot be changed. (They can, however, be deleted.)
 -  The procedure for editing time programs is the same as that for editing sequence tables.
 ["4.3.4 Editing Sequence Tables" P. 4-27](#)
- 6 Click .
The time program is saved to the selected method file and the "Time Program" window closes.
 -  To perform analysis using time programs, select the appropriate method files in the sequence table's [Method] column.
 For details on analysis procedures, refer to ["4.1 Overall Flow of Operation" P. 4-2](#).

4.4.4 Time-program Setting Example

A setting example for time programs is provided below.

Gradient mode: Binary gradient (B.GE1)

Change in concentration: After 10 minutes have elapsed, the concentration of mobile phase B is changed to 80 % and is held at 80 % until a total of 15 minutes have elapsed. After a total of 15.01 minutes have elapsed, the concentration of mobile phase B is reduced to 0 %.

One cycle is 20-minutes long.

The setting for mobile phase B (B.CONC) in the method is 0 %.

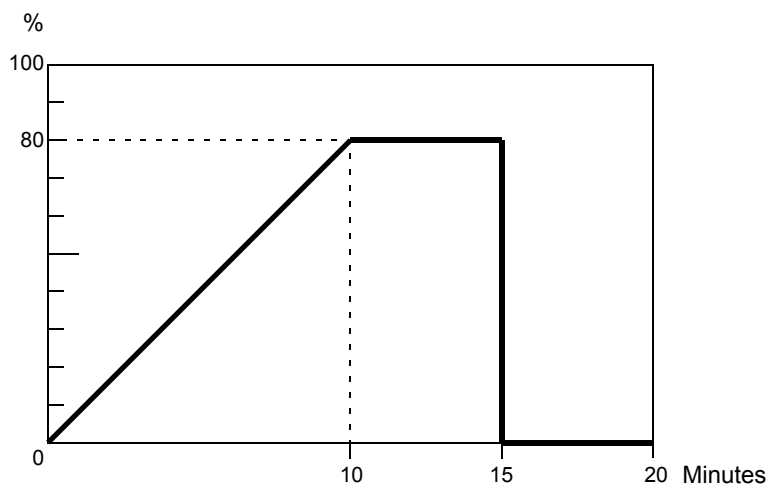


Fig. 4.1

Set the time program for this operation in the way shown in the following table.


No.	Time	Module	Function	Value
1	10	B. GE1	B. CONC	80.0
2	15	B. GE1	B. CONC	80.0
3	15.01	B. GE1	B. CONC	0.0
4	20	Controller	STOP	



Be sure to set the STOP command for the "Controller" at the end of the time program.

4.5 Starting Analysis

4.5.1 Starting and Ending Analysis

Click  to start analysis. The system controller operates in the following way.

- (1) If a sequence table has been set, the table is registered to the analysis queue and analysis is performed in accordance with the table settings. If there is already a sequence registered to the analysis queue, however, analysis starts from the first sequence in the queue.
- (2) If a sequence table has not been set, analysis is performed in accordance with the time program.
- (3) If neither a sequence table nor a time program has been set, the analysis starts and does not stop.



With this system controller, it is possible to output a start signal to connectors OUT1 to OUT4 on the back of the system controller or to the optical-link interface (for Chromatopac) each time analysis is started. It is also possible to automatically auto-zero the detector.


■ Forcibly Stopping Analysis

Click  to forcibly stop analysis.


Analysis is stopped forcibly.

Analysis cannot be restarted from a sequence that was stopped forcibly.




If analysis is forcibly stopped during autosampler operation, [Stop] is displayed in the status display (when using an autosampler other than SIL-30A/20A series). In this case, click  to initiate automatic rinsing of the flow line.

■ Pausing Analysis Operation


Click  to pause analysis operation.

[Pause] is displayed in the status display when the current analysis operation is completed.

Analysis operation enters waiting status when the current (single) analysis operation is completed (or the current (single) time program in the analysis file is completed).

Click  again to resume analysis from the next operation.

■ Canceling "Cooling Down" or "Power Down"

If a shutdown is set in the analysis queue, [Cooling Down] or [Power Down] is displayed in the status display after the sequence has been completed. If  is clicked, the shutdown is canceled and [Ready] is displayed.

■ Changing Parameters During Analysis

Input is possible from the "Analysis" tab page after analysis has started. If file contents are changed during execution, however, operation is affected in the ways described below.


● Changing Autosampler Parameters


If autosampler parameters are changed during execution, the new settings become valid with the next analysis. The current analysis is completed in accordance with the previous settings.

● Changing the solvent delivery module's Flow-rate or Concentration Parameters

If flow-rate or concentration parameters are changed during execution, subsequent changes for time-program functions will not be made.






● Changing Sequence Tables

In the "Sequence" section,  is displayed on the left of the currently executed step in the sequence table.

- Steps already executed cannot be changed.
- The step which is currently being executed and the following step cannot be changed while the sequence is running.
- To change the following step click  first to pause the sequence, then change the following step.

4.5.2 Analysis Using a Manual Injector

Use the following settings and procedure for analysis with a manual injector.


- 1 Create a sequence table if necessary.
 -  When creating a sequence table for analysis using a manual injector, set [-] in the sequence table's [From] column.
- 2 Load the sample in the microsyringe into the manual injector.
- 3 With the microsyringe in the injection position, turn the manual injector's handle to the INJECT position and, at the same time, click  .
 -  Analysis can also be started via input to the MAN.INJ. connector on the back of the system controller.
 -  If a sequence table is set, after the analysis for one step in the table is completed, proceed to the next step by clicking  .

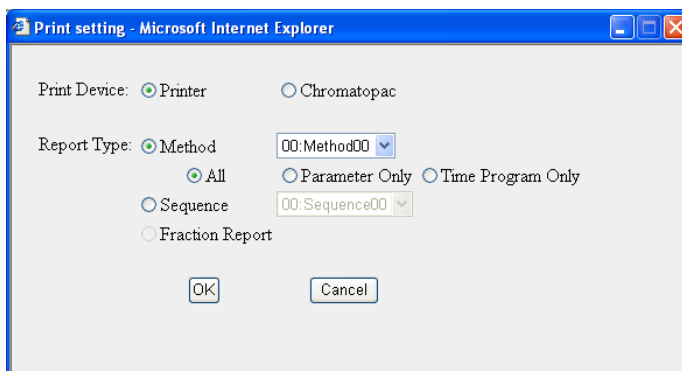
4.6 Printing Files

Method and sequence files can be printed out in the "Analysis Execution" application.

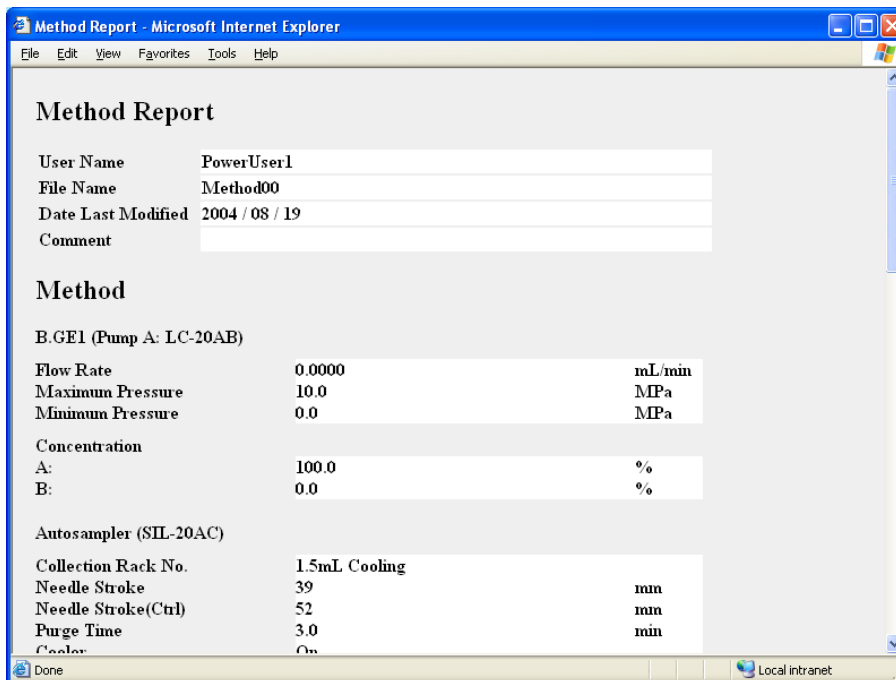
4.6.1 Printer

Method and sequence files can be printed out to a printer connected to the PC.

- 1 Click the  button in the "Analysis Execution" window. The "Print" window will be displayed.



- 2 Select "Printer" and the item to print out. Fraction Report cannot be selected.
- 3 Click the [OK] button. The "Method Report" or "Sequence Report" window will be displayed.





- 4 Select [Files] - [Print] in the menu of Internet Explorer.

4.6.2 Print to Chromatopac

Method and sequence files can be printed out to Chromatopac when connected to a system controller. Chromatopac should be linked to the system controller by the [OPEN TRS] or [OPEN GCLC] command beforehand.

 ["9.2.9 Chromatopac Connection and Setup" P. 9-21](#)

- 1** Click the  button in "Analysis Execution" application.
"Print" window will be displayed.
- 2** Select "Chromatopac" and the item to print out.
Fraction Report can be select only when fraction results exist.
 To print out a fraction result report after each analysis, set "Enable printing on fraction result" to ON in the system controller's configuration parameters.
- 3** Click the [OK] button.
The selected item will be printed out to Chromatopac.

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5

Application Operation

This chapter provides descriptions on the system controller's various analysis methods, such as sequential analysis using queues and analysis using a fraction collector, as well as the file and group settings used for analysis.

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5.7	Managing Files	5-25
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5.9	Managing Groups	5-39
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5.1 Injecting Standard Samples at Regular Intervals

If there are samples that need to be injected repeatedly at regular intervals, it is possible to create a standard-sample injection table for repeat injection and insert and execute this table at regular intervals within the analysis sequence. Specify the number of lines in the sequence table between each execution of the standard-sample injection table.

5.1.1 Example of Analysis Using Standard sample Injection Table

An example of analysis based on a sequence table incorporating a standard-sample insertion table is described below together with the corresponding settings.

Example: Inserting the Standard-sample Injection Table at 4-line Intervals

No.	Rack No.	Sample No. From	Sample No. To	Injections /Vial	Injection Volume	Method	Run Time
1	1	1	10	1	10	-	15.00
2	1	11	20	1	10	-	15.00
3	1	21	30	1	10	-	15.00
4	1	31	40	1	10	-	15.00
5	1	51	51	10	5	-	15.00
6	1	52	52	10	5	-	15.00
7	1	53	53	10	5	-	15.00
8	1	54	54	10	5	-	15.00
9	1	70	70	1	10	-	20.00

The standard-sample injection table shown below is inserted after every 4 lines.

No.	Rack No.	Sample No. From	Sample No. To	Injections /Vial	Injection Volume	Method	Run Time
1	0	1	1	1	10	-	20.00
2	0	2	2	1	10	-	20.00
3	0	3	3	5	10	-	20.00

● Actual Analysis Performed

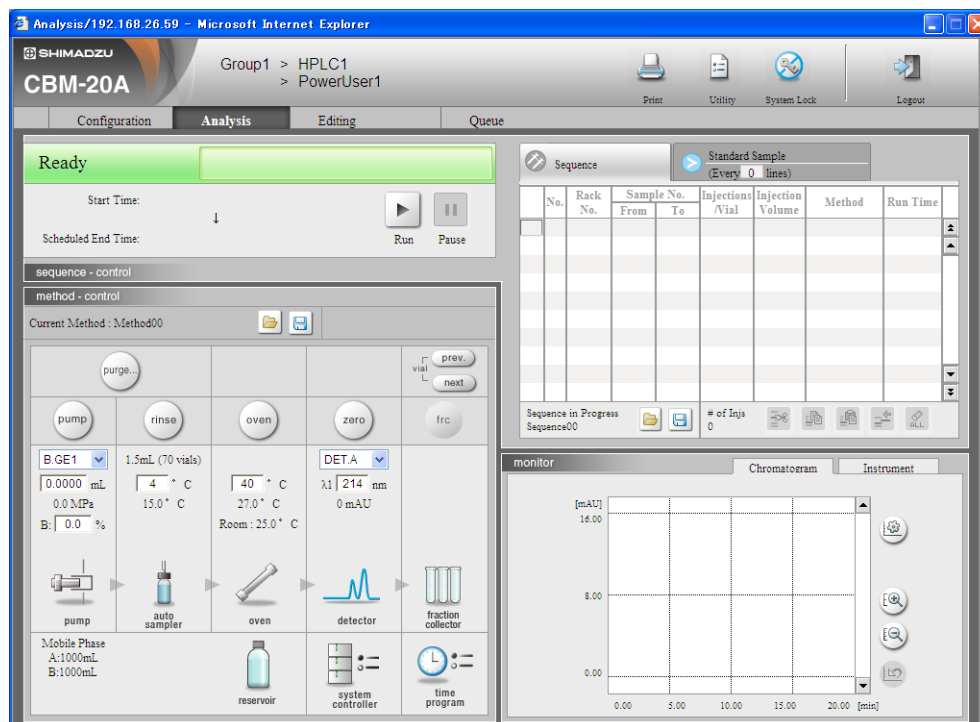
- (1) Lines 1 to 3 of the standard-sample injection table are executed.
- (2) Lines 1 to 4 of the sequence table are executed.
(The standard-sample injection table is executed after every 4 lines of the sequence and so the sequence is executed in 4-line blocks.)
- (3) Lines 1 to 3 of the standard-sample injection table are executed again.
- (4) Lines 5 to 8 of the sequence table are executed.
- (5) Lines 1 to 3 of the standard-sample injection table are executed again.
- (6) Line 9 of the sequence table is executed and analysis is completed.


5.1.2 Creating Standard-sample Injection Tables

Standard-sample injection tables can be created in the "Analysis" tab page or the "Editing" tab page. The creation method is the same as that for sequence tables.

The method for creating a table from the "Analysis" tab page is described below.

- 1 Click the [Analysis] tab in the "Analysis Execution" application window. The "Analysis" tab page is displayed.







- 2 Select a sequence file.
 ["4.3.1 Selecting Sequence Files" P. 4-22](#)

5. Application Operation

- 3** Click the [Standard Sample] tab.
The standard-sample injection table is displayed.

Sequence		Standard Sample (Every 4 lines)					
No.	Rack No.	Sample No.		Injections /Vial	Injection Volume	Method	Run Time
		From	To				
1	0	1	1	1	10	-	20.00
2	0	2	2	1	10	-	20.00
3	0	3	3	5	10	-	20.00

- 4** Create a standard-sample injection table.
-  The displayed contents, the functions of the buttons, and the creation methods for standard-sample injection tables are the same as for sequence tables.
 -  ["4.3.2 Table and Buttons Used for Analysis Sequences" P. 4-24](#)
 -  ["4.3.3 Creating Sequence Tables" P. 4-26](#)
 -  Up to 10 lines can be input. Input of 11 lines or more is not supported.
- 5** Input the number of lines of sequence between each execution of the standard-sample injection table in the [Every n lines] field in the [Standard Sample] tab.
- 6** Click the [Sequence] tab.
Standard-sample insertion marks are displayed between the lines of the sequence at the appropriate positions and the standard-sample insertion table is saved together as part of the sequence file.

5.2 Setting the Mobile Phase Reserve Volume

If the mobile-phase volume is entered in advance, the solvent delivery module will calculate the reserve volume by subtracting the flow volume from the mobile phase volume that was entered. This allows the user to monitor the reserve volume of mobile phase. If a reserve volume threshold is set, a warning can be displayed when the reserve volume drops below this threshold.

Also, if the autosampler rinse-solvent volume and a reserve-volume threshold are entered, the reserve volume can be monitored and warnings displayed in the same way as for the mobile phase. The methods for using these functions are explained below.

The reserve volumes of the mobile phase and the rinse solution can be set in the "Analysis" tab page or the "Editing" tab page. The setting method is the same for both pages. The example below describes the "Analysis" tab page method.

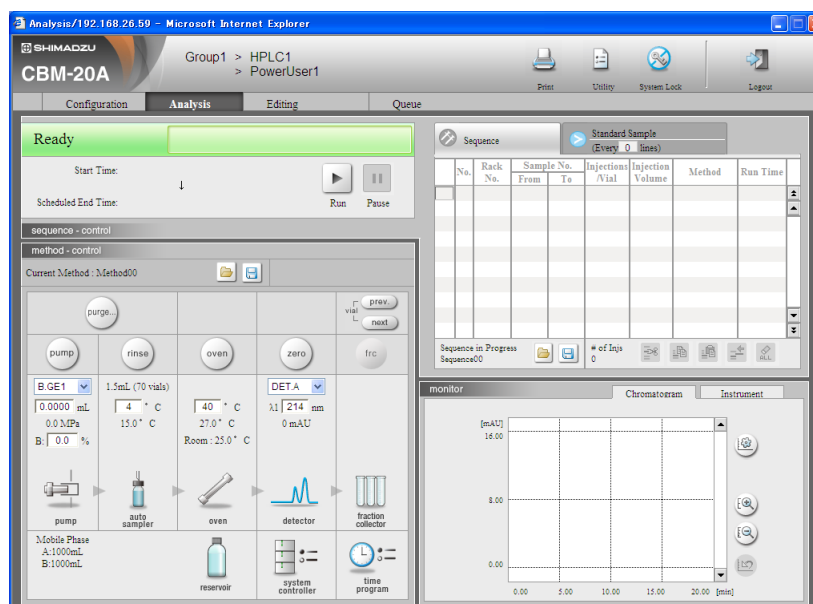


The mobile phase reserve volume can only be entered if an LC-30A/20A series pump (LC-30AD/20AB/20AD/20AT/20AP/20AR, etc.) is connected. The rinse solution reserve volume can be entered if an SIL-30A/20A series autosampler (SIL-30AC/30ACMP/20A/20AC, etc.) is connected.


5.2.1 Displaying the "Mobile Phase Reserve Volume Setting" Window

The procedure for displaying the "Mobile Phase Reserve Volume Setting" window is explained below.

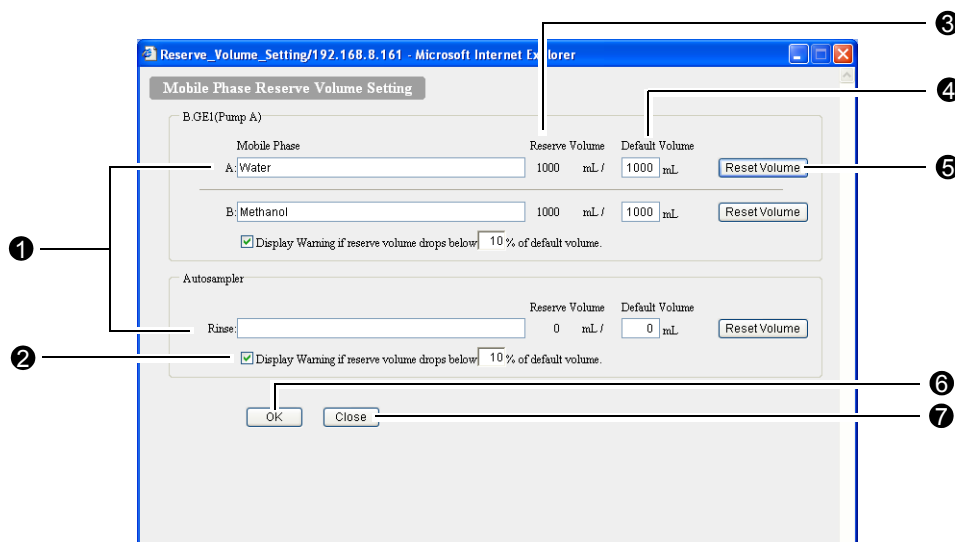
- 1 Click the [Analysis] tab in the "Analysis Execution" application window. The "Analysis" tab page is displayed.






5. Application Operation

- 2 Click  in the "Analysis" tab page.



The "Mobile Phase Reserve Volume Setting" window is displayed.



 The displayed contents of the "Mobile Phase Reserve Volume Setting" window vary with the type of solvent delivery module and autosampler connected and the pumping mode.

	Display	Description
①	Mobile Phase, Rinse	Input the names of mobile phases and rinse solutions. Up to 50 characters can be entered.
②	Display Warning if reserve volume drops below n% of default volume.	Set the reserve-volume threshold, below which a warning is displayed. To set a threshold, click the check box and input a threshold. The default setting is for the check box to be unselected. Threshold setting range: 1 to 99 Minimum unit: 1 Default value: 10.
③	Reserve Volume	The reserve volumes for the mobile phases and rinse liquid delivered from the solvent delivery modules are displayed.
④	Default Volume	Input the mobile-phase and rinse liquid volumes initially set in the reservoir. The setting range is 0 to 9999 (mL), the minimum unit is 1, and the default value is 0. If 0 is entered, the reserve volume is not displayed in the "Analysis" tab page.  For the LC-20AP, the setting range is 0 to 99.99 (L), the minimum unit is 0.01, and the default value is 0. For the LC-20AR, the setting range is 0 to 99999 (mL), the minimum unit is 1, and the default value is 0.
⑤		Click to reset the [Default Volume] setting. If (additional) mobile phase has been set in the reservoir, set the mobile-phase volume and click this button. The data is sent to the solvent delivery module. (Same applies to the rinse liquid.)

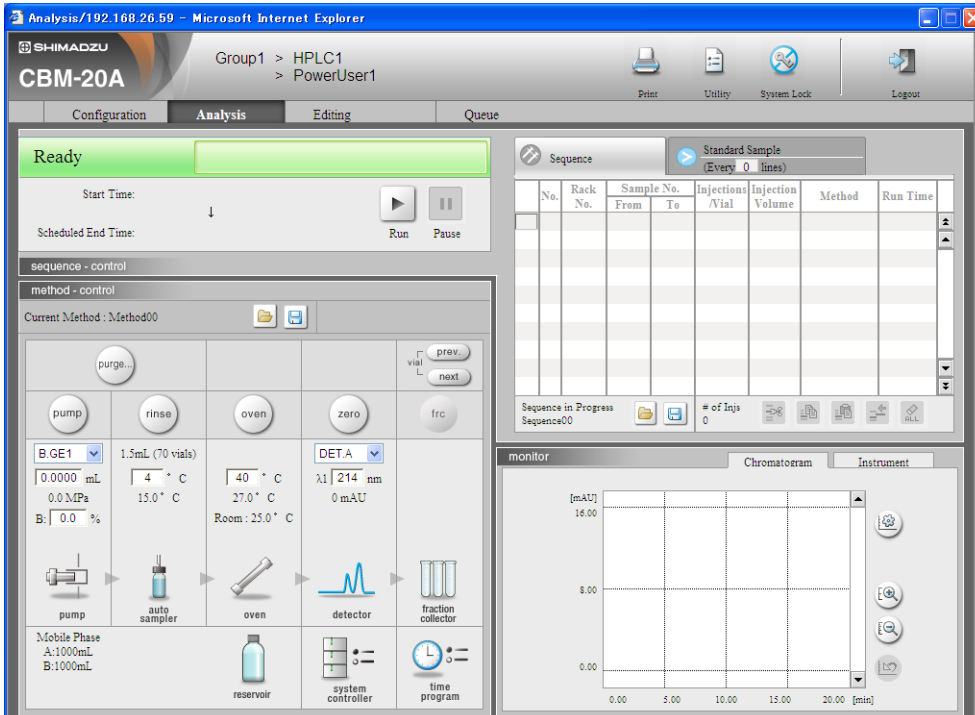
5.2 Setting the Mobile Phase Reserve Volume

	Display	Description
⑥		Click after making new settings for the mobile-phase or rinse-solution names or for warming display and close this window.
⑦		Click to close this window.

5.2.2 Checking the Mobile Phase Reserve Volume

Use the procedure below to check the mobile phase reserve volume.

- 1 Click the [Analysis] tab.
The "Analysis" tab page is displayed.




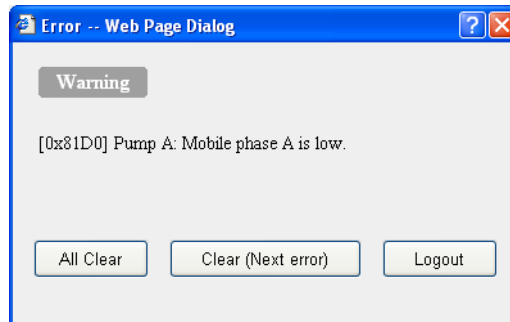
The screenshot shows the SHIMADzu CBM-20A software interface. The 'Analysis' tab is active, displaying a 'Ready' status. The 'Sequence' table is empty. The 'method - control' section shows various parameters for the pump, rinse, oven, and detector. The 'monitor' section displays a chromatogram plot with a y-axis labeled '[mAU]' and an x-axis labeled '[min]'. The plot shows a single peak at approximately 11.214 minutes.

5

5. Application Operation

- 2 Select the desired solvent delivery module using the pull-down pump menu.
The reserve volume for the selected solvent delivery module is displayed. The reserve volume for the autosampler rinse solution is always displayed.

 If the reserve volume drops below the set threshold, the following window is displayed. Check the mobile phase reserve volume.



5.3 Executing Autopurge for Solvent Delivery Modules and Autosamplers

This system controller allows for automatic replacement of the solvents in the flow line from the suction filter to the autosampler and in the measuring pump of the autosampler with the rinse solution or mobile phase used for analysis.

 ["4.1.7 Executing Autopurge" P. 4-6](#)

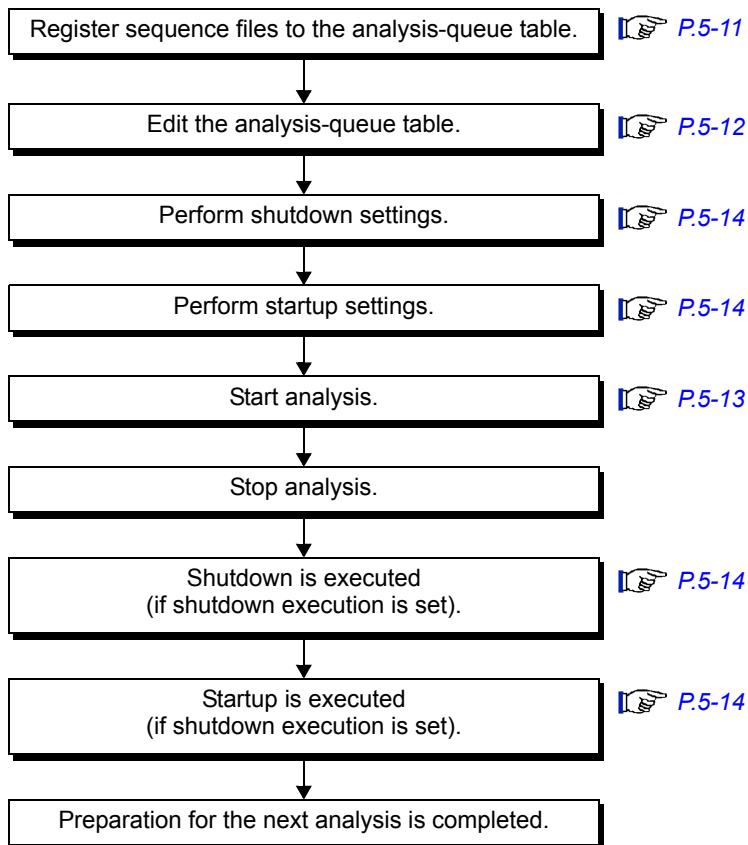
To supplement the information provided in ["4.1.7 Executing Autopurge" P. 4-6](#), a description of the autopurge procedure is provided below.

- Solvent delivery module purge operation can only be executed when the LC-30A/20A series pump (LC-30AD/20AB/20AD/20AT/20AP, etc.) is connected as "Pump A", and when the SIL-30A/20A series autosampler (SIL-30AC/30ACMP/20A/20AC, etc.) is connected as the autosampler. (See note 1.)
 - Purge operation using the [Perform purge according to gradient parameters set in method.] option can only be executed when the SIL-30A/20A series autosampler (SIL-30AC/30ACMP/20A/20AC, etc.) is connected as the autosampler. (See note 1.)
 - Autopurge of the flow line can be executed only for flow lines in systems with pump A.
 - Depending on the pumping mode, Autopurge may be executed for up to 4 solvents.
 - Autopurge can be executed while the autosampler is not running.
 - The purge execution time cannot be set if an SIL-10A-series Autosampler is connected.
1. If the connected autosampler is the SIL-30AC, autopurge cannot be executed when the loop injection is set for the injection type.

5.4 Analysis Using Queues

This system controller allows several sequence files to be registered to the table on the "Queue" tab page. This creates an "analysis queue", and continuous analysis is performed based on these files in the order they appear in the table. The table in the "Queue" tab page is referred to here as the "analysis-queue table."

The overall flow of operations required to use analysis queues is shown below.

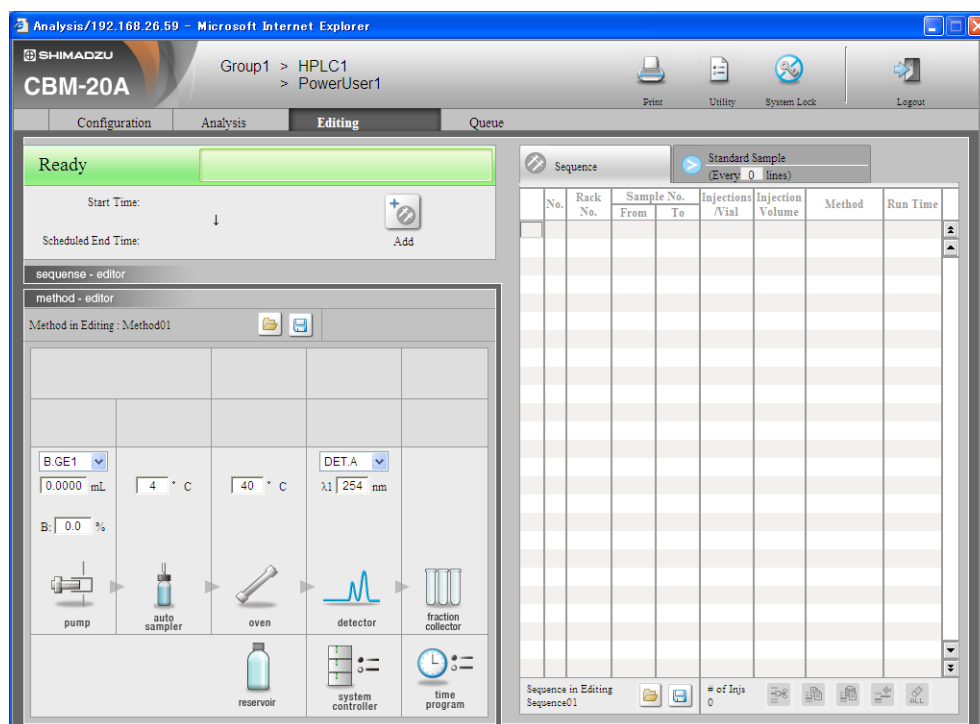




5.4.1 Registering Sequence Files to the Analysis-queue Tables

Analysis-queue tables are registered in the "Editing" tab page. Although the analysis-queue table itself is displayed by clicking the [Queue] tab, the sequence files are not registered directly into the table; they are registered in the "Editing" tab page.

The method for registering sequence files in an analysis-queue table is described below.

- 1 Click the [Editing] tab.
The "Editing" tab page is displayed.



- 2 Select a sequence file to be registered to the analysis-queue table and used for analysis.
 ["4.3.1 Selecting Sequence Files" P. 4-22](#)
- 3 Click  in the "Sequence" section.
The sequence file is registered to the analysis-queue table.
- 4 Repeat steps 2 and 3 until all the required sequence files are registered to the analysis-queue table.

5. Application Operation


5.4.2 Editing Analysis-queue Tables

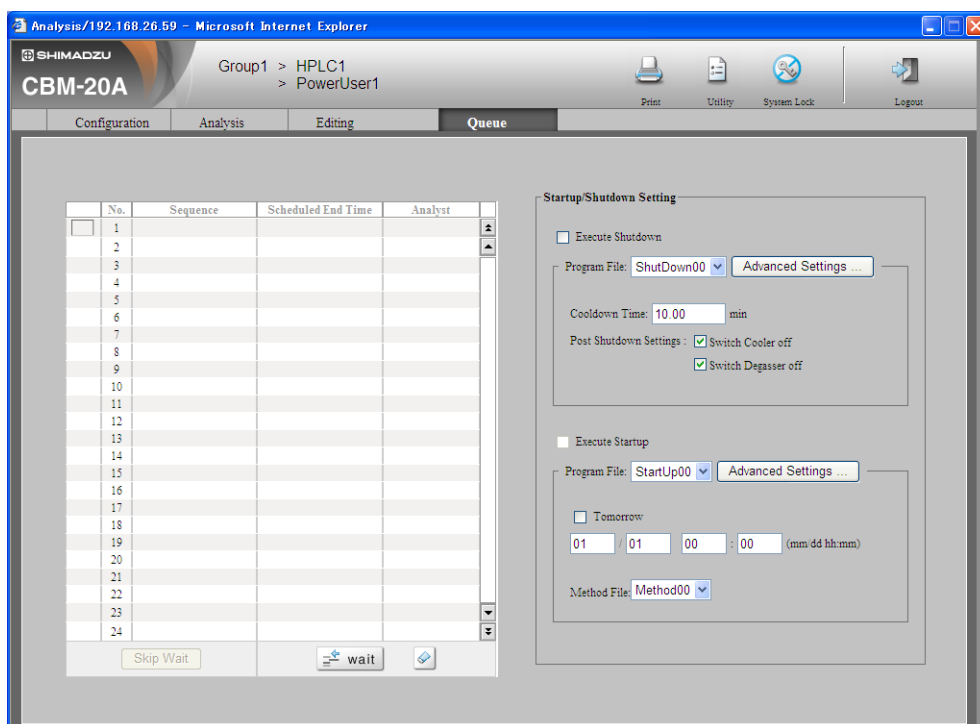
It is possible to delete registered sequence files from the analysis-queue table and to put the analysis queue into wait status by inserting WaitSeq lines.

■ Displaying Analysis-queue Tables

Display the analysis-queue table to review the registered sequence files.


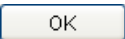
- 1 Click the [Queue] tab in the "Analysis Execution" application window.
The analysis-queue table is displayed.

 For details on the "Startup/Shutdown Setting" section on the right of the page, refer to "5.5 Shutdown and Startup Settings" P. 5-14.



■ Deleting Registered Sequence Files

The method for deleting sequence files registered to an analysis-queue table is described below.

- 1 Select the sequence file to be deleted from the analysis-queue table by clicking the box on the left of the filename.
The selected line turns light blue.
- 2 Click .
The message [Selected line will be deleted. Continue?] is displayed.
- 3 Click .
The sequence file is deleted.


■ Putting the Analysis Queue in Waiting Status

An analysis queue can be put in waiting status between sequences in the queue by inserting WaitSeq lines in the analysis-queue table.

- 1 Select the first sequence to be executed after the analysis queue is put in waiting status by clicking the box on the left of the filename.
The selected line turns light blue.



Lines that are being or have already been executed cannot be selected.

- 2 Click  .
A WaitSeq line is inserted above the selected line.

5.4.3 Starting Analysis

The method for starting analysis based on an analysis queue is the same as that for standard analysis.

- 1 Click the [Analysis] tab.
The "Analysis" tab page is displayed.

- 2 Click  .
Analysis starts.


5.4.4 Clearing Waiting Status

When an analysis queue comes to a WaitSeq line in an analysis-queue table, the status display changes to [WaitSeq] and the queue enters waiting status. There are two methods for clearing waiting status: one is used in the "Analysis" tab page and the other is used in the "Queue" tab page.

■ Clearing Waiting Status from the "Analysis" Tab Page

- 1 Click the [Analysis] tab.
The "Analysis" tab page is displayed.
- 2 Click the pause button.
Waiting status is cleared and the next analysis sequence is executed.

■ Clearing Waiting Status from the "Queue" Tab Page

- 1 Click the [Queue] tab.
The analysis-queue table is displayed.
- 2 Click  .
Waiting status is cleared and the next analysis sequence is executed.

5.5 Shutdown and Startup Settings


If shutdown and startup are entered in the analysis queue, and analysis for that queue is complete, the system will automatically perform shutdown operations, and prepare for the next analysis. These parameters are entered in the "Queue" tab page.

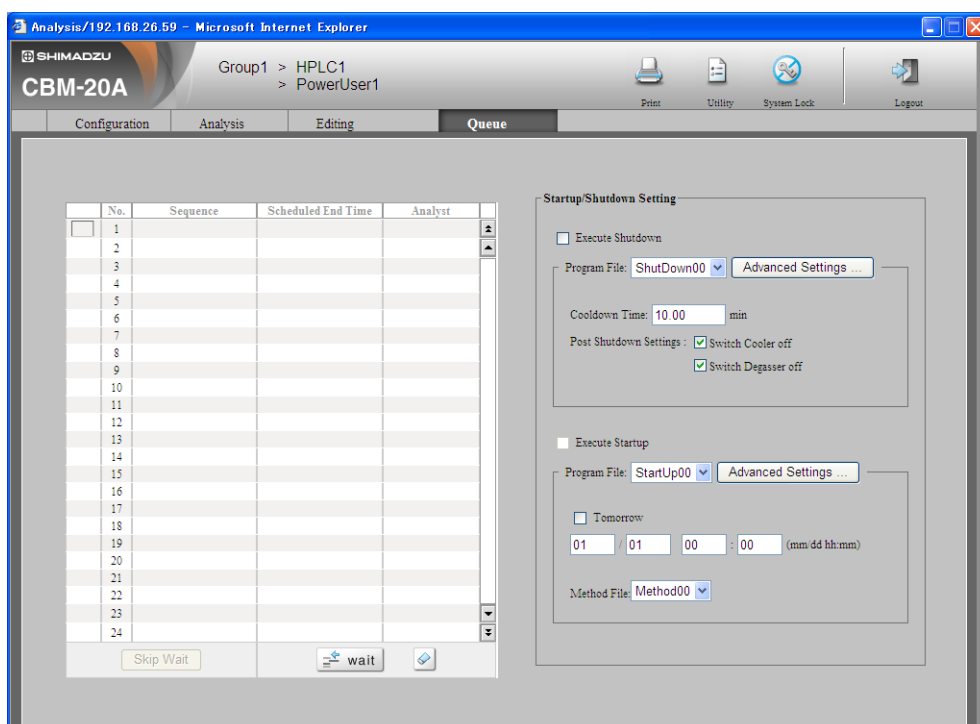
The procedure for inserting shutdown and startup is described below.

5.5.1 Displaying the "Queue" Tab Page

Shutdown and startup settings are performed in the "Queue" tab page.

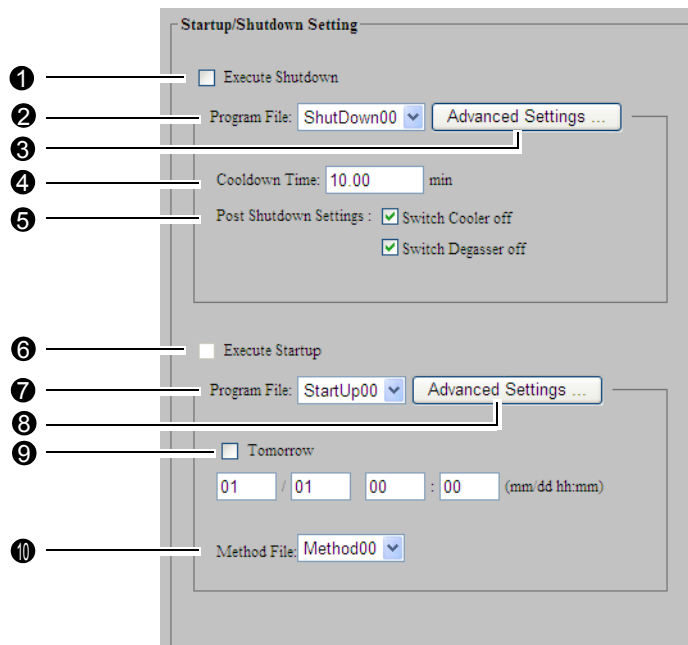
- 1 Click the [Queue] tab.
The "Queue" tab page is displayed.



 For details on the analysis-queue table on the left of the page, refer to ["5.4 Analysis Using Queues" P. 5-10.](#)



5.5.2 Shutdown and Startup Parameters and Buttons

The parameters and button functions of the "Startup/Shutdown Setting" section are described below.



	Setting item or button	Description
①	Execute Shutdown	Click the check box to set shutdown execution.
②	Program File	The pull-down menu contains 12 files, ShutDown00 to ShutDown11. Set the details for the shutdown methods in these files.  The names of these files cannot be changed.
③	Advanced Settings	Click to display the "Advanced Shutdown Settings" window.
④	Cooldown Time	Input the execution time for column cooldown. Setting range: 0.01 to 120.00 (minutes) Setting unit: 0.01 Default setting: 10.00 (minutes).
⑤	Post Shutdown Settings	Click the check boxes for the required items.
⑥	Execute Startup	Click the check box to set startup execution. Startup can be executed only if the "Execute Shutdown" check box is selected.
⑦	Program File	The pull-down menu contains 12 files, StartUp00 to StartUp11. Set the details for the startup methods in these files.  The names of these files cannot be changed.
⑧	Advanced Settings	Click to display the "Advanced Startup Settings" window.

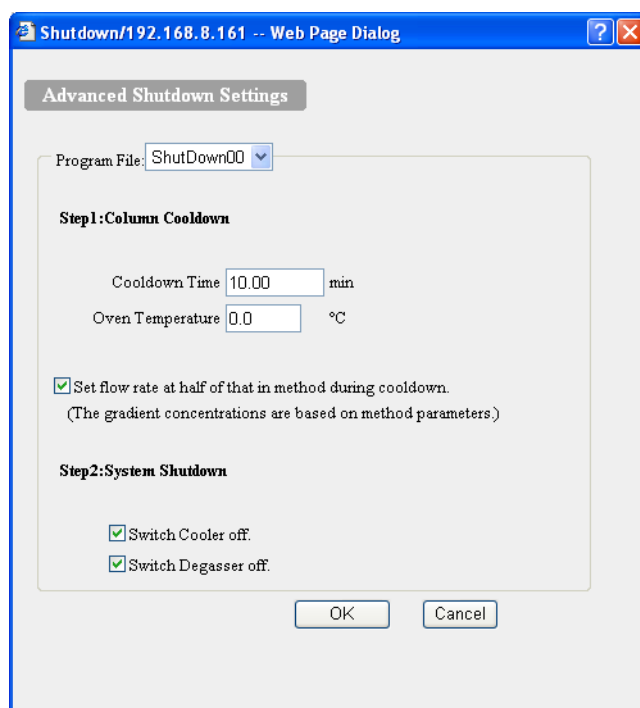
5. Application Operation


	Setting item or button	Description
9	Tomorrow	Click the check box to set startup to be executed on the day after analysis is started. If this check box is selected, only the hour and minute settings can be entered. If this check box is not selected, the month, day, hour, and minute settings can all be input. The time is displayed in 24-hour format.
10	Method File	Select the method file to be executed at startup.



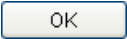
5.5.3 "Advanced Shutdown Settings" Window

Use the "Advanced Shutdown Settings" window to enter the parameter changes that need to be performed after the analysis queue is complete. For example, the column temperature and mobile phase flow rate to be used for cool down are set in this window.

- 1 Click **Advanced Settings** in the "Startup/Shutdown Setting" section.
The "Advanced Shutdown Settings" window is displayed.



- 2 Select the file (ShutDown00 to ShutDown11) in which to save the advanced settings from the [Program File] pull-down menu.
- 3 Input the column's cooldown time.
 -  The setting range is 0.01 to 120.00 (minutes), the setting unit is 0.01, and the default setting is 10.00 (minutes).


- 4 Input the column temperature.
 This item can be set to 0.0 or to a temperature in the range 4.0 to 80.0 (°C). If 0.0 is set, the column turns OFF.
- 5 To execute pumping during cooldown at the concentration and at half the flow rate specified for the pump in the method file, click the [Set flow rate at half of that in method during cooldown.] check box.
- 6 Click the check boxes for required items under [Step 2: System Shutdown].
 Pumping operation by the solvent delivery module, temperature control of the oven, and the detector lamps are all turned OFF when shutdown is executed.
- 7 Click  .
The settings are saved and the window closes.
The cooldown-time setting and the settings made under "Step 2: System Shutdown" are all reflected in the "Startup/Shutdown Setting" section.

5. Application Operation

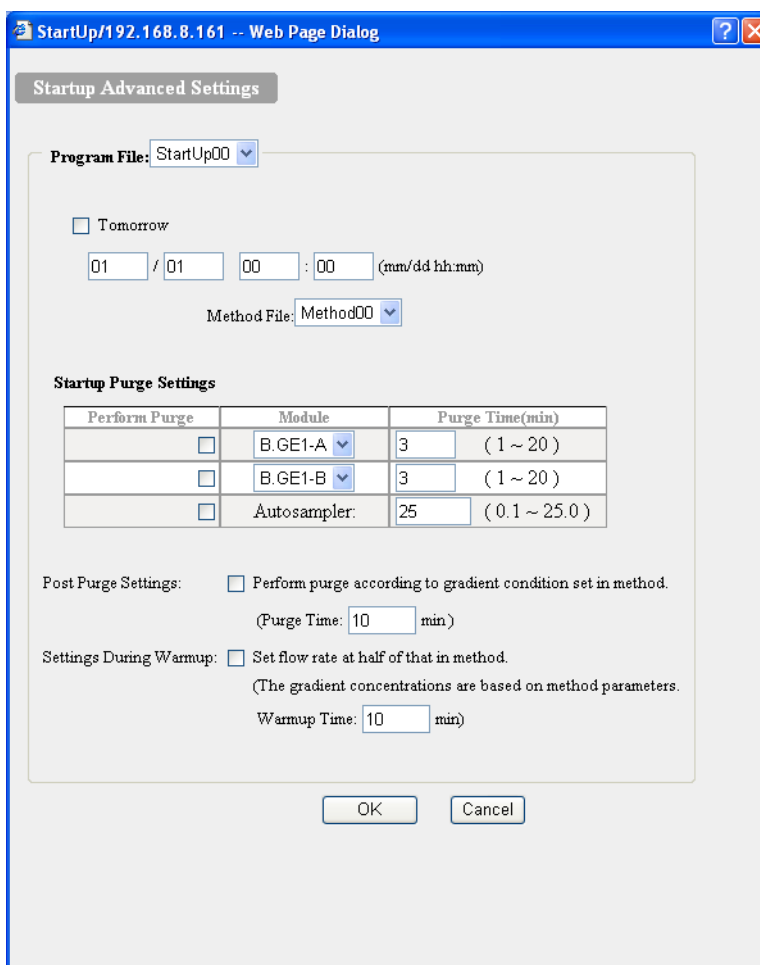
5.5.4 "Advanced Startup Settings" Window

Use the "Advanced Startup Settings" window to enter the parameter changes that need to be performed before analysis can begin on the analysis queue. For example, the purge operation and mobile phase flow rate to be used during warm up are set in this window.


 ["5.3 Executing Autopurge for Solvent Delivery Modules and Autosamplers" P. 5-9](#)

 The "Execute Startup" check box can be selected only when the "Execute Shutdown" check box is selected.








- 1 Click .
The "Advanced Startup Settings" windows is displayed.



Perform Purge	Module	Purge Time(min)
<input checked="" type="checkbox"/>	B.GE1-A	3 (1 ~ 20)
<input checked="" type="checkbox"/>	B.GE1-B	3 (1 ~ 20)
<input type="checkbox"/>	Autosampler	25 (0.1 ~ 25.0)

 The contents displayed in the window vary with the type of solvent delivery module and autosampler connected.

- 2 Select the file (StartUp00 to StartUp11) in which to save the advanced settings from the [Program File] pull-down menu.

- 3 To execute startup on the next day, click the [Tomorrow] check box.
- 4 Select the method file to be executed at startup from the [Method File] pull-down menu.
- 5 Click the boxes in the [Perform Purge] column corresponding to the components (in the [Module] column) for which purge operation is to be executed at startup.
 -  The solvent delivery module (pump) names are displayed only if an LC-30A/20A series pump (LC-30AD/20AB/20AD/20AT/20AP, etc.) and an SIL-30A/20A series autosampler (SIL-30AC/30ACMP/20A/20AC, etc) are connected.
- 6 Input the purge execution times for components selected in step 5.
 -  The setting ranges for purge execution time are 0 to 20 (minutes) for the pump and 0.1 to 25.0 (minutes) for the autosampler.
 -  If the connected autosampler is the SIL-30AC/30ACMP, "0" (minutes) can be set for the purge execution time.
 -  The purge execution time cannot be set if an SIL-10A-series Autosampler is connected.
- 7 To execute purge operation according to the gradient condition set in the method file after autopurge is completed, click the [Perform purge according to gradient condition set in method.] check box.
 -  Purge operation using the [Perform purge according to gradient parameters set in method.] option can only be executed when the SIL-30A/20A series autosampler (SIL-30AC/30ACMP/20A/20AC, etc) is connected.
- 8 If the [Perform purge according to gradient condition set in method.] check box is selected, input the purge execution time in the [Purge Time] field.
 -  The input range is 1 to 120 (minutes).
- 9 To execute pumping at half the flow rate set in the method file during warmup, click the [Set flow rate at half of that in method.] check box.
- 10 If the [Set flow rate at half of that in method.] check box is selected, input the pumping time in the [Warmup Time] field.
 -  The input range is 1 to 120 (minutes).

11 Click  .

The settings are saved and the window is closed.

The settings for month, day, hour, and minute of startup execution as well as the items of the method file are all reflected in the "Startup/Shutdown Setting" section.

5.6 Analysis Using Fraction Collectors

Using a fraction collector makes it possible to automatically measure out (fractionate) eluate from the column according to the detector signals. To use a fraction collector, enter the fraction collector parameters in the method file. A time program controls the fraction collector in the same way as other components. If a rack other than a Shimadzu rack is used, teaching of the custom rack must be performed for the fraction collector.

5.6.1 Selecting Method Files

Select a method file that uses the fraction collector.

The method file can be selected from either the "Analysis" tab page or the "Editing" tab page in the "Analysis Execution" application.

The selection method is the same for both pages.

 ["4.2.1 Selecting Method Files" P. 4-10](#)


5

5.6.2 Parameters for the Fraction Collector

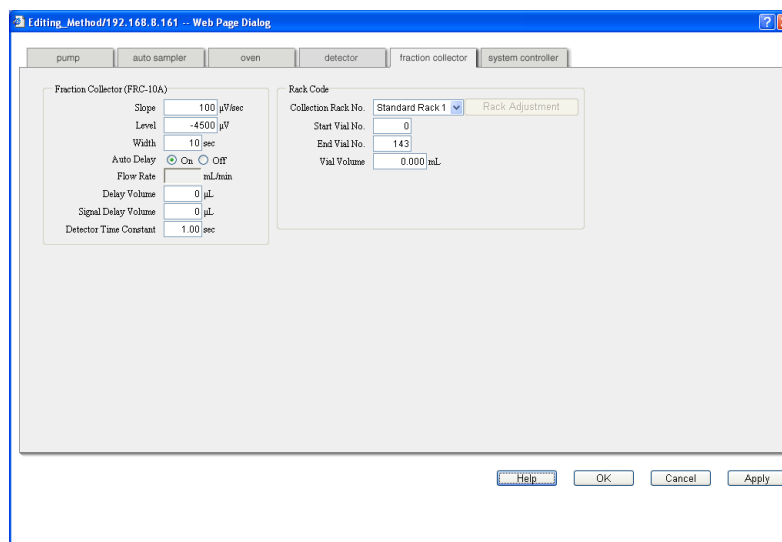
Set the parameters for the fraction collector, such as the slope and the level.

The method for setting the parameters from the "Analysis" tab page is described below.




1

Click  in the "Analysis" tab page.

The "Fraction Collector" tab page in the "Method Parameter" window is displayed.





5. Application Operation

- 2 Set the method parameters for the fraction collector.
 -  For details on the setting ranges, minimum units, units, and default values for the parameters, refer to ["5.12.5 Fraction Collector" P. 5-109](#). For details on the functions of the buttons, refer to ["4.2.2 Editing the "Method Parameter" Window" P. 4-12](#).
 -  For parameters such as the vial volume, set values that match the operating environment. For example: when set to Vial volume: 0.01 mL, Flow rate: 10 mL/min, the fraction time will be 60 mS per vial ($0.01 \text{ [ml]}/10 \text{ [ml/min]} = 0.001 \text{ [min]}$), which will be too short to actually allow fractioning. Set the parameters to allow for intervals of at least 2 to 3 seconds or more.
- 3 Click  when setting is complete. The "Method Parameter" window closes.

5.6.3 Controlling the Fraction Collector with a Time Program


The fraction collector can be controlled with a time program in the same way as other components.

-  For details on how to set time programs, refer to ["4.4 Gradient Analysis Using Time Programs" P. 4-28](#). For details on the commands, setting ranges, and default values for the fraction collector, refer to ["5.13 List of Time-program Commands" P. 5-115](#).
-  When setting fraction-collector commands in a time program, be sure that the time set for the first fraction-collector command is at least 0.33 minutes.

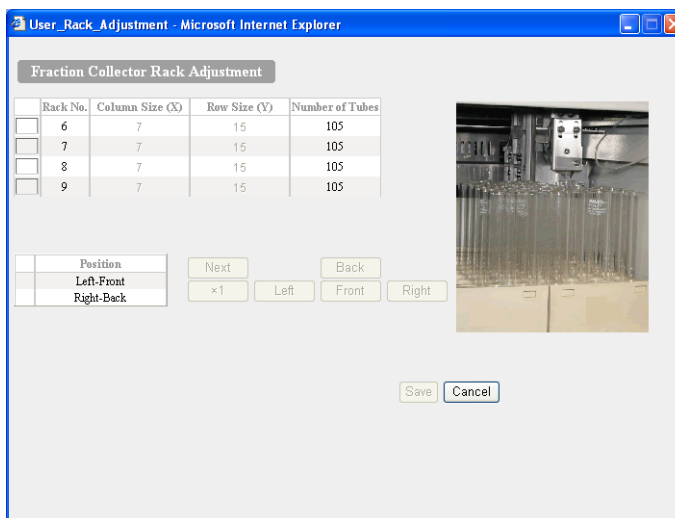
5.6.4 Setting the Number and Positions of Vials in Racks

If using a fraction collector rack other than a Shimadzu rack, the number and positions of vials must be stored in the system. Enter the rack information in the "Fraction Collector Rack Adjustment" window.

■ Displaying the "Fraction Collector Rack Adjustment" Window

- 1 Click  in the "Analysis" tab page. The "Fraction Collector" tab page in the "Method Parameter" window is displayed.
- 2 Select the desired rack ("User Rack" 6 to 9) from the [Collection Rack No.] pull-down menu.

- 3 Click .
The "Fraction Collector Rack Adjustment" window is displayed.



■ Functions of Buttons

The functions of the buttons and the setting items displayed in the window are described in the following table.

Display	Description
Rack No.	Displays "User Rack" numbers 6, 7, 8, and 9.
Column Size (X)	Input the number of vials in the left-right direction across the rack.
Row Size (Y)	Input the number of vials in the front-back direction across the rack.
Number of Tubes	When the number of vials in the left-right and front-back directions have been input, the total number of vials is calculated automatically and displayed.
<input type="button" value="Next"/>	Click to set the corner of the rack.
<input type="button" value="×1"/> <input type="button" value="×10"/>	Used to change the scale for position adjustment. The scale switches between [×1] (2 mm) and [×10] (20 mm) each time the button is clicked.
<input type="button" value="Front"/> <input type="button" value="Back"/> <input type="button" value="Left"/> <input type="button" value="Right"/>	Used for position adjustment of the fraction collector's arm. The arm operates according to the scale set with the scale-change button.

■ Adjusting the Rack Position

Set the rack position in the "Fraction Collector Rack Adjustment" window using the following procedure.

- 1** Select the rack to be adjusted by clicking the box on the left of the corresponding rack number.
The selected line turns blue.
- 2** Input the number of vials in the rack's X direction.
This field turns gray and the [Row Size (Y)] field becomes active.
- 3** Input the number of vials in the rack's Y direction.
This field becomes gray and the total number of vials is automatically calculated and displayed in the [Number of Tubes] field. Also, [Left-Front] is selected under [Position] and the position-adjustment buttons become active.
- 4** Move the fraction collector's arm to the position of the left-front vial using the position-adjustment buttons and click .
The left-front position is set. [Right-Back] is selected and the photo in the window switches to one showing the corresponding view.
- 5** Move the fraction collector's arm to the position of the right-back vial using the position-adjustment buttons and click .
The right-back position is set and the window closes.
- 6** Click to cancel the settings.
The window closes without saving the settings.

5.7 Managing Files

With this system controller, method and sequence files can be saved to a PC and then downloaded from the PC when needed. It is also possible to create new files by copying existing files and editing the parameters.



5.7.1 Saving Files to a PC

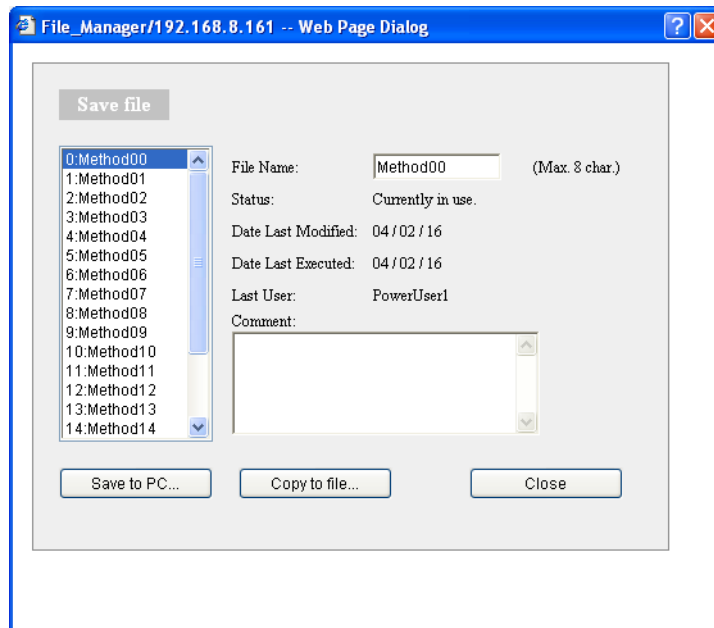
Use the procedure described below to save method and sequence files to a PC. The procedure is the same for both types of file.

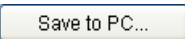
Files can be saved to the PC from either the "Analysis" tab page or the "Editing" tab page. The procedure for saving files from the "Analysis" tab page is described below.

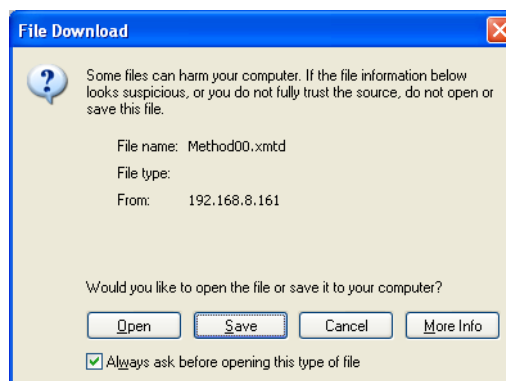
- 1 Click the [Analysis] tab.
The "Analysis" tab page is displayed.

5. Application Operation

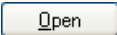
- 2 Click  in the "Method" section to save method files and click  in the "Sequence" section to save sequence files.
The "Save file" window is displayed.

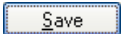


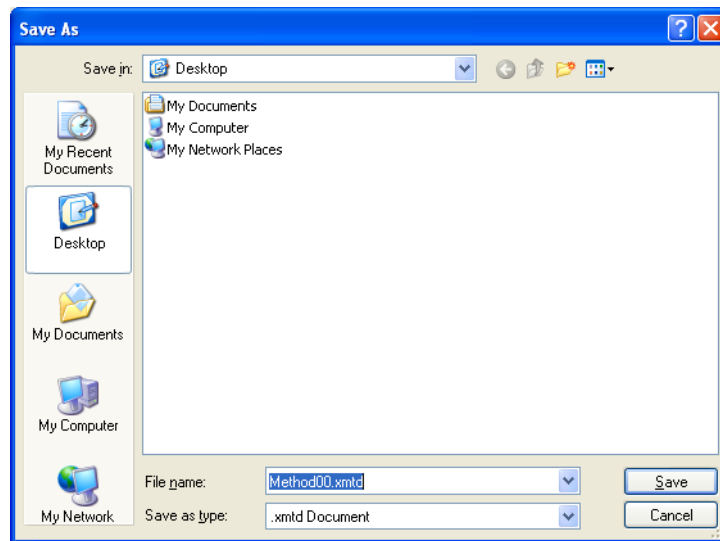
- 3 Select the file to be saved from the list on the left of the window.
- 4 Click  .
The following window is displayed.



CAUTION

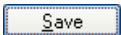
Do not click  . Clicking this button and associating the file with another application may make it impossible to save the file. If this button is inadvertently clicked and the "Open With" window is displayed, close the window by clicking [Cancel].

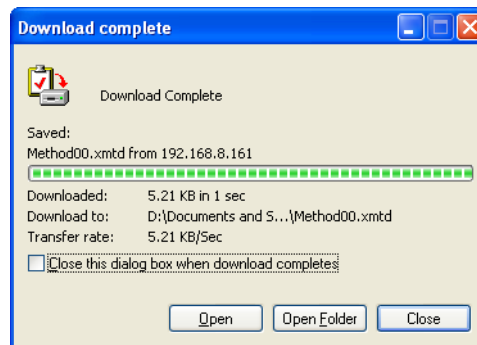
- 5 Click  .
The following window is displayed.

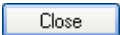


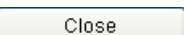
- 6 Select the save location.

- 7 Input the filename.

- 8 Click  .
The file is saved in the selected location and the following window is displayed.



- 9 Click  in the "Download complete" window.
The window closes.

- 10 Repeat steps 3 to 9 until all the required files are saved. To end the saving procedure, click  in the "Save file" window.

The "Save file" window closes.

5. Application Operation

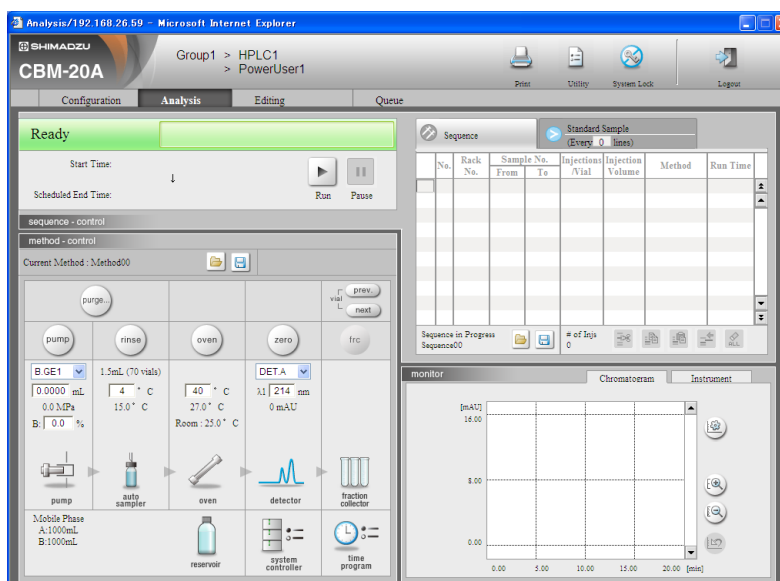
5.7.2 Creating New Files Using Existing Files



It is possible to create new method and sequence files by copying and using the parameters from existing files. The procedure is the same for both types of files.

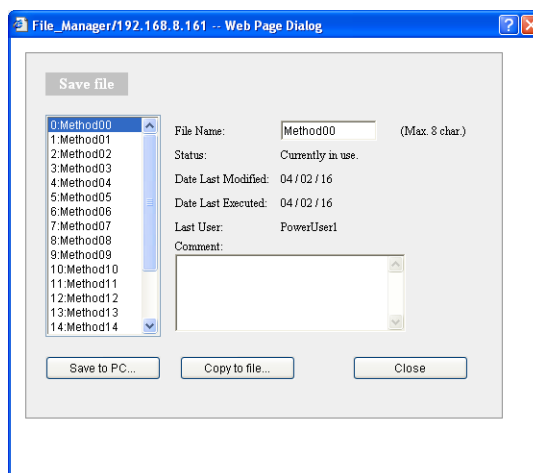
Existing files can be copied to other files from either the "Analysis" tab page or the "Editing" tab page.

The procedure for copying from the "Analysis" tab page is described below.

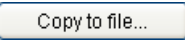
- 1 Click the [Analysis] tab.
The "Analysis" tab page is displayed.

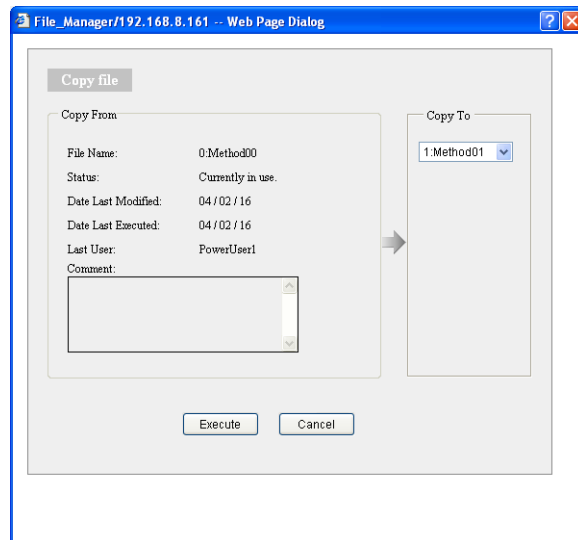


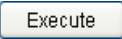


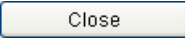
- 2 Click  in the "Method" section to save method files and click  in the "Sequence" section to save sequence files.
The "Save file" window is displayed.



- 3 Select the file to be copied from the list on the left of the window.

- 4 Click  .
The following window is displayed.



- 5 Select the file to be copied to from the [Copy To] pull-down menu.
- 6 Click  .
The parameters in the file selected in step 3 are copied to the file selected in step 5.
-  Click  to close the window and return to the "Save file" window.
- 7 Repeat steps 3 to 6 until all the required files are copied. To end the copying procedure, click  in the "Save file" window.
The "Save file" window closes.

5.7.3 Downloading Files from a PC

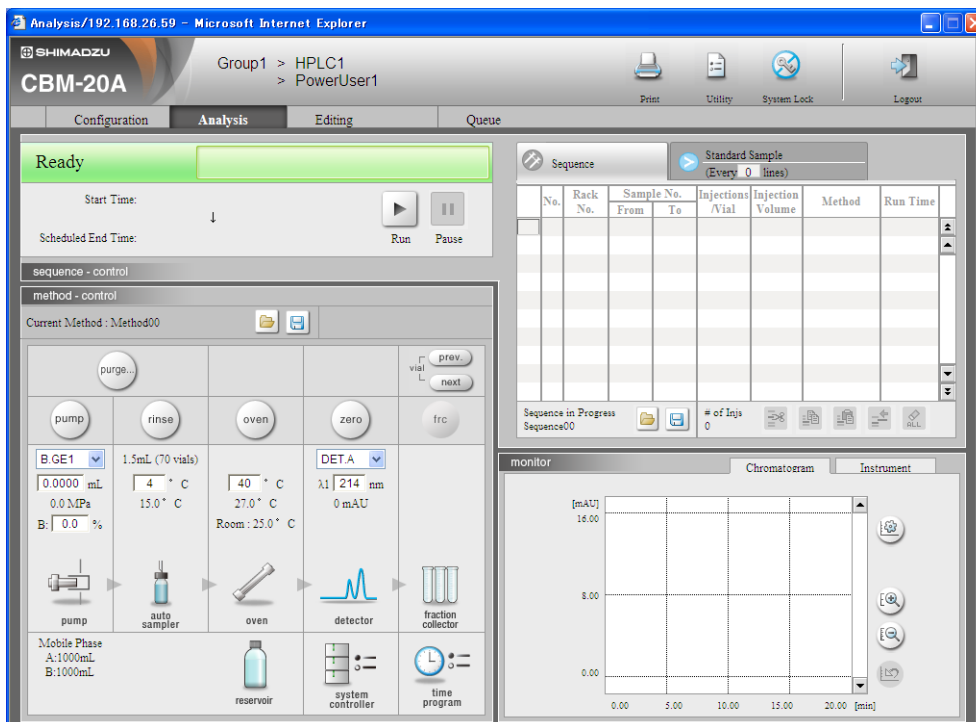
Method and sequence files that have been saved to a PC can be downloaded. The procedure is the same for both file types.



Files saved to a PC can be downloaded from either the "Analysis" tab page or the "Editing" tab page.

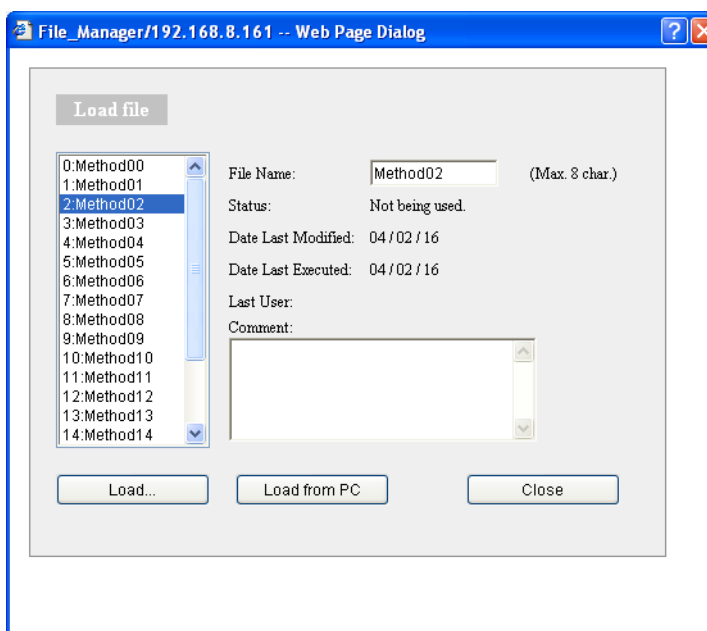
The procedure for downloading files from the "Analysis" tab page is described below.

5. Application Operation

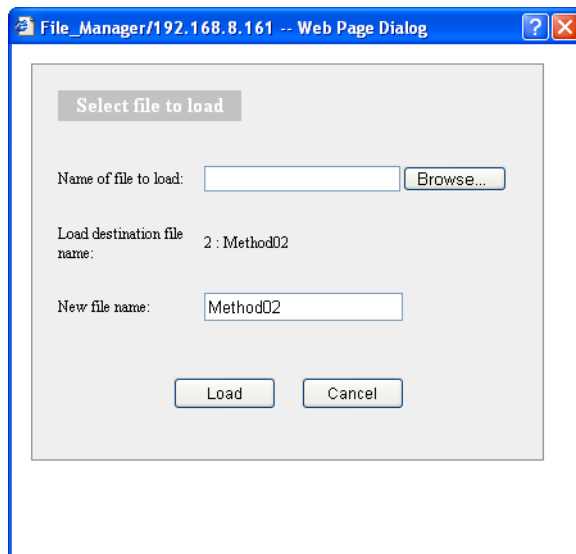
- 1 Click the [Analysis] tab.
The "Analysis" tab page is displayed.



- 2 Click  in the "Method" section to download method files and click  in the "Sequence" section to download sequence files.
The "Load File" window is displayed.




- 3 Click .
The following window is displayed.



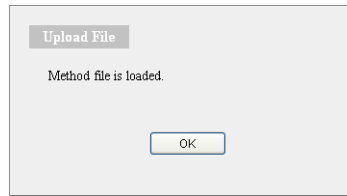
- 4 Click next to the [Name of file to load] field.
The following window is displayed.



- 5 Select the file to be downloaded.
 The files with the ".xmtd" extension can be downloaded as method files and the files with the ".xseq" extension can be downloaded as sequence files.
 The selected file is displayed in the [File name] field.
- 6 Click .
The [Open] window closes and the name of the selected file is displayed in the [Name of file to load] field in the "Select file to load" window.
- 7 The filename can be changed by inputting a new filename in the [New file name] field. Up to 8 characters can be entered for method files and up to 10 characters for sequence files. The symbols "-" (hyphen) and "_" (underscore) can be used.

5. Application Operation

- 8** Click .
The following window is displayed.



- 9** Click .
This completes the procedure for downloading a file.

- 10** Repeat steps 3 to 9 until all the required files are downloaded. To end the downloading procedure, click in the "Load File" window.


The "Load File" window closes.

5.8 Managing Component Parameters

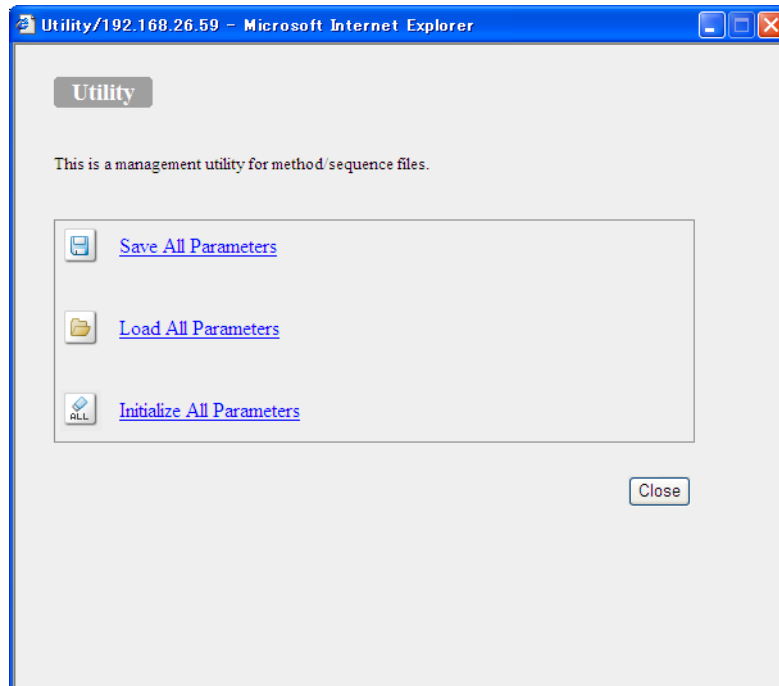
With this system controller, the parameters in method and sequence files can be saved to and subsequently downloaded from a PC either separately or in one operation.

5.8.1 Saving All Component Parameters to a PC


All the parameters in the method and sequence files can be saved in one operation. This operation is performed from the "Utility" window.

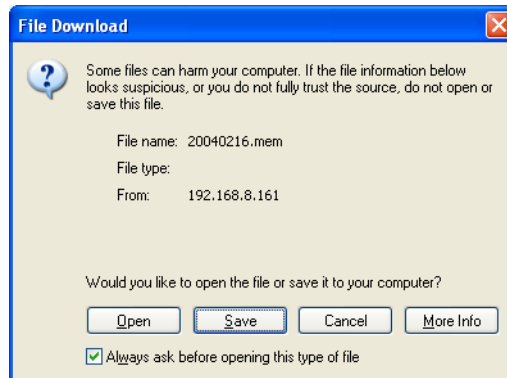
- 1 Click  in the "Analysis Execution" application window.

The "Utility" window is displayed.

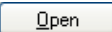


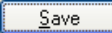
5. Application Operation

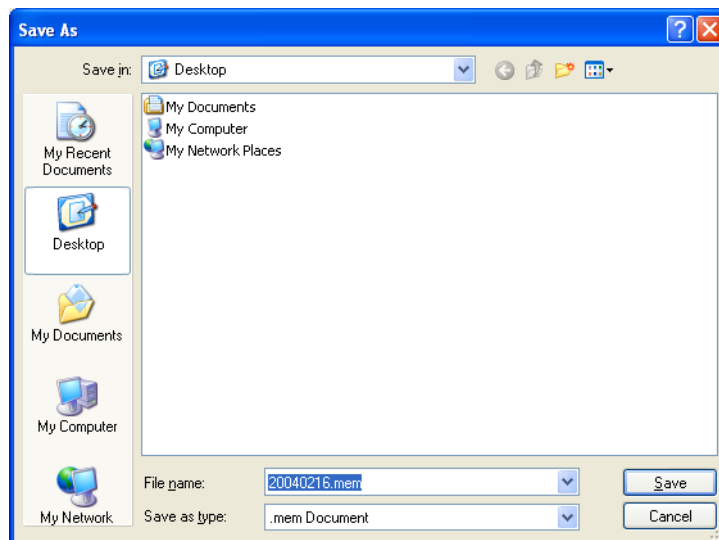
- 2 Click  or [Save All Parameters].
The following window is displayed.



CAUTION

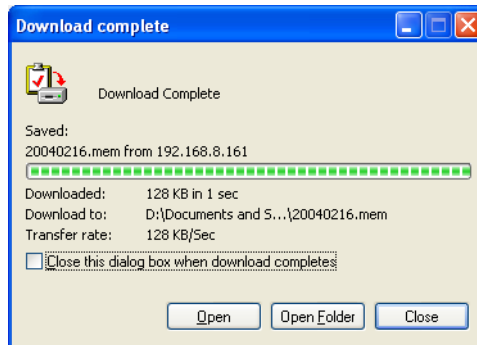
Do not click . Clicking this button and associating the file with another application may make it impossible to save the file. If this button is inadvertently clicked and the "Open With" window is displayed, close the window by clicking [Cancel].

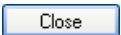
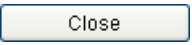
- 3 Click .
The following window is displayed.



- 4 Select the save location.
- 5 Input the filename.

- 6 Click . The file is saved in the selected location and the following window is displayed.




- 7 Click  in the "Download complete" window. The window closes.
- 8 To end the saving procedure, click  in the "Utility" window. The "Utility" window closes.

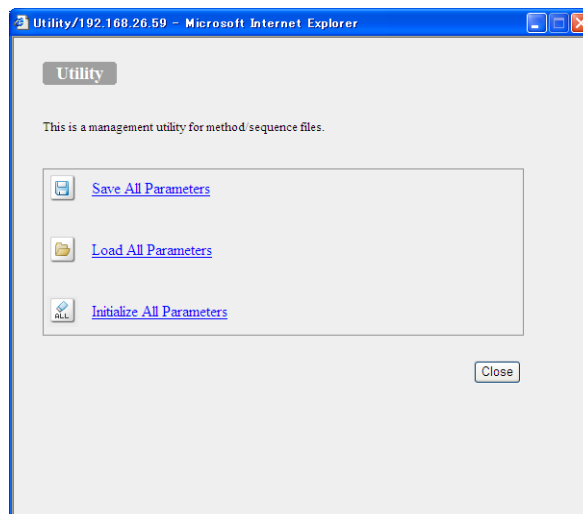
5.8.2 Downloading All Component Parameters from a PC

All the parameters saved from method files and sequence files to a PC can be downloaded together. This operation is performed from the "Utility" window.




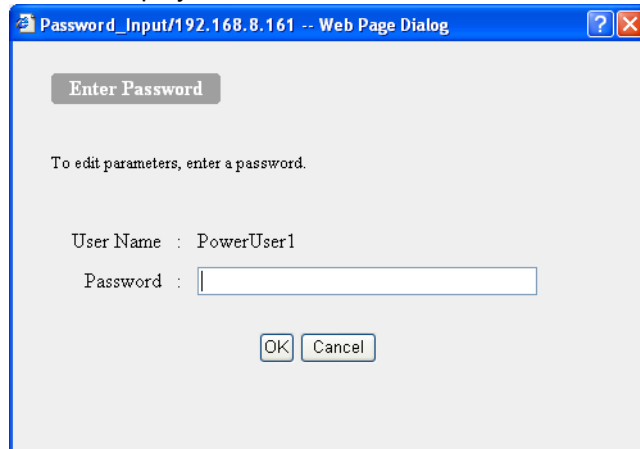
This operation can be performed only by Administrators or Power Users.


- 1 Click  in the "Analysis Execution" application window. The "Utility" window is displayed.

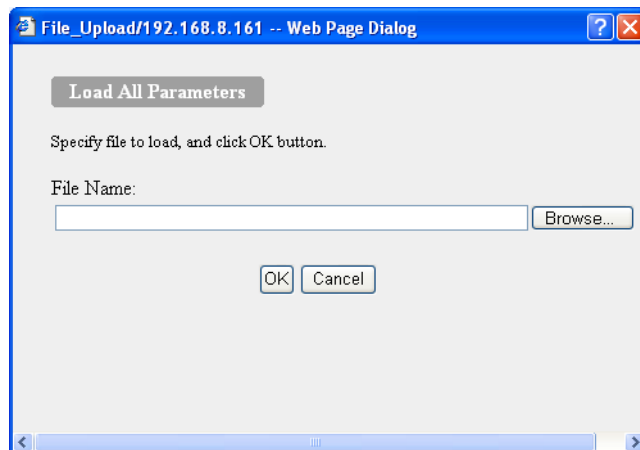


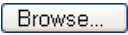
5. Application Operation

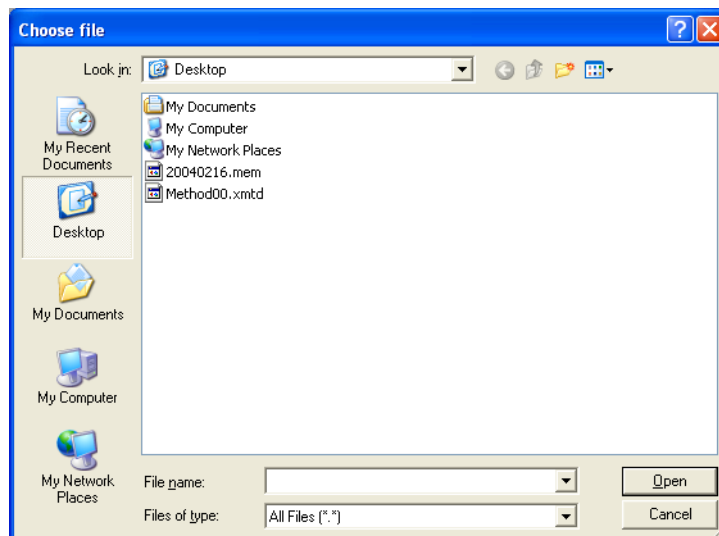
- 2 Click  or [Load All Parameters].
The following window is displayed.




- 3 Input the user password.
- 4 Click .
The [Load All Parameters] window is displayed.



- 5 Click  next to the [File Name] field.
The following window is displayed.



6 Click the file to be downloaded.

 Only files with the extension ".mem" can be downloaded.

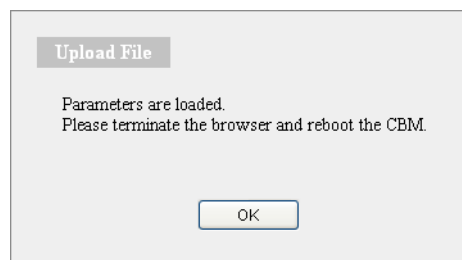
The name of the selected file is displayed in the [File name] field.

7 Click .

The [Choose file] window closes and the name of the selected file is displayed in the [Name of file to load] field in the "Select file to load" window.

8 Click .


The following window is displayed.



9 Click .

10 Click in the "Utility" window.

The "Utility" window closes.

11 Click  and close the "Analysis Execution" application. Also close the "Group Monitor" application.


12 Reset the power to the system controller.

5.8.3 Initializing Parameters


It is possible to delete all of the parameters in the method and sequence files and return the parameters to their default settings. This operation is performed from the "Utility" window.

WARNING

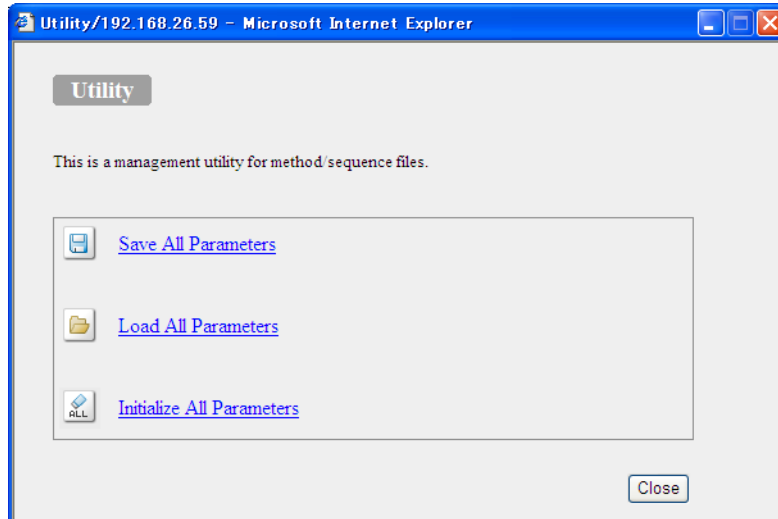
Performing this operation returns all parameters in method and sequence files, including configuration parameters, to their default settings.


 This operation can be performed only by Administrators or Power Users.

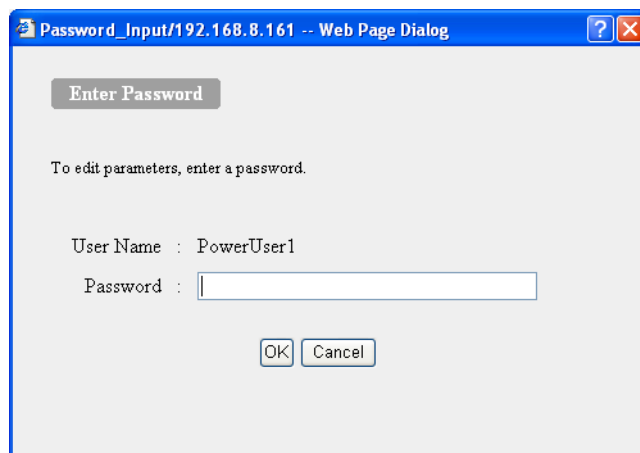
5. Application Operation


- 1 Click  in the "Analysis Execution" application window.

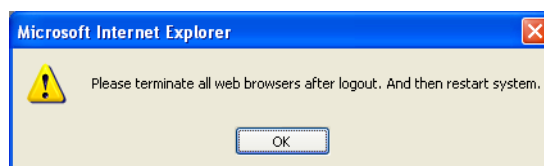
The "Utility" window is displayed.



- 2 Click  or [Initialize All Parameters].
The following window is displayed.





- 3 Input the user password.
- 4 Click  .
The following window is displayed.



- 5 Close the browser and turn OFF the power to the system controller. The parameters are initialized when power is turned ON.

5.9 Managing Groups


With this system controller, it is possible to change and delete the user information and components registered to groups as well as register new components and users. These functions are used in the "Group Settings" application.

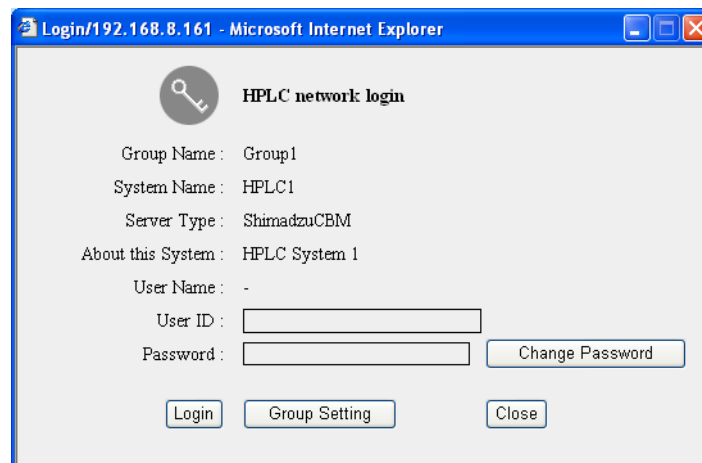
-  Only Administrators can log into the "Group Settings" application. It is not possible to log into a system if there is a user already logged in, there is an active login restriction, or analysis is being performed by that system.
-  When changing network settings without connecting to the network, make the changes from the [Calibration] menu of the LC-30A/20A series pump (LC-30AD/20AB/20AD/20AT/20AP, etc.), autosampler (SIL-30AC/30ACMP/20A/20AC, etc.), UV detector (SPD-20A/20AV), or fluorometric detector (RF-20A/20Axs) or using terminal software via an RS-232C connection.

 ["9.3.2 Making TCP/IP-related Settings" P. 9-30](#)

5.9.1 Displaying the "Group Settings" Application Window

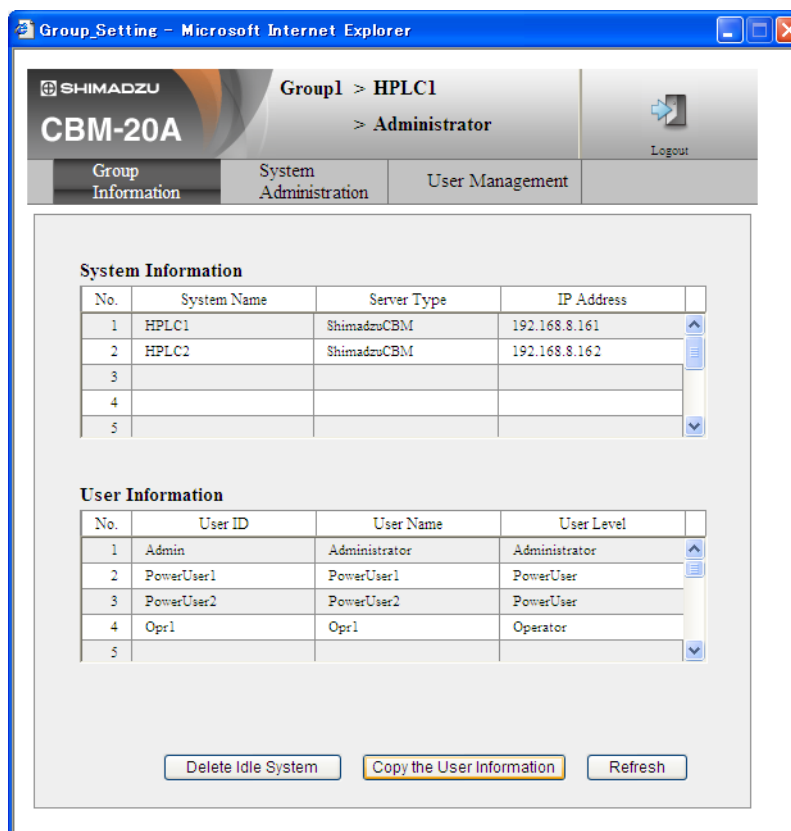
Use the following procedure to display the "Group Settings" application window.

- 1 Click  or the system name in the "Status" tab page. The "Login" window is displayed.




5. Application Operation

- 2 Input the user ID and password and click . The "Group Settings" application window is displayed.

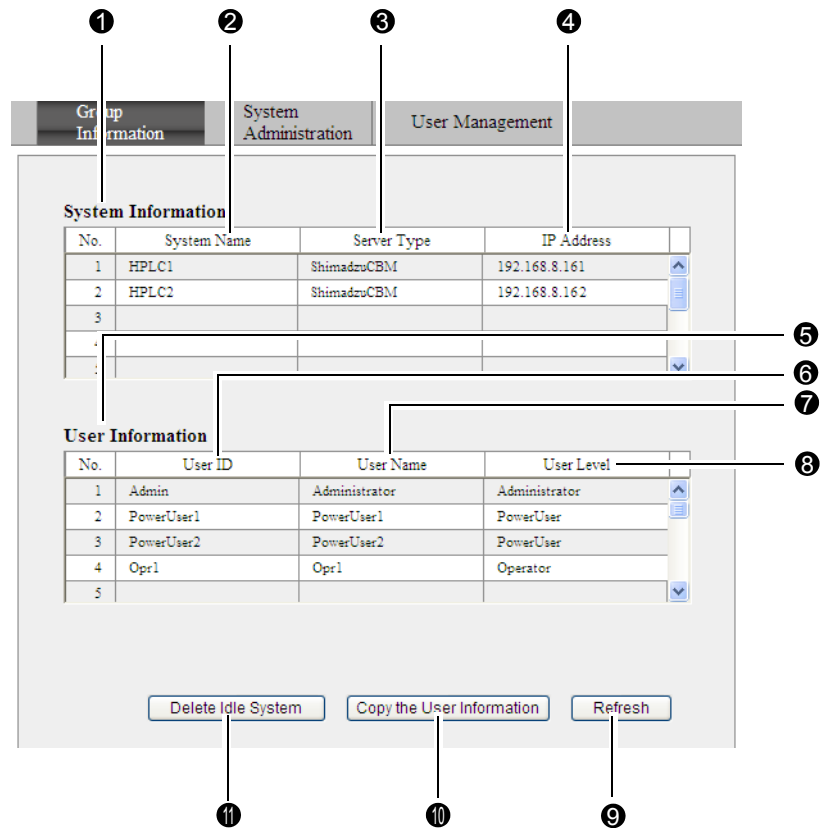


The "Group Settings" application window consists of three tab pages: "Group Information", "System Administration", and "User Management".

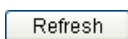
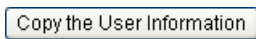

Page or button	Description
"Group Information" tab page	This page is displayed when the "Group Settings" application window is logged into or when the [Group Information] tab is clicked. Information on the systems and users registered to the group is displayed.
"System Administration" tab page	This page is displayed when the [System Administration] tab is clicked. It is used to configure settings related to information on systems in the group and restrictions on user access to these systems.
"User Management" tab page	This page is displayed when the [User Management] tab is clicked. It is used to register new users and change or delete information on registered users.
	Logout button. This button is displayed with all 3 tab pages. If it is clicked, the "Group Settings" application window is closed and the "Group Monitor" application window is displayed.

5.9.2 "Group Information" Tab Page

Information on the systems and users currently registered to the group is displayed in the "Group Information" tab page. This page is displayed when the "Group Settings" application window is logged into or when the [Group Information] tab is clicked.






	Display	Description
①	System Information Table	Displays information on up to 10 systems. If there are systems in the group with power turned OFF, the information for these systems is displayed in red.
②	System Name	Displays the names used to identify the system controllers or PDA detectors registered to the group.
③	Server Type	Displays the server types for the system controllers or PDA detectors registered to the group. (Always [ShimadzuCBM] or [SimadzuPDA].)
④	IP Address	Displays the network addresses for the system controllers or PDA detectors registered to the group.
⑤	User Information Table	Displays up to 20 items of user information.
⑥	User ID	Displays the registered user IDs.
⑦	User Name	Displays the names of the registered users.
⑧	User Level	Displays the access level set for the user.

	Display	Description
9		Click to display the latest information for the system logged into and the users logged in.
10		Click to copy the information in the user information table for the system logged into to all the other systems in the group. Information is not copied, however, to systems that are powered OFF.
11		Click to delete information on systems with power turned OFF from the system information table. This button is used to delete information on systems that are no longer recognized in the network (e.g., due to relocation or removal). Although information is also deleted for systems that are recognized in the network but have their power turned OFF, these systems are automatically re-registered to the table when power is turned ON again.

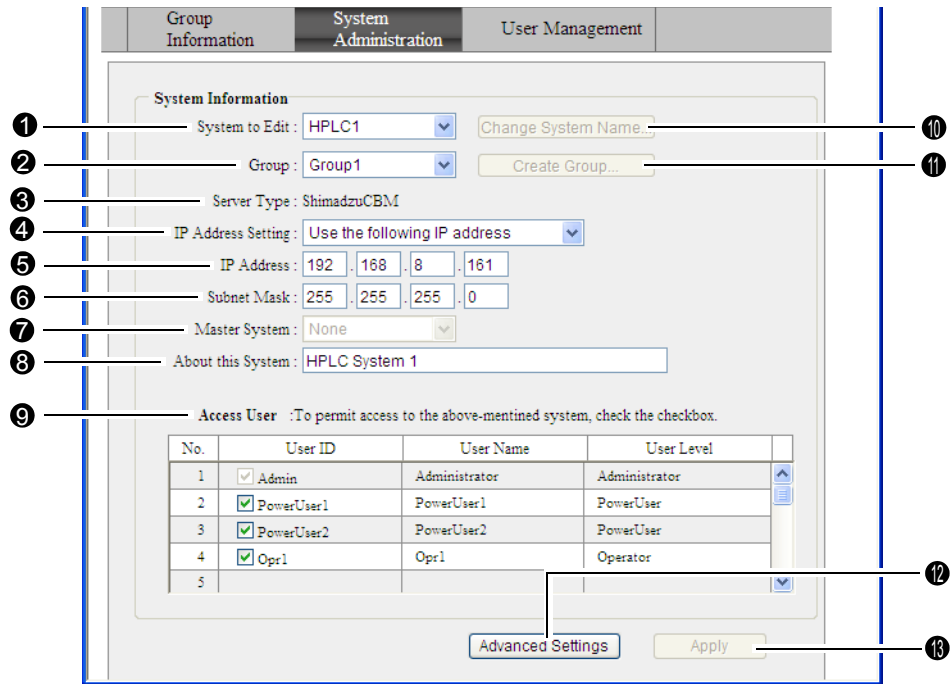
■ Sharing and Centralizing User Information for Systems in a Group

The user information for each system is stored at the respective system. To share user information, centralize all the user information at one designated system and copy the information to other systems.


- 1 Create, change, and delete user information as necessary.
 ["5.9.4 User Registration" P. 5-48](#), ["5.10 Changing Passwords" P. 5-55](#)
- 2 Confirm that the power is ON for all of the systems listed in the system information table.
 Changes in user information are not reflected in systems with power turned OFF.
- 3 Click [Copy the User Information].
- 4 Set the access users for each system in the "System Administration" tab page.
 ["5.9.3 "System Administration" Tab Page" P. 5-43](#)

5.9.3 "System Administration" Tab Page

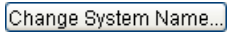

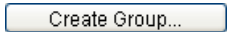
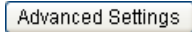

This page is used to edit system information related to a group. Parameters related to restrictions of user access to systems are entered in the "System Administration" tab page. This page is displayed by clicking the [System Administration] tab in the "Group Settings" application.



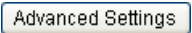
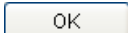

5

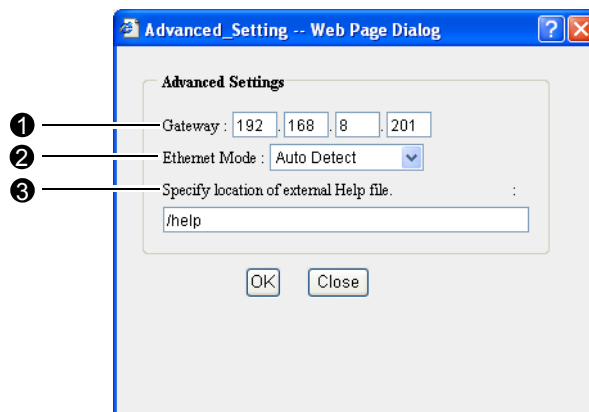
	Display	Description
❶	System to Edit	Select the name of the system to be edited from the pull-down menu. The information for the selected system can be displayed and the settings changed without logging into that system.
❷	Group	To move the system selected for editing to another group, select the group from the pull-down menu. The status of being unregistered to any group is also available (displayed as [-]).
❸	Server Type	The system controller's server type is displayed. ([ShimadzuCBM] for all controllers.)
❹	IP Address Setting	Select "Obtain an IP address automatically" when obtaining an IP address from a DHCP server.  Appendix "Automatic Acquisition of IP Addresses from a DHCP Server" P. Appendix-11
❺	IP Address	Used to set the system controller's network address.
❻	Subnet Mask	Used to set the subnet mask of the network to which the system controller is connected.
❼	Master System	[None] is always displayed.
❽	About this System	Input information such as the purpose of the server. Up to 30 characters can be entered.

5. Application Operation

	Display	Description
⑨	Access User	Set which users can access the system by clicking the check boxes for these users. The check boxes for Administrators are always selected; they cannot be deselected.
⑩		Use to change the name of the system currently logged into. This button becomes active when not registered to a group. When registered to a group, after selecting [-] (unregistered) from the pull-down menu in the [Group] field and clicking  , the user must log in again.
⑪		Use this button to create a new group. This button becomes active when [-] (unregistered) is displayed in the [Group] field.
⑫		Used to display the "Advanced Settings" window.
⑬		Used to apply the settings. This button becomes active when the system information has been changed. If this button is clicked after changing the group or system name, the user is automatically logged out. After changing the IP address setting, IP address, subnet mask, or default gateway, the user must log out and reboot to enable the new settings.

■ "Advanced Settings" Window


Click  to display the following window. If values are changed and  is clicked, this window closes and  in the "System Administration" tab page becomes active.

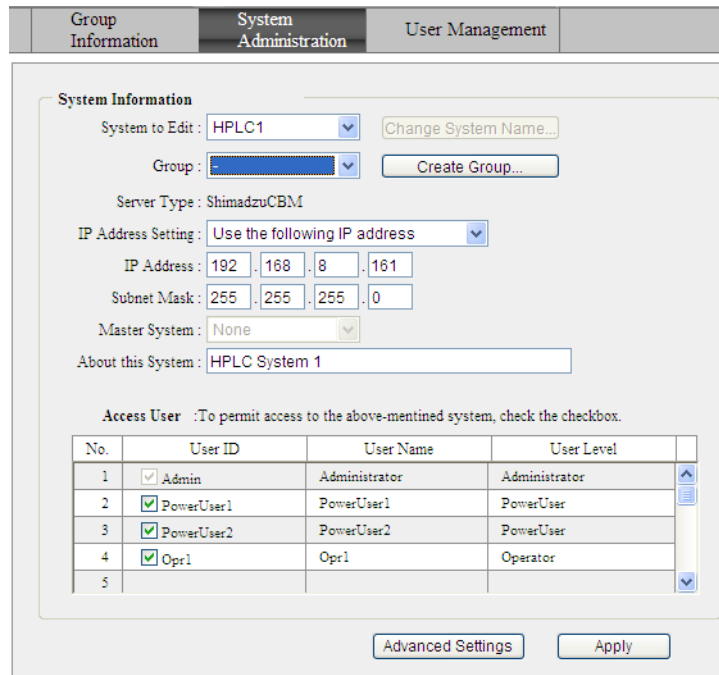


	Display	Description
①	Gateway	Input the address of the default gateway.
②	Ethernet Mode	Select the Ethernet mode from the pull-down menu.
③	Specify location of external Help file.	Specify the location of the Help file by URL. Under normal circumstances, do not change the default setting. (The default setting is "/help".)

■ Changing System Names


Use the following procedure to change the name of the system currently logged into.

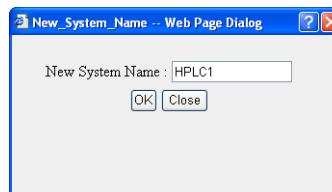
- 1 Select [-] from the [Group] pull-down menu.
 If already displayed when the system is logged into, start from step 5.



The screenshot shows the 'System Administration' tab in a web interface. The 'System Information' section includes fields for 'System to Edit' (HPLC1), 'Group', 'Server Type' (ShimadzuCBM), 'IP Address Setting' (Use the following IP address), 'IP Address' (192.168.8.161), 'Subnet Mask' (255.255.255.0), 'Master System' (None), and 'About this System' (HPLC System 1). There are buttons for 'Change System Name...' and 'Create Group...'. The 'Access User' section has a table with columns 'No.', 'User ID', 'User Name', and 'User Level'. The table contains five rows, with the first four rows having checkboxes in the 'User ID' column that are checked. At the bottom are 'Advanced Settings' and 'Apply' buttons.


No.	User ID	User Name	User Level
1	<input checked="" type="checkbox"/> Admin	Administrator	Administrator
2	<input checked="" type="checkbox"/> PowerUser1	PowerUser1	PowerUser
3	<input checked="" type="checkbox"/> PowerUser2	PowerUser2	PowerUser
4	<input checked="" type="checkbox"/> Opr1	Opr1	Operator
5			

- 2 Click .
The window closes and the user is automatically logged out. The "Group Monitor" application window is displayed.
- 3 Log into the "Group Settings" application again.
 ["5.9.1 Displaying the "Group Settings" Application Window" P. 5-39](#)
- 4 Click the [System Administration] tab.
The "System Administration" tab page is displayed.
- 5 Click .
The following window is displayed.



The screenshot shows a 'Web Page Dialog' window titled 'New_System_Name'. It contains a text input field with 'HPLC1' entered, and 'OK' and 'Close' buttons below it.

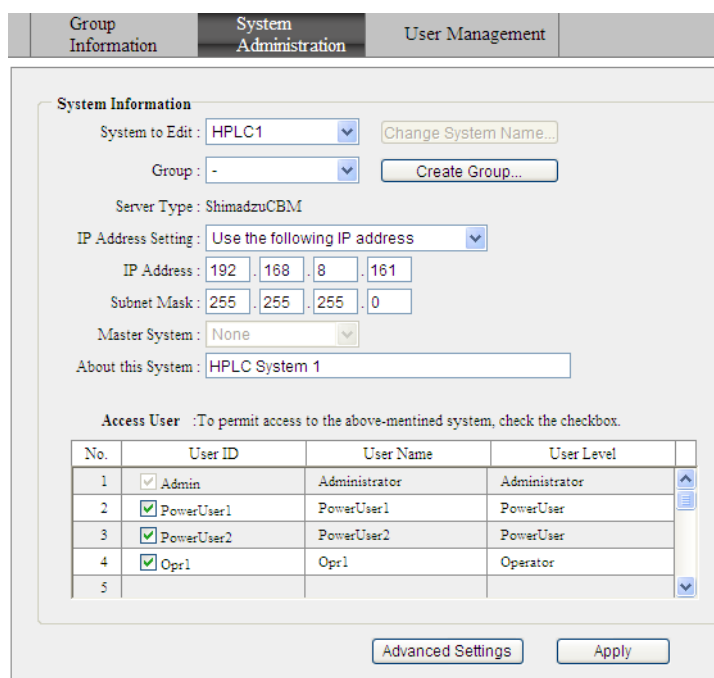
5. Application Operation

- 6 Input the new system name.
 Up to 15 characters, consisting of alphanumeric characters and the symbols "-" (hyphen) and "_" (underscore), can be entered.
- 7 Click .
- 8 Click .
The window closes and the user is automatically logged out. The "Group Monitor" application window is displayed.

■ Moving Systems to Different Groups

Use the following procedure to move a system to another group.

- 1 Select the system to move from the [System to Edit] pull-down menu.



The screenshot shows the "System Administration" window with the "System Information" tab selected. The "System to Edit" dropdown is set to "HPLC1". The "Group" dropdown is set to "-". The "Server Type" is "ShimadzuCBM". The "IP Address Setting" is "Use the following IP address". The IP Address is 192.168.8.161 and the Subnet Mask is 255.255.255.0. The "Master System" is "None". The "About this System" field contains "HPLC System 1". Below this, there is a section for "Access User" with a checkbox and a table of users.

No.	User ID	User Name	User Level
1	<input type="checkbox"/> Admin	Administrator	Administrator
2	<input checked="" type="checkbox"/> PowerUser1	PowerUser1	PowerUser
3	<input checked="" type="checkbox"/> PowerUser2	PowerUser2	PowerUser
4	<input checked="" type="checkbox"/> Opr1	Opr1	Operator
5			

- 2 Select the group in which the system is to be moved to from the [Group] pull-down menu.
- 3 Click .
The window closes and the user is automatically logged out. The "Group Monitor" application window is displayed.

■ Creating New Groups

Use the following procedure to create a new group.

- 1 Select [-] from the [Group] pull-down menu.

System Information

System to Edit: HPLC1

Group: [-]

Server Type: ShimadzuCBM

IP Address Setting: Use the following IP address

IP Address: 192 . 168 . 8 . 161

Subnet Mask: 255 . 255 . 255 . 0

Master System: None

About this System: HPLC System 1

Access User : To permit access to the above-mentioned system, check the checkbox.

No.	User ID	User Name	User Level
1	<input checked="" type="checkbox"/> Admin	Administrator	Administrator
2	<input checked="" type="checkbox"/> PowerUser1	PowerUser1	PowerUser
3	<input checked="" type="checkbox"/> PowerUser2	PowerUser2	PowerUser
4	<input checked="" type="checkbox"/> Opr1	Opr1	Operator
5			

- 2 Click . The following window is displayed.

New_Group_Name -- Web Page Dialog

New Group Name :

- 3 Input the new group name.

Up to 15 characters, consisting of alphanumeric characters and the symbols "-" (hyphen) and "_" (underscore), can be entered.

- 4 Click .

- 5 Click .
The window closes and the user is automatically logged out. The "Group Monitor" application window is displayed.


5. Application Operation

5.9.4 User Registration

The "User Management" tab page is used to register new users and to edit user information for currently registered users. This page is displayed by clicking the [User Management] tab in the "Group Settings" application.

The screenshot shows a web browser window titled "Group_Setting - Microsoft Internet Explorer". The page header includes the SHIMADZU logo, "CBM-20A", and navigation links for "Group1 > HPLC1" and "> Administrator". A "Logout" button is visible in the top right. The main content area is divided into three tabs: "Group Information", "System Administration", and "User Management". The "User Management" tab is active and contains two sections:


- Register New User:** Includes input fields for "User ID", "User Name", "Password", and "Password(Confirmation)", a dropdown for "User Level" (set to "Administrator"), and a "Register" button. A note "(Max. 30 char.)" is next to the password field.
- Change/Delete User Information:** Includes a dropdown for "User ID" (set to "Admin"), a "Delete this User Account" button, input fields for "User Name" (set to "Administrator") and "User Level" (set to "Administrator"), and an "Apply" button.

 For details on sharing user information within a group, refer to "5.9.2 "Group Information" Tab Page" P. 5-41.

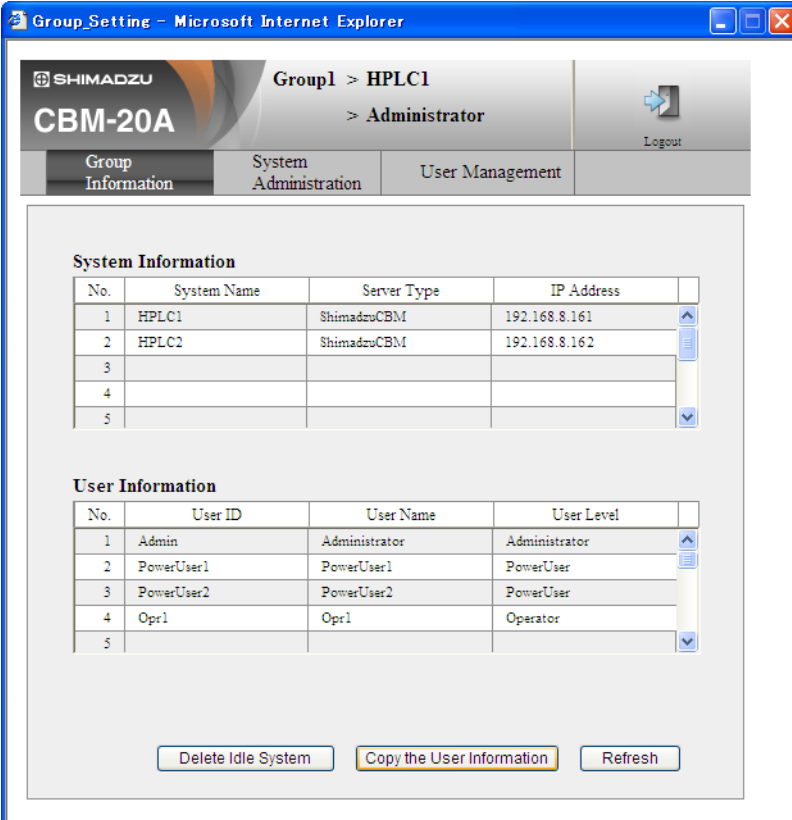
■ Registering New Users

Register the users that will be authorized to use the system.

Enter the user ID, user name, user information, and password to register a new user.

 At least one user must be registered to each system. Only Administrators (mentioned later in this manual) can log into the "Group Settings" application.

- 1 The "Login" window is accessed from the "Status" tab page of the "Analysis Execution" application. Enter a user ID and password, and click [Group Settings]. The "Group Settings" application window is displayed.



System Information

No.	System Name	Server Type	IP Address
1	HPLC1	ShimadzuCBM	192.168.8.161
2	HPLC2	ShimadzuCBM	192.168.8.162
3			
4			
5			

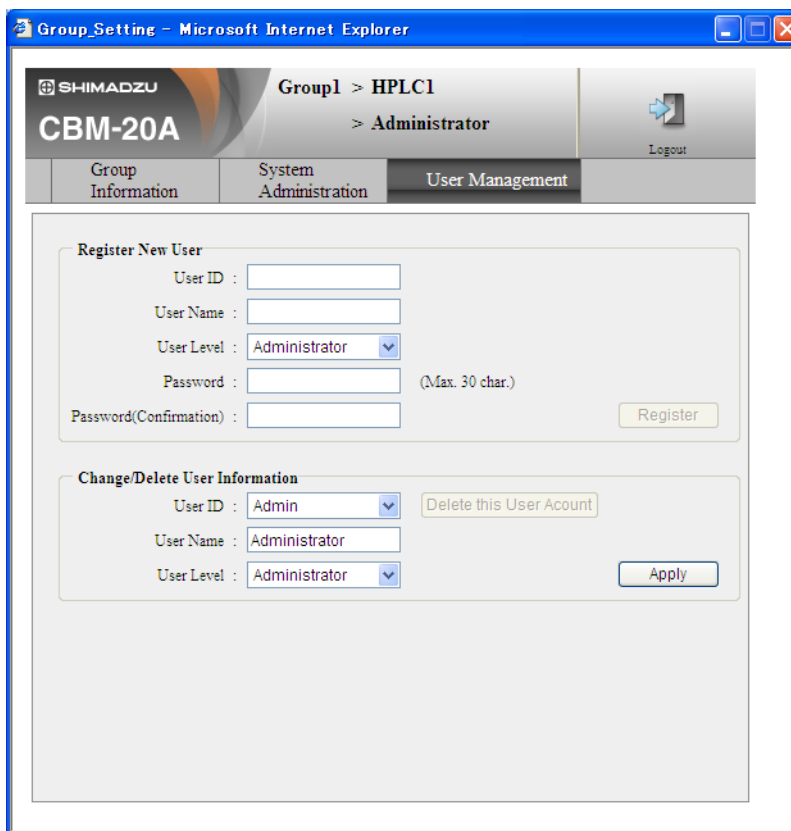
User Information



No.	User ID	User Name	User Level
1	Admin	Administrator	Administrator
2	PowerUser1	PowerUser1	PowerUser
3	PowerUser2	PowerUser2	PowerUser
4	Opr1	Opr1	Operator
5			

Buttons: Delete Idle System, Copy the User Information, Refresh

5. Application Operation

- 2 Click the [User Management] tab in the "Group Settings" application. The "User Management" tab page is displayed.






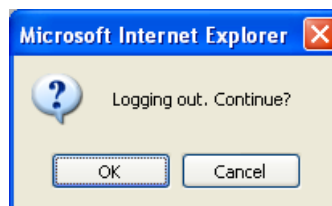
- 3 Click on the [User ID] field in the "Register New User" section and input a new user ID.
 -  Up to 30 characters, consisting of alphanumeric characters and the symbols "-" (hyphen) and "_" (underscore), can be entered.
- 4 Click the [User Name] field and input the user name.
 -  Up to 60 alphanumeric characters can be entered.
- 5 Select the user level from the [User Level] pull-down menu. The following three user levels are available.

User level	Description
Administrator	Authorized to perform group settings (e.g., adding/removing components and users to/from the group and changing settings) in addition to the operations for which a Power User is authorized. Also authorized to forcibly log out users logged into the "Analysis Execution" application window ^{*1} , and to disable system locks.
PowerUser	Authorized to perform all the operations related to analysis (e.g., editing methods and sequences, executing, adding, and stopping analyses, and executing system checks) and to change system configurations. Also authorized to clear errors or forcibly stop analysis being performed by other users.

User level	Description
Operator	Authorized to edit analysis sequences, execute, add, and stop analyses, and execute system checks. When editing methods, can only edit flow rate of pump and cooler temperature of autosampler. Not authorized to clear errors or forcibly stop analysis being performed by other users.

*1A user can only be forcibly logged out from a PC other than that on which they are logged in.


- 6 Click on the [Password] field and input the password.
 -  Up to 30 characters, consisting of alphanumeric characters and the symbols "-" (hyphen) and "_" (underscore), can be entered.
- 7 Click the [Password (Confirmation)] field and input the same password input in the [Password] field.
- 8 Click .
The user is registered.
 -  If the password is not input correctly, an "Error" window is displayed. In this case, close the window and input an acceptable password.
- 9 Repeat steps 1 to 8 as necessary to register more users.
- 10 Click  .
The "Logout" window is displayed.



- 11 Click .
The "Logout" window closes and the "Status" tab page is displayed.

■ Changing User Information

Use the following procedure to change the information registered for users.

 The user ID cannot be changed. Also, the user levels for users currently logged into the "Group Settings" application can only be changed by Administrators.

1 Select the user ID to be changed from the [User ID] pull-down menu.


2 Input the new user name in the [User Name] field.

3 Select the new user level from the [User Level] pull-down menu.

4 Click .
The new user name and user level are enabled.

■ Deleting User Information

Use the following procedure to delete registered users.

 Users currently logged into the "Group Settings" application cannot be deleted.

1 Select the user ID to be deleted from the [User ID] pull-down menu.
 becomes active.

2 Click .
The selected user ID is deleted from the [User ID] field.

5.9.5 User Levels and Functions

Functions that can be used at each user level are as shown in the following table.

Item	Main functions	Administrator	Power User	Operator
Group management	Group creation System name setting Setting user information	✓		
Unit Configuration	Link Check setting System Component setting Operation Mode setting	✓	✓	
Analysis	Method editing	✓	✓	Δ
	Environment setting in the "Method Parameter" window ("Analysis" tab page only)	✓	✓	
	Sequence editing Adding to the analysis queue Executing and stopping analysis Direct control buttons	✓	✓	✓
	Stopping analysis registered by other users, clearing errors	✓	✓	
System check	Performing system checks	✓	✓	✓

✓ : Available

Δ : Only the solvent delivery module's flow rate and autosampler cooler temperature can be set.

Empty : Not available

5. Application Operation

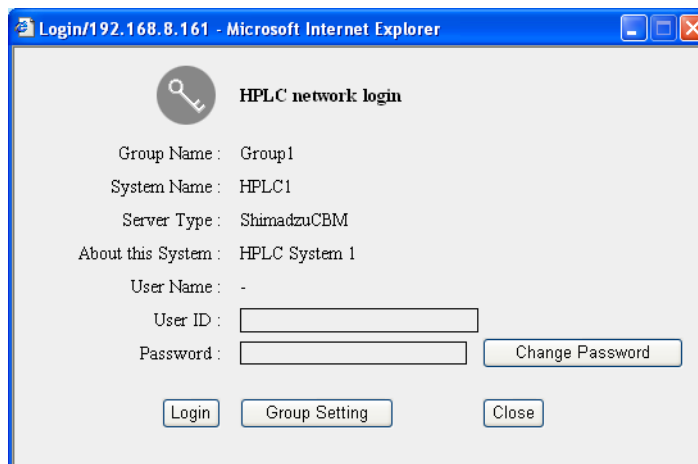
Exclusive login control is as shown in the following table.

System controller status		Logged in user		
		Internet Explorer		LC-WS
		Administrator	Power User Operator	LCsolution CLASS-VP
Logged into "System Check" or "Group Management" application				
Logged into "Analysis Execution" application		✓ ^{*1}		
Logged out	System locked	✓		
	When there is a remaining LC-WS analysis result			✓
	During Web analysis	✓	✓	
	Other than the above	✓	✓	✓
During connection from LC-WS				


*1 A user can only be forcibly logged out from a PC other than that on which they are logged in.

5.10 Changing Passwords

All users can change their own passwords.
 Passwords are changed in the "Login" window.



- 1 Input the user ID in the [User ID] field.
- 2 Input the password in the [Password] field.
- 3 Click .
 The [New Password] and [New Password (Confirmation)] fields are displayed under the [Password] field.
- 4 Input the new password in the [New Password] field.
- 5 Input the same password in the [New Password (Confirmation)] field.
- 6 Click .
 The input password is saved as the new password and the "Analysis" tab page is displayed.


 User information is handled independently for each system. For this reason, to change the password for other systems, it is necessary to change passwords on all systems being used, or to request an Administrator to copy the new password setting to other systems using the [Copy the User Information] function from the "Group Information" tab page.

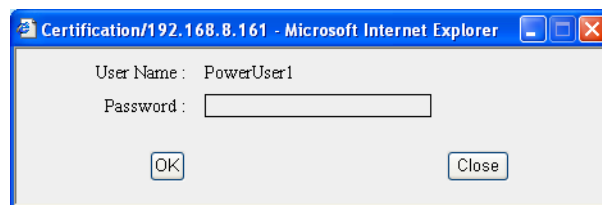
 ["5.9.2 "Group Information" Tab Page" P. 5-41](#)

5.11 Locking Systems


With this system controller, it is possible to log out and close the Web browser or even turn OFF the power to the PC and still continue analysis. During this time, any other user registered to the system can login. It is possible, however, to lock the system and thereby restrict access by other users.



The system lock and unlock are activated from the "Analysis Execution" application.

- 1 Click  in the "Analysis Execution" application.
The following window is displayed.

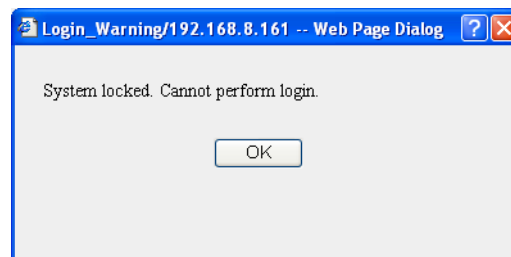


- 2 Input the password.

- 3 Click  and close the window.


 changes to . (In the case of system lock.)

The following window is displayed when attempting to log into a system which has been locked.



5.12 Parameter Details

The basic parameters and configuration parameters for the system controller and system components are explained below.

 For details on parameter entry procedures, refer to "4.2.7 Parameters for the CBM-20A" P. 4-20.

5.12.1 Pump

■ Comparison of Parameters for Different Models

Parameter	LC-30AD	LC-20AD LC-20ADXR LC-10ADvp LC-10AD	LC-20AB	LC-20AT LC-10ATvp LC-10AT	LC-10AS	LC-10Ai LC-20Ai	LC-20AP LC-20AR	LC-8A	LC-6AD LC-7A
Method parameters									
Flow Rate	✓	✓	✓	✓	✓	✓	✓	✓	✓
Maximum Pressure	✓	✓	✓	✓	✓	✓	✓	✓	✓
Concentration B, C, D (for gradient pumping only)	✓	✓	✓	✓	✓	✓	✓	✓	✓
Minimum Pressure	✓	✓	✓	✓	✓	✓	✓	✓	✓
LP.GE Mode	✓	✓		✓		✓ (See note 1.)			
Solenoid Valve PSV	✓	✓	✓	✓	✓	✓	✓	✓	✓
Solvent Blending	✓								
Configuration parameters									
System Protection	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pressure units	✓	✓	✓	✓	✓	✓	✓	✓	✓
Purge below Minimum Pressure	✓	✓	✓	✓			✓		
Solenoid Valve	✓	✓	✓	✓	✓	✓	✓	✓	✓
Solvent Blending	✓								

1. Not available with LC-20Ai.

5. Application Operation



The [Solenoid Valve PSV] setting is displayed if [Used] is selected under [Solenoid Valve] in the pump "Configuration Parameter" window. The [LP.GE Mode] setting is displayed only for pump A and only if LP.GE is set as the pumping mode. [Purge below Minimum Pressure] is displayed when the solvent delivery module of the LC-30A/20A is used with the SIL-30AC/20A/20AC autosampler.



Method parameter [Solvent Blending] is displayed if [Used] is selected under [Solvent Blending] in the "Configuration Parameter" window. Solvent blending can be used with LC-30AD version 2.20 and higher.

Method Parameters for the Pump

● LC-30AD

Parameter	Setting range	Minimum unit	Default setting	Remark
Flow Rate (mL/min)	0.0000 to 10.0000	0.0001	0	Indicates the total flow rate when performing gradient pumping. (See note 1.)
Concentration A (%)	0.0 to 100.0	0.1	100	Displayed when LP.GE, B.GE, T.GE, or B.GEx2 is set as the pumping mode. (See note 2.) Concentration A cannot be edited directly. Concentration A = 100 - Concentration B - Concentration C - Concentration D (%)
Concentration B (%)	0.0 to 100.0	0.1	0	Setting possible when LP.GE, B.GE, T.GE, or B.GEx2 is set as the pumping mode. (See note 2.)
Concentration C (%)	0.0 to 100.0	0.1	0	Setting possible when LP.GE or T.GE is set as the pumping mode. (See note 2.)
Concentration D (%)	0.0 to 100.0	0.1	0	Setting possible when LP.GE is set as the pumping mode. (See note 2.)
Maximum Pressure: MPa kgf/cm ² psi bar	1.0 to 130.0 10 to 1326 142 to 19000 10 to 1300	0.1 1 1 1	10 102 1451 100	
Minimum Pressure: MPa kgf/cm ² psi bar	0.0 to 130.0 0 to 1326 0 to 19000 0 to 1300	0.1 1 1 1	0 0 0 0	
Solenoid Valve (FCV-10AL type)	1, 2, 3, 4		1	Sets the position of the 4-position valve.

Parameter	Setting range	Minimum unit	Default setting	Remark
Solenoid Valve (FCV-11AL type)	1a, 1b/ 2a, 2b/ 3a, 3b		1a/2a/3a	Sets the position a or b for flow lines 1 to 3.
Solvent Blending A [%]	0.0 to 100.0	0.1	100.0	Sets a blending ratio of four solvents using [Solvent Blending A] to [Solvent Blending D]. Blending ratio A cannot be edited directly. Blending ratio A = 100 - blending ratio B - blending ratio C - blending ratio D [%] (See note 3.)
Solvent Blending B to D [%]	0.0 to 100.0	0.1	0	(See note 3.)

1. For LC-30ADs earlier than version 2.10, the available setting range is 0.0000 to 5.0000.
2. For LC-30ADs earlier than version 2.10, the LP.GE mode cannot be used.
3. For LC-30ADs earlier than version 2.20, solvent blending cannot be used.

● LC-20AB

Parameter	Setting range	Minimum unit	Default setting	Remark
Flow Rate (mL/min)	0.0000 to 10.0000	0.0001	0	Indicates the total flow rate for mobile phases A and B.
Concentration A (%)	0.0 to 100.0	0.1	100	Concentration A cannot be edited directly. Concentration A = 100 - Concentration B (%)
Concentration B (%)	0.0 to 100.0	0.1	0	
Maximum Pressure: MPa kgf/cm ² psi bar	1.0 to 44.0 10 to 449 142 to 6387 10 to 440	0.1 1 1 1	10 102 1451 100	
Minimum Pressure: MPa kgf/cm ² psi bar	0.0 to 40.0 0 to 408 0 to 5804 0 to 400	0.1 1 1 1	0 0 0 0	
Solenoid Valve (FCV-10AL type)	1, 2, 3, 4		1	Sets the position of the 4-position valve.
Solenoid Valve (FCV-11AL type)	1a, 1b/ 2a, 2b/ 3a, 3b		1a/2a/3a	Sets position a or b for flow lines 1 to 3.

5. Application Operation

● LC-20AD, LC-20ADXR

Parameter	Setting range	Minimum unit	Default setting	Remark
Flow Rate (mL/min)	0.0000 to 10.0000	0.0001	0	Indicates the total flow rate when performing gradient pumping. The setting range for model LC-20ADXR is 0.0000 to 5.0000.
Concentration A (%)	0.0 to 100.0	0.1	100	Displayed when LP.GE, B.GE, T.GE, or B.GEx2 is set as the pumping mode. (See note 1.) Concentration A cannot be edited directly. Concentration A = 100 - Concentration B - Concentration C - Concentration D (%)
Concentration B (%)	0.0 to 100.0	0.1	0	Setting possible when LP.GE, B.GE, T.GE, or B.GEx2 is set as the pumping mode. (See note 1.)
Concentration C (%)	0.0 to 100.0	0.1	0	Setting possible when LP.GE or T.GE is set as the pumping mode. (See note 1.)
Concentration D (%)	0.0 to 100.0	0.1	0	Setting possible when LP.GE is set as the pumping mode. (See note 1.)
Maximum Pressure:				The setting range for model LC-20ADXR are,
MPa	1.0 to 44.0	0.1	10	1.0 to 66.0
kgf/cm ²	10 to 449	1	102	10 to 673
psi	142 to 6387	1	1451	142 to 9573
bar	10 to 440	1	100	10 to 660
Minimum Pressure:				The setting range for model LC-20ADXR are,
MPa	0.0 to 40.0	0.1	0	0.0 to 60.0
kgf/cm ²	0 to 408	1	0	0 to 612
psi	0 to 5804	1	0	0 to 8706
bar	0 to 400	1	0	0 to 600
Solenoid Valve (FCV-10AL type)	1, 2, 3, 4		1	Sets the position of the 4-position valve.
Solenoid Valve (FCV-11AL type)	1a, 1b/ 2a, 2b/ 3a, 3b		1a/2a/3a	Sets position a or b for flow lines 1 to 3.

1. The LP.GE mode is not available on the LC-20ADXR earlier than version 1.30.

● LC-20AT

Parameter	Setting range	Minimum unit	Default setting	Remark
Flow Rate (mL/min)	0.000 to 10.000	0.001	0	Indicates the total flow rate when performing gradient pumping.
Concentration A (%)	0.0 to 100.0	0.1	100	Displayed when LP.GE, B.GE, T.GE, or B.GEx2 is set as the pumping mode. Concentration A cannot be edited directly. Concentration A = 100 - Concentration B - Concentration C - Concentration D (%)
Concentration B (%)	0.0 to 100.0	0.1	0	Setting possible when LP.GE, B.GE, T.GE, or B.GEx2 is set as the pumping mode.
Concentration C (%)	0.0 to 100.0	0.1	0	Setting possible when LP.GE or T.GE is set as the pumping mode.
Concentration D (%)	0.0 to 100.0	0.1	0	Setting possible when LP.GE is set as the pumping mode.
Maximum Pressure: MPa kgf/cm ² psi bar	1.0 to 44.0 10 to 449 142 to 6387 10 to 440	0.1 1 1 1	10 102 1451 100	
Minimum Pressure: MPa kgf/cm ² psi bar	0.0 to 40.0 0 to 408 0 to 5804 0 to 400	0.1 1 1 1	0 0 0 0	
LP.GE Mode	Automatic 1-cycle 2-cycle 4-cycle		Automatic	Setting possible for pump A when LP.GE is set as the pumping mode.
Solenoid Valve (FCV-10AL type)	1, 2, 3, 4		1	Sets the position of the 4-position valve.
Solenoid Valve (FCV-11AL type)	1a, 1b/ 2a, 2b/ 3a, 3b		1a/2a/3a	Sets position a or b for flow lines 1 to 3.

5. Application Operation

● LC-20Ai

Parameter	Setting range	Minimum unit	Default setting	Remark
Flow Rate (mL/min)	0.000 to 10.000	0.001	0	Indicates the total flow rate when performing gradient pumping.
Concentration A (%)	0.0 to 100.0	0.1	100	Displayed when B.GE, T.GE, or B.GEx2 is set as the pumping mode. Concentration A cannot be edited directly. Concentration A = 100 - Concentration B - Concentration C (%)
Concentration B (%)	0.0 to 100.0	0.1	0	Setting possible when B.GE, T.GE, or B.GEx2 is set as the pumping mode.
Concentration C (%)	0.0 to 100.0	0.1	0	Setting possible when T.GE is set as the pumping mode.
Maximum Pressure: MPa kgf/cm ² psi bar	1.0 to 30.0 10 to 306 142 to 4353 10 to 300	0.1 1 1 1	10 102 1451 100	
Minimum Pressure: MPa kgf/cm ² psi bar	0.0 to 30.0 0 to 306 0 to 4353 0 to 300	0.1 1 1 1	0 0 0 0	
Solenoid Valve (FCV-10AL type)	1, 2, 3, 4		1	Sets the position of the 4-position valve.
Solenoid Valve (FCV-11AL type)	1a, 1b/ 2a, 2b/ 3a, 3b		1a/2a/3a	Sets position a or b for flow lines 1 to 3.

● LC-10ADvp, LC-10AD

Parameter	Setting range	Minimum unit	Default setting	Remark
Flow Rate (mL/min)	0.000 to 9.999	0.001	0	Indicates the total flow rate when performing gradient pumping.
Concentration A (%)	0.0 to 100.0	0.1	100	Displayed when LP.GE, B.GE, T.GE, or B.GEx2 is set as the pumping mode. Concentration A cannot be edited directly. Concentration A = 100 - Concentration B - Concentration C - Concentration D (%)
Concentration B (%)	0.0 to 100.0	0.1	0	Setting possible when LP.GE, B.GE, T.GE, or B.GEx2 is set as the pumping mode.
Concentration C (%)	0.0 to 100.0	0.1	0	Setting possible when LP.GE or T.GE is set as the pumping mode.
Concentration D (%)	0.0 to 100.0	0.1	0	Setting possible when LP.GE is set as the pumping mode.
Maximum Pressure: MPa kgf/cm ² psi bar	1.0 to 43.2 10 to 440 142 to 6260 10 to 432	0.1 1 1 1	9.8 100 1422 98	
Minimum Pressure: MPa kgf/cm ² psi bar	0.0 to 39.2 0 to 400 0 to 5690 0 to 392	0.1 1 1 1	0 0 0 0	
Solenoid Valve (FCV-10AL type)	1, 2, 3, 4		1	Sets the position of the 4-position valve.
Solenoid Valve (FCV-11AL type)	1a, 1b/ 2a, 2b/ 3a, 3b		1a/2a/3a	Sets position a or b for flow lines 1 to 3.

5. Application Operation

● LC-10ATvp, LC-10AT

Parameter	Setting range	Minimum unit	Default setting	Remark
Flow Rate (mL/min)	0.000 to 9.999	0.001	0	Indicates the total flow rate when performing gradient pumping.
Concentration A (%)	0.0 to 100.0	0.1	100	Displayed when LP.GE, B.GE, T.GE, or B.GEx2 is set as the pumping mode. Concentration A cannot be edited directly. Concentration A = 100 - Concentration B - Concentration C - Concentration D (%)
Concentration B (%)	0.0 to 100.0	0.1	0	Setting possible when LP.GE, B.GE, T.GE, or B.GEx2 is set as the pumping mode.
Concentration C (%)	0.0 to 100.0	0.1	0	Setting possible when LP.GE or T.GE is set as the pumping mode.
Concentration D (%)	0.0 to 100.0	0.1	0	Setting possible when LP.GE is set as the pumping mode.
Maximum Pressure: MPa kgf/cm ² psi bar	1.0 to 43.2 10 to 440 142 to 6260 10 to 432	0.1 1 1 1	9.8 100 1422 98	
Minimum Pressure: MPa kgf/cm ² psi bar	0.0 to 39.2 0 to 400 0 to 5690 0 to 392	0.1 1 1 1	0 0 0 0	
LP.GE Mode	Automatic 1-cycle 4-cycle		Automatic	Setting possible for pump A when LP.GE is set as the pumping mode.
Solenoid Valve (FCV-10AL type)	1, 2, 3, 4		1	Sets the position of the 4-position valve.
Solenoid Valve (FCV-11AL type)	1a, 1b/ 2a, 2b/ 3a, 3b		1a/2a/3a	Sets position a or b for flow lines 1 to 3.

● LC-10Ai

Parameter	Setting range	Minimum unit	Default setting	Remark
Flow Rate (mL/min)	0.000 to 9.999	0.001	0	Indicates the total flow rate when performing gradient pumping.
Concentration A (%)	0.0 to 100.0	0.1	100	Displayed when LP.GE, B.GE, T.GE, or B.GEx2 is set as the pumping mode. Concentration A cannot be edited directly. Concentration A = 100 - Concentration B - Concentration C - Concentration D (%)
Concentration B (%)	0.0 to 100.0	0.1	0	Setting possible when LP.GE, B.GE, T.GE, or B.GEx2 is set as the pumping mode.
Concentration C (%)	0.0 to 100.0	0.1	0	Setting possible when LP.GE or T.GE is set as the pumping mode.
Concentration D (%)	0.0 to 100.0	0.1	0	Setting possible when LP.GE is set as the pumping mode.
Maximum Pressure: MPa kgf/cm ² psi bar	1.0 to 43.2 10 to 440 142 to 6260 10 to 432	0.1 1 1 1	9.8 100 1422 98	
Minimum Pressure: MPa kgf/cm ² psi bar	0.0 to 39.2 0 to 400 0 to 5690 0 to 392	0.1 1 1 1	0 0 0 0	
LP.GE Mode	Automatic 1-cycle 4-cycle		Automatic	Setting possible for pump A when LP.GE is set as the pumping mode.
Solenoid Valve (FCV-10AL type)	1, 2, 3, 4		1	Sets the position of the 4-position valve.
Solenoid Valve (FCV-11AL type)	1a, 1b/ 2a, 2b/ 3a, 3b		1a/2a/3a	Sets position a or b for flow lines 1 to 3.

5. Application Operation

● LC-10AS

Parameter	Setting range	Minimum unit	Default setting	Remark
Flow Rate (mL/min)	0.00 to 9.99	0.01	0	Indicates the total flow rate when performing gradient pumping.
Concentration A (%)	0.0 to 100.0	0.1	100	Displayed when B.GE, T.GE, or B.GEx2 is set as the pumping mode. Concentration A cannot be edited directly. Concentration A = 100 - Concentration B - Concentration C (%)
Concentration B (%)	0.0 to 100.0	0.1	0	Setting possible when B.GE, T.GE, or B.GEx2 is set as the pumping mode.
Concentration C (%)	0.0 to 100.0	0.1	0	Setting possible when T.GE is set as the pumping mode.
Maximum Pressure: MPa kgf/cm ² psi bar	1.0 to 43.2 10 to 440 142 to 6260 10 to 432	0.1 1 1 1	9.8 100 1422 98	
Minimum Pressure: MPa kgf/cm ² psi bar	0.0 to 39.2 0 to 400 0 to 5690 0 to 392	0.1 1 1 1	0 0 0 0	
Solenoid Valve (FCV-10AL type)	1, 2, 3, 4		1	Sets the position of the 4-position valve.
Solenoid Valve (FCV-11AL type)	1a, 1b/ 2a, 2b/ 3a, 3b		1a/2a/3a	Sets position a or b for flow lines 1 to 3.

● LC-20AP

Parameter	Setting range	Minimum unit	Default setting	Remark
Flow Rate (mL/min)	0.00 to 150.00	0.01	0	Indicates the total flow rate when performing gradient pumping.
Concentration A (%)	0.0 to 100.0	0.1	100	Displayed when LP.GE, B.GE, T.GE or B.GEx2 is set as the pumping mode. (See note 1.) Concentration A cannot be edited directly. Concentration A = 100 - Concentration B - Concentration C (%)
Concentration B (%)	0.0 to 100.0	0.1	0	Setting possible when LP.GE, B.GE, T.GE or B.GEx2 is set as the pumping mode. (See note 1.)

Parameter	Setting range	Minimum unit	Default setting	Remark
Concentration C (%)	0.0 to 100.0	0.1	0	Setting possible when LP.GE or T.GE is set as the pumping mode. (See note 1.)
Concentration D (%)	0.0 to 100.0	0.1	0	Setting possible when LP.GE is set as the pumping mode. (See note 1.)
Maximum Pressure: MPa kgf/cm ² psi bar	1.0 to 44.0 10 to 449 142 to 6387 10 to 440	0.1 1 1 1	10 102 1451 100	
Minimum Pressure: MPa kgf/cm ² psi bar	0.0 to 40.0 0 to 408 0 to 5804 0 to 400	0.1 1 1 1	0 0 0 0	
Solenoid Valve (FCV-200AL type)	1, 2, 3, 4		1	Sets the position of the 4-position valve.
Solenoid Valve (FCV-11AL type)	1a, 1b/ 2a, 2b/ 3a, 3b		1a/2a/3a	Sets the position a or b for flow lines 1 to 3.
Solenoid Valve (FCV-230AL type)	0, 1, 2, 3		1	Sets the position of the 4-position valve.

1. The LP.GE mode is not available on the LC-20AP earlier than version 1.10.

● LC-20AR

Parameter	Setting range	Minimum unit	Default setting	Remark
Flow Rate (mL/min)	0.00 to 20.000	0.001	0	Indicates the total flow rate when performing gradient pumping.
Concentration A (%)	0.0 to 100.0	0.1	100	Displayed when B.GE, T.GE or B.GEx2 is set as the pumping mode. Concentration A cannot be edited directly. Concentration A = 100 - Concentration B - Concentration C (%)
Concentration B (%)	0.0 to 100.0	0.1	0	Setting possible when B.GE, T.GE or B.GEx2 is set as the pumping mode.
Concentration C (%)	0.0 to 100.0	0.1	0	Setting possible when T.GE is set as the pumping mode.
Maximum Pressure: MPa kgf/cm ² psi bar	1.0 to 50.0 10 to 510 142 to 7260 10 to 500	0.1 1 1 1	9.8 100 1422 98	

5. Application Operation

Parameter	Setting range	Minimum unit	Default setting	Remark
Minimum Pressure: MPa kgf/cm ² psi bar	0.0 to 49.0 0 to 500 0 to 7110 0 to 490	0.1 1 1 1	0 0 0 0	
Solenoid Valve (FCV-200AL type)	1, 2, 3, 4		1	Sets the position of the 4-position valve.
Solenoid Valve (FCV-11AL type)	1a, 1b/ 2a, 2b/ 3a, 3b		1a/2a/3a	Sets the position a or b for flow lines 1 to 3.
Solenoid Valve (FCV-230AL type)	0, 1, 2, 3		1	Sets the position of the 4-position valve.

● LC-8A

Parameter	Setting range	Minimum unit	Default setting	Remark
Flow Rate (mL/min)	0.0 to 150.0	0.1	0	Indicates the total flow rate when performing gradient pumping.
Concentration A (%)	0.0 to 100.0	0.1	100	Displayed when B.GE, T.GE, or B.GEx2 is set as the pumping mode. Concentration A cannot be edited directly. Concentration A = 100 - Concentration B - Concentration C (%)
Concentration B (%)	0.0 to 100.0	0.1	0	Setting possible when B.GE, T.GE, or B.GEx2 is set as the pumping mode.
Concentration C (%)	0.0 to 100.0	0.1	0	Setting possible when T.GE is set as the pumping mode.
Maximum Pressure: MPa kgf/cm ² psi bar	1.0 to 43.2 10 to 440 142 to 6260 10 to 432	0.1 1 1 1	9.8 100 1422 98	
Minimum Pressure: MPa kgf/cm ² psi bar	0.0 to 39.2 0 to 400 0 to 5690 0 to 392	0.1 1 1 1	0 0 0 0	
Solenoid Valve (FCV-130AL/FCV-130BL type)	0, 1, 2		0	Sets the position of the 3-position valve.

● LC-7A, LC-6AD

Parameter	Setting range	Minimum unit	Default setting	Remark
Flow Rate (mL/min)	0.000 to 20.000	0.001	0	Indicates the total flow rate when performing gradient pumping.
Concentration A (%)	0.0 to 100.0	0.1	100	Displayed when B.GE, T.GE, or B.GEx2 is set as the pumping mode. Concentration A cannot be edited directly. Concentration A = 100 - Concentration B - Concentration C (%)
Concentration B (%)	0.0 to 100.0	0.1	0	Setting possible when B.GE, T.GE, or B.GEx2 is set as the pumping mode.
Concentration C (%)	0.0 to 100.0	0.1	0	Setting possible when T.GE is set as the pumping mode.
Maximum Pressure: MPa kgf/cm ² psi bar	1.0 to 50.0 10 to 510 142 to 7260 10 to 500	0.1 1 1 1	9.8 100 1422 98	
Minimum Pressure: MPa kgf/cm ² psi bar	0.0 to 49.0 0 to 500 0 to 7110 0 to 490	0.1 1 1 1	0 0 0 0	
Solenoid Valve (FCV-7AL/ type)	0, 1		0	Sets the position of the 2-position valve.

5. Application Operation

● Flow Rate and Maximum/Minimum Pressure

The setting ranges for the maximum and minimum pressure are basically as given in the previous tables. Depending on the flow rate (or the flow rate and the PMAX RANGE for the LC-10Ai, LC-20Ai), however, the following restrictions are applied automatically to the maximum pressure.

	0 ≤ Flow Rate ≤ 5 mL
LC-30AD	The maximum pressure up to 130.0 MPa (1326 kgf/cm ²) can be set regardless of the flow rate. However, when the flow rate is greater than 3 mL/min, regardless of the maximum pressure setting, pumping will automatically stop if the working pumping pressure has been exceeded.

 For details about the working pumping pressure, refer to the instruction manual for the LC-30AD.

	Flow Rate ≤ 5 mL	5 mL < Flow Rate
LC-20AB	44.0 MPa (449 kgf/cm ²)	22.0 MPa (224 kgf/cm ²)
LC-20AD		
LC-20AT		
LC-10ADvp	43.1 MPa (440 kgf/cm ²)	21.6 MPa (220 kgf/cm ²)
LC-10ATvp		
LC-10AD		
LC-10AT		
LC-10AS		
LC-20AR	50 MPa (510 kgf/cm ²)	25.5 MPa (260 kgf/cm ²)
LC-7A		
LC-6AD		

	Flow Rate ≤ 3 mL	3 mL < Flow Rate
LC-20ADXR	66.0 MPa (673 kgf/cm ²)	44.0 MPa (449 kgf/cm ²)

	PMAX RANGE = 0	Flow Rate ≤ 5 mL PMAX RANGE = 1	5 mL < Flow Rate PMAX RANGE = 1
LC-10Ai	21.6 MPa (220 kgf/cm ²)	29.4 MPa (300 kgf/cm ²)	21.6 MPa (220 kgf/cm ²)
LC-20Ai	22 MPa (224 kgf/cm ²)	30 MPa (306 kgf/cm ²)	22 MPa (224 kgf/cm ²)

	Flow Rate \leq 50 mL	50 mL < Flow Rate \leq 100 mL	100 mL < Flow Rate
LC-20AP	44.0 MPa (449 kgf/cm ²)		33.0 MPa (337 kgf/cm ²)
LC-8A	31.4 MPa (320 kgf/cm ²)	19.6 MPa (200 kgf/cm ²)	9.8 MPa (100 kgf/cm ²)

5. Application Operation

■ Configuration Parameters for the Pump

● LC-30AD, LC-20AP, LC-20AB, LC-20AD, LC-20AT, LC-20AR, LC-20Ai

Parameter	Setting range	Default setting	Remark
System Protection	Disable Enable	Disable	Disable: Stops pumping. Enable: Continues pumping at half the flow rate. (See note 1.)
Pressure units	MPa kgf/cm ² psi bar	MPa	
Purge below Minimum Pressure	Disable Enable	Disable	Disable: Displays error if pressure drops. Enable: Executes purge and attempts to restore operation if pressure drops. (See note 2.)
Solenoid Valve	Not Used Used	Not Used	Not Used: The solenoid-valve parameter is not displayed in the "Pump" tab page in the "Method Parameter" window. Used: The solenoid-valve parameter is displayed in the "Pump" tab page in the "Method Parameter" window. (See notes 3 and 4.)
Solvent Blending (See note 5.)	Not Used Used	Not Used	Not Used: The solvent blending function is disabled and the solvent blending parameters are not displayed in the "Method Parameter" window. Used: The solvent blending function is enabled and the solvent blending parameters are displayed in the "Method Parameter" window. When the solvent blending function is enabled, a blending ratio of four solvents can be set for each pump. (See note 6.)

- Pumping stops when the error is cleared.
- If the SIL-20A series autosampler (SIL-20A/20AC, etc.) is connected or if the SIL-30AC/30ACMP autosampler is connected and the direct injection type is set, pump purge (including purge according to gradient parameter and warmup) is executed (the autosampler purge is not executed).
 - Purge time conforms to the settings in the "Autopurge" window.
 - After the purge has finished, the sequence analysis will restart from the line at which the error occurred.
 - If the [P.MIN] error (below minimum pressure error) occurs again during purge, the analysis is stopped.
 - This function is not available if an LC workstation is connected. Please set to "Disable" when the CBM is controlled from an LC workstation.
- This setting can be made for each solvent delivery module. Set the valve type at each solvent delivery module beforehand.
- Select [Used] if a solenoid valve is connected.
- Available only with LC-30AD.
- For LC-30ADs earlier than version 2.20, the solvent blending cannot be used.

● LC-10ADvp, LC-10AD, LC-10ATvp, LC-10AT, LC-10Ai, LC-10AS, LC-8A, LC-7A, LC-6AD

Parameter	Setting range	Default setting	Remark
System Protection	Disable Enable	Disable	Disable: Stops pumping. Enable: Continues pumping at half the flow rate. (See note 1.)
Pressure units	MPa kgf/cm ² psi bar	MPa	
Solenoid Valve	Not Used Used	Not Used	Not Used: The solenoid-valve parameter is not displayed in the "Pump" tab page in the "Method Parameter" window. Used: The solenoid-valve parameter is displayed in the "Pump" tab page in the "Method Parameter" window. (See notes 2 and 3.)

1. Pumping stops when the error is cleared.
2. This setting can be made for each solvent delivery module. Set the valve type at each solvent delivery module beforehand.
3. Select [Used] if a solenoid valve is connected.

5. Application Operation

5.12.2 Autosampler

■ Comparison of Parameters for Different Models

Parameter	SIL-30ACMP	SIL-30AC	SIL-20A SIL-20AXR	SIL-20AC SIL-20ACXR	SIL-10ADvp	SIL-10A SIL-10AF SIL-10AP SIL-10Ai	SIL-10AXL
Method parameters							
Rack						✓	✓
Needle Stroke		✓	✓	✓	✓	✓	✓
Needle Stroke (Ctrl)		✓	✓	✓			
Purge Time			✓	✓	✓		
Cooler		✓		✓	✓		
Cooler RackPlate L	✓						
Cooler RackPlate M	✓						
Cooler RackPlate R	✓						
Cooler Temperature	✓	✓		✓	✓		
Sampling Speed	✓	✓	✓	✓	✓	✓	✓
Rinse Volume	✓	✓	✓	✓	✓	✓	✓
Rinse Speed	✓	✓	✓	✓	✓	✓	✓
Rinse Mode	✓	✓	✓	✓	✓		
Rinse Dip Time	✓	✓	✓	✓	✓		
Rinse Time	✓	✓	✓	✓			
MTP Type		✓	✓	✓			
MTP Sample Order	✓	✓	✓	✓			
MTP Tray					✓		
Needle Stroke Stack D		✓	✓	✓			
Needle Stroke Stack C		✓	✓	✓			
Needle Stroke Stack B		✓	✓	✓			
Needle Stroke Stack A		✓	✓	✓			
Sample Discharge Speed		✓					
Measuring Line Purge Volume	✓	✓					
Air Gap Volume	✓	✓					

Parameter	SIL-30ACMP	SIL-30AC	SIL-20A SIL-20AXR	SIL-20AC SIL-20ACXR	SIL-10ADvp	SIL-10A SIL-10AF SIL-10AP SIL-10Ai	SIL-10AXL
Loop Injection Type		✓					
Excess Volume		✓					
Loop Fill Factor		✓					
Rinse Type	✓	✓					
Rinse Port Liquid	✓	✓					
Purge Time Rinse Port Purging with R0	✓	✓					
Purge Time Measuring Line Purging with R0	✓	✓					
Purge Time Rinse Port Purging with R1	✓	✓					
Purge Time Rinse Port Purging with R2	✓	✓					
Rinsing Start Timing	✓	✓					
Rinsing Start Time	✓	✓					
Rinsing Sequence	✓	✓					
Rinsing Volume R0/R1/R2	✓	✓					
Injection Port Rinsing R0/R1/R2	✓	✓					
Sample Loop Equilibration	✓	✓					
Equilibration Start Time	✓	✓					
Equilibration Hold Time	✓	✓					
Configuration parameters							
Synchronize injection With external input	✓	✓	✓	✓	✓	✓	✓
Overlap Injection	✓	✓	✓	✓	✓	✓	✓
Rinse Pump Setting	✓	✓	✓	✓			
Injection Type	✓	✓					
Maximum Injection Volume	✓	✓	✓	✓			
Loop Volume		✓					

5. Application Operation

Parameter	SIL-30ACMP	SIL-30AC	SIL-20A SIL-20AXR	SIL-20AC SIL-20ACXR	SIL-10ADvp	SIL-10A SIL-10AF SIL-10AP SIL-10Ai	SIL-10AXL
Measure Pump Volume			✓	✓			
Flow Line			✓	✓			
Rinse Solvents			✓	✓			
Syringe Volume						✓	✓
Excess Volume of Sample Aspiration						✓	
Injection Compensation Factor [Kvol]						✓	✓
Needle Stroke	✓						
Distance from the rack surface	✓						
Comment	✓						



The [Rinse Time] setting is displayed when [Used] is set in the [Rinse Pump Setting] field in the "Configuration Parameter" window. [Needle Stroke Stack A-D] is displayed when a rack changer is connected.



The [Rinsing Start Timing], [Rinsing Start Time], [Sample Loop Equilibration], [Equilibration Start Time] and [Equilibration Hold Time] settings are displayed when direct injection is set for the injection type.



The [Sample Discharge Speed], [Loop Injection Type], [Excess Volume] and [Loop Fill Factor] settings are displayed when loop injection is set for the injection type.

■ Method Parameters for the Autosampler

● SIL-30ACMP

Parameter	Setting Range	Minimum Unit	Default setting	Remark
Injection settings				
Cooler RackPlate L	On, Off		On	Set the ON/OFF status of temperature control for rack plate L.
Cooler RackPlate M	On, Off		On	Set the ON/OFF status of temperature control for rack plate M.
Cooler RackPlate R	On, Off		On	Set the ON/OFF status of temperature control for rack plate R and control vial rack.
Cooler Temperature (°C)	4 to 40	1	15	
Sampling Speed (μL/sec)	0.1 to 15.0	0.1	5.0	Set the speed at which the measuring pump measures samples. (See note 2.)
Measuring Line Purge Volume (μL)	0 to 2000	1	Rinse Type Internal and External: 600 Other than the above: 100	Set the purge volume of rinse solution R0 in the measuring flow line and the needle internal rinsing flow lines. (See note 2.)
Air Gap Volume (μL)	0 to 5.0	0.1	0	Set the air volume to be trapped before and after the aspirated sample.
MTP Sample Order	A1, A2 mode 1A, 1B mode		A1, A2 mode	Select the injection order for the MTP/ DWP. (See note 1.)
Rinse type setting				
Rinse Type	OFF External Only Internal and External OFF (Fast LC)		External Only	Select the needle rinsing method. OFF: No needle rinsing External Only: Rinsing the external surface of the needle before and after sample aspiration Internal and External: Rinsing the internal surface of the needle and the flow lines during and after analysis in addition to external rinsing of the needle OFF (Fast LC): No needle rinsing while fixing some parameters to shorten the analysis cycle. (See note 3.)
Rinse setting				
Rinse Volume (μL)	0 to 2000	1	500	Set the purge volume (low-pressure flow line purge volume) for the rinse port after injection. (See note 2.)

5. Application Operation

Parameter	Setting Range	Minimum Unit	Default setting	Remark
Rinse Speed ($\mu\text{L}/\text{sec}$)	1 to 35	1	35	Set the purge speed of rinse solution. If the rinse solution has a high viscosity, bubbles may form in the low-pressure flow line. Set a speed appropriate to the viscosity. (See note 2.)
Rinse Mode	No rinse Before Sampling After Sampling Before and after sampling		Before and after sampling	No rinse: No external rinsing of the needle at the rinse port Before sampling: External rinsing of the needle at the rinse port before sampling After sampling: External rinsing of the needle at the rinse port after sampling Before and after sampling: External rinsing of the needle at the rinse port before and after sampling (See note 2.)
Rinse Dip Time (sec)	0 to 60	1	0	Set the time for which the needle is dipped in rinse solution at the rinse port. Enabled for [Rinse Mode] settings other than "No rinse". (See note 2.)
Rinse Time (sec)	1 to 9	1	2	Set the time for external rinsing of the needle while pumping rinse solution with the rinsing pump. (See note 2.)
Rinse Port Liquid	R0 R1 R2		R1	Select the type of rinse solution used for external rinsing of the needle. (See note 2.)
Purge settings				
Purge Time Rinse Port Purging with R0 [min]	0.0 to 25.0	0.1	10.0	Set the purge time of the rinse port with rinse solution R0. (See note 2.)
Purge Time Measuring Line Purging with R0 [min]	0.0 to 25.0	0.1	10.0	Set the purge time of the measuring flow line with rinse solution R0. When R0 is selected for "Rinse Port Liquid", this setting applies to the purge time of the rinse port with rinse solution R0.
Purge Time Rinse Port Purging with R1 (min)	0.0 to 25.0	0.1	10.0	Set the purge time of the rinse port with rinse solution R1. (See note 2.)
Purge Time Rinse Port Purging with R2 (min)	0.0 to 25.0	0.1	10.0	Set the purge time of the rinse port with rinse solution R2. (See note 2.)
Internal Rinse Settings				
Rinsing Start Timing	After Analysis Specify Start Time		After Analysis	Set the timing to start the internal rinsing of the needle. (See note 2.)

Parameter	Setting Range	Minimum Unit	Default setting	Remark
Rinsing Start Time (min)	0.00 to 9.99 10.0 to 99.9 100 to 999	0.01 0.1 1	0.00	Set the time to start the internal rinsing of the needle. Input the time elapsing from the start of analysis. Enabled when "Specify Start Time" is selected for the Rinsing Start Timing. (See note 2.)
Rinsing Sequence	0 to 2222	1	1	Set the rinse solution type and order for internal rinsing of the needle. For example, to perform internal rinsing of the needle with rinse solution R0 → R1 → R2 → R0, set "0120". (See note 2.)
Rinsing Volume R0/R1/R2 [μ L]	0 to 2000	1	300	Set the volume of rinse solution to be used for internal rinsing of the needle. (See note 2.)
Injection Port Rinsing R0/R1/R2	On, Off		R0: Off R1: Off R2: Off	Check the box when performing rinsing of the injection port after internal rinsing of the needle. Only the rinse solutions specified at [Rinsing Sequence] are enabled. (See note 2.)
Sample Loop Equilibration	Disable Enable		Disable	Determine whether or not to perform equilibration of the sample loop. (See notes 2 and 4.)
Equilibration Start Time (min)	0.00 to 9.99 10.0 to 99.9 100 to 999	0.01 0.1 1	0.00	Set the time to start the equilibration of the sample loop. Input the time elapsing from the start of analysis. Enabled when "Enable" is selected for [Sample Loop Equilibration] and "Specify Start Time" is selected for [Rinsing Start Timing]. (See notes 2 and 4.)
Equilibration Hold Time (min)	0.00 to 9.99 10.0 to 99.9 100 to 999	0.01 0.1 1	1.00	Set the time to keep the equilibration of the sample loop. Enabled when "Enable" is selected for [Sample Loop Equilibration]. (See notes 2 and 4.)

1. If MTP Sample Order is changed in one method file, this change is applied to all other files (No. 0 to 19), because it is depend on the sample rack.
2. Depending on the rinse type setting, this setting is shown or hidden and enabled or disabled.
3. For details about the parameters that are fixed when "OFF (Fast LC)" is selected for [Rinse Type], refer to the SIL-30ACMP instruction manual.
4. For details about sample loop equilibration, refer to the SIL-30ACMP instruction manual.

5. Application Operation

● SIL-30AC

Parameter	Setting Range	Minimum Unit	Default setting	Remark
Injection settings				
Autosampler/vial rack				
Needle Stroke (mm)	17 to 54	1	52	(See note 1.)
Autosampler/MTP rack				
Needle Stroke (mm)	10 to 52	1	45	(See note 1.)
MTP Type	96 wells 384 wells		96 wells	Select the MTP/DWP well type. (See note 1.)
MTP Sample Order	A1, A2 mode 1A, 1B mode		A1, A2 mode	Select the injection order for the MTP/ DWP. (See note 1.)
Autosampler/DWP rack				
Needle Stroke (mm)	10 to 52	1	40	(See note 1.)
MTP Type	96 wells 384 wells		96 wells	Select the MTP/DWP well type. (See note 1.)
MTP Sample Order	A1, A2 mode 1A, 1B mode		A1, A2 mode	Select the injection order for the MTP/ DWP. (See note 1.)
Common Parameters				
Needle Stroke (Ctrl) (mm)	17 to 54	1	52	Needle Stroke for control vial.
Cooler	On, Off		On	
Cooler Temperature (°C)	4 to 40	1	15	
Sampling Speed (μL/sec)	0.1 to 15.0	0.1	5.0	Set the speed at which the measuring pump measures samples. (See note 2.)
Sample Discharge Speed (μL/sec)	0.1 to 15.0	0.1	1.0	Set the speed for discharging the sample to the sample loop. (See note 2.)
Measuring Line Purge Volume (μL)	0 to 2000	1	Rinse Type Internal and External: 600 Other than the above: 100	Set the purge volume of rinse solution R0 in the measuring flow line and the needle internal rinsing flow lines. (See note 2.)
Air Gap Volume (μL)	0 to 5.0	0.1	Injection Type Direct Injection: 0 Loop Injection: 0.1	Set the air volume to be trapped before and after the aspirated sample.
Loop Injection Type	Partial Loop Full Loop		Partial Loop	Two loop injection methods are available. Select either partial loop method or full loop method.

Parameter	Setting Range	Minimum Unit	Default setting	Remark
Excess Volume (μL)	4 to 20	1	10	Set the excess volume of sample to be aspirated.
Loop Fill Factor (times)	1.0 to 5.0	0.1	3.0	Set how many times of the loop volume the sample should be injected. Enabled when "full loop" is selected for the loop injection type.
Rinse type setting				
Rinse Type	OFF External Only Internal and External OFF (Fast LC)		External Only	Select the needle rinsing method. OFF: No needle rinsing External Only: Rinsing the external surface of the needle before and after sample aspiration Internal and External: Rinsing the internal surface of the needle and the flow lines during and after analysis in addition to external rinsing of the needle OFF (Fast LC): No needle rinsing while fixing some parameters to shorten the analysis cycle. (See note 3.)
Rinse setting				
Rinse Volume (μL)	0 to 2000	1	500	Set the purge volume (low-pressure flow line purge volume) for the rinse port after injection. (See note 2.)
Rinse Speed ($\mu\text{L}/\text{sec}$)	1 to 35	1	35	Set the purge speed of rinse solution. If the rinse solution has a high viscosity, bubbles may form in the low-pressure flow line. Set a speed appropriate to the viscosity. (See note 2.)
Rinse Mode	No rinse Before Sampling After Sampling Before and after sampling		Before and after sampling	No rinse: No external rinsing of the needle at the rinse port Before sampling: External rinsing of the needle at the rinse port before sampling After sampling: External rinsing of the needle at the rinse port after sampling Before and after sampling: External rinsing of the needle at the rinse port before and after sampling (See note 2.)
Rinse Dip Time (sec)	0 to 60	1	0	Set the time for which the needle is dipped in rinse solution at the rinse port. Enabled for [Rinse Mode] settings other than "No rinse". (See note 2.)

5. Application Operation

Parameter	Setting Range	Minimum Unit	Default setting	Remark
Rinse Time (sec)	1 to 9	1	2	Set the time for external rinsing of the needle while pumping rinse solution with the rinsing pump. (See note 2.)
Rinse Port Liquid	R0 R1 R2		R1	Select the type of rinse solution used for external rinsing of the needle. (See note 2.)
Purge settings				
Purge Time Rinse Port Purging with R0 [min]	0.0 to 25.0	0.1	10.0	Set the purge time of the rinse port with rinse solution R0. (See note 2.)
Purge Time Measuring Line Purging with R0 [min]	0.0 to 25.0	0.1	10.0	Set the purge time of the measuring flow line with rinse solution R0. When R0 is selected for "Rinse Port Liquid", this setting applies to the purge time of the rinse port with rinse solution R0.
Purge Time Rinse Port Purging with R1 (min)	0.0 to 25.0	0.1	10.0	Set the purge time of the rinse port with rinse solution R1. (See note 2.)
Purge Time Rinse Port Purging with R2 (min)	0.0 to 25.0	0.1	10.0	Set the purge time of the rinse port with rinse solution R2. (See note 2.)
Internal Rinse Settings				
Rinsing Start Timing	After Analysis Specify Start Time		After Analysis	Set the timing to start the internal rinsing of the needle.
Rinsing Start Time (min)	0.00 to 9.99 10.0 to 99.9 100 to 999	0.01 0.1 1	0.00	Set the time to start the internal rinsing of the needle. Input the time elapsing from the start of analysis. Enabled when "Specify Start Time" is selected for the Rinsing Start Timing.
Rinsing Sequence	0 to 2222	1	1	Set the rinse solution type and order for internal rinsing of the needle. For example, to perform internal rinsing of the needle with rinse solution R0 → R1 → R2 → R0, set "0120". (See note 2.)
Rinsing Volume R0/R1/ R2 [uL]	0 to 2000	1	300	Set the volume of rinse solution to be used for internal rinsing of the needle. (See note 2.)
Injection Port Rinsing R0/ R1/R2	On, Off		R0: Off R1: Off R2: Off	Check the box when performing rinsing of the injection port after internal rinsing of the needle. Only the rinse solutions specified at [Rinsing Sequence] are enabled. (See note 2.)

Parameter	Setting Range	Minimum Unit	Default setting	Remark
Sample Loop Equilibration	Disable Enable		Disable	Determine whether or not to perform equilibration of the sample loop. (See notes 2 and 4.)
Equilibration Start Time (min)	0.00 to 9.99 10.0 to 99.9 100 to 999	0.01 0.1 1	0.00	Set the time to start the equilibration of the sample loop. Input the time elapsing from the start of analysis. Enabled when "Enable" is selected for [Sample Loop Equilibration] and "Specify Start Time" is selected for [Rinsing Start Timing]. (See notes 2 and 4.)
Equilibration Hold Time (min)	0.00 to 9.99 10.0 to 99.9 100 to 999	0.01 0.1 1	1.00	Set the time to keep the equilibration of the sample loop. Enabled when "Enable" is selected for [Sample Loop Equilibration]. (See notes 2 and 4.)
Rack changer				
Needle Stroke (mm) Stack A Stack B Stack C Stack D	10 to 52	1	45	Displayed if a rack changer is connected. Set the needle stroke for each stack in the rack changer. This needle stroke is used if a changer rack is used. When using 1.5-mL vial plates, the available needle stroke range is 10 mm to 46 mm and the default value is 44 mm.

1. If Needle Stroke, MTP Type and MTP Sample Order are changed in one method file, these changes are applied to all other files (No. 0 to 19), because they are depend on the sample rack.
2. Depending on the rinse type setting, this setting is shown or hidden and enabled or disabled.
3. For details about the parameters that are fixed when "OFF (Fast LC)" is selected for [Rinse Type], refer to the SIL-30AC instruction manual.
4. For details about sample loop equilibration, refer to the SIL-30AC instruction manual.

5. Application Operation

● SIL-20A, SIL-20AC, SIL-20AXR, SIL-20ACXR

Parameter	Setting range	Minimum unit	Default setting	Remark
Autosampler/vial rack				
Needle Stroke (mm)	17 to 54	1	52	(See note 1.)
Autosampler/MTP rack				
Needle Stroke (mm)	10 to 52	1	45	(See note 1.)
MTP Type	96 wells 384 wells		96 wells	Select the MTP/DWP well type. (See note 1.)
MTP Sample Order	A1, A2 mode 1A, 1B mode		A1, A2 mode	Select the injection order for the MTP/ DWP. (See note 1.)
Autosampler/DWP rack				
Needle Stroke (mm)	10 to 52	1	40	(See note 1.)
MTP Type	96 wells 384 wells		96 wells	Select the MTP/DWP well type. (See note 1.)
MTP Sample Order	A1, A2 mode 1A, 1B mode		A1, A2 mode	Select the injection order for the MTP/ DWP. (See note 1.)
Common parameters				
Needle Stroke (Ctrl) (mm)	17 to 54	1	52	Needle stroke for control vial.
Purge Time (min)	0.1 to 25.0	0.1	25.0	Sets the time for which the low- pressure flow line is purged with the measuring pump.
Cooler	On, Off		On	(See note 2.)
Cooler Temperature (°C)	4 to 40	1	15	(See note 2.)
Sampling Speed (µL/sec)	0.1 to 1.0 1 to 15	0.1 1	15	Sets the speed at which the measuring pump measures samples. The default value for models SIL- 20AXR and SIL-20ACXR is 5.
Rinse Volume (µL)	0 to 2000	1	200	Sets the solution-replacement volume (low-pressure flow line's solution- replacement volume) for the rinse port after injection.
Rinse Speed (µL/sec)	1 to 35	1	35	Sets the solution-replacement speed for the rinse port after injection. If the rinse solution has a high viscosity, bubbles may form in the low-pressure flow line and so set a speed appropriate to the viscosity.

Parameter	Setting range	Minimum unit	Default setting	Remark
Rinse Mode	No Rinse Before Sampling After Sampling Before and After Sampling		No Rinse	No Rinse: Needle not rinsed at rinse port. Before Sampling: Needle rinsed at rinse port before sampling. After Sampling: Needle rinsed at rinse port after sampling. Before and After Sampling: Needle rinsed at rinse port before and after sampling.
Rinse Dip Time (sec)	0 to 60	1	0	Sets the time for which the needle is dipped in rinse solution at the rinse port. Enabled for [Rinse Mode] settings other than [No Rinse].
Rinse Time (sec)	1 to 9	1	1	Sets the time for which the needle is rinsed using rinse solution pumped by the rinse pump.
Rack changer				
Needle Stroke (mm) Stack A Stack B Stack C Stack D	10 to 52	1	45	Displayed if a rack changer is connected. Sets the needle stroke for each stack in the rack changer. This needle stroke is used if a changer rack is used. When using 1.5-mL vial plates, the available needle stroke range is 10 mm to 46 mm and the default value is 44 mm.

1. If Needle Stroke, MTP Type and MTP Sample Order are changed in one method file, these changes are applied to all other files (No. 0 to 19), because they depend on the sample rack.
2. Displayed if equipped with a sample cooler (such as SIL-20AC).

● SIL-10ADvp

Parameter	Setting range	Minimum unit	Default setting	Remark
Needle Stroke (mm) Standard Rack 1, 3, 6, 7 Cooling Rack 11, 13, 16, 17	20 to 54	1	52	(See note 1.)
Needle Stroke (mm) Standard Rack 4, 5 Cooling Rack 14, 15	8 to 54	1	19	(See note 1.)
Needle Stroke (mm) Standard Rack 2 Cooling Rack 12	20 to 43	1	41	(See note 1.)
Purge Time (min)	0.1 to 25.0	0.1	25.0	Sets the time for which a low-pressure flow line is purged with the measuring pump.

5. Application Operation

Parameter	Setting range	Minimum unit	Default setting	Remark
Cooler	On, Off		On	Displayed if equipped with a sample cooler.
Cooler Temperature (°C)	4 to 40	1	4	Displayed if equipped with a sample cooler.
Sampling Speed (μL/sec)	0.1 to 1.0 1 to 15	0.1 1	15	Sets the speed at which the measuring pump measures samples.
Rinse Volume (μL)	1 to 2000	1	200	Sets the solution-replacement volume (low-pressure flow line's solution-replacement volume) for the rinse port after injection.
Rinse Speed (μL/sec)	1 to 35	1	35	Sets the solution-replacement speed for the rinse port after injection. If the rinse solution has a high viscosity, bubbles may form in the low-pressure flow line and so set a speed appropriate to the viscosity.
Rinse Mode	No Rinse Before Sampling After Sampling Before and After Sampling		No Rinse	No Rinse: Needle not rinsed at rinse port. Before Sampling: Needle rinsed at rinse port before sampling. After Sampling: Needle rinsed at rinse port after sampling. Before and After Sampling: Needle rinsed at rinse port before and after sampling.
Rinse Dip Time (sec)	0 to 60	1	0	Sets the time for which the needle is dipped in rinse solution at the rinse port. Enabled for [Rinse Mode] settings other than [No Rinse].
MTP Tray	1, 2		1	Select the MTP/DWP quantity. (See note 1.)

1. If Needle Stroke and MTP Tray are changed in one method file, these changes are applied to all other files (No. 0 to 19), because they are depend on the sample rack.

● SIL-10A, SIL-10AF, SIL-10AP, SIL-10Ai, SIL-10AXL

Parameter	Setting range	Minimum unit	Default setting	Remark
Rack S, COOL-S				
Needle Stroke (mm)	20 to 39	1	39	(See note 1.)
Rack L, COOL-L				
Needle Stroke (mm)	20 to 51	1	51	(See note 1.)
Rack LL, MTP1, MTP2 (See note 2.)				
Needle Stroke (mm)	20 to 58	1	57	(See note 1.)
500 μ L syringe				
Sampling Speed (μ L/sec)	1 to 150	1	3	Sets the speed at which the measuring pump measures samples.
Rinse Volume (μ L)	1 to 2000	1	500	Sets the solution-replacement volume (low-pressure flow line's solution-replacement volume) for the rinse port after injection.
Rinse Speed (μ L/sec)	1 to 150	1	150	Sets the solution-replacement speed for the rinse port after injection. If the rinse solution has a high viscosity, bubbles may form in the low-pressure flow line and so set a speed appropriate to the viscosity.
2500 μ L syringe				
Sampling Speed (μ L/sec)	5 to 150	1	50	Sets the speed at which the measuring pump measures samples.
Rinse Volume (μ L)	1 to 9999	1	2500	Sets the solution-replacement volume (low-pressure flow line's solution-replacement volume) for the rinse port after injection.
Rinse Speed (μ L/sec)	5 to 150	1	150	Sets the solution-replacement speed for the rinse port after injection. If the rinse solution has a high viscosity, bubbles may form in the low-pressure flow line and so set a speed appropriate to the viscosity.
5000 μ L syringe (See note 2.)				
Sampling Speed (μ L/sec)	10 to 150	1	50	Sets the speed at which the measuring pump measures samples.
Rinse Volume (μ L)	1 to 20000	1	5000	Sets the solution-replacement volume (low-pressure flow line's solution-replacement volume) for the rinse port after injection.

5. Application Operation

Parameter	Setting range	Minimum unit	Default setting	Remark
Rinse Speed (μL/sec)	10 to 150	1	150	Sets the solution-replacement speed for the rinse port after injection. If the rinse solution has a high viscosity, bubbles may form in the low-pressure flow line and so set a speed appropriate to the viscosity.
Common parameters				
Sample Rack	S L COOL-S COOL-L LL MTP1 MTP2		S	(See note 1.) (See note 2.)

1. If Needle Stroke and Sample Rack are changed in one method file, these changes are applied to all other files (No. 0 to 19), because they are depend on the sample rack.
2. Rack LL,MTP1,MTP2 and 5000μL syringe are available only with SIL-10A version 4.10 or later and SIL-10AF/10AP. Do not select 5000μL syringe, SIL-10A earlier than version 4.10, or SIL-10Ai/10AXL.

■ Configuration Parameters for the Autosampler

● SIL-30ACMP

Parameter	Setting range	Minimum unit	Default setting	Remark
Synchronize injection with external input. (INJIN)	Disabled Enabled		Disabled	Disabled: The autosampler injects the sample immediately after loading it. Enabled: After loading the sample, the autosampler waits for a contact input signal (MAN.INJ.) before injecting the sample. (See note 1.)
Overlap Injection	Disabled Enabled		Disabled	If this setting is enabled, when executing multiple analysis, injection for the next analysis is started before completion of the current analysis, and the next analysis is started immediately after the current analysis is completed. (See note 2.)

Parameter	Setting range	Minimum unit	Default setting	Remark
Rinse Pump Setting	Rinse Port Only Rinse Pump Only Rinse Pump → Rinse Port Rinse Port → Rinse Pump Rinse Port → Rinse Pump (between Analysis)		Rinse Port Only	Operation settings for the rinse pump. Reserved for future expansion. Do not use this setting.
Injection Type	Direct Injection		Direct Injection	The injection type is displayed. Setting impossible.
Maximum Injection Volume (μL)			50	Upper limit injection volume is displayed. Setting impossible.
Needle Stroke Settings				
Needle Stroke (mm) Rack A to F	10 to 52	1	1.5 mL sample vial plate:47 microtiter plate:45 deep-well plate:40	Set the needle stroke for rack A to F. The default value varies depending on the plate type set on the rack.
Needle Stroke (mm) Control Vial	17 to 54	1	52	Set the needle stroke for control vial.
Distance from the rack surface (mm) Rack A to F Control Vial	0 to 42	1		The distance from the needle tip to the rack plate surface for sample aspiration is calculated from the needle stroke and is displayed. This value cannot be edited.
Comment Rack A to F	64 bytes max			Input a comment for rack A to F. (See note 3.)

1. If there is a contact input signal before the sample is loaded, the sample is injected as soon as loading is completed.
2. The time at which injection is started is calculated automatically according to the analysis completion time and the type.
3. A Unicode character string (UTF-8) can be entered.

● SIL-30AC

Parameter	Setting range	Default setting	Remark
Synchronize injection with external input. (INJIN)	Disabled Enabled	Disabled	Disabled: The autosampler injects the sample immediately after loading it. Enabled: After loading the sample, the autosampler waits for a contact input signal (MAN.INJ.) before injecting the sample. (See note 1.)

5. Application Operation

Parameter	Setting range	Default setting	Remark
Overlap Injection	Disabled Enabled	Disabled	If this setting is enabled, when executing multiple analysis, injection for the next analysis is started before completion of the current analysis, and the next analysis is started immediately after the current analysis is completed. (See note 2.)
Rinse Pump Setting	Rinse Port Only Rinse Pump Only Rinse Pump → Rinse Port Rinse Port → Rinse Pump Rinse Port → Rinse Pump (between Analysis)	Rinse Port Only	Operation settings for the rinse pump. Reserved for future expansion. Do not use this setting.
Injection Type	Direct Injection Loop Injection	Direct Injection	The injection type is displayed. Setting impossible.
Maximum Injection Volume (μL)		50	Upper limit injection volume is displayed. Setting impossible. Displayed when "Direct Injection" is set for the injection type.
Loop Volume (μL)		1.5	Loop volume is displayed. Setting impossible. Displayed when "Loop Injection" is set for the injection type.

1. If there is a contact input signal before the sample is loaded, the sample is injected as soon as loading is completed.
2. The time at which injection is started is calculated automatically according to the analysis completion time and the type of autosampler connected.

● SIL-20A, SIL-20AC, SIL-20AXR, SIL-20ACXR

Parameter	Setting range	Default setting	Remark
Synchronize injection with external input. (INJIN)	Disabled Enabled	Disabled	Disabled: The autosampler injects the sample immediately after loading it. Enabled: After loading the sample, the autosampler waits for a contact input signal (MAN.INJ.) before injecting the sample. (See note 1.)
Overlap Injection	Disabled Enabled	Disabled	If this setting is enabled, when executing multiple analyses, injection for the next analysis is started before completion of the current analysis, and the next analysis is started immediately after the current analysis is completed. (See note 2.)

Parameter	Setting range	Default setting	Remark
Rinse Pump Setting	Rinse Port Only Rinse Pump Only Rinse Pump → Rinse Port Rinse Port → Rinse Pump Rinse Port → Rinse Pump Rinse Pump (between Analyses)	Rinse Port Only	Operation settings for the rinse pump (optional). Reserved: Reserved for future expansion. Do not use this setting.
Maximum Injection Volume (μL)		100	Upper limit injection volume is displayed. Setting impossible. (See note 3.) The default value for models SIL-20AXR and SIL-20ACXR is 50.
Measure Pump Volume (μL)		100	Measure Pump Volume is displayed. Setting is not possible. (See note 4.)
Flow Line		Standard	Flow Line is displayed. Setting is not possible. (See note 4.)
Rinse Solvents Mobile Phase Rinse Solvent1 Rinse Solvent2	On, Off	On Off Off	Select Rinse Solvents. (See note 4.)

1. If there is a contact input signal before the sample is loaded, the sample is injected as soon as loading is completed.
2. The time at which injection is started is calculated automatically according to the analysis completion time and the type of autosampler connected.
3. Displayed when an autosampler compatible with this function is connected.
4. This function is for future expansion. Displayed when an autosampler compatible with this function is connected.

● SIL-10ADvp

Parameter	Setting range	Default setting	Remark
Synchronize injection with external input.	Disabled Enabled	Disabled	Disabled: The autosampler injects the sample immediately after loading it. Enabled: After loading the sample, the autosampler waits for a contact input signal (MAN.INJ.) before injecting the sample. (See note 1.)
Overlap Injection	Disabled Enabled	Disabled	If this setting is enabled, when executing multiple analyses, injection for the next analysis is started before completion of the current analysis, and the next analysis is started immediately after the current analysis is completed. (See note 2.)

1. If there is a contact input signal before the sample is loaded, the sample is injected as soon as loading is completed.
2. The time at which injection is started is calculated automatically according to the analysis completion time and the type of autosampler connected.

5. Application Operation

● SIL-10A, SIL-10AF, SIL-10AP, SIL-10Ai, SIL-10AXL

Parameter	Setting range	Minimum unit	Default setting	Remark
Synchronize injection with external input.	Disabled Enabled		Disabled	Disabled: The autosampler injects the sample immediately after loading it. Enabled: After loading the sample, the autosampler waits for a contact input signal (MAN.INJ.) before injecting the sample. (See note 1.)
Overlap Injection	Disabled Enabled		Disabled	If this setting is enabled, when executing multiple analyses, injection for the next analysis is started before completion of the current analysis, and the next analysis is started immediately after the current analysis is completed. (See note 2.)
Syringe Volume (μL)	500 2500 5000		500	Select the capacity of the mounted syringe. 500: 500μL syringe used. 2500: 2500μL syringe used. 5000: 5000μL syringe used. (See note 3.)
Excess Volume of Sample Aspiration (μL)	10 to 100	1	50	Not displayed with the SIL-10AXL.
Injection Compensation Factor (Kvol)	1.00 to 1.30	0.01	1	

1. If there is a contact input signal before the sample is loaded, the sample is injected as soon as loading is completed.
2. The time at which injection is started is calculated automatically according to the analysis completion time and the type of autosampler connected.
3. 5000μL syringe is available only with SIL-10A version 4.10 or later and SIL-10AF/10AP. Do not select 5000μL syringe, SIL-10A earlier than version 4.10, or SIL-10Ai/10AXL.

5.12.3 Column Oven

●Comparison of Parameters for Different Models

Parameter	CTO-30AS	CTO-30A	CTO-20A CTO-20AC	CTO-10Av CTO-10ACvp CTO-10ASvp CTO-10A CTO-10AC
Method parameters				
Oven Temperature	✓	✓	✓	✓
Maximum Temperature	✓	✓	✓	✓
Heat Compensation		✓		
Heat Compensation Flow		✓		
Valve Position		✓	✓	
Configuration parameters				
Solenoid Valve		✓	✓	
CMD				
Column ID	✓	✓	✓	
Column Name	✓	✓	✓	
Column Size	✓	✓	✓	
Maximum Injection No.	✓	✓	✓	
Total Injection No.	✓	✓	✓	
Total Injection Vol.	✓	✓	✓	
Usage Time Limit	✓	✓	✓	



The [Valve Position] setting is displayed when [Used] is selected in the [Solenoid Valve] field in the "Configuration Parameter" window. [CMD] is displayed when a column module device is connected.

5. Application Operation

■ Method Parameters for the Column Oven

● CTO-30AS

Parameter	Setting range	Minimum unit	Default setting	Remark
Oven Temperature (°C)	0, 4 to 85	1	40	0 means OFF.
Maximum Temperature (°C)	5 to 90	1	90	

● CTO-30A

Parameter	Setting range	Minimum unit	Default setting	Remark
Oven Temperature (°C)	0, 4 to 150	1	40	0 means OFF.
Maximum Temperature (°C)	5 to 160	1	160	
Heat Compensation	AUTO MANUAL		AUTO	AUTO: The flow rate of pump A set in the "Method Parameter" window is set as the heat compensation flow. MANUAL: The value set for [Heat Compensation Flow] is set.
Heat Compensation Flow (mL/min)	0 to 10.0000	0.0001	0	Setting is available when "MANUAL" is selected for [Heat Compensation].
Valve Position 2 Position Valve R 2 Position Valve L	0, 1		0	Set the position of the 2-position valves R and L.
Valve Position 6 Position Valve R 6 Position Valve L	1, 2, 3, 4, 5, 6		1	Set the position of the 6-position valves R and L.

● CTO-20A, CTO-20AC

Parameter	Setting range	Minimum unit	Default setting	Remark
Oven Temperature (°C)	0, 4 to 85	1	40	0 means OFF.
Maximum Temperature (°C)	5 to 90	1	90	
Valve Position 2 Position Valve R 2 Position Valve L	0, 1		0	Sets the position of 2-position valves R and L.
Valve Position 6 Position Valve R 6 Position Valve L	1, 2, 3, 4, 5, 6		1	Sets the position of 6-position valves R and L.

● CTO-10Avp, CTO-10ACvp, CTO-10ASvp, CTO-10A, CTO-10AC

Parameter	Setting range	Minimum unit	Default setting	Remark
Oven Temperature (°C)	0, 4 to 80	1	40	0 means OFF.
Maximum Temperature (°C)	5 to 85	1	85	

■ Configuration Parameters for the Column Oven

● CTO-30AS

Parameter	Setting range	Minimum unit	Default setting	Remark
CMD				
Column ID	26 bytes max.			(See note 1.)
Column Name	26 bytes max.			(See note 1.)
Column Size	26 bytes max.			(See note 1.)
Maximum Injection No.	0 to 4294967295	1	0	
Total Injection No.	0 to 4294967295	1	0	Setting not possible.
Total Injection Vol. (μL)	0 to 4294967295	1	0	Setting not possible.
Usage Time Limit	10 bytes max.			(See note 1.)

1. A Unicode character string (UTF-8) can be entered.

● CTO-30A, CTO-20A, CTO-20AC

Parameter	Setting range	Minimum unit	Default setting	Remark
Solenoid Valve	Not Used Used		Not Used	Not Used: The valve-position parameter is not displayed in the "column oven" tab page in the "Method Parameter" window. Used: The valve-position parameter is displayed in the "column oven" tab page in the "Method Parameter" window.
CMD				
Column ID	26 bytes max.			(See note 1.)
Column Name	26 bytes max.			(See note 1.)
Column Size	26 bytes max.			(See note 1.)
Maximum Injection No.	0 to 4294967295	1	0	
Total Injection No.	0 to 4294967295	1	0	Setting not possible.
Total Injection Vol. (μL)	0 to 4294967295	1	0	Setting not possible.
Usage Time Limit	10 bytes max.			(See note 1.)

1. A Unicode character string (UTF-8) can be entered.

5. Application Operation

5.12.4 Detector

■ Comparison of Parameters for Different Models

Parameter	SPD-20A SPD-20AV	SPD-10Avp SPD-10AVvp	SPD-10A SPD-10AV SPD-10Ai SPD-10AVi	RF-20A	RF-20Axs	RF-10AXL RF-10A	RID-20A	RID-10A	SPD-M30A	SPD-M20A
Method parameters										
Wavelength1	✓	✓	✓						✓	✓
Wavelength2	✓	✓	✓						✓	✓
Wavelength3									✓	✓
Wavelength4									✓	✓
Excitation Wavelength				✓	✓	✓				
Emission Wavelength				✓	✓	✓				
Excitation Wavelength2				✓	✓					
Emission Wavelength2				✓	✓					
Wavelength Mode	✓	✓	✓	✓	✓					
Measurement Mode							✓	✓		
Lamp	✓	✓	✓	✓	✓	✓			✓	✓
AUX Range	✓	✓	✓				✓	✓		
AUX Range1									✓	✓
AUX Range2									✓	✓
AUX Range3									✓	✓
AUX Range4									✓	✓
Bandwidth1									✓	✓
Bandwidth2									✓	✓
Bandwidth3									✓	✓
Bandwidth4									✓	✓
Recorder Range						✓	✓	✓		
Recorder Range2				✓	✓					

Parameter	SPD-20A SPD-20AV	SPD-10Avp SPD-10AVvp	SPD-10A SPD-10AV SPD-10Ai SPD-10AVi	RF-20A	RF-20Axs	RF-10AXL RF-10A	RID-20A	RID-10A	SPD-M30A	SPD-M20A
Response	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Polarity							✓	✓	✓	✓
Gain				✓	✓	✓				
Sensitivity				✓	✓	✓				
SV Level	✓	✓					✓			
SV Delay Time	✓	✓					✓			
Temperature Control	✓				✓		✓	✓		✓
Cell Temperature	✓				✓		✓	✓		✓
Configuration parameters										
Perform auto zero at analysis start.	✓	✓	✓	✓	✓	✓	✓	✓		
Solvent Recycle Valve	✓	✓					✓			
Sampling Rate									✓	✓
Slit Width									✓	✓
Reference Compensation									✓	✓
Reference Wavelength									✓	✓
Reference Bandwidth									✓	✓



[SV Level] and [SV Delay Time] are displayed when [Used] is selected for the solvent recycle valve on the "Configuration Parameter" window.

5. Application Operation

■ Method Parameters for the Detector

● SPD-20A

Parameter	Setting range	Minimum unit	Default setting	Remark
Single				
Wavelength1 (nm)	190 to 700	1	254	
Dual				
Wavelength1 (nm)	190 to 370 371 to 700	1	254	Use the same setting range for both wavelength 1 and wavelength 2.
Wavelength2 (nm)	190 to 370 371 to 700	1	254	Displayed if [Dual] is selected as the wavelength mode.
Common parameters				
Wavelength Mode	Single Dual		Single	
Lamp	Off, D2		D2	
AUX Range (AU/V)	0.5, 1, 2, 4, 1.25, 2.5		2	
Response (sec)	No Filter, 0.05, 0.1, 0.5, 1.0, 1.5, 3.0, 6.0, 8.0, 10.0, 2.0		1.0	
SV Level (AU)	0.0000 to 1.0000	0.0001	0.0000	
SV Delay Time (sec)	0.0 to 99.9	0.1	2.0	
Temperature Control	On, Off		On	
Cell Temperature (°C)	9 to 50	1	40	

● SPD-20AV

Parameter	Setting range	Minimum unit	Default setting	Remark
D2 lamp/single				
Wavelength1 (nm)	190 to 370	1	254	
D2 lamp/dual				
Wavelength1 (nm)	190 to 370	1	254	
Wavelength2 (nm)	190 to 370	1	254	Displayed if [Dual] is selected as the wavelength mode.
W lamp/single				
Wavelength1 (nm)	371 to 900	1	500	

Parameter	Setting range	Minimum unit	Default setting	Remark
W lamp/dual				
Wavelength1 (nm)	371 to 700 701 to 900	1	500	Use the same setting range for both wavelength 1 and wavelength 2.
Wavelength2 (nm)	371 to 700 701 to 900	1	500	Displayed if [Dual] is selected as the wavelength mode.
D2+W lamp/single				
Wavelength1 (nm)	190 to 900	1	254	
D2+W lamp/dual				
Wavelength1 (nm)	190 to 370 371 to 700 701 to 900	1	500	Use the same setting range for both wavelength 1 and wavelength 2.
Wavelength2 (nm)	190 to 370 371 to 700 701 to 900	1	500	Displayed if [Dual] is selected as the wavelength mode.
Common parameters				
Wavelength Mode	Single Dual		Single	
Lamp	Off, D2, W, D2+W		D2	
AUX Range (AU/V)	0.5, 1, 2, 4, 1.25, 2.5		2	
Response (sec)	No Filter, 0.05, 0.1, 0.5, 1.0, 1.5, 3.0, 6.0, 8.0, 10.0, 2.0		1.0	
SV Level (AU)	0.0000 to 1.0000	0.0001	0.0000	
SV Delay Time (sec)	0.0 to 99.9	0.1	2.0	
Temperature Control	On, Off		On	
Cell Temperature (°C)	9 to 50	1	40	

● SPD-10Avp

Parameter	Setting range	Minimum unit	Default setting	Remark
Single				
Wavelength1 (nm)	190 to 600	1	254	
Dual				
Wavelength1 (nm)	190 to 370 371 to 600	1	254	Use the same setting range for both wavelength 1 and wavelength 2.

5. Application Operation

Parameter	Setting range	Minimum unit	Default setting	Remark
Wavelength2 (nm)	190 to 370 371 to 600	1	254	Displayed if [Dual] is selected as the wavelength mode.
Common parameters				
Wavelength Mode	Single Dual		Single	
Lamp	Off, D2		D2	
AUX Range (AU/V)	0.5, 1, 2, 4, 1.25, 2.5		2	
Response (sec)	0.05, 0.1, 0.5, 1.0, 1.5, 3.0, 6.0, 8.0, 10.0, 2.0		1.0	
SV Level (AU)	0.0000 to 1.0000	0.0001	0.0000	
SV Delay Time (sec)	0.0 to 99.9	0.1	2.0	

● SPD-10AVvp

Parameter	Setting range	Minimum unit	Default setting	Remark
D2 lamp/single				
Wavelength1 (nm)	190 to 370	1	254	
D2 lamp/dual				
Wavelength1 (nm)	190 to 370	1	254	
Wavelength2 (nm)	190 to 370	1	254	Displayed if [Dual] is selected as the wavelength mode.
W lamp/single				
Wavelength1 (nm)	371 to 900	1	500	
W lamp/dual				
Wavelength1 (nm)	371 to 700 701 to 900	1	500	Use the same setting range for both wavelength 1 and wavelength 2.
Wavelength2 (nm)	371 to 700 701 to 900	1	500	Displayed if [Dual] is selected as the wavelength mode.
Common parameters				
Wavelength Mode	Single Dual		Single	
Lamp	Off, D2, W		D2	
AUX Range (AU/V)	0.5, 1, 2, 4, 1.25, 2.5		2	

Parameter	Setting range	Minimum unit	Default setting	Remark
Response (sec)	0.05, 0.1, 0.5, 1.0, 1.5, 3.0, 6.0, 8.0, 10.0, 2.0		1.0	
SV Level (AU)	0.0000 to 1.0000	0.0001	0.0000	
SV Delay Time (sec)	0.0 to 99.9	0.1	2.0	

● SPD-10A, SPD-10Ai

Parameter	Setting range	Minimum unit	Default setting	Remark
Single				
Wavelength1 (nm)	190 to 600	1	254	
Dual				
Wavelength1 (nm)	190 to 370 371 to 600	1	254	Use the same setting range for both wavelength 1 and wavelength 2.
Wavelength2 (nm)	190 to 370 371 to 600	1	254	Displayed if [Dual] is selected as the wavelength mode.
Common parameters				
Wavelength Mode	Single Dual		Single	
Lamp	Off, D2		D2	
AUX Range (AU/V)	0.5, 1, 2, 4, 1.25, 2.5		2	
Response (sec)	0.05, 0.1, 0.5, 1.0, 1.5, 3.0, 6.0, 8.0, 10.0, 2.0		1.0	

● SPD-10AV, SPD-10AVi

Parameter	Setting range	Minimum unit	Default setting	Remark
D2 lamp/single				
Wavelength1 (nm)	190 to 370	1	254	
D2 lamp/dual				
Wavelength1 (nm)	190 to 370	1	254	
Wavelength2 (nm)	190 to 370	1	254	Displayed if [Dual] is selected as the wavelength mode.
W lamp/single				
Wavelength1 (nm)	371 to 900	1	500	

5. Application Operation

Parameter	Setting range	Minimum unit	Default setting	Remark
W lamp/dual				
Wavelength1 (nm)	371 to 700 701 to 900	1	500	Use the same setting range for both wavelength 1 and wavelength 2.
Wavelength2 (nm)	371 to 700 701 to 900	1	500	Displayed if [Dual] is selected as the wavelength mode.
Common parameters				
Wavelength Mode	Single Dual		Single	
Lamp	Off, D2, W		D2	
AUX Range (AU/V)	0.5, 1, 2, 4, 1.25, 2.5		2	
Response (sec)	0.05, 0.1, 0.5, 1.0, 1.5, 3.0, 6.0, 8.0, 10.0, 2.0		1.0	

● RF-20A

Parameter	Setting range	Minimum unit	Default setting	Remark
Excitation Wavelength (nm)	0, 200 to 900	1	350	Can be set to [0] only if [Single] is selected as the wavelength mode.
Emission Wavelength (nm)	0, 200 to 900	1	450	Can be set to [0] only if [Single] is selected as the wavelength mode.
Excitation Wavelength2 (nm)	200 to 900	1	350	Displayed if [Dual] is selected as the wavelength mode.
Emission Wavelength2 (nm)	200 to 900	1	450	Displayed if [Dual] is selected as the wavelength mode.
Wavelength Mode	Single Dual		Single	
Lamp	On, Off		On	
Recorder Range2	0 to 9	1	1	
Response (sec)	No Filter, 0.05, 0.1, 0.5, 1.0, 1.5, 3.0, 6.0, 8.0, 10.0, 2.0		1.0	
Gain	x1, x4, x16		x4	
Sensitivity	High Middle Low		Middle	

● RF-20Axs

Parameter	Setting range	Minimum unit	Default setting	Remark
Excitation Wavelength (nm)	0, 200 to 900	1	350	Can be set to [0] only if [Single] is selected as the wavelength mode.
Emission Wavelength (nm)	0, 200 to 900	1	450	Can be set to [0] only if [Single] is selected as the wavelength mode.
Excitation Wavelength2 (nm)	200 to 900	1	350	Displayed if [Dual] is selected as the wavelength mode.
Emission Wavelength2 (nm)	200 to 900	1	450	Displayed if [Dual] is selected as the wavelength mode.
Wavelength Mode	Single Dual		Single	
Lamp	On, Off		On	
Recorder Range2	0 to 9	1	1	
Response (sec)	No Filter, 0.05, 0.1, 0.5, 1.0, 1.5, 3.0, 6.0, 8.0, 10.0, 2.0		1.0	
Gain	x1, x4, x16		x4	
Sensitivity	High Middle Low		Middle	
Temperature Control	On, Off		On	
Cell Temperature (°C)	4 to 40		30	

● RF-10AXL

Parameter	Setting range	Minimum unit	Default setting	Remark
Excitation Wavelength (nm)	0, 200 to 900	1	350	
Emission Wavelength (nm)	0, 200 to 900	1	450	
Lamp	On, Off		On	
Recorder Range	0 to 9	1	1	
Response (sec)	0.1, 0.5, 1.5, 3.0		1.5	
Gain	x1, x4, x16		x4	
Sensitivity	High Middle Low		Middle	

5. Application Operation

● RF-10A

Parameter	Setting range	Minimum unit	Default setting	Remark
Excitation Wavelength (nm)	0, 200 to 900	1	350	
Emission Wavelength (nm)	0, 200 to 900	1	450	
Recorder Range	0 to 9	1	1	
Response (sec)	0.1, 0.5, 1.5, 3.0		1.5	
Gain	x1, x4, x16		x4	
Sensitivity	High Low		Low	

● RID-20A

Parameter	Setting range	Minimum unit	Default setting	Remark
Normal mode				
Recorder Range (μRIU FS)	0 to 500.00	0.01	100.00	
Preparative/Large-scale preparative mode				
Recorder Range (μRIU FS)	0 to 5000	1	100	
Common parameters				
Measurement Mode	Analytical Preparative Large-scale preparative		Analytical	
Response (sec)	No Filter, 0.05, 0.1, 0.5, 1.0, 1.5, 3.0, 6.0, 8.0, 10.0, 2.0		1.5	
Polarity	+ -		+	
AUX Range (RIU/V)	1.0E-04 1.0E-03 1.0E-02 2.5E-04		1.0E-03	
Temperature Control	On, Off		On	
Cell Temperature (°C)	30.0 to 60.0	0.1	40.0	
SV Level (μRIU)	0.00 to 9999.00	0.01	9999.00	
SV Delay Time (sec)	0.0 to 99.9	0.1	2.0	

● RID-10A

Parameter	Setting range	Minimum unit	Default setting	Remark
Normal mode				
Recorder Range (μ RIU FS)	0 to 500.00	0.01	100.00	
Preparative/Large-scale preparative mode				
Recorder Range (μ RIU FS)	0 to 5000	1	100	
Common parameters				
Measurement Mode	Analytical Preparative Large-scale preparative		Analytical	
Response (sec)	0.05, 0.1, 0.5, 1.0, 1.5, 3.0, 6.0, 8.0, 10.0, 2.0		1.5	
Polarity	+ -		+	
AUX Range (RIU/V)	1.0E-4 1.0E-3 1.0E-2 2.5E-4		1.0E-03	
Temperature Control	On, Off		On	
Cell Temperature ($^{\circ}$ C)	30.0 to 60.0	0.1	40.0	

● SPD-M30A

Parameter	Setting range	Minimum unit	Default setting	Remark
Wavelength1 (nm) Wavelength2 (nm) Wavelength3 (nm) Wavelength4 (nm)	190 to 700	1	254	
Lamp	Off, D2		D2	
AUX Range1 (AU/V) AUX Range2 (AU/V) AUX Range3 (AU/V) AUX Range4 (AU/V)	0.5, 1, 2, 4, 1.25, 2.5		1	
Bandwidth1 (nm) Bandwidth2 (nm) Bandwidth3 (nm) Bandwidth4 (nm)	0 to 500	1	4	

5. Application Operation

Parameter	Setting range	Minimum unit	Default setting	Remark
Response (msec)	None, 5, 10, 25, 80, 160, 240, 320, 640, 1280, 2000		2000	
Polarity	+ -		+	

● SPD-M20A

Parameter	Setting range	Minimum unit	Default setting	Remark
Wavelength1 (nm) Wavelength2 (nm) Wavelength3 (nm) Wavelength4 (nm)	190 to 800	1	254	
Lamp	Off, D2, W, D2+W		D2+W	
AUX Range1 (AU/V) AUX Range2 (AU/V) AUX Range3 (AU/V) AUX Range4 (AU/V)	0.5, 1, 2, 4, 1.25, 2.5		1	
Bandwidth1 (nm) Bandwidth2 (nm) Bandwidth3 (nm) Bandwidth4 (nm)	1 to 50	1	4	
Response (msec)	None, 25, 80, 160, 240, 320, 640, 1280, 2000		2000	
Polarity	+ -		+	
Temperature Control	On, Off		On	
Cell Temperature (°C)	9 to 50	1	40	

■ Configuration Parameters for the Detector

● SPD-20A, SPD-20AV, SPD-10Avp, SPD-10AVvp

Parameter	Setting range	Minimum unit	Default setting	Remark
Auto zero when performing at analysis start.	Disable Enable		Enable	
Solvent Recycle Valve	Not Used Used		Not Used	

● SPD-10A, SPD-10Ai, SPD-10AV, SPD-10AVi

Parameter	Setting range	Minimum unit	Default setting	Remark
Auto zero when performing at analysis start.	Disable Enable		Enable	

● RID-20A

Parameter	Setting range	Minimum unit	Default setting	Remark
Auto zero when performing at analysis start.	Disable Enable		Enable	
Solvent Recycle Valve	Not Used Used		Not Used	

● RF-20A, RF-20Axs, RF-10AXL, RF-10A, RID-10A

Parameter	Setting range	Minimum unit	Default setting	Remark
Auto zero when performing at analysis start.	Disable Enable		Enable	

● SPD-M30A

Parameter	Setting range	Minimum unit	Default setting	Remark
Sampling Rate (msec)	5, 10, 25, 80, 160, 240, 320, 640, 1280, 2000		640	
Slit Width	1, 8		1	
Reference Compensation	On, Off		Off	
Reference Wavelength (nm)	190 to 700	1	350	
Reference Bandwidth (nm)	0 to 100	1	20	

5. Application Operation

● SPD-M20A

Parameter	Setting range	Minimum unit	Default setting	Remark
Sampling Rate (msec)	25, 80, 160, 240, 320, 640, 1280, 2000		640	
Slit Width	1.2, 8		1.2	
Reference Compensation	On, Off		Off	
Reference Wavelength (nm)	190 to 800	1	350	
Reference Bandwidth (nm)	1 to 50	1	20	

5.12.5 Fraction Collector

■ Method Parameters for the Fraction Collector

● FRC-10A

Parameter	Setting range	Minimum unit	Default setting	Remark
Standard Rack1				
Start Vial No.	-1, 0 to 143	1	0	Start Vial No. \leq End Vial No.
End Vial No.	-1, 0 to 143	1	143	
Standard Rack2				
Start Vial No.	-1, 0 to 63	1	0	Start Vial No. \leq End Vial No.
End Vial No.	-1, 0 to 63	1	63	
Standard Rack3				
Start Vial No.	-1, 0 to 15	1	0	Start Vial No. \leq End Vial No.
End Vial No.	-1, 0 to 15	1	15	
Standard Rack4				
Start Vial No.	-1, 0 to 49	1	0	Start Vial No. \leq End Vial No.
End Vial No.	-1, 0 to 49	1	49	
Standard Rack5				
Start Vial No.	0		0	Set 0 for [Start Vial No.]
End Vial No.	120		120	Set 120 for [End Vial No.]
User Racks 6 to 8				
Start Vial No.	-1, 0 to (See note 1.)	1	(See note 1.)	Start Vial No. \leq End Vial No.
End Vial No.	-1, 0 to (See note 1.)	1	(See note 1.)	
User Racks9				
Start Vial No.	0		0	Set 0 for [Start Vial No.]
End Vial No.	(See note 2.)		(See note 2.)	
Common parameters				
Slope (μ V/sec)	0 to 1000000	1	100	
Level (μ V)	-4500 to 1000000	1	-4500	
Width (sec)	1 to 99	1	10	
Auto Delay	On, Off		On	
Flow Rate (mL/min)	0.100 to 150.000	0.001	1.000	
Detector Time Constant (sec)	0.00 to 20.00	0.01	1.00	

5. Application Operation

Parameter	Setting range	Minimum unit	Default setting	Remark
Delay Volume (μL)	0 to 99999	1	0	
Signal Delay Volume (μL)	0 to 9999	1	0	
Vial Volume (mL)	0 to 1000.000	0.001	0	
Collection Rack No.	Standard Rack1 Standard Rack2 Standard Rack3 Standard Rack4 Standard Rack5 User Rack6 User Rack7 User Rack8 User Rack9		Standard Rack1	
Rack Adjustment				Button displayed for User Racks 6 to 9. Click this button to display the adjustment window for User Racks 6 to 9.


1. For User Racks 6 to 8, the maximum value available for [Start Vial No.], [End Vial No.] and the initial value for [End Vial No.] is the last number which was set in the "Fraction Collector Rack Adjustment" window.
2. The [End Vial No.] for User Rack 9 is the last number which was set in the "Fraction Collector Rack Adjustment" window.

5.12.6 System Controller

■ Method Parameters for the System Controller


●CBM-20A

Parameter	Setting range	Default setting	Remark
Event Output: Event1 Event2 Event3 Event4	On, Off	Off	Event output is controlled by turning the 4 (2 with CBM-20-Alite) relay contact outputs ON and OFF. Click the check box to enable the corresponding event output. The selected event outputs are displayed in gray.
Multiple Terminal Box	On, Off	On	This setting turns ON/OFF the power from the Multiple Terminal Box outlet marked "SWITCHED". Multiple Terminal Box cannot be used with CBM-20Alite. The CBM always starts up with this parameter "ON", and the setting becomes effective after the first action, for example pump "ON".

 The [Event Out 1 (Relay1)] to [Event Out 4 (Relay4)] fields under [Event Signals Setting] in the system controller "Configuration Parameter" window must have [Event] set for the output numbers used to control the relay outputs using event-output parameters.

●Sub-controller vp, Option Box vp, Option Box L, Valve Interface

Parameter	Setting range	Minimum unit	Default setting	Remark
2 Position Valve A 2 Position Valve B	0, 1		0	Sets the position of 2-position valves A and B.
6 Position Valve C 6 Position Valve D	1, 2, 3, 4, 5, 6		1	Sets the position of 6-position valves C and D.
Solenoid Valve (FCV-10AL type)	1, 2, 3, 4		1	Sets the position of the 4-position valve.
Solenoid Valve (FCV-11AL type)	1a, 1b/ 2a, 2b/ 3a, 3b		1a/2a/3a	Sets position a or b for flow lines 1 to 3.
Degassing Unit	Off Purge Operate		Off	Used to control the online degassing unit.
Syringe Unit Aspiration Speed ($\mu\text{L}/\text{sec}$)	1 to 150	1	5	Used if Sub-controller A is Option Box L.
Syringe Unit Discharge Speed ($\mu\text{L}/\text{sec}$)	1 to 150	1	5	Used if Sub-controller A is Option Box L.

 Only the 4 settings from [2 Position Valve A] to [6 Position Valve D] can be used for Sub-controller B.

■ Configuration Parameters for the System Controller

●CBM-20A

Parameter	Setting range	Default setting	Remark
Event Signals Setting			
Event Out 1 (Relay1) Event Out 2 (Relay2) Event Out 3 (Relay3) Event Out 4 (Relay4)	Start Stop Error Event Event Ready	Event	Start : START signal output Stop : STOP signal output Error : Contacts close when an error occurs. Event : Output controlled by event parameters. Ready : Contacts close when the system controller status is ready or pause.
External Start Output	None All Runs Injection Only	All runs	None: No output All Runs: Signal output when analysis starts, including analysis for lines with no injection. Injection Only: Signal output only when analysis starts for lines with injection.
Event In 3	Alarm In Ready In Stop In	Alarm In	Alarm In : Configures IN 3 terminal as an error input. Ready In : Configures IN 3 terminal as a ready input. Sequence analysis enters pause status when each analysis operation is completed. When IN 3 terminal is closed, sequence analysis is resumed from the next operation. Stop In: Configures IN 3 terminal as a stop input.
Data Processing System Setting			
Communication Mode	Manual CLASS-VP LCsolution C-R8A C-R7A/ C-R5A C-R4A C-R6A C-R6A(II)	LCsolution	Manual: Allows manual setting. Becomes possible to set the baud rate and protocol. Do not use the Manual setting normally. CLASS-VP: Connects CLASS-VP. LCsolution: Connects to LCsolution. C-R8A: Connects to C-R8A. C-R7A/C-R5A: Connects to C-R7A or C-R5A. C-R4A: Connects to C-R4A. C-R6A: Connects to C-R6A or C-R3A. C-R6A(II): Connects to C-R6A or C-R3A equipped with ROM BASE II. Reserved: Reserved for future expansion. Do not use this setting.
Interface	Opt-Link(PAC) RS-232C Ethernet	Ethernet	Opt-Link(PAC): Connects to Chromatopac via optical cable. Connect to remote connector 8 on the CBM-20A or remote connector 4 on the CBM-20Alite. RS-232C: Connects to PC or Chromatopac via RS-232C. Ethernet: Connects to PC via Ethernet.

Parameter	Setting range	Default setting	Remark
Baud Rate [bps]	300 600 1200 2400 4800 9600 19200	9600	Used only if the communication mode is set to [Manual].
Protocol	No Protocol Level 1 Level 2 Level 3	Level 2	Used only if the communication mode is set to [Manual].
Chromatopac Setting			
Enable printing on "Injection Settings"	On, Off	Off	Select to print the autosampler's injection information to Chromatopac when analysis starts.
Enable printing on "Fraction Results"	On, Off	Off	Select to print the fraction collector's fractionation results to Chromatopac.
Chromatopac Channel (PAC CH)	Ch.1 Ch.2 Ch.1&2	Ch.1	Ch.1: Analysis by channel 1. Ch.2: Analysis by channel 2. Ch.1&2: Analysis by both channels (in 2-wavelength mode or with 2 detectors)
Internal Clock Setting			
Set time from PC clock			Click this button to read the time from the PC and adjust the internal clock to this time.
Date Format	YY/MM/DD MM/DD/YY DD/MM/YY	YY/MM/DD	Select the desired date format.
System P.Max Setting (See note 1.)			
Enable System P.Max	OFF AUTO MANUAL	AUTO	OFF: No checking for the system P.Max value. AUTO: System P.Max value is automatically recognized and used for checking. (See note 2.) MANUAL: System P.Max value specified for [System P.Max Value] is used for checking.
System P.Max Value	0.0 to 130.0 MPa 0 to 1326 kgf/cm ² 0 to 19000 psi 0 to 1300 bar	0 0 0 0	No checking when 0 is set. Enabled when "MANUAL" is selected for [Enable System P.Max]. When "AUTO" is selected, the system P.Max value automatically recognized is displayed.

5. Application Operation

Parameter	Setting range	Default setting	Remark
Miscellaneous			
Shut down Multiple Terminal Box on error	Disable Enable	Disable	Disable: Power stays ON when an error occurs. Enable: Power turns OFF when an error occurs.
Control Mode	Normal Fast LC	Normal	Normal: Control HPLC units as the normal mode. Fast LC: Select to analyze with the Fast LC units.

1. The maximum pressure limit for the entire system (system P.Max) can be set. This setting is provided to avoid applying a pressure greater than the allowable withstand pressure to the connected autosampler. This setting is available only when autosampler is connected. When the system P.Max setting is enabled, an error will occur in the event that the pressure has risen above the system P.Max value.
2. The system P.Max value varies depending on the connected autosampler. The table below gives the system P.Max values for respective models. If no autosampler is connected, the system P.Max value defaults to 0.

Model name	System P.Max value (MPa)
SIL-30ACMP SIL-30AC	130.0
SIL-20AXR SIL-20ACXR	66.0
SIL-20AHT UFLC SIL-20ACHT UFLC SIL-20AHT SIL-20ACHT	35.0
SIL-20A SIL-20AC	20.0
SIL-10ADvp SIL-10A SIL-10AF SIL-10AP	34.3
SIL-10Ai	19.6
Not connected	0

5.13 List of Time-program Commands

The commands that are used for all the components when creating a time program, along with descriptions, setting ranges, and default settings, are given below.



The commands displayed in pull-down menus vary according to the configuration of connected components.

5.13.1 Solvent Delivery Module

■ LC-30AD

Module	Function	Description	Setting range	Minimum unit	Default setting	Remark
ISO1 to ISO4	FLOW	Flow rate (mL/min)	0 to 10.0000	0.0001	0	(See note 3.)
	PSV	Number of FCV-10AL type solenoid valve	1 to 4	1	1	
		Number of FCV-11AL type solenoid valve	0 to 123	1	0	For example, set [13] to turn ON solenoid valves 1 and 3.
B.GE1, B.GE3	T.FLOW	Total flow rate for gradient pumping (mL/min)	0 to 10.0000	0.0001	0	(See note 3.)
	B.CONC	Concentration of solvent B (%)	0 to 100	0.1	0	
	B.CURV (See note 1.)	Gradient curve profile of solvent B	-10 to 10	1	0	
	PASV PBSV	Number of FCV-10AL type solenoid valve	1 to 4	1	1	
	PCSV PDSV	Number of FCV-11AL type solenoid valve	0 to 123	1	0	For example, set [13] to turn ON solenoid valves 1 and 3.
T.GE1	T.FLOW	Total flow rate for gradient pumping (mL/min)	0 to 10.0000	0.0001	0	(See note 3.)
	B.CONC C.CONC	Concentration of solvent B (C) (%)	0 to 100	0.1	0	
	B.CURV C.CURV	Gradient curve profile of solvent B (C)	-10 to 10	1	0	

5. Application Operation

Module	Function	Description	Setting range	Minimum unit	Default setting	Remark
T.GE1	PASV	Number of FCV-10AL type solenoid valve	1 to 4	1	1	
	PBSV	Number of FCV-11AL type solenoid valve	0 to 123	1	0	For example, set [13] to turn ON solenoid valves 1 and 3.
	PCSV					
LP.GE1 (See note 2.)	T.FLOW	Total flow rate for gradient pumping (mL/min)	0 to 10.0000	0.0001	0	(See note 3.)
	B.CONC	Concentration of solvent B, C, and D (%)	0 to 100	0.1	0	
	C.CONC					
	D.CONC					
B.CURV	Gradient curve profile of solvent B, C, and D	-10 to 10	1	0		
C.CURV						
D.CURV						

1. This function is not available on B.GE1 in fast LC mode.
2. For LC-30ADs earlier than version 2.10, the LP.GE mode cannot be used.
3. For LC-30ADs earlier than version 2.10, the available setting range is 0.0000 to 5.0000.

■ LC-20AB

Module	Function	Description	Setting range	Minimum unit	Default setting	Remark
B.GE1 to B.GE4	T.FLOW	Total flow rate (mL/min) for gradient pumping	0 to 10.0000	0.0001	0	
	B.CONC	Concentration of solvent B (%)	0 to 100	0.1	0	
	B.CURV (See note 1.)	Gradient curve profile of solvent B	-10 to 10	1	0	
	PSV	Number of FCV-10AL-type solenoid valve	1 to 4	1	1	
		Number of FCV-11AL-type solenoid valve	0 to 123	1	0	For example, set [13] to turn ON solenoid valves 1 and 3.

1. This function is not available in fast LC mode.

■ LC-20AD, LC-20ADXR

Module	Function	Description	Setting range	Minimum unit	Default setting	Remark
ISO1 to ISO4	FLOW	Flow rate (mL/min)	0 to 10.0000	0.0001	0	0 to 5.0000 for model LC-20ADXR
	PSV	Number of FCV-10AL-type solenoid valve	1 to 4	1	1	
		Number of FCV-11AL-type solenoid valve	0 to 123	1	0	For example, set [13] to turn ON solenoid valves 1 and 3.
B.GE1, B.GE3	T.FLOW	Total flow rate (mL/min) for gradient pumping	0 to 10.0000	0.0001	0	0 to 5.0000 for model LC-20ADXR
	B.CONC	Concentration of solvent B (%)	0 to 100	0.1	0	
	B.CURV (See note 1.)	Gradient curve profile of solvent B	-10 to 10	1	0	
	PASV PBSV PCSV PDSV	Number of FCV-10AL-type solenoid valve	1 to 4	1	1	
		Number of FCV-11AL-type solenoid valve	0 to 123	1	0	For example, set [13] to turn ON solenoid valves 1 and 3.
T.GE1	T.FLOW	Total flow rate (mL/min) for gradient pumping	0 to 10.0000	0.0001	0	0 to 5.0000 for model LC-20ADXR
	B.CONC C.CONC	Concentration of solvents B and C (%)	0 to 100	0.1	0	
	B.CURV C.CURV	Gradient curve profile of solvents B and C	-10 to 10	1	0	
	PASV PBSV PCSV	Number of FCV-10AL-type solenoid valve	1 to 4	1	1	
		Number of FCV-11AL-type solenoid valve	0 to 123	1	0	For example, set [13] to turn ON solenoid valves 1 and 3.

5. Application Operation

Module	Function	Description	Setting range	Minimum unit	Default setting	Remark
LP.GE1 (See note 2.)	T.FLOW	Total flow rate (mL/min) for gradient pumping	0 to 10.0000	0.0001	0	
	B.CONC C.CONC D.CONC	Concentration of solvents B, C, and D (%)	0 to 100	0.1	0	
	B.CURV C.CURV D.CURV	Gradient curve profile of solvents B, C and D	-10 to 10	1	0	

1. This function is not available on B.GE1 in fast LC mode.
2. The LP.GE mode is not available on the LC-20ADXR earlier than version 1.30.

■ LC-20AT

Module	Function	Description	Setting range	Minimum unit	Default setting	Remark
ISO1 to ISO4	FLOW	Flow rate (mL/min)	0 to 10.000	0.001	0	
	PSV	Number of FCV-10AL-type solenoid valve	1 to 4	1	1	
		Number of FCV-11AL-type solenoid valve	0 to 123	1	0	For example, set [13] to turn ON solenoid valves 1 and 3.
B.GE1, B.GE3	T.FLOW	Total flow rate (mL/min) for gradient pumping	0 to 10.000	0.001	0	
	B.CONC	Concentration of solvent B (%)	0 to 100	0.1	0	
	B.CURV	Gradient curve profile of solvent B	-10 to 10	1	0	
	PASV PBSV PCSV PDSV	Number of FCV-10AL-type solenoid valve	1 to 4	1	1	
		Number of FCV-11AL-type solenoid valve	0 to 123	1	0	For example, set [13] to turn ON solenoid valves 1 and 3.

Module	Function	Description	Setting range	Minimum unit	Default setting	Remark
T.GE1	T.FLOW	Total flow rate (mL/min) for gradient pumping	0 to 10.000	0.001	0	
	B.CONC C.CONC	Concentration of solvents B and C (%)	0 to 100	0.1	0	
	B.CURV C.CURV	Gradient curve profile of solvents B and C	-10 to 10	1	0	
	PASV PBSV PCSV	Number of FCV-10AL-type solenoid valve	1 to 4	1	1	
Number of FCV-11AL-type solenoid valve		0 to 123	1	0	For example, set [13] to turn ON solenoid valves 1 and 3.	
LP.GE1	T.FLOW	Total flow rate (mL/min) for gradient pumping	0 to 10.000	0.001	0	
	B.CONC C.CONC D.CONC	Concentration of solvents B, C, and D (%)	0 to 100	0.1	0	
	B.CURV C.CURV D.CURV	Gradient curve profile of solvents B, C and D	-10 to 10	1	0	

■ LC-20Ai

Module	Function	Description	Setting range	Minimum unit	Default setting	Remark
ISO1 to ISO4	FLOW	Flow rate (mL/min)	0 to 10.000	0.001	0	
	PSV	Number of FCV-10AL-type solenoid valve	1 to 4	1	1	
		Number of FCV-11AL-type solenoid valve	0 to 123	1	0	For example, set [13] to turn ON solenoid valves 1 and 3.

5. Application Operation

Module	Function	Description	Setting range	Minimum unit	Default setting	Remark
B.GE1, B.GE3	T.FLOW	Total flow rate (mL/min) for gradient pumping	0 to 10.000	0.001	0	
	B.CONC	Concentration of solvent B (%)	0 to 100	0.1	0	
	B.CURV	Gradient curve profile of solvent B	-10 to 10	1	0	
	PASV PBSV PCSV	Number of FCV-10AL-type solenoid valve	1 to 4	1	1	
Number of FCV-11AL-type solenoid valve		0 to 123	1	0	For example, set [13] to turn ON solenoid valves 1 and 3.	
T.GE1	T.FLOW	Total flow rate (mL/min) for gradient pumping	0 to 10.000	0.001	0	
	B.CONC C.CONC	Concentration of solvents B and C (%)	0 to 100	0.1	0	
	B.CURV C.CURV	Gradient curve profile of solvents B and C	-10 to 10	1	0	
	PASV PBSV PCSV	Number of FCV-10AL-type solenoid valve	1 to 4	1	1	
Number of FCV-11AL-type solenoid valve		0 to 123	1	0	For example, set [13] to turn ON solenoid valves 1 and 3.	

■ LC-10ADvp/10ATvp/10AD/10AT/10Ai

Module	Function	Description	Setting range	Minimum unit	Default setting	Remark
ISO1 to ISO4	FLOW	Flow rate (mL/min)	0 to 9.999	0.001	0	
	PSV	Number of FCV-10AL-type solenoid valve	1 to 4	1	1	
		Number of FCV-11AL-type solenoid valve	0 to 123	1	0	For example, set [13] to turn ON solenoid valves 1 and 3.

5.13 List of Time-program Commands

Module	Function	Description	Setting range	Minimum unit	Default setting	Remark
B.GE1, B.GE3	T.FLOW	Total flow rate (mL/min) for gradient pumping	0 to 9.999	0.001	0	
	B.CONC	Concentration of solvent B (%)	0 to 100	0.1	0	
	B.CURV	Gradient curve profile of solvent B	-10 to 10	1	0	
	PASV PBSV PCSV PDSV	Number of FCV-10AL-type solenoid valve	1 to 4	1	1	
		Number of FCV-11AL-type solenoid valve	0 to 123	1	0	For example, set [13] to turn ON solenoid valves 1 and 3.
T.GE1	T.FLOW	Total flow rate (mL/min) for gradient pumping	0 to 9.999	0.001	0	
	B.CONC C.CONC	Concentration of solvents B and C (%)	0 to 100	0.1	0	
	B.CURV C.CURV	Gradient curve profile of solvents B and C	-10 to 10	1	0	
	PASV PBSV PCSV	Number of FCV-10AL-type solenoid valve	1 to 4	1	1	
		Number of FCV-11AL-type solenoid valve	0 to 123	1	0	For example, set [13] to turn ON solenoid valves 1 and 3.
LP.GE1	T.FLOW	Total flow rate (mL/min) for gradient pumping	0 to 9.999	0.001	0	
	B.CONC C.CONC D.CONC	Concentration of solvents B, C, and D (%)	0 to 100	0.1	0	
	B.CURV C.CURV D.CURV	Gradient curve profile of solvents B, C and D	-10 to 10	1	0	

5. Application Operation

■ LC-10AS

Module	Function	Description	Setting range	Minimum unit	Default setting	Remark
ISO1 to ISO4	FLOW	Flow rate (mL/min)	0 to 9.99	0.01	0	
	PSV	Number of FCV-10AL-type solenoid valve	1 to 4	1	1	
		Number of FCV-11AL-type solenoid valve	0 to 123	1	0	For example, set [13] to turn ON solenoid valves 1 and 3.
B.GE1, B.GE3	T.FLOW	Total flow rate (mL/min) for gradient pumping	0 to 9.99	0.01	0	
	B.CONC	Concentration of solvent B (%)	0 to 100	0.1	0	
	B.CURV	Gradient curve profile of solvent B	-10 to 10	1	0	
	PASV PBSV PCSV PDSV	Number of FCV-10AL-type solenoid valve	1 to 4	1	1	
		Number of FCV-11AL-type solenoid valve	0 to 123	1	0	For example, set [13] to turn ON solenoid valves 1 and 3.
T.GE1	T.FLOW	Total flow rate (mL/min) for gradient pumping	0 to 9.99	0.01	0	
	B.CONC C.CONC	Concentration of solvents B and C (%)	0 to 100	0.1	0	
	B.CURV C.CURV	Gradient curve profile of solvents B and C	-10 to 10	1	0	
	PASV PBSV PCSV	Number of FCV-10AL-type solenoid valve	1 to 4	1	1	
		Number of FCV-11AL-type solenoid valve	0 to 123	1	0	For example, set [13] to turn ON solenoid valves 1 and 3.

■ LC-20AP

Module	Function	Description	Setting range	Minimum unit	Default setting	Remark
ISO1 to ISO4	FLOW	Flow rate (mL/min)	0 to 150.00	0.01	0	
	PSV	Number of FCV-200AL type solenoid valve	1 to 4	1	1	
		Number of FCV-11AL type solenoid valve	0 to 123	1	0	For example, set [13] to turn ON solenoid valves 1 and 3.
		Number of FCV-230AL type solenoid valve	0 to 3	1	1	
B.GE1, B.GE3	T.FLOW	Total flow rate for gradient pumping (mL/min)	0 to 150.00	0.01	0	
	B.CONC	Concentration of solvent B (%)	0 to 100	0.1	0	
	B.CURV	Gradient curve profile of solvent B	-10 to 10	1	0	
	PASV PBSV PCSV PDSV	Number of FCV-200AL type solenoid valve	1 to 4	1	1	
		Number of FCV-11AL type solenoid valve	0 to 123	1	0	For example, set [13] to turn ON solenoid valves 1 and 3.
Number of FCV-230AL type solenoid valve		0 to 3	1	1		

5. Application Operation

Module	Function	Description	Setting range	Minimum unit	Default setting	Remark	
T.GE1	T.FLOW	Total flow rate for gradient pumping (mL/min)	0 to 150.00	0.01	0		
	B.CONC C.CONC	Concentration of solvent B (C) (%)	0 to 100	0.1	0		
	B.CURV C.CURV	Gradient curve profile of solvent B (C)	-10 to 10	1	0		
	PASV PBSV PCSV		Number of FCV-200AL type solenoid valve	1 to 4	1	1	
			Number of FCV-11AL type solenoid valve	0 to 123	1	0	For example, set [13] to turn ON solenoid valves 1 and 3.
			Number of FCV-230AL type solenoid valve	0 to 3	1	1	
LP.GE1 (See note 1.)	T.FLOW	Total flow rate for gradient pumping (mL/min)	0 to 150.00	0.01	0	(See note 1.)	
	B.CONC C.CONC D.CONC	Concentration of solvent B, C, and D (%)	0 to 100	0.1	0		
	B.CURV C.CURV D.CURV	Gradient curve profile of solvent B, C, and D	-10 to 10	1	0		

1. The LP.GE mode is not available on the LC-20AP earlier than version 1.10.

■ LC-20AR

Module	Function	Description	Setting range	Minimum unit	Default setting	Remark
ISO1 to ISO4	FLOW	Flow rate (mL/min)	0 to 20.000	0.001	0	
	PSV	Number of FCV-200AL type solenoid valve	1 to 4	1	1	
		Number of FCV-11AL type solenoid valve	0 to 123	1	0	For example, set [13] to turn ON solenoid valves 1 and 3.
		Number of FCV-230AL type solenoid valve	0 to 3	1	1	
B.GE1, B.GE3	T.FLOW	Total flow rate for gradient pumping (mL/min)	0 to 20.000	0.001	0	
	B.CONC	Concentration of solvent B (%)	0 to 100	0.1	0	
	B.CURV	Gradient curve profile of solvent B	-10 to 10	1	0	
	PASV PBSV PCSV PDSV	Number of FCV-200AL type solenoid valve	1 to 4	1	1	
		Number of FCV-11AL type solenoid valve	0 to 123	1	0	For example, set [13] to turn ON solenoid valves 1 and 3.
Number of FCV-230AL type solenoid valve		0 to 3	1	1		
T.GE1	T.FLOW	Total flow rate for gradient pumping (mL/min)	0 to 20.000	0.001	0	
	B.CONC	Concentration of solvent B (C) (%)	0 to 100	0.1	0	
	C.CONC					
	B.CURV	Gradient curve profile of solvent B (C)	-10 to 10	1	0	
C.CURV						

5. Application Operation

Module	Function	Description	Setting range	Minimum unit	Default setting	Remark
T.GE1	PASV PBSV PCSV	Number of FCV-200AL type solenoid valve	1 to 4	1	1	
		Number of FCV-11AL type solenoid valve	0 to 123	1	0	For example, set [13] to turn ON solenoid valves 1 and 3.
		Number of FCV-230AL type solenoid valve	0 to 3	1	1	

■ LC-8A

Module	Function	Description	Setting range	Minimum unit	Default setting	Remark
ISO1 to ISO4	FLOW	Flow rate (mL/min)	0 to 150	0.1	0	
	PSV	Number of FCV-130AL-type solenoid valve	0 to 2	1	0	
B.GE1, B.GE3	T.FLOW	Total flow rate (mL/min) for gradient pumping	0 to 150	0.1	0	
	B.CONC	Concentration of solvent B (%)	0 to 100	0.1	0	
	B.CURV	Gradient curve profile of solvent B	-10 to 10	1	0	
	PASV PBSV PCSV PDSV	Number of FCV-130AL-type solenoid valve	0 to 2	1	0	
T.GE1	T.FLOW	Total flow rate (mL/min) for gradient pumping	0 to 150	0.1	0	
	B.CONC C.CONC	Concentration of solvents B and C (%)	0 to 100	0.1	0	
	B.CURV C.CURV	Gradient curve profile of solvents B and C	-10 to 10	1	0	
	PASV PBSV PCSV	Number of FCV-130AL-type solenoid valve	0 to 2	1	0	

■ LC-6AD/7A

Module	Function	Description	Setting range	Minimum unit	Default setting	Remark
ISO1 to ISO4	FLOW	Flow rate (mL/min)	0 to 20	0.001	0	
	PSV	Number of FCV-7AL-type solenoid valve	0 to 1	1	0	
B.GE1, B.GE3	T.FLOW	Total flow rate (mL/min) for gradient pumping	0 to 20	0.001	0	
	B.CONC	Concentration of solvent B (%)	0 to 100	0.1	0	
	B.CURV	Gradient curve profile of solvent B	-10 to 10	1	0	
	PASV PBSV PCSV PDSV	Number of FCV-7AL-type solenoid valve	0 to 1	1	0	
T.GE1	T.FLOW	Total flow rate (mL/min) for gradient pumping	0 to 20	0.001	0	
	B.CONC C.CONC	Concentration of solvents B and C (%)	0 to 100	0.1	0	
	B.CURV C.CURV	Gradient curve profile of solvents B and C	-10 to 10	1	0	
	PASV PBSV PCSV	Number of FCV-7AL-type solenoid valve	0 to 1	1	0	

5. Application Operation

5.13.2 Autosampler

■ All Models

Module	Function	Description	Setting range	Minimum unit	Default setting	Remark
Autosampler	RINSE	Rinsing of needle				
	S.PURGE	Execution of purge				
	S.PRET	Start of injection operation				
	INJECT	Execution of injection				

5.13.3 Column Oven

■ CTO-30AS

Module	Function	Description	Setting range	Minimum unit	Default setting	Remark
OvenA OvenB	OVEN.T	Oven Temperature (°C)	0, 4 to 85	1	40	0 to OFF
	LINEART	Linear temperature (°C)	4 to 85	1	40	

■ CTO-30A

Module	Function	Description	Setting range	Minimum unit	Default setting	Remark
OvenA OvenB	OVEN.T	Oven Temperature (°C)	0, 4 to 150	1	40	0 to OFF
	LINEART	Linear temperature (°C)	4 to 150	1	40	
	RV.L	Position of 2-position valve on L side	0, 1	1	1	
		Position of 6-position valve on L side	1 to 6	1	1	
	RV.R	Position of 2-position valve on R side	0, 1	1	1	
		Position of 6-position valve on R side	1 to 6	1	1	

■ CTO-20A/20AC

Module	Function	Description	Setting range	Minimum unit	Default setting	Remark
OvenA OvenB	OVEN.T	Oven temperature (°C)	0, 4 to 85	1	40	0 to OFF
	LINEART	Linear temperature (°C)	4 to 85	1	40	
	RV.L	Position of 2-position valve on L side	0, 1	1	1	
		Position of 6-position valve on L side	1 to 6	1	1	
	RV.R	Position of 2-position valve on R side	0, 1	1	1	
		Position of 6-position valve on R side	1 to 6	1	1	

■ CTO-10Avp/10ACvp/10ASvp/10A/10AC

Module	Function	Description	Setting range	Minimum unit	Default setting	Remark
OvenA OvenB	OVEN.T	Oven temperature (°C)	0, 4 to 80	1	40	0 to OFF

5. Application Operation

5.13.4 Detector

■ SPD-20A

Module	Function	Description	Setting range	Minimum unit	Default setting	Remark
DetectorA DetectorB	WAVE	Wavelength 1 (nm)	190 to 700	1	254	Setting for single mode
			190 to 370	1	254	Settings for dual mode
			371 to 700	1	500	
	WAVE2	Wavelength 2 (nm)	190 to 370	1	254	
			371 to 700	1	500	
	RESP	Response	0 to 10	1	4	
	LAMP	Lamp selection	0:OFF, 1:D2	1	1	
	CELL.T	Cell temperature (°C)	0, 9 to 50	1	40	0 to OFF
	ZERO	Execution of auto-zero				
SV.WASTE	Solvent recycle valve switching	0: According to the SV level setting 1: Always waste side	1	0	Setting for solvent recycle valve	

■ SPD-20AV

Module	Function	Description	Setting range	Minimum unit	Default setting	Remark
DetectorA DetectorB	WAVE	Wavelength 1 (nm)	190 to 370	1	254	Setting for D2 lamp
			371 to 700	1	500	Settings for W lamp in single mode
			701 to 900	1	500	
			190 to 370	1	254	
			371 to 700	1	254	Settings for D2 and W lamps in single mode
			701 to 900	1	254	
			371 to 700	1	500	Settings for W lamp in dual mode
			701 to 900	1	800	
			190 to 370	1	254	Settings for D2 and W lamps in dual mode
			371 to 700	1	500	
			701 to 900	1	800	

Module	Function	Description	Setting range	Minimum unit	Default setting	Remark
DetectorA DetectorB	WAVE2	Wavelength 2 (nm)	190 to 370	1	254	Setting for D2 lamp
			371 to 700	1	500	Settings for W lamp
			701 to 900	1	800	
			190 to 370	1	254	Settings for D2 and W lamps
			371 to 700	1	500	
			701 to 900	1	800	
	RESP	Response	0 to 10	1	4	
	LAMP	Lamp selection	0:OFF 1:D2 2:W 3:D2+W	1	1	
	CELL.T	Cell temperature (°C)	0, 9 to 50	1	40	0 to OFF
	ZERO	Execution of auto-zero				
SV.WASTE	Solvent recycle valve switching	0: According to the SV level setting 1: Always waste side	1	0	Setting for solvent recycle valve	

■ SPD-10Avp/10A/10Ai

Module	Function	Description	Setting range	Minimum unit	Default setting	Remark
DetectorA DetectorB	WAVE	Wavelength 1 (nm)	190 to 600	1	254	Setting for single mode
			190 to 370	1	254	Settings for dual mode
			371 to 600	1	500	
	WAVE2	Wavelength 2 (nm)	190 to 370	1	254	
			371 to 600	1	500	
	RESP	Response	1 to 10	1	4	
	LAMP	Lamp selection	0:OFF 1:D2	1	1	
ZERO	Execution of auto-zero					

5. Application Operation

■ SPD-10AVvp/10AV/10AVi

Module	Function	Description	Setting range	Minimum unit	Default setting	Remark
DetectorA DetectorB	WAVE	Wavelength 1 (nm)	190 to 370	1	254	Setting for D2 lamp
			371 to 900	1	500	Setting for W lamp in single mode
			371 to 700	1	500	Settings for W lamp in dual mode
			701 to 900	1	800	
	WAVE2	Wavelength 2 (nm)	190 to 370	1	254	Setting for D2 lamp
			371 to 700	1	500	Settings for W lamp
			701 to 900	1	800	
	RESP	Response	1 to 10	1	4	
	LAMP	Lamp selection	0:OFF 1:D2 2:W	1	1	
	ZERO	Execution of auto-zero				

■ RF-20A/20Axs

Module	Function	Description	Setting range	Minimum unit	Default setting	Remark
DetectorA DetectorB	EX.WAV	Excitation wavelength (nm)	0 200 to 900	1	350	Can be set to [0] only if [Single] is selected as the wavelength mode.
	EM.WAV	Emission wavelength (nm)	0 200 to 900	1	450	Can be set to [0] only if [Single] is selected as the wavelength mode.
	EX.WAV2	Excitation wavelength2 (nm)	200 to 900	1	350	Settings for dual mode
	EM.WAV2	Emission wavelength2 (nm)	200 to 900	1	450	Settings for dual mode
	RANGE2	Recorder range2	0 to 9	1	1	Settings for single mode
	RESP	Response	0 to 10	1	4	
	GAIN	Gain	1:x1 2:x4 3:x16	1	2	
	SENSE	Sensitivity	1:HIGH 2:MID 3:LOW	1	2	
	LAMP	Lamp selection	0:OFF 1:ON	1	1	
	CELL.T (See note 1.)	Cell temperature (°C)	0, 4 to 40	1	30	0 to OFF
	MARK	Marker output to recorder terminal				
	ZERO	Execution of auto-zero				

1. Cannot be used with the RF-20A.

5. Application Operation

■ RF-10AXL/10A

Module	Function	Description	Setting range	Minimum unit	Default setting	Remark
DetectorA DetectorB	EX.WAV	Excitation wavelength (nm)	0 200 to 900	1	350	
	EM.WAV	Emission wavelength (nm)	0 200 to 900	1	450	
	RANGE	Recorder range	0 to 9	1	1	
	RESP	Response	1:0.1 2:0.5 3:1.5 4:3.0	1	3	
	GAIN	Gain	1:x1 2:x4 3:x16	1	2	
	SENSE	Sensitivity	1:HIGH 2:MID 3:LOW	1	2	With the RF-10A, available settings are 1:HIGH and 2:LOW.
	LAMP	Lamp selection	0:OFF 1:ON	1	1	
DetectorA DetectorB	MARK	Marker output to recorder terminal				
	ZERO	Execution of auto-zero				

■ RID-20A

Module	Function	Description	Setting range	Minimum unit	Default setting	Remark
Detector A Detector B	RANGE	Recorder range (μRIU FS)	0 to 500.00	0.01	100.00	During measurement in the analytical mode
			0 to 5000	1	100	During measurement in the fractionation or large-scale fractionation mode
	RESP	Response	0 to 10	1	5	
	POLARITY	Polarity	-1:- 1:+		1	
	CELL.T	Cell temperature (°C)	0 30.0 to 60.0	0.1	40.0	0 to OFF
	SV.LEVEL	SV Level (μRIU)	0 to 9999.00	0.01	9999.00	Setting for solvent recycle valve
	PURGE	Execution of reference purge				
	PURGE.E	Stoppage of reference purge				
	BALANCE	Automatic adjustment of optical balance				
	MARK	Marker output to recorder terminal				
ZERO	Execution of autozero					

5. Application Operation

■ RID-10A

Module	Function	Description	Setting range	Minimum unit	Default setting	Remark
DetectorA DetectorB	RANGE	Recorder range (μRIU FS)	0 to 500.00	0.01	100.00	During measurement in the analytical mode
			0 to 5000	1	500	During measurement in the fractionation or large-scale fractionation mode
	RESP	Response	1 to 10	1	5	
	POLARITY	Polarity	-1:-, 1:+		1	
	CELL.T	Cell temperature (°C)	0 30.0 to 60.0	0.1	40	0 to OFF
	R.FLOW	Execution of reference purge				
	R.CLOSE	Stoppage of reference purge				
	BALANCE	Automatic adjustment of optical balance				
	MARK	Marker output to recorder terminal				
	ZERO	Execution of auto-zero				

5.13.5 Fraction Collector

■ FRC-10A

Module	Function	Description	Setting range	Minimum unit	Default setting	Remark
FRC	LOCK	Lock on fractionation operation	0: Unlocked 1: Locked	1	1	
	SLOPE	Slope value ($\mu\text{V}/\text{sec}$)	-1000000 to 1000000	1	100	
	LEVEL	Level value (μV)	-4500 to 1000000	1	200	
	SOR.LV	Upper limit of level (μV)	-4500 to 1000000	1	200	
	VLV.OPN	Fractionation ON				
	VLV.CLS	Fractionation OFF				
	I.VIAL	Number of first vial for fractionation	(Rack1) 0 to 143	1	0	
			(Rack2) 0 to 63	1	0	
			(Rack3) 0 to 15	1	0	
			(Rack4) 0 to 49	1	0	
			(Rack5) 0		0	
			(Rack6 to 8) 0 to (See note 1.)	1	0	
			(Rack9) 0		0	
	F.VIAL	Number of last vial for fractionation	(Rack1) 0 to 143	1	143	
			(Rack2) 0 to 63	1	63	
(Rack3) 0 to 15			1	15		
(Rack4) 0 to 49			1	49		
(Rack5) 120				120		
(Rack6 to 8) 0 to (See note 1.)			1	(See note 1.)		

5. Application Operation

Module	Function	Description	Setting range	Minimum unit	Default setting	Remark
FRC	F.VIAL	Number of last vial for fractionation ("End Vial No.")	(Rack9) (See note 2.)		(See note 2.)	
	PK.NO	Fractionation peak number	1 to 200	1	1	
	DIV.TM	Time for dividing peaks (min)	0.05 to 9999.99	0.01	1	
	BAND	Fractionation time band (min)	0 to 100.0	0.1	1	
	HI.WRL	Upper limit for fractionation with ratio chromatogram	0.01 to 99.99	0.01	1	
	LO.WRL	Lower limit for fractionation with ratio chromatogram	0.01 to 99.99	0.01	1	
	PURGE	Flow line purge time (sec)	0 to 300	1	10	
	V.VOL	Changes the vial volume. Effective from vials starting after the set time.	0 to 1000.000	0.001	0	
	GOTO.V	Moves the nozzle to the specified vial and forcibly performs fractionation.	(Rack1) 0 to 143	1	0	
			(Rack2) 0 to 63	1	0	
			(Rack3) 0 to 15	1	0	
			(Rack4) 0 to 49	1	0	
			(Rack5) -		-	Not available
			(Rack6 to 8) 0 to (See note 1.)	1	0	
(Rack9) -				-	Not available	
RET.V	Stops fractionation performed forcibly in accordance with the GOTO.V command and moves the nozzle to the vial where it was before execution of the GOTO.V command.					

1. For User Racks 6 to 8, the maximum value available for [Start Vial No.], [End Vial No.] and the initial value for [End Vial No.] is the last number which was set in the "Fraction Collector Rack Adjustment" window.
2. The [End Vial No.] for User Rack 9 is the last number which was set in the "Fraction Collector Rack Adjustment" window.

5.13.6 System Controller

■ CBM-20A

Module	Function	Description	Setting range	Minimum unit	Default setting	Remark
Controller	EVENT	Relay output to OUT terminal	0 to 1234	1	0	For example, set [13] to turn ON event outputs 1 and 3.
	POWER	Control of multiple terminal box	0:OFF, 1:ON	1	1	CBM-20A only
	START	Output of analysis start signal				
	STOP	Stops time program				

■ SUBC-vp/OPTION-BOX vp

Module	Function	Description	Setting range	Minimum unit	Default setting	Remark	
SubcA	RV.A	Position of valve A	0 to 1	1	0		
	RV.B	Position of valve B	0 to 1	1	0		
	RV.C	Position of valve C	1 to 6	1	1		
	RV.D	Position of valve D	1 to 6	1	1		
	SV		Number of FCV-10AL-type solenoid valve	1 to 4	1	1	
			Number of FCV-11AL-type solenoid valve	0 to 123	1	0	For example, set [13] to turn ON solenoid valves 1 and 3.
	DEGAS	Status of degassing unit	0 to 2	1	0	0:Off, 1:Purge, 2:Operate	

5. Application Operation

■ OPTION-BOXL VALVE I/F

Module	Function	Description	Setting range	Minimum unit	Default setting	Remark	
SubcA	RV.A	Position of valve A	0 to 1	1	0		
	RV.B	Position of valve B	0 to 1	1	0		
	RV.C	Position of valve C	1 to 6	1	1		
	RV.D	Position of valve D	1 to 6	1	1		
	SV		Number of FCV-10AL-type solenoid valve	1 to 4	1	1	
			Number of FCV-11AL-type solenoid valve	0 to 123	1	0	For example, set [13] to turn ON solenoid valves 1 and 3.
	DEGAS	Status of degassing unit	0 to 2	1	0	0:Off, 1:Purge, 2:Operate	
	SYRNG	Aspiration and discharge position of syringe unit [%]	0 to 100	0.01	0.00		
	SYR.VLV	Switching valve of syringe unit	0 to 1	1	0		
	SYR.SI	Syringe unit aspiration speed	1 to 150	1	5		
SYR.SO	Syringe unit discharge speed	1 to 150	1	5			

■ All Sub-controller Models

Module	Function	Description	Setting range	Minimum unit	Default setting	Remark
SubcB	RV.A	Position of valve A	0 to 1	1	0	
	RV.B	Position of valve B	0 to 1	1	0	
	RV.C	Position of valve C	1 to 6	1	1	
	RV.D	Position of valve D	1 to 6	1	1	

5.13.7 Description of Time Programs

■ INJECT Command

The INJECT command can be used to perform sample injection with the autosampler at a specified time during an analysis time program. In this case, sample injection is not performed at the start of the analysis sequence.

The differences in standard analysis and analysis using the INJECT command are shown in the following diagrams.

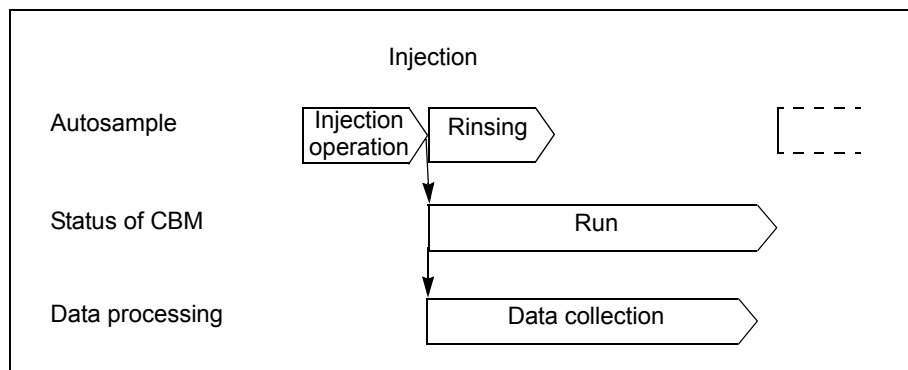


Fig. 5.1 Standard Analysis (without the INJECT Command)

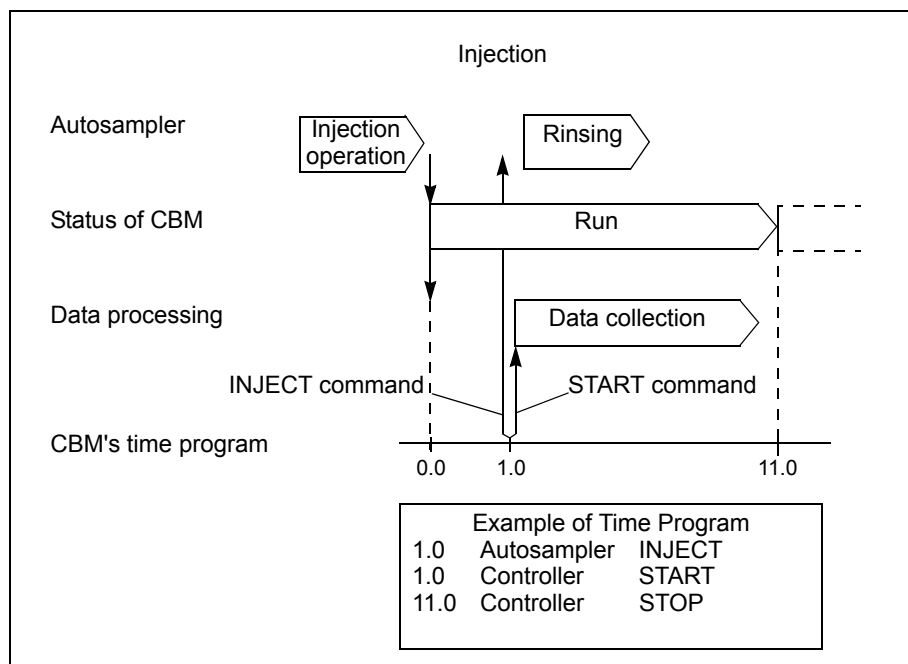


Fig. 5.2 Analysis Using the INJECT Command



In order to start data processing at the point where the INJECT command is executed, set [None] in the [External Start Output] field in the "Configuration Parameter" window to stop the start signal being output when time program starts.

Also, set the START command to be executed at the same time as the INJECT command in the time program.





"START Command" P. 5-143


■ S.PRET Command

In analysis sequences based on sequence tables, injection for the next analysis starts after the current analysis (time program) is completed.

The S.PRET command can be used to start injection operation at any time during the analysis time program.

 If injection operation for the next analysis has already started at the time set for the S.PRET command in a time program, the command is ignored.

 Although the time required for sample-injection operation varies with the injection volume and other factors, if processing is started sufficiently early using the S.PRET command, injection of the next sample is executed as soon as the current analysis is completed.

 Instead of the S.PRET command, the overlap-injection function can be used to achieve the same kind of operation.

 ["5.12.2 Autosampler" P. 5-74](#)

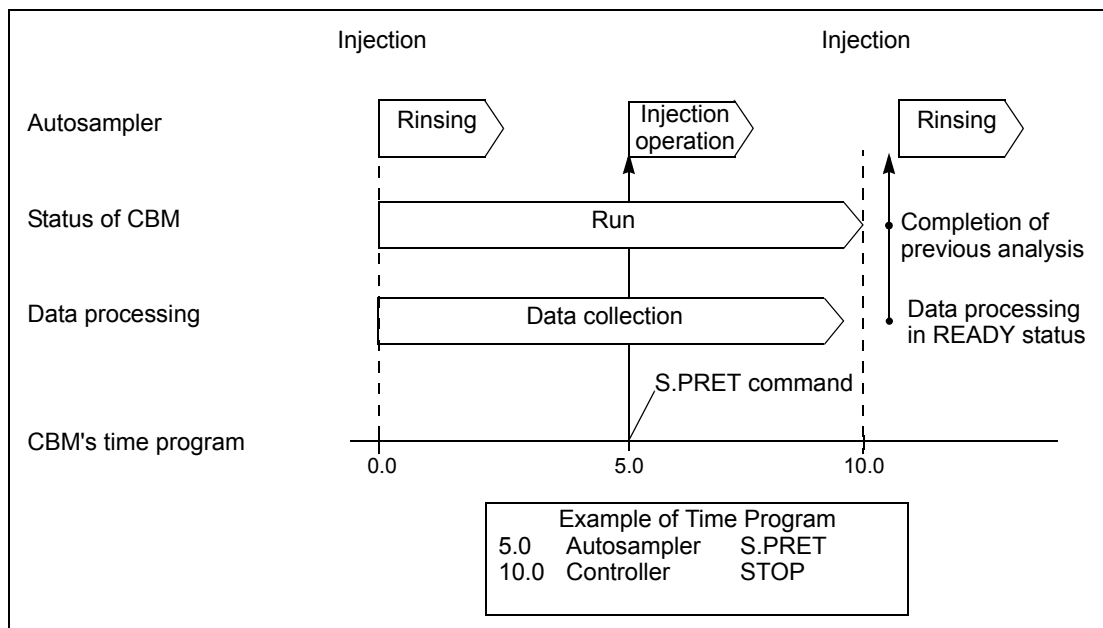


Fig. 5.3 Analysis Using the S.PRET Command

■ START Command

In standard analysis, a start signal is automatically sent to the LC Workstation (or Chromatopac) and the OUT terminal as an event when the time program in the analysis method starts.

The system controller's START command can be used to output this start signal at any time during a time program.



In order to output the start signal using the START command, set [None] in the [External Start Output] field in the "Configuration Parameter" window to stop the start signal being output when analysis starts.



In order to output the start signal as event output, set [Start] for the desired event output number in the "Configuration Parameter" window.

■ Completing the Program Setting

Be sure to input the STOP command for the system controller at the end of the program.

■ Gradient Curve

●CURV Parameter

To change the concentration of straight line to curve in gradient analysis, set an initial CONC value (B.CONC, C.CONC, D.CONC) and CURV value (B.CURV, C.CURV, D.CURV) in the time program.



Set the CURV value after 0.01 minutes of the CONC value.



To have the concentration vary exponentially from the start of analysis in binary gradient analysis, set the B.CONC value at 0.01 min and the B.CURV value at 0.02 min.



No other function should be set between CONC and CURV.



If no CURV value is set, the default setting of 0 (= straight line) will be implemented.

Example of Time-program setting:

Time	Module	Function	Value	Description
0.01	B.GE1	B.CONC	0.0	Initial concentration
0.02	B.GE1	B.CURV	3	CURV should be set in the next line of CONC.
10	B.GE1	B.CONC	80.0	
15	B.GE1	B.CONC	80.0	
15.01	B.GE1	B.CONC	0.0	
20	Controller	STOP		

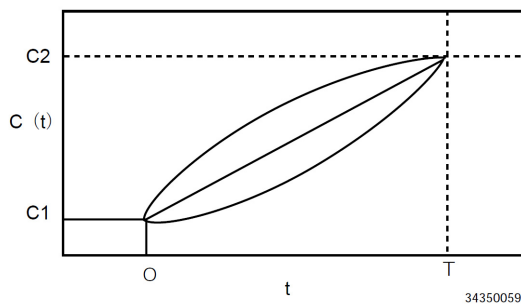
5. Application Operation

The concentration curve that is implemented is derived from the CURV value according to the following equations:

1) When $a < > 0$
$$C(t) = C1 + (C2 - C1) \frac{e^{\frac{a}{T}t} - 1}{e^a - 1}$$

2) When $a = 0$
$$C(t) = C1 + (C2 - C1) \frac{t}{T}$$

where $C(t)$ is the concentration at time t , and a is the CURV value.

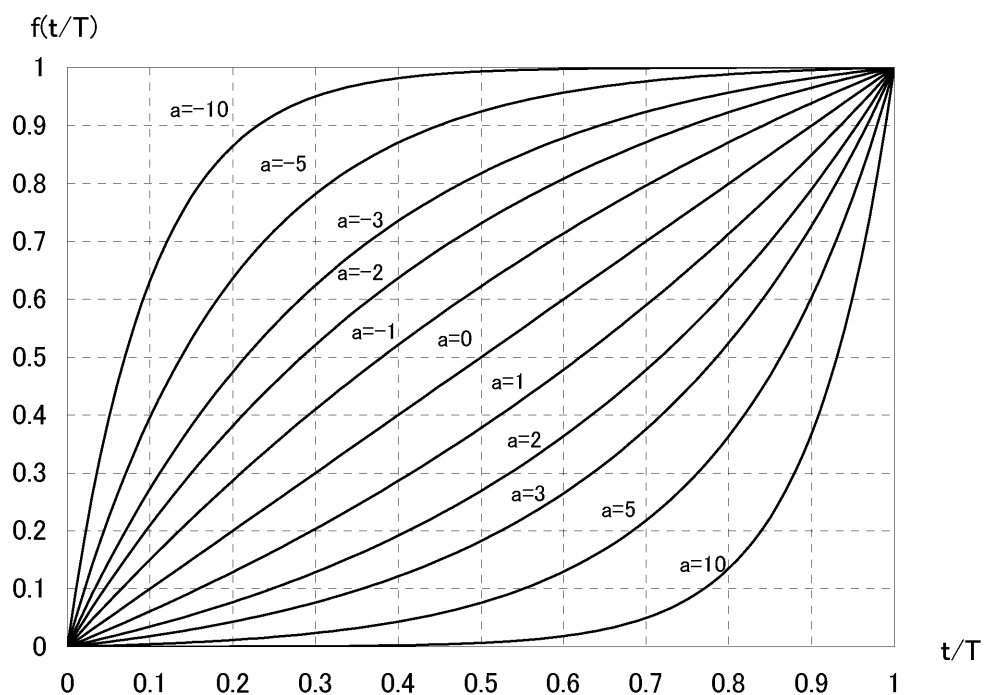


● Gradient Curve Profile

The details of the gradient curve profile are as follows:

1) When $a < > 0$
$$f\left(\frac{t}{T}\right) = \frac{e^{\frac{a}{T}t} - 1}{e^a - 1}$$

2) When $a = 0$
$$f\left(\frac{t}{T}\right) = \frac{t}{T}$$



5.13.8 Fast LC Mode

The fast LC mode is for fast gradient analysis, and is available on systems that include CBM-20A, LC-30AD, LC-20AD, LC-20ADXR, and LC-20AB units. Compared to the normal mode, the fast LC mode has the following restrictions. Therefore, use the normal mode for more typical analytical conditions, and only use the fast LC mode when adequate retention time reproducibility cannot be obtained for fast gradient analysis, such as when the mobile phase ratio is changed within 3 minutes. The fast LC mode solves the problem of tracking flow rate changes during fast gradient analysis by dividing changes in mobile phase flow rate into microsteps. This allows obtaining satisfactory retention time reproducibility even for fast gradients.

The ROM version for conducting fast gradient with these units are as follows.

Unit	Version
CBM-20A/20Alite	1.10 or later
LC-30AD	All version
LC-20AD	1.10 or later
LC-20ADXR	All version
LC-20AB	1.10 or later

■ Fast LC Mode Settings

The mode is switched to the fast LC mode in the system controller configuration window on the Web. In the "Miscellaneous" group, change the "Control Mode" setting from "Normal" (default) to "Fast LC".

■ Restrictions of Fast LC Mode

When the control mode is switched to the fast LC mode, note that compared to the normal mode, the fast LC mode has the following restrictions.

● Valid System Configurations for the Fast LC Mode

The fast LC mode is enabled only on systems where solvent delivery pumps are controlled from a CBM-20A controller, pump A is an LC-20AB unit or both pumps A and B are any of LC-30AD, LC-20AD or LC-20ADXR unit, operating in the B.GE mode. All other configurations will only operate in the normal mode, even if set to the fast LC mode. In addition, connect an autosampler unit to the system.

● Number of Lines in Time Programs

Up to 400 lines may be used for time programs in the normal mode, but only 320 lines are available for commands to solvent delivery units in the fast LC mode. (The total number of commands available for both solvent delivery and other units is still 400 lines.)

Note that if more than 320 lines are used for solvent delivery unit commands, any solvent delivery unit commands exceeding the 320 line limit will not be executed.

● Time Program Commands

In the fast LC mode, the B.CURV, gradient curve command for the pump, is always set to 0. Note that even if B.CURV is set to a value other than 0, the resulting gradient will be linear.


■ Using an SPD-M20A/M30A Detector

When CBM-20A version 1.20 or later and SPD-M20A version 1.07 or later or SPD-M30A are used in combination, a chromatogram (3D data) is obtained immediately after starting an analysis due to improvements. When using an SPD-M20A/M30A detector for fast analysis, make sure the system is configured as follows.

- CBM-20A version 1.20 or later is combined with SPD-M20A version 1.07 or later or SPD-M30A.
- An autosampler is connected
- CBM-20A and SPD-M20A/M30A are configured as parent and child (CBM-20A and SPD-M20A/M30A are in the same group and the system name of the CBM-20A is specified as the master server name for the SPD-M20A/M30A detector)


5.14 List of Rack Numbers

The rack numbers available for sequence tables are listed below.

 The numbers vary with the autosampler type.

■ Rack and Plate for SIL-30ACMP

Rack/Plate	Rack No.	Sample No.
1.5 mL sample vial plate	1 to 6	1 to 54
96-well microtiter plate	1 to 6	1 to 96 A1 to H12
384-well microtiter plate	1 to 6	1 to 384 A1 to P24
96-well deep-well plate	1 to 6	1 to 96 A1 to H12
384-well deep-well plate	1 to 6	1 to 384 A1 to P24
Control-vial rack	0	1 to 10

 With the SIL-30ACMP, rack plates L, M and R can be set for three sample racks and can be used at the same time. Each sample rack can hold two plates; set a value from 1 to 6 in the [Rack No.] column in the sequence table according to the plate position used. Note that the number for each plate position may vary depending on the settings on the autosampler. For details, refer to the SIL-30ACMP instruction manual. When specifying the control vial rack, set 0 in the [Rack No.] column in the sequence table.

■ Rack for SIL-30AC/20A/20AC/20AXR/20ACXR

Rack	Rack No.	Sample No.
1.5-mL standard rack, 1.5-mL (105 vials)	1	1 to 105
1.5-mL cooling rack, 1.5-mL (70 vials)	1	1 to 70
1-mL cooling rack	1	1 to 175
4-mL cooling rack	1	1 to 50
MTP cooling rack	1, 2	A1 to H12 (96 wells) A1 to P24 (384 wells)
DWP cooling rack	1, 2	A1 to H12 (96 wells) A1 to P24 (384 wells)
Control-vial rack	0	1 to 10
MTP changer rack	1 to 12	A1 to H12
DWP changer rack	1 to 12	A1 to H12



Set 1 in the [Rack No.] column in the sequence table when using a 1.5-mL standard (cooling/105 vials/70 vials) rack, 1-mL cooling rack or 4-mL cooling rack without rack changer.

When using an MTP cooling rack or a DWP cooling rack, set 1 for the plate at the front in the rack and 2 for the plate at the back.

Set 0 in the [Rack No.] column in the sequence table when specifying the control vial rack.

Set 1 to 12 in the [Rack No.] column in the sequence table when specifying a rack in the rack changer.

■ Rack for SIL-10ADvp

Rack	Sample No.
Standard rack 1	0 to 149
Standard rack 2	0 to 69
Standard rack 3	0 to 59
Standard rack 4	1 to 96 (MTP x 1) 1 to 192 (MTP x 2)
Standard rack 5	1 to 384 (MTP x 1) 1 to 768 (MTP x 2)
Standard rack 6	0 to 99
Standard rack 7	0 to 69
Cooling rack 1	0 to 149
Cooling rack 2	0 to 69
Cooling rack 3	0 to 59
Cooling rack 4	1 to 96 (MTP x 1) 1 to 192 (MTP x 2)
Cooling rack 5	1 to 384 (MTP x 1) 1 to 768 (MTP x 2)
Cooling rack 6	0 to 99

■ Rack for SIL-10A/10AF/10AP/10Ai/10AXL

Rack	Sample No.
Rack S	0 to 99
Rack L	0 to 79
Cooling rack S	0 to 59
Cooling rack L	0 to 49
Rack LL	0 to 24
MTP1	1 to 96
MTP2	1 to 192

5.15 List of Character String Type and Size

Item	Type	Size
Group Name	ASCII	15 byte
System Name	ASCII	15 byte
About this System	Unicode	30 byte
Memo	Unicode	63 byte
User Name	Unicode	60 byte
User ID	ASCII	30 byte
Password	ASCII	30 byte
Method Filename	ASCII	8 byte
Method Comment (*1)	Unicode	250 byte
Method File Path	Depends on the OS	255 byte
Sequence Filename	ASCII	10 byte
Sequence Comment	Unicode	250 byte
Sequence File Path	Depends on the OS	255 byte
Column ID	Unicode	26 byte
Column Name (*2)	Unicode	26 byte
Column Size (*2)	Unicode	26 byte
Usage Time Limit	Unicode	10 byte
Mobile Phase A to D (*2)	Unicode	50 byte
Rack A to F Comment	Unicode	64 byte

(*1) If CMD is not connected, this item is displayed in "Column/Comment" of the "Status Summary" section. The first character string before the CR code is displayed in the first line, and the second in the second line. (If the character string exceeds the column width, the excess characters will not be displayed.)

(*2) If CMD is connected, these items are displayed in "Column/Comment" of the "Status Summary" section. Column Name and Column Size are displayed in Name (Size) format in the first line, and Mobile Phase A to D are displayed in A/B/C/D format in the second line. (If the character string exceeds the column width, the excess characters will not be displayed.)

6

Troubleshooting

Contents



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6.2	Error Message	6-6

6.1 Troubleshooting and Corrective Action






This section describes the probable causes of problems that can arise, and the corrective action to be taken to eliminate the causes. For more detailed procedures, refer to the indicated page.

If the problem cannot be resolved even after taking the indicated measures, or if there are problems not included in the following tables, contact your Shimadzu representative.


■ System Configuration

Symptom	Corrective action
A link cannot be created to a connected LC-series component.	<ol style="list-style-type: none"> 1. Check that there is no dirt on the optical-cable connector and that there is no foreign matter inside the connector. 2. Check that the optical cable is fully inserted. 3. Check that the component's link address and the address for the system controller's optical connector are the same. 4. Check that the component is not in local mode. <p> "3.4 Determine the System Configuration" P. 3-7</p>
There are discrepancies between the connected-component configuration and the component information displayed in the "Configuration" tab page. Connected components cannot be controlled.	<p>Check that [Auto] is selected for the [Unit Configuration] setting in the "Configuration" tab page.</p> <p> "3.4 Determine the System Configuration" P. 3-7</p>
Component names and version numbers are not displayed.	<ol style="list-style-type: none"> 1. Version numbers are not displayed for the LC-8A and LC-6AD/7A. 2. Depending on the component, the component name and version number are sometimes not displayed during the interval between turning power ON and the completion of initialization.
The settings in the "Configuration" tab page cannot be changed.	The component configuration cannot be changed by users with only Operator-level authorization.

■ Analysis and control

Symptom	Corrective action
The scheduled end time is different to the time required for the actual analysis.	The scheduled end time is recalculated with the execution of each line in the sequence table. In sequences with lines containing two or more analysis (or injection) processes, only the time for the first analysis is calculated and so the scheduled end time will be incorrectly calculated in the following cases: Racks are replaced frequently with a changer. Extremely short analyses are executed repetitively. The oven temperature is changed with each analysis and [WaitCTO] is displayed.
A P.MAX error occurs during autopurge.	Verify that the P-PMAX value for the solvent delivery module is appropriate (i.e., not too small).
Autopurge is not possible.	Autopurge is possible only for combinations of LC-30A/20A-series Solvent Delivery Modules and Autosamplers.
The mobile-phase reserve-volume warning is displayed.	No warning is displayed if the warning check box in the "Mobile Phase Reserve Volume Setting" window is not selected, or if 0 is set as the reserve volume.
A buzzer sounds on the solvent delivery module or autosampler when an error occurs.	If an LC-30A/20A-series Solvent Delivery Module, Autosampler, or UV/UV-VIS/Fluorometric Detector is connected, the buzzer at the LC-30A/20A component with the smallest link address sounds when a CBM error occurs.
The time program cannot be edited.	If the current system configuration is different from the system configuration when the time program was created, the functions for non-existent modules cannot be changed. Delete the applicable line and add a new one.  "4.4 Gradient Analysis Using Time Programs" P. 4-28
The sequence is not registered to the analysis queue when  is clicked.	The following operation is performed when  is clicked: 1. If the analysis queue is empty, the sequence is registered to the queue and analysis starts. 2. If there are sequences registered to the analysis queue, new sequences cannot be registered to the queue using  . The sequence is registered to the analysis queue in the "Editing" tab page.
The external input/output terminals on the back of the system controller do not operate properly. The detector is not auto-zeroed when analysis starts. The Chromatopac does not start when analysis starts.	Verify that the configuration parameters are set correctly for the system controller.  "5.12 Parameter Details" P. 5-57




6. Troubleshooting


Symptom	Corrective action
The status remains at pause and sequence analysis doesn't move to the next step.	Check that "Event In 3" under system controller's configuration parameter is set to "Alarm In".  "5.12.6 System Controller" P. 5-111
The system-check results are not displayed for any components.	System checks can only be executed for components in the LC-30A/20A Series or the LC-10Avp Series (except the sub-controller).
Characters are garbled when CMD information is displayed.	If the CMD is shared with an LC-2010, use ASCII characters.
System P.Max error occurs.	Verify that the system P.Max value for the system controller is appropriate.

■ Login

Symptom	Corrective action
It is not possible to log in.	<ol style="list-style-type: none"> 1. Check that the user ID and password are correct. Passwords are case sensitive. 2. Check that the user trying to log in is authorized for access (i.e., is registered as a user for the group and an access user for the system). 3. It is not possible to log in while another user is logged in or connected to the LC Workstation. 4. Power Users and Operators cannot log into the "Group Settings" application.

■ Browser (Internet Explorer)

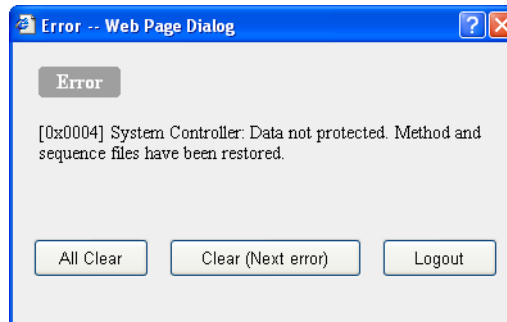
Symptom	Corrective action
The [Enter] key does not work.	Settings are confirmed either by using the [Tab] key or by moving the cursor away from the data input field and clicking the mouse button.  "2.9 Precautions Related to Internet Explorer Operations" P. 2-32
Maintenance information and system configuration cannot be printed.	Press the [P] key while holding down the [Ctrl] key. The browser "Print" window is displayed.  "2.9 Precautions Related to Internet Explorer Operations" P. 2-32
The windows are not displayed properly. Internet Explorer doesn't start.	Check the Internet Explorer settings.  "2.9 Precautions Related to Internet Explorer Operations" P. 2-32

Symptom	Corrective action
<p>The link to the system controller cannot be added to the "Favorites" folder.</p>	<p>The toolbar and status bar are not displayed when connecting to the system controller from Internet Explorer and so the link cannot be added to the "Favorites" folder in the browser. Create a shortcut on the desktop of the PC.</p> <p> "2.9 Precautions Related to Internet Explorer Operations" P. 2-32</p>
<p>Connection became impossible after changing the installation location.</p>	<p>Check that the IP address, subnet mask, and default gateway set for the system controller and the PC are correct for the network at the new installation location.</p>
<p>The version number displayed when connected to the CBM is different from the version number displayed in the "Configuration" tab page.</p>	<p>Be sure to delete temporary files after making the following configuration changes by selecting [Tools] – [Internet Options] – [Delete Files] in Internet Explorer.</p> <ul style="list-style-type: none"> • Changes involving two CBMs with different version numbers, where a version number becomes smaller while the IP address stays the same. • Changes involving two CBMs with the same IP address but with different version numbers, where the CBM connected to the network is changed by turning ON/OFF the power to the system controllers. • Changes where the version of the CBM program becomes lower.


6.2 Error Message

6.2.1 Errors at Power ON

After the power to the system controller is turned ON, a memory check is performed as part of internal initialization. If an abnormality is discovered, the following type of error message is displayed after login.



Error Code	Error Message	Cause and Action
0x0003	Data not protected. Method and sequence files have been initialized.	Method and sequence files have been initialized. After making the appropriate settings for the connected components in the "Configuration" tab page, reset the methods and sequences in all the relevant windows.
0x0004	Data not protected. Method and sequence files have been restored.	The method and sequence files have been returned to the state they were in the previous time the system controller was started up. Check the methods and sequences.
0x0005	Illegal backup parameter. Method and sequence files have been changed.	Some parameters have been initialized. Check the methods and sequences.
0x0006	Illegal backup parameter. System information and user information have been changed.	Some information has been initialized. Check the system and user information.

 For details on the error window and on clearing errors, refer to "6.2.2 Operating Errors" P. 6-7.



Method and sequence files contain the following data.

- Method-file ("Method00" to "Method19") parameters and time programs
- Sequence-file ("Sequence00" to "Sequence11") sequences and standard-sample injection tables
- Shutdown-file ("ShutDown00" to "ShutDown11") and startup-file ("StartUp00" to "StartUp11") settings

- Settings made in the "Configuration Parameter" window and the "Configuration" tab page (including settings for the system controller's serial interface)



Component and user information includes the following data.

- Component information such as system and group names
- User names, user IDs, passwords, and access levels
- Results and execution dates of system checks



Data that has been lost cannot be restored.

- It is recommended that method and sequence files are saved by executing [Save All Parameters] in the "Utility" window.
- The creation of backup files for component and user information is not possible. Ensure that users make records of settings as appropriate.
- If there is a CBM operating in the same group, user information can be copied from that CBM.

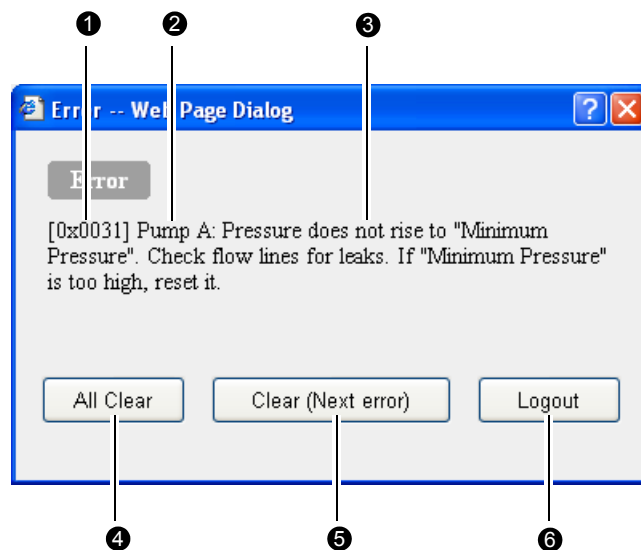
6.2.2 Operating Errors

If an error occurs in the system controller or in a connected component while the user is performing window operations, an error message is displayed. If LC-30A/20A-series components are connected, the buzzer sounds and the error is displayed at one of these components.



In the case of the Nexera UC series instruments (LC-30ADSF, SFE-30A, and SFC-30A), operations using Internet Explorer are not guaranteed and no error message will be displayed.

■ Error Window



6. Troubleshooting

	Display item	Description
❶	Error code	A 6-digit alphanumeric error code is displayed.
❷	Component name	The name of the component for which the error occurred is displayed.
❸	Error message	A description of the error is displayed.
❹	All-clear button	Click to clear all errors except fatal errors.
❺	Clear button	Click to clear the currently displayed (non-fatal) error. If there is more than one error, the next error is displayed.
❻	Logout button	Click to log out.

■ Error

The 3 types of error are described in the following table.

Error Message	Description
Warning	Urges the user to exercise caution.
Error	Indicates an error in the system.
Fatal error	Indicates a problem related to hardware. The message [Turn OFF the power.] is displayed.

●Warning

No processing is performed by the system controller. It becomes possible, however, to make settings from the operating panel of the displayed component. Control is not possible from the system controller.

Instrument	Error Code	Error Message
Pump	0x0033	Operation mode is local. Set the operation mode to remote.
	0x81D0	Mobile phase A is low.
	0x81D1	Mobile phase B is low.
	0x81D2	Mobile phase C is low.
	0x81D3	Mobile phase D is low.
	0x81E7	Cannot write parameters in EEPROM.
	0x81F1	A seal malfunction has occurred in the online degassing unit vacuum line.
Autosampler	0x0094	Operation mode is local. Set the operation mode to remote.
	0x8541	Rack on rack plate L is not adjusted.
	0x8542	Rack on rack plate M is not adjusted.
	0x8543	Rack on rack plate R is not adjusted.
	0x8544	Invalid rack ID.
	0x8545	Racks with same rack ID are set.

Instrument	Error Code	Error Message
Autosampler	0x8546	The temperature control of rack plate L has been turned off because no rack has been set for more than 30 minutes. If the rack is set, the temperature control will be on again.
	0x8547	The temperature control of rack plate M has been turned off because no rack has been set for more than 30 minutes. If the rack is set, the temperature control will be on again.
	0x8548	The temperature control of rack plate R has been turned off because no rack has been set for more than 30 minutes. If the rack is set, the temperature control will be on again.
	0x85EB	It is necessary to set all racks on the stacks at the rack-changer. Check all racks are set.
	0x85EC	The stack is open. Close the stack in the rack-changer soon.
	0x85ED	The temperature control has been off because stack has been opened for more than 30 minutes. If the stack is closed, the temperature control will be on again.
	0x85EE	As the stack has been closed, the temperature control has been on again.
	0x85EF	No rack is detected. Check the rack on the stack. If the rack is not set and analysis is executed, the sequence will be stopped.
	0x85F0	The reserved warning code 1 has been detected.
	0x85F1	Full rack is detected. Remove the duplex rack on the stack or set the dummy rack. If the rack is not changed, the sequence will be stopped.
	0x8B00	Operation mode is local. Set the operation mode to remote.
	0x8B02	Autosampler and SFE Unit are connected at the same time.
	0x8B45	Low set temperature.
	Column oven	0x0075
0x0077		Low set temperature.
0x0078		High set temperature.
0x8632		Cannot write in CMD.
Detector	0x0046	Operation mode is local. Set the operation mode to remote.
	0x0049	Auto zero level is out of range. Confirm the installation of the cell, no bubble in the cell, and the settings of SENS and GAIN parameters.
	0x0050	No scan data
	0x87D0	Low set temperature.
	0x8721	Low set temperature.
PDA Detector	0x8952	LAN timeout error has occurred. (PC)
	0x8954	LAN timeout error has occurred. (CBM)
	0x89D2	Temperature is increasing inside the instrument.
	0x89FB	Undefined warning.

6. Troubleshooting

Instrument	Error Code	Error Message
System controller	0x2F01 to 0x2F0A	OptLink memory error.
	0x2F10 to 0x2F3F	Communication error.
	0x4001	Buffering error.
	0x4004	Buffering error.
	0x8001	System check timeout error has occurred.
	0x8002	Confirm startup time.
	0x8084	PDA detector cannot accept communication command. (PDA Detector)
	0x80E0	The system which can be registered on the group is 10 in the maximum.
	0x80F0	Connection request received from more than one PDA detector. (PDA Detector)
	0x80F3	Connection cancel because of changing PDA detector's IP address. (PDA Detector)
	0x80F4	Connection cancel because of changing PDA detector's master system name. (PDA Detector)
	0x80F5	Connection cancel because of changing PDA detector's group name/system name. (PDA Detector)
	0x80F7	PDA Detector is too busy. (PDA Detector)
	0x8568	Rinse liquid is low. (Autosampler)
Supercritical controller	0x8B94	BPR cover is open.
	0x8BA3	Pump has turned off because the pump head cooling temperature was not stable or cooling was turned off.
All instruments (Common error code)	0x00D0	Invalid value.
	0x2F80	Undefined warning.

● Error

The error display can be cleared by clicking [All Clear] or [Clear (Next error)] in the error window.

This operation also clears the errors displayed at the solvent delivery module or other component at which the buzzer sounded when the error occurred.

If [System Protection] is set to [Enable] in the solvent delivery module configuration settings, solvent delivery may continue after an error occurs. Solvent delivery stops when [All Clear] or [Clear (Next error)] is pressed.

If an error occurs, the currently executed time program stops, and the operation of autosamplers and fraction collectors is interrupted. Also, operation according to the operation level is performed as described in the following table.

Level	Description
1	If [System Protection] is set to [Enable] in the solvent delivery module configuration settings, the column oven turns OFF and the solvent delivery module continues pumping at half the flow rate. If [System Protection] is set to [Disable], the column oven and the solvent delivery module both turn OFF.
2	The column oven and the solvent delivery module both turn OFF.
3	Neither the column oven nor the solvent delivery module turns OFF.

Instrument	Error Code	Level	Error Message
Pump	0x000A	1	Link time out error.
	0x0030	1	Pressure has exceeded "Maximum Pressure". Check flow lines for clogging. If "Maximum Pressure" is too low, reset it.
	0x0031	2	Pressure does not rise to "Minimum Pressure". Check flow lines for leaks. If "Minimum Pressure" is too high, reset it.
	0x0032	2	Home position cannot be detected.
	0x0034	2	Leak error is detected.
	0x81D4	1	Purge failure. Line pressure is too high.
	0x81E4	2	Link is cut off during pumping and pumping is stopped automatically.
Autosampler	0x000A	1	Link time out error.
	0x0016	1	Pretreatment program error. An error occurred while pretreatment program was running.
	0x0017	3	Pretreatment program does not exist.
	0x0018	3	Pretreatment file exceeds the maximum size.
	0x0019	3	Rack does not exist/Rack detection fail.
	0x001C	1	Invalid aspiration/discharge volume setting in pretreatment program.
	0x001E	3	Invalid aspiration/discharge volume setting of metering pump in pretreatment program.
	0x0091	3	No vial is set on the rack.
	0x0092	2	Leak error is detected.
	0x8530	3	Invalid injection volume.
	0x8531	3	Pretreatment file does not exist.
	0x8540	3	The sequence has skipped because a rack is not adjusted. Adjust the rack.
	0x8549	3	Invalid vial number.
	0x8550	2	Leak error is detected by a sensor near a Low-pressure valve.

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Instrument	Error Code	Level	Error Message
Autosampler	0x8551	2	Leak error is detected by a sensor near a High-pressure valve.
	0x85E0	3	No rack was detected, the sequence has stopped.
	0x85E8	3	Cannot set rack in current position on rack-changer.
	0x85F4	2	The rack cannot be changed since the rack-changer is disconnected.
	0x85F5	2	The reserved error code 2 has been detected.
	0x8B05	2	Incorrect rack number.
	0x8B06	2	The rack is not set.
	0x8B07	2	Rack Changer Disconnect Error.
	0x8B30	2	Leak is detected.
	0x8B40	2	No extraction vessel is set on the rack.
	0x8B41	2	Heater is turned off because the temperature of the extraction vessel exceeded the maximum temperature.
	0x8B43	2	Heater is turned off because the temperature of the pre-heater exceeded the maximum temperature.
	0x8B46	2	The extraction vessel temperature has dropped. Please confirm the extraction vessel has been fastened.
Column oven	0x000A	1	Link time out error.
	0x0070	1	Oven temperature has exceeded T.Max.
	0x0073	2	Leak error is detected.
	0x8650	2	Heater L temperature has exceeded T.Max.
Detector	0x000A	1	Link time out error.
	0x004A	3	Wavelength is inaccurate. Run WAVE CALIB in SPD to calibrate wavelength.
	0x00A1	2	Leak error is detected.
	0x8714	2	Xe lamp does not light.
	0x8715	3	Invalid wavelength calibration data.
	0x8716	3	Invalid wavelength calibration data.
	0x8717	3	Invalid wavelength calibration data.
	0x8718	3	Invalid wavelength calibration data.
	0x8719	3	Hg lamp does not light.
	0x871A	2	The wavelength shift is greater than 2 nm.
	0x871B	2	The wavelength shift is greater than 2 nm.
	0x871C	2	The wavelength shift is greater than 2 nm.

Instrument	Error Code	Level	Error Message
Detector	0x871D	2	Flow cell is overheated.
	0x871E	2	Lamp cover is open.
	0x871F	2	Fan for the Peltier unit has stalled.
	0x8720	2	Cooling fan for the Xe lamp power has stalled.
	0x8743	2	D2 lamp does not light.
	0x8744	2	D2 lamp overcurrent.
	0x874B	2	Over-heated. Lamp is off.
PDA Detector	0x8901	3	Wavelength calibration was not executed.
	0x8902	3	EEPROM read error has occurred.
	0x8903	3	EEPROM write error has occurred.
	0x8904	3	Invalid EEPROM parameter.
	0x8911	3	PDA board is not connected.
	0x8912	3	Detector is not ready.
	0x8921	2	Leak error is detected.
	0x8922	3	System check error has occurred.
	0x8941	3	Buffer memory overflow in detector.
	0x8942	3	Hard disk cannot be initialized.
	0x8943	3	Hard disk is full.
	0x8944	3	Buffer memory overflow in detector during analysis. It is not possible to send the data again.
	0x8945	3	Photo diode is saturated.
	0x8951	3	SNTP synchronization error.
	0x8955	3	SNTP timeout error has occurred.
	0x8956	3	IP resource contention.
	0x8964	3	Failed to detect cell.
	0x8965	3	Installed cell is not registered. Register the cell ID in PDA detector, then adjust the exposure time and calibrate the wavelength.
	0x8966	3	The exposure time of the installed cell is not adjusted. Set the exposure time.
	0x8967	3	The wavelength of the installed cell is not calibrated. Perform wavelength calibration.
	0x8971	3	Invalid slit position.
	0x8972	3	Invalid response.
	0x8973	3	Invalid sampling rate.
0x8974	3	Invalid cell temperature.	

6. Troubleshooting

Instrument	Error Code	Level	Error Message
PDA Detector	0x8975	3	Invalid analog range.
	0x8976	3	Invalid polarity.
	0x8977	3	Invalid wavelength.
	0x89C1	3	Changing lamp condition.
	0x89C2	2	D2 lamp overcurrent.
	0x89C3	2	D2 lamp current is low.
	0x89C4	2	W lamp current is low.
	0x89C5	3	Starting up D2 lamp.
	0x89C6	3	Lamp housing cover open. Lamp is off.
	0x89C7	2	D2 lamp heater overcurrent.
	0x89C9	2	W lamp is overcurrent.
	0x89CA	2	D2 lamp heater current is low.
	0x89CB	3	Failed to detect D2 lamp.
	0x89CC	3	Failed to detect W lamp.
	0x89CD	2	W lamp overvoltage.
	0x89E1	3	Parameter set error; co-efficient of element-wave.
	0x89FC	1	Undefined error (Level 1).
	0x89FD	2	Undefined error (Level 2).
	0x89FE	3	Undefined error (Level 3).
Fraction collectors	0x000A	1	Link time out error.
	0x0024	1	User rack is not adjusted. Configure it and activate.
	0x8F01	2	No empty vial in the fraction collector.
	0x8F02	2	Liquid leakage has been detected.

Instrument	Error Code	Level	Error Message
System controller	0x0003	3	Data not protected. Method and sequence files have been initialized.
	0x0004	3	Data not protected. Method and sequence files have been restored.
	0x0005	3	Illegal backup parameter. Method and sequence files have been changed.
	0x0006	3	Illegal backup parameter. System information and user information have been changed.
	0x0008	2	Signal received from ALARM INPUT terminal.
	0x000B	3	Component fixed on Configuration screen has not been linked.
	0x000F	3	Invalid vial number. (Autosampler or Fraction Collector)
	0x0019	3	Rack does not exist/Rack detection fail. (Autosampler)
	0x001D	3	Invalid vial number in pretreatment program.
	0x0026	3	Invalid vial number. Set value within the valid range for the sample rack. (Fraction Collector)
	0x4101	3	The IP address was set to "192.168.200.99" as the CBM failed to obtain an IP address.
	0x4102	2	The CBM will be rebooted because of the failure to renew/rebind the IP address.
	0x4103	3	The CBM has been rebooted because of the failure to renew/rebind the IP address.
	0x8003	2	Pump pressure has exceeded the system maximum pressure. Check the system P.Max setting.
	0x8010	2	Purge is executed, because pressure dropped to "Minimum Pressure". (Pump A)
	0x80F1	3	Failure to connect to PDA Detector.
	0x80F2	3	LAN timeout error has occurred (PDA Detector).
	0x856A	3	Invalid injection volume. (Autosampler)
	Sub controller	0x000A	1
0x0086		1	Syringe Unit: The setting for syringe aspiration/ discharge is out of range.
0x008C		2	Leak error is detected.
Supercritical controller	0x8BB0	2	Leak is detected.

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Instrument	Error Code	Level	Error Message
All instruments (Common error code)	0x2E01	1	Undefined error (Level 1).
	0x2E02	2	Undefined error (Level 2).
	0x2E03	3	Undefined error (Level 3).

- Fatal error

Normal operation cannot be restored after a fatal error has occurred. The [All Clear] button and the [Clear (Next error)] button are not displayed for fatal errors. Only the [Logout] button is displayed. After logging out, turn OFF the power.

When a fatal error occurs, solvent delivery modules and column ovens are turned OFF and current time programs are stopped. Operation of autosamplers and fraction collectors is interrupted.

Instrument	Error Code	Error Message
Pump	0x81E2	Abnormal high temperature is detected inside the instrument.
	0x81E3	Motor cooling fan has stalled.
	0x81E5	Leak sensor is open or short-circuit.
	0x81E6	Motor current error is detected.
	0x81F0	Communication error occurred between A and B pumps.

Instrument	Error Code	Error Message
Autosampler	0x0010	Needle X axis home position error.
	0x0011	Needle Y axis home position error.
	0x0012	Needle Z axis home position error.
	0x0013	6-port valve home position error.
	0x0014	3-way valve home position error.
	0x0015	Syringe home position error.
	0x001A	6-position valve home position error.
	0x001B	Metering pump home position error.
	0x0095	No rack home position.
	0x8513	Low-pressure valve home position error.
	0x8529	System error has occurred.
	0x8532	Rack-changer's top panel is open. Before opening the top panel, turn the rack changer OFF.
	0x8533	Sample cooling unit malfunction.
	0x8534	Dehumidification unit malfunction.
	0x8535	Room temperature sensor malfunction.
	0x8537	Abnormal temperature detected by temperature sensor into rack plate L.
	0x8538	Abnormal temperature detected by temperature sensor into rack plate M.
	0x8539	Abnormal temperature detected by temperature sensor into rack plate R.
	0x8562	Cannot adjust metering pump position.
	0x8563	Needle malfunction in X (left-right) direction.
	0x8564	Needle malfunction in Y (front-back) direction.
	0x8565	Cooling unit malfunction.
	0x8566	Heater malfunction.
	0x8567	Abnormal temperature detected by temperature sensor.
	0x8569	Needle protection error has occurred.
	0x85D0	Rack-changer malfunction in X (left-right) direction.
	0x85D1	Rack-changer malfunction in Z (up-down) direction.
	0x85D2	Rack-changer malfunction in Y (front-back) direction.
	0x85D3	Rack-changer home position error in X (left-right) direction.
	0x85D4	Rack-changer home position error in R (rotation) direction.
0x85D5	Rack-changer home position error in Z (up-down) direction.	
0x85D6	Rack-changer home position error in Y (front-back) direction.	

6. Troubleshooting

Instrument	Error Code	Error Message
Autosampler	0x85D8	Rack-changer error has occurred. (Reserved)
	0x85D9	Rack-changer cannot release the rack.
	0x85DA	Rack-changer cannot find the rack.
	0x85DB	Rack-changer cannot set the rack.
	0x85DC	Abnormal high temperature detected by rack-changer temperature sensor.
	0x85DD	Rack-changer cooling unit malfunction.
	0x85DE	Rack-changer stack is opened.
	0x85DF	Rack-changer error has occurred. (Reserved)
	0x85E1	Rack-changer system error 1 has occurred.
	0x85E2	Rack-changer system error 2 has occurred.
	0x85E3	Rack-changer system error 3 has occurred.
	0x85E4	Rack-changer system error 4 has occurred.
	0x85E5	Rack-changer system error 5 has occurred.
	0x85E6	Rack-changer system error 6 has occurred.
	0x85E7	Rack-changer system error 7 has occurred.
	0x85E9	Rack-changer system error 8 has occurred.
	0x85EA	Rack-changer heater malfunction.
	0x85F2	The reserved fatal error code 1 has been detected.
	0x85F3	The reserved fatal error code 2 has been detected.
	0x8B01	System error.
	0x8B10	Needle home position error.
	0x8B11	Motor has slipped.
	0x8B12	Debris detected on needle. Please remove the debris from the inside of the SFE.
	0x8B20	Could not detect the home position of the SFE extraction valve.
	0x8B21	Could not detect the home position of the SFE vent valve.
	0x8B31	Leak sensor is open or short-circuit.
	0x8B42	Extraction vessel temperature sensor is open or short-circuit.
	0x8B44	Pre-heater temperature sensor is open or short-circuit.
	0x8B47	The extraction vessel heater failure.
	0x8B48	Pre-heater failure.
	0x8B49	The extraction vessel temperature sensor wire is broken.
	0x8B50	Room temperature sensor is open or short-circuit.

Instrument	Error Code	Error Message
Column oven	0x0071	Temperature sensor reading abnormally high.
	0x0072	Temperature sensor reading abnormally low. The sensor is not connected or short-circuited.
	0x0074	Fan speed does not increase.
	0x0076	Leak sensor wire broke.
	0x0079	Cannot detect cooling unit.
	0x8630	Rotary valve home position error.
	0x8633	Gas sensor is open.
	0x8634	Heater failure.
	0x8635	Power heat exhaust fan rotation error.
	0x8636	Post-column cooler rotation error
	0x8637	Block cooling fan rotation error.
	0x8638	Door sensor failure.
Detector	0x0040	Grating home position error.
	0x0041	Filter home position error.
	0x0042	Lamp home position error.
	0x0043	D2 lamp does not light.
	0x0044	D2 lamp overcurrent.
	0x0047	Ex grating motor home position error.
	0x0048	Em grating motor home position error.
	0x004B	Over-heated. Lamp is off.
	0x004C	Xe lamp is not lit.
	0x004D	Reference data overflow.
	0x00A0	Zero glass home position error.
	0x00A4	Over-heated.
	0x870E	Cannot write in EEPROM.
	0x8710	Lamp mirror home position error.
	0x8723	Error in the flow cell's cooling unit.
	0x8724	Error in the flow cell's heating unit.
	0x8725	Leak sensor is open.
	0x8726	Leak sensor is short.
	0x8728	Error in the temperature sensor.
	0x8729	Error in hardware.
PDA detector	0x8961	The cell is overheated.
	0x8962	The cell overcurrent has occurred.

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Instrument	Error Code	Error Message
PDA detector	0x8978	Leak sensor is short.
	0x8979	Leak sensor is open.
	0x897A	Lamp housing temperature sensor is open.
	0x89C8	Lamp housing is overheated.
	0x89D1	Failed to detect light shutter/filter origin.
	0x89D6	Lamp housing fan rotation error.
	0x89D7	Power heat exhaust fan rotation error.
	0x89D8	Polychromator is overheated.
	0x89D9	Heater sensor is open.
	0x89DA	Room sensor is open.
	0x89D3	Abnormal high temperature is detected inside the instrument.
	0x89D4	D2 lamp overvoltage.
	0x89D5	D2 lamp overvoltage.
	0x89FF	Undefined fatal error.
Fraction collectors	0x0020	Arm X axis home position error.
	0x0021	Arm Y axis home position error.
Sub controller	0x0080	Rotary valve A home position error.
	0x0081	Rotary valve B home position error.
	0x0082	Rotary valve C home position error.
	0x0083	Rotary valve D home position error.
	0x0084	Syringe Unit: Valve home position error.
	0x0085	Syringe Unit: Syringe home position error.
Supercritical controller	0x8B90	Could not detect the home position of the BPR motor.
	0x8B91	The BPR motor has slipped.
	0x8B92	BPR has Over-heated.
	0x8B93	BPR heater controller error.
	0x8B95	BPR temperature sensor is open or short-circuit.
	0x8BA0	Pump head temperature sensor is open or short-circuit.
	0x8BA1	Pump head cooling fan rotation error.
	0x8BA2	Coolant pump for cooling the pump head failure.
	0x8BB1	Leak sensor is open or short-circuit.
All instruments (Common error code)	0x2E00	Undefined fatal error.

7

Hardware Validation

This chapter provides instruction on hardware validation, which verifies the performance of individual components and the instrument as a whole.

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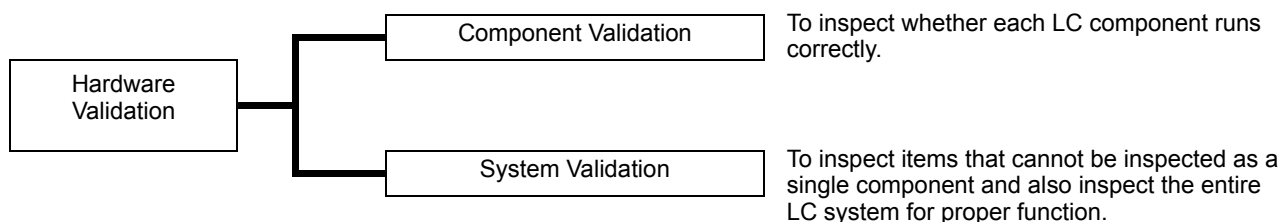
7.1 Overview of Hardware Validation

7.1.1 Hardware Validation

Hardware validation examines whether the LC system runs correctly and the instrument is suitable for the intended analysis. Validation is performed through LC system Installation, Operation and Performance Qualifications followed by periodic inspections. The performance of the LC system deteriorates with age, reflecting the wear of consumable parts. Hardware validation must therefore be performed periodically from the time of installation until the system is retired. Although validation aspects related to analysis, such as method validation and system suitability tests should also be performed, hardware validation is a prerequisite for these items.

7.1.2 Types of Hardware Validation

A High Performance Liquid Chromatograph consists of several LC components such as pump(s), autosampler, column oven, and detector(s). For this reason, hardware validation is divided into the inspection of individual components and system validation as a whole.



The operational protocol and criteria for this component and the HPLC system are described in this chapter to assist the user in conducting validation. Refer to each the instruction manual for each component for operational protocol of that specific component.

7.2 Implementation of Hardware Validation

7.2.1 Periodic Validation

Component and system validation must be performed at installation and every 6-12 months, as the performance of an LC instrument changes with age. It is also important to perform maintenance such as replacement of consumables in advance of hardware validation.

7.2.2 Daily Inspection

Daily inspection of the components and HPLC system examine the condition of maintenance parts to ensure a high level of analysis data reliability.

Items such as column deterioration and mobile phase adjustment are examined during system suitability tests.

7.2.3 Validation After Maintenance

After any maintenance, component performance must be re-validated. The type of validation depends on the actual work done.

If the maintenance inspection cannot be performed solely by the specific component validation, system validation is required.



Maintenance information and results of hardware validation must be recorded and kept for future reference.

7.3 Validation Precautions

7.3.1 Environment

Instrument performance may be affected by abrupt changes in ambient temperature such as drafts from heating and air conditioning vents.

The equipment should be installed in a room with minimal (< 2 °C) temperature fluctuation and away from sources of drafts and air currents.

7.3.2 Installation Site

The installation site is very important for ensuring correct validation. The site should satisfy the following conditions:

 **WARNING**

- Provide ample ventilation with no fire sources in vicinity
When flammable or toxic solvents are used as the mobile phase, the room must be properly ventilated. When flammable solvents are used, open flame or other fire sources must be strictly prohibited.
- Precautions for use of the low-pressure Hg (Mercury) lamp
Install the low-pressure Hg (Mercury) lamp before turning on the power of the lamp. Looking straight at the lamplight could damage eyes.

 **CAUTION**

- **Avoid dust or corrosive gas**

Avoid installing the instrument in places subject to excessive dust or corrosive gas since service life and performance levels may be affected.

- **Keep away from strong magnetic fields**

Do not install the instrument near equipment that generates strong magnetic fields. If the power supply line is subject to high electrical noise, use a commercially-available power surge protector.

- **Provide adequate installation surface and space**

The weight of CBM-20A is 5.5 kg. During installation, consider the entire weight combined with other LC components.

The lab table on which this instrument is installed should be strong enough to support the total weight of the LC system. It should be level, stable and have depth of at least 600 mm.

If these precautions are not followed, the instrument could tip over or fall off the table. When components are installed side by side, maintain a keep space of at least 30 mm between the components.

- **Regulate room temperature and humidity**

The room temperature should be between 4 and 35 °C, with minimal temperature variations throughout the course of a day. Humidity should be kept within 20-85 %.

- **Position instrument properly in the room**

Install the instrument in a location that is free from vibration and away from sunlight, and heat/air conditioning drafts.

7.4 Equipment Required for Validation

The equipment and samples listed below are required for hardware validation. Prepare necessary equipment and samples depending on the system configuration of the instrument.

■ Testing Equipment

A list of testing equipment required for hardware validation is shown below. A certificate ensuring traceability or inspection results should accompany each item of testing equipment that is used.

Equipment	Description
Thermo recorder	For inspection of the temperature setting accuracy for the column oven and the autosampler's sample cooler. The thermo recorder must be certified as having an accuracy rating of ± 1.0 °C for the required temperature range (0 °C to 50 °C) at the time of inspection.
Resistance thermometer	For inspection of the temperature accuracy for the column oven. The resistance thermometer must have a testing accuracy of ± 0.5 °C for the required temperature range (0 °C to 50 °C) at the time of inspection.
Thermocouple	For inspection of the temperature accuracy for the column oven and autosampler's sample cooler. The thermocouple must have a testing accuracy of ± 0.6 °C for the required temperature range (0 °C to 50 °C) at the time of inspection.
DC voltage/current generator	For the hardware validation of the chromatopac. The DC voltage/current generator must be certified as having an accuracy rating of ± 0.15 % at the time of testing.
Stopwatch	For inspection of the flow rate accuracy for the solvent delivery module. The stopwatch must be certified at 5'30" ± 0.3 sec at the time of inspection.
Measuring flask	For inspection of the flow rate accuracy for the solvent delivery module. Obtain a 5 mL-measuring flask.
Electronic balance	For inspection of the injection volume accuracy for the autosampler. The balance must be calibrated and able to perform measurement with a 0.001g precision at the time of inspection.

■ Standard Reagents for Validation

A list of standard reagents required for validation is shown below. The customer should prepare standard reagents to the stated specifications.

Standard sample	Part No.	Description
Caffeine set (5 concentrations)	S228-45725-91	For inspection of the absorbance linearity for the UV-VIS spectrophotometric and photodiode array detectors. For also inspection of system reproducibility for a system equipped with a UV-VIS spectrophotometric or photodiode array detector.
Caffeine (250 mg/L)	S228-45725-06	For inspection of system reproducibility for a system equipped with a refractive index detector, inspection of autosampler carry-over, and inspection of the gradient concentration accuracy for gradient systems.
Naphthalene (60 mg/L)	S228-32996-01	For inspection of system reproducibility for a system equipped with a spectrofluorometric detector.
Glycerol (0.872 mg/L)	S228-32996-05	For inspection of the span for the refractive index detector.

7. Hardware Validation

■ Hardware Testing Supplies

A list of supplies required for hardware validation is shown below. Note that items such as autosampler vials or mobile phase solutions may be required in addition to the items listed.

Implement	Part No.	Description
Resistor tube	S228-45726-91	I.D. 0.13 mm × 2 m + I.D. 0.8 mm × 2 m For inspection of flow rate and gradient concentration accuracy for solvent delivery module, etc.
Syringe	S046-00001 or S046-00038-01	For inspection of the absorbance linearity for the UV-VIS spectrophotometric and photodiode array detectors. For also inspection of the span for the refractive index detector. This item is provided with detectors as a standard accessory.
Syringe adapter	S228-15672-91	Same as above.
Coupling 1.6C	S228-16004-13	For each kind of inspection and in plumbing the detector. This item is provided with each component as a standard accessory.
Male nut, PEEK	S228-18565	Same as above.
Plug	S228-16006	For inspection of the drift/noise for the refractive index detector.
Low-pressure Hg (Mercury) lamp set	S200-38423	For inspection of the wavelength accuracy for the UV-VIS photodiode array detector and the spectrofluorometric detector.
Hg (Mercury) lamp holder	S228-34170-91	For inspection of the wavelength accuracy for the UV-VIS photodiode array detector.
	S228-34478-91	For inspection of the wavelength accuracy for the spectrofluorometric detector.
PTFE block assembly	S228-34319-91	For inspection of the wavelength accuracy for the spectrofluorometric detector.
Column Shim-pack VP-ODS or LUNA C18(2)	S228-34937-91 or 00F-4252-E0	Particle size: 5µm Column Dimension: I.D. 4.6 mm × length 150 mm (An equivalent ODS column may also be used.) For the system validation.

7.5 Validation: System Controller

7.5.1 Check Terms

Check terms for the pump validation are listed below.

	Check Term	Description
7.5.2	ROM, RAM Self Diagnosis and Firmware Version Check	Checks whether the memory (ROM, RAM) functions correctly. Checks the version of firmware.
7.5.3	System control	Checks the control operation of the system controller.
7.5.4	Memory backup	Checks that the parameters are backed up when power is turned OFF.

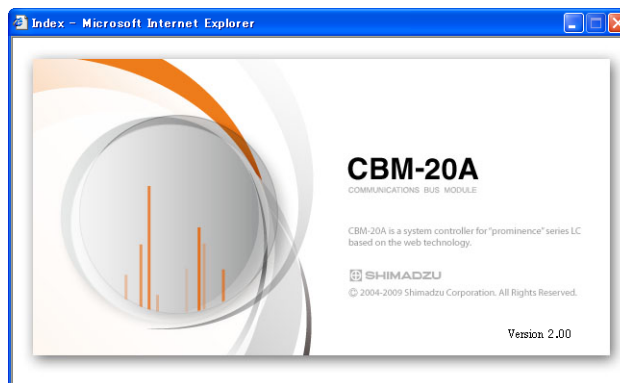
7.5.2 ROM, RAM Self Diagnosis and Firmware Version Check

■ Objective

To check whether the memory (ROM, RAM) functions correctly. To check the version of firmware.

■ Check Procedure

- 1 Turn ON the power.
If the memory check is completed normally, the system starts up.
- 2 Start up Internet Explorer at the PC and enter the URL for the system controller.
- 3 Check the version number (version number of the contents) displayed together with the Shimadzu logo.



- 4 Log into the system controller.

7. Hardware Validation

- 5** Click the [Configuration] tab and check the version number of the system controller (version number of the control unit) displayed in the configuration table.

- **CHECK CRITERIA**
- **The version numbers for both the contents and the control unit are the same as the administrated ones.**

7.5.3 System Control

■ Objective




Check control operation of the system controller.


■ Check Procedure

- 1** Start up the system controller.
- 2** Start up Internet Explorer on a PC and specify the URL of the system controller.
- 3** Enter the analysis sequence as shown in the following table.


Rack No.	Sample No. From	Sample No. To	Injections/ Vial	Injection Volume	Method	Run Time
1	1	1	1	10	-	1.00

- 4** Enter the analysis method as shown in the following table.

System	Settings
Isocratic system	Click  in the "Analysis" tab page. Set the flow rate for ISO1 to 0.5 mL/min.
Low-pressure gradient system	Click  in the "Analysis" tab page. Set the flow rate for LP.GE1 to 1 mL/min and concentration B to 50 %.
High-pressure gradient system	Click  in the "Analysis" tab page. Set the flow rate for B.GE1 to 1 mL/min and concentration B to 50 %.

- 5 Click  in the "Analysis" tab page.

System	Settings
SPD-20A/20AV	Set the wavelength to 250.
RF-20A/20Axs	Set the excitation wavelength to 300 and the emission wavelength to 400.
RID-20A	Set the cell temperature to 35.
SPD-M20A	Set the wavelength 1 to 250.

- 6 Click to close the "Method Parameter" window and click . The system operates in accordance with the programmed sequence.

- | | |
|---|---|
| <ul style="list-style-type: none"> • CHECK CRITERIA | <ul style="list-style-type: none"> • The system must operate in accordance with the set sequence. |
|---|---|

7.5.4 Backup Memory

■ Objective

To check whether parameters are backed up correctly when the power is turned OFF.

■ Check Procedure

- 1 Start up the system controller and Internet Explorer.
- 2 Check that the analysis program for the previous test is recorded.
- 3 After completing inspection, return all the conditions to their original state.

- | | |
|---|--|
| <ul style="list-style-type: none"> • CHECK CRITERIA | <ul style="list-style-type: none"> • All the input parameters must be saved in memory. |
|---|--|

7.6 System Validation

- The LC system is comprised of many individual components. System validation is used to confirm the function of each component as well as the performance of the entire system.
- The standard system validation procedure described in this section is used to determine whether the LC system is functioning normally. This procedure constitutes the basis of the LC system capability inspection.
- System validation is performed at installation, and periodically thereafter. If a problem occurs during operation, system validation may be performed to determine whether the problem is in the LC system or in the analysis method.
- If the LC system passes the system validation, it can be assumed that the LC system is normal and that the problem lies in the particular analysis method or conditions being used.
- If the LC system does not pass the system validation, it may be assumed that there is an abnormality in the system, and component validation must be performed to identify the malfunctioning component(s).


7.6.1 Validation of Isocratic LC System

■ Objective

An analysis is performed and the retention time and peak area are obtained for each peak. The data is then examined to check for reproducibility. Reproducible data validates the system.


Generally, the system being validated consists of a minimum of the following components: pump, column oven, autosampler, detector, system controller and data processor.

■ Items Required for Validation

Item	Description
Mobile phase	Mixture of water and methanol (3/2, v/v)  Both the water (distilled) and the methanol should be HPLC grade
Column	Shim-pack VP-ODS (Part No. S228-34937-91), LUNA C18 (2) (Part No. 00F-4252-E0) or equivalent ODS column (Particle size 5 µm, Column Dimension : I.D. 4.6 mm × length 150 mm)

Item	Description
Sample	20 mg/L caffeine solution (included in Caffeine set (5 concentrations) Part No. S228-45725-91) <Preparation> Weigh 20 mg of anhydrous caffeine, transfer to a 100 mL volumetric flask and dilute to volume with water. Transfer 1 mL of the solution to a 10 mL volumetric flask, and dilute to volume with water.
Water	HPLC grade, or equivalent
2-propanol	HPLC grade, or equivalent

■ Checking and Preparing the LC System

- 1 Check all the wiring connections in the LC system.
Refer to individual component instruction manuals for details. If a Chromatopac is used, it should be connected to the detector with the signal cable connector provided with the Chromatopac, and the signal cable should then be connected to the detector integrator terminals.
 If the system normally uses Chromatopac or LC workstation, the connections used for regular analysis will be satisfactory
- 2 Check the LC system plumbing.
Ensure that the tubing between (a) the autosampler outlet and the column inlet, (b) the column outlet and the detector inlet, has an I.D. of less than 0.3 mm, and is shorter than 300 mm. Keep the liquid volume that is not in the column as low as possible.
- 3 Clean the system flow lines using one of the procedures described below.
Before cleaning the flow lines, remove the column from the system, and connect the column inlet to the column outlet with a coupling 1.6C ("Fig. 7.1").
 - **< For a new system >**
Clean the flow lines first with 2-propanol, then with water. In each case, pass the liquid through the flow lines for 10 minutes, at a rate of 2 mL/min.
 - **< For a system in use that uses a mobile phase with a low dielectric constant, such as hexane>**
The procedure is the same as that of a new system, given above
 - **< For a system that has been using a mixture of a water solution and an organic solvent as mobile phase, or water plus an organic solvent miscible with water (methanol, acetonitrile, etc.) >**
Clean the flow lines with water. Pass water through the flow lines for 10 minutes, at a rate of 2 mL/min.

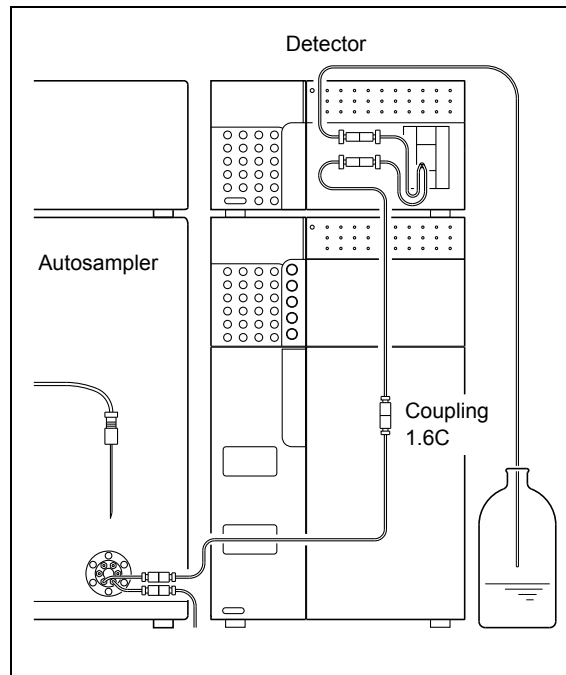


Fig. 7.1

- 4 When cleaning is finished, pour mobile phase (mixture of water and methanol (3/2, (v/v))) into the reservoir, and reconnect the column with the LC system.

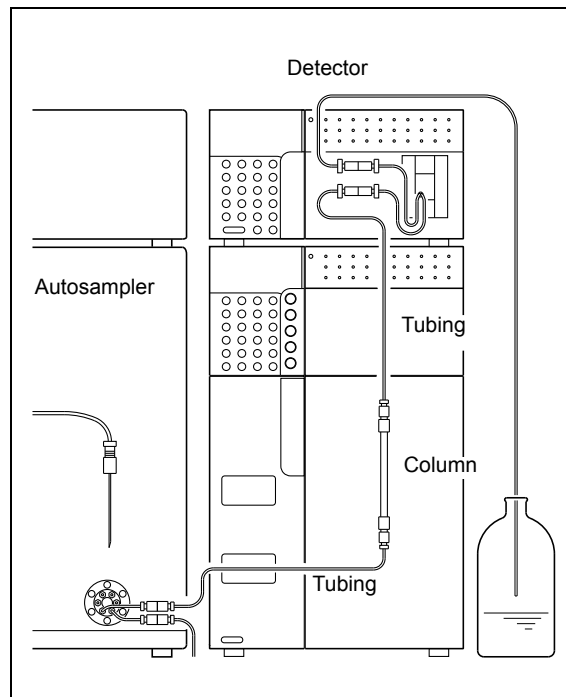
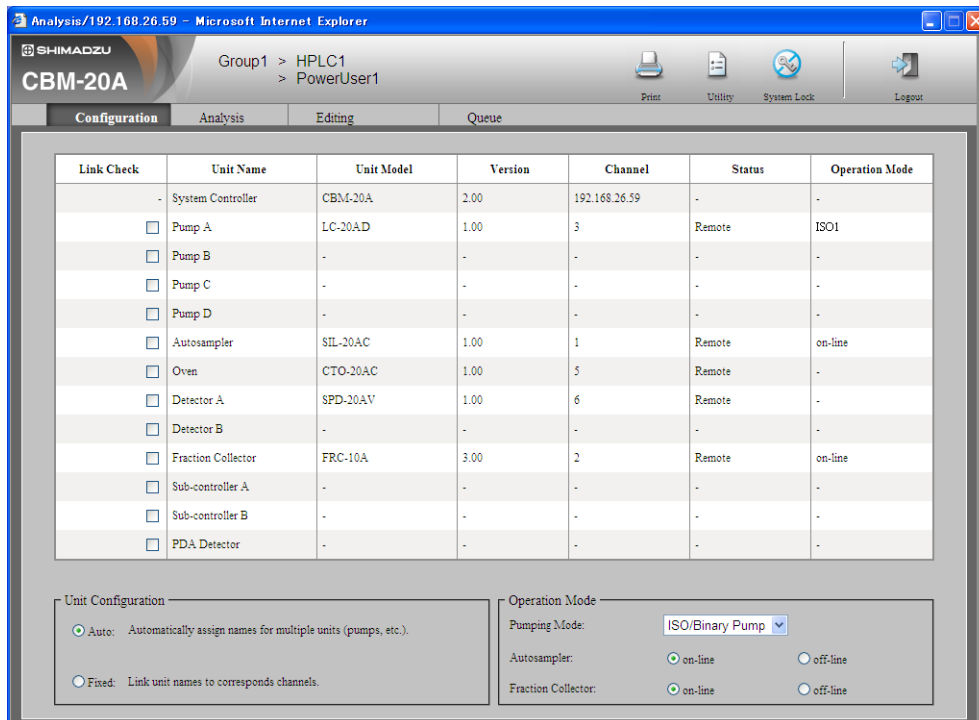


Fig. 7.2

■ Check Procedure

- 1 Check that the pumping mode in the "Configuration" tab page is set to [ISO/Binary Pump]. If it is not, select [ISO/Binary Pump] from the pull-down menu.



For details on the display of the "Configuration" tab page, refer to "3.4 Determine the System Configuration" P. 3-7.

- 2 Enter the parameters for the solvent delivery module, autosampler, column oven, and detector in the method file as shown in the following table.


Parameters		Set value
Solvent delivery module (Pump)	Flow Rate	1 mL/min
	Maximum Pressure	20.0 MPa
Autosampler	Sampling Speed	15 µL/sec
	Rinse Volume	200 µL
	Rinse Speed	35 µL/sec
	Rinse Mode	No Rinse
Column oven	Oven Temperature	40 °C
Detector	Wavelength	272 nm
	AUX Range	1 AU/V
	Response	0.5 sec



For details on setting component parameters, refer to "4.2 Creating Method Files" P. 4-10.

7. Hardware Validation


- 3 Enter the parameters for the data-processing system as shown in the following table.

Parameters	Set value
WIDTH	5
DRIFT	0
T.DBL	1000
ATTEN	10 (1024 mAUFS)
SLOPE	100
MIN.AREA	100000
STOP.TM	5

 For details on setting parameters, refer to the instruction manual for the data-processing system.

- 4 Click  to start the solvent delivery module pump and  to start the column oven temperature control.


Verify that liquid flows through the detector outlet tubing, and that there are no leaks from any of the connections.


- 5 Monitor the baseline.
When the baseline has stabilized, click .

- 6 Inject 10 μ L of mobile phase, and verify that no peaks are observed.

- 7 Create a sequence table based on the conditions shown in the following table.

Parameters	Set value
Injection Volume	10 μ L
Injections/Vial	6 times
Run Time	5 min

 For details on creating sequence tables, refer to "4.3 Creating Sequence Files" P. 4-22.

 When using a manual injector, inject a volume equal to 5 times the loop volume.

- 8 Use the following formula to obtain the retention time, peak area, and peak height for each of 6 consecutive analyses.

$$RSD(C.V.) = (SD/X) \times 100$$

$$SD = \sqrt{\frac{\sum_{i=1}^n (X_i - \bar{X})^2}{n-1}}$$

$$X = (X_1 + X_2 + \dots + X_{n-1} + X_n) / n$$

n : Number of analyses

$X_1 \dots X_n$: Retention time (or areas) of each peak

X : Average

SD : Standard deviation

RSD : Relative standard deviation

$C.V.$: Coefficient of variation


- | | |
|---|--|
| <ul style="list-style-type: none"> • CHECK CRITERIA | <ul style="list-style-type: none"> • The RSD (C.V.)'s obtained must satisfy the following criteria: • Retention time RSD must not exceed 0.5 %. • Peak area RSD must not exceed 1.0 %. |
|---|--|

7.6.2 Validation of Gradient LC System

■ Objective

An analysis is performed and the retention time and peak area are obtained for each peak. The data is then examined to check for repeatability. Reproducible data validates the system. Generally, the system being validated consists of a minimum of the following components: pump, column oven, autosampler, detector, system controller and data processor.


■ Items Required for Validation

Item	Description
Mobile phases	A: Distilled water B: Methanol A / B = 60 % / 40 %  Both the water (distilled) and the methanol should be HPLC grade.
Column	Shim-pack VP-ODS (Part No. S228-34937-91), LUNA C18 (2) (Part No. 00F-4252-E0) or equivalent ODS column (Particle size 5 µm, Column Dimension : I.D. 4.6 mm × length 150 mm)

Item	Description
Sample	20 mg/L caffeine solution (included in Caffeine set (5 concentrations) Part No. S228-45725-91) <Preparation> Weigh 20 mg of anhydrous caffeine, transfer to a 100 mL volumetric flask and dilute to volume with water. Transfer 1 mL of the solution to a 10 mL volumetric flask, and dilute to volume with water.
Water	HPLC grade, or equivalent
2-propanol	HPLC grade, or equivalent

■ Checking and Preparing the LC System

- 1** Check all the wiring connections in the LC system.
Refer to individual component instruction manuals for details. If a Chromatopac is used, it should be connected to the detector with the signal cable connector provided with the Chromatopac, and the signal cable should then be connected to the detector integrator terminals.

 If the system normally uses Chromatopac or LC workstation, the connections used for regular analysis will be satisfactory.
- 2** Check the LC system plumbing.
Ensure that the tubing between (a) the autosampler outlet and the column inlet, (b) the column outlet and the detector inlet, has an I.D. of less than 0.3 mm, and is shorter than 300 mm. Keep the liquid volume that is not in the column as low as possible.
- 3** Clean the system flow lines using one of the procedures described below.
Before cleaning the flow lines, remove the column from the system, and connect the column inlet to the column outlet with a coupling 1.6C ("Fig. 7.3").

 - **< For a new system >**
Clean the flow lines first with 2-propanol, then with water. In each case, pass the liquid through the flow lines for 10 minutes, at a rate of 2 mL/min.
 - **< For a system in use that uses a mobile phase with a low dielectric constant, such as hexane >**
The procedure is the same as that of a new system, given above.
 - **< For a system that has been using a mixture of a water solution and an organic solvent as mobile phase, or water plus an organic solvent miscible with water (methanol, acetonitrile, etc.) >**
Clean the flow lines with water. Pass water through the flow lines for 10 minutes, at a rate of 2 mL/min.

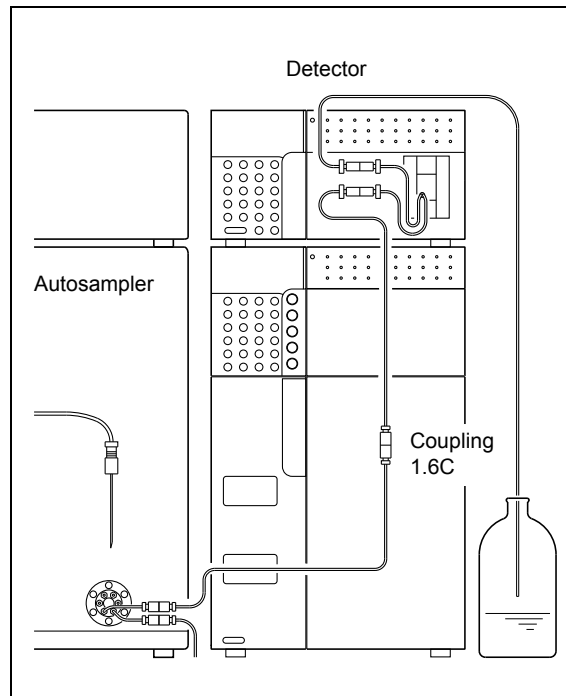


Fig. 7.3

- 4 When cleaning is finished, pour mobile phase (A: water, B: methanol) into the reservoir, and reconnect the column with the LC system.

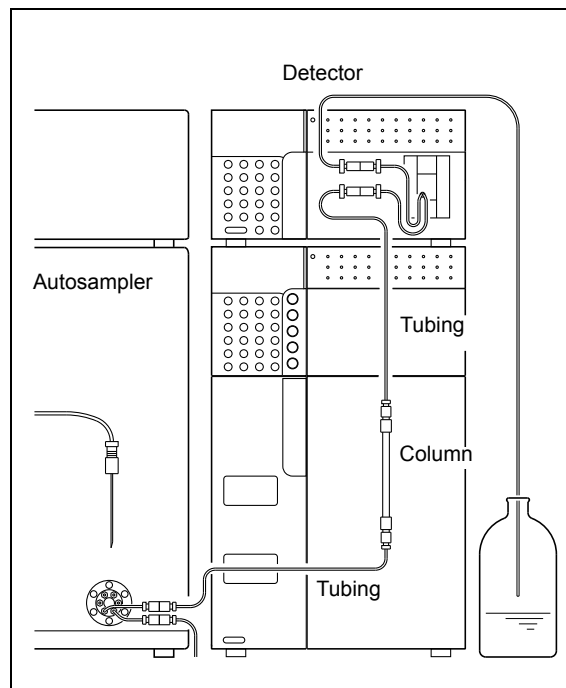
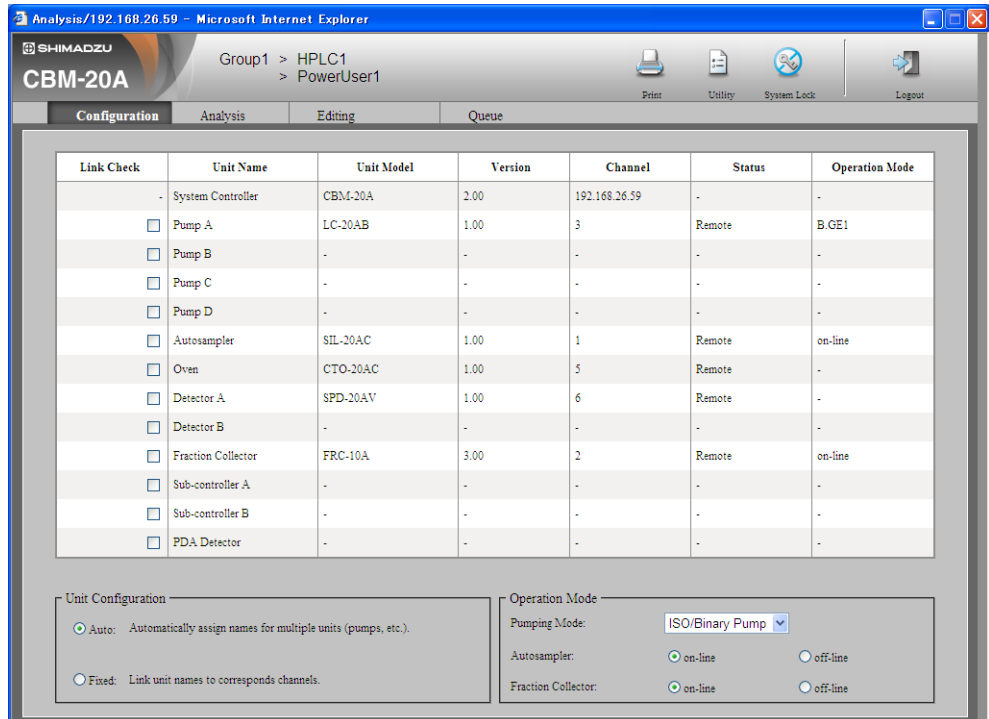


Fig. 7.4

■ Check Procedure

- 1 Verify that the pumping mode is set correctly in the "Configuration" tab page.



[ISO/Binary Pump] is selected for the LC-20AB Solvent Delivery Module and [B.GE] is selected for other solvent delivery modules.

For details on the display of the "Configuration" tab page, refer to "3.4 Determine the System Configuration" P. 3-7.


- 2** Enter the parameters for the solvent delivery module, autosampler, column oven, and detector in the method file as shown in the following table.




Parameter		Set value
Pump	Flow Rate	1 mL/min
	Concentration of solvent B	40 %
	Maximum Pressure	20.0 MPa
Autosampler	Sampling Speed	15 µL/sec
	Rinse Volume	200 µL
	Rinse Speed	35 µL/sec
	Rinse Mode	None
Column Oven	Oven Temperature	40°C
Detector	Wavelength	272 nm
	AUX Range	1 AU/V
	Response	0.5 sec

 For details on setting component parameters, refer to "4.2 Creating Method Files" P. 4-10.

- 3** Enter the parameters for the data-processing system as shown in the following table.


Parameters	Set value
WIDTH	5
DRIFT	0
T.DBL	1000
ATTEN	10 (1024 mAUFs)
SLOPE	1000
MIN.AREA	100000
STOP.TM	5

 For details on setting parameters, refer to the instruction manual for the data-processing system.

- 4** Click  to start the solvent delivery module pump and  to start the column oven temperature control.
Verify that liquid flows through the detector outlet tubing, and that there are no leaks from any of the connections.
- 5** Monitor the baseline.
When the baseline has stabilized, click .


7. Hardware Validation


6 Inject 10µL of mobile phase.

 Verify that no peaks are observed.

7 Create a sequence table based on the conditions shown in the following table.

Parameters	Set value
Injection Volume	10µL
Injections/Vial	6 times
Run Time	5 min

 For details on creating sequence tables, refer to "4.3 Creating Sequence Files" P. 4-22.

 When using a manual injector, inject a volume equal to 5 times the loop volume.

8 Use the following formula to obtain the retention time, peak area, and peak height for each of 6 consecutive analyses.

$$RSD(C.V.) = (SD/X) \times 100$$

$$SD = \sqrt{\frac{\sum_{i=1}^n (X_i - \bar{X})^2}{n-1}}$$

$$X = (X_1 + X_2 + \dots + X_{n-1} + X_n) / n$$

n : Number of analyses

$X_1 \dots X_n$: Retention time (or areas) of each peak

X : Average

SD : Standard deviation

RSD : Relative standard deviation

$C.V.$: Coefficient of variation

• **CHECK
CRITERIA**

• **The RSD (C.V.)'s obtained must satisfy the following
criteria:**

- **Retention time RSD must not exceed 0.5 %.**
- **Peak area RSD must not exceed 1.0 %.**

7.7 If Validation Fails

Should the system fail to satisfy any of the system validation check criteria, or should a component fail to satisfy any of the component validation check criteria, proceed as follows.

- Check whether any consumable items have reached the end of their service life :

The cause of failure to satisfy check criteria could be a consumable part that is no longer usable. Check consumable parts and replace them if necessary.

- Perform troubleshooting :

It is possible that some minor problem (such as air bubbles) has caused the system to fail the criteria.

Perform troubleshooting to check for such problems, and take action to eliminate any problems found.

For troubleshooting procedures for individual system components, see the applicable instruction manuals.

- If a cause cannot be determined, contact your Shimadzu representative :

If you are unable to determine the cause of the failure, or if you are unclear about troubleshooting or corrective action procedures, contact your Shimadzu representative.

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8

Maintenance

The hardware status for the whole system and for each component can be checked with the system controller. It is also possible to obtain maintenance information that can be used as a guide for timing the replacement of parts. This chapter explains how to perform system checks as well as how to obtain maintenance information.

Contents



8.1	Checking the System	8-2
8.2	Checking Maintenance Information	8-9
8.3	Periodic Inspection and Maintenance	8-13


8.1 Checking the System

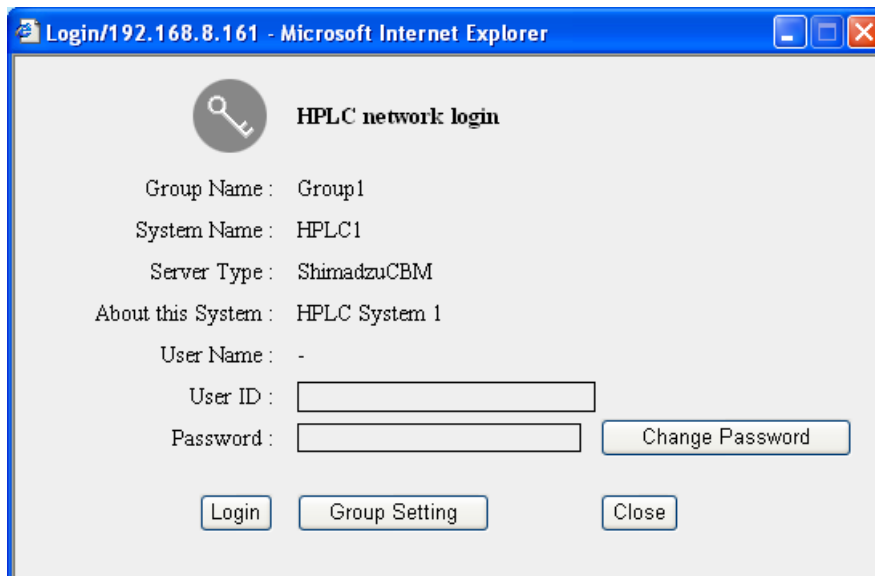
System checks can be executed for LC-30A/LC-20A/LC-10Avp-series products connected to the system controller and the results can be displayed. It is also possible to display the results of system checks for all the LC systems in a group in tabular format.


System checks are executed from the "System Check" tab page in the "Status Summary" section.

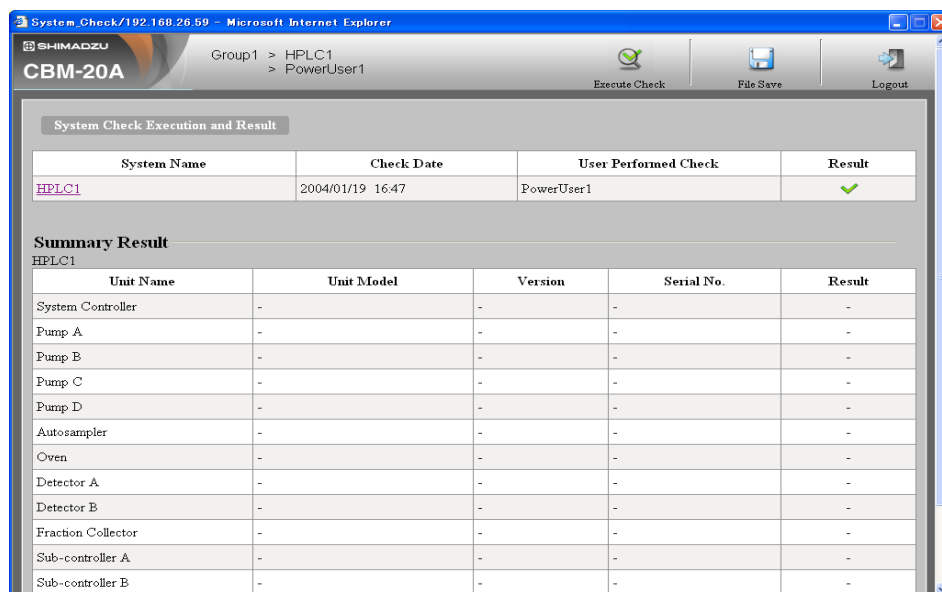
- 1 Click the [System Check] tab in the "Status Summary" section.
The "System Check" tab page is displayed.

System Name (Proceed to Check)	Check Date	Result	User Performed Check
 HPLC1	2004/01/23 10:08	✓	PowerUser1
 HPLC2	2009/12/14 13:05	✓	PowerUser2

- 2 Click the name (or ) of the system to be checked.
The "Login" window is displayed.



- 3 Input the user ID and password and click . The "System Check" application window is displayed.



The screenshot shows the "System Check Execution and Result" window. It contains a table with the following data:

System Name	Check Date	User Performed Check	Result
HPLC1	2004/01/19 16:47	PowerUser1	✓

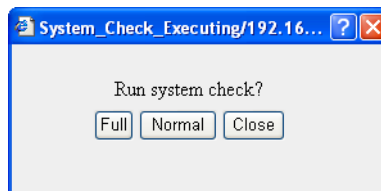
Below this table is a "Summary Result" section for HPLC1, which includes another table with the following data:




Unit Name	Unit Model	Version	Serial No.	Result
System Controller	-	-	-	-
Pump A	-	-	-	-
Pump B	-	-	-	-
Pump C	-	-	-	-
Pump D	-	-	-	-
Autosampler	-	-	-	-
Oven	-	-	-	-
Detector A	-	-	-	-
Detector B	-	-	-	-
Fraction Collector	-	-	-	-
Sub-controller A	-	-	-	-
Sub-controller B	-	-	-	-

The results of the previous system check are displayed. (Only the results of system checks performed after power is turned ON are displayed in the "Summary Result" table.)

- 4 Click .

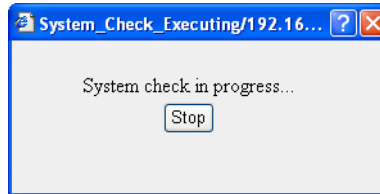
The following window is displayed.




-  There are 2 types of system check: [Full] and [Normal]. If [Full] is selected, the lamp energy for the UV/UV-VIS detector light source and wavelength accuracy for the UV/UV-VIS detector and the fluorometric detector (RF-20Axs only) light sources are checked. These items are not checked as part of the [Normal] system check.
-  Wavelength accuracy check cannot be executed with the SPD-M20A/M30A from the CBM-20A, but data of the SPD-M20A/M30A can be collected and check results displayed.
-  System checks can be executed for all LC-30A/LC-20A/LC-10Avp-series components (except LC-10Avp-series Sub-controllers).

8. Maintenance

- 5 Click or as required.
The following window is displayed and the system check starts.



-  Click to stop the system check. Depending on the system, the processing required to stop the system check may take 1 or 2 minutes.

When the system check is completed, the "System Check Executing" window closes and the results of the system check are displayed.

8.1.1 System Check Results

The results of the system check are divided into the following 3 tables: the "System Check Execution and Result" table, the "Summary Result" table, and the "Detailed Results" table.

■ "System Check Execution and Result" Table

The check results for the whole system are displayed.

①	②	③	④
System Name	Check Date	User Performed Check	Result
HPLC1	2004/01/19 16:47	PowerUser1	✔

	Display item	Description
①	System Name	Displays the names of the systems in the group. Click on a name to jump to the "Summary Result" table for that system.
②	Check Date	Displays the year, month, day, and time of the last check.
③	User Performed Check	Displays the name of the user who executed the system check.
④	Result	Result for the LC system.
	✔	Displayed if the system passed the check.
	!	Displayed if there is a replaceable part that has passed its recommended replacement date.
	✘	Displayed if the system failed the check.
	-	Displayed if the system check has not been executed.

■ "Summary Result" Table

All the components connected to the system are displayed along with their check results.

①	②	③	④	⑤
Unit Name	Unit Model	Version	Serial No.	Result
System Controller	CBM-20A	2.00	L20224200001	✓
Pump A	LC-20AB	1.00	L20124100001	✓
Pump B	-	-	-	-
Pump C	-	-	-	-
Pump D	-	-	-	-
Autosampler	SIL-20AC	1.00	L20174100001	✓
Oven	CTO-20AC	1.00	L20214100001	✓
Detector A	SPD-20AV	1.00	L20144100001	✓
Detector B	-	-	-	-
Fraction Collector	FRC-10A	3.00	-	-
Sub-controller A	-	-	-	-





	Display item	Description
①	Unit Name	Displays the names of the components connected to the system. Click on a name to jump to the "Detailed Results" table (if there is one) for that component.
②	Unit Model	Displays the model names of the connected components.
③	Version	Displays the version numbers of the connected components.
④	Serial No.	Displays the serial numbers of the connected components.
⑤	Result	Displays the system-check results for the connected components. The meanings of the displayed symbols are as previously described. [-] is displayed if there is no check item.

■ "Detailed Results" Table

Detailed system-check results for individual components are displayed.


Detailed Results				
System Controller		CBM-20A		
Item	Check Date	Result of Check		Result
		Result Value	Criterion Value	
UNIT NAME	-	CBM-20A		-
REPORT DATE	2004/01/23 10:08	-		-
SERIAL NUMBER	-	L20224200001		-
ROM VERSION	-	V2.00		-
IP ADDRESS	-	192.168.26.59		-
SUBNET MASK	-	255.255.254.0		-
DEFAULT GATEWAY	-	192.168.26.201		-
MAC ADDRESS	-	00:E0:96:01:00:2E		-
ROM CHECK	2004/01/23 10:08	-		✓
RAM CHECK	2004/01/23 10:08	-		✓
TOTAL OP TIME (hr)	2004/01/23 10:08	123		-

	Display item	Description
①	Item	Displays the system-check item.
②	Check Date	Displays the year, month, day, and time of the last check.
③	Result Value and Criterion Value	Displays the value obtained for each check item along with a value representing the criterion for that item.
④	Result	The check results for each item are displayed. The meanings of the displayed symbols are as previously described.

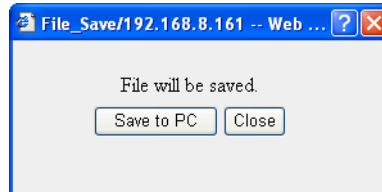
- 
 If  or  is displayed in the "Result" column:
 Replace parts or do whatever is necessary to remove the cause of the problem with reference to the instruction manual for the relevant component.
- 
 When the power is turned OFF, only the check results for the system as a whole are saved, and the data for the "Summary Result" table and the "Detailed Results" table is lost.


8.1.2 Saving the Results of System Checks

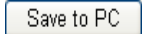
System-check results can be saved as text files. The saved data can be viewed and edited with applications such as Microsoft Excel.

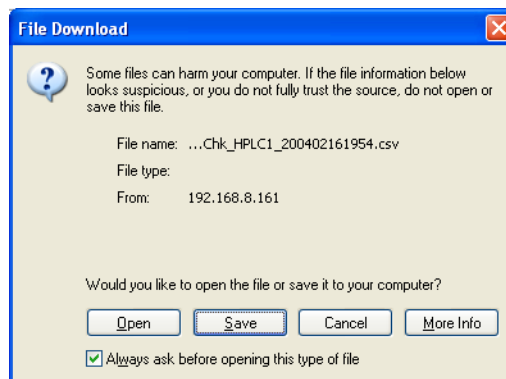
- 1 Click  at the top of the "System Check" application window.

The "Save File" window is displayed.




 The filename is specified automatically.

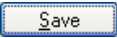
- 2 Click  .
The following window is displayed.

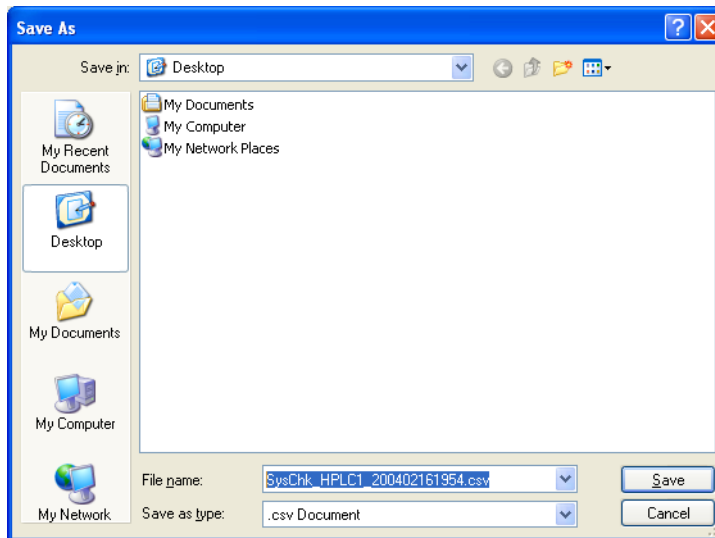


CAUTION

Do not click  . Clicking this button and associating the file with another application may make it impossible to save the file. If this button is inadvertently clicked and the "Open With" window is displayed, close the window by clicking [Cancel].

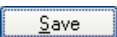
8. Maintenance

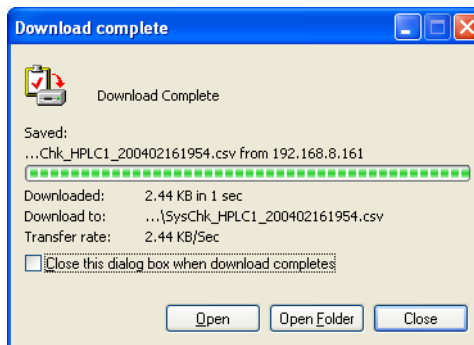
- 3 Click .
The following window is displayed.

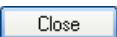


- 4 Select the save location.

- 5 Input the filename.

- 6 Click .
The file is saved in the selected location and the following window is displayed.



- 7 Click  in the "Download Complete" window.
The window is closed.

8.2 Checking Maintenance Information

Information required for maintenance, such as information on the solvent delivery module plunger seal, the autosampler needle and rotor seal, and the illumination time of the detector lamp, can be checked in the "Maintenance" tab page.

8.2.1 Displaying the "Maintenance" Tab Page

Click the [Maintenance] tab in the "Status Summary" section to display the "Maintenance" tab page.

The message [Collecting maintenance data...] is displayed and the maintenance information for the systems in the group is displayed in the "Maintenance" tab page.

8.2.2 "Maintenance" Tab Page Display

Details on the items displayed in the "Maintenance" tab page are provided below.



The displayed items vary with the type of solvent delivery module, autosampler, and detector connected.





For details, refer to "8.2.3 List of Displayed Maintenance Items".

Unit Name	Unit Model	Item	Result	Present / Recommendation	Date Last Replaced
Pump A	LC-20AB	A L SEAL [L]	✓	2 / 90	2004/01/20
		A R SEAL [L]	✓	2 / 90	2004/01/20
		B L SEAL [L]	✓	2 / 90	2004/01/20
		B R SEAL [L]	✓	2 / 90	2004/01/20
Autosampler	SIL-20AC	NEEDLE SEAL [times]	✓	100 / 40000	2004/01/20

	Display item	Description
①	Unit Name	Displays the names of the components connected to the system.
②	Unit Model	Displays the model names of the connected components.
③	Item	Displays the maintenance items.

8. Maintenance

	Display item	Description
④	Result	
		Displayed for items satisfying the recommended criterion (i.e., not requiring replacement).
		Displayed for items not satisfying the recommended criterion (i.e., requiring replacement).
	-	Displayed for components with no maintenance information.
⑤	Present/ Recommendation	Displays the usage up to the present date and the recommended usage limit value.
⑥	Date Last Replaced	Displays the year, month, and day of the last replacement.

8.2.3 List of Displayed Maintenance Items

Unit Name	Unit Model	Item	Display of "Recommendation" (See note 1.)	Display of "Date Last Replaced"
Solvent delivery module	LC-30AD	L SEAL[L] R SEAL[L]	Displayed	Displayed
	LC-20AB	A L SEAL [L] A R SEAL [L] B L SEAL [L] B R SEAL [L]	Displayed	Displayed
	LC-20AD LC-20ADXR LC-20AT LC-20AP LC-20AR LC-20Ai	L SEAL [L] R SEAL [L]	Displayed	Displayed
	LC-10ADvp LC-10ATvp	L SEAL [L] R SEAL [L]	Displayed	Not displayed
	LC-10AD	TOTAL REV [rev]	Not displayed	Not displayed
	LC-10AT			
	LC-10AS			
	LC-10Ai			
	LC-6AD			
	LC-7A			
	LC-8A			

8.2 Checking Maintenance Information

Unit Name	Unit Model	Item	Display of "Recommendation" (See note 1.)	Display of "Date Last Replaced"
Autosampler	SIL-30ACMP SIL-30AC	NEEDLE SEAL [times]	Displayed	Displayed
		HPV ROTOR SEAL [rev]		
	SIL-20A SIL-20AC	HPV STATOR [rev]	Displayed	Displayed
		LPV ROTOR SEAL [rev]		
		LPV STATOR [rev]		
		EXT R-PUMP [sec]		
	SIL-20AXR SIL-20ACXR	NEEDLE SEAL [times]	Displayed	Displayed
		HPV ROTOR SEAL [rev]		
		HPV STATOR [rev]		
		LPV ROTOR SEAL [rev]		
		EXT R-PUMP [sec]		
	SIL-10ADvp	NEEDLE SEAL [times]	Displayed	Not displayed
		6V ROTOR SEAL [rev]		
SIL-10A SIL-10AF SIL-10AP SIL-10Ai SIL-10AXL	NEEDLE SEAL [times]	5000 (See note 2.)	Not displayed	
	ROTOR SEAL [rev]	50000		
	SYRINGE TIP [mL]	4500 (See note 3.)		
Oven	CTO-30A	RV.L ROTOR SEAL [rev] RV.R ROTOR SEAL [rev]	Displayed	Displayed
Detector connected	SPD-20A	D2 TIME [hr]	Displayed	Displayed
	SPD-20AV	D2 TIME [hr] W TIME [hr]	Displayed	Displayed
	SPD-10Avp	D2 TIME [hr]	Displayed	Not displayed
	SPD-10AVvp	D2 TIME [hr] W TIME [hr]	Displayed	Not displayed
	SPD-10A SPD-10Ai	D2 TIME [hr]	2000	Not displayed
	SPD-10AV SPD-10AVi	D2 TIME [hr] W TIME [hr]	2000 2000	Not displayed
	SPD-M30A	D2 TIME [hr]	Displayed	Displayed
	SPD-M20A	D2 TIME [hr] W TIME [hr]	Displayed	Displayed

8. Maintenance

Unit Name	Unit Model	Item	Display of "Recommendation" (See note 1.)	Display of "Date Last Replaced"
Detector connected	RF-20A RF-20Axs	Xe TIME [hr]	2000	Displayed
		Xe COUNT [times]	Not displayed	Not displayed
	RF-10AXL RF-10A	Xe TIME [hr]	500	Not displayed
		RID-20A	W TIME [hr]	Displayed
	RID-10A	W TIME [hr]	20000	Not displayed

- 1: If the Recommendation value is "Displayed", this value is set at the component. The recommended value cannot be changed for items that have a specific value listed in the above table.
Reset the Present value for an item at the component. However, for the SIL-10A-series products click the Present value item with the mouse to reset it. Enter the password according to the instructions displayed on screen.
- 2: If using an SIL-10AXL, the recommended value for the NEEDLE SEAL item is 40000.
- 3: If the syringe volume is 2500 or 5000 μL , the recommended values are respectively 22500 and 45000.

8.3 Periodic Inspection and Maintenance


8.3.1 Periodic Inspection and Maintenance

It is necessary to perform periodic inspections of this instrument to ensure its safe use. It is possible to have these periodic inspections performed by Shimadzu service representatives on a contractual basis. For information regarding the maintenance inspection contract, contact your Shimadzu representative.

8.3.2 Exterior Cleaning

If the instrument cover or front panel becomes dirty, wipe it clean with a soft dry cloth or tissue paper.

For persistent stains, clean the exterior using the following procedure.

- 1** Dip a piece of cloth in a dilute neutral detergent and twist firmly to remove excess liquid. Use this cloth to scrub the soiled area of the exterior surface of the instrument.
 - 2** Dip a piece of cloth into water and twist firmly to remove excess liquid. Use this cloth to wipe away all the remaining detergent. Use a dry cloth to remove all moisture from the exterior surface of the instrument.
-  Do not allow spilled water to remain on the instrument surface, and do not use alcohol or thinner-type solvents to clean the surfaces. These can cause rusting and discoloration.

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9

Technical Information

This chapter provides technical information about the system controller such as, installation location, installation conditions, plumbing, wiring, specifications and methods for connecting to other devices.

Contents

9.1	Installation	9-2
9.2	Connecting the System Controller and Components	9-7
9.3	Initializing Components	9-29
9.4	System Controller Installation and Setup (Example)	9-32
9.5	Specifications	9-43
9.6	Maintenance Parts	9-52
9.7	Introduction to HPLC System	9-53
9.8	Mobile Phase Characteristics	9-56

9.1 Installation

9.1.1 Installation Site

■ Suitable Sites and Preparation

To ensure safe operation, install the instrument in a suitable location that satisfies the following conditions.

WARNING

- Ample ventilation

The solvents used with the HPLC system are often flammable and toxic. Therefore, the room where the instrument is installed must be well-ventilated.

- No fire sources used near the instrument

The solvents used with the HPLC are often flammable. Therefore, the use of open flame where the instrument is installed must be strictly prohibited. Also, do not install in the same room with equipment that emits or could potentially emit sparks.

- Fire extinguishers permanently available

Have fire extinguishers permanently available in case of fire.

- Protective equipment provided near the instrument

If solvent gets into the eyes or onto the skin, it must be flushed away immediately.

Provide equipment, such as eye wash stations and safety showers, as close to the instrument as possible.

CAUTION

- Avoid dust or corrosive gas

To ensure a long service life of the instrument and preserve its performance levels, avoid installing it in places subject to large amounts of dust or corrosive gas.

- Keep away from equipment generating strong magnetic fields

To ensure proper operation, do not install the instrument in places subject to strong magnetic fields. If the power supply line is subject to high electrical noise, install a surge protector.

- Install the instrument in the location that satisfies the following conditions to preserve the performance:

- room temperature is between 4 and 35 °C, with minimal temperature variation through a day.
- air currents from heating or air conditioning equipment are not directed on the instrument.
- sunlight does not shine directly on the instrument.
- there is no vibration.
- humidity stays within 20 - 85 %.
- place without condensation

Required Installation Space

CAUTION

- The weight of CBM-20A is 5.5 kg. During installation, consider the entire weight combined with other LC components.

The lab table on which this instrument is installed should be strong enough to support the total weight of the LC system. It should be level, stable and have depth of at least 600 mm.

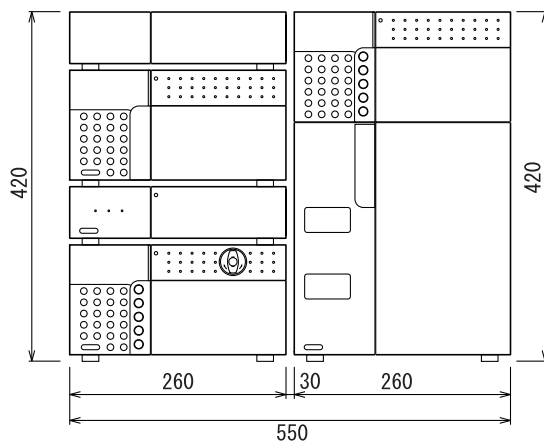
If these precautions are not followed, the instrument could tip over or fall off the table.

- Keep at least 100 mm between the rear of the instrument and the wall.

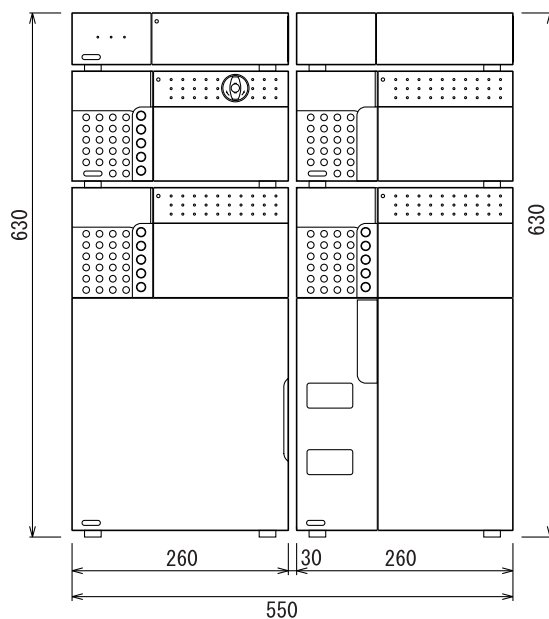
This allows for sufficient air circulation to provide cooling and prevent the instrument from overheating and impairing the performance.

Typical system configurations and required installation spaces are shown in the figures below.

● System 1 (with Manual Injector)



● System 2 (with Autosampler)



(Unit : mm)

Fig. 9.1

9.1.2 Installation

■ Installation

The instrument is designed for stacking with other Shimadzu HPLC components.

 ["9.7 Introduction to HPLC System" P. 9-53](#)

 **CAUTION**

When the LC-20A series components are stacked on each other, the clearance between the components is only 5 mm. Use caution to avoid pinching your fingers between the components.

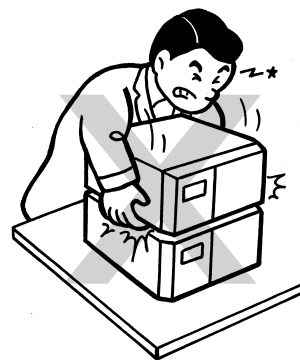


Fig. 9.2

■ Stacking Brackets

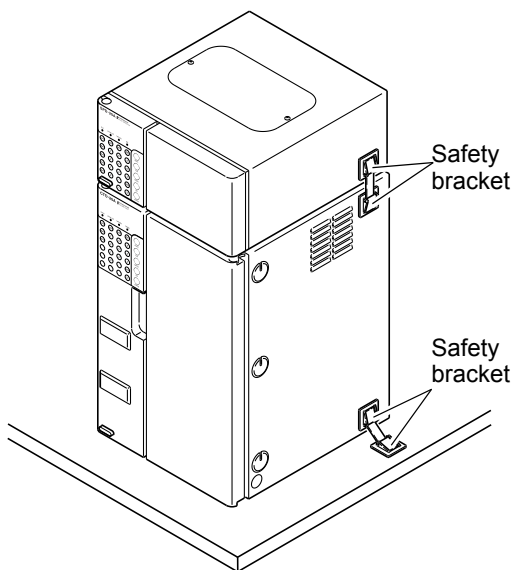


Fig. 9.3

The use of commercially available stacking brackets is recommended. These brackets limit the possibility of the instrument falling off the lab table during an earthquake or the like.

Various grades of stacking brackets are available.

Fasten the instrument firmly in place by attaching stacking brackets to both the right and left sides.

For more details, contact your Shimadzu representative.

An example of stacking bracket placement is shown in ["Fig. 9.3"](#).

9.1.3 Power Supply Connection

The following table shows the electrical voltage, power consumption, and frequency.

Part No.	Power Supply Voltage (indicated on the instrument)	Consumption	Frequency	Rated Breaking Capacity ²
S228-45012-31 /41	AC100-120 V (100-120 V~)	400 VA ¹	50-60 Hz	40A
S228-45012-32 /42	AC100-120 V (100-120 V~)	400 VA ¹	50-60 Hz	40A
S228-45012-38 /46/48/58	AC220-240 V (220-240 V~)	400 VA ¹	50-60 Hz	40A

1: 100 VA if the AC output connectors are not used.

2: Connect the instrument to a power outlet that is equipped with a circuit breaker that shuts off the current at the described value or less.

Verify that the power outlet to be used for connection has sufficient capacity. If capacity is insufficient, a power outage or voltage drop can occur, affecting not only this instrument, but other instruments connected to the same power supply.

■ Connection to Power Outlet

WARNING

Handle the power cord with care, and observe the following precautions to avoid cord damage, fire, electric shock or instrument malfunction.

- Do not place heavy objects on the cord.
- Keep hot items away from the cord.
- Do not modify the cord.
- Do not bend the cord excessively or pull on it.
- To unplug the instrument, pull the plug itself, NOT the cord.

If the cord is damaged, replace it immediately.

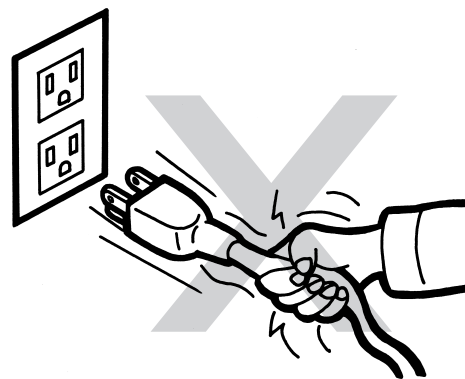


Fig. 9.4

CAUTION

Before plugging in the instrument, make sure that the power switch is OFF.

- 1 Insert the connector side of the power cord into the power cord connector at the back of the instrument.

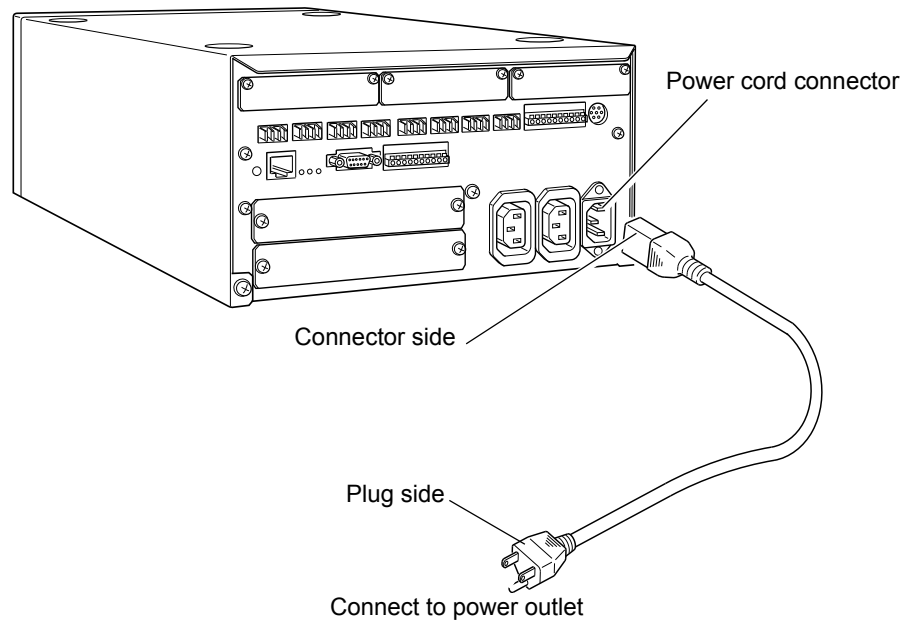


Fig. 9.5

- 2 Insert the plug side of the power cord into the power supply outlet.

■ Grounding

WARNING

To prevent electric shock and to maintain stability in operation of the product, be sure to ground the product.

The product will be grounded when the provided 3-wired power plug is inserted into a 3-wired power socket equipped with a ground terminal.

9.2 Connecting the System Controller and Components

⚠ WARNING

- Before performing wiring, turn OFF all components and unplug the power cables.
- Do not use any other than specified cables for wiring.
- Do not perform any other than the indicated wiring operations.

Failure to observe the above cautions could result in fire, electric shock or instrument malfunction.

9.2.1 Types of Connector

The different types of connectors on the back of the system controller and the components that are connected to them described below.

■ CBM-20A

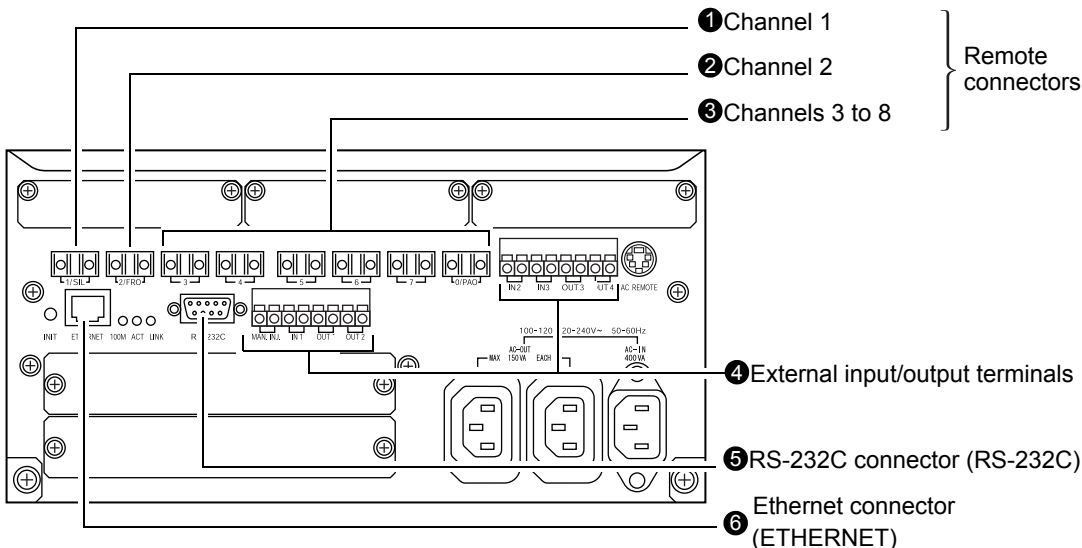







Fig. 9.6

9. Technical Information

	Name	Description
①	Remote connectors: Channel 1	Used to connect an autosampler. Another component can be connected, however, if no autosampler is used.  "9.2.4 Autosampler Connection and Setup" P. 9-15
②	Remote connectors: Channel 2	Used to connect a fraction collector. Another component can be connected, however, if no fraction collector is used.  "9.2.5 Fraction Collector Connection" P. 9-16
③	Remote connectors: Channels 3 to 8	Used to connect the following components: <ul style="list-style-type: none"> • Solvent delivery module • Column oven • Detector • Sub-controller  "9.2.6 Detector, Column Oven, and Solvent Delivery Module Connection and Setup" P. 9-16 and "9.2.7 Sub-controller Connection and Setup" P. 9-19 Channel 8 can also be used to connect a Chromatopac. For details, refer to "9.2.9 Chromatopac Connection and Setup" P. 9-21 .
④	External input/output terminals	Used to connect external devices.  "External Input/Output Terminals (CBM-20A)" P. 9-9
⑤	RS-232C connector (RS-232C)	Used to connect Chromatopac or a PC.  "9.2.9 Chromatopac Connection and Setup" P. 9-21 or "9.2.10 LC Workstation Connection and Setup" P. 9-25
⑥	Ethernet connector (ETHERNET)	Used to connect a PC via a network.

● External Input/Output Terminals (CBM-20A)

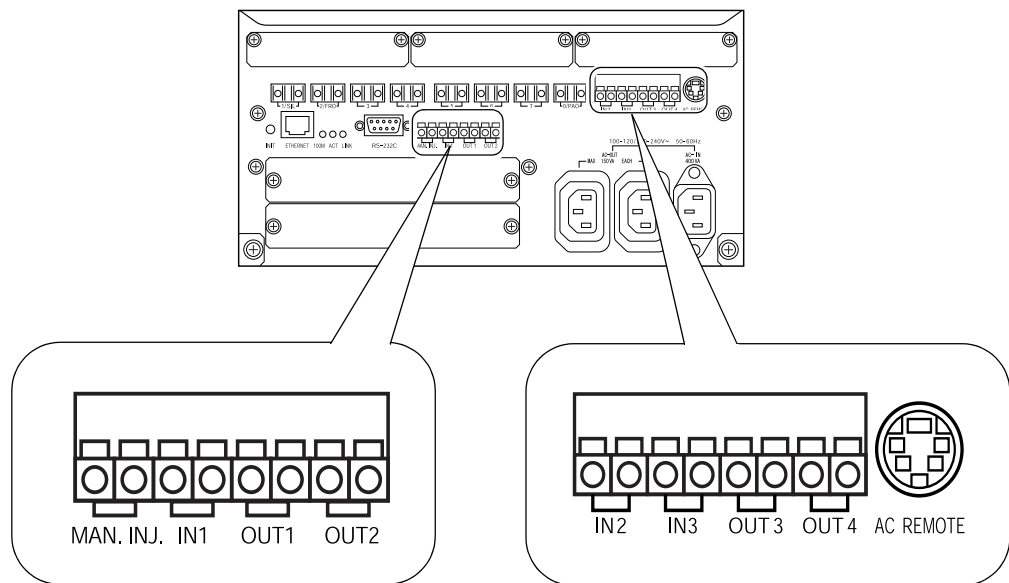
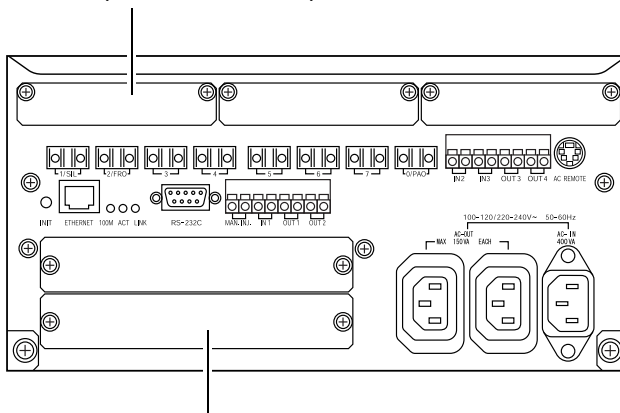


Fig. 9.7

Name	Description
External start input terminals (MAN.INJ.)	Contact input terminals used to start analysis. They can be connected to a manual injector. 👉 "9.2.11 External Device Connection and Setup" P. 9-27
Error input terminals (IN1, IN2/3)	Contact input terminals used for alarm signals. They can be connected to a degassing unit. For each set of terminals, the one on the left is GND (Common). 👉 "9.2.11 External Device Connection and Setup" P. 9-27
General-purpose output terminals (OUT1/2, OUT3/4)	Contact output terminals used for signals related to starting and stopping analysis, errors, and events.
External power-receptacle output connector (AC REMOTE)	Used to connect a multiple terminal box. 👉 "9.2.8 Connecting the Multiple Terminal Box" P. 9-21

●Options (CBM-20A)

①CBM-OPT4 Optical-connector Expansion Board



②PC-55N A/D Board

Fig. 9.8

	Name	Description
①	CBM-OPT4 Optical-connector Expansion Board	Mounted when the number of remote-connector channels is insufficient. Enables channels 9 to 12 to be used.
②	PC-55N A/D Board	Board for analog-digital conversion for connecting a detector that uses the analog output.



Optional boards are mounted by Shimadzu service personnel. Consult your Shimadzu representative for details.

●CBM-20Alite

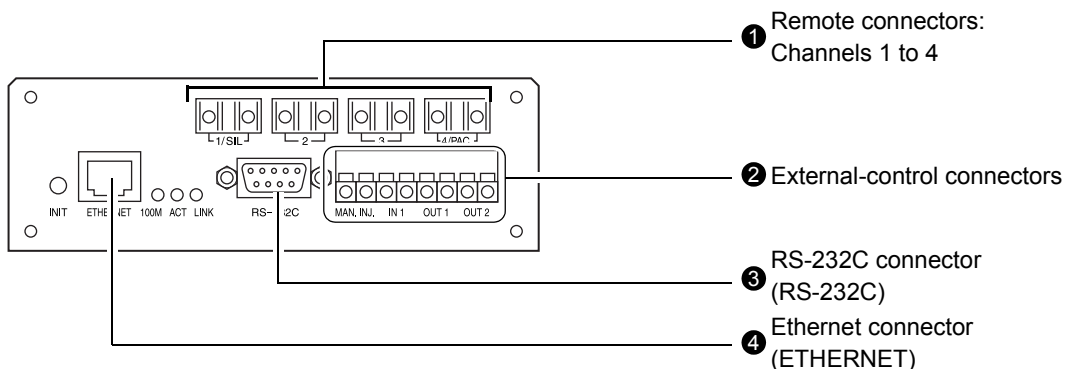


Fig. 9.9

	Name	Description
1	Remote connectors: Channels 1 to 4	Used to connect components. ✎ If an autosampler is used, connect it to channel 1. ☞ Channel 4 can also be used to connect a Chromatopac. For details, refer to "9.2.9 Chromatopac Connection and Setup" P. 9-21.
2	External input/output terminals	Used to connect external devices. ☞ "External Input/Output Terminals (CBM-20Alite)" P. 9-12
3	RS-232C connector (RS-232C)	Used to connect Chromatopac or a PC. ☞ "9.2.9 Chromatopac Connection and Setup" P. 9-21 or "9.2.10 LC Workstation Connection and Setup" P. 9-25
4	Ethernet connector (ETHERNET)	Used to connect a PC via a network.

●External Input/Output Terminals (CBM-20Alite)

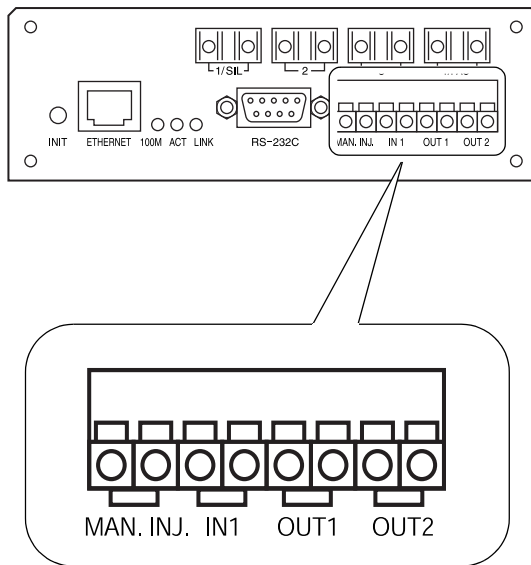


Fig. 9.10

Name	Description
External start input terminals (MAN.INJ.)	Contact input terminals used to start analysis. They can be connected to a manual injector. 👉 "9.2.11 External Device Connection and Setup" P. 9-27
Error input terminals (IN1)	Contact input terminals used for alarm signals. They can be connected to a degassing unit.
General-purpose output terminals (OUT1/2)	Contact output terminals used for signals related to starting and stopping analysis, errors, and events.

9.2.2 Connecting the Optical Cable

The optical cable provided with this instrument is a two-way assembly for both transmission and reception of signals, and connects to the [REMOTE] connector.

- 1 Before connection, remove the cap from the connection channel to be used.

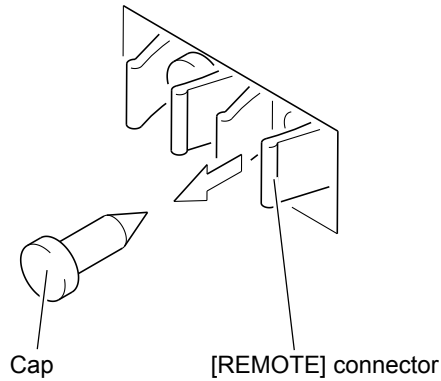


Fig. 9.11

CAUTION

The caps on the [REMOTE] connectors prevent dirt or dust from getting into the connector.

If a [REMOTE] connector is not used, leave the cap on it to prevent dirt or dust from interfering with communication.

When a cap is removed, keep it in a safe place for future use.

- 2 Insert the optical cable plug into the [REMOTE] connector until it clicks into place.

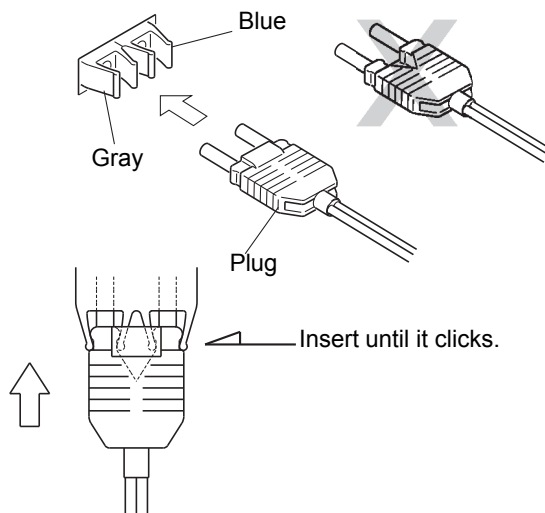


Fig. 9.12

⚠ CAUTION

Make sure there is no dirt or dust on the plug.
Dirt or dust on the plug will get inside the [REMOTE] connector.
Failure to follow these precautions above could result in malfunction or communication problems.

⚠ CAUTION

- Do not bend the optical cable less than 35 mm in radius.
- When inserting and removing the plug, grip the plug itself, not the cable.
- Do not bend the cable where it joins the plug.

Failure to follow these above precautions could result in damage to the plug or a broken wire in the cable.

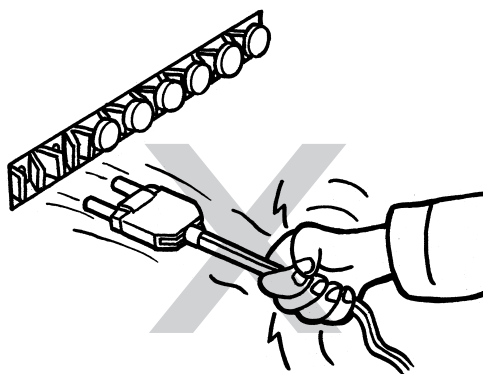


Fig. 9.13

9.2.3 Installing the CBM-20Alite in an Autosampler or Solvent Delivery Module

The CBM-20Alite must be installed into an LC-30A/20A series autosampler (SIL-30AC/30ACMP/20A/20AC, etc.) or an LC-30A/20A series pump (LC-30AD/20AB/20AD/20AT/20AP/20AR, etc.). Optical connection is not required because it is connected directly to the component. Up to 4 other components can be connected to the remote connectors on the CBM-20Alite and the component in which the CBM-20Alite is installed is automatically allocated to channel 5.


■ Installation and Setup

● Installation

The CBM-20Alite is installed by Shimadzu service personnel.

● Setup

Set [0] (Int) for the [CBM LINK] parameter in the [System Settings Group] for the autosampler or solvent delivery module in which the CBM-20Alite is incorporated.

 For details on connections to the remote connectors, refer to the following descriptions on component connection methods.

9.2.4 Autosampler Connection and Setup

The method for connecting a system controller to an autosampler varies with the type of autosampler. Separate descriptions are provided for the SIL-30A/20A series/SIL-10ADvp and the SIL-10A Series (SIL-10A/SIL-10AF/SIL-10AP/SIL-10Ai/SIL-10AXL).

■ SIL-30A/20A Series/10ADvp Autosamplers

● Hardware Connection

- 1 Insert one end of the optical cable provided with the autosampler into the remote connector (REMOTE) on the autosampler.
- 2 Insert the other end of the cable into the remote connector for channel 1 on the system controller.

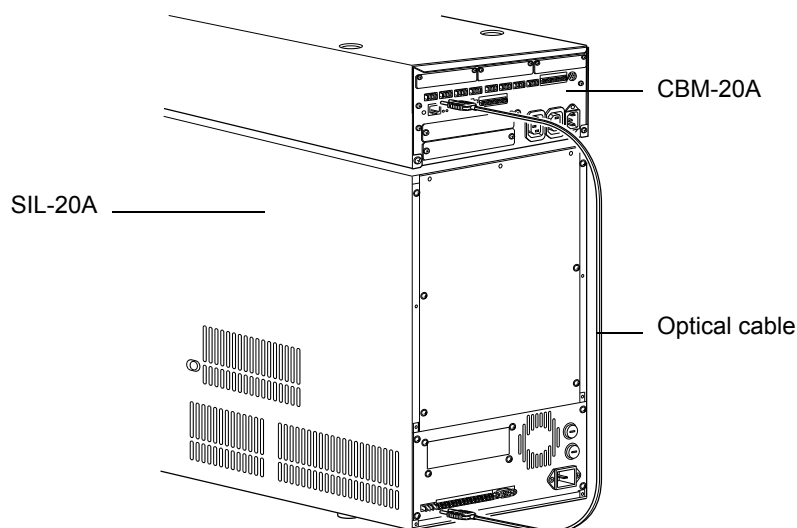



Fig. 9.14

 The autosampler is always connected to channel 1. It is not possible to control the autosampler if it is connected to other channels.

● Component Setup

The component settings required at the autosampler after connecting it to the system controller are explained below.

- 1 Insert the autosampler power plug into the power supply outlet and turn the power switch ON.
- 2 Verify that the [LOCAL] value in the autosampler display screen is [0].
If using an SIL-30A/20A series autosampler, verify that the [CBM LINK] value is [1] (Ext). This completes the setup procedure.

 For details on autosampler setup, refer to the autosampler instruction manual.



If the [LOCAL] value is [1], the autosampler is in local mode and control will not be possible from the system controller.

■ Connecting SIL-10A-series Autosamplers

- 1** Insert the autosampler AC cable plug into an AC output connector (AC OUT) on the CBM-20A.
- 2** Insert one end of the optical cable provided with the autosampler into the autosampler remote connector (REMOTE).
- 3** Insert the other end of the cable into the remote connector for channel 1 on the CBM-20A.



The autosampler is always connected to channel 1. It is not possible to control the autosampler if it is connected to other channels.

9.2.5 Fraction Collector Connection

Use the following procedure to connect a fraction collector to the system controller.

- 1** Insert the power cable plug of the (FRC-10A) fraction collector into an AC output connector (AC OUT) on the CBM-20A.
- 2** Insert one end of the optical cable provided with the fraction collector into the remote connector (REMOTE) on the fraction collector.
- 3** Insert the other end of the cable into the remote connector for channel 2 on the CBM-20A.



The fraction collector is always connected to channel 2 on the system controller. It is not possible to control the fraction collector if it is connected to other channels.

9.2.6 Detector, Column Oven, and Solvent Delivery Module Connection and Setup

The connection and setup methods of solvent delivery pumps, column ovens, detectors, and supercritical controllers are the same.


Up to 4 solvent delivery modules can be connected.



Use solvent delivery modules of the same model when configuring a high-pressure GE unit. Performance will be insufficient if different models are used.

A maximum of two detectors, four column ovens, and two supercritical controllers can be connected.

Connect the solvent delivery pump, column oven, detector or supercritical controller to channels 1 to 8 of the remote connector. If more than eight channels are necessary on the CBM-20A, add an optical connector expansion board (CBM OPT-4) option to enable the use of up to channel 12.

-  This system controller may not connect to a solvent delivery pump and detector or a supercritical controller if the system configuration is changed although [Fixed] is set. Select "Auto" in the unit configuration beforehand. There are 2 ways to set unit configuration;
- Set the configuration in the "Configuration" tab page in "Analysis Execution" application.
 - Push initialization button on the back of system controller more than 3 seconds.

 ["3.4.5 Selecting the Unit-name Allocation Method" P. 3-11](#)

■ Hardware Connection

- 1 Insert one end of the optical cable provided with the component into the remote connector on the component.
- 2 Insert the other end of the cable into the remote connector for a channel number from 1 to 8 on the system controller. (Channel 1 to 12 if an optional optical-connector expansion board is mounted.)

 Make a note of the channel number used for connection.

- 3 Set the channel number at the component.

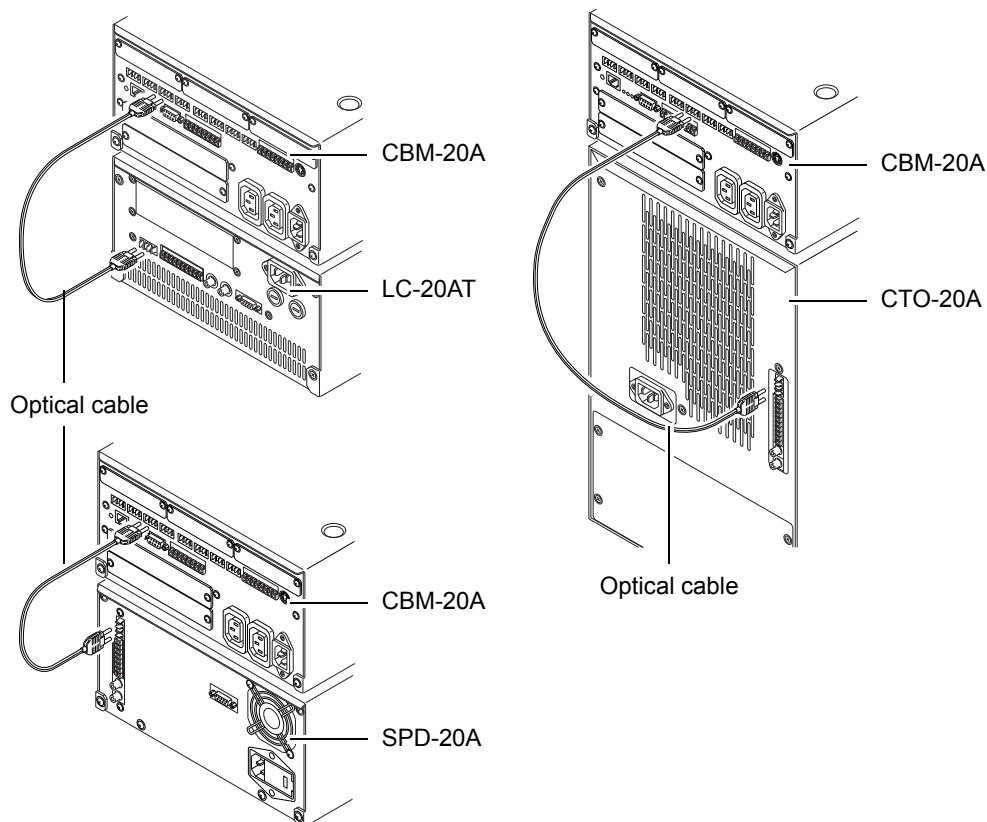


Fig. 9.15


■ Component Setup

The settings required at the component are explained below.

1 Insert the component power plug into the power supply outlet and turn the power switch ON.

2 Open the "LINK ADRS" screen on the component.

3 Enter the channel number used to connect the component to the system controller.

 *For details on the component setup, refer to the component instruction manual.*



If several solvent delivery modules are connected, the system controller recognizes them as pumps A, B, C, and D in order of increasing channel number. If 2 detectors are connected, the system controller recognizes them as detectors A and B in order of increasing channel number. If the CBM-20Alite is incorporated in a solvent delivery module, however, the unit in which the system controller is incorporated is always recognized as pump A.

4 Verify that the [LOCAL] value is [0].

If using an LC-30A/20A series pump (LC-30AD/20AB/20AD/20AT/20AP/20AR, etc.), verify that the [CBM LINK] value is [1] (Ext).



If the [LOCAL] value is [1], the component is in local mode and control will not be possible from the system controller.

9.2.7 Sub-controller Connection and Setup

It is possible to control a solenoid valve or degassing unit from the CBM-20A by connecting a sub-controller vp, Option Box vp, Option Box L or Valve Interface. Up to 2 of these components can be controlled from the CBM-20A.

 For details on connections and settings, refer to the component instruction manual.

■ DIP Switch Settings

Before connecting the CBM-20A to the component, make the necessary DIP switch settings at the components.

The procedure for Option Box vp is described below as an example.

- 1 Set the channel number for the remote connector (REMOTE) on the system controller to which the component is connected using pins SW1 to SW4 of the "8-position DIP switch".

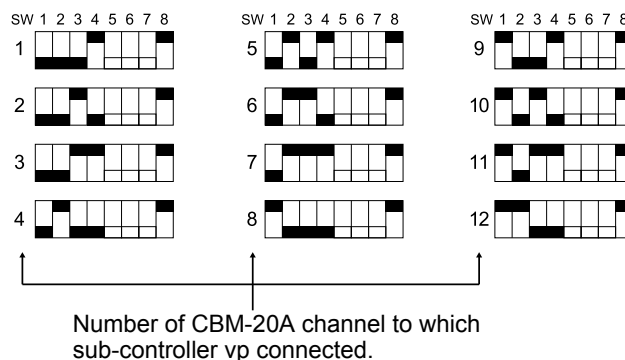







Fig. 9.16

-  The component can be connected to the remote connector for a channel number from 1 to 8 (1 to 12 if the optional CBM OPT-4 Optical-connector Expansion Board is mounted).
-  DIP switch setup is performed in the same way for Sub-controller vp, Option Box L, and Valve Interface.
-  If two sub-controllers are connected, the system controller recognizes them as sub-controllers A and B in order of increasing channel number.

- 2 Set pins SW5 to SW8 of the "8 position DIP switch" according to the system configuration.


Item	Number	Remark
SV-TYPE	SW5	Set to ON if the FCV-10AL (vp) is used.
	SW6	Set to ON if the FCV-11AL (S) or FCV-15AL is used.
DEGAS	SW7	Set to ON if the DGU-10A/B is used.
MODE	SW8	Always set to ON when connecting to the CBM.

-  Do not set both SW5 and SW6 to ON.

 Different DIP switch settings are required when using the Option Box L or Valve Interface.


■ Hardware Connection

1 Insert the component power cable plug into an AC output connector (AC OUT) on the system controller.

 If the AC output connectors are already being used, insert the component power cable into an AC output connector (AC OUT) on the back of the fraction collector.

2 Insert one end of the optical cable provided with the component into the remote connector (REMOTE) on the component.

3 Insert the other end of the optical cable into the remote connector on the system controller. Use the channel number set with the DIP switch.

 Connection is performed in the same way for Option Box vp, Option Box L, and Valve Interface.

9.2.8 Connecting the Multiple Terminal Box

If the CBM-20A is connected to a multiple terminal box, 4 of the 8 power outlets can be controlled with the system controller.

There are two types of multiple terminal box: one type is used by mounting onto the back of Option Box L and the other is used as an individual unit.

The method for connecting the system controller and the power-receptacle box is described below.

- 1** Insert the plug of the external power-receptacle output cable provided with the system controller into the remote connector (REMOTE) of the multiple terminal box.
- 2** Insert the plug at the other end of the external power-receptacle output cable into the system controller's external power-receptacle output connector (AC REMOTE).
- 3** Insert the plug of the power cable of the multiple terminal box into a power outlet.

9.2.9 Chromatopac Connection and Setup

Two-way transmission of data is possible by connecting the system controller to a Shimadzu Chromatopac chromatograph-data processing system using an optical cable. It is also possible to transmit the detector chromatographic data via an optical cable with the C-R8A. The methods for hardware connection and component setup for the C-R8A and the C-R7Aplus are described below.

Connect and setup other Chromatopac models according to the following descriptions. Optical cables must be ordered separately.

 Refer to "1.3 Optional Parts" P. 1-6




Optical-link Interface Provisions

- C-R8A or C-R7Aplus Chromatopac:

These models are equipped with an optical-link interface as a standard feature. It is also possible to use an RS-232C cable instead of the optical-link interface.

- Other Chromatopac Models:

The optional PC-56N RS-232C Interface must be connected to the Chromatopac (part number: S223-02983-92, equipped with optical-link interface).


 For details on connecting the PC-56N, refer to the Chromatopac instruction manual.

■ Hardware Connection


1 Insert one end of the optical cable into the optical-link connector (OPT LINK) on the Chromatopac.

2 Insert the other end of the optical cable into the optical-link connector (PAC) on the system controller.

The remote connectors for channel 8 on the CBM-20A and channel 4 on the CBM-20Alite also act as optical-link connectors.

 The system controller and Chromatopac can also be connected using the RS-232C connectors.

- System controller: 9-pin pin-type connector
- Chromatopac other than C-R8A: 25-pin socket-type connector
- C-R8A Chromatopac: 9-pin pin-type connector

 The PAC connector and RS-232C connector on the system controller cannot be used at the same time.


■ Chromatopac Setup

The component settings required at the Chromatopac after connecting it to the system controller are explained below.

Set the baud rate at Chromatopac as shown in the following table.

Chromatopac	Interface (RS-232C/optical link)	Baud rate	Communication protocol (communication-mode setting)
C-R8A	Optical link	19200	LEVEL-2 (12917)
C-R7A	Optical link	9600	LEVEL-2 (12917)
C-R5A	Optical link	9600	LEVEL-2 (12917)
C-R4A	Optical link	4800	LEVEL-2 (12917)
C-R6A	Optical link	2400	LEVEL-1 (4465)
C-R6A (II)	Optical link	2400	LEVEL-2 (12917)

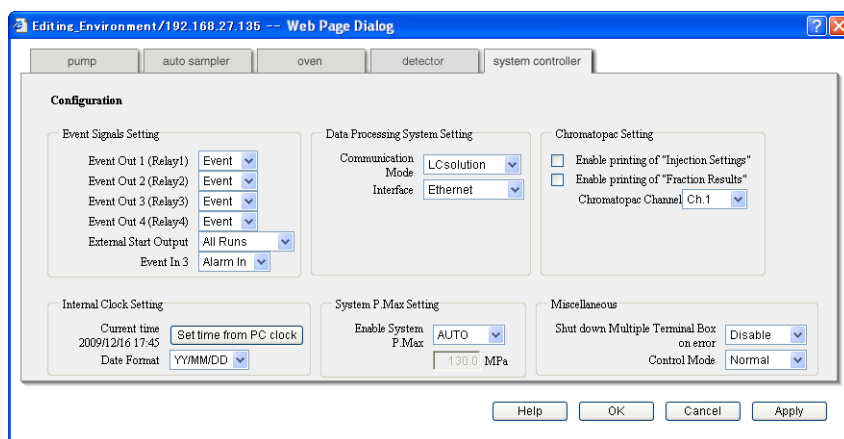
 If the communication mode is changed, reset the power to Chromatopac.

 For details on Chromatopac operations, refer to the Chromatopac instruction manual.

The communication mode and interface can be set either from Internet Explorer or from an LC-30A/20A-series Autosampler, Solvent Delivery Module, or Detector.

● Setup from Internet Explorer

- 1 Turn ON the power to the system controller and Chromatopac.
- 2 Start up Internet Explorer and login to the system controller.
- 3 Display the "System Controller" tab page in the "Configuration Parameter" window.



["4.2 Creating Method Files" P. 4-10](#)

- 4 Select the communication mode from the [Communication Mode] pull-down menu.
 - Select the connected Chromatopac model as the communication mode.
- 5 Select the interface from the [Interface] pull-down menu.
 - Select Opt-Link (PAC) if the Chromatopac is connected via an optical-link connector (OPT LINK). Select RS-232C if the Chromatopac is connected via the RS-232C connector.
- 6 Enter the channel number for the Chromatopac in the [Chromatopac Channel] field under [Chromatopac Setting].
- 7 Click to save the settings.

8 Set the communication mode at the Chromatopac.



C-R8A:

Set the baud rate for the STD1 port to "19200" and the communication mode to "12917" from the "T: TRS" screen in "CONFIG".

C-R7Aplus:

Set the baud rate to "9600" with the DIP switch. Set the communication mode from the "Communication Port Parameters" screen in Win4, as shown in the previous table.

9 Close Internet Explorer.

10 Reset the power to the system controller and Chromatopac.

11 Digital communications is possible for the C-R8A via an optical-link cable. Enter [OPEN GCLC 7,1,1] and press to establish digital communications between the system controller and the C-R8A.

Remote operation of the system controller from the C-R7A Chromatopac becomes possible by entering [OPEN TRS 7] from Chromatopac keyboard and press **enter** .



The communication port should be closed before turning OFF the power to the system controller or Chromatopac. If it was opened using [OPEN GCLC 7,1,1], enter [CLOSE GCLC 1] and press **enter** . If it was opened using [OPEN TRS 7], enter [CLOSE TRS 7] and press **enter** .

● Setup from an LC-30A/20A-series Component

- 1** Turn ON the power to the LC-30A/20A-series Autosampler, Solvent Delivery Module, or Detector and establish connection with the system controller.
- 2** In the VP-function calibration support group, display [CBM PARAMETER] and press **enter** .
- 3** Press **func** and enter the [CBM PARAMETER] items.

	Optical-link connection	RS-232C connection
INTERFACE	0:OPT(Opt Link)	1:RS(RS-232C)
TRS MODE	11:C-R8A 12:C-R7A/C-R5A 13:C-R4A 14:C-R6A 15:C-R6A(II)	11:C-R8A 12:C-R7A/C-R5A 13:C-R4A 14:C-R6A 15:C-R6A(II)



The Chromatopac channel number cannot be set from an LC-30A/20A-series component.



Refer to *Setup from Internet Explorer Change to change the channel number.*

- 4** If [CBM PARAMETER] items are changed, reset the power.

9.2.10 LC Workstation Connection and Setup

It is possible to control the LC system from LC Workstation by connecting the system controller and LC Workstation (LCsolution or Class-VP) via a network (ETHERNET) or an RS-232C cable.

■ Connecting via a Network

Connect the system controller and the PC to the same network.

■ Connecting via RS-232C

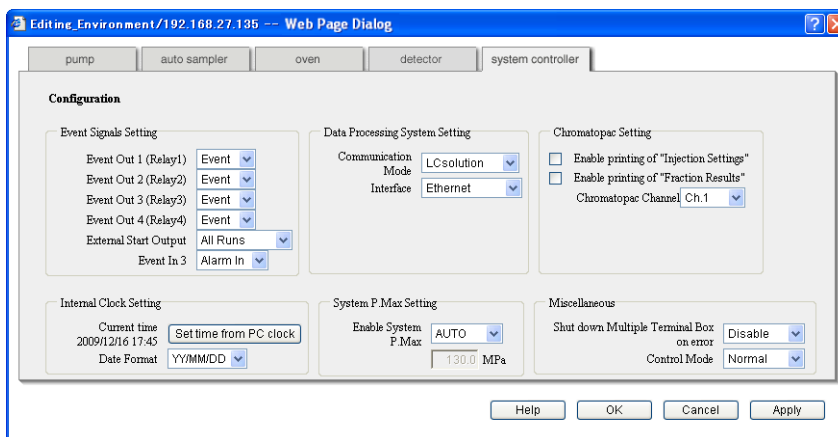
Connect an RS-232C cable to the RS-232C connector on the system controller and the PC.

■ System Controller Setup

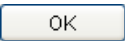
The communication mode and interface can be set either from Internet Explorer or from an LC-30A/20A-series Autosampler, Solvent Delivery Module, or Detector.

● Setup from Internet Explorer

- 1 Turn ON the power to the system controller.
- 2 Start up Internet Explorer and log into the system controller.
- 3 Display the "System Controller" tab page in the "Configuration Parameter" window.



 "4.2 Creating Method Files" P. 4-10

- 4 Select the communication mode from the [Communication Mode] pull-down menu. Select the model of the connected LC Workstation as the communication mode.
- 5 Select the interface from the [Interface] pull-down menu. Select [Ethernet] if LC Workstation is connected via a network (ETHERNET). Select [RS-232C] if LC Workstation is connected using RS-232C connectors.
- 6 Click  to save the settings.
- 7 Close Internet Explorer.
- 8 Reset the power to the system controller.

● Setup from an LC-30A/20A-series Component

1 Turn ON the power to the LC-30A/20A-series Autosampler, Solvent Delivery Module, or Detector and establish connection with the system controller.

2 In the VP-function calibration support group, display [CBM PARAMETER] and press **enter** .

3 Press **func** and enter the [CBM PARAMETER] items.

	ETHERNET connection	RS-232C connection
INTERFACE	2:ETH(ETHERNET)	1:RS(RS-232C)
TRS MODE	2: CLASS-VP or 3: LCsolution	2: CLASS-VP or 3: LCsolution

4 If [CBM PARAMETER] items are changed, reset the power.

9.2.11 External Device Connection and Setup

The external input/output terminals of the system controller are used to connect to external devices other than LC-30A/20A/LC-10Avp/LC-10A-series components and control them from the system controller.

The names and connection methods of the external input/output terminals are given below.

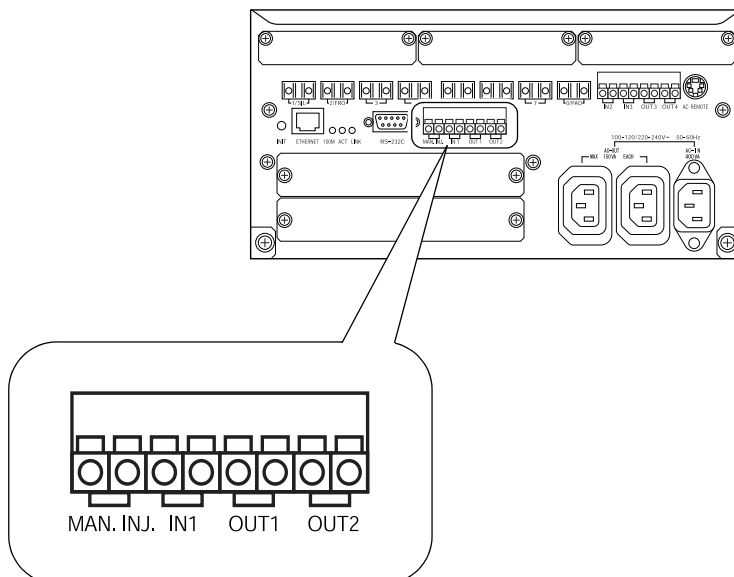


Fig. 9.17

Name	Description
External start input terminals (MAN.INJ.)	These terminals can be connected to a manual injector to receive external start signals.
Error input terminals (IN)	These terminals can be connected to a degassing unit to receive error signals (e.g., from leak sensors).
General-purpose output terminals (OUT)	These terminals can be used to send auto-zero signals to the detector or error output signals to other components.

■ Hardware Connection

1 Peel the cable about 10 mm.

2 When the cable has the stranded wires, strand the wires enough and insert with pressing the button of the terminal.
When removing the cable, remove the cable by pressing the button of the terminal.







Use wire of the diameter shown below.

- Cable with single wire : ϕ 0.4 to ϕ 1.2 (AWG26 to 16)
- Cable with stranded wire : 0.3 mm² to 1.25 mm² (AWG22 to 16), diameter of single wire thicker than ϕ 0.18.

The cable with stranded wire is suitable to prevent disconnection.

9.3 Initializing Components

The initialization button on the back of the system controller has the following functions:

Function	Operation of initialization button
Return components to their default settings.	Turn the system controller power ON while pressing the initialization button and continue to hold the button down for approximately 20 seconds.  "9.3.1 Initializing Components" P. 9-29
Make TCP/IP-related settings.	Turn the system controller power ON while pressing the initialization button, and release the button after 5 seconds.  "9.3.2 Making TCP/IP-related Settings" P. 9-30
Change the system configuration from "Fixed" to "Auto" and clear the link check settings.	Hold the initialization button down for longer than 3 seconds. All errors are also cleared.  "9.2.6 Detector, Column Oven, and Solvent Delivery Module Connection and Setup" P. 9-16
Clear all errors.	Press the initialization button more than 1 second.  "2.8 "Error" Window" P. 2-31

9.3.1 Initializing Components

All component settings, including those in methods and component logs, are returned to their default settings.

Item	Default setting
IP address setting	Use the following IP address
IP address	192.168.200.99
Subnet mask	255.255.255.0
Default gateway	None
Group Name	Unregistered
System Name	Serial number
User name and level	Administrator
User ID	Admin
Password	Admin

 For details on default settings, refer to ["5.12 Parameter Details" P. 5-57](#).

- 1 Turn the system controller power ON while pressing the initialization button and continue to hold the initialization in the pressed position for approximately 20 seconds. When initialization is complete, the 100M, ACT, and LINK indicators on the back of the system controller all turn ON briefly and then turn OFF and return to the normal status. The status indicator of the CBM-20A changes from orange to green.

9.3.2 Making TCP/IP-related Settings

The [IP address], [Subnet mask], [Default gateway], and [Ether speed] parameters can be set via the CBM-20A's RS-232C terminals.

- 1 Connect the RS-232C terminals on the CBM and the RS-232C terminals on the PC with a crossover cable. Use one of the recommended cables given in 1.3 Optional Parts or a commercial 9pin Dsub-9pin Dsub cable.


- 2 Start the terminal software, such as Hyper Terminal, at the PC. Configure the following settings with terminal software:
Bits per second: 9600
Data bits: 8
Parity: None
Stop bits: 1
Flow control: None
Reset the power to the system controller while pushing the initialization button. When the message [Release INIT-SW to enter boot menu or initialize all parameter] is displayed on the terminal, release the button.

 If approximately 5 seconds elapse after startup and the message is not displayed on the terminal, release the initialization button and examine the terminal settings and cable connections. If the button remains in the pressed position, the entire system will be initialized.

- 3 When the following message is displayed on the terminal, press the [Enter] key.
CBM-20A Loader version X.XX
Press the [Enter] key to proceed:
The current settings are displayed on the terminal.
1. IP address : 192.168.200.99
2. Subnet mask : 255.255.255.0
3. Default gateway :
4. Ether speed : 0 (Auto)
5. Boot parameter :
v. ROM Version Up from serial port
1-5: Change or 0 : quit ?

4 Enter a number from 1 to 4 to change the corresponding setting.

 Refer to "[Parameter Settings](#)" P. 9-31 for more details.

 Select 0 to save the current settings and start the system.

■ Parameter Settings

Parameter	Description
1. IP address	Set the IP address and the subnet mask. Set [0.0.0.0] for the IP address when obtaining an IP address automatically from a DHCP server.
2. Subnet mask	
3. Default gateway	Sets the default gateway. If there is no default gateway, input [-].
4. Ether speed	Sets the Ethernet speed/mode for the CBM-20A. Any value in the range 0 to 4 can be set. 0 : Auto 1 : 10M/Half 2 : 10M/Full 3 : 100M/Half 4 : 100M/Full Normally, the setting "0: Auto" (automatic switching) is used. If, however, it is not possible to link to the hub of the communications destination, the Ethernet speed/mode can be fixed by setting a value in the range 1 to 4.
5. Boot parameter	Do not use these settings. (For service purpose only)
v. ROM Version Up from serial port	

9.4 System Controller Installation and Setup (Example)

At system installation or the change of an installation location, it is necessary to set or change the component information and network settings. This allows control of the system controller from a PC over the network or sharing of component information between system controllers. The following example describes how to set group names and IP addresses.

9.4.1 System Configuration (Example)

The following example describes connecting this type of LC system to the network.

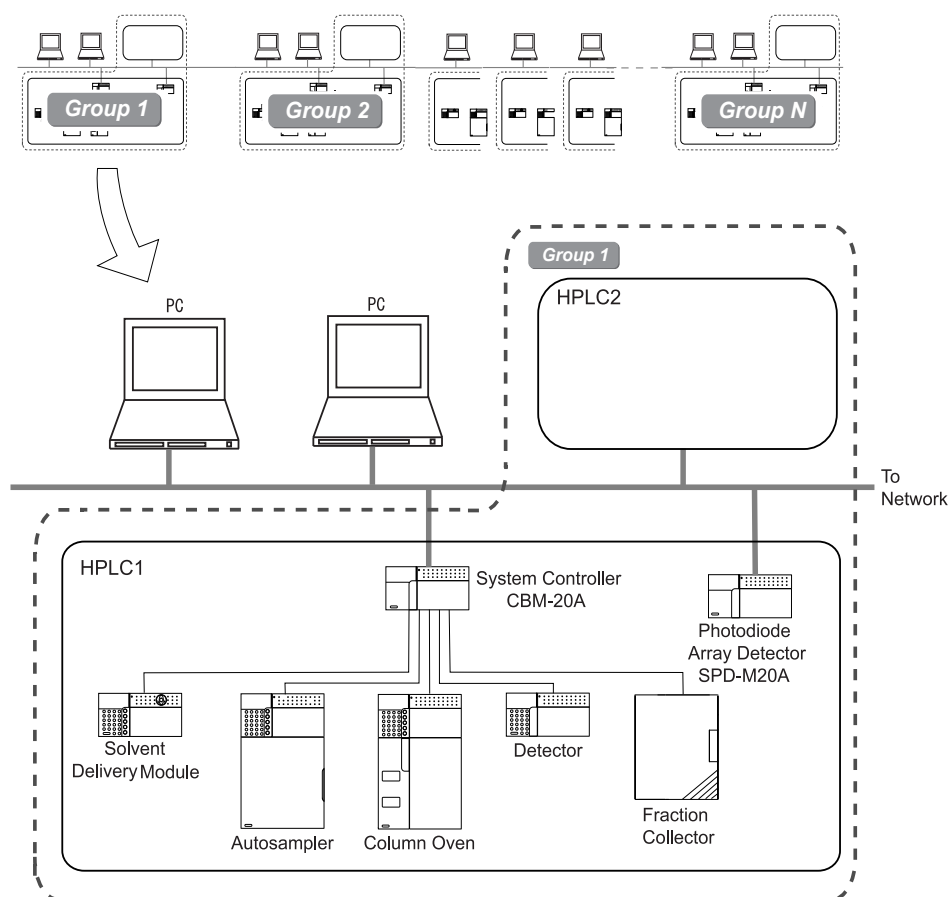


Fig. 9.18

Group name	Group1		
System name	HPLC1		HPLC2
Model name	CBM-20A	SPD-M20A/M30A	CBM-20A
IP address	192.168.8.161	192.168.8.165	192.168.8.162
Subnet mask	255.255.255.0	255.255.255.0	255.255.255.0
Default gateway	192.168.8.101	192.168.8.101	192.168.8.101
User registration	User1(PowerUser) User2(PowerUser)	-	User1(PowerUser) User2(PowerUser)

- (1) The LC systems are installed as 2 sets under the group name "Group1".
- (2) The two LC systems are given the system names of "HPLC1" and "HPLC2".
- (3) The PDA detector (SPD-M20A/M30A) is included in HPLC1. This system is configured with LC-30A/20A-series components.
- (4) HPLC2 is configured with LC-10Avp-series components.



The group and system names can be set freely. Using the same group names for different LC systems makes it possible to handle them as systems in the same group. (One group can contain a combined total of up to 10 CBM-20A/20Alite System Controllers and SPD-M20A/M30A PDA Detectors.) User IDs and user levels can be copied from one system controller to another system controller in the same group. This makes it possible to log into any system in the same group with the same user ID and password. Use different system names for each system in a group.



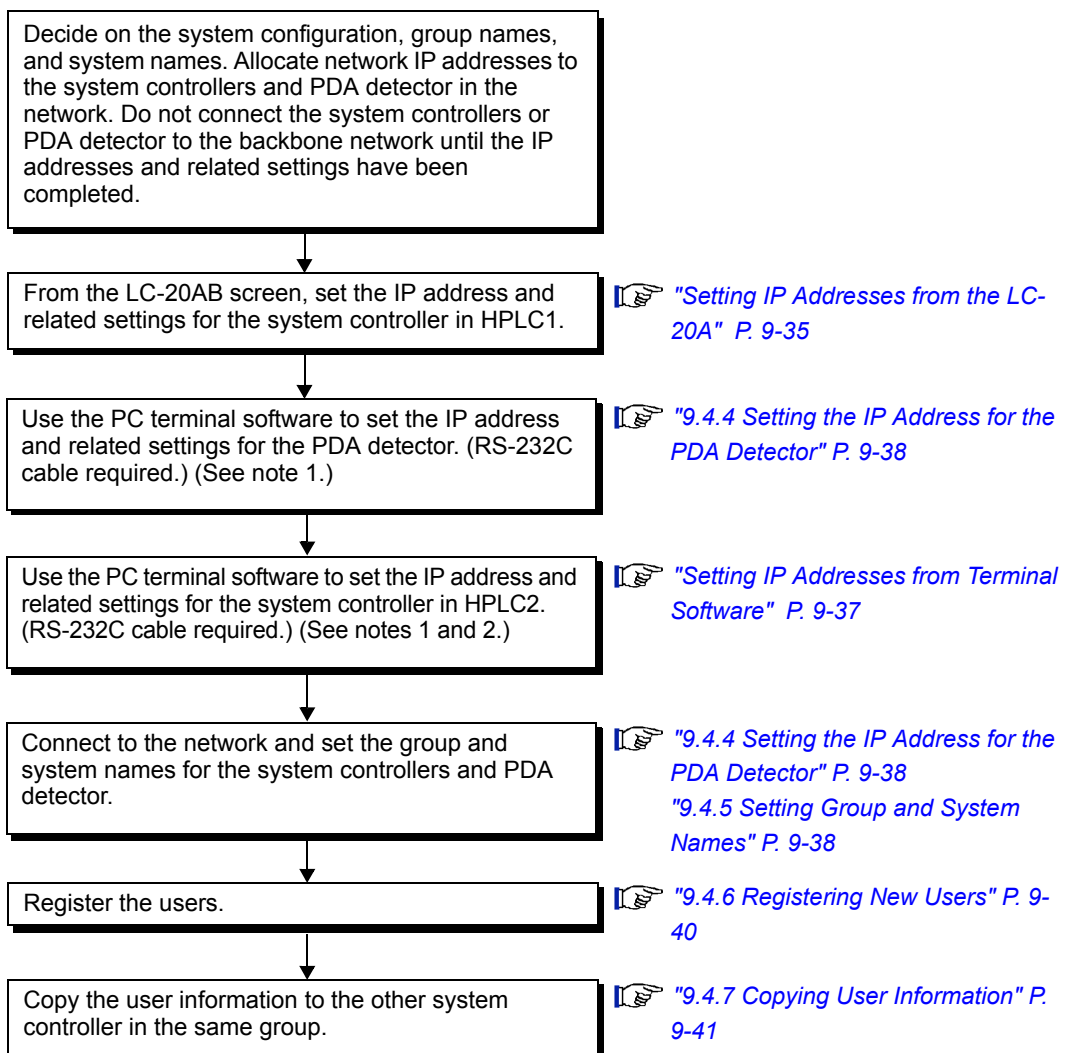
Use the same group name for a PDA detector in an LC system as that used for the system controller.





A system controller can be controlled from a PC as long as it is in the same network. Position the PC as close to the LC system as possible to reduce the transmission load and network delays. It is recommended that the PC be connected to the same switching hub as the LC system. It is also recommended that system controllers and PDA detectors in the same system be connected to the same switching hub.

9.4.2 Overview of Settings

Perform system settings according to the following procedure.



-  The IP address, if known, it can be changed by connecting directly to a PC and changing the setting from Internet Explorer.
-  It is possible to set the IP address and related settings by temporarily connecting an LC-30A/20A-series component (solvent delivery module, autosampler, or UV/UV-VIS/fluorometric detector) to the system controller.

9.4.3 Setting IP Addresses from an LC-20A HPLC

■ Setting IP Addresses from the LC-20A

1 Link the system controller to the LC-20AB with an optical cable.



An LC-30A/20A-series Solvent Delivery Module, Autosampler, or UV/UV-VIS/Fluorometric Detector can be used instead of the LC-20AB.

2 From the LC-20AB's [CBM PARAMETER] screen, press the [Enter] key and enter the parameters shown in the following table.


The [CBM PARAMETER] screen is in the [VP] menu's [CALIBRATION] group.

Setting	Remark
SERIAL NUMBER	Displays the serial number of the system controller.
S/W ID:	Displays the control-unit version number and the model name for the system controller.
INTERFACE	Select the interface for connecting to a Chromatopac or LC Workstation. This setting does not need to be changed when not connecting to a Chromatopac or LC Workstation.
ETHERNET SPEED	Set the baud rate for communications with the switching hub. Under normal circumstances, set [0].
USE GATEWAY	Set [1] when using a default gateway. Set [2] when obtaining an IP address from a DHCP server. In this example, the gateway 192.168.8.101 is used and so set [1].
IP ADDRESS	In this example, set [192.168.8.161].
SUBNET MASK	In this example, set [255. 255. 255.0].
DEFAULT GATEWAY	In this example, set [192.168.8.101].
TRS MODE	When connecting to a Chromatopac or LC Workstation, select the communication destination.

3 The new settings are enabled when the power is reset.

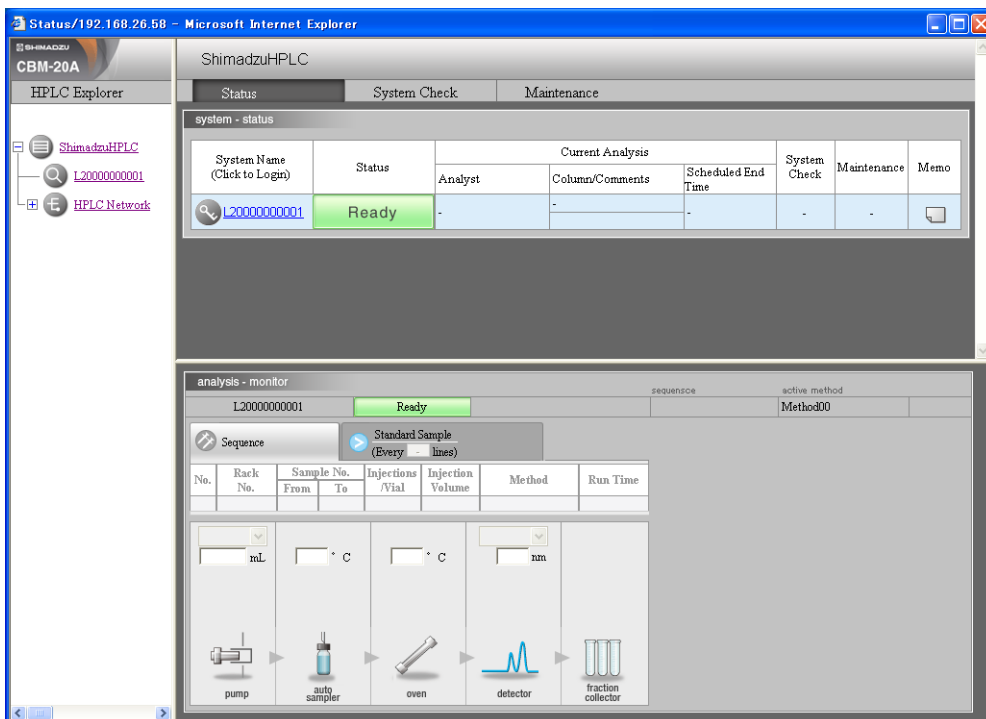
■ Setting IP Addresses from Internet Explorer

The procedure for setting IP addresses from Internet Explorer is explained below. This method can be used if the IP address of the system controller is already known.

 There is a possibility that the current IP address and related settings do not concur with the network environment. It is recommended that the IP address be set in an independent local network consisting of the PC and the system controller. In this case, set an IP address for the PC that is in the same subnet as the system controller.

1 Start Internet Explorer and enter the URL of the system controller. (The default IP address for a new installation is 192.168.200.99).


2 Click the system name in the "Status Summary" section.



3 Login to the "Group Settings" application as an Administrator. (The user name and password for a new installation is "Admin".)

4 Set the IP address and subnet mask in the "System Administration" tab page and set the default gateway in the "Advanced Settings" window.

5 Enter the group and system names in order.

 For subsequent steps, refer to "9.4.7 Copying User Information" P. 9-41.

■ Setting IP Addresses from Terminal Software

The procedure for setting IP addresses from terminal software, such as Windows' Hyper Terminal, is explained below. Connect the PC and system controller with an RS-232C cable.

1 Start up Hyper Terminal, specifying the COM port connected to the system controller.

 Make the following settings:

Bits per second: 9600

Data bits: 8

Parity: None

Stop bits: 1

Flow control: None

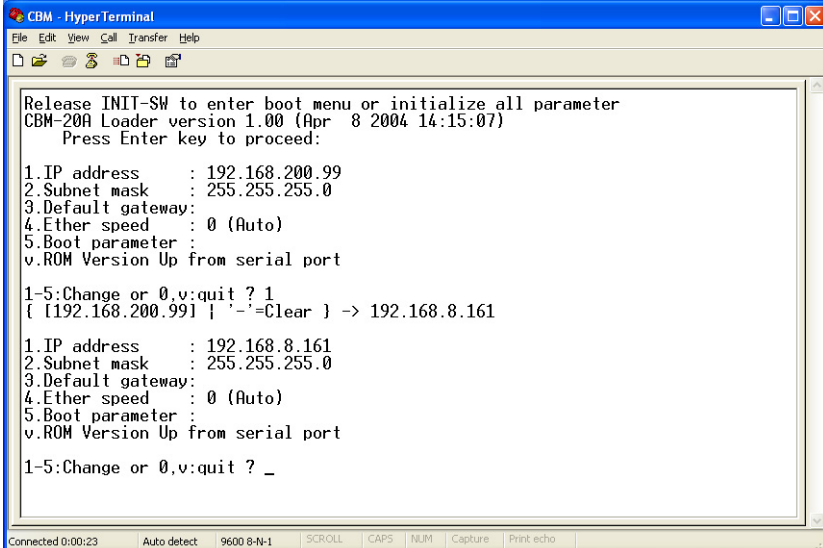
2 Reset the power while pushing the initialization button on the back of the system controller.

3 When characters are displayed on the screen, release the button.

CAUTION

If 5 seconds elapse after startup and no characters are displayed, release the button. If the button remains in the pressed position, the entire system will be initialized.

4 Following the instructions displayed on the screen, set the [IP address], [Subnet mask], [Default gateway], and [Ether speed]. Set "0.0.0.0" for [IP address] when obtaining an IP address from a DHCP server. Under normal circumstances, set the [Ether speed] to 0.



```

CBM - HyperTerminal
File Edit View Call Transfer Help
Release INIT-SW to enter boot menu or initialize all parameter
CBM-20A Loader version 1.00 (Apr 8 2004 14:15:07)
Press Enter key to proceed:
1.IP address      : 192.168.200.99
2.Subnet mask    : 255.255.255.0
3.Default gateway:
4.Ether speed    : 0 (Auto)
5.Boot parameter :
v.ROM Version Up from serial port

1-5:Change or 0,v:quit ? 1
{ [192.168.200.99] | '-'=Clear } -> 192.168.8.161

1.IP address      : 192.168.8.161
2.Subnet mask    : 255.255.255.0
3.Default gateway:
4.Ether speed    : 0 (Auto)
5.Boot parameter :
v.ROM Version Up from serial port

1-5:Change or 0,v:quit ? _

Connected 0:00:23  Auto detect  9600 8-N-1  SCROLL  CAPS  NUM  Capture  Print echo

```

5 When the settings are completed, press the [0] key (quit) to save the settings. The system controller reboots and the new settings are enabled.

9.4.4 Setting the IP Address for the PDA Detector

The procedure for setting the IP address and related settings for the PDA detector from Internet Explorer is explained below. This method can be used if the IP address of the PDA detector is already known.



There is a possibility that the current IP address and related settings do not concur with the network environment. It is recommended that the IP address be set in an independent local network consisting of the PC and the system controller. In this case, set an IP address for the PC that is in the same subnet as the system controller.



The IP address and related settings can also be set via RS-232C. For details, refer to "[Setting IP Addresses from Terminal Software](#)" P. 9-37.

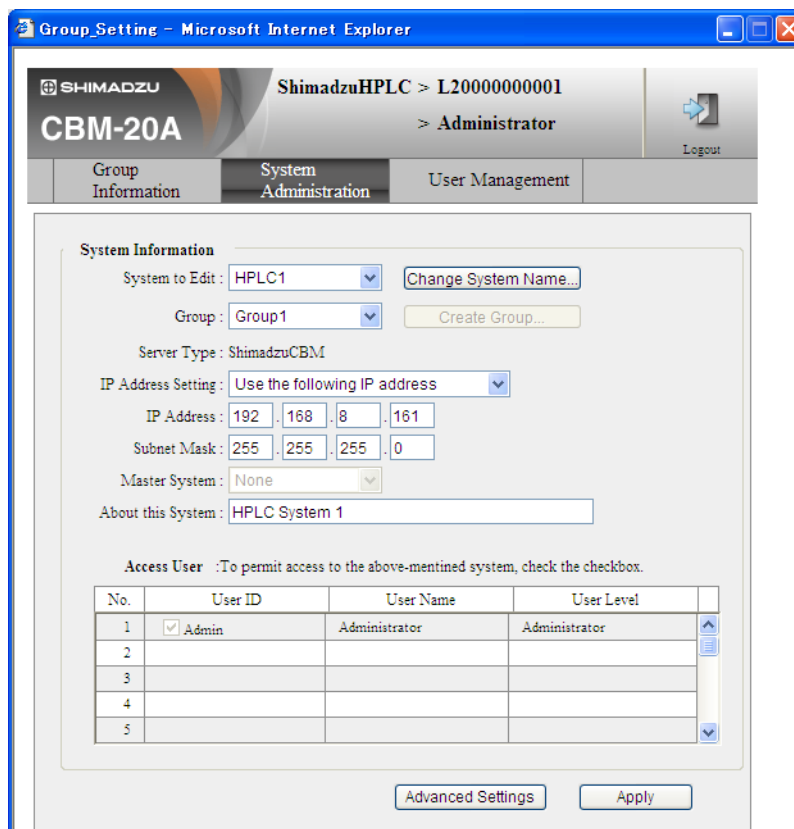
- 1** Start Internet Explorer and enter the URL for the PDA detector.
- 2** Login as an Administrator.
- 3** Set the IP address, subnet mask, default gateway, system name, and group name.
- 4** The new settings are enabled when the power is reset.

9.4.5 Setting Group and System Names





An Administrator sets the group and system names.

- 1** Connect the system controller to the network.
- 2** Start Internet Explorer and enter the URL for the system controller. (URL for HPLC1: 192.168.8.161).
- 3** Click the system name in the "Status Summary" section.
The serial number of the system controller is displayed as the system name for new installations.

- 4 Login to the "Group Settings" application as an Administrator. (The user name and password for a new installation is "Admin".)
- 5 In the "System Administration" tab page, enter the parameters for [Create Group] and [Change System Name] in that order.



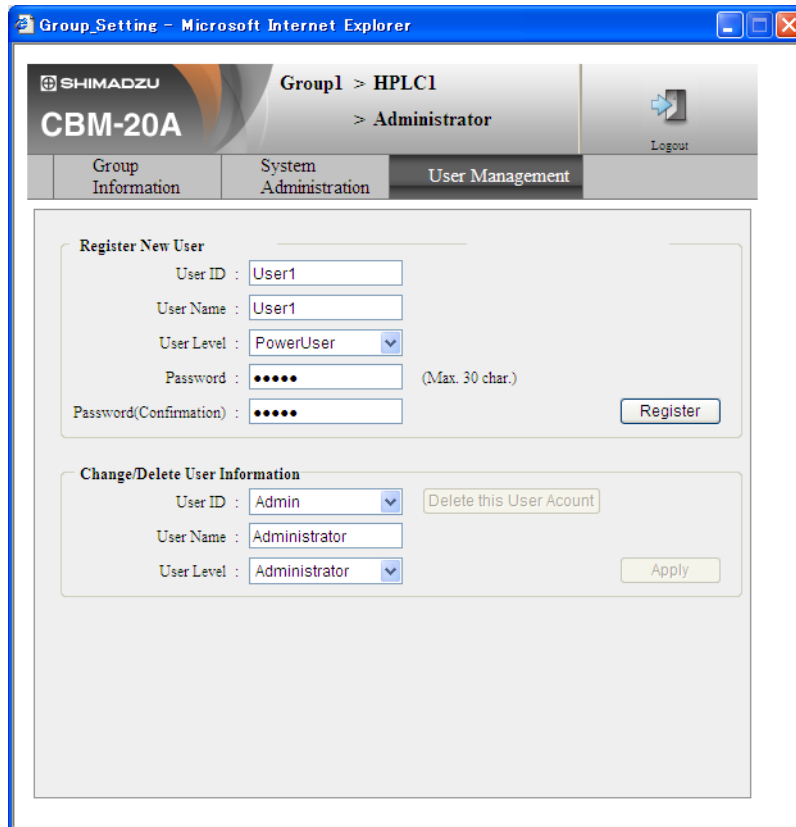
- 6 Click and close the "System Administration" tab page.

-  A group can be created only if there is no group set (i.e., [-] is displayed).
-  The groups displayed in the [Group] pull-down menu are all in the same subnet and so the system can be added to an existing group by selecting a group from the pull-down menu.
-  The system name can be changed only if there is no group set (i.e., [-] is displayed). To change the system name, clear the group settings (i.e., select [-]), click , and log in again.
-  If the IP address, subnet mask, or default gateway is changed, close all Internet Explorer windows according to the on-screen instructions, and reset the system controller power.

9.4.6 Registering New Users

Use the following procedure to register new users.

- 1 Log into the "Group Settings" application as an Administrator, just as described in "9.4.5 Setting Group and System Names" P. 9-38.
- 2 Open the "User Management" tab page.

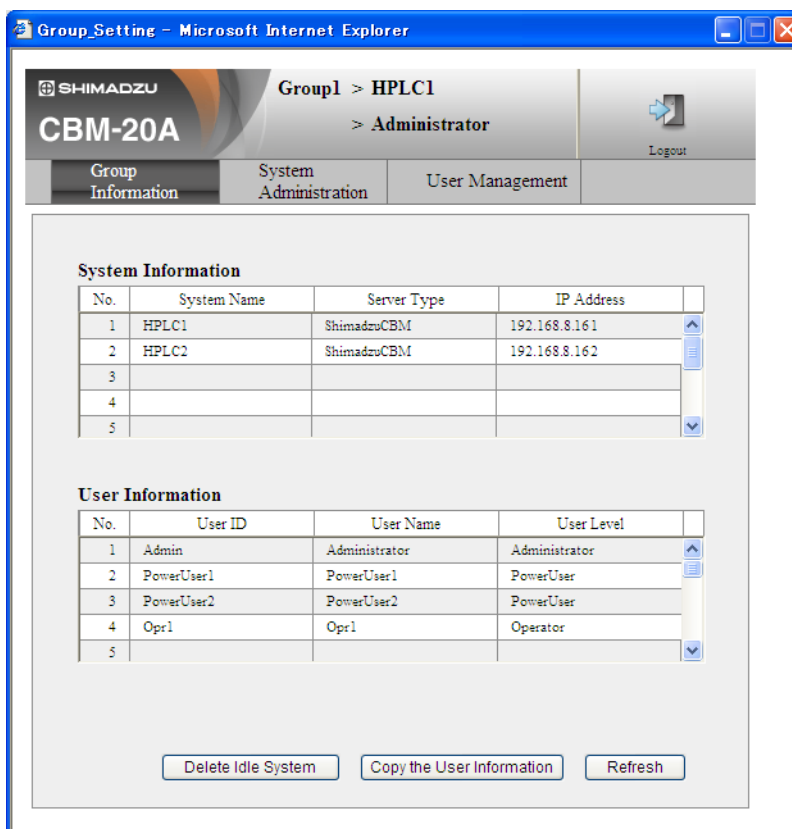


- 3 Enter the user ID, name, level and temporary password, then click .
- 4 Register all the users.

9.4.7 Copying User Information

After users have reset their passwords, copy the group information to the other system controllers in the same group.

- 1 All of the users must change their passwords for the same system controller. In this example, all users changed their passwords using the system controller for HPLC1.
- 2 Login as an Administrator to the "Group Settings" window for HPLC1.
- 3 Click in the "Group Information" tab page to copy the user information registered for this system controller to other system controllers in the same group (HPLC2 in this example).



9.4.8 Group Information, System Administration, and User Management

This section provides details on Group Information, System Administration, and User Management.

■ Group Management

The following rules pertain to group management.

- In order to manage system components within a group, they are assigned a common group name.
- Up to 10 system components, including system controller and PDA detectors, can be assigned to a single group.
- System components to be managed in the same group must be included within the same subnet of the network.
- When the PDA detector is to be controlled by the system controller, the system controller and the PDA detector must be in the same group, and the master server name set for the PDA detector must match the system name of the system controller.

■ User Management

The following rules pertain to user management.

- A maximum of 20 users can be registered under a single system controller.
- User information must be entered for each system controller.

■ Managing Users as a Group

The operations for managing users as a group are as follows.

- One of the system controllers in a group is designated as the master server.
- User registration and changes to user information and passwords are always made under this master server.
- When user information is changed, an Administrator copies the user information to the "Group Settings" application window of the master server.
- To copy user information, the user information from the master server is used to replace the user information for all the system controllers in a group. However, if a user exists on the master server and targeted system controller the user access level, is not changed for that user.

9.5 Specifications

9.5.1 CBM-20A

Item	Specification	
	CBM-20A	CBM-20Alite
Power Supply	100 to 120 or 220 to 240 VAC, 50 / 60 Hz, 400 VA ¹	5VDC 1A Supplied from the incorporated instrument
Rated Breaking Capacity ²	40A	
Installation Environment (IEC)	Installation Category II Pollution Degree 2 Altitude 2000 m or lower Install inside the room.	
Operating Temperature Range	4 °C to 35 °C	
Dimensions	W 260 × H 140 × D 420 mm, excluding protruding parts	W 144 × H 45 × D 130 mm, excluding protruding parts
Weight	5.5 kg	0.4 kg

1. If AC OUT is not used, this value is 100 VA.
2. Connect the instrument to a power outlet that is equipped with a circuit breaker that shuts off the current at the described value or less.

9.5.2 Specifications for External Connections

■ Input/Output Connectors

Connector	Number of connectors		Remark
	CBM-20A	CBM-20Alite	
External start input (MAN.INJ.)	1	1	Relay contact input
Error input (IN)	3	1	Relay contact input
General-purpose output (OUT) (See note 1.)	4	2	Relay contact input
Remote connector (REMOTE)	8 Up to 12 (See note 2.)	4	Used for controlling LC components.
Ethernet (ETHERNET)	1	1	Used for network connection.

9. Technical Information

Connector	Number of connectors		Remark
	CBM-20A	CBM-20Alite	
Optical link (PAC) (See note 3.)	1	1	Used for connecting to Chromatopac. (Also functions as a remote connector.)
RS-232C	1	1	Used for connecting to a PC.
External power-receptacle output (AC REMOTE)	1	-	Used for connecting to multiple terminal box.
AC output (operationally linked to power switch)	2	-	Used for the autosampler, fraction collector, or sub-controller.

1. Used for start, stop, or error output. Can also be set from a program.
2. The optional CBM-20A OPT4 is required.
3. When a Chromatopac is connected to the optical link (PAC) connector, an RS-232C connector can not be used.

■ Connectable HPLC Components

The components and options that can be controlled from the system controller are given in the following table.

● Connectable HPLC Components

	LC-30A Series	LC-20A Series	LC-10Avp Series	LC-10A Series etc. (See note 1.)	Maximum number of connectable units	
					CBM-20A	CBM-20Alite
Solvent Delivery Module	LC-30AD LC-30ADSF (See note 8.)	LC-20AB LC-20AD LC-20ADXR LC-20AT LC-20AP LC-20AR LC-20Ai	LC-10ADvp LC-10ATvp	LC-10AD LC-10AT LC-10Ai LC-10AS LC-8A (See note 2.) LC-6AD (See note 2.) LC-7A (See note 2.)	4	4
Autosampler	SIL-30AC SIL-30ACMP SFE-30A (See note 8.)	SIL-20A SIL-20AC SIL-20AXR SIL-20ACXR	SIL-10ADvp	SIL-10A SIL-10AF SIL-10AP SIL-10Ai SIL-10AXL	1 (See note 3.)	1 (See note 4.)
Column Oven	CTO-30A CTO-30AS	CTO-20A CTO-20AC	CTO-10Avp CTO-10ACvp CTO-10ASvp	CTO-10A CTO-10AC	4 (See note 7.)	4 (See note 7.)

	LC-30A Series	LC-20A Series	LC-10Avp Series	LC-10A Series etc. (See note 1.)	Maximum number of connectable units	
					CBM-20A	CBM-20Alite
Detector		SPD-20A SPD-20AV RF-20A RF-20Axs RID-20A	SPD-10Avp SPD-10AVvp CDD-10Avp CDD-10Asp (See note 5.)	SPD-10A SPD-10AV SPD-10Ai SPD-10AVi RF-10AXL RF-10A RID-10A	2	2
Fraction Collector				FRC-10A	1	-
Sub-controller			Sub-controller vp Option Box vp	Option Box L Valve Interface	2 (See note 3.)	-
Photodiode Array Detector	SPD-M30A (See note 6.)	SPD-M20A (See note 6.)			1	1
Supercritical Controller	SFC-30A (See note 8.)				2	2

1. Connection is supported to version 3, or higher, LC-10A-series components.
2. The optional PC-31L is required for the LC-8A/6A/7A. The version number for these components is not displayed in the "Configuration" tab page.
3. When connecting to one SIL-10A/10AF/10AP/10Ai/10AXL and two Sub-controllers (total 3 units), the optional multiple terminal box (Part No.S228-35327-91 for 100 V area or -92 for 200 V area) and a power cable (Part No.S071-60821-08 for 100 V area or S071-60825-51 for 200 V area) are required.
4. LC-10A-series Autosamplers cannot be connected.
5. CDD-10Avp/sp can be connected in combination of CBM-20A/20Alite version 1.20 (or later) and LCsolution version 1.24 (or later) or LabSolutions version 5.2 (or later). When using the CDD-10Avp/sp system, be sure to perform operations on the LCsolution or LabSolutions software. When using Chromatopac on the CDD-10Avp/sp system, be sure to use the SCL-10Avp system controller. Note that operations of CBM-20A/20Alite on the Web application window using Internet Explorer are not guaranteed.
6. The Photodiode Array Detector can be controlled as a 4-wavelength detector from the system controller via the network.
7. When CBM-20A/20Alite version 2.40 (or later) and LabSolutions version 5.54 (or later) are connected in combination, a maximum of four column ovens can be controlled. In addition, two column ovens can be controlled by operating the CBM-20A/20Alite on the Web application window using Internet Explorer.
8. Note that operations of CBM-20A/20Alite on the Web application window using Internet Explorer are not guaranteed.

●Units Controlled via Sub-controller (CBM-20A only)

Name	Model	Number of connectable units				Maximum number of connectable units (per CBM-20A)
		Sub-controller vp	Option Box vp	Option Box L	Valve Interface	
Solenoid Valve	FCV-10ALvp FCV-10AL FCV-11AL(S) FCV-15AL	1	1	1	-	1 (See note1.)
Degassing Unit	DGU-10A DGU-10B	1	1	1	-	1 (See note1.)
2-position Valve	FCV-12AH FCV-32AH	2	2	2	2	4
6-position Valve	FCV-13AL FCV-14AH	2	2	2	2	4
Syringe Unit	Syringe Unit	-	-	1	-	1 (See note1.)

1. Solenoid valves, degassing units, and syringe units can be controlled only by sub-controller A.

●Connectable Optional Products

Component	Model	Option
Solvent Delivery Module	LC-30AD	Low-pressure GE Unit, Reservoir switching valve kit, FCV-11AL (S), FCV-15AL Online Degassing Unit
	LC-20AB	FCV-10ALvp (See note 1.) FCV-11AL(S), FCV-15AL Online Degassing Unit
	LC-20AD LC-20AT	Low-pressure GE Unit FCV-11AL(S), FCV-15AL Online Degassing Unit
	LC-20ADXR	Low-pressure GE Unit FCV-11AL(S), FCV-15AL Online Degassing Unit
	LC-10ADvp LC-10ATvp	FCV-10ALvp, FCV-11AL(S), FCV-15AL
	LC-10AD LC-10AT LC-10Ai LC-10AS	FCV-10AL, FCV-10ALvp, FCV-11AL(S), FCV-15AL
	LC-20AP	FCV-200AL, FCV-230AL, FCV-11AL (S), FCV-15AL Online Degassing Unit
	LC-20AR	FCV-200AL (See note 1.), FCV-11AL, FCV-230AL Online Degassing Unit
	LC-20Ai	FCV-10AL(vp), FCV-11AL(s), FCV-15AL
	LC-8A	FCV-130AL
Autosampler	LC-6AD LC-7A	FCV-7AL
	SIL-30AC	Rack Changer C, Rack Changer II
	SIL-20A SIL-20AXR	Rack Changer C, Rack Changer II
	SIL-20AC SIL-20ACXR	Rack Changer C, Rack Changer II
Column Oven	SIL-10ADvp	Sample Cooler
	CTO-30AS	CMD
	CTO-30A	2-position Valve (flow-line switching valve) 6-position Valve (column-switching valve) CMD
	CTO-20A CTO-20AC	2-position Valve (flow-line switching valve) 6-position Valve (column-switching valve) CMD

9. Technical Information

Component	Model	Option
Detector	SPD-20A SPD-20AV SPD-10Avp SPD-10AVvp RID-20A	Solvent Recycle Valve
System Controller	CBM-20A	Multiple Terminal box, PC-55N

1. Cannot be used as a low-pressure gradient unit.

9.5.3 Control Specifications

Item		Control	
		Internet Explorer	LC Workstation
Analysis files (parameters, time programs)	Number of files	20	Depends on PC.
	Number of time-program steps	400 (total for all files)	400
	Program time	0.01 to 9999.9 minutes	0.01 to 9999.9 minutes
Analysis-sequence files	Number of files	12	Depends on PC.
	Number of steps	100 (per file)	
Autosampler-pretreatment files		Creation not supported.	Depends on PC.
Scan data		Display not supported.	Display supported.
Control of solvent delivery module	Pumping mode	<ul style="list-style-type: none"> • Isocratic • High-pressure gradient • Low-pressure gradient 	<ul style="list-style-type: none"> • Isocratic • High-pressure gradient • Low-pressure gradient • Constant-pressure pumping
	Setting items	<ul style="list-style-type: none"> • Flow rate • Concentration • Maximum pressure • Minimum pressure 	<ul style="list-style-type: none"> • Flow rate • Pressure • Concentration • Maximum pressure • Minimum pressure
Control of solvent delivery module	Gradient profile	<ul style="list-style-type: none"> • Straight line • Step • Exponential 	<ul style="list-style-type: none"> • Straight line • Step • Exponential

Item		Control	
		Internet Explorer	LC Workstation
Control of autosampler	Setting items	<ul style="list-style-type: none"> • Sample injection volume • Number of repeated analyses • Analysis time analysis-file number 	<ul style="list-style-type: none"> • Sample injection volume • Number of repeated analyses • Analysis method
Control of column oven	Setting items	<ul style="list-style-type: none"> • Oven temperature • Maximum temperature 	<ul style="list-style-type: none"> • Oven temperature • Maximum temperature
Control of detector	Setting items	<ul style="list-style-type: none"> • Detector wavelength • Time constant • Lamp replacement etc. 	<ul style="list-style-type: none"> • Detector wavelength • Recorder range • Polarity • Time constant • Scan etc.
Control of fraction collector	Setting items	<ul style="list-style-type: none"> • Fractionation conditions • Peak-detection conditions • Analysis conditions etc. 	<ul style="list-style-type: none"> • Fractionation conditions • Peak-detection conditions • Analysis conditions etc.



In the case of the Nexera UC series instruments (LC-30ADSF, SFE-30A, and SFC-30A), operations using Internet Explorer are not guaranteed.

The following component functions cannot be used when controlling the system controller from Internet Explorer.

Component	Restricted item
Solvent delivery module	<ul style="list-style-type: none"> • Control based on constant pressure • Compressibility setting (See note 1.)
Autosampler	<ul style="list-style-type: none"> • Creation of pretreatment files (Operation is based on standard injection conditions.) • Stat analysis • Reagent vials for SIL-10ADvp and Reagent rack for SIL-10A series
Detector	<ul style="list-style-type: none"> • Executing and displaying data for spectral scans <p>UV/UV-VIS detector (SPD):</p> <ul style="list-style-type: none"> • REC MODE setting and output of ratio-chromatogram signal (See note 2.) • RANGE setting and output of recorder signal (See note 3.) • POLARITY setting (See note 4.) <p>Fluorometric detector (RF-20A/20Axs)</p> <ul style="list-style-type: none"> • ANALOG 1 MODE and ALALOG 2 MODE settings and output of recorder signal (see note 5.) • 3-wavelength mode and 4-wavelength mode settings and data display

9. Technical Information

Component	Restricted item
Fraction collector	<ul style="list-style-type: none"> Setting of fractionation parameters using chromatogram display window

- If the solvent delivery pump (LC-30AD, LC-20AP and LC-20AR) parameters are changed with Internet Explorer, the compressibility setting is automatically made to the value set at the instrument.
- If UV/UV-VIS-detector (SPD) parameters are changed with Internet Explorer, the REC MODE setting is automatically changed to 1 (i.e., when performing measurement with 2 channels, the absorbance for channel 2 is output to the recorder terminals). For this reason, the ratio-chromatogram signal cannot be output to the recorder terminals.
- The REC RANGE setting is changed automatically in accordance with the AUX RANGE setting.

AUX RANGE ([AU/V])	REC RANGE
0.5	0.005
1	0.01
2	0.02
4	0.04
1.25	0.0125
2.5	0.025


- The POLARITY setting is automatically changed to "+".
- If fluorometric detector (RF-20A/20Axs) parameters are changed with Internet Explorer, the ANALOG 1 MODE and ALALOG 2 MODE settings are automatically changed as follows.

- When the wavelength mode is set to [Single]
 - ANALOG 1 MODE: 0 (Ch1 data is output to the Chromatopac from the analog output connector 1.)
 - ANALOG 2 MODE: 1 (Ch1 data is output to the recorder from the analog output connector 2.)
- When the wavelength mode is set to [Dual]
 - ANALOG 1 MODE: 0 (Ch1 data is output to the Chromatopac from the analog output connector 1.)
 - ANALOG 2 MODE: 2 (Ch2 data is output to the Chromatopac from the analog output connector 2.)
 - The RANGE (recorder range 2) setting cannot be specified. (It can be specified only when the wavelength mode is [Single].)

■ Other Specifications

Item	Function
Data backup	Analysis methods, analysis sequences and other parameters are backed up even when power is interrupted. The clock-counter function has battery backup.
Self-diagnosis	There is a memory-check function that operates at startup.
Safety measures	Connecting to other units with an optical cable makes it possible to perform error monitoring for the following items: <ul style="list-style-type: none"> • Maximum/minimum pressure • Maximum oven temperature • Lamp current • Error monitoring for motor rotation • System maximum pressure (See note 1.)

1. By using the system P.MAX setting, the maximum pressure at the autosampler can be monitored.

 For details about the system P.MAX, see "[5.12.6 System Controller](#)".

9.6 Maintenance Parts

Part	Part No.	Remark
Fuse, 250 V 4AT	S072-02004-22	CBM-20A only

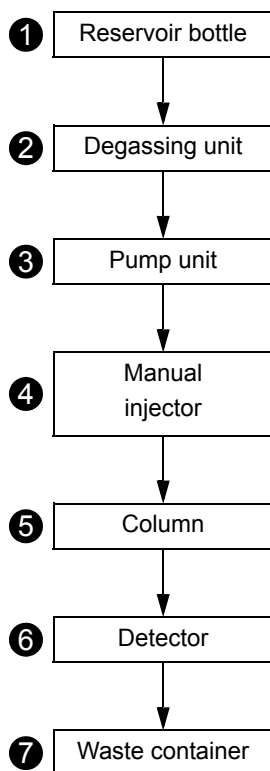
9.7 Introduction to HPLC System

The Prominence LC (LC-20A) series components are for use with Shimadzu high performance liquid chromatography (HPLC) systems, which are designed to provide high accuracy and high sensitivity analyses. Example system configurations are provided below, along with descriptions of the operations of the various components.

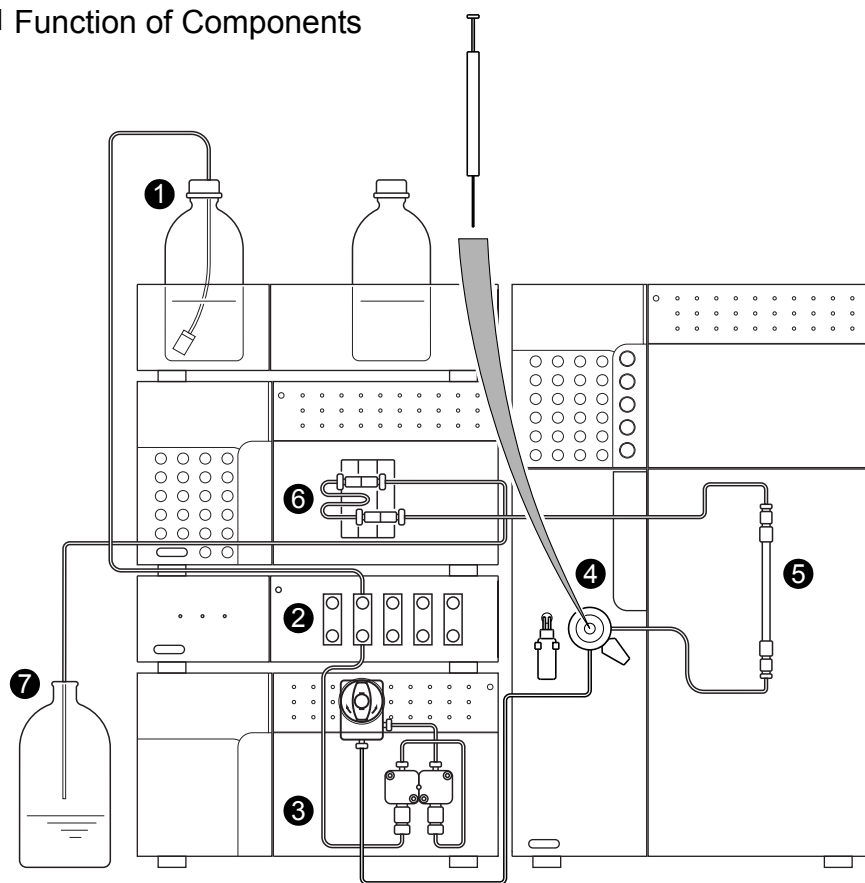
9.7.1 Example of a Simple (Isocratic) System

Each component of the system is controlled locally. This is a simple system composed of the minimum number of components for stable analysis.

■ Solvent Flow



■ Function of Components



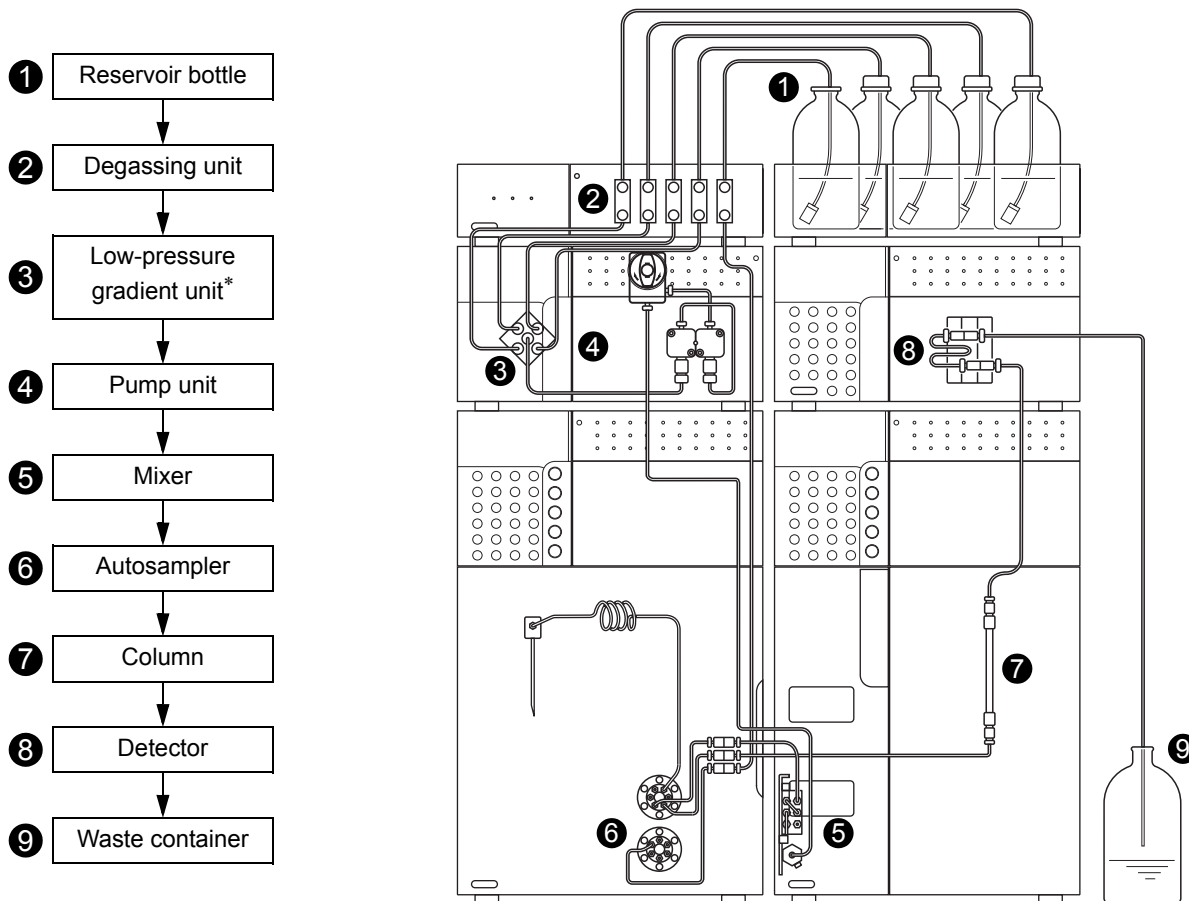
- ① Mobile phase is drawn out of the reservoir bottle and pumped through the tubing by the pump.
- ② The degassing unit removes dissolved air from the mobile phase, preventing air bubbles and consequent rise, drift or other baseline irregularities caused by dissolved air.
- ③ The pump sends the mobile phase through the manual injector, column and detector, in that order, and finally into the waste container.
- ④ Samples are injected into the system by the manual injector, with a syringe.
- ⑤ In the column, the components are separated by means of the mutual interactions of the mobile phase and the column packing (stationary phase).
- ⑥ The detector detects the components eluted from the column, and sends the signal data to a Chromatopac or PC.
- ⑦ Mobile phase from the detector drains into the waste container.

9.7.2 Example of Autosampler System (1)

Centralized control of all the components by a CBM-20Alite system controller enhances ease operation and is well suited for automated analyses. The CBM-20Alite can control a maximum of 5 LC components. Since it is installed in the pump unit or autosampler, the system requires a smaller space.

■ Solvent Flow

■ Function of Components



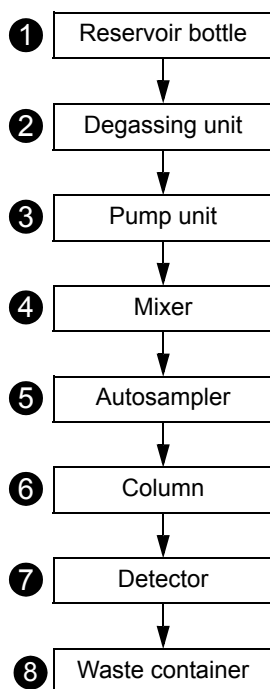
- ① Mobile phase is drawn out of the reservoir bottles and pumped through the tubing by the pump.
- ② The degassing unit removes dissolved air from the mobile phase, preventing air bubbles and consequent rise, drift or other baseline irregularities caused by dissolved air.
- ③ The low-pressure gradient unit mixes up to 4 mobile phases that have been degassed by the degassing unit. (*This item is necessary for a low-pressure gradient system.)
- ④ The pump sends the mobile phase through the autosampler, column and detector, in that order, and finally into the waste container.
- ⑤ The mixer enhances the mixing efficiency of the mobile phases. This item is required for low or high-pressure gradient system.
- ⑥ The autosampler automatically injects the sample into the flow lines. By adding a rack changer, it is possible to automatically change the autosampler racks.
- ⑦ In the column, the components are separated by means of the mutual interactions of the mobile phase and the column packing (stationary phase).
- ⑧ The detector detects the components separated in the column, and sends the signal data to a Chromatopac or PC.
- ⑨ Mobile phase from the detector drains into the waste container.

9.7.3 Example of Autosampler System (2)

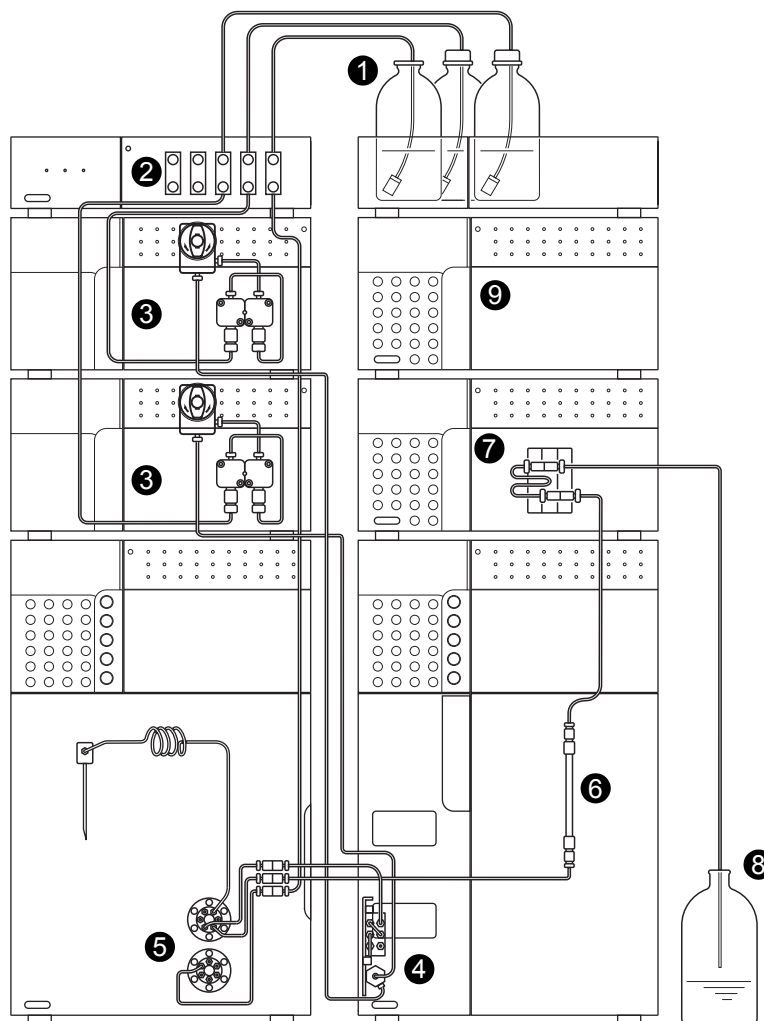
The CBM-20A system controller can control a maximum of 8 LC components (12 LC components as an option).

Use the same type of pumps for high-pressure gradient system.

■ Solvent Flow



■ Function of Components



- ① Mobile phase is drawn out of the reservoir bottles and pumped through the tubing by the pump.
- ② The degassing unit removes dissolved air from the mobile phase, preventing air bubbles and consequent rise, drift or other baseline irregularities caused by dissolved air.
- ③ The pump sends the mobile phase through the autosampler, column and detector, in that order, and finally into the waste container.
- ④ The mixer enhances mixing efficiency of the mobile phases.
- ⑤ The autosampler automatically injects the sample into the flow lines. By adding a rack changer, it is possible to automatically change the autosampler racks.
- ⑥ In the column, the components are separated by means of the mutual interactions of the mobile phase and the column packing (stationary phase).
- ⑦ The detector detects the components eluted from the column, and sends the signal data to a Chromatopac or PC.
- ⑧ Mobile phase from the detector drains into the waste container.
- ⑨ The CBM-20A system controller can control a maximum of 8 LC components (12 LC components as an option) including a maximum of 4 pump units.

9.8 Mobile Phase Characteristics

	(1) Solvent (*) $\eta \leq 0.5\text{cP}$, B.P. > 45°C (**) $\eta \leq 0.5\text{cP}$, B.P. < 45°C	(2) Source	(3) UV Cutoff	(4) R.I. _{25°}	Boiling Point (°C)	Viscosity (cP,25°C)	(5) p'	(6) e ^a	(7) Water Solubility % ^W _{in} ^{20°C} Solvent	(8) Dielectric Constant e ²⁰	(9) p'+ 0.25e
1	FC-78 (*) FC-75 (Fluorescent solvent) FC-43	(LC specific)	210nm 210 (opaque under 210)	1.267 1.276 1.291	50 102 174	0.4 0.8 2.6	< -2 < -2 < -2	-0.25 -0.25 -0.25		1.88 1.86 1.9	p' and Dielect. const. (Function proportional to strength)
2	Isooctane(*) (2,2,4- tri methylpentane)	LC	197	1.389	99	0.47	0.1	0.01	0.011	1.94	0.1
3	n-Heptane(*)	LC	195	1.385	98	0.40	0.2	0.01	0.010	1.92	0.5
4	n-Hexane(*)	LC	190	1.372	69	0.30	0.1	0.01	0.010	1.88	0.5
5	n-Pentane(**)	LC	195	1.355	36	0.22	0.0	0.00	0.010	1.84	0.5
6	Cyclohexane	LC	200	1.423	81	0.90	-0.2	0.04	0.012	2.02	0.5
7	Cyclopentane(*)	LC	200	1.404	49	0.42	-0.2	0.05	0.014	1.97	0.6
8	l-Chlorobutane(*)	LC	220	1.400	78	0.42	1.0	0.26		7.4	2.8
9	Carbon disulfide	LC	380	1.624	46	0.34	0.3	0.15	0.005	2.64	1.7
10	2-Chloropropane(**)	LC	230	1.375	36	0.30	1.2	0.29		9.82	3.7
11	Carbon tetrachloride	LC	265	1.457	77	0.90	1.6	0.18	0.008	2.24	2.3
12	n-Butyl ether		220	1.397	142	0.64	2.1	0.25	0.19	2.8	2.4
13	Triethylamine			1.398	89	0.36	1.9	0.54		2.4	2.4
14	Bromoethane(*)			1.421	38	0.38	2.0	0.35		9.4	4.3
15	i-Propyl ether(*)		220	1.365	68	0.38	2.4	0.28	0.62	3.9	3.2
16	Toluene	LC	285	1.494	110	0.55	2.4	0.29	0.046	2.4	2.9
17	p-Xylene		290	1.493	138	0.60	2.5	0.26		2.3	3.0
18	Chlorobenzene			1.521	132	0.75	2.7	0.30		5.6	4.1
19	Bromobenzene			1.557	156	1.04	2.7	0.32		5.4	4.1
20	Iodobenzene						2.8	0.35			
21	Phenyl ether			1.580	258	3.3	3.4			3.7	3.7
22	Phenetole			1.505	170	1.14	3.3			4.2	4.9
23	Ethyl ether(**)	LC	218	1.350	35	0.24	2.8	0.38	1.3	4.3	4.0
24	Benzene	LC	280	1.498	80	0.60	2.7	0.32	0.058	2.3	3.6
25	Tricresyl phosphate										
26	Ethyl iodide			1.510	72	0.57	2.2			7.8	4.2
27	n-Octanol		205	1.427	195	7.3	3.4	0.5	3.9	10.3	5.8
28	Fluorobenzene			1.46	85	0.55	3.1			5.4	4.6
29	Benzylether			1.538	288	4.5	4.1				
30	Methylene chloride(**)	LC	233	1.421	40	0.41	3.1	0.42	0.17	8.9	5.6
31	Anisole			1.514	154	0.9	3.8			4.3	4.6
32	i-Pentanol			1.405	130	3.5	3.7	0.61	9.2	14.7	7.3
33	1,2-Dichloroethane	LC	228	1.442	83	0.78	3.5	0.44	0.16	10.4	6.3

	(1) Solvent (*): $\eta \leq 0.5\text{cP}$, B.P. > 45°C (**): $\eta \leq 0.5\text{cP}$, B.P. < 45°C	(2) Source	(3) UV Cutoff	(4) R.I. _{25°}	Boiling Point (°C)	Viscosity (cP, 25°C)	(5) p'	(6) e ^{°a}	(7) Water Solubility % W ₁ in 20°C Solvent	(8) Dielectric Constant e ²⁰	(9) p'+ 0.25e
34	t-Butanol			1.385	82	3.6	4.1	0.7	miscible	12.5	
35	n-Butanol	LC	210	1.397	118	2.6	3.9	0.7	20.1	17.5	8.3
36	n-Propanol	LC	240	1.385	97	1.9	4.0	0.82	miscible	20.3	
37	Tetrahydrofuran(*)	LC	212	1.405	66	0.46	4.0	0.57	miscible	7.6	
38	Propylamine(*)			1.385	48	0.35	4.2		miscible	5.3	
39	Ethylacetate(*)	LC	256	1.370	77	0.43	4.4	0.58	8.8	6.0	5.8
40	i-Propanol	LC	205	1.384	82	1.9	3.9	0.82	miscible	20.3	
41	Chloroform(*)	LC	245	1.443	61	0.53	4.1	0.40	0.072	4.8	5.6
42	Acetophenone			1.532	202	1.64	4.8			17.4	8.7
43	Methylethyl	LC	329	1.376	80	0.38	4.7	0.51	23.4	18.3	9.1
44	Cyclohexanone			1.450	156	2.0	4.7			18.3	9.1
45	Nitrobenzene			1.550	211	1.8	4.4			34.8	13.2
46	Benzonitrile			1.536	191	1.2	4.8			25.2	10.9
47	Dioxane	LC	215	1.420	101	1.2	4.8		miscible	2.2	
48	Tetramethyl urea	LC	265	1.449	175		6.0	0.56		23.0	10.7
49	Quinoline			1.625	237	3.4	5.0			9.0	7.4
50	Pyridine			1.507	115	0.88	5.3		miscible	12.4	
51	Nitroethane		380	1.390	114	0.64	5.2		0.9		
52	Acetone(*) Benzyl alcohol	LC	330	1.356 1.538	56 205	0.30 5.5	5.1 5.7	0.71	miscible	13.1	8.8
53	Tetramethyl guanidine						6.1	0.6			
54	Methoxyethanol	LC	210	1.400	125	1.60	5.5		miscible	19.9	
55	Tris(cyanoethoxy) propane	GC					6.6	0.56			
56	Propylene carbonate	LC					6.1				
57	Ethanol	LC	210	1.359	78	10.8	4.3		miscible	24.6	
58	Oxydipropionitrile	GC					6.8				
59	Aniline			1.584	184	3.77	6.3			6.9	8.1
60	Acetic acid			1.370	118	1.1	6.0		miscible	6.2	
61	Acetonitrile(*)	LC	190	1.341	82	0.34	5.8		miscible	37.5	
62	N,N-dimethylaceta-mide	LC	268	1.436	166	0.78	6.5	0.88		37.8	
63	Dimethylformamide	LC	268	1.428	153	0.80	6.4			36.7	
64	Dimethylsulfoxide	LC	268	1.477	189	2.00	7.2	0.62	miscible	4.7	
65	N-methyl-2-pyrididone	LC	285	1.468	202	1.67	6.7			32	
66	Hexamethyl phosphoric acid triamide			1.457	233	3	7.4	0.65		30	
67	Methanol(*)	LC	205	1.326	65	0.54	5.1		miscible	32.7	
68	Nitromethane		380	1.380	101	0.61	6.0		2.1		
69	m-Cresol			1.540	202	14	7.4			11.8	10.0
70	N-methylformamide			1.447	182	1.65	6.0		miscible	182	

9. Technical Information

	(1) Solvent (*) $\eta \leq 0.5\text{cP}$, B.P. > 45°C (**) $\eta \leq 0.5\text{cP}$, B.P. < 45°C	(2) Source	(3) UV Cutoff	(4) R.I. _{25°}	Boiling Point (°C)	Viscosity (cP, 25°C)	(5) p'	(6) e ^{°a}	(7) Water Solubility % W _i in 20°C Solvent	(8) Dielectric Constant e ²⁰	(9) p'+ 0.25e
71	Ethylene glycol			1.431	182	16.5	6.9		miscible	37.7	
72	Formamide			1.447	210	3.3	9.6		miscible	111	
73	Water	LC		1.333	100	0.89	10.2			80	

- (1) An asterisk (*) indicates solvents most suitable for LC, with low boiling points (>45 °C) and low viscosity ($\leq 0.5\text{cP}$).
Double asterisks (**) indicates solvents with a very low viscosity and boiling point.
- (2) "LC" indicates that a grade of solvent specifically for LC is commercially available from companies like the following:
Burdick & Jackson, Baker Chemical, Mallinckrodt Chemical, Fischer Scientific, Waters Associate, Manufacturing Chemists. Inc.
"GC" indicates that a solvent is used as a stationary phase for gas chromatography, and can be purchased from companies selling GC columns and stationary phases. (These solvents are used as stationary phase in liquid-to-liquid LC.)
- (3) The wavelength below which the solvent becomes opaque.
- (4) Refractive index at 25 °C.
- (5) Polarity parameter of solvent.
- (6) Solvent's strength parameter in relation to liquid-to-solid adsorption in alumina.
- (7) Water solubility (%W) at 20 °C of solvent used in liquid-to -solid adsorption.
- (8) Value at 20 °C.
- (9) Function consisting of p' (proportional to solvent strength) plus the dielectric constant, in ion chromatography.

Source: A.M.Krstulovic and P.R.Brown, *Reversed-Phase High-Performance Liquid Chromatography*, Wiley Interscience, 1982.

Appendix

Contents

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LC-30A/20A-series Network Installation Guide

The system controller can be used to set parameters as well as create and execute analysis schedules from a Web browser. A data-processing system, such as a Chromatopac is required to perform data analysis.

If the SPD-M20A/M30A PDA Detector is used as a 4-wavelength detector, it is possible to make parameter settings and start analysis from the Web browser. A data-processing system, such as a Chromatopac, is required to perform data analysis. A Shimadzu analysis workstation is required for data analysis if the detector is used as a 3D detector.

If the TCP/IP protocol is used, the system controller and PDA detector may be controlled from a Shimadzu analysis workstation.

The system controller can be used to control LC-10Avp-series and LC-10A-series systems in addition to the LC-30A/20A-series systems, allowing these systems to be included in the LC-30A/20A-series networks. Exceptions apply for some models and special systems, such as the ion-chromatograph systems.

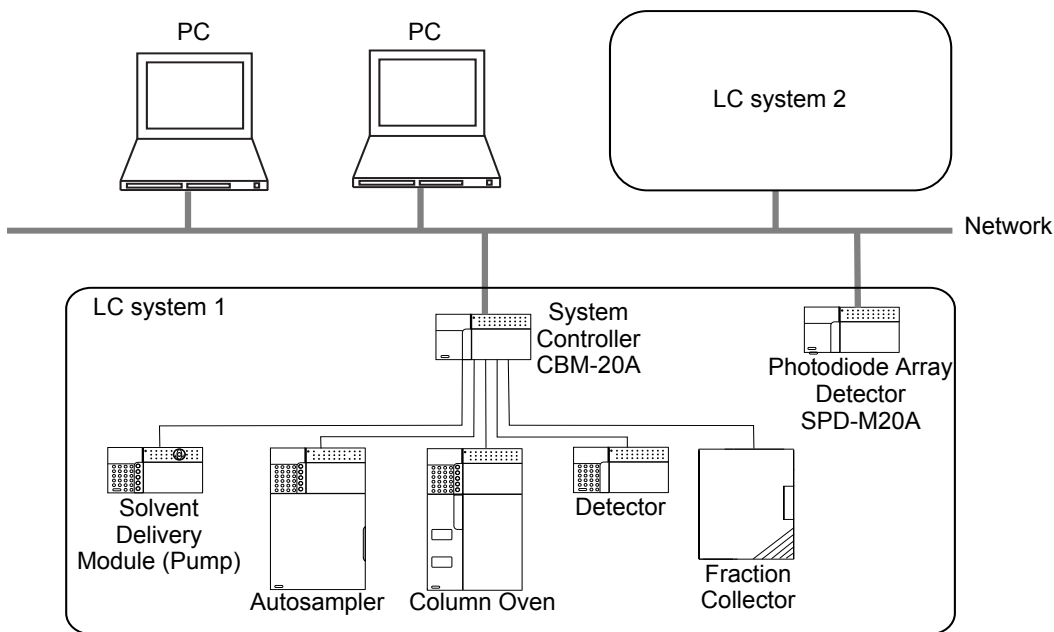


Fig.1

■ Items Required before Installation

The items required before installation are given in the following table.

Item	Q'ty	Remark
PC	Depends on the scale of the system installed.	
Switching hub	As above.	Consult the network administrator of the department or office where the system will be used.
Cable holder	As above.	As above.
LAN cable	One for every PC, switching hub, CBM-20A/20Alite, and SPD-M20A/M30A.	As above.

■ Group Settings

Using network connections, any system controller can obtain information from and monitor the other system controllers in the group. The following operations are possible.

- Monitor the analysis status of several systems.
- Execute system checks and view the results.
- Display and manage information on replaceable parts for several systems.
- Unified management of all of the systems in one workplace or group.
- Manage groups of users who are authorized to use the system.

Management of system users is performed within groups. A group may contain a combined total of up to 10 CBM-20A/20Alite System Controllers and SPD-M20A/M30A PDA Detectors.

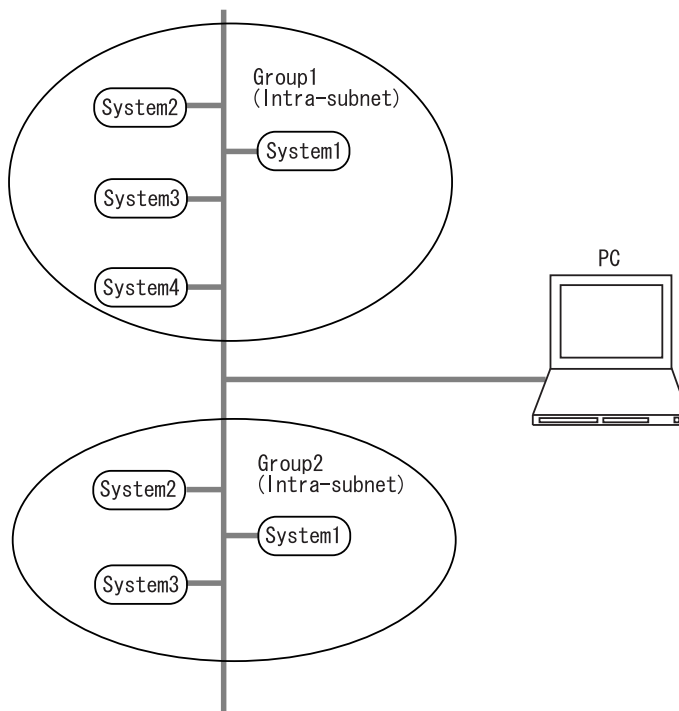
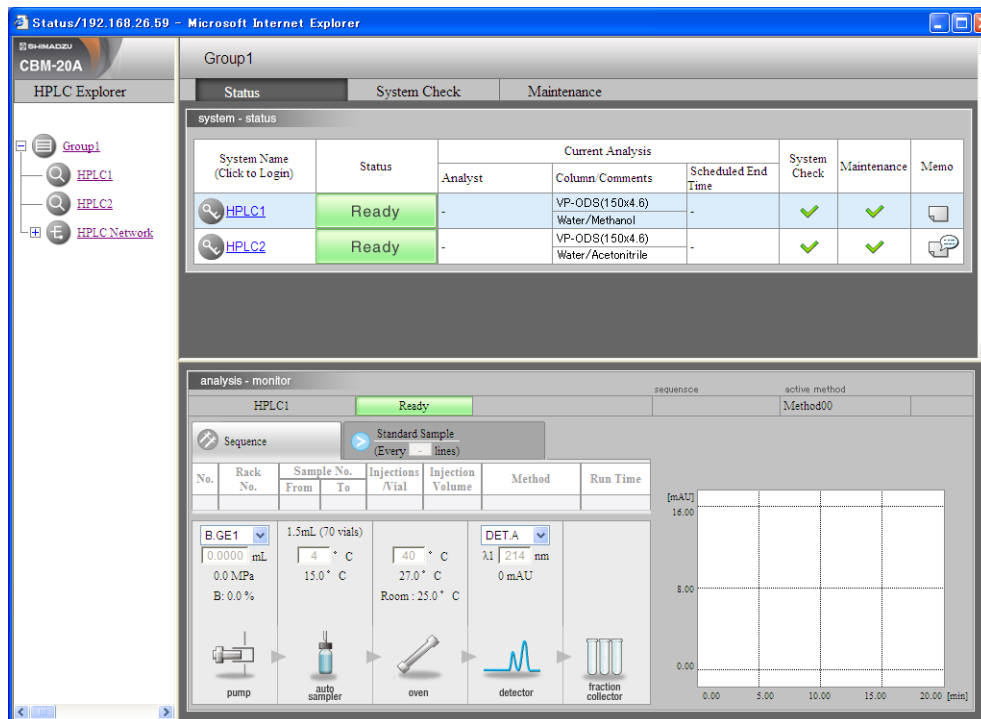


Fig.2

In order to perform group settings, all the CBM-20A/20Alite System Controllers and SPD-M20A/M30A PDA Detectors must be in the same subnet, and the same group name must be set in the "Group Settings" application window. Consider factors such as the number of users for each system when deciding on the group configuration.



■ Devices Required for Connecting to the Network

The equipment required to create an execution environment for the Web browser and to construct a network is provided below.

● PC

Name	Remark
PC	CPU : Intel Celeron 800 MHz or higher Memory : 256 MB min. LAN adapter : 100Base-TX compatible Display : 1024 × 768 or higher OS : Windows 2000/XP/Vista/ 7 Other : Internet Explorer 6.0 SP1 or later/ 7/ 8/ 9

- The CPU specification is only a recommendation.
- The memory and LAN specifications are necessary requirements.
- The OS must be one for which correct operation has been confirmed. Correct operation cannot be assured with Windows 95, 98, Me, or NT.

● Network Cables and Devices

Name	Remark
Straight LAN cable	Category-5 or later UTP straight cable
Switching hub	100Base-TX compatible
Cable holder	Required when routing the LAN cable along the floor or across a wall.

- Use commercial products satisfying the specifications given in the "Remark" column.
- One LAN cable is required for every PC, switching hub, CBM-20A/20Alite, and SPD-M20A/M30A.
- If the total number of PCs, CBM-20A/20Alite System Controllers, and SPD-M20A/M30A Photodiode Array Detectors is greater than the number of ports on the switching hub, increase the number of ports as appropriate using cascade connections.
- Consult the network administrator of the department or office where the system will be used before constructing a network.

■ User Management

In general, user information (user ID, user name, password, user level) is managed separately for each CBM-20A/20Alite System Controller. Up to 20 users can be registered per system.

The system controller, however, has a group settings function for copying (overwriting) all the user information for a system to other systems. If this function is used, the maximum number of users is 20 for the whole group. Note, however, that user information cannot be copied to a PDA detector.

This user-management function is required to control systems from the Web browser. If a PC workstation is used, user management is performed with the user management function of the PC workstation. It is only possible to monitor the system from the Web browser when using a PC workstation.

■ Deciding on the Group Configuration

In order to perform group settings, all the CBM-20A/20Alite System Controllers and SPD-M20A/M30A PDA Detectors must be in the same subnet, and the same group name must be set in the "Group Settings" application window. Consider factors such as the number of users for each system when deciding on the group configuration.

■ Deciding on the Network Configuration

● Minimal Network Configuration

The smallest possible network configuration consists of one PC, one CBM-20A/20Alite System Controller or SPD-M20A/M30A Detector, and one switching hub.

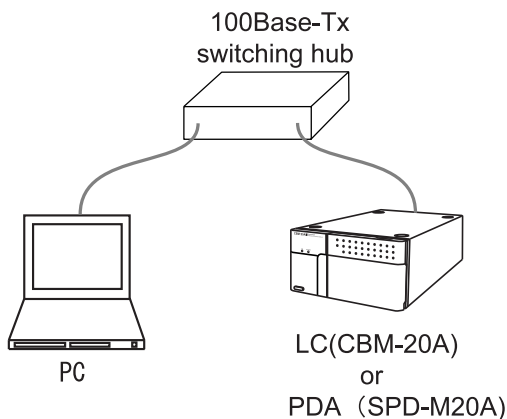


Fig.3

This system can be expanded by adding to PCs, CBM-20A/20Alite System Controllers, or SPD-M20A/M30A Detectors to unused ports.

To connect to an office or department network, connect one of the unused ports to a switching hub or router in the office or department network. (Consult the network maintenance department or network administrator.)

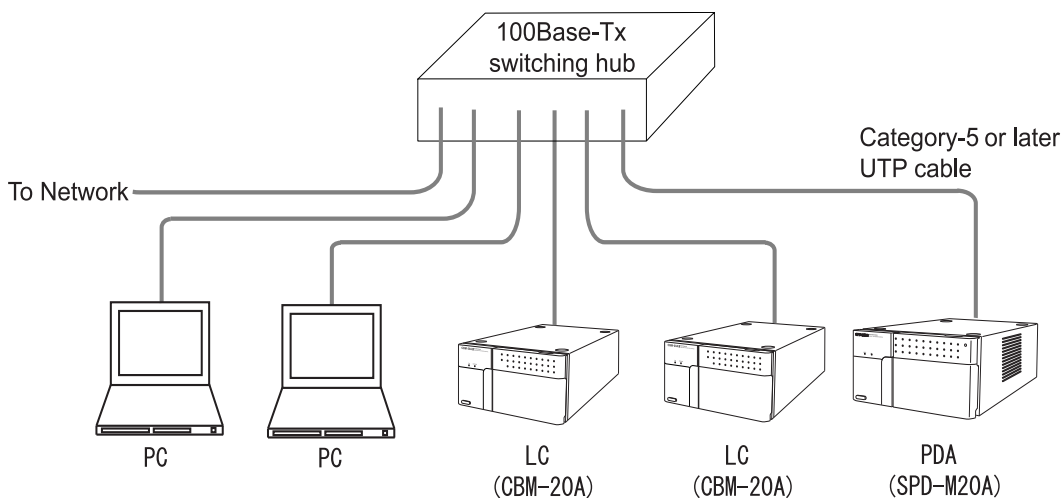


Fig.4

● Small to Medium-size Network Configurations

If there are many PCs, CBM-20A/20Alite System Controllers, and SPD-M20A/M30A Detectors, a small to medium-size network must be constructed. An example is shown below.

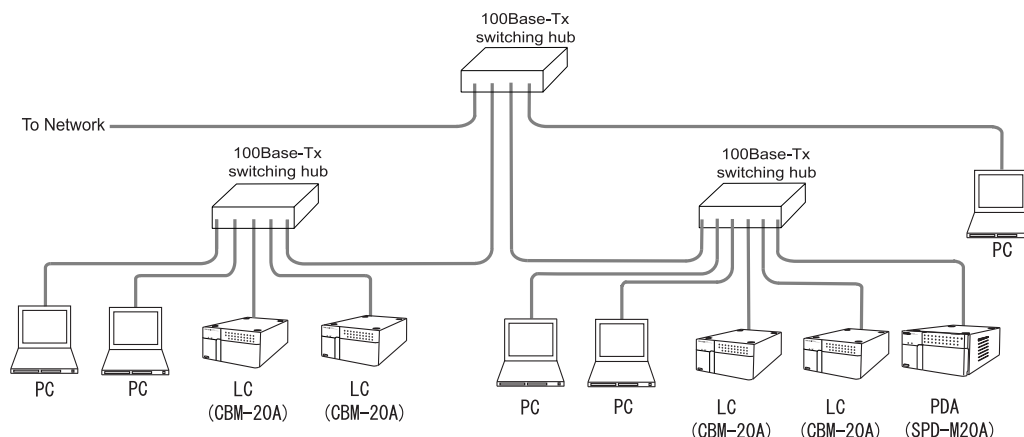


Fig.5

■ Points about Network Configurations

- Consider the operation rate of the HPLC system when deciding on the number of CBM-20A/ 20Alite System Controllers and SPD-M20A/M30A Detectors to be controlled from the PC. The number of connection licenses restricts this number if a PC workstation is used.
- If an SPD-M20A/M30A is controlled from a PC workstation, connect the PC and the SPD-M20A/M30A to the same switching hub to handle the large volume of transferred data.
- Consider the switching-hub arrangement when deciding on the HPLC system layout.
- Group the above switching hubs together with another switching hub. If necessary, include spare PCs in the network in case the operation rate of the HPLC system changes.
- To connect to an office or department network, connect one of the switching hubs to a switching hub or router in the office or department network. Consult the network maintenance department or network administrator.

■ Deciding on a Security Policy

Consider the following points when deciding on the security policy for a laboratory network.

- Should the laboratory network be connected to the backbone network for an office?
- If the laboratory network is connected to the backbone network, should the laboratory network become a subnet of the backbone network?
- What kind of access restrictions should be applied to the protocols used to communicate between the backbone network and the laboratory network?
- What kind of rules should be applied to user names and passwords?
- How should user-access restrictions be set?
- What procedures should be used to handle user information that includes passwords?

Make decisions on the above issues after consultation with the maintenance department or network administrator for the office or department network. Also refer to "Security Information" below.

■ Security Information

The security information for the CBM-20A/20Alite and SPD-M20A/M30A is shown below. This information can be used to assess the merits of connecting to the backbone network of an office or department and is required when making connection settings. Decide on a security policy after presenting this information to the network maintenance department or network administrator.

Security Information for CBM-20A/20Alite and SPD-M20A/M30A

Protocol		Port number		Remark
		Source	Destination	
TCP	HTTP 1.0	Not fixed (PC)	80	Used when controlling the CBM-20A/20Alite or SPD-M20A/M30A from a Web browser.
	Original	Not fixed (PC)	5000(SPD-M20A) 5001(CBM) 5006(SPD-M30A)	Used when controlling the CBM-20A/20Alite or SPD-M20A/M30A from a PC workstation.
	Original	Not fixed (CBM)	5001(SPD-M20A) 5007(SPD-M30A)	Used to synchronize the CBM-20A/20Alite and SPD-M20A/M30A.
UDP	Original	1500	1500	Used to coordinate the CBM-20A/20Alite and SPD-M20A/M30A with the UDP broadcast function.
	SNTP	123	123	Used to synchronize timing with the CBM-20A/20Alite and SPD-M20A/M30A.
	DHCP	68(CBM)	67(Server)	Used to obtain an IP address automatically from a DHCP server.
		67(Server)	68(CBM)	
NetBIOS-NS	137	137	Used to solve the CBM name by using NetBIOS over TCP/IP.	

If the CBM-20A/20Alite or SPD-M20A/M30A and the PC are on different subnets, special settings (e.g., router settings) may be required.



The following conditions apply only to the system controller in a Microsoft Internet Explorer 6.0 SP1 environment.

- (1) Script language: Required (JavaScript)
- (2) DLL: Required (MSXML.DLL 3.0. Installed with Microsoft Internet Explorer 6.0 SP1 as a standard feature. Operation has not been confirmed for version 4.0 and so correct operation may not be possible if version 4.0 is used in XML-based business-oriented applications.)
- (3) The intranet security settings must satisfy the following conditions:
 - The URL for the CBM-20A/20Alite must be contained in the local intranet Web site.
 - [Run ActiveX controls and plug-ins] of [ActiveX controls and plug-ins] must be set to [Enable].
 - [Script ActiveX controls marked safe for scripting] of [ActiveX controls and plug-ins] must be set to [Enable].
 - [Access data sources across domains] of [Miscellaneous] must be set to [Enable] or [Prompt].
 - [Active scripting] of [Scripting] must be set to [Enable].
 - Select [Enable] under [File download] of [Downloads] must be set to [Enable].

■ Allocating IP Addresses

Allocate IP addresses to the PC and the CBM-20A/20Alite or SPD-M20A/M30A based on the network configuration and security policy decided upon. Before connecting to an office network, consult the network administrator of the department or office where the system will be used.

■ Choosing System Names

Select a name for each system that allows easy recognition. Up to 26 alphanumeric characters or symbols may be used. The symbols "-" (hyphen) and "_" (underscore) may also be used.

Select a system name that is not the same as that of other CBM-20A/20Alite system or the computer name.

■ Creating User Accounts

Create user accounts that will include the user IDs, user names, and passwords. Follow the security policy when creating user accounts.

	Character type	Character size	Remark
User ID	Alphanumeric characters and symbols	30 byte	The symbols "-" and "_" may be used.
User name	Unicode	60 byte	60 7-bit ASCII characters
Password	Alphanumeric characters and symbols	30 byte	The symbols "-" and "_" may be used

■ User Level

The CBM-20A/20Alite System Controller has the user levels shown in the following table.

User level	Description
Administrator	Authorized to perform group settings (e.g., adding/removing components and users to/from the group and changing settings) in addition to the operations for which a Power User is authorized. Also authorized to forcibly log out users logged into the "Analysis Execution" application window ^{*1} , and to disable system locks.
PowerUser	Authorized to perform all the operations related to analysis (e.g., editing methods and sequences, executing, adding, and stopping analyses, and executing system checks) and to change system configurations. Also authorized to clear errors or forcibly stop analysis being performed by other users.
Operator	Authorized to edit analysis sequences, execute, add, and stop analyses, and execute system checks. When editing methods, can only edit flow rate of pump and cooler temperature of autosampler. Not authorized to clear errors or forcibly stop analysis being performed by other users.

*1 A user can only be forcibly logged out from a PC other than that on which they are logged in.

■ Access Level

The access levels are set for each system in a group and determine which users can log into each system. The Administrator is always authorized for access and all other users are authorized for access according to the default settings. Deny access if necessary.

 ["5.9 Managing Groups" P. 5-39](#)

Automatic Acquisition of IP Addresses from a DHCP Server

■ Allocation of IP Addresses

With the CBM-20A, it is assumed that the same IP address is used continuously until the power is switched off. Therefore, you should in principle set the IP address before use. If the IP address is allocated from a DHCP server, ensure that the term of the IP address lease is infinite. If the IP address is changed while the CBM-20A is in operation, an error will occur at the CBM-20A and it will restart. Note that if this happens during analysis data will be lost.

■ Settings in the DHCP Mode

There are three ways to set the IP address for the CBM-20A. To change to the DHCP mode (automatic acquisition of the IP address from the DHCP server), make the following settings.

Setting Method	Screen / Section	Setting
Setting from LC-20A	"CBM PARAMETER" screen "USE GATEWAY" section	2
Setting from Internet Explorer	"System Administration" tab page screen of the "Group Settings" application window "IP Address Setting" section	"Obtain an IP address automatically"
Setting from the terminal software	Start while pressing the initialization button "IP address" section	0.0.0.0



Even if "0.0.0.0" is set for the IP address, the mode will switch to the DHCP mode.



If the IP address or other settings are changed, you must restart the unit.

■ Action in the Event of an IP Address Allocation Error

If, due to network trouble or for other reasons, the IP address cannot be acquired from the DHCP server, the CBM-20A takes the following action.

Conditions when error occurred	Action by the CBM-20A
If the previously-used IP address is still within its lease term at startup	The CBM-20A searches for a DHCP server by transmitting a DHCPDISCOVER packet. If a DHCP server is not found, the CBM-20A starts up with the previously allocated IP address.
When acquiring a particular IP address for the first time at startup When the lease of the previously used IP address has expired at startup	Starts up with the address 192.168.200.99.
When the CBM-20A is used with a limited lease and the lease term has expired	An error occurs and analysis stops. One minute later, the CBM restarts.

Conditions when error occurred	Action by the CBM-20A
When the IP address is duplicated in the network	No error check is performed. The CBM starts up with the allocated address.

■ DHCP Packets

This section describes the information communicated between the DHCP server and the CBM-20A in the DHCP mode. For details on DHCP, refer to RFC2131.

●DHCPDISCOVER Transmission

Option No.	Option name	Description
60	Vendor Class Identifier	Set as SHIMADZU CBM20A
12	Host Name	The CBM system name is transmitted. If the system name is not compatible with RFC1035 it is not transmitted. The initial value for the system name is the CBM body number.
61	Client-identifier	The CBM body number is transmitted. "^0" is not appended at the head of the number.
51	Lease Time	0xffffffff (infinity) is requested.



The DHCPDISCOVER packet is sent a maximum of five times.

●DHCPOFFER Receive/Select

Option No.	Option name	Description
2	Time Offset	If this option is available, it is set at the CBM.
6	Domain Name Server	If multiple server names are designated, set the first four in order ^(*1) .
7	Log Server	If this option is available, it is set at the CBM ^(*2) ^(*3) .
12	Host Name	If this option is available, the host name is set as the CBM system name ^(*4) .
15	Domain Name	If this option is available, it is set at the CBM.
42	NTP Server	If this option is available, synchronization with the time server is accomplished using SNTP ^(*3) .

Option No.	Option name	Description
43	Vendor Specific Information	
1	Server Type	DHCP servers that start with "SHIMADZU" are given priority. For other servers, DHCPDISCOVER is sent four times and the DHCP offered that is acquired fastest is selected.
2	Fixed IP Mode	If the value is other than 0, the allocated IP address is memorized as the fixed address. From the next time on, the unit starts up with this address.
3	Group Name	This is set as the group name for the CBM (*4).



If the same options have been included in the DHCPACK packet, the DHCPACK packet value is given priority.

- (*1) The Domain Name Server is memorized in the CBM. To clear it, receive a DHCPOFFER/DHCPACK whose Domain Name is effective while the IP address for this option is 0.0.0.0.
- (*2) The Log Server and NTP Server are memorized in the CBM. To clear them, receive a DHCPOFFER/DHCPACK whose IP address for these options is 0.0.0.0.
- (*3) This is for evaluation of the CBM. Do not use this option.
- (*4) The system name or group name will not be memorized if it includes characters that cannot be used in a system name/group name, or if the total number of characters exceeds 15.

●DHCPREQUEST Transmission

Option No.	Option name	Description
50	Requested IP Address	Sent if the previously allocated IP address is still within its period of validity.
60	Vendor Class Identifier	The same as DHCPDISCOVER
12	Host Name	The same as DHCPDISCOVER
61	Client-identifier	The same as DHCPDISCOVER
51	Lease Time	The same as DHCPDISCOVER
55	Parameter Request List	The parameter request list
1	Subnet Mask	
2	Time Offset	
3	Router	
6	Domain Name Server	
7	Log Server	
12	Host Name	
15	Domain Name	
42	NTP Server	

●DHCPACK Reception/Selection

Option No.	Option name	Description
1	Subnet Mask	Set as SUBNET MASK
2	Time Offset	The same as DHCPOFFER
3	Router	Set as DEFAULT GATEWAY Only one DEFAULT GATEWAY can be set.
6	Domain Name Server	The same as DHCPOFFER
7	Log Server	The same as DHCPOFFER
12	Host Name	The same as DHCPOFFER
15	Domain Name	The same as DHCPOFFER
42	NTP Server	The same as DHCPOFFER
43	Vendor Specific Information	
	2 Fixed IP Mode	The same as DHCPOFFER
	3 Group Name	The same as DHCPOFFER
51	Lease Time	This option is mandatory.
58	Renewal Time	If this option is not available, half of the Lease Time is set. If the Lease Time is infinite, the Renewal Time will also be infinite.
59	Rebinding Time	If this option is not available, seven eighths of the Lease Time is set. If the Lease Time is infinite, the Rebinding Time will also be infinite.

■ System Name and Host Name

With the CBM-20A, the system name and host name of the network are treated as the same thing. Enter the system name of the CBM-20A as the host name of the DHCPDISCOVER/DHCPREQUEST packet. Note also that the name designated as the host name for the DHCPOFFER/DHCPACK packet is saved as the system name. However, because the permissible character types and name lengths differ between the system name and host name, when a system name or host name is saved using DHCP you must use character types and a name length that are permissible for both.

■ Name Solution Using NetBIOS over TCP/IP

The CBM-20A allows names to be solved by using NetBIOS over TCP/IP (NBT). NBT can be used when the PC and CBM-20A are in the same subnet, and the system name of the CBM-20A is used as the NetBIOS name. For example, if the system name of the CBM-20A is the initial value (unit serial number L20234301234), entering `http://L20234301234/` as the address in Internet Explorer will start the CBM-20A's "group monitor" application.



The relationship between the NetBIOS name and IP address is cached in the PC for a set time (about 10 minutes). Consequently, if the IP address of the CBM-20A is changed, it may not be possible to solve it from the PC based on the NetBIOS name until the cache is cleared.



When using Internet Explorer 7 or later as the browser, change the browser setting so that the system name is included in the intranet.

["2.9 Precautions Related to Internet Explorer Operations" P. 2-32](#)



The name solution using NBT is available both when the IP address setting is DHCP mode and when it is Fixed IP address mode.

■ Character Types and Name Length

The character types and name length that can be used with the CBM-20A are indicated in the table below.

	System name	Host name	NetBIOS name	Group name
Character types	Alphanumerics, -, _	Alphanumerics, - The initial character must be a letter of the alphabet. The final character must not be -.	Alphanumerics, - Must not consist entirely of numerals Even if lower case characters are input upper case characters are set.	Alphanumerics, -, _
Name length	1 character or longer Up to 15 characters	3 characters or longer Up to 15 characters	1 character or longer Up to 15 characters	1 character or longer Up to 15 characters

Due to system name and PC restrictions, the permissible ranges for the character types and length of the host name and NetBIOS name may be narrower than those stipulated with RFC.

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