Operation manual / Network Guide

Environmental Stress Chamber
AR Series
Ethernet Computer Interface

4410004041600
February 10, 2015

ESPEC CORP.

■Read this operation manual thoroughly before operating.
■Carefully read and familiarize yourself with the "Safety indications" section before using this product.
■Keep this operation manual handy for future reference.

Liability

ESPEC CORP. assumes NO responsibility whatsoever for accidents or equipment trouble arising from the failure to observe handling instructions contained herein. Do not perform any operation or handle the chamber in any way or form that is not described in this guide or which is herein specifically prohibited. Careless usage of the sort may result in unexpected damage to the chamber or accident.

Contents

Read this section before using the equipment.

Introduction

Read this section before using the equipment.

For restricted use

The test chamber should be operated only by experienced engineers or persons who have received training in proper usage from an experienced engineer.

■ Definition of an experienced engineer

A person who understands the purpose of use of the chamber, has received training in the operation method, daily maintenance and inspections, etc., and can foresee and prevent risks associated with common sources of hazards such as electricity, etc.

Safety indications

The following safety indications are used throughout this manual.

■ The following signs represent the degrees of danger to users.

DANGER	**Means that extremely dangerous consequences may arise, with the risk of death or serious injury to the user, if the chamber is handled improperly.**
WARNING	**Means that dangerous consequences may arise, with the risk of death or serious injury to the user, if the chamber is handled improperly.**
CAUTION	**Means that dangerous consequences may arise, with the risk of minor injury or light wound to the user, if the chamber is handled improperly.**

■ Labels that instruct the user to avoid danger.

PROHIBITED	**This mark means that specific actions are prohibited in order to prevent a dangerous situation from arising.**
Imperative Action Required	**This mark means that it is imperative for the user to take specific actions (instructions) in order to prevent a dangerous situation from arising.**

■ Labels that indicate information on physical damage and environmental contamination.

Notice	**This mark means dangerous consequences may arise, with the possibility of damage to equipment and facilities, or environmental pollution, if the equipment is handled incorrectly.**

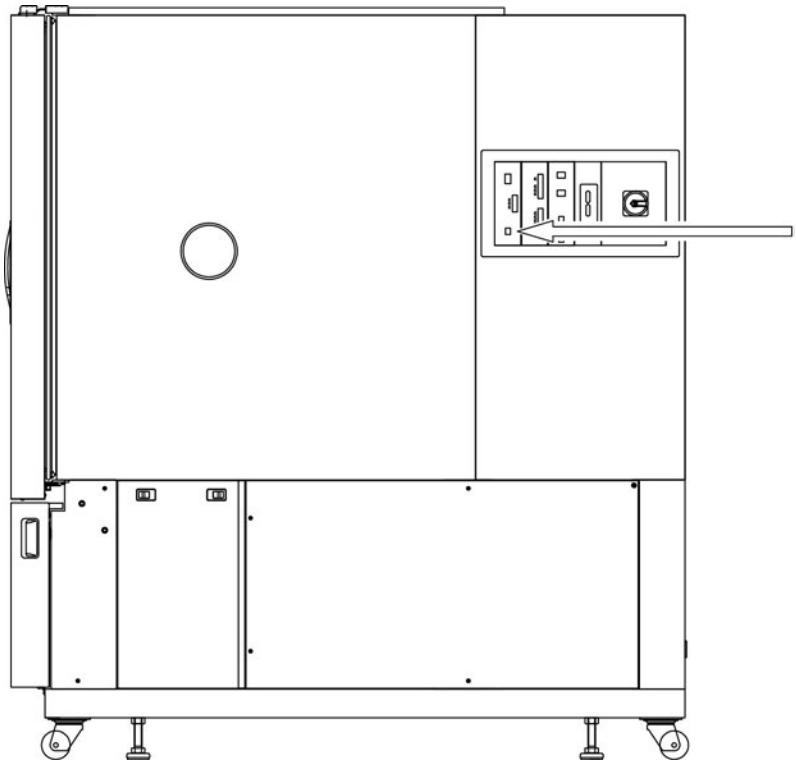
Keywords

■ The following keywords are used throughout this manual.

Note	**Provides information necessary for gaining full performance from the chamber or to prevent damage to the equipment.**
Procedure	**Explains how to operate the chamber on a step-by-step basis.**
Reference	**Offers additional information.**

Chapter 1 Overview

You can use the standard equipped Ethernet interface of the chamber to use the computer communication functions.



Right side of chamber

1.1 Network

Ethernet can be connected in a point-to-point manner with the personal computer (hereinafter PC).

1.2 Communication interfaces

A Ethernet (100BASE-TX) is used as the interface connector.
The protocol is TCP/IP. Use the port number 57732 to connect.

1.3 Data handled by the network

1.3.1 Data types

There are two types of data: command data and response data.

■ **Command data**

Data sent from the host computer to the chamber is treated as command data.
There are two types of command data:

- Monitor command
  Use this to monitor the operation state of the chamber and the chamber atmosphere.
- Setting command
  Use this to change the operation state of the chamber or the chamber temperature or humidity target settings.

■ **Response data**

Data returned from the chamber as a response to the command data from the host computer is treated as response data.There are two types of response data:

- Reception state data
  Indicates whether the setting command from the host computer was processed normally.

  <If processed normally>
  "OK: Address, setting command"

  <If not processed normally>
  "NA: Error message"
  (See "Table 1.1 Error messages" for details about the error message.)

- Monitor data
  Indicates the response from the host computer to the monitor command.

  <If processed normally>
  "Response"
  (See "3.2 Monitor command details" for details about the response.)

  <If not processed normally>
  "NA: Error message"
  (See "Table 1.1 Error messages" for details about the error message.)

◆ **Reference** ◆

It may take some time to activate the instrumentation panel of the chamber. Timeout may occur because communication with the chamber is interrupted for about 60 seconds at startup, including the case of restart after a power failure.

1.3.2 Data format

■ Command data format

Command data sent from the host computer has the following format.

main-command[,option-parameter]	delimiter

◆ Reference ◆
Delimiter The delimiter is fixed to CRLF.

■ **Response data format**

The response data returned by the chamber as a response to the command data has the following format.

reception-state-data or monitor-data	delimiter

1.3.3 Error messages

When the command data sent from the host computer cannot be processed normally, the chamber displays "NA:" followed by the set error message, and sends it to the host computer as response data.

The types and descriptions of the error messages are shown below.

Table 1.1 Error messages

Error message	Error description	Example
CMD_ERR	Main command error	• "ROM?" entered as "RUM?"
PARA ERR	Option parameter error	• Text entered for numerical-only parameter
DATA NOT READY	Specified data does not exist.	• An unregistered program number was specified.
DATA OUT OF RANGE	Specified value outside the setting range	• Specify "TEMP,S300"for the setting range of 0°C to 200°C.
PROTECT ON	Setting prohibited by network [Set Protection] - [Remote setting] is set to [ON] on the chamber.	• Attempt to change the temperature set point while the remote setting is on
INVALID REQ	Unsupported function specified	• A command related to the time signal was sent to a chamber not equipped with the time signal option.
CHB NOT READY	Command specified when the chamber is not ready to receive*	• Attempt to change KEYPROTECT when the panel power is off • "PRGM,PAUSE" (pause) was executed when the chamber was stopped.

* For details, see "Table 3.11 Reception state list".

■ **Understanding the difference between "program operation" and "remote operation"**

When changing the chamber from constant operation (the function for operating with the same settings) to an operation that changes automatically with the elapsed time, there are two methods of this network that are described here: program operation and remote operation. Familiarize yourself with the differences between the two and use them accordingly.

Program operation

This refers to an operation that uses program data that can be edited and executed on the instrumentation.

Advantage: Operations are managed on the chamber until the program ends and are not affected by computer operations (including network connection issues and computer shutdown).

Disadvantage: There are restrictions to the number of steps and patterns.

Remote operation
This refers to a single-step program operation that can be executed only on the network.
Advantage: Operates on a computer, so it does not have the restrictions of the chamber (number of steps and programs), and patterns can be created.
Disadvantage: Affected by computer operations (including network connection issues and computer shutdown), so careful consideration must be given to the possibility of the program shutting down and no longer being executed.

CAUTION

When performing operations in the test area or vicinity, be sure not to perform remote operation over a LAN or other network. In particular, if there is a possibility of operation, take measures, such as by enabling remote operation protection.

Sudden operation of the chamber can result in injury.
For details about configuring the protection settings, see "***2.1 Setting communication***".

1.4 Data transfer

CAUTION

If there is response data, be sure to receive the response data before sending the next command.

Otherwise, normal communication may not be possible.

When sending commands to the same address, provide a delay time from the time reception is complete to the time the next command is sent.

Otherwise, the network load may prevent normal control.

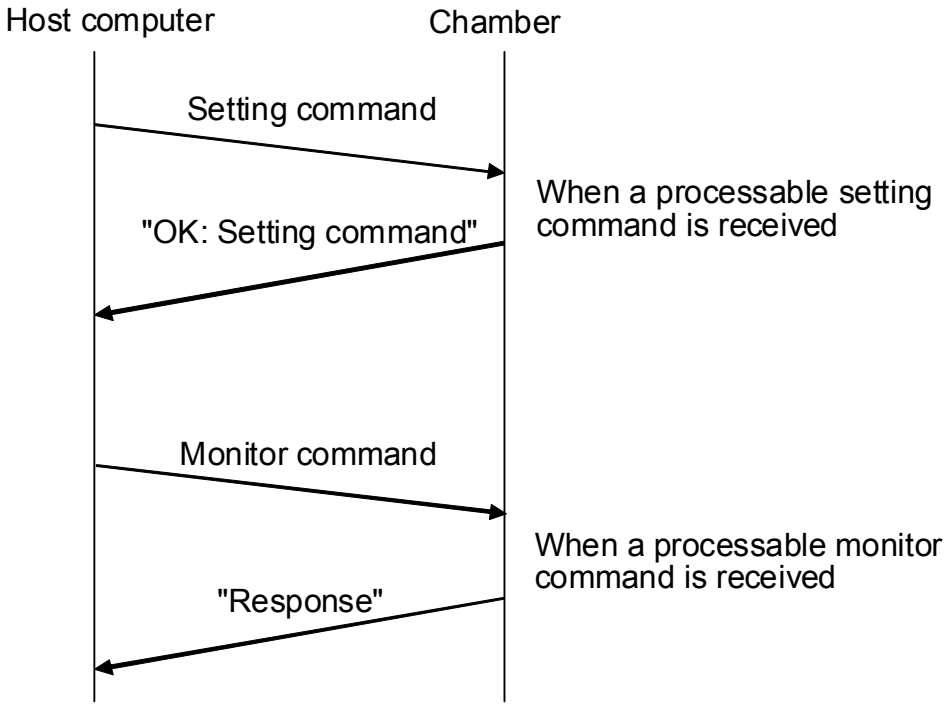
<Procedure>

1) Send command to the specified IP address.
2) Receive response from the specified IP address.
3) Wait a fixed period of time depending on the type of command sent in step 1.
   (* See the delay time and monitor updating.)
4) Send command to the specified IP address.

* The delay time is as follows.
· Monitor command:
0.2 seconds or longer
However, program-related commands (PRGM DATA?, RUN PRGM?, etc.) are 0.3 seconds or longer.
· Setting command:
0.5 seconds or longer
However, program-related commands (PRGM DATA?, RUN PRGM?, etc.) are 1 second or longer.

※Monitor updating is as follows.
• Updating of a monitor value requires at least 0.5 seconds.
• Updating of the operation state when the operation is changed with a setting command requires at least 1.0 second.

The chamber returns response data (reception state data or monitor data) in response to the command data sent from the host computer.



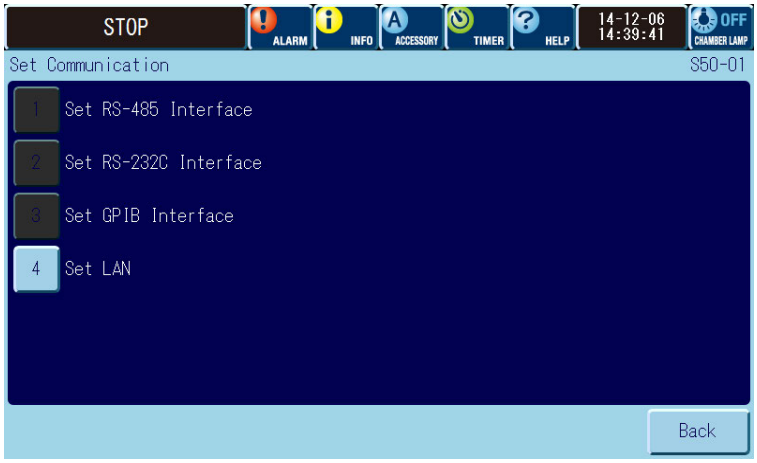
Chapter 2 Configuration

2.1 Setting communication

Use the maintenance setting (communication setting) of management settings to configure the communication setting. For details about the management settings, see the Controller guide of operation manual.

<Procedure>

1) Select “Set Communication” on "Configuration" of the [Chamber Setup] tab.



2) Select "Set LAN".

Set the IP address, subnet mask, and gateway address.

When you are done, save the settings and return to the monitor screen.

■ Setting protection

By setting protection, errors can be prevented when configuring settings or operations. You can also limit the functionality of the chamber. Set the protection as required.

Click [Set Protection] on the management settings screen.

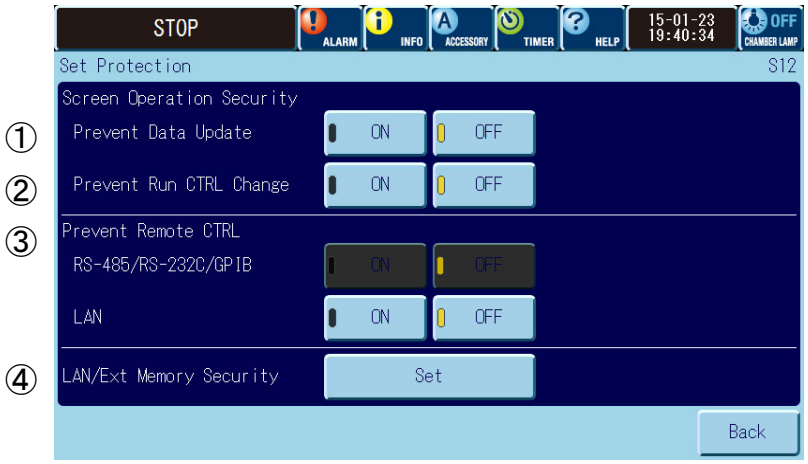
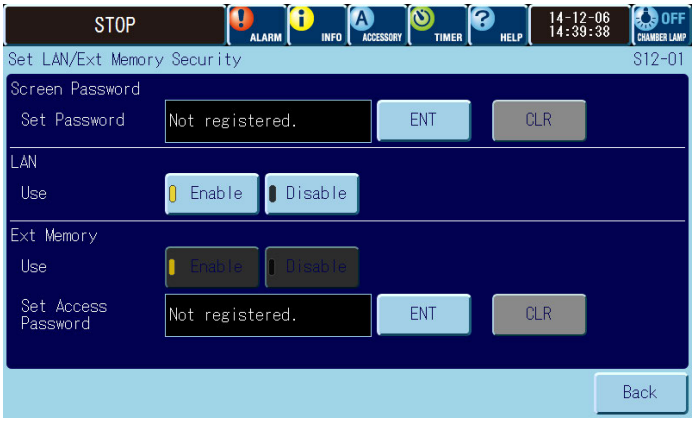


Table 2.1 Set protection items

Set Oper		When each protection setting is set to "ON".
①	Prevent Data Update	Disables all operations related to setups.
②	Prevent Run CTRL Change	Disables the key operation on the operation mode screen and the operation of turning off the power of the instrumentation panel.
③	Prevent Remote CTRL RS-485/RS-232C/GPIB	Disables the execution of the request of data change and operation status change from RS-485/RS-232C/GPIB.
	Prevent Remote CTRL LAN	Disables the execution of the request of data change and operation status change from LAN.

		Setting details
④	LAN/Ext Memory Security	You can limit the usage of the LAN feature and of external memory.  (1) Screen Password Register a password to prevent unauthorized changes to the settings on this screen. (2) LAN If you will not use the Web function through a LAN, select [Disable]. The settings on the communications setup screen and the IP address setup screen will both be displayed in gray, and you will not be able to configure these settings. The default is [Enable]. (3) Ext Memory If you will not use the external memory function, select [Disable]. Alternatively, you can set an access password that must be entered to use the external memory function. * You can only change this setting when an external memory is not connected. The default is [Enable]. * Even if you select [Disable], you can still collect back trace data.

CAUTION

When performing operation inside or around the test area of the equipment, ensure that remote control is not being performed by LAN or transmitted communication.

When there is a possibility that the equipment is being operated remotely, turn on [Prevent Remote CTRL] or take other appropriate measures.
There is a danger that operation in the test area may start suddenly and injure the operator.

Attract the operator's attention by indicating on the equipment that remote control is being performed.

Notice

Using the external memory function and back traces

Even if you set Ext Memory to [Disable], you can collect back trace data. If you are using the Online Diagnostics Service, set Utilize to [Enable] to generate back trace data. Regardless of whether you are using the Online Diagnostics Service, restart the data collection.

◆ **Reference** ◆

When an attempt to perform a protected operation is made, the "Protection is enabled" dialog box appears.

- If the breaker is turned on again with operation protection enabled, only the power switch of the instrumentation can be turned on.
- If an alarm occurs, Prevent Data Update, Prevent Run CTRL Change, and Prevent Remote CTRL are cancelled automatically to enable emergency stop of the chamber and changes to the settings. However, for the sake of information security, the Network Screen Password, LAN Use, Ext Memory Use, and Access Password are not cancelled.

Chapter 3 Commands

3.1 List of commands

The monitor and setting commands are shown in Table 3.1 and Table 3.2, respectively.

Table 3.1 List of monitor commands

Command	Description
ROM?	Monitors the ROM version.
DATE?	Monitors the date of the internal calendar.
TIME?	Monitors the current time of the internal calendar.
SRQ?	Monitors the SRQ status.
MASK?	Monitors the SRQ status mask setting.
TIMER ON?	Monitors the number of the timer enabled for startup.
TIMER USE?	Monitors the number of the set timer.
TIMER LIST?	Monitors the timer setting information.
ALARM?	Monitors information related to alarms.
KEYPROTECT?	Monitors the protection setting.
TYPE?	Monitors the chamber information.
MODE?	Monitors the operation mode.
MON?	Monitors the operation state.
TEMP?	Monitors information related to the temperature.
HUMI?	Monitors information related to the humidity.
SET?	Monitors information related to the refrigerator setting.
REF?	Monitors the output state of the refrigerator.
RELAY?	Monitors the time signal setting.
%?	Monitors the control output (heater output).
CONSTANT SET?	Monitors the setting of constant setup.
PRGM MON?	Monitors the operation state of the program that is operating.
PRGM SET?	Monitors the end setting, etc., of the program that is operating.
PRGM USE?	Monitors the number of set program patterns.
PRGM DATA?	Monitors the details of the program pattern.
SYSTEM SET?	Monitors the on-board specimen temperature information.
MON PTC?	Monitors the operation state (including specimen temperature information).
SET PTC?	Monitors the specimen temperature control that is operating.
PTC?	Monitors the specimen temperature control parameters.
TEMP PTC?	Monitors the specimen temperature.
PRGM DATA PTC?	Monitors the details of the program pattern (including specimen temperature information).
RUN PRGM MON?*1	Monitors the operation state of the remote program that is operating.
RUN PRGM? *1	Monitors the settings of the remote program that is operating.

*1: "Program operation" of the network refers to an operation that uses program data that can be edited and executed on the controller.
"Remote program operation" refers to a single-step program operation that can be edited, started, and managed on the network.

Table 3.2 List of setting commands

Command	Description
DATE	Changes the date of the internal calendar.
TIME	Changes the time of the internal calendar.
MASK	Performs the mask setting of the SRQ status.
SRQ	Clears the SRQ status.
TIMER WRITE	Sets the timer.
TIMER ERASE	Deletes the timer setting.
TIMER	Starts the timer.
KEYPROTECT	Sets protection.
POWER	Turns on and off the panel power.
TEMP	Configures settings related to the temperature.
HUMI	Configures settings related to the humidity.
SET	Sets the refrigerator.
RELAY	Sets the time signal.
PRGM	Controls the program that is operating.
MODE	Sets the operation state.
PRGM DATA WRITE	Edits the program data.
PRGM ERASE	Deletes the program data.
RUN PRGM*1	Sets and starts remote program operation.
TEMP PTC	Configures settings related to the specimen temperature in constant setup.
PTC	Sets the specimen temperature control parameters.

*1: "Program operation" of the network refers to an operation that uses program data that can be edited and executed on the controller.
"Remote program operation" refers to a single-step program operation that can be edited, started, and managed on the network.

3.2 Monitor command details

Monitor commands have the following format.

address, main-command[,option-parameter]

·In the description, spaces and quotation marks ("") are used to highlight certain areas. For details about the usable characters, see "1.3 Data handled by the network".

■ ROM version monitor

Monitor command		Description, monitor command example, response data format, or response example
Main command	**Option parameter**	
ROM?	-	<Description> Returns the version of the ROM for the temperature control unit of the chamber.
		<Monitor command example> "ROM?"
		<Response data format> "ROM type ROM version"
		<Response example> "P3ARCCN 30.00STD"
	DISP	<Description> Returns the version of the ROM for the display unit of the chamber.
		<Monitor command example> "ROM?, DISP"
		<Response data format> "ROM type ROM version"
		<Response example> "P3ARCDS 30.00STD"
	CONT	<Description> Returns the version of the ROM for the temperature control unit of the chamber.
		<Monitor command example> "ROM?, CONT"
		<Response data format> "ROM type ROM version"
		<Response example> "P3ARCCN 30.00STD"

■ **Date monitor**

Monitor command		Description, monitor command example, response data format, or response example
Main command	**Option parameter**	
DATE?	-	<Description> Returns the date of the internal calendar.
		<Monitor command example> "DATE?"
		<Response data format> "Year.Month/Day"
		<Response example> "12.03/04"

■ **Time monitor**

Monitor command		Description, monitor command example, response data format, or response example
Main command	**Option parameter**	
TIME?	-	<Description> Returns the current time of the internal calendar.
		<Monitor command example> "TIME?"
		<Response data format> "Hour:Minute:Second"
		<Response example> "18:00:00"

■ **Interrupt information monitor**

Monitor command		**Description, monitor command example, response data format, or response example**
Main command	**Option parameter**	
SRQ?	-	<Description> Returns the state of the SRQ status.
		<Monitor command example> "SRQ?"
		<Response data format> "SRQ1 SRQ2 SRQ3 SRQ4 SRQ5 SRQ6 SRQ7 SRQ8"
		<Response example> "01000000" SRQ1: Not used SRQ2: When an alarm occurs on the chamber, 1 is set. SRQ3: When a single-step operation ends in remote program operation, 1 is set. SRQ4: When the state transitions from power off to operation, or vice versa, 1 is set. SRQ5: Not used SRQ6: Not used SRQ7: Reserved with the SRQ function for GPIB communication SRQ8: Not used (Caution) • If the MASK setting command is not used to set an interrupt mask, the appropriate SRQ will not become "1" even if an event allocated to SRQ occurs.(For details, see the MASK setting command.) • An SRQ status set to "1" will be retained even if the event is canceled. The SRQ status is reset in the following cases. ① When the "SRQ,RESET" setting command is sent ② When the chamber main power is turned off ③ When address expression "01" is added to "SRQ?" and sent

■ **Interrupt mask monitor**

Monitor command		Description, monitor command example, response data format, or response example
Main command	**Option parameter**	
MASK?	-	<Description> Returns the value of the interrupt mask bit.
		<Monitor command example> "MASK?"
		<Response data format> "SRQ1 SRQ2 SRQ3 SRQ4 SRQ5 SRQ6 SRQ7 SRQ8"
		<Response example> "01000000" For bit allocations, see the "SRQ?" monitor command.

■ **Valid timer monitor**

Monitor command		Description, monitor command example, response data format, or response example
Main command	**Option parameter**	
TIMER ON?	-	<Description> Returns the number of valid timers and the timer number.
		<Monitor command example> "TIMER ON?"
		<Response data format> "number-of-valid-timers [,timer-number] [,timer-number]"
		<Response example> "2, 1, 2 " • The timer numbers are as follows. 0: Quick timer 1: Start timer 2: End timer

■ **Timer usage monitor**

Monitor command		**Description, monitor command example, response data format, or response example**
Main command	**Option parameter**	
TIMER USE?	-	<Description> Returns the number of set timers and the timer number.
		<Monitor command example> "TIMER USE?"
		<Response data format> "number-of-set-timers [,timer-number] [,timer-number]"
		<Response example> "2, 1, 2 " • The timer numbers are as follows. 0: Quick timer 1: Start timer 2: End timer

■ **Timer content monitor**

Monitor command		**Description, monitor command example, response data format, or response example**
Main command	**Option parameter**	
TIMER LIST?	0	<Description> Returns the settings of the quick timer.
		<Monitor command example> "TIMER LIST?, 0"
		<Response data format> "operation-mode ,set-time" or "stop-mode ,set-time"
		<Response example> For details about operation mode and stop mode, see Table 3.4 and Table 3.5. • Returns "NA:DATA NOT READY" when timer data is not set.
	1	<Description> Returns the settings of timer 1 (start timer).
		<Monitor command example> "TIMER LIST?, 1"
		<Response data format> "timer-number ,start-mode ,operation-mode"
		<Response example> For details about start mode and operation mode, see Table 3.3 and Table 3.4. • Returns "NA:DATA NOT READY" when timer data is not set.
	2	<Description> Returns the settings of timer 2 (end timer).
		<Monitor command example> "TIMER LIST?, 2"
		<Response data format> "timer-number, start-mode, stop-mode"
		<Response example> For details about start mode and stop mode, see Table 3.3 and Table 3.5. • Returns "NA:DATA NOT READY" when timer data is not set.

Table 3.3 Start mode details

Setting	Response data display	Response example
First execution mode	"MODE1,start-date,start-time"	"MODE1,12.03/04,10:00"
Weekly execution mode	"MODE2,start-day,start-time"	"MODE2,SAT,23:00"
Daily execution mode	"MODE3,start-time"	"MODE3,0:00"

The start days are expressed as follows.

Monday: "MON"
Tuesday: "TUE"
Wednesday: "WED"
Thursday: "THU"
Friday: "FRI"
Saturday: "SAT"
Sunday: "SUN"

Multiple start days can be specified.

To specify multiple days, use slashes (/).

"MODE2,MON/SAT,10:00"

Table 3.4 Operation mode details

Setting	Response data display	Response example
Program operation	"RUN, RAM:pattern-number,STEPxx"	"RUN,RAM:1,STEP1"
Constant operation	"CONSTANT"	"CONSTANT"

Table 3.5 Stop mode details

Setting	Response data display	Response example
All operation stopped	"STANDBY"	"STANDBY"
Power off	"OFF"	"OFF"

■ Alarm status monitor

Monitor command		Description, monitor command example, response data format, or response example
Main command	**Option parameter**	
ALARM?	-	<Description> Returns the number of occurring alarms and the alarm number.
		<Monitor command example> "ALARM?"
		<Response data format> "number-of-alarms [,alarm-number] [,alarm-number]..."
		<Response example> "2, 1, 7 " • For details about the alarm numbers, see "Operation manual: Basic guide". • The same alarm numbers are not counted in the number of alarms. • The maximum number of occurring alarms is 16.

■ Key protection monitor

Monitor command		Description, monitor command example, response data format, or response example
Main command	**Option parameter**	
KEYPROTECT?	-	<Description> Returns the key protection state.
		<Monitor command example> "KEY PROTECT?"
		<Response data format> "key-protection-state"
		<Response example> "ON" • "Key-protection-state" of the response is as follows, according to the key protection state. Key protection on "ON" Key protection off "OFF" • "Key protection on" refers to the fact that either setting change protection or operation protection is on. (The remote setting protection state cannot be recognized.)

■ **Chamber type monitor**

Monitor command		**Description, monitor command example, response data format, or response example**
Main command	**Option parameter**	
TYPE?	-	<Description> Returns the type of sensor connected to the temperature controller, the type of temperature controller, and the set temperature upper limit.
		<Monitor command example> "TYPE?"
		<Response data format> "dry-bulb-sensor-type[,wet-bulb-sensor-type], temperature-controller-type, set-temperature-upper-limit"
		<Response example> "T, T, P-310, 160.0" • The sensor type is as follows. T thermocouple sensor "T" • "Wet-bulb-sensor-type" is omitted for temperature-only chambers. • "Set-temperature-upper-limit" is a valid real number expression to the first decimal place.

■ Operation mode monitor

<table>
<tr><th colspan="2">Monitor command</th><th rowspan="2">Description, monitor command example, response data format, or response example</th></tr>
<tr><th>Main command</th><th>Option parameter</th></tr>
<tr><td rowspan="5">MODE?</td><td rowspan="4">-</td><td><Description>
Returns the chamber operation state.</td></tr>
<tr><td><Monitor command example>
"MODE?"</td></tr>
<tr><td><Response data format>
"operation-state"</td></tr>
<tr><td><Response example>
"CONSTANT"
• "Operation-state" is as follows, according to the chamber operation state.
Panel power off "OFF"
All operation stop "STANDBY"
Constant operation "CONSTANT"
Program/remote operation "RUN"
• "Program/remote operation state" refers to the following states.
Program operating, program operation pausing, program operation end hold, remote program operating, remote program pausing, remote program end hold</td></tr>
<tr><td>DETAIL</td><td><Description>
Returns the (detailed) chamber operation state.</td></tr>
<tr><td></td><td><Monitor command example>
"MODE?, DATAIL"</td></tr>
<tr><td></td><td><Response data format>
"operation-state"</td></tr>
<tr><td></td><td><Response example>
"CONSTANT"
• "Operation-state" is as follows, according to the chamber operation state.
Panel power off "OFF"
All operation stopping "STANDBY"
Constant operating "CONSTANT"
Program operating "RUN"
Program pausing "RUN PAUSE"
Program operation end hold "RUN END HOLD"
Remote program operating "RMT RUN"
Remote program pausing "RMT RUN PAUSE"
Program operation end hold "RMT RUN END HOLD"</td></tr>
</table>

■ **Test area state monitor**

Monitor command		**Description, monitor command example, response data format, or response example**
Main command	**Option parameter**	
MON?	-	<Description> Returns the chamber test area state.
		<Monitor command example> "MON?"
		<Response data format> "measured-temperature, [measured-humidity] ,operation-state, number-of-alarms-occurring"
		<Response example> "23.0, 85, CONSTANT, 0" • "Operation-state" has the same response as "MODE?". "Measured-humidity" is omitted for temperature-only chambers. • "Measured-temperature" is a valid real number expression to the first decimal place. • "Measured-humidity" is an integer expression.
	DETAIL	<Description> Returns the chamber test area state.
		<Monitor command example> "MON?"
		<Response data format> "measured-temperature, [measured-humidity] ,operation-state, number-of-alarms-occurring"
		<Response example> "23.0, 85, CONSTANT, 0" • "Operation-state" has the same response as "MODE?, DETAIL". • "Measured-humidity" is omitted for temperature-only chambers. • "Measured- temperature" is a valid real number expression to the first decimal place. • "Measured-humidity" is an integer expression.

■ **Temperature setting monitor**

Monitor command		Description, monitor command example, response data format, or response example
Main command	**Option parameter**	
TEMP?	-	<Description> Returns the temperature parameter.
		<Monitor command example> "TEMP?"
		<Response data format> "measured-temperature ,temperature-set-point ,temperature-upper-limit-alarm-value ,temperature-lower-limit-alarm-value"
		<Response example> "23.0, 85.0, 105.0, -45.0" • All values are valid real number expressions to the first decimal place. • The current controllable set point is set to the temperature set point. • The current valid alarm values are set as the upper and lower limit alarm values. • When the panel power is off or stopping, the set points for constant setup No.1 and alarm values are set.

■ **Humidity setting monitor**

Monitor command		Description, monitor command example, response data format, or response example
Main command	**Option parameter**	
HUMI?	-	<Description> Returns the humidity parameter.
		<Monitor command example> "HUMI?"
		<Response data format> "measured-humidity ,humidity-set-point ,humidity-upper-limit-alarm-value ,humidity-lower-limit-alarm-value"
		<Response example> "25, 85, 100, 0" • All values are integer expressions. • Returns "NA:INVALID REQ" for temperature-only chambers. • The current controllable set point is set to the humidity set point. • When humidity control is disabled, the humidity set point is set to "OFF". • The current valid alarm values are set as the upper and lower limit alarm values. • When the panel power is off or stopping, the set points for constant setup No.1 and alarm values are set.

■ **Refrigerator setting monitor**

Monitor command		**Description, monitor command example, response data format, or response example**
Main command	**Option parameter**	
SET?	-	<Description> Returns the refrigerator set point of the chamber.
		<Monitor command example> "SET?"
		<Response data format> "refrigerator-set-point"
		<Response example> "REF9" "Refrigerator-set-point" has the following response, according to the refrigerator set point. Manual REF0 to 8 Auto REF9

■ **Refrigerator output monitor**

Monitor command		**Description, monitor command example, response data format, or response example**
Main command	**Option parameter**	
REF?	-	<Description> Returns the operation state of equipped refrigerators.
		<Monitor command example> "REF?"
		<Response data format> "number-of-operating-refrigerators, operation-state-of-refrigerator1[operation-state-of-refrigerator2]"
		<Response example> "2, ON1, OFF2" • The refrigerator "operation-state" has the following response. Refrigerator operating ONxx Refrigerator stopped OFFxx

■ **Relay (time signal) monitor**

Monitor command		Description, monitor command example, response data format, or response example
Main command	**Option parameter**	
RELAY?	-	<Description> Returns the number of enabled time signals and their numbers.
		<Monitor command example> "RELAY?"
		<Response data format> "number-of-enabled-time-signals, [time-signal-number, time-signal-number, time-signal-number]..."
		<Response example> "2, 1, 2"

■ **Heater output monitor**

Monitor command		Description, monitor command example, response data format, or response example
Main command	**Option parameter**	
%?	-	<Description> Returns the number of controllable heaters and their heater output values.
		<Monitor command example> "%?"
		<Response data format> "number-of-heaters, heater-output-value[,humidifying-heater-output-value]"
		<Response example> "2, 56.2, 19.3" • "Humidifying-heater-output-value" is omitted for temperature-only chambers. • "Heater-output-value" is a valid real number expression to the first decimal place.

■ **Constant monitor**

Monitor command		**Description, monitor command example, response data format, or response example**
Main command	**Option parameter**	
CONSTANT SET?	TEMP	<Description> Returns the temperature set point in constant setup (No.1).
		<Monitor command example> "CONSTANT SET?,TEMP"
		<Response data format> "temperature-set-point,control-permission"
		<Response example> "100.0,ON" • "Temperature-set-point" is a valid real number expression to the first decimal place. • "Control-permission" is always "ON".
	HUMI	<Description> Returns the humidity set point in constant setup (No.1).
		<Monitor command example> "CONSTANT SET?,HUMI"
		<Response data format> "humidity-set-point,control-permission"
		<Response example> "85,ON" • "Humidity-set-point" is an integer expression. • "Control-permission" has the following response. Humidity control on: "ON" Humidity control off: "OFF"

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Monitor command		Description, monitor command example, response data format, or response example
Main command	**Option parameter**	
CONSTANT SET?	REF	<Description> Returns the refrigerator setting in constant setup (No.1).
		<Monitor command example> "CONSTANT SET?,REF"
		<Response data format> "Refrigerator setting"
		<Response example> "AUTO" • The refrigerator setting varies depending on the number of equipped refrigerators and the auto/manual settings. Auto setting:"AUTO" Manual setting: "OFF", "10", "20", "50", "100"
	RELAY	<Description> Returns the time signal set point in constant setup (No.1).
		<Monitor command example> "CONSTANT SET?,RELAY"
		<Response data format> "number-of-enabled-time-signals, [time-signal-number], [time-signal-number], [time-signal-number]..."
		<Response example> "2,1,2"
	PTC	<Description> Returns the specimen temperature control set point in constant setup (No.1).
		<Monitor command example> "CONSTANT SET?,PTC"
		<Response data format> "specimen-temperature-control-permission,upper-deviation-for-specimen-temperature-control,lower-deviation-for-specimen-temperature-control"
		<Response example> "ON,20.0,-20.0" • The specimen temperature control permission has the following response. Specimen temperature control enabled: "ON" Specimen temperature control disabled: "OFF" • "Upper-deviation-for-specimen-temperature-control" and "Lower-deviation-for-specimen-temperature-control" are valid real number expressions to the first decimal place.

■ **Program execution monitor**

Monitor command		**Description, monitor command example, response data format, or response example**
Main command	**Option parameter**	
PRGM MON?	-	<Description> Returns the operation state parameter when a program is operating.
		<Monitor command example> "PRGM MON?"
		<Response data format> "program-number-being-executed, step-number-being-executed, temperature-set-point[, humidity-set-point], step-remaining-time, remaining-counter-A, remaining-counter-B"
		<Response example> "1, 2, 27.0, 85, 0:58, 1, 2" • When a program is not operating, "NA:CHB NOT READY" is returned. • Remote program operation is an exception to this monitor command. To monitor the remote program operation state See "■ Remote program operation state monitor". • The control set points at this time are set to the temperature and humidity set points. (When humidity control is disabled, "OFF" is set.) • "Humidity-set-point" is omitted for temperature-only chambers. • When the temperature (humidity) control-permission is set to OFF, the following response is returned. "program-number-being-executed, step-number-being-executed, OFF[, OFF], step-remaining-time"

■ **Program assignment monitor**

Monitor command		**Description, monitor command example, response data format, or response example**
Main command	**Option parameter**	
PRGM SET?	-	<Description> Returns the program area, program pattern name, and end setting of the program operation being executed.
		<Monitor command example> "PRGM SET?"
		<Response data format> "program-area, program-pattern-name, end-condition"
		<Response example> "RAM:1, SAMPLE-1, END(OFF)" • When a program is not operating, "NA:CHB NOT READY" is returned.(Remote program operation is an exception to this monitor command.) • "Program-area" has the following response. RAM:xx (xx is the pattern number during operation.) • "End-condition" has the following description, according to the end condition of the program data. When power is off after the program ends: "END(OFF)" When operation stops after the program ends: "END(STANDBY)" When constant operation starts after the program ends: "END(CONSTANT)" When the final step is retained after the program ends: "END(HOLD)" When a program operation starts after the program ends: "END(RUN)"

■ **Program pattern usage monitor**

Monitor command		**Description, monitor command example, response data format, or response example**
Main command	**Option parameter**	
PRGM USE?	RAM	<Description> Returns the program pattern information with set data.
		<Monitor command example> "PRGM USE?, RAM"
		<Response data format> "number-of-program-patterns [pattern-number] [pattern-number]..."
		<Response example> "5, 1, 2, 10, 15, 17 "
	RAM: Pattern number	<Description> Returns the pattern number of the specified program pattern and the write date.
		<Monitor command example> "PRGM USE?, RAM:1"
		<Response data format> "pattern-name ,write-date"
		<Response example> "SAMPLE-1, 12. 03/04 " • The specified range of the pattern number is a value between 1 and 8. • Returns "NA:DATA NOT READY" when program data is not set.

■ **Program data monitor**

Monitor command		Description, monitor command example, response data format, or response example
Main command	**Option parameter**	
PRGM DATA?	RAM: Pattern number or PGM: Pattern number	<Description> Returns the details of the specified program pattern.
		<Monitor command example> "PRGM DATA?, RAM:1"
		<Response data format> "number-of-steps, pattern-name, counter-A-setting, counter-B-setting, end-condition"
		<Response example> "5, <PGM-1>, COUNT, A(1. 3. 10), B(0. 0. 0), END(OFF)" • Remote program operation is an exception to this monitor command. • Returns "NA:DATA NOT READY" when data is not set. • The specified range of the pattern number is a value between 1 and 40. • "Pattern-name" is expressed with angle brackets (<>) added. • "Counter-A" and "counter-B" are expressed as follows. COUNT, A(1. 3. 10) Number of repeat cycles Repeating end step number Repeating start step number • "End-condition" has the following description, according to the end condition of the program data. When power is off after the program ends: "END(OFF)" When operation stops after the program ends: "END(STANDBY)" When constant operation starts after the program ends: "END(CONSTANT)" When the final step is retained after the program ends: "END(HOLD)" When program operation starts after the program ends: "END(RUN:pattern-number)"

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<table>
<tr><th colspan="2">Monitor command</th><th rowspan="2">Description, monitor command example, response data format, or response example</th></tr>
<tr><th>Main command</th><th>Option parameter</th></tr>
<tr><td rowspan="4">PRGM DATA?</td><td rowspan="4">RAM: Pattern number, STEPxx
or
PGM: Pattern number, STEPxx</td><td><Description>
Returns the information of the specified step data.</td></tr>
<tr><td><Monitor command example>
"PRGM DATA?, RAM:1, STEP1"</td></tr>
<tr><td><Response data format>
"step-number, temperature-set-point, temperature-gradient [,humidity-set-point, humidity-gradient], time-setting, exposure-setting, refrigerator-setting[, time-signal-setting], paused-setting "</td></tr>
<tr><td><Response example>
"5, TEMP23.0, TEMP RAMP ON, HUMI50, HUMI RAMP OFF, TIME99:59, GRANTY ON, REF9, RELAY ON1.2, PAUSE OFF"
• Remote program operation is an exception to this monitor command.
• To monitor the setting data of the remote program operation
See "■ Remote program data monitor".
• Returns "NA:DATA NOT READY" when data is not set.
• The specified range of the pattern number is a value between 1 and 40.
• "Humidity-set-point" and "humidity-gradient" are omitted for temperature-only chambers.
• When humidity control is disabled, "humidity-set-point" is set to "OFF".
• "Refrigerator-setting" has the same response as "SET?".
• "Time-signal-setting" is omitted when there is no time signal set to "ON".
• When the temperature (humidity) control-permission is set to OFF, the following response is returned.
"step-number, time-setting"</td></tr>
</table>

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<table>
<tr><th colspan="2">Monitor command</th><th rowspan="2">Description, monitor command example, response data format, or response example</th></tr>
<tr><th>Main command</th><th>Option parameter</th></tr>
<tr><td>PRGM DATA?</td><td>RAM: Pattern number, DETAIL
or
PGM: Pattern number, DETAIL</td><td><Description>
Returns the step information of the specified program pattern.</td></tr>
<tr><td></td><td></td><td><Monitor command example>
"PRGM DATA?, RAM:1, DETAIL"</td></tr>
<tr><td></td><td></td><td><Response data format>
"temperature-warning-upper-limit-absolute-value, temperature-warning-lower-limit-absolute-value [,humidity -warning-upper-limit-absolute-value] [,humidity -warning-lower-limit-absolute-value] temperature-start-setting [, start-temperature-setting] [, humidity-start-setting] [, start-humidity-setting]"</td></tr>
<tr><td></td><td></td><td><Response example>
"90.0, -10.0, 100, TEMPSV, 80.0, 50"
• Remote program operation is an exception to this monitor command.
• Returns an error message when no program data is set. "NA:DATA NOT READY"
• The specified range of the pattern number is a value between 1 and 40.
• "Temperature-start-setting" is set as follows.
When the temperature start setting is disabled: "TEMPOFF"
When the temperature start setting is a measured value: "TEMPPV"
When the temperature start setting is a set value: "TEMPSV"
• "Humidity-start-setting" is set as follows.
When the humidity start setting is disabled: "HUMIOFF"
When the humidity start setting is a measured value: "HUMIPV"
When the humidity start setting is a set value: "HUMISV"
• "Temperature-warning-upper-limit-absolute-value" and "temperature-warning-lower-limit-absolute-value" are real number expressions.
• "Humidity-warning-upper-limit-absolute-value" and "humidity-warning-lower-limit-absolute-value" are integer expressions. (These are omitted for temperature-only chambers.)
• The temperature set point of the temperature start setting is set with the same format as the temperature set point. (This is omitted when the temperature start setting is "TEMPOFF" or "TEMPPV".)
• The humidity set point of the humidity start setting is set with the same format as the humidity set point. (This is omitted when the humidity start setting is "HUMIOFF" or "HUMIPV".)</td></tr>
</table>

■ **On-board specimen temperature information monitor**

Monitor command		**Description, monitor command example, response data format, or response example**
Main command	**Option parameter**	
SYSTEM SET?	PTC	<Description> Returns the on-board specimen temperature information.
		<Monitor command example> "SYSTEM SET?, PTC"
		<Response data format> "On-board-information"
		<Response example> "ON" • "On-board-information" has the following response. When equipped with a specimen temperature control function: "ON" When not equipped with a specimen temperature control function: "OFF"

■ **Test area state monitor (including specimen temperature information)**

Monitor command		**Description, monitor command example, response data format, or response example**
Main command	**Option parameter**	
MON PTC?	-	<Description> Returns the chamber test area state (including specimen temperature control).
		<Monitor command example> "MON PTC?"
		<Response data format> "specimen-temperature, measured-temperature, [measured-humidity] ,operation-state, alarm-number"
		<Response example> "20.0, 23.0, 85, CONSTANT, 0" • "Operation-state" has the same response as "MODE?". • "Measured-humidity" is omitted for temperature-only chambers. • "Specimen-temperature" and "measured-temperature" are valid real number expressions to the first decimal place. • "Measured-humidity" is an integer expression.

■ **Operating specimen temperature control monitor**

Monitor command		Description, monitor command example, response data format, or response example
Main command	**Option parameter**	
SET PTC?	-	<Description> Returns the specimen temperature control state.
		<Monitor command example> "SET PTC?"
		<Response data format> "specimen-temperature-control-status,upper-deviation-for-specimen-temperature-control,lower-deviation-for-specimen-temperature-control"
		<Response example> "ON, 20.0, -20.0" • "Specimen-temperature-control-status" has the following response. Specimen temperature control enabled: "ON" Specimen temperature control disabled: "OFF" • "Upper-deviation-for-specimen-temperature-control" and "lower-deviation-for-specimen-temperature-control" are valid real number expressions to the first decimal place. • If the chamber is not in operating status, the response is as follows. "OFF, OFF, OFF" • When the chamber is operating but specimen temperature control is disabled, the response is as follows. "OFF, upper-deviation-for-specimen-temperature-control, lower-deviation-for-specimen-temperature-control" • When the chamber is operating and specimen temperature control is enabled, the response is as follows. "ON, upper-deviation-for-specimen-temperature-control, lower-deviation-for-specimen-temperature-control"

■ **Specimen temperature control parameter monitor**

Monitor command		**Description, monitor command example, response data format, or response example**
Main command	**Option parameter**	
PTC?	-	<Description> Returns the setting parameter related to specimen temperature control.
		<Monitor command example> "PTC?"
		<Response data format> "upper-limit, lower-limit, P-parameter, filter-value, I-parameter, option-setting-1, option-setting-2"
		<Response example> "150.0, -40.0, 1.0, 36.0, 2.0, 0.0, 0.0" • Each parameter is a valid real number expression to the first decimal place. • "Option-setting-1" and "option-setting-2" are unused. • When specimen temperature control option is not equipped, an error message is returned. Error message: "NA:INVLID REQ"

■ Specimen temperature monitor

Monitor command		Description, monitor command example, response data format, or response example
Main command	**Option parameter**	
TEMP PTC?	-	<Description> Returns the setting parameter related to specimen temperature control.
		<Monitor command example> "TEMP PTC?"
		<Response data format> "specimen-temperature-control-status, specimen-temperature, chamber-temperature, setting-temperature, chamber-setting-temperature, upper-deviation-for-specimen-temperature-control, lower-deviation-for-specimen-temperature-control"
		<Response example> "ON, 27.7, 26.5, 30.0, 45.6, 20.0, 20.0" • Specimen-temperature-control-status has the following response. Specimen temperature control enabled: "ON" Specimen temperature control disabled: "OFF" • "specimen-temperature", "chamber-temperature", "setting-temperature", "chamber-setting-temperature", “upper-deviation-for-specimen-temperature-control” and “lower-deviation-for-specimen-temperature-control" are valid real number expressions to the first decimal place. • If the chamber is not in operating status, the response is as follows. "OFF, specimen-temperature, chamber-temperature, OFF, OFF, OFF, OFF" • When the chamber is operating but specimen temperature control is disabled, the response is as follows. "OFF, specimen-temperature, chamber-temperature, setting-temperature, OFF, upper-deviation-for-specimen-temperature-control, lower-deviation-for-specimen-temperature-control" • When the chamber is operating, and specimen temperature control is enabled but the setting value is invalid, the response is as follows. "ON, specimen-temperature, chamber-temperature, 999.9, 999.9, upper-deviation-for-specimen-temperature-control, lower-deviation-for-specimen-temperature-control"

• When specimen temperature control is disabled, an error message is returned.
Error message: "NA : INVALID REQ"

■ **Program pattern data monitor (including specimen temperature information)**

Monitor command		**Description, monitor command example, response data format, or response example**
Main command	**Option parameter**	
PRGM DATA PTC?	RAM: Pattern number	<Description> Returns the details of the specified program pattern (including specimen temperature control information).
		<Monitor command example> "PRGM DATA PTC?, RAM:1"
		<Response data format> "number-of-steps, pattern-name, counter-A-setting, counter-B-setting, end-condition"
		<Response example> "5, <PGM-1>, COUNT, A(0. 0. 0), B(0. 0. 0), END(OFF)" • Remote program operation is an exception to this monitor command. • Returns "NA:DATA NOT READY" when data is not set. • The specified range of the pattern number is a value between 1 and 40. • "Pattern-name" is expressed with angle brackets (<>) added. • "Counter-A" and "counter-B" are expressed as follows. COUNT, A(x. x. x) Number of repeat cycles Repeating end step number Repeating start step number • "End-condition" has the following description. When power is off after the program ends: "END(OFF)" When operation stops after the program ends: "END(STANDBY)" When constant operation starts after the program ends: "END(CONSTANT)" When program operation starts after the program ends: "END(RUN:pattern-number)" When the final settings are retained after the program ends: "END(HOLD)"

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Monitor command		Description, monitor command example, response data format, or response example
Main command	**Option parameter**	
PRGM DATA PTC?	RAM: Pattern number, STEPxx	<Description> Returns the step information of the specified program pattern.
		<Monitor command example> "PRGM DATA PTC?, RAM:1, STEP1"
		<Response data format> "step-number, temperature-set-point, temperature-gradient, specimen-temperature-control-status [, humidity-set-point, humidity-gradient], time-setting, exposure-setting, refrigerator-setting [, time-signal-setting], paused-setting, upper-deviation-for-specimen-temperature-control, lower-deviation-for-specimen-temperature-control"
		<Response example> "5, TEMP23.0, TEMP RAMP ON, PTC ON, HUMI50, HUMI RAMP OFF, TIME99:59, GRANTY ON, REF9, RELAY ON1.2, PAUSE OFF, DEVP10.0, DEVN -10.0" • Remote program operation is an exception to this monitor command. • Returns "NA:DATA NOT READY" when data is not set. • The specified range of the pattern number is a value between 1 and 40. • The specimen temperature control status is as shown below. Specimen temperature control enabled: "ON" Specimen temperature control disabled: "OFF" • "Humidity-set-point" and "humidity-gradient" are omitted for temperature-only chambers. • When humidity control is disabled, "humidity-set-point" is set to "OFF". • "Time-signal-setting" is omitted when there is no time signal set to "ON". • When paused, "PAUSE ON" is displayed, and when disabled, "PAUSE OFF" is displayed. • When the temperature (humidity) control-permission is set to OFF, the following response is returned. "step-number, time-setting"

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Monitor command		Description, monitor command example, response data format, or response example
Main command	**Option parameter**	
PRGM DATA PTC?	RAM: Pattern number, DETAIL	<Description> Returns the step information of the specified program pattern.
		<Monitor command example> "PRGM DATA PTC?, RAM:1, DETAIL"
		<Response data format> "temperature-warning-upper-limit-absolute-value, temperature-warning-lower-limit-absolute-value [, temperature-warning-upper-limit-absolute-value] [, temperature-warning-lower-limit-absolute-value] temperature-start-setting [, start-temperature-setting] [, humidity-start-setting] [, start-humidity-setting]"
		<Response example> "90.0, -10.0, 100, TEMPSV, 80.0, 50" • Remote program operation is an exception to this monitor command. • Returns an error message when no program data is set. "NA:DATA NOT READY" • The specified range of the pattern number is a value between 1 and 40. • "Temperature-start-setting" is set as follows. When the temperature start setting is disabled: "TEMPOFF" When the temperature start setting is a measured value: "TEMPPV" When the temperature start setting is a set value: "TEMPSV" • "Humidity-start-setting" is set as follows. When the humidity start setting is disabled: "HUMIOFF" When the humidity start setting is a measured value: "HUMIPV" When the humidity start setting is a set value: "HUMISV" • "Temperature-warning-upper-limit-absolute-value" and "temperature-warning-lower-limit-absolute-value" are real number expressions. • "Humidity-warning-upper-limit-absolute-value" and "humidity-warning-lower-limit-absolute-value" are integer expressions. (These are omitted for temperature-only chambers.) • The temperature set point of the temperature start setting is set with the same format as the temperature set point. (This is omitted when the temperature start setting is "TEMPOFF" or "TEMPPV".) • The humidity set point of the humidity start setting is set with the same format as the humidity set point. (This is omitted when the humidity start setting is "HUMIOFF" or "HUMIPV".)

■ Remote program operation state monitor

Monitor command		Description, monitor command example, response data format, or response example
Main command	**Option parameter**	
RUN PRGM MON?	-	<Description> Returns the operation state of the remote program operation being executed.
		<Monitor command example> "RUN PRGM MON?"
		<Response data format> "data-count, set-temperature [,set-humidity], remaining-time, remaining-repeat-cycles"
		<Response example> "4, 35.9, 85, 1:00, 1" • When a remote program is not operating, "NA:CHB NOT READY" is returned. • Program operation is an exception to this monitor command. To monitor the program operation state See "■ Program execution monitor". • "Set-temperature" is a valid real number expression to the first decimal place. • "Set-humidity" is an integer expression. • "Set-humidity" is omitted for temperature-only chambers. • When humidity control is disabled, "humidity-set-point" is set to "OFF". • "Remaining-repeat-cycles" is currently not used. ("1" is set as a dummy value.)

■ **Remote program data monitor**

Monitor command		**Description, monitor command example, response data format, or response example**
Main command	**Option parameter**	
RUN PRGM?	-	<Description> Returns the setting data of the remote program operation being executed.
		<Monitor command example> "RUN PRGM?"
		<Response data format> "start-temperature-setting endpoint-temperature-setting [start-humidity-setting endpoint-humidity-setting] time-setting refrigerator-setting [time-signal-setting]"
		<Response example> "TEMP10.0 GOTEMP30.0 HUMI10 GOHUMI100 TIME1:00 REF9 RELAYON,1,2" • When a remote program is not operating, the setting of the previously performed remote program operation is returned. • Program operation is an exception to this monitor command. To monitor the setting data of the program operation See "■ Program data monitor". • "Start-temperature-setting" and "endpoint-temperature-setting" are valid real number expressions to the first decimal place. • "Start-humidity-setting" and "endpoint-humidity-setting" are integer expressions. • "Time-setting" is in the format "hour:minute" (variable length). • "Start-humidity-setting" and "endpoint-humidity-setting" are omitted for temperature-only chambers. • When humidity control is disabled, "humidity-set-point" is set to "OFF". • "Refrigerator-setting" has the same response as "SET?". • "Time-signal-setting" is omitted when there is no time signal set to "ON".

3.3 Setting command details

Setting commands have the following format.

address,	main-command[,option-parameter]	,setting-data

- In the description, spaces and quotation marks ("") are used to highlight certain areas.
  For details about the usable characters, see "1.3 Data handled by the network".
- Some commands may not be accepted depending on the chamber.
  See "Table 3.11 Reception state list".
- In constant operation only constant setup No.1 is specified.

■ Date setting

Setting command			Description, data transmission format, setting command example
Main command	**Option parameter**	**Transmission data**	
DATE	-	Date data	<Description> Sets the date.
			<Transmission data format> "Year.Month/Day"
			<Setting command example> "DATE, 12. 03/04" • Enter 07 to 37 for the year. • You can also use the old-specification method of entering single-digit numerical values. • The command is accepted even when ".Day" of the old specification is added. (The day specification is ignored.) • When the chamber is in the following states, "NA:CHB NOT READY" is returned. Program operating (including pausing and hold) Timer set Recording sampling log Recording external memory

■ Time setting

Setting command			Description, data transmission format, setting command example
Main command	**Option parameter**	**Transmission data**	
TIME	-	Time data	<Description> Sets the time.
			<Transmission data format> "Hour:Minute:Second"
			<Setting command example> "TIME, 18:00:00" • The time is expressed in 24-hour format. • When the chamber is in the following states, "NA:CHB NOT READY" is returned. Program operating (including pausing and hold) Timer set Recording sampling log Recording external memory

■ **Interrupt mask setting**

Setting command			Description, data transmission format, setting command example
Main command	**Option parameter**	**Transmission data**	
MASK	-	Mask data	<Description> Sets the interrupt mask.
			<Transmission data format> "SRQ1 SRQ2 SRQ3 SRQ4 SRQ5 SRQ6 SRQ7 SRQ8" SRQ1: Not used SRQ2: When an alarm occurs on the chamber, 1 is set. SRQ3: When a single-step operation ends in remote program operation, 1 is set. SRQ4: When the state transitions from power off to operation, or vice versa, 1 is set. SRQ5: Not used SRQ6: Not used SRQ7: Reserved with the SRQ function for GPIB communication SRQ8: Not used
			<Setting command example> "MASK,01000000" • By using this command to set an interrupt mask, the SRQ status is set when an event is allocated to the above SRQ, thereby enabling confirmation of an event with the "SRQ?" monitor command. (When using the GPIB network, an SRQ interrupt is generated.) • Setting this to "1" allows setting to the SRQ status.

■ **SRQ status setting**

Setting command			Description, data transmission format, setting command example
Main command	**Option parameter**	**Transmission data**	
SRQ	-	Reset command	<Description> Clears the SRQ status.
			<Transmission data format> "Reset command"
			<Setting command example> "SRQ,RESET"

■ **Timer writing**

Setting command			Description, data transmission format, setting command example
Main command	**Option parameter**	**Transmission data**	
TIMER WRITE	NO0	Timer data	<Description> Edits the quick timer.
			<Transmission data format> "start-time, operation-mode" or "start-time, stop-mode"
			<Setting command example> "TIMER WRITE, NO0, 10:00, CONSTANT" • Use "start-time" to set the time in "hour:minutes" format until the timer starts after the timer is set to "ON". • Set the time from 0:01 to 9999:59. • For details about operation mode and stop mode, see Table 3.7 and Table 3.8. • When the quick timer is set, "NA:CHB NOT READY" is returned.
	NO1	Timer data	<Description> Edits the start timer.
			<Transmission data format> "start-mode, operation-mode"
			<Setting command example> "TIMER WRITE, NO1, MODE1, 12.03/04, 10:00, CONSTANT" • For details about start mode and operation mode, see Table 3.6 and Table 3.7. • When the start timer is set, "NA:CHB NOT READY" is returned.
	NO2	Timer data	<Description> Edits the end timer.
			<Transmission data format> "start-mode, stop-mode"
			<Setting command example> "TIMER WRITE, NO2, MODE2, SAT, 10:00, OFF" • For details about start mode and stop mode, see Table 3.6 and Table 3.8. • When the end timer is set, "NA:CHB NOT READY" is returned.

Table 3.6 Start mode details

Setting	Transmission data format	Input example
First execution mode	"MODE1,start-date,start-time"	"MODE1,12.03/04,10:00"
Weekly execution mode	"MODE2,start-day,start-time"	"MODE2,SAT,23:00"
Daily execution mode	"MODE3,start-time"	"MODE3,0:00"

The start days are expressed as follows.

Monday: "MON"
Tuesday: "TUE"
Wednesday:"WED"
Thursday: "THU"
Friday: "FRI"
Saturday: "SAT"
Sunday: "SUN"

Multiple start days can be specified.

To specify multiple days, use slashes (/).

"MODE2,MON/SAT,10:00"

Table 3.7 Operation mode details

Setting	Transmission data format	Input example
Program operation	"RUN, RAM:pattern-number,STEPxx"	"RUN,RAM:1,STEP1"
Constant operation (No.1)	"CONSTANT"	"CONSTANT"

The specified range of the pattern number is a value between 1 and 40.

Table 3.8 Stop mode details

Setting	Transmission data format	Input example
All operation stopped	"STANDBY"	" STANDBY "
Power off	"OFF"	"OFF"

■ **Timer deletion**

Setting command			Description, data transmission format, setting command example
Main command	**Option parameter**	**Transmission data**	
TIMER ERASE	NO0 NO1 NO2	-	<Description> Deletes the specified timer setting.
			<Transmission data format> -
			<Setting command example> "TIMER ERASE, NO1" • When there is no setting data in the specified timer, "NA:DATA NOT READY" is returned.

■ **Valid timer setting**

Setting command			Description, data transmission format, setting command example
Main command	**Option parameter**	**Transmission data**	
TIMER	ON	Timer number	<Description> Enables the specified timer.
			<Transmission data format> "timer-number"
			<Setting command example> "TIMER, ON, 1" • Enter 0 to 2 for the timer number. 0: Quick timer 1: Start timer 2: End timer • When there is no setting data in the specified timer, "NA:DATA NOT READY" is returned. • When the specified timer is set to "ON", "NA:CHB NOT READY" is returned.
	OFF	Timer number	<Description> Disables the specified timer.
			<Transmission data format> "timer-number"
			<Setting command example> "TIMER, OFF, 2" • Enter 0 to 2 for the timer number. 0: Quick timer 1: Start timer 2: End timer • When there is no setting data in the specified timer, "NA:DATA NOT READY" is returned.

■ Key protection setting

Setting command			Description, data transmission format, setting command example
Main command	**Option parameter**	**Transmission data**	
KEYPROTECT	-	ON	<Description> Enables setting change protection and operation protection at the same time.
			<Transmission data format> "ON"
			<Setting command example> "KEYPROTECT, ON" • When the panel power is off, "NA:CHB NOT READY" is returned. • Setting change protection and operation protection can be set separately. • Remote setting protection cannot be operated through communication.
	-	OFF	<Description> Disables setting change protection and operation protection at the same time.
			<Transmission data format> "OFF"
			<Setting command example> "KEYPROTECT, OFF" • When the panel power is off, "NA:CHB NOT READY" is returned. • Setting change protection and operation protection can be set separately. • Remote setting protection cannot be operated through communication.

■ Power ON/OFF

Setting command			Description, data transmission format, setting command example
Main command	**Option parameter**	**Transmission data**	
POWER	-	ON	<Description> Turns on the panel power and starts constant operation (No.1).
			<Transmission data format> "ON"
			<Setting command example> "POWER, ON"
	-	OFF	<Description> Stops operation and turns off the panel power.
			<Transmission data format> "OFF"
			<Setting command example> "POWER, OFF"

■ Temperature-related settings

Setting command			Description, data transmission format, setting command example
Main command	**Option parameter**	**Transmission data**	
TEMP	-	S set point	<Description> Changes the temperature set point in constant setup (No.1).
			<Transmission data format> "S-set-point"
			<Setting command example> "TEMP, S23.0" • Enter a value from the temperature lower limit alarm value to the temperature upper limit alarm value. • The value is a valid number to the first decimal place. (All other digits are ignored.)
	-	H set point	<Description> Changes the temperature upper absolute alarm value in constant setup (No.1).
			<Transmission data format> "H-set-point"
			<Setting command example> "TEMP, H100.0" • Enter a value from the temperature set point in constant setup (No.1) to the set temperature upper limit. • The value is a valid number to the first decimal place. (All other digits are ignored.)
	-	L set point	<Description> Changes the temperature lower absolute alarm value in constant setup (No.1).
			<Transmission data format> "L-set-point"
			<Setting command example> "TEMP, L-40.0" • Enter a value from the set temperature lower limit to the temperature set point in constant setup (No.1). • The value is a valid number to the first decimal place. (All other digits are ignored.)
	-	S set point H set point L set point	<Description> Changes the temperature set point in constant setup (No.1), temperature upper limit absolute alarm value, and temperature lower limit absolute alarm value together.
			<Transmission data format> "S-set-point H-set-point L-set-point"
			<Setting command example> "TEMP, S23.0 H100.0 L-40.0"

■ **Humidity-related settings**

Setting command			Description, data transmission format, setting command example
Main command	**Option parameter**	**Transmission data**	
HUMI	-	S set point	<Description> Changes the humidity set point in constant setup (No.1).
			<Transmission data format> "S-set-point"
			<Setting command example> "HUMI, S85" • Returns "NA:INVALID REQ" for temperature-only chambers. • Enter a value from the humidity lower limit alarm value to the humidity upper limit alarm value. • This value is treated as an integer value. (Digits after the decimal place are ignored.) • To disable humidity control, describe this as "HUMI,SOFF".
	-	H set point	<Description> Changes the humidity upper limit absolute alarm value in constant setup (No.1).
			<Transmission data format> "H-set-point"
			<Setting command example> "HUMI, H100" • Returns "NA:INVALID REQ" for temperature-only chambers. • Enter a value from the humidity set point in constant setup (No.1) to the set humidity upper limit. • This value is treated as an integer value. (Digits after the decimal place are ignored.)
	-	L set point	<Description> Changes the humidity lower limit absolute alarm value in constant setup (No.1).
			<Transmission data format> "L-set-point"
			<Setting command example> "HUMI, L0" • Returns "NA:INVALID REQ" for temperature-only chambers. • Enter a value from the set humidity lower limit to the humidity set point in constant setup (No.1). • This value is treated as an integer value. (Digits after the decimal place are ignored.)

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Setting command			Description, data transmission format, setting command example
Main command	**Option parameter**	**Transmission data**	
HUMI	-	S set point H set point L set point	<Description> Changes the humidity set point in constant setup (No.1), humidity upper limit absolute alarm value, and humidity lower limit absolute alarm value together.
			<Transmission data format> "S-set-point H-set-point L-set-point"
			<Setting command example> "HUMI, S23 H100 L0" • Returns "NA:INVALID REQ" for temperature-only chambers.

■ **Refrigerator-related settings**

Setting command			Description, data transmission format, setting command example
Main command	**Option parameter**	**Transmission data**	
SET	-	Set point	<Description> Changes the refrigerator set point in constant setup (No.1).
			<Transmission data format> "REF-set-point"
			<Setting command example> "SET, REF9" • Enter 0 to 9 for the set point. Set point 0: Manual OFF Set point 1 to 2: Manual 20% Set point 3 to 5: Manual 50% Set point 6 to 8: Manual 100%

■ **Relay (time signal) setting**

Setting command			Description, data transmission format, setting command example
Main command	**Option parameter**	**Transmission data**	
RELAY	ON	Relay number	<Description> Enables the time signal set point in constant setup (No.1).
			<Transmission data format> "time-signal-number [,time-signal-number][,time-signal-number]..."
			<Setting command example> "RELAY, ON, 1, 2" • Returns "NA:INVALID REQ" if time signal 1 is specified when the external output is not set to time signal 1. • Returns "NA:INVALID REQ" if a number of a chamber not equipped with the time signal is specified. (Time signals 3 to 8 are options.)
	OFF	Relay number	<Description> Disables the time signal set point in constant setup (No.1).
			<Transmission data format> "time-signal-number [,time-signal-number][,time-signal-number]..."
			<Setting command example> "RELAY, OFF, 1, 2" • Returns "NA:INVALID REQ" if time signal 1 is specified when the external output is not set to time signal 1. • Returns "NA:INVALID REQ" if a number of a chamber not equipped with the time signal is specified. (Time signals 3 to 8 are options.)

■ **Program operation control**

Setting command			Description, data transmission format, setting command example
Main command	**Option parameter**	**Transmission data**	
PRGM	RUN	RAM: Pattern number, STEPxx	<Description> Starts the specified program pattern.
			<Transmission data format> "RAM:pattern-number, STEPxx"
			<Setting command example> "PRGM, RUN, RAM:1, STEP1 〃 • The specified range of the pattern number is a value between 1 and 40. • Returns "NA:DATA NOT READY" when the specified pattern is not available. • Returns "NA:DATA NOT READY" when the specified step is not available.
	PAUSE	-	<Description> Pauses the program operation that is operating.
			<Transmission data format> -
			<Setting command example> "PRGM, PAUSE" • When a program is not operating (including remote program operation), "NA:CHB NOT READY" is returned. • When a program is paused, "NA:CHB NOT READY" is returned. • When program operation holds, "NA:CHB NOT READY" is returned.
	CONTINUE	-	<Description> Restarts the paused program operation.
			<Transmission data format> -
			<Setting command example> "PRGM, CONTINUE" • When a program is not paused (including remote program operation), "NA:CHB NOT READY" is returned.

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Setting command			Description, data transmission format, setting command example
Main command	**Option parameter**	**Transmission data**	
PRGM	ADVANCE	-	<Description> Ends the step that is operating and operates the next step.
			<Transmission data format> -
			<Setting command example> "PRGM, ADVANCE" • When a program is not operating, "NA:CHB NOT READY" is returned. • When program operation holds, "NA:CHB NOT READY" is returned.
	END	End condition	<Description> Ends program operation that is operating at that point, and migrates operation according to the specified end condition.
			<Transmission data format> "end-condition"
			<Setting command example> "PRGM, END, HOLD" • When a program is not operating (including remote program operation), "NA:CHB NOT READY" is returned. • "End-condition" is described as follows. Hold the final step after the program ends "END,HOLD" Start constant operation (No.1) after the program ends "END,CONST" Turn off the panel power after the program ends "END,OFF" Stop operation after the program ends "END,STANDBY"

■ Operation mode settings

Setting command			Description, data transmission format, setting command example
Main command	**Option parameter**	**Transmission data**	
MODE	-	Operation mode	<Description> Migrates to the specified operation mode.
			<Transmission data format> "operation-mode"
			<Setting command example> "MODE, OFF" • "Operation-mode" is described as follows. To turn off panel power "OFF" To stop operation "STANDBY" To perform constant operation (No.1) "CONSTANT" To perform program operation "RUN-pattern-number" • Returns "NA:DATA NOT READY" when the specified program pattern is not available. • To perform remote program operation See "■ Editing remote program data".

■ **Program pattern editing**

Setting command			Description, data transmission format, setting command example
Main command	**Option parameter**	**Transmission data**	
PRGM DATA WRITE	PGM Pattern number or PGM: Pattern number	Edit data	<Description> Edits the program data.
			<Transmission data format> See Table 3.9.
			<Setting command example> "PRGM DATA WRITE, PGM1, EDIT START" "PRGM DATA WRITE, PGM1, STEP1, TEMP10.0, TIME1:00" "PRGM DATA WRITE, PGM1, STEP2, HUMI100, TIME1:00" "PRGM DATA WRITE, PGM1, COUNT, A(1. 2. 10), B(0. 0. 0)" "PRGM DATA WRITE, PGM1, NAME, SAMPLE-1" "PRGM DATA WRITE, PGM1, END, OFF" "PRGM DATA WRITE, PGM1, EDIT END" • When the program-related screen appears on the controller, the network settings are not valid. To edit from communication, switch to a screen other than for program editing. • When performing humidity-related editing on a temperature-only chamber, "NA:INVALID REQ" is returned. • When setting only the program name or counter without setting the temperature or humidity, "NA:DATA NOT READY" is returned. • When the timer is set for the specified pattern, "NA:CHB NOT READY" is returned. • When the specified pattern is assigned to the operation start setting of measuring instrument synchronization, "NA:CHB NOT READY" is returned.

<Program pattern editing: Transmission data details>

- The following two modes are available for program pattern editing.

  New mode: Creates new program data.
  (Step data must be specified continuously from step 1.)
  Overwrite mode: Enables editing of arbitrary step data for program data already created.

- Use the following procedure to edit program data in new mode.
  Set a create new start request.

  Set the step data for step 1.
  Set the step data for step 2.
  :
  Set the counter setting (can be omitted).
  Set the file name (can be omitted).
  Set the end condition (can be omitted).
  Set a create new end request.

- Use the following procedure to edit program data in overwrite mode.
  Set the overwrite start request.
  Set the step data for the desired step.
  :
  Set the overwrite end request.

- The following is the description method.

Table 3.9 Transmission data details

Setting		Description method	Default value
Descriptions for new mode	New start	"EDIT START"	
	New end	"EDIT END"	
	New cancel	"EDIT CANCEL"	
Descriptions for overwrite mode	Overwrite start	"OVER WRITE START"	
	Overwrite end	"OVER WRITE END"	
	Overwrite cancel	"OVER WRITE CANCEL"	
Descriptions for step data		"STEPxx,setting-data" The setting data is described as follows. Temperature set point "TEMPx.x to xxx.x " 0.0 Temperature gradient "TRAMPON" or "TRAMPOFF" OFF Humidity set point "HUMIx to xxx" ("HUMI OFF" to turn off) 0 Humidity gradient "HRAMPON" or "HRAMPOFF" OFF Time setting "TIMEx:xx to xxxx:xx" 0:00 Exposure setting "GRANTY ON" or "GRANTY OFF" OFF Refrigerator setting "REFx" 9 Time-signal setting "RELAY ON x. x…." or "RELAY OFF x. x...." ALL OFF Pause "PAUSE ON" or "PAUSE OFF" OFF When a parameter is omitted, the value of the previous step is set. (The previous step is set to the default values.)	

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Setting		Description method	Omitted parameter value
Descriptions for program details	Counter setting	"COUNT,A(x. x. x)[,COUNT,B(x. x. x)]" A(x. x. x) Number of repeat cycles Repeat end step number Repeat start step number • Either COUNT,A or COUNT,B can be omitted. • To set both, separate with a comma (,). (Example: "COUNT,A(1. 2. 3),B(5. 7. 10)")	0.0.0
	Pattern name	"NAME,pattern-name" • The pattern name can be up to 15 single-byte characters. • Lower case letters are converted to upper case letters. • The at symbol (@) cannot be used two or more times in succession in the pattern name. "ABC@DEF": OK "ABC@DE@": OK "ABC@@DE": Not OK	PGM-xx
	Temperature warning upper limit absolute value	"HTEMP, x.x to xxx.x" From 0.0 or the highest set temperature in the pattern to the temperature warning upper limit absolute value	Upper limit of the chamber's allowable range
	Temperature warning lower limit absolute value	"LTEMP, x.x to xxx.x" From the temperature warning lower limit absolute value to 0.0 or the lowest set temperature in the pattern	Lower limit of the chamber's allowable range
	Humidity warning upper limit absolute value	"HHUMI, x to xxx" From 0 or the highest set humidity in the pattern to the humidity warning upper limit absolute value	Upper limit of the chamber's allowable range
	Humidity warning lower limit absolute value	"LHUMI, x to xxx" From the humidity warning lower limit absolute value to 0 or the lowest set humidity in the pattern	Lower limit of the chamber's allowable range
	Start condition setting	"PRE MODE, TEMP, setting-mode" or "PRE MODE, HUMI, setting-mode" • The setting mode is described as follows. No start setting "OFF" Starting with a measured value "PV" • Starting with a set value"SV"	OFF
	Start temperature setting	"PRE TSV, x.x to xxx.x" This is required when the temperature setting mode is set to "SV" in the start condition setting. • When the temperature setting mode is set to a setting other than "SV", "PARA ERR" is returned.	0

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Setting		Description method	Omitted parameter value
Descriptions for program details	Start humidity setting	"PRE HSV, x to xxx" This is required when the humidity setting mode is set to "SV" in the start condition setting. • When the humidity setting mode is set to a setting other than "SV", "PARA ERR" is returned.	0
	End condition	"END,end-condition" The end condition is described as follows. Power off after the program ends "OFF" Stop after the program ends "STANDBY" Constant operation (No.1) after the program ends "CONSTANT" Retain the last step after the program ends "HOLD" Start another program operation after the program ends "RUN,pattern-number" The pattern number is described as follows. "PTNxx" └──1 to 40	END.OFF

(Caution)
If a "DATA OUT OF RANGE" error occurs when the program operations are finished (when an EDIT END or OVERWRITE END command is transmitted):
A time exceeding approximately 50,000 days may have been set.

There are limits on the amount of time that a chamber can save, so write your program while referring to the following combination example.

Total time of steps 1 to 20 × number of cycles ≤ 1,193,046 hours
Combination example
① If the total time of all steps is 1,200 hours
If the number of cycles is less than 994, the data can be saved.
1,193,046 hours ÷ 1,200 hours = 994.2 times

② If the set time of one step is 9999:59
If there is only one step, the number of cycles can be 119 or less.
1,193,046 hours ÷ 10,000 hours = 119 times
If you are using 20 steps, the number of cycles can be 5 or less.
1,193,046 hours ÷ 200,000 hours = 5.9 times

■ Deleting a program pattern

Setting command			Description, data transmission format, setting command example
Main command	**Option parameter**	**Transmission data**	
PRGM ERASE	RAM: Pattern number or PGM: Patten number	-	<Description> Deletes or edits the specified program data.
			<Transmission data format> -
			<Setting command example> "PRGM ERASE, RAM:1" • This command deletes all steps of the specified program data. • When the program data-related screen appears on the controller, deletion of the network is not valid. (To delete from communication, switch to a screen other than for program editing.) • Returns "NA:DATA NOT READY" in the following cases. When there is no program data in the specified pattern • Returns " NA:CHB NOT READY " in the following cases. When the specified pattern is operating. When the timer is set for the specified pattern. When the specified pattern is registered to an end condition (next program). When the specified pattern is assigned to the operation start setting of measuring instrument synchronization.

■ **Editing remote program data**

Setting command			Description, data transmission format, setting command example
Main command	**Option parameter**	**Transmission data**	
RUN PRGM	-	Program data	<Description> Sets remote program operation. (Remote program operation starts when the setting is completed.)
			<Transmission data format> See Table 3.10.
			<Setting command example> "RUN PRGM, TEMP10.0 GOTEMP23.0 HUMI85 GOHUMI100 TIME1:00" • When performing humidity-related editing on a temperature-only chamber, "NA:INVALID REQ" is returned.

<Remote program data editing: Details>

- Remote program operation is one-step program operation that enables control of editing, starting, and ending from the host computer.
- This command starts remote program operation.
- When program operation ends, the final settings are retained. (The end condition is not defined in the remote program data.)
- By setting an interrupt mask, the end of remote program operation can be recognized.
  See the "MASK" setting command or "SRQ?" monitor command.
- To change the operation state, use the "MODE" or "PRGM" setting command.

Table 3.10 Remote program data editing details

Setting	Format	Example
Start temperature setting	"TEMP"	"TEMP23.0"
Endpoint temperature setting (can be omitted)	"GOTEMP"	"GOTEMP30.0"
Start humidity setting (can be omitted)	"HUMI"	"HUMI100" ("HUMI OFF" to turn off humidity control)
Endpoint humidity setting (can be omitted)	"GOHUMI"	"GOHUMI50"
Time setting	"TIME"	"TIME99:59"
Refrigerator setting (can be omitted)	"REF"	"REF9"
Time-signal setting (can be omitted)	"RELAYON" or "RELAYOFF"	"RELAYON, 1, 2"

- If the endpoint temperature (humidity) setting is omitted, the start temperature (humidity) setting is used.
- If the refrigerator setting or time-signal setting is omitted, the setting for the previous remote program operation is used. (The default refrigerator setting is "REF9", and the default time-signal setting is "OFF" for all.)
- The order for describing the settings cannot be changed.

■ Constant setup specimen temperature settings

Setting command			Description, data transmission format, setting command example
Main command	**Option parameter**	**Transmission data**	
TEMP PTC	-	Specimen temperature control status Upper deviation Lower deviation	<Description> Sets the specimen temperature control set point in constant setup.
			<Transmission data format> "specimen-temperature-control-status, upper-deviation, lower-deviation"
			<Setting command example> "TEMP PTC, PTCON, DEVP10.0, DEVN-10.0" • Specify the specimen temperature control status as follows. Specimen temperature control enabled: "PTCON" Specimen temperature control disabled: "PTCOFF" • Specify the upper deviation as follows. "DEVP-numerical-value" Specify the numerical value from 0.0 to 50.0. • Specify the lower deviation as follows. "DEVN-numerical-value" Specify the numerical value from -50.0 to 0.0.

■ Specimen temperature control parameter setting

Setting command			Description, data transmission format, setting command example
Main command	**Option parameter**	**Transmission data**	
PTC	-	Upper limit, Lower limit, P parameter, Filter value, I parameter, Option setting 1, Option setting 2	<Description> Sets the specimen temperature control parameters.
			<Transmission data format> "upper-limit, lower-limit, P-parameter, filter-value, I-parameter, option-setting-1, option-setting-2"
			<Setting command example> "PTC, 150.0, -40.0, 1.0, 36.0, 2.0, 0.0, 0.0" • Specify the upper limit from the chamber lower limit setting to the chamber upper limit setting. • Specify the lower limit from the chamber upper limit setting to the chamber lower limit setting. • Specify the P parameter from 0.0 to 100.0. • Specify the I parameter from 0.0 to 1000.0. • Specify the filter value from 0.0 to 1000.0. • Option setting 1 and option setting 2 are unused. Specify "0".

■ Reception state list

Table 3.11 Reception state list

				Panel power off	Operation stopped	Constant operation	Program operation	Program operation pausing	Program operation end hold	Remote operation	Remote operation pausing	Remote operation end hold	Setting change protection on	Operation protection on	Remote program protection on*	Alarm occurring	Timer set	Recording sampling	External memory (graph data) in use
Setting command	POWER	ON		○	○	○	○	○	○	○	○	○	○	○	×	-	○	○	○
		OFF		Δ	○	○	○	○	○	○	○	○	○	○	×	○	○	○	○
	TEMP	Sxxx		○	○	○	○	○	○	○	○	○	○	○	×	○	○	○	○
		Hxxx		○	○	○	○	○	○	○	○	○	○	○	×	○	○	○	○
		Lxxx		○	○	○	○	○	○	○	○	○	○	○	×	○	○	○	○
	HUMI	Sxxx		○	○	○	○	○	○	○	○	○	○	○	×	○	○	○	○
		Hxxx		○	○	○	○	○	○	○	○	○	○	○	×	○	○	○	○
		Lxxx		○	○	○	○	○	○	○	○	○	○	○	×	○	○	○	○
	SET			○	○	○	○	○	○	○	○	○	○	○	×	○	○	○	○
	MODE	OFF		○	○	○	○	○	○	○	○	○	○	○	×	○	○	○	○
		STANDBY		○	○	○	○	○	○	○	○	○	○	○	×	○	○	○	○
		CONSTANT		○	○	○	○	○	○	○	○	○	○	○	×	○	○	○	○
		RUNxxx		○	○	○	○	○	○	○	○	○	○	○	×	○	○	○	○
				○	○	○	○	○	○	○	○	○	○	○	×	○	○	○	○
	PRGM	RUN		○	○	○	○	○	○	○	○	○	○	○	×	○	○	○	○
		PAUSE		×	×	×	○	×	×	○	×	×	○	○	×	○	○	○	○
		CONTINUE		×	×	×	×	○	×	×	○	×	○	○	×	○	○	○	○
		ADVANCE		×	×	×	○	○	×	×	×	×	○	○	×	○	○	○	○
		END	HOLD	×	×	×	○	○	Δ	○	○	Δ	○	○	×	○	○	○	○
			OFF	×	×	×	○	○	○	○	○	○	○	○	×	○	○	○	○
			STANDBY	×	×	×	○	○	○	○	○	○	○	○	×	○	○	○	○
			CONST	×	×	×	○	○	○	○	○	○	○	○	×	○	○	○	○
	PRGM DATA WRITE			○	○	○	○	○	○	○	○	○	○	○	×	○	○	○	○
	PRGM ERASE			○	○	○	○	○	○	○	○	○	○	○	×	○	○	○	○
	KEY PROTECT			×	○	○	○	○	○	○	○	○	○	○	×	○	○	○	○
	MASK			○	○	○	○	○	○	○	○	○	○	○	×	○	○	○	○
	SRQ			○	○	○	○	○	○	○	○	○	○	○	×	○	○	○	○
	DATE			○	○	○	×	×	×	○	○	○	○	○	×	○	×	×	×
	TIME			○	○	○	×	×	×	○	○	○	○	○	×	○	×	×	×
	TIMER WRITE			○	○	○	○	○	○	○	○	○	○	○	×	○	○	○	○
	TIMER ERASE			○	○	○	○	○	○	○	○	○	○	○	×	○	○	○	○
	TIMER			○	○	○	○	○	○	○	○	○	○	○	×	○	○	○	○
Monitor commands	PRGM MON?			×	×	×	○	○	○	×	×	×	○	○	○	○	○	○	○
	RUN PRGM MON?			×	×	×	×	×	×	○	○	○	○	○	○	○	○	○	○

○: Processed normally (OK response returned).
Δ: OK response is returned, but no change to state.
×: Error message returned. Processing not accepted.
* Error message details: When remote program protection is on "NA:PROTECT ON"
Other cases "NA:CHB NOT READY"

3.4 Differences from previous series

New functions have been added to the new series (last number of model: 2), so there are differences between the commands that are supported by the previous series (last number of model: 1) and the new series.

◆ Reference ◆

The previous series does not support Ethernet.

■ Connection method

There is no difference in the connection methods.
For the new series, the Ethernet function is available as standard equipment.

Communication function interfaces

	New series	Previous series
Ethernet	Standard equipment	None
RS-485	Optional equipment	Standard equipment
RS-232C	Optional equipment	Standard equipment
GPIB	Optional equipment	Optional equipment

■ Functional differences

		New series	Previous series
Upper and lower limit alarm settings		Multiple (Separate alarm settings available for each constant operation and program operation)	Single (Common configuration for constant operation and program operation patterns)
Constant operation settings		3 patterns	1 pattern
Program operation settings	Number of patterns	40 patterns	20 patterns
	Number of steps	99 steps	99 steps
	Repeat settings	2 items (counter A and B)	2 items
	Number of repeat cycles	1 to 999 cycles	1 to 99 cycles
	Name	15 characters	15 characters

■ Supported commands

As a result of enhancements to the chamber functions and communication commands, commands for date, time, timer, constant operation, program operation, and specimen temperature have been added on the new series. In addition, the specifications of some commands available on the previous series are different between the two series.

○: Supported ×: Not supported

(1) Monitor commands

Command	Model		Difference
	New series	Previous series	
ROM?	○	○	The response data is different.
DATE?	○	○	
TIME?	○	○	
SRQ?	○	○	
MASK?	○	○	
TIMER ON?	○	○	
TIMER USE?	○	○	
TIMER LIST?	○	○	
ALARM?	○	○	
KEYPROTECT?	○	○	
TYPE?	○	○	The response data is different.
MODE?	○	○	The option parameters are different.
MON?	○	○	The option parameters are different.
TEMP?	○	○	
HUMI?	○	○	
SET?	○	○	The response data is different.
REF?	○	○	
RELAY?	○	○	
%?	○	○	
CONSTANT SET?	○	○	
PRGM MON?	○	○	The response data is different.
PRGM SET?	○	○	
PRGM USE?	○	○	
PRGM DATA?	○	○	The response data is different.
SYSTEM SET?	○	○	
MON PTC?	○	○	
SET PTC?	○	○	
PTC?	○	○	
PRGM DATA PTC?	○	○	
RUN PRGM MON?	○	○	
RUN PRGM	○	○	

(2) Setting commands

Command	Model		Difference
	New series	Previous series	
DATE	○	○	
TIME	○	○	
MASK	○	○	
SRQ	○	○	
TIMER WRITE	○	○	
TIMER ERASE	○	○	
TIMER	○	○	
KEYPROTECT	○	○	
POWER	○	○	
TEMP	○	○	
HUMI	○	○	
SET	○	○	
RELAY	○	○	
MODE	○	○	
PRGM	○	○	
PRGM DATA WRITE	○	○	
PRGM ERASE	○	○	
RUN PRGM	○	○	
TEMP PTC	○	○	
PTC	○	○	

■ Command differences

(1) Monitor commands

<table>
<tr><th>Command</th><th>Description</th></tr>
<tr><td>ROM?</td><td>The way that the ROM version of the ROM type is expressed in response data has been changed.<table><tr><td>New series</td><td>P3ARCCN30.00STD</td></tr><tr><td>Previous series</td><td>JAR x.xx</td></tr></table></td></tr>
<tr><td>TYPE?</td><td>The way that the temperature controller type is expressed in response data has been changed.<table><tr><td>New series</td><td>P-310</td></tr><tr><td>Previous series</td><td>SCP</td></tr></table></td></tr>
<tr><td>MODE?</td><td>Option parameter "DETAIL" has been added on the new series. Using this option parameter enables monitoring of operation state in more detail.</td></tr>
<tr><td>MON?</td><td>Option parameter "DETAIL" has been added on the new series. Using this option parameter enables monitoring of operation state in more detail.</td></tr>
</table>

<table>
<tr><th>Command</th><th>Description</th></tr>
<tr><td>TEMP?</td><td>
On the previous series, there was a single temperature warning upper/lower limit absolute value for the entire chamber, but on the new series, the value can be set for each operation setting. Therefore, the temperature set point, temperature warning upper limit absolute value, and temperature warning upper lower absolute value responses are different as shown below.
<table>
<tr><th rowspan="2">Chamber operation status</th><th colspan="2">New series</th></tr>
<tr><th>Temperature set point</th><th>Temperature upper and lower limit absolute values</th></tr>
<tr><td>Panel power on</td><td>The set point of constant No.1 (*1)</td><td>The set point of constant No.1</td></tr>
<tr><td>Not in operation</td><td>The set point of constant No.1 (*1)</td><td>The set point of constant No.1</td></tr>
<tr><td>Constant operation</td><td>The set point of constant operation (*2)</td><td>Constant operation setting (*2)</td></tr>
<tr><td>Program operation</td><td>The set point of program operation (*3)</td><td>The set point of program operation (*3)</td></tr>
<tr><td>Remote operation</td><td>The set point of remote operation</td><td>The set point of constant No.1</td></tr>
</table>
<table>
<tr><th rowspan="2">Chamber operation status</th><th colspan="2">Previous series</th></tr>
<tr><th>Temperature set point</th><th>Temperature upper and lower limit absolute values</th></tr>
<tr><td>Panel power on</td><td>0.0</td><td>The chamber's upper and lower limit set points</td></tr>
<tr><td>Not in operation</td><td>0.0</td><td>The chamber's upper and lower limit set points</td></tr>
<tr><td>Constant operation</td><td>The set point of constant operation</td><td>The chamber's upper and lower limit set points</td></tr>
<tr><td>Program operation</td><td>The set point of program operation</td><td>The chamber's upper and lower limit set points</td></tr>
<tr><td>Remote operation</td><td>The set point of remote operation</td><td>The chamber's upper and lower limit set points</td></tr>
</table>
*1: In accordance with the specifications of the temperature warning upper/lower limit absolute value, the set point of constant No.1 is also returned as response data for the temperature set point.
*2: For constant operation, a set point configured during operation of No. 1 to 3 is returned as response data.
*3: For program operation, the set point configured during operation is returned as response data.
</td></tr>
</table>

<table>
<tr><th>Command</th><th>Description</th></tr>
<tr><td>HUMI?</td><td>
On the previous series, there was a single humidity warning upper/lower limit absolute value for the entire chamber, but on the new series, the value can be set for each operation setting. Therefore, the humidity set point, humidity warning upper limit absolute value, and humidity warning upper lower absolute value responses are different as shown below.
<table>
<tr><th rowspan="2">Chamber operation status</th><th colspan="2">New series</th></tr>
<tr><th>Humidity set point</th><th>Humidity upper and lower limit absolute values</th></tr>
<tr><td>Panel power on</td><td>The set point of constant No.1 (*1)</td><td>The set point of constant No.1</td></tr>
<tr><td>Not in operation</td><td>The set point of constant No.1 (*1)</td><td>The set point of constant No.1</td></tr>
<tr><td>Constant operation</td><td>The set point of constant operation (*2)</td><td>Constant operation setting (*2)</td></tr>
<tr><td>Program operation</td><td>The set point of program operation (*3)</td><td>The set point of program operation (*3)</td></tr>
<tr><td>Remote operation</td><td>The set point of remote operation</td><td>The set point of constant No.1</td></tr>
</table>
<table>
<tr><th rowspan="2">Chamber operation status</th><th colspan="2">Previous series</th></tr>
<tr><th>Humidity set point</th><th>Humidity upper and lower limit absolute values</th></tr>
<tr><td>Panel power on</td><td>OFF</td><td>The chamber's upper and lower limit set points</td></tr>
<tr><td>Not in operation</td><td>OFF</td><td>The chamber's upper and lower limit set points</td></tr>
<tr><td>Constant operation</td><td>The set point of constant operation</td><td>The chamber's upper and lower limit set points</td></tr>
<tr><td>Program operation</td><td>The set point of program operation</td><td>The chamber's upper and lower limit set points</td></tr>
<tr><td>Remote operation</td><td>The set point of remote operation</td><td>The chamber's upper and lower limit set points</td></tr>
</table>
*1: In accordance with the specifications of the humidity warning upper/lower limit absolute value, the set point of constant No.1 is also returned as response data for the humidity set point.
*2: For constant operation, a set point configured during operation of No. 1 to 3 is returned as response data.
*3: For program operation, the set point configured during operation is returned as response data.
</td></tr>
<tr><td>SET?</td><td>
The response is different between the new series and previous series as shown below. On the new series, the response has been consolidated to the set point of constant No.1 when the panel power is off or stopped. (consolidation of TEMP? and HUMI?)
<table>
<tr><th>Chamber operation status</th><th>New series</th><th>Previous series</th></tr>
<tr><td>Panel power on</td><td>The set point of constant No.1</td><td>REF9</td></tr>
<tr><td>Not in operation</td><td>The set point of constant No.1</td><td>REF9</td></tr>
<tr><td>Constant operation</td><td>The set point of constant operation (*1)</td><td>Constant operation setting</td></tr>
<tr><td>Program operation</td><td>The set point of program operation (*2)</td><td>The set point of program operation</td></tr>
<tr><td>Remote operation</td><td>The set point of remote operation</td><td>The set point of remote operation</td></tr>
</table>
*1: For constant operation, a set point configured during operation of No. 1 to 3 is returned as response data.
*2: For program operation, the set point configured during operation is returned as response data.
</td></tr>
</table>

■ Error message differences

The error messages that follow "NA:" differ between the new series and the previous series.

Examples of different error messages (for details, see the error message list)

Error cause	New series response
If the command cannot be recognized as command data	CMD_ERR
If "HUMI?" is sent to a chamber that is not equipped with the humidity function.	NA:INVALID REQ

List of new series error messages (underlined error messages are the same on both series)

Error message	Error description	Example	On the previous series
CMD_ERR	Main command error	Command data such as "TENMP?" (the correct command is "TEMP?") was sent.	COMMAND ERR
PARA ERR	Option parameter error	An option parameter necessary for the command is not available. The option parameter is unrecognizable.	PARAMETER ERR
DATA NOT READY	Valid data does not exist.	An attempt was made to execute a program pattern with invalid data.	DATA NOT READY
DATA OUT OF RANGE	Specified value outside the setting range	A temperature (humidity) set point outside the setting range was specified.	DATA OUT OF RANGE
PROTECT ON	An attempt was made to change the temperature set point when the remote protection setting is ON.	An attempt was made to change the temperature set point when the remote protection setting is ON.	PROTECT ON
INVALID REQ	Unsupported function specified	A specimen temperature command was sent to a chamber not equipped with specimen temperature control.	CONTROLLER NOT READY-1,2,4 PRGM WRITE ERR-1 to 8,12,13
CHB NOT READY	Command specified when the chamber is not ready to receive it	"PRGM,PAUSE" (pause) was transmitted when the chamber was stopped.	CONTROLLER NOT READY-3 PRGM WRITE ERR-9

List of previous series error messages (underlined error messages are the same on both series)

Error message	Error description	Example	On the new series
COMMAND ERR	Main command error	Command data such as "TENMP?" (the correct command is "TEMP?") was sent.	CMD_ERR
CONTROLLER NOT READY-1	The chamber cannot support the command.	Command data related to humidity was sent to a chamber that does not support humidity control.	INVALID REQ
CONTROLLER NOT READY-2	The chamber cannot support the command.	Command data related to program operation was sent to a chamber on which a program is not operating.	CHB NOT READY
CONTROLLER NOT READY-3	The chamber cannot support the command.	Key lock was set when the power was off.	CHB NOT READY
CONTROLLER NOT READY-4	The chamber cannot support the command.	An attempt was made to set a time signal that cannot be changed.	INVALID REQ
DATA NOT READY	Valid data does not exist.	An attempt was made to execute a program pattern with invalid data.	DATA NOT READY
PARAMETER ERR	Option parameter error	An option parameter necessary for the command is not available. The option parameter is unrecognizable.	PARA ERR
DATA OUT OF RANGE	Specified value outside the data range	A temperature (humidity) set point outside the setting range was specified.	DATA OUT OF RANGE
PROTECT ON	Setting changes through communication is prohibited because the remote protection setting is ON.	An attempt was made to change the temperature set point when the remote protection setting is ON.	PROTECT ON
PRGM WRITE ERR-1	Program editing error	An attempt was made to write data without first specifying edit or overwrite mode.	INVALID REQ
PRGM WRITE ERR-2	Program editing error	A command related to editing was made when program data was not being edited.	INVALID REQ
PRGM WRITE ERR-3	Program editing error	An attempt was made to overwrite data while the data was being edited.	INVALID REQ

Error message	Error description	Example	On the new series
PRGM WRITE ERR-4	Program editing error	An attempt was made to edit the data while overwriting.	INVALID REQ
PRGM WRITE ERR-5	Program editing error	A command related to overwriting was made when program data was not being overwritten.	INVALID REQ
PRGM WRITE ERR-6	Program editing error	A program pattern that differs from that of the program pattern being written was specified.	INVALID REQ
PRGM WRITE ERR-7	Program editing error	A specification that would break the step number sequence was made.	INVALID REQ
PRGM WRITE ERR-8	Program editing error	Repeat setting error	INVALID REQ
PRGM WRITE ERR-9	Program editing error	An attempt was made to edit the program data that is in operation.	CHB NOT READY
PRGM WRITE ERR-12	Program editing error	An attempt was made to configure the exposure setting when a gradient setting was on.	INVALID REQ
PRGM WRITE ERR-13	Program editing error	An attempt was made to configure the humidity control gradient setting when the humidity control was off.	INVALID REQ

Chapter 4 Specifications

4.1 Specifications

When performing communication, match the communication port setting of the computer with the communication setting of the chamber.

4.1.1 Ethernet specifications

- Standard
  100BASE-TX
- Protocol
  TCP/IP
- Other
  AUTO-MDIX (the LAN port can recognize which port is used between MDI and MDI-X on the partner device, and then automatically switch the transmitting and receiving terminals)

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