User's Manual

Thermal Shock Chamber

- Option -
(Communication Function)

4015304030011

Applicable chambers

TSA-41L, 71L, 71S, 71H, 101L, 101S, 201S, 301L
TSE-11
TSB-21, 51
TSD-100

⚠
- Read this manual carefully before using the equipment.
- Familiarize yourself with all safety precautions before using the equipment.
- Keep this manual handy for future reference.

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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 equipment in any way or form that is not described in this user's manual or which is herein specifically prohibited. Careless usage of the sort may result in unexpected damage to the equipment or accident.

Introduction

This manual explains how to set up and use the thermal shock chamber. It was written for users and engineers. Read it thoroughly to ensure absolute safety and gain maximum performance from equipment.

Safety Indications

The following safety indications are used throughout this manual.

- **Degree of DANGER**

⚠ **VERY DANGEROUS**	**This mark means extremely dangerous consequences may arise, with the possibility of death or serious injury to the user, if the equipment is handled incorrectly.**
⚠ **DANGER**	**This mark means dangerous consequences may arise, with the possibility of death or serious injury to the user, if the equipment is handled incorrectly.**
⚠ **CAUTION**	**This mark means dangerous consequences may arise, with the possibility of somewhat serious injury to the user and/or damage to equipment and facilities, if the equipment is handled incorrectly.**

Keywords

The following keywords are used in this manual.

Note : Provides information necessary for gaining full performance from the chamber or to prevent damage to equipment.

Procedure : Explains how to operate the chamber on a step-by-step basis.

Reference : Offers supplementary information.

Contents

Introduction

Chapter 1 Overview

1.1 Communication Function 8
• GPIB (IEEE-488/HP-IB) 8
• RS-232C 8
1.2 Communication Interface 9
• GPIB 9
• RS-232C 9
1.3 Transmitted Data 10
• Types of Data 10
• Data Format 11
• Error Messages 12
1.4 Data Transfer 14
• GPIB 15
• RS-232C 16

Chapter 2 Communication Setup

2.1 Communication Setup 20
• GPIB Communication Setup 20
• RS-232C Communication Setup 21

Chapter 3 Commands

3.1 Command List 24
3.2 Monitor Commands 29
(1) Monitoring Initial Settings 29
• To Monitor ROM Version 29
• To Monitor Power Recovery Mode Setting 30
• To Monitor Auto Shutoff Setting 30
• To Monitor Guaranteed Soak Range Setting 31
• To Monitor Dry Mode Temperature Setting 31
• To Monitor Ambient Temperature Exposure Time Setting 32
• To Monitor Fluid Temperature Return Settings 32
• To Monitor Protect Feature Setting 33
• To Monitor STT Sensor Setting 33
(2) Monitoring Operation 34
• To Monitor Chamber Status 34
• To Monitor the Test Pattern No. and Name 36
• To Monitor Exposure Temperature 36

• To Monitor Preheat/Precool Temperature 37
• To Monitor Zone End Time 37
• To Monitor Test Cycle Count 38
• To Monitor Chamber Model 38
• To Monitor Alarm Status 39
• To Monitor Fluid Temperature Return Schedule Status 42
• To Monitor Test Area (Specimen Basket) Position 42
• To Monitor Specimen Temperature 43
(3) Monitoring Test Patterns 44
• To Monitor Test Pattern Exposure Temperature Settings 44
• To Monitor Test Pattern Preheat/Precool Mode Setting 44
• To Monitor Test Pattern Preheat/Precool Temperature Settings 45
• To Monitor Test Pattern Exposure Time Settings 45
• To Monitor Test Pattern Test Cycle Setting 46
• To Monitor Test Pattern Test Start Position Setting 46
• To Monitor Test Pattern Scheduled Test Pause Setting 47
• To Monitor Test Pattern Guaranteed Soak Control Setting 47
• To Monitor Test Pattern Economized Operation Control Setting 48
• To Monitor Test Pattern End Mode Setting 48
• To Monitor Test Pattern Name 49
• To Monitor Test Pattern Sensor Position Setting 49
• To Monitor Test Pattern Defrost Mode Setting 50
• To Monitor Test Pattern Defrost Standby Position Setting 50
• To Monitor Test Pattern Hot Box Defrost Standby Control Setting 51
• To Monitor Test Pattern Quick Exposure Control Setting 51
• To Monitor Test Pattern Overheat/Overcool Protection Temperature Settings 52
• To Monitor Test Pattern Auxiliary Cooling Control Setting 52
• To Monitor Test Pattern External Output 1 Setting 53
• To Monitor Test Pattern External Output 2 Setting 54
• To Monitor Drying Mode Temperature and Time Settings 55
• To Monitor Test Pattern Drying Mode Control Setting 55
• To Monitor Test Pattern STT Trigger Time Setting 56
• To Monitor Test Pattern STT Sensor Using Mode Setting 56
• To Monitor Test Pattern Test Pause and Ambient Temperature Return Setting 57
• To Monitor Test Pattern Test End and Ambient Temperature Return Setting 57
• To Monitor Test Pattern STT Trigger Mode Setting 58
• To Monitor Test Pattern Forced Step Shift Time Setting 58
3.3 Setting Commands 59
(1) Making Initial Settings 59

• To Set Fluid Return Temperature 59
• To Turn Protect Feature ON/OFF 59
• To Set STT Sensor ON/OFF 60
(2) Making Operation Settings 61
• To Idle the Chamber 61
• To Start Prepping 61
• To Prep the Chamber and Start Testing After Prepping 61
• To Start Testing 62
• To Pause Testing 62
• To Resume Testing 62
• To Clear Remaining Cycles 63
• To Start Fluid Temperature Return 63
• To Defrost the Chamber 63
• To Start a Dry Operation 64
• To Set the Auto Prep Timer 64
• To Set the Auto Start Timer 64
• To Start Timers 65
• To Cancel Timers 65
• To Schedule Fluid Temperature Return 65
• To Cancel Fluid Temperature Return Schedule 66
• To Select a Test Pattern for Running 66
• To Set Operating Mode 66
• To Start Ambient Temperature Return 68
• To Cancel Ambient Temperature Return 68
(3) Opening and Closing Test Patterns 69
• To Open a Test Pattern for Viewing Only 69
• To Close a Test Pattern Opened for Viewing Only 69
• To Open a Test Pattern for Editing 70
• To Close a Test Pattern Opened for Editing 70
(4) Setting Up Test Patterns 71
• To Set Exposure Temperature 71
• To Set Preheat/Precool Control 72
• To Set Preheat/Precool Temperature 72
• To Set Exposure Time 73
• To Set Test Cycles 73
• To Set Test Start Position 74
• To Set Defrost Mode 74
• To Set Hot Box Defrost Standby Control 75
• To Set Defrost Standby Position 75
• To Schedule Test Pausing 76
• To Set Quick Exposure Control 76
• To Set Guaranteed Soak Control 77
• To Set Economized Operation Control 77
• To Set Sensor Position 78
• To Set Auxiliary Cooling Control 78

• To Set End Mode....79
• To Name Test Patterns....79
• To Set Overheat/Overcool Protection Temperature....79
• To Set External Output 1....80
• To Set External Output 2....81
• To Set Drying Mode Temperature and Time....82
• To Set Drying Mode Control....82
• To Set STT Trigger Time....83
• To Set STT Sensor Using Mode....83
• To Set Test Pause and Ambient Temperature Return....84
• To Set Test End and Ambient Temperature Return....84
• To Set STT Trigger Mode....85
• To Set Forced Step Shift Time....85

Chapter 4 Example Applications

4.1 To Monitor Chamber Control Status from Computer....92
4.2 To Edit Test Setup from Computer....93

Chapter 5 Specifications

5.1 GPIB Specifications....96
• Cable and Signal Lines....96
• Address....96
• Interface Support....97
• Control Bus Support....97
• Universal Command Support....98
• Address Command Support....98
5.2 RS-232C Specifications....99
• Cable and Signal Lines....99
• Communication System....99
• Transmission Rate....99
• Data Bit....99
• Flow Control....99
• Local Echo....99

Chapter 1
Overview

1.1 Communication Function

The communication function connects a thermal shock chamber to a computer or some other external device via a communication interface. This interface makes it possible to control the chamber as well as monitor chamber control status and the program being run with commands sent from the computer.

Reference

Difference between "Computer Program" and "Test Program"
A "computer program" is a program created on computer. It is different from the test program run in the chamber’s program mode.

The communication interface is selected between GPIB and RS-232C at the time of purchase.

GPIB (IEEE-488/HP-IB)

GPIB (General Purpose Interface Bus) is a standard parallel interface used for attaching sensors and programmable instruments to a computer. It is officially known as IEEE-488 (standard No. 488 of the Institute of Electrical and Electronic Engineers [USA]) and was based on the HP-IB (Hewlett-Packard Interface Bus) standard of Hewlett-Packard Company.

RS-232C

RS-232C (Recommended Standard-232) is a serial interface widely adopted for transmission between computers and peripheral devices, and a communication standard of the EIA (Electronic Industries Association).
The interface connector will differ according to the connected computer. Check the specifications of your computer and prepare a cable that can make the signal connections given in "1.2 Communication Interface".

1.2 Communication Interface

GPIB

The GPIB conforms to IEEE-488.1. Use a communication cable that also conforms to IEEE-488.1.

RS-232C

The RS-232C interface is a serial modem (DCE). Use a cable with the interface connector specified for your computer.

1.3 Transmitted Data

Types of Data

Data is handled as either command data or response data.

■Command Data

Data sent from the computer to the chamber is treated as a command. Commands are of the following two basic types.

- Monitor Commands
  These commands are used to monitor the chamber's operating status and conditions inside the chamber.

- Setting Commands

These commands are used to change the chamber's operating mode or test pattern.

■Response Data

Data returned from the chamber in response to computer commands is treated as a response. Responses are of the following two basic types.

- Reception Status
  This response tells the computer whether the setting command it sent was processed correctly or not.
  ＜When the setting command is correctly processed＞
  "OK : setting command"

  ＜When the setting command is not correctly processed＞
  "NA : error message"
  (For details on error messages, see Table 1.1.)

- Monitor Data
  This data is sent in response to monitor commands from the computer.
  ＜When the monitor command is correctly processed＞
  "monitored data"
  (For details on responses, see "3.2 Monitor Commands".)

  ＜When the monitor command is not correctly processed＞
  "NA : error message"
  (For details on error messages, see Table 1.1.)

Data Format

■Command Data Format

Command data sent from the computer has the following format.

command data | delimiter

Reference

Address

Command data with the below address header can be recognized with this option.

address, | command data | delimiter

■Response Data Format

The response data returned from the chamber to the computer has the following format.

response data | delimiter

Reference

About Main Commands and Optional Parameters

- Main commands and optional parameters are expressed as ASCII text in either capital or small case letters.
- Spaces between characters are automatically deleted.

Error Messages

When command data sent from the computer is not correctly processed by the chamber, the chamber returns an "NA :" code attached with an error message. These messages and their meaning are given here below.

Table 1.1 Error messages

Error message	Meaning	Example
CMD ERR	Chamber could not recognize command data.	• When "MOD?"command is sent. The correct command is "MODE?".
CONT NOT READY-1	A command only executable during tests was sent while a test was not running.	• When the "OPEHALT" command is sent when a test is not running.
CONT NOT READY-2	The user attempted to set the protect feature when control power was OFF.	• "PROTECT" command
CONT NOT READY-3	Chamber was in the state of being unable to process the request when using setting commands.	• While test area was being moved, operation change command was used.
CONT NOT READY-4	A humidity command was sent to a chamber without humidity control support.	
PARA ERR	• Parameter error • The command did not contain a data attachment.	• When the "OPEPRESET-SETUP" command is set without including date data.
DATA OUT OF RANGE	Data is outside the specified range.	
PROTECT ON	The user attempted to change a setting or the operating mode when setting is blocked by the protect feature.	
PRGM READ ERR-1	The user attempted to refer to a test pattern without opening in viewing.	
PRGM READ ERR-2	The user attempted to perform an operation change or edit test a pattern while a test pattern was being opened in viewing.	
PRGM READ ERR-3	The user opened a test pattern again while a test pattern was being opened in viewing.	
PRGM READ ERR-20	The user attempted to use a parameter for a test pattern that uses the STT function when a test pattern that does not use the STT function is referred.	
PRGM READ ERR-21	The user attempted to use a parameter for a test pattern that does not use the STT function when a test pattern that uses the STT function is referred.	
PRGM WRITE ERR-1	The user attempted to edit a test pattern without opening in editing.	
PRGM WRITE ERR-2	The user attempted to perform an operation change or edit a test pattern while a test pattern was being opened in editing.	
PRGM WRITE ERR-3	The user opened a test pattern again while a test pattern was being opened in viewing.	
PRGM WRITE ERR-4	The user attempted to edit ROM pattern.	
PRGM WRITE ERR-5	The user attempted to close a pattern other than the opened test pattern.	

Cont.

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Error message	Meaning	Example
PRGM WRITE ERR-6	The user attempted to edit by communication command while a test pattern was being edited/referred on the screen.	
PRGM WRITE ERR-7	The user attempted to edit a value of preheat/precool control during the controlling auto preheat/precool control.	
PRGM WRITE ERR-8	The user attempted to enable quick exposure control when economized operation control was valid or guaranteed soak control was valid.	
PRGM WRITE ERR-9	The user attempted to enable guaranteed soak control when quick exposure control was valid.	
PRGM WRITE ERR-10	The user attempted to enable economized operation control when quick exposure control was valid.	
PRGM WRITE ERR-11	The user attempted to carry out auxiliary cooling control when auxiliary cooling option was not mounted.	
PRGM WRITE ERR-20	The user attempted to use a parameter for a test pattern that uses the STT function when a test pattern that does not use the STT function is edited.	
PRGM WRITE ERR-21	The user attempted to use a parameter for a test pattern that does not use the STT function when a test pattern that uses the STT function is edited.	

1.4 Data Transfer

⚠ CAUTION

- **Wait to receive the response of a previous command before sending the next command.**
  If a subsequent command is sent without waiting for the response of a previous command, communications may not be successful.
- **When sending commands to the same address, provide a time lag from when reception of the first command completes to when the next command is sent.**
  If commands are sent continuously, the communication load may destabilize control.

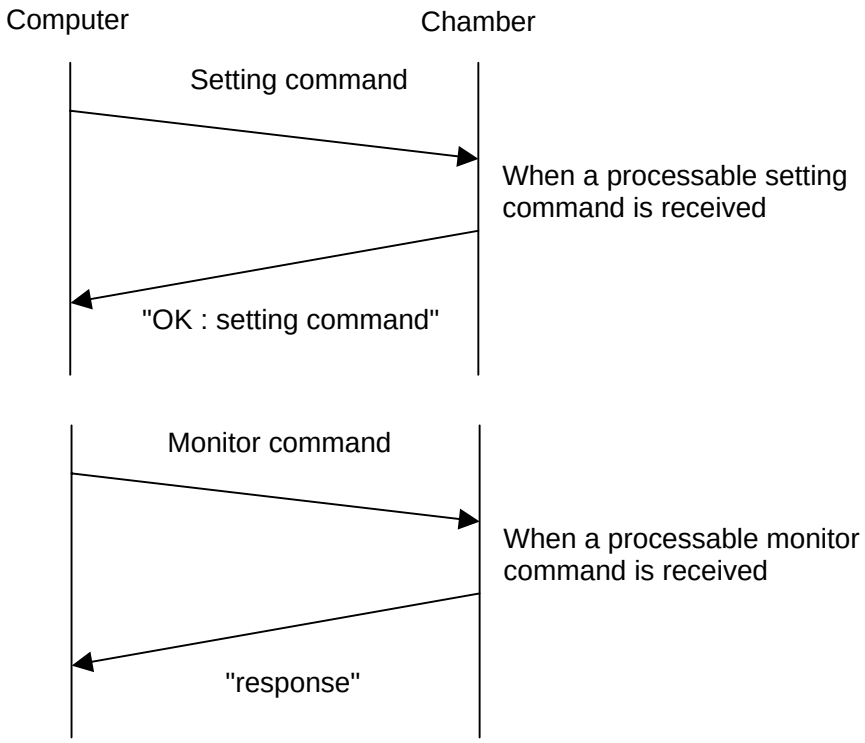
Procedure

1. Send to address 1.
2. Receive response from address 1.
3. Wait a discrete amount of time as demanded by the type of command sent in procedure 1. (See * below.)
4. Send to address 1.

* The time lag should be as follows.
- For monitor commands
  0.2 seconds or more
  However, ensure 0.3 seconds or more for program commands (PRGM DATA?, RUN PRGM?, etc.).
- For setting commands
  0.5 seconds or more
  However, ensure one second or more for program commands (PRGM DATA WRITE, RUN PRGM, etc.).

GPIB

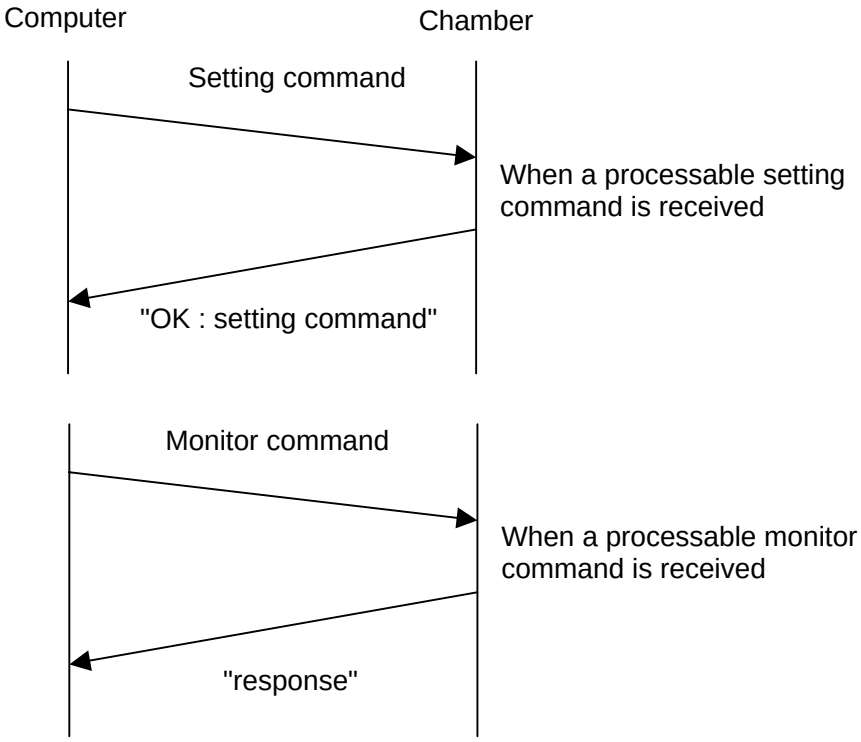
Data transfer in GPIB communications is as shown below. The computer sends commands (setting command or monitor command) to the chamber and the chamber returns a response (reception status or monitor data) to the computer.



RS-232C

■Standard Mode

The computer sends commands (setting command or monitor command) to the chamber and the chamber returns a response (reception status or monitor data) to the computer.



■E-BUS Mode

When the E-BUS mode is selected as the data transfer mode, you have the choice of using echo back or not.

- When Echo Back is ON
  When echo back is ON, the chamber returns responses to the computer in the below format.

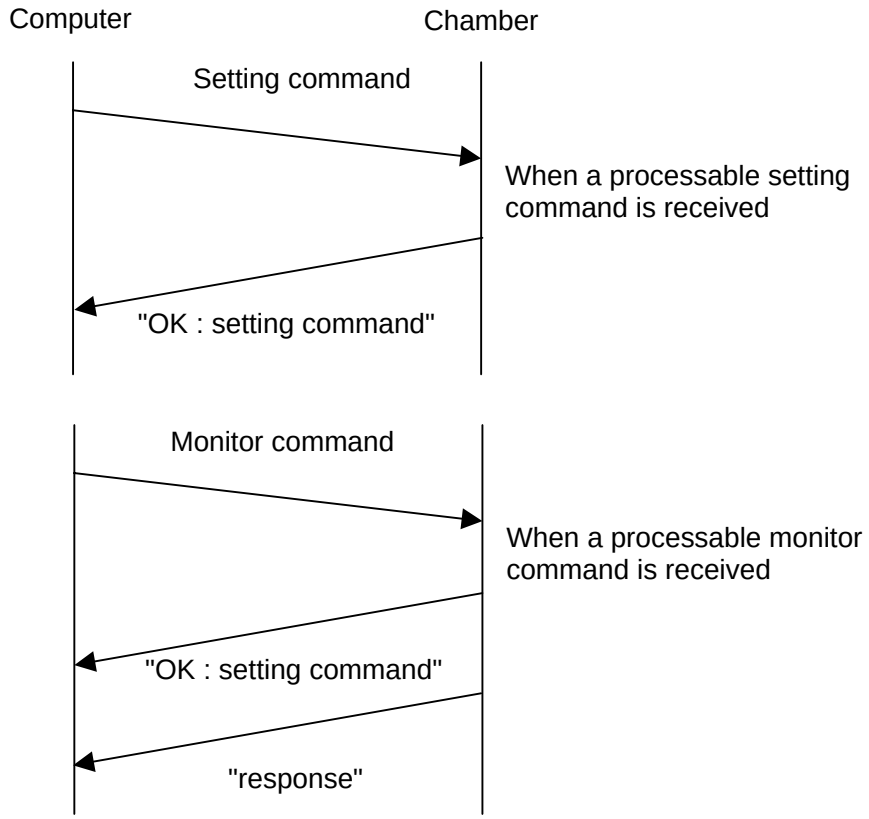
＜Response to setting commands＞

reception status data	delimiter

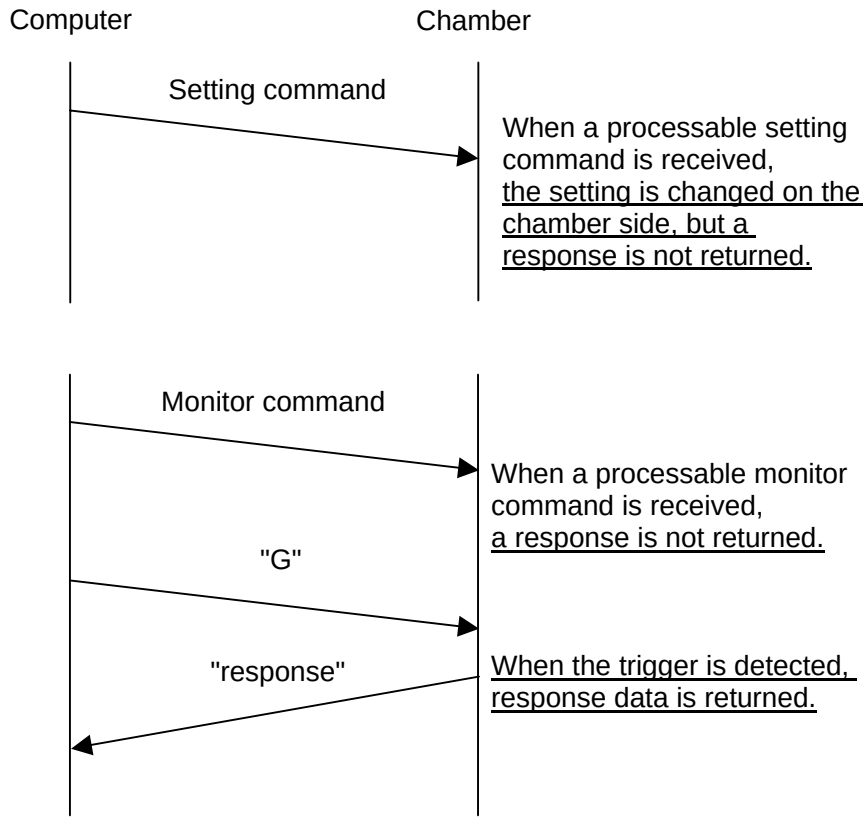
＜Response to monitor commands＞

reception status data	delimiter	monitored data	delimiter

Therefore, when the entire response data including the delimiter is treated as a single data set, data transfer is as follows.



- When Echo Back is OFF
  When echo back is OFF, the chamber does not return a response to computer commands until it receives the data transfer trigger. With this communication function, "G" is used as the data transfer trigger instead of the command data. In this case, data transfer is as follows.



Chapter 2
Communication Setup

You can set up communications from the communication setup mode.
For more information on this mode, see the User's Manual –Reference–.

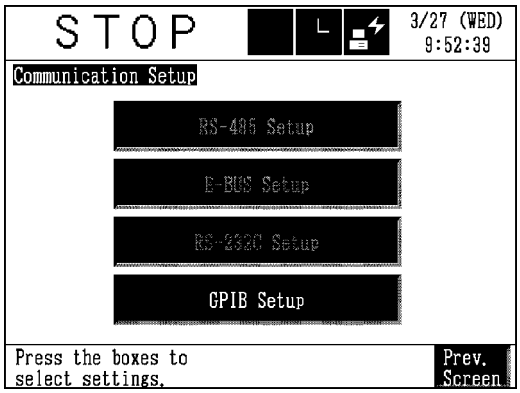
2.1 Communication Setup

Communications can be set up from the chamber configuration mode. For more information on the chamber configuration mode, see the User's Manual –Reference–.

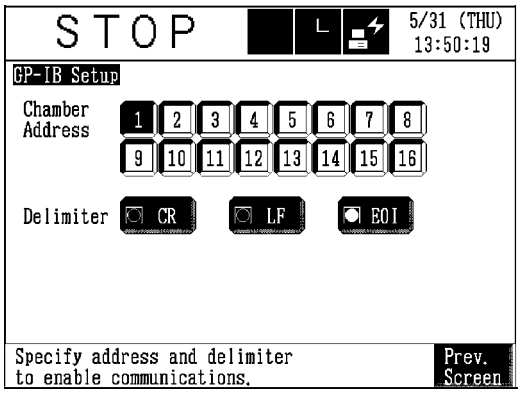
GPIB Communication Setup

Procedure

1. Press the [1] [Communication Setup] box on the Chamber Configuration screen.



2. Press the [GPIB Setup] box on the Communication Setup screen.



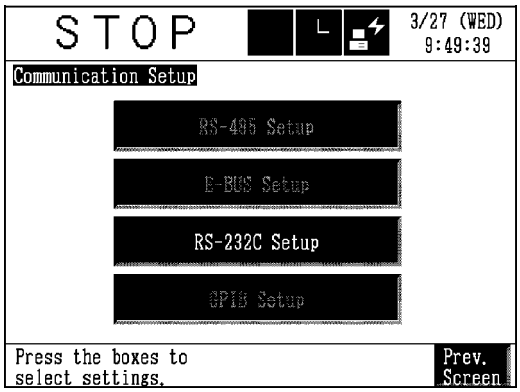
Set the chamber's Address and Delimiter.

This completes setup. Return to the main monitor.

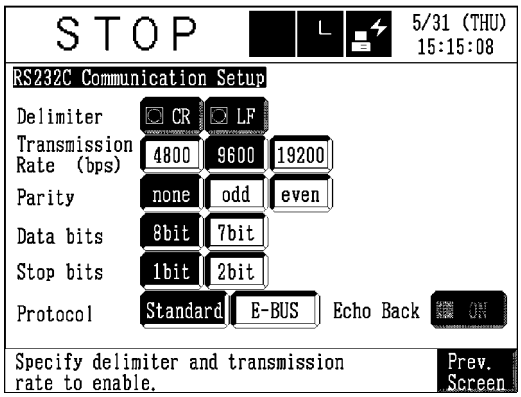
RS-232C Communication Setup

Procedure

1. Press the [1] [Communication Setup] box on the Chamber Configuration screen.



2. Press the [RS-232C Setup] box on the Communication Setup screen.



Set the Delimiter, Transmission Rate, Parity, Data bits and Stop bits. To use echo back, select the "E-BUS" box next to Protocol.

This completes setup. Return to the main monitor.

Chapter 3
Commands

This chapter explains setting commands and monitor commands. It provides format, response data and also examples.

3.1 Command List

Monitor commands and setting commands are listed in Tables 3.1 and 3.2 respectively.

Table 3.1 Monitor command list

Command	Description	Chamber			
		TSA Series	TSE Series	TSB Series	TSD Series
ROM?	Monitors ROM version.	Supported	Supported	Supported	Supported
POWERCUT?	Monitors power recovery mode setting.	Supported	Supported	Supported	Supported
STOPMODE?	Monitors auto shutoff setting.	Supported	Supported	Supported	Supported
G-SOAKTEMP?	Monitors guaranteed soak range setting.	Supported	Supported	Supported	Not supported
DRYTEMP?	Monitors dry mode temperature setting.	Supported	Not supported	Not supported	Not supported
AMBTIME?	Monitors ambient temperature exposure time setting.	Supported	Not supported	Not supported	Not supported
STABLETEMP?	Monitors fluid return temperature settings.	Not supported	Not supported	Supported	Not supported
KEYPROTECT?	Monitors protect feature setting.	Supported	Supported	Supported	Supported
MODE?	Monitors chamber status.	Supported	Supported	Supported	Supported
ASSIGN?	Monitors test pattern No. and name.	Supported	Supported	Supported	Supported
TEMP?	Monitors exposure temperature.	Supported	Supported	Supported	Supported
PRE?	Monitors preheat/precool temperatures.	Supported	Supported	Supported	Supported
TIME?	Monitors current exposure zone and end time of that zone.	Supported	Supported	Supported	Supported
CYCLE?	Monitors test cycle count.	Supported	Supported	Supported	Supported
MODEL?	Monitors chamber model.	Supported	Supported	Supported	Supported
ALARM?	Monitors alarm status.	Supported	Supported	Supported	Supported
FTEMPRET?	Monitors fluid temperature return schedule status.	Not supported	Not supported	Supported	Not supported
TAREA?	Monitors test area (specimen basket) position.	Not supported	Supported	Supported	Supported
LISTTEMP?	Monitors exposure temperature settings of selected test pattern.	Supported	Supported	Supported	Supported
LISTPREAI?	Monitors preheat/precool control setting of selected test pattern.	Supported	Supported	Supported	Supported
LISTPRE?	Monitors preheat/precool temperature settings of selected test pattern.	Supported	Supported	Supported	Supported
LISTTIME?	Monitors exposure time settings of selected test pattern.	Supported	Supported	Supported	Supported
LISTCYCLE?	Monitors test cycles setting of selected test pattern.	Supported	Supported	Supported	Supported
LISTSTART POSITION?	Monitors test start position setting of selected test pattern.	Supported	Supported	Supported	Supported

Cont.

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Command	Description	Chamber			
		TSA Series	TSE Series	TSB Series	TSD Series
LISTPAUSE?	Monitors scheduled test pause setting of selected test pattern.	Supported	Supported	Supported	Supported
LISTG-SOAK?	Monitors guaranteed soak control setting of selected test pattern.	Supported	Supported	Supported	Supported
LISTECONOMY?	Monitors economized operation control setting of selected test pattern.	Supported	Supported	Supported	Supported
LISTEND?	Monitors end mode setting of selected test pattern.	Supported	Supported	Supported	Supported
LISTNAME?	Monitors name of selected test pattern.	Supported	Supported	Supported	Supported
LISTSENSOR?	Monitors sensor position setting of selected test pattern.	Supported	Supported	Not supported	Supported
LISTDEFROST?	Monitors defrost mode setting of selected test pattern.	Supported	Supported	Not supported	Supported
LISTTEMP-L-DEFROST?	Monitors defrost standby position setting of selected test pattern.	Supported	Not supported	Not supported	Not supported
LIST-H-DEFCMP?	Monitors hot box defrost standby control setting of selected test pattern.	Not supported	Supported	Not supported	Supported
LISTQ-EXP?	Monitors quick exposure control setting of selected test pattern.	Supported	Supported	Not supported	Supported
LISTTEMPLIMIT?	Monitors overheat/overcool protection temperature settings of selected test pattern.	Supported	Supported	Supported	Supported
LISTAUXCOOLER?	Monitors auxiliary cooling control setting of selected test pattern.	Supported	Supported	Not supported	Supported
RELAY1?	Monitors external output 1 setting of selected test pattern.	Supported	Supported	Supported	Supported
RELAY2?	Monitors external output 2 setting of selected test pattern.	Supported	Supported	Supported	Supported
LISTDRYMODESET?	Monitors drying mode temperature and time settings of selected test pattern.	Supported	Not supported	Not supported	Not supported
LISTDRYMODE?	Monitors drying mode control setting of selected test pattern.	Supported	Not supported	Not supported	Not supported
STT-SET?	Monitors STT sensor setting.	Not supported	Not supported	Not supported	Supported
STTTEMP?	Monitors specimen temperatures.	Not supported	Not supported	Not supported	Supported
LLISTSTT-TIME?	Monitors STT trigger time setting of selected test pattern.	Not supported	Not supported	Not supported	Supported
LISTSTT-MODE?	Monitors STT sensor using mode setting of selected test pattern.	Not supported	Not supported	Not supported	Supported
LISTP-AMB?	Monitors test pause and ambient temperature return setting of selected test pattern.	Not supported	Not supported	Not supported	Supported
LISTE-AMB?	Monitors test end and ambient temperature return setting of selected test pattern.	Not supported	Not supported	Not supported	Supported
LISTSTT-TRG?	Monitors STT trigger mode setting of selected test pattern.	Not supported	Not supported	Not supported	Supported
LISTSTT-SHIFT-TTIME?	Monitors forced step shift time setting of selected test pattern.	Not supported	Not supported	Not supported	Supported

Table 3.2 Setting command list

Command	Description	Chamber			
		TSA Series	TSE Series	TSB Series	TSD Series
STABLETEMP	Sets fluid return temperatures.	Not supported	Not supported	Supported	Not supported
KEYPROTECT	Turns protect feature ON/OFF.	Supported	Supported	Supported	Supported
OPESTANDBY	Idles chamber.	Supported	Supported	Supported	Supported
OPESETUP	Starts prepping.	Supported	Supported	Supported	Supported
OPESETUPEND	Starts prepping and then starts testing once prepping ends.	Supported	Supported	Supported	Supported
OPETEST	Starts testing.	Supported	Supported	Supported	Supported
OPEHALT	Pauses testing.	Supported	Supported	Supported	Supported
OPERELEASE	Resumes paused test.	Supported	Supported	Supported	Supported
OPECYCLE RESET	Clears remaining cycles.	Supported	Supported	Supported	Supported
OPEHEAT RETURN	Starts fluid temperature return.	Not supported	Not supported	Supported	Not supported
OPEDEFROST	Defrosts chamber.	Supported	Supported	Not supported	Supported
OPEDRY	Starts dry operation.	Supported	Not supported	Not supported	Not supported
OPEPRESET-SETUP	Sets auto prep timer.	Supported	Supported	Supported	Supported
OPEPRESET-TEST	Sets auto start timer.	Supported	Supported	Supported	Supported
OPEPRESET-ON	Starts timers.	Supported	Supported	Supported	Supported
OPEPRESET-CLR	Cancels timers.	Supported	Supported	Supported	Supported
OPEPRESET-HRET-ON	Schedules fluid temperature return.	Not supported	Not supported	Supported	Not supported
OPEPRESET-HRET-CLR	Cancels fluid temperature return.	Not supported	Not supported	Supported	Not supported
ASSIGN	Selects test pattern for running.	Supported	Supported	Supported	Supported
MODE	Sets operating mode.	Supported	Supported	Supported	Supported
PRGMREAD	Opens test pattern for viewing only.	Supported	Supported	Supported	Supported
PRGMREADEND	Closes test pattern opened for viewing.	Supported	Supported	Supported	Supported
READEND	Closes test pattern opened for viewing.	Supported	Supported	Supported	Supported
PRGMWRITE	Opens test pattern for editing.	Supported	Supported	Supported	Supported
PRGMCREATE	Opens test pattern for editing.	Supported	Supported	Supported	Supported
PRGMWRITEEND	Closes test pattern opened for editing.	Supported	Supported	Supported	Supported
WRITEEND	Closes test pattern opened for editing.	Supported	Supported	Supported	Supported
PRGMCREATE END	Closes test pattern opened for editing.	Supported	Supported	Supported	Supported
CREATEEND	Closes test pattern opened for editing.	Supported	Supported	Supported	Supported
TEMP	Sets exposure temperatures in selected test pattern.	Supported	Supported	Supported	Supported

Cont.

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Command	Description	Chamber			
		TSA Series	TSE Series	TSB Series	TSD Series
PREAI	Sets preheat/precool control in selected test pattern.	Supported	Supported	Supported	Supported
PRE	Sets preheat/precool temperatures in selected test pattern.	Supported	Supported	Supported	Supported
TIME	Sets exposure time in selected test pattern.	Supported	Supported	Supported	Supported
CYCLE	Sets test cycles in selected test pattern.	Supported	Supported	Supported	Supported
STARTPOSITION	Sets test start position in selected test pattern.	Supported	Supported	Supported	Supported
DEFROST	Sets defrost mode in selected test pattern.	Supported	Supported	Not supported	Supported
H-DEFCMP	Sets hot box defrost standby control in selected test pattern.	Not supported	Supported	Not supported	Supported
TEMP-L-DEFROST	Sets defrost standby position in selected test pattern.	Supported	Not supported	Not supported	Not supported
PAUSE	Schedule test pausing in selected test pattern.	Supported	Supported	Supported	Supported
Q-EXP	Sets quick exposure control in selected test pattern.	Supported	Supported	Supported	Supported
G-SOAK	Sets guaranteed soak control in selected test pattern.	Supported	Supported	Supported	Supported
ECONOMY	Sets economized operation control in selected test pattern.	Supported	Supported	Supported	Supported
SENSOR	Sets sensor position in selected test pattern.	Supported	Supported	Not supported	Supported
AUXCOOLER	Sets auxiliary cooling control in selected test pattern.	Supported	Supported	Not supported	Supported
END	Sets end mode in selected test pattern.	Supported	Supported	Supported	Supported
NAME	Names selected test pattern.	Supported	Supported	Supported	Supported
TEMPLIMIT	Sets overheat/overcool protection temperatures in selected test pattern.	Supported	Supported	Supported	Supported
RELAY1	Sets external output 1 in selected test pattern.	Supported	Supported	Supported	Supported
RELAY2	Sets external output 2 in selected test pattern.	Supported	Supported	Supported	Supported
DRYMODESET	Sets drying mode temperature and time in selected test pattern.	Supported	Not supported	Not supported	Not supported
DRYMODE	Sets drying mode control in selected test pattern.	Supported	Not supported	Not supported	Not supported
STT-SET	Sets STT sensor in selected test pattern.	Not supported	Not supported	Not supported	Supported
OPEAMB-ON	Starts ambient temperature return in selected test pattern.	Not supported	Not supported	Not supported	Supported
OPEAMB-CLR	Cancel ambient temperature return in selected test pattern.	Not supported	Not supported	Not supported	Supported
STT-TIME	Sets STT trigger time in selected test pattern.	Not supported	Not supported	Not supported	Supported

Cont.

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Command	Description	Chamber			
		TSA Series	TSE Series	TSB Series	TSD Series
STT-MODE	Sets STT sensor using mode in selected test pattern.	Not supported	Not supported	Not supported	Supported
P-AMB	Sets test pause and ambient temperature return in selected test pattern.	Not supported	Not supported	Not supported	Supported
E-AMB	Sets test end and ambient temperature return in selected test pattern.	Not supported	Not supported	Not supported	Supported
STT-TRG	Sets STT trigger mode in selected test pattern.	Not supported	Not supported	Not supported	Supported
STT-SHIFT-TIME	Sets forced step shift time in selected test pattern.	Not supported	Not supported	Not supported	Supported

3.2 Monitor Commands

Monitor commands have the below format.

Main command [, optional parameter]

(1) Monitoring Initial Settings

■To Monitor ROM Version

Table 3.3 ROM version monitor commands

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
ROM?	－	＜Description＞ This command requests the chamber to return the version of the temperature controller ROM.
		＜Example command＞ "ROM?"
		＜Response format＞ "Chamber model ROM version"
		＜Example response＞ "JTBC 1.00"
	DISP	＜Description＞ This command requests the chamber to return the version of the display ROM.
		＜Example command＞ "ROM?, DISP"
		＜Response format＞ "Chamber model ROM version"
		＜Example response＞ "JTBD 1.00.00"

■To Monitor Power Recovery Mode Setting

Table 3.4 Power recovery mode setting monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
POWER CUT?	−	＜Description＞ This command requests the chamber to return the power recovery mode setting.
		＜Example command＞ "POWERCUT?
		＜Response format＞ "mode setting"
		＜Example response＞ "STOP" ● The response differs as follows depending on the setting. When the chamber is set not to resume operation after power recovery: "STOP" When the chamber is set to resume operation after power recovery: "CONTINUE"

■To Monitor Auto Shutoff Setting

Table 3.5 Auto shutoff setting monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
STOP MODE?	−	＜Description＞ This command requests the chamber to return the auto shutoff setting.
		＜Example command＞ "STOPMODE?
		＜Response format＞ "mode setting"
		＜Example response＞ "ON" ● The response differs as follows depending on the setting. When the feature is ON: "ON" When the feature is OFF: "OFF"

■To Monitor Guaranteed Soak Range Setting

Table 3.6 Guaranteed soak range setting monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
G-SOAK TEMP?	−	＜Description＞ This command requests the chamber to return the guaranteed soak (temperature) range setting.
		＜Example command＞ "G-SOAKTEMP?"
		＜Response format＞ "guaranteed soak range setting"
		＜Example response＞ "03" • The guaranteed soak (temperature) range has a fixed 2-character length and ranges from 01 to 10.

■To Monitor Dry Mode Temperature Setting

Table 3.7 Dry mode temperature setting monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
DRY TEMP?	−	＜Description＞ This command requests the chamber to return the dry mode temperature setting.
		＜Example command＞ "DRYTEMP?"
		＜Response format＞ "dry mode temperature setting"
		＜Example response＞ "100" • Dry mode temperature has a fixed 3-character length.

■To Monitor Ambient Temperature Exposure Time Setting

Table 3.8 Ambient temperature exposure time setting monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
AMB TIME?	−	＜Description＞ This command requests the chamber to return the ambient temperature exposure time setting.
		＜Example command＞ "AMBTIME?"
		＜Response format＞ "ambient temperature exposure time setting"
		＜Example response＞ "00:29" • The ambient temperature exposure time setting has the below format. Each time data item has a fixed 2-character length. "hours:minutes"

■To Monitor Fluid Temperature Return Settings

Table 3.9 Fluid temperature return settings monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
STABLE TEMP?	−	＜Description＞ This command requests the chamber to return the fluid temperature return settings.
		＜Example command＞ "STABLETEMP?"
		＜Response format＞ "hot bath fluid temperature return setting, cold bath fluid temperature return setting"
		＜Example response＞ "060, 000" • Each fluid return temperature has a fixed 3-character length.

■To Monitor Protect Feature Setting

Table 3.10 Protect feature setting monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
KEY PROTECT?	−	＜Description＞ This command requests the chamber to return the protect feature setting.
		＜Example command＞ "KEYPROTECT? "
		＜Response format＞ "protect feature setting "
		＜Example response＞ "ON": When feature is ON. (Changes to settings and operating mode are blocked.) "OFF": When feature is OFF. (Changes to settings and operating mode are not blocked.)

■To Monitor STT Sensor Setting

Table 3.11 STT sensor setting monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
STT-SET?	−	＜Description＞ This command requests the chamber to return the STT sensor setting.
		＜Example command＞ "STT-SET?"
		＜Response format＞ ”ON/OFF, ON/OFF, ON/OFF, ON/OFF, ON/OFF”
		＜Example response＞ ”ON, ON, OFF, OFF, OFF” • ”ON”: STT sensor is ON. ”OFF”: STT sensor is OFF. • A setting for 5 channels is returned. • When STT 3-point expansion (option) is not equipped, the following is returned. ”ON, ON, , ,”

(2) Monitoring Operation

■To Monitor Chamber Status

Table 3.12 Chamber status monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
MODE?	−	＜Description＞ This command requests the chamber to return the current chamber status and estimated time that status will end.
		＜Example command＞ "MODE?"
		＜Response format＞ "chamber status, month/day, hours:minutes"
		＜Example response＞ "SETUP,02/22,13:00"

Table 3.13 Chamber status and estimated end time

Chamber status	Response data		Chamber			
	Chamber status	Estimated end time	TSA Series	TSE Series	TSB Series	TSD Series
Primary power ON (Control power OFF)	"POWER-OFF"	(Nothing returned)	Supported	Supported	Supported	Supported
Idling	"STANDBY"	(Nothing returned)	Supported	Supported	Supported	Supported
Fluid temperature return in progress	"STABLETEMP"	Estimated fluid temperature return end time	Not supported	Not supported	Supported	Not supported
Fluid recovery in progress	"RETRIEVING"	(Nothing returned)	Not supported	Not supported	Supported	Not supported
Ambient temperature return in progress	“AMB”	(Nothing returned)	Not supported	Not supported	Not supported	Supported
Manual defrosting in progress	"DEFROST"	Estimated defrost end time	Supported	Supported	Not supported	Supported
Running in dry mode	"DRY"	(Nothing returned)	Supported	Not supported	Not supported	Not supported
Prepping in progress	"SETUP"	Estimated prep end time	Supported	Supported	Supported	Supported
Prepping complete	"READY"	Prep end time	Supported	Supported	Supported	Supported
Testing in progress	"TEST"	Estimated test end time	Supported	Supported	Supported	Supported
Test currently paused	"HALT"	Time testing was paused	Supported	Supported	Supported	Supported
Test currently paused (Ambient temperature return in progress)	“AMB”	Time testing was paused	Not supported	Not supported	Not supported	Supported
Test currently paused (Waiting for defrosting to end)	”HALT”	Time testing was paused	Supported	Supported	Not supported	Supported

Cont.

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Chamber status	Response data		Chamber			
	Chamber status	Estimated end time	TSA Series	TSE Series	TSB Series	TSD Series
Test currently paused Defrosting and ambient temperature return in progress	“AMB”	Time testing was paused	Not supported	Not supported	Not supported	Supported
Testing in progress (Waiting for defrosting to end)	"TEST "	Estimated test end time	Supported	Supported	Not supported	Supported
Testing ended (Prepping in progress)	"END-SETUP"	Time testing ended	Supported	Supported	Supported	Supported
Testing ended (Prepping complete)	"END-READY"	Time testing ended	Supported	Supported	Supported	Supported
Testing ended (Chamber stopped)	"END-OFF"	Time testing ended	Supported	Supported	Supported	Supported
Testing ended (Running in dry mode)	"END-DRY"	Time testing ended	Supported	Not supported	Not supported	Not supported
Testing ended (Running in ambient exposure mode)	"END-AMB"	Time testing ended	Supported	Not supported	Not supported	Not supported
Testing ended Chamber stopped and ambient temperature return in progress	"END-OFF-AMB"	Time testing ended	Not supported	Not supported	Not supported	Supported
Testing ended (Defrosting in progress)	"END-DEFROST"	Estimated time until defrosting ends	Supported	Supported	Not supported	Supported
Testing ended (Fluid temperature return in progress)	"END-STABLETEMP"	Time testing ended	Not supported	Not supported	Supported	Not supported
Testing ended (Fluid recovery in progress)	"END (RECOVER)"	Time testing ended	Not supported	Not supported	Supported	Not supported
Testing ended Defrosting and ambient temperature return in progress	"END-DEF-AMB"	Estimated time until defrosting ends	Not supported	Not supported	Not supported	Supported
Auto prep timer counting down	"WAIT-SETUP"	Prep end time	Supported	Supported	Supported	Supported
Auto start timer counting down	"WAIT-TEST"	Prep end time	Supported	Supported	Supported	Supported

■To Monitor the Test Pattern No. and Name

Table 3.14 Selected test pattern no. and name monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
ASSIGN?	−	＜Description＞ This command requests the chamber to return the No. and name of the currently selected test pattern.
		＜Example command＞ "ASSIGN?"
		＜Response format＞ "RAM:xx/test pattern name" "ROM:xx/test pattern name"
		＜Example response＞ "RAM:02/PATTERN01" • Test pattern Nos. have a fixed 2-character length. • Only the first 14 characters of test pattern names are returned.

■To Monitor Exposure Temperature

Table 3.15 Exposure temperature monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
TEMP?	−	＜Description＞ This command requests the chamber to return temperature data sampled every 10 sec for 1 min. Six temperatures are returned.
		＜Example command＞ "TEMP?"
		＜Response format＞ "hours:minutes, temperature 1, temperature 2, temperature 3, temperature 4, temperature 5, temperature 6"
		＜Example response＞ "12:30, 080, 081, 080, 080, 080, 081" • The time data is the time that temperature data sampling started. • The hours and minutes have each a fixed 2-character length. • Temperature data is returned as it is sampled. • Each exposure temperature has a fixed 3-character length.

■To Monitor Preheat/Precool Temperature

Table 3.16 Preheat/Precool temperature monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
PRE?	−	＜Description＞ This command requests the chamber to return the current temperature of the hot bath/hot box/hot zone and cold bath/cold box/cold zone.
		＜Example command＞ "PRE?"
		＜Response format＞ "preheat temperature, precool temperature"
		＜Example response＞ "165, -77" ● Each temperature has a fixed 3-character length.

■To Monitor Zone End Time

Table 3.17 Zone end time monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
TIME?	−	＜Description＞ This command requests the chamber to return the current exposure zone of the ongoing test pattern and the end time of that zone.
		＜Example command＞ "TIME?"
		＜Response format＞ "exposure zone, end time"
		＜Example response＞ "H, 00:29" ● Exposure zone is returned as follows. During high temperature exposure: "H" During low temperature exposure: "L" During ambient temperature exposure: "A" ● The end time is returned as follows. For TSA chambers: "hours:minutes" For TSE chambers: "hours:minutes" For TSB chambers: "minutes:seconds" For TSD chambers: "hours:minutes" Each time data item has a fixed 2-character length. ● An error is returned if a test is not underway.

■To Monitor Test Cycle Count

Table 3.18 Test cycle count monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
CYCLE?	−	＜Description＞ This command requests the chamber to return the set number of test cycles in the current test pattern and the number of executed cycles.
		＜Example command＞ "CYCLE?"
		＜Response format＞ "number of executed test cycles, set number of cycles"
		＜Example response＞ "0100, 9999" • If testing is not in progress, “0000” is returned for the number of executed cycles. • Each test cycle data item has a fixed 4-character length.

■To Monitor Chamber Model

Table 3.19 Chamber model monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
MODEL?	−	＜Description＞ This command requests the chamber to return its model code.
		＜Example command＞ "MODEL?"
		＜Response format＞ "model code"
		＜Example response＞ "TSB-51"

■To Monitor Alarm Status

Table 3.20 Alarm status monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
ALARM?	—	＜Description＞ This command requests the chamber to return the alarm codes of currently active alarms.
		＜Example command＞ "ALARM?"
		＜Response format＞ "number of active alarms [, alarm code, alarm code,…]"
		＜Example response＞ "02, 1, 10" • The number of active alarms has a fixed 2-character length (total up to 6 characters). • Alarm codes are of variable length. Alarms codes 0 to 9 are one character long, while those 10 to 99 are two characters long.

Table 3.21 Alarm codes

Alarm code	Alarm	Chamber			
		TSA Series	TSE Series	TSB Series	TSD Series
1	Phase reversed	Supported	Supported	Supported	Supported
2	Burn-out Ai-CH5	Supported	Supported	Supported	Supported
3	Burn-out Ai-CH1	Supported	Supported	Supported	Supported
4	Burn-out Ai-CH2	Supported	Supported	Not supported	Supported
5	Burn-out Ai-CH6	Supported	Supported	Supported	Supported
7	Burn-out Ai-CH0	Supported	Supported	Supported	Supported
9	Overheat protector trip	Supported	Supported	Supported	Supported
10	Overcool protector trip	Supported	Supported	Supported	Supported
11	Overheating (test area)	Supported	Supported	Supported	Supported
12	Overcooling (test area)	Supported	Supported	Supported	Supported
13	Hot bath/hot box/hot zone abs. high limit temp.	Supported	Supported	Supported	Supported
14	Cold bath/cold box/cold zone abs. high limit temp.	Supported	Supported	Supported	Supported
16	Hot box/hot zone circulator failure	Supported	Supported	Not supported	Supported
19	Cold box/cold zone circulator failure	Supported	Supported	Not supported	Supported
21	Refrig. condenser fan failure	Supported	Supported	Supported	Not supported
22	Water suspension relay trip	Supported	Supported	Supported	Supported
23	Hi stage refrig.(1) overcurrent	Not supported	Supported	Supported	Not supported
24	High stage high-pressure failure (1)	Supported	Supported	Supported	Supported

Cont.

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Alarm code	Alarm	Chamber			
		TSA Series	TSE Series	TSB Series	TSD Series
25	High stage refrig.(1) surface temp. failure	Supported	Supported	Supported	Supported
26	Low stage refrig.(1) overcurrent	Not supported	Supported	Supported	Not supported
27	Low stage high-pressure failure (1)	Supported	Supported	Supported	Supported
28	Low stage refrig.(1) surface temp. failure	Supported	Supported	Supported	Supported
39	Test area position failure	Not supported	Supported	Not supported	Supported
40	Specimen basket shift failure Test area shift/drive failure	Not supported	Supported	Supported	Supported
41	Transfer failure/Elevating unit failure	Not supported	Supported	Not supported	Supported
42	Specimen transfer motor failure/specimen elevating motor error	Not supported	Supported	Not supported	Supported
45	Cold bath/cold box/cold zone abs. low limit temp	Supported	Supported	Supported	Supported
46	Burn-out Ai-CH3	Supported	Supported	Supported	Not supported
47	Disconnection in other temperature sensor	Supported	Supported	Supported	Supported
48	Other system error	Supported	Supported	Supported	Supported
49	Boil-dry	Not supported	Not supported	Supported	Not supported
50	High stage refrig.(2) overcurrent	Not supported	Not supported	Supported	Not supported
51	High stage high-pressure failure (2)	Not supported	Not supported	Supported	Not supported
52	High stage refrig.(2) surface temp. failure	Not supported	Not supported	Supported	Not supported
55	Low stage refrig.(2) overcurrent	Not supported	Not supported	Supported	Not supported
56	Low stage high-pressure failure (2)	Not supported	Not supported	Supported	Not supported
57	Low stage refrig.(2) surface temp. failure	Not supported	Not supported	Supported	Not supported
60	Recovering air circulator	Not supported	Not supported	Supported	Not supported
61	Air supply circuit down	Supported	Not supported	Supported	Not supported
62	Circuit protector trip	Supported	Not supported	Supported	Supported
63	Low fluid level warning (hot bath)	Not supported	Not supported	Supported	Not supported
64	Low fluid level warning (cold bath)	Not supported	Not supported	Supported	Not supported
65	Hot bath agitator failure	Not supported	Not supported	Supported	Not supported
66	Cold bath agitator failure	Not supported	Not supported	Supported	Not supported
67	High temp : air circulator 2	Supported	Not supported	Not supported	Not supported
68	Low temp : air circulator 2	Supported	Not supported	Not supported	Not supported

Cont.

Cont. from the previous page

Alarm code	Alarm	Chamber			
		TSA Series	TSE Series	TSB Series	TSD Series
69	Amb temp : air circulator	Supported	Not supported	Not supported	Not supported
71	Frosted over	Supported	Not supported	Not supported	Supported
73	Ext. equipment failure (ALM)	Not supported	Not supported	Not supported	Supported
74	Water leak	Not supported	Not supported	Not supported	Supported
75	Specimen temp sensor error	Not supported	Not supported	Not supported	Supported
81	Door open	Not supported	Supported	Not supported	Supported
82	Door open (at test start)	Not supported	Supported	Not supported	Supported
83	Low air supply pressure	Supported	Not supported	Supported	Not supported
84	Specimen in/out panel open (during testing)	Not supported	Not supported	Supported	Not supported
85	Specimen in/out panel open (at test start)	Not supported	Not supported	Supported	Not supported
86	Test area door open	Supported	Not supported	Not supported	Not supported
87	Test area door open	Supported	Not supported	Not supported	Not supported
90	STT exposure time	Not supported	Not supported	Not supported	Supported
91	Ext. equipment failure (WAR)	Not supported	Not supported	Not supported	Supported
92	Specimen temp sensor 1 error	Not supported	Not supported	Not supported	Supported
93	Specimen temp sensor 2 error	Not supported	Not supported	Not supported	Supported
94	Specimen temp sensor 3 error	Not supported	Not supported	Not supported	Supported
95	Specimen temp sensor 4 error	Not supported	Not supported	Not supported	Supported
96	Specimen temp sensor 5 error	Not supported	Not supported	Not supported	Supported

■To Monitor Fluid Temperature Return Schedule Status

Table 3.22 Fluid temperature return schedule status monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
FTEMPRET?	−	＜Description＞ This command requests the chamber to return the schedule status of fluid temperature return.
		＜Example command＞ "FTEMPRET?"
		＜Response format＞ "fluid temperature return schedule status"
		＜Example response＞ "ON": When fluid temperature return is scheduled for operation. "OFF": When fluid temperature return is not scheduled for operation.

■To Monitor Test Area (Specimen Basket) Position

Table 3.23 Test area (specimen basket) position monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
TAREA?	−	＜Description＞ This command requests the chamber to return the position of the test area (specimen basket).
		＜Example command＞ "TAREA? "
		＜Response format＞ "position"
		＜Example response＞ "MOVE" • The position is returned as follows. "MOVE": The test area (specimen basket) is currently moving. "H": The test area is in the hot bath/box. "C": The test area is in the cold bath/box. "HU": The test area is at the upper end of the hot bath/box. "CU": The test area is at the upper end of the cold bath/box.

■To Monitor Specimen Temperature

Table 3.24 Specimen temperature monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
STTTEMP?	−	＜Description＞ This command requests the chamber to return the specimen temperature.
		＜Example command＞ "STTTEMP?"
		＜Response format＞ "specimen temperature Ch1, specimen temperature Ch2, specimen temperature Ch3, specimen temperature Ch4, specimen temperature Ch5"
		＜Example response＞ ”100, 098, 097, 096, 101” • Each temperature has a fixed 3-character length. (integer number) • When STT 3-point expansion (option) is not equipped, the following is returned. ”100, 098, , ,” • “E” is displayed when the temperature detection by STT sensor is invalid (Specimen temp sensor error, communicatuion error). ”100, E, 098, 099, 097”

(3) Monitoring Test Patterns

- To monitor test patterns with these monitor commands, it is necessary to first open a test pattern.

(Example: To monitor test pattern No. 1)

"PRGMREAD, RAM:01"
"LISTTEMP?"
"LISTTIME?"
・
・
"PRGMREADEND"

■To Monitor Test Pattern Exposure Temperature Settings

Table 3.25 Test pattern exposure temperature settings monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
LIST TEMP?	−	＜Description＞ This command requests the chamber to return the high temperature and low temperature settings in the selected test pattern.
		＜Example command＞ "LISTTEMP?"
		＜Response format＞ "high temperature setting, low temperature setting"
		＜Example response＞ "100, -65" • Each exposure temperature has a fixed 3-character length.

■To Monitor Test Pattern Preheat/Precool Mode Setting

Table 3.26 Test pattern preheat/precool control setting monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
LIST PREAI?	−	＜Description＞ This command requests the chamber to return the preheat/precool control setting in the selected test pattern.
		＜Example command＞ "LISTPREAI?"
		＜Response format＞ "control setting"
		＜Example response＞ "ON" • The response differs as follows depending on the setting. When either preheat or precool control or both are set to the auto mode: "ON" When both preheat and precool control are set to the manual mode: "OFF"

■To Monitor Test Pattern Preheat/Precool Temperature Settings

Table 3.27 Test pattern preheat/precool temperature settings monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
LIST PRE?	—	＜Description＞ This command requests the chamber to return the preheat/precool temperature settings in the selected test pattern.
		＜Example command＞ "LISTPRE?"
		＜Response format＞ "preheat temperature setting, precool temperature setting"
		＜Example response＞ "165, -77" • Each temperature has a fixed 3-character length.

■To Monitor Test Pattern Exposure Time Settings

Table 3.28 Test pattern exposure time settings monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
LIST TIME?	—	＜Description＞ This command requests the chamber to return the exposure time settings in the selected test pattern.
		＜Example command＞ "LISTTIME?"
		＜Response format＞ "ambient temperature exposure time setting, high temperature exposure time setting, low temperature exposure time setting"
		＜Example response＞ "00:00, 00:30, 10:00" • Exposure time is returned as follows. For TSA chambers: "hours:minutes" For TSE chambers: "hours:minutes" For TSB chambers: "minutes:seconds" For TSD chambers: "hours:minutes" (Each time data item has a fixed 2-character length.) • With TSE and TSD chambers, ambient exposure time is fixed to “00:00”. • The following error is returned when a test pattern which uses the STT function is specified as viewing mode. "NA:PRGM RD ERR-21"

■To Monitor Test Pattern Test Cycle Setting

Table 3.29 Test pattern test cycle setting monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
LIST CYCLE?	−	＜Description＞ This command requests the chamber to return the set number of test cycles in the selected test pattern.
		＜Example command＞ "LISTCYCLE?"
		＜Response format＞ "set number of cycles"
		＜Example response＞ "0999" • The test cycle setting has a fixed 4-character length.

■To Monitor Test Pattern Test Start Position Setting

Table 3.30 Test pattern test start position setting monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
LIST START POSITION?	−	＜Description＞ This command requests the chamber to return the test start position setting in the selected test pattern.
		＜Example command＞ "LISTSTARTPOSITION?"
		＜Response format＞ "start position setting"
		＜Example response＞ "H" • The response differs as follows depending on the setting. When set to start from high temperature exposure: "H" When set to start from low temperature exposure: "L"

■To Monitor Test Pattern Scheduled Test Pause Setting

Table 3.31 Test pattern scheduled test pause setting monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
LIST PAUSE?	−	＜Description＞ This command requests the chamber to return the scheduled test pause setting in the selected test pattern.
		＜Example command＞ "LISTPAUSE?"
		＜Response format＞ "mode setting, number of pause test cycle setting"
		＜Example response＞ "ON, 0010" • The response differs as follows depending on the setting. When scheduled test pause control is OFF: "OFF, 0000" When the scheduled test pause control is ON: "ON, number of pause test cycle setting" • The number of cycles after which the test pauses has a fixed 4-character length.

■To Monitor Test Pattern Guaranteed Soak Control Setting

Table 3.32 Test pattern guaranteed soak control setting monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
LIST G-SOAK?	−	＜Description＞ This command requests the chamber to return the guaranteed soak control setting in the selected test pattern.
		＜Example command＞ "LISTG-SOAK?"
		＜Response format＞ "guaranteed soak control setting"
		＜Example response＞ "ON" • The response differs as follows depending on the setting. When guaranteed soak control is ON: "ON" When guaranteed soak control is OFF: "OFF" • The following error is returned when a test pattern which uses the STT function is specified as viewing mode. "NA:PRGM RD ERR-21"

■To Monitor Test Pattern Economized Operation Control Setting

Table 3.33 Test pattern economized operation control setting monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
LIST ECONOMY?	—	＜Description＞ This command requests the chamber to return the economized operation control setting in the selected test pattern.
		＜Example command＞ "LISTECONOMY?"
		＜Response format＞ "economized operation control setting"
		＜Example response＞ "ON" ● The response differs as follows depending on the setting in the selected test pattern. When the economized operation is ON: "ON" When the economized operation is OFF:"OFF" ● The following error is returned when a test pattern which uses the STT function is specified as viewing mode. "NA:PRGM RD ERR-21"

■To Monitor Test Pattern End Mode Setting

Table 3.34 Test pattern end mode setting monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
LIST END?	—	＜Description＞ This command requests the chamber to return the end mode setting in the selected test pattern.
		＜Example command＞ "LISTEND?"
		＜Response format＞ "end mode setting"
		＜Example response＞ "OFF" ● The response differs as follows depending on the setting. When the chamber is set to stop at test end: "OFF" When the chamber is set to return fluid temperature at test end and then stop: "HEATRETURN" When the chamber is set to prep at test end: "SETUP" When the chamber is set to defrost at test end and then stop: "DEFROST" When the chamber is set to run a dry operation at test end and then stop: "DRY" When the chamber is set to restore ambient temperature at test end and then stop: "AMB"

■To Monitor Test Pattern Name

Table 3.35 Test pattern name monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
LISTNAME?	—	＜Description＞ This command requests the chamber to return the name of the selected test pattern.
		＜Example command＞ "LISTNAME?"
		＜Response format＞ "test pattern name"
		＜Example response＞ "PATTERN-01" • Only the first 14 characters of test pattern names are returned. If the name is shorter than 14 characters, the remaining spaces are filled with blanks.

■To Monitor Test Pattern Sensor Position Setting

Table 3.36 Test pattern sensor position setting monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
LIST SENSOR?	—	＜Description＞ This command requests the chamber to return the sensor position setting in the selected test pattern.
		＜Example command＞ "LISTSENSOR?"
		＜Response format＞ "sensor position setting"
		＜Example response＞ "UP" • The response differs as follows depending on the setting. When using the upstream sensor: "UP" When using the downstream sensor: "DOWN"

■To Monitor Test Pattern Defrost Mode Setting

Table 3.37 Test pattern defrost mode setting monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
LIST DEFROST?	—	＜Description＞ This command requests the chamber to return the defrost mode setting in the selected test pattern.
		＜Example command＞ "LISTDEFROST?"
		＜Response format＞ "number of defrost cycle or defrost mode setting"
		＜Example response＞ "0050" "AI" "NO" • The response differs as follows depending on the setting. When set to cycle defrosting: Set defrost cycle count (Fixed 4-character length) When set to auto defrosting: "AI" When defrosting is turned OFF: "NO"

■To Monitor Test Pattern Defrost Standby Position Setting

Table 3.38 Test pattern defrost standby position setting monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
LIST TEMP-L- DEFROST?	—	＜Description＞ This command requests the chamber to return the defrost standby position setting in the selected test pattern.
		＜Example command＞ "LISTTEMP-L-DEFROST?"
		＜Response format＞ "defrost standby position setting"
		＜Example response＞ "H" • The response differs as follows depending on the setting. When set to high temperature: "H" When set to ambient temperature: "A"

■To Monitor Test Pattern Hot Box Defrost Standby Control Setting

Table 3.39 Test pattern hot box defrost standby control setting monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
LIST-H-DEFCMP?	—	＜Description＞ This command requests the chamber to return the hot box defrost standby control setting in the selected test pattern.
		＜Example command＞ "LIST-H-DEFCMP?"
		＜Response format＞ "hot box defrost standby control setting"
		＜Example response＞ "ON" ● The response differs as follows depending on the setting. When hot box defrost standby control is ON from the end of the current cycle until defrosting ends and the next low temperature cycle starts: "ON" When hot box defrost standby control is OFF from the end of the current cycle until defrosting ends and the next low temperature cycle starts: "OFF"

■To Monitor Test Pattern Quick Exposure Control Setting

Table 3.40 Test pattern quick exposure control setting monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
LIST Q-EXP?	—	＜Description＞ This command requests the chamber to return the quick exposure control setting in the selected test pattern.
		＜Example command＞ "LISTQ-EXP? "
		＜Response format＞ "quick exposure control"
		＜Example response＞ "ON" ● The response differs as follows depending on the setting. When the quick exposure control is ON: "ON" When the quick exposure control is OFF: "OFF" ● The following error is returned when a test pattern which uses the STT function is specified as viewing mode. "NA:PRGM RD ERR-21"

■To Monitor Test Pattern Overheat/Overcool Protection Temperature Settings

Table 3.41 Test pattern overheat/overcool protection temperature settings monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
LIST TEMPLIMIT?	—	＜Description＞ This command requests the chamber to return the overheat/overcool protection temperature settings in the selected test pattern.
		＜Example command＞ "LISTTEMPLIMIT? "
		＜Response format＞ "overheat protection temperature setting, overcool protection temperature setting"
		＜Example response＞ "175, -75" ● Each temperature has a fixed 3-character length.

■To Monitor Test Pattern Auxiliary Cooling Control Setting

Table 3.42 Test pattern auxiliary cooling control setting monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
LIST AUX COOLER?	—	＜Description＞ This command requests the chamber to return the auxiliary cooling control setting in the selected test pattern.
		＜Example command＞ "LISTAUXCOOLER? "
		＜Response format＞ "auxiliary cooling control setting"
		＜Example response＞ ● The response differs as follows depending on the setting. When auxiliary cooling control is ON: "ON" When auxiliary cooling control is OFF: "OFF" ● The auxiliary cooler is an option, therefore, if the chamber is not equipped with the cooler, an error is returned.

■To Monitor Test Pattern External Output 1 Setting

Table 3.43 Test pattern external output 1 setting monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
LIST RELAY1?	—	＜Description＞ This command requests the chamber to return the external output 1 setting in the selected test pattern.
		＜Example command＞ "LISTRELAY1? "
		＜Response format＞ "output setting"
		＜Example response＞ "9" ● The setting is returned as follows. 1 : When the signal is sent at test start 2 : When the signal is sent during high temperature exposure 3 : When the signal is sent during low temperature exposure 4*: When the signal is sent at the end of high temperature exposure 5*: When the signal is sent at the end of low temperature exposure 6 : When the signal is sent only while the high exposure temperature is attained 7 : When the signal is sent only while the low exposure temperature is attained 8 : When the signal is sent if and while testing is paused 9 : When signal output is OFF 10 : When the signal is sent during ambient temperature exposure 11*: When the signal is sent at the end of ambient temperature exposure * The signal is held for 5 sec.

■To Monitor Test Pattern External Output 2 Setting

Table 3.44 Test pattern external output 2 setting monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
LIST RELAY2?	—	＜Description＞ This command requests the chamber to return the external output 2 setting in the selected test pattern.
		＜Example command＞ "LISTRELAY2? "
		＜Response format＞ "output setting"
		＜Example response＞ "9" ● The setting is returned as follows. 1 : When the signal is sent at test start 2 : When the signal is sent during high temperature exposure 3 : When the signal is sent during low temperature exposure 4*: When the signal is sent at the end of high temperature exposure 5*: When the signal is sent at the end of low temperature exposure 6 : When the signal is sent only while the high exposure temperature is attained 7 : When the signal is sent only while the low exposure temperature is attained 8 : When the signal is sent if and while testing is paused 9 : When signal output is OFF 10 : When the signal is sent during ambient temperature exposure 11*: When the signal is sent at the end of ambient temperature exposure * The signal is held for 5 sec.

■To Monitor Drying Mode Temperature and Time Settings

Table 3.45 Test pattern drying mode temperature and time settings monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
LIST DRYMODESET?	−	＜Description＞ This command requests the chamber to return the drying mode temperature and time settings in the selected test pattern.
		＜Example command＞ "LISTDRYMODESET? "
		＜Response format＞ "drying mode temperature, drying mode time"
		＜Example response＞ "050, 00:30" ● The temperature setting has a fixed 3-character length. ● The time setting has the below format. The time data has a fixed 2-character length. "hours:minutes"

■To Monitor Test Pattern Drying Mode Control Setting

Table 3.46 Test pattern drying mode control setting monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
LIST DRYMODE?	−	＜Description＞ This command requests the chamber to return the drying mode control setting in the selected test pattern.
		＜Example command＞ "LISTDRYMODE? "
		＜Response format＞ "drying mode control setting"
		＜Example response＞ "ON" or "OFF" ● The response differs as follows depending on the setting. When drying mode control is ON: "ON" When drying mode control is OFF: "OFF"

■To Monitor Test Pattern STT Trigger Time Setting

Table 3.47 Test pattern STT trigger time setting monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
LISTSTT-TIME?	—	＜Description＞ This command requests the chamber to return the STT trigger time setting in the selected test pattern.
		＜Example command＞ "LISTSTT-TIME? "
		＜Response format＞ "ambient temperature exposure trigger time setting, high temperature exposure trigger time setting, low temperature exposure trigger time setting"
		＜Example response＞ "00:00, 00:30, 10:00" • Exposure trigger time is returned as follows. "hours:minutes" (Each time has a fixed 2-character length.) • Ambient temperature exposure trigger time is fixed to "00:00". • The following error is returned when a test pattern which uses the STT function is specified as viewing mode. "NA:PRGM RD ERR-20"

■To Monitor Test Pattern STT Sensor Using Mode Setting

Table 3.48 Test pattern STT sensor using mode setting monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
LISTSTT-MODE?	—	＜Description＞ This command requests the chamber to return the STT sensor using mode setting in the selected test pattern.
		＜Example command＞ "LISTSTT-MODE? "
		＜Response format＞ "MODE1" or “MODE2”
		＜Example response＞ "MODE1" • The response differs as follows depending on the setting. ALWAYS: "MODE1" 5 CYCLES: "MODE2" • The following error is returned when a test pattern which uses the STT function is specified as viewing mode. "NA:PRGM RD ERR-20"

■To Monitor Test Pattern Test Pause and Ambient Temperature Return Setting

Table 3.49 Test pattern test pause and ambient temperature return setting monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
LISTP-AMB?	—	＜Description＞ This command requests the chamber to return the test pause and ambient temperature return setting in the selected test pattern.
		＜Example command＞ "LISTP-AMB? "
		＜Response format＞ "test pause and ambient temperature return setting"
		＜Example response＞ "ON" ● The response differs as follows depending on the setting. When test pause and ambient temperature return is ON: "ON" When test pause and ambient temperature return is OFF: "OFF"

■To Monitor Test Pattern Test End and Ambient Temperature Return Setting

Table 3.50 Test pattern test end and ambient temperature return setting monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
LISTE-AMB?	—	＜Description＞ This command requests the chamber to return the test end and ambient temperature return setting in the selected test pattern.
		＜Example command＞ "LISTE-AMB? "
		＜Response format＞ "test end and ambient temperature return setting"
		＜Example response＞ "ON" ● The response differs as follows depending on the setting. When test end and ambient temperature return is ON: "ON" When test end and ambient temperature return is OFF: "OFF"

■To Monitor Test Pattern STT Trigger Mode Setting

Table 3.51 Test pattern STT trigger mode setting monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
LISTSTT-TRG?	—	＜Description＞ This command requests the chamber to return the STT trigger mode setting in the selected test pattern.
		＜Example command＞ "LISTSTT-TRG? "
		＜Response format＞ "STT trigger mode setting”
		＜Example response＞ ● The response differs as follows depending on the setting. AUTO: "AUTO" SELECT: "1" to “2” (Select "1" to "5" when STT 3-point expansion (option) is equipped.) ● The following error is returned when a test pattern which uses the STT function is specified as viewing mode. "NA:PRGM RD ERR-20"

■To Monitor Test Pattern Forced Step Shift Time Setting

Table 3.52 Test pattern forced step shift time setting monitor command

Monitor command		Description/Example command/Response format/Example response
Main command	**Optional parameter**	
LISTSTT-SHIFT-TIME?	—	＜Description＞ This command requests the chamber to return the forced step shift time setting in the selected test pattern.
		＜Example command＞ "LISTSTT-SHIFT-TIME? "
		＜Response format＞ " forced step shift time”
		＜Example response＞ ● Time data is returned by the minute. ● The forced step shift time setting is of variable length. ● The following error is returned when a test pattern which uses the STT function is specified as viewing mode. "NA:PRGM RD ERR-20"

3.3 Setting Commands

Setting commands have the below format.

Main command [, optional parameter] , setting data

Whether the chamber can accept a particular setting command or not depends on chamber status. See Table 3.109 Setting command acceptance conditions.

(1) Making Initial Settings

■To Set Fluid Return Temperature

Table 3.53 Fluid return temperature setting command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
STABLETEMP	−	"hot bath fluid return temperature, cold bath fluid return temperature"	＜Description＞ This command sets the fluid return temperatures.
			＜Setting data format＞ "xxx, xxx"
			＜Example command＞ "STABLETEMP, 060, 000" • Set settings to a fixed 3-character length. • Setting range is as follows. Hot bath fluid return temperature: 040 to 150 Cold bath fluid return temperature: -65 to 030

■To Turn Protect Feature ON/OFF

Table 3.54 Protect feature ON/OFF setting command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
KEYPROTECT	−	setting	＜Description＞ This command turns the protect feature ON/OFF.
			＜Setting data format＞ "ON" or "OFF"
			＜Example command＞ "KEYPROTECT, ON" • "ON" turns the protect feature ON. Changes to settings and operating mode will be blocked. • "OFF" turns the protect feature OFF. Changes to settings and operating mode will not be blocked.

■To Set STT Sensor ON/OFF

Table 3.55 STT sensor ON/OFF setting command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
STT-SET	−	setting channel, ON/OFF setting	＜Description＞ This command sets each STT sensor ON/OFF.
			＜Setting data format＞ Setting ch, "ON" or "OFF"
			＜Example command＞ "STT-SET, 1, ON" "STT-SET, 2, OFF" "STT-SET, ALL, OFF, ON" • Setting channels "1" and "2" can be set. (Setting channels "1" to "5" can be set when STT 3-point expansion (option) is equipped.) • When "ALL" is selected, setting channels “1” and “2” can be set. (Setting channels "1" to "5" can be set when STT 3-point expansion (option) is equipped.) • "ON": STT sensor is ON (usable). • "OFF": STT sensor is OFF (nonusable). • The following error is returned when setting channel is out of range. (standard specification: "1" to "2", when STT 3-point expansion (option) is equipped: "1" to "5") "NA:DATA OUT OF RANGE"

(2) Making Operation Settings

■To Idle the Chamber

Table 3.56 Idle command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
OPESTANDBY	−	−	＜Description＞ This command idles the chamber.
			＜Setting data format＞ −
			＜Example command＞ "OPESTANDBY"

■To Start Prepping

Table 3.57 Prepping start command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
OPESETUP	−	−	＜Description＞ This command starts prepping.
			＜Setting data format＞ −
			＜Example command＞ "OPESETUP"

■To Prep the Chamber and Start Testing After Prepping

Table 3.58 Prep and test start command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
OPESETUPEND	−	−	＜Description＞ This command starts prepping and then starts testing once prepping has finished.
			＜Setting data format＞ −
			＜Example command＞ "OPESETUPEND"

■To Start Testing

Table 3.59 Test start command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
OPETEST	—	—	＜Description＞ This command starts testing.
			＜Setting data format＞ —
			＜Example command＞ "OPETEST"

■To Pause Testing

Table 3.60 Test pause command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
OPEHALT	—	—	＜Description＞ This command pauses the ongoing test.
			＜Setting data format＞ —
			＜Example command＞ "OPEHALT"

■To Resume Testing

Table 3.61 Test resume command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
OPERELEASE	—	—	＜Description＞ This command resumes the paused test.
			＜Setting data format＞ —
			＜Example command＞ "OPERELEASE"

■**To Clear Remaining Cycles**

Table 3.62 Remaining cycles clear command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
OPECYCLE RESET	—	—	＜Description＞ This command clears the number of remaining test cycles.
			＜Setting data format＞ —
			＜Example command＞ "OPECYCLERESET"

■**To Start Fluid Temperature Return**

Table 3.63 Fluid temperature return start command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
OPEHEAT RETURN	—	—	＜Description＞ This command starts fluid temperature return.
			＜Setting data format＞ —
			＜Example command＞ "OPEHEATRETURN "

■**To Defrost the Chamber**

Table 3.64 Chamber defrost command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
OPEDEFROST	—	—	＜Description＞ This command starts defrosting operations.
			＜Setting data format＞ —
			＜Example command＞ "OPEDEFROST"

■To Start a Dry Operation

Table 3.65 Dry operation start command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
OPEDRY	—	—	＜Description＞ This command starts drying operations.
			＜Setting data format＞ —
			＜Example command＞ "OPEDRY"

■To Set the Auto Prep Timer

Table 3.66 Auto prep timer setting command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
OPEPRESET-SETUP	—	date and time	＜Description＞ This command sets the auto prep timer to a preferred end time. Prepping will start when this timer overflows.
			＜Setting data format＞ "month/day, hours:minutes"
			＜Example command＞ "OPEPRESET-SETUP, 03/05,19:21" • Set each date and time item to a fixed 2-character length.

■To Set the Auto Start Timer

Table 3.67 Auto start timer setting command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
OPEPRESET-TEST	—	date and time	＜Description＞ This command sets the auto start timer to a preferred start time. Testing will start when this timer overflows.
			＜Setting data format＞ "month/day, hours:minutes"
			＜Example command＞ "OPEPRESET-TEST, 03/05, 9:21" • Set each date and time item to a fixed 2-character length.

■**To Start Timers**

Table 3.68 Timer start command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
OPEPRESET-ON	—	—	＜Description＞ This command starts set timers.
			＜Setting data format＞ —
			＜Example command＞ "OPEPRESET-ON" ● Timers cannot start if set to a time that does not allow enough time to prep the chamber.

■**To Cancel Timers**

Table 3.69 Timer cancel command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
OPEPRESET-CLR	—	—	＜Description＞ This command cancels running timers.
			＜Setting data format＞ —
			＜Example command＞ "OPEPRESET-CLR" ● The command is not valid unless a timer is running.

■**To Schedule Fluid Temperature Return**

Table 3.70 Fluid temperature return schedule command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
OPEPRESET-HRET-ON	—	—	＜Description＞ This command schedules fluid temperature return.
			＜Setting data format＞ —
			＜Example command＞ "OPEPRESET-HRET-ON" ● This command is valid only while testing is in progress. An error is returned if this command is sent in any other situation.

■To Cancel Fluid Temperature Return Schedule

Table 3.71 Fluid temperature returen cancel setting command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
OPEPRESET-HRET-CLR	—	—	＜Description＞ This command cancels scheduled fluid temperature return.
			＜Setting data format＞ —
			＜Example command＞ "OPEPRESET-HRET-CLR" ● This command is valid only when fluid temperature return is scheduled for operation. An error is returned if this command is sent in any other situation.

■To Select a Test Pattern for Running

Table 3.72 Test pattern select (run) command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
ASSIGN	—	Test pattern No.	＜Description＞ This command selects a test pattern for operation.
			＜Setting data format＞ "ROM:pattern No." or "RAM:pattern No."
			＜Example command＞ "ASSIGN, RAM:01" ● Set pattern Nos. to a fixed 2-character length. ● This command is not accepted while testing is in progress.

■To Set Operating Mode

Table 3.73 Operating mode setting command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
MODE	—	operating mode	＜Description＞ This command sets the operating mode.
			＜Setting data format＞ "operating mode"
			＜Example command＞ "MODE, OFF"

Table 3.74 Operating modes and setting commands

Command	Operating mode	Chamber			
		TSA Series	TSE Series	TSB Series	TSD Series
OFF	Turns control panel OFF.	Supported	Supported	Supported	Supported
STANDBY	Idles the chamber.	Supported	Supported	Supported	Supported
SETUP	Starts prepping.	Supported	Supported	Supported	Supported
SETUPEND	Starts prepping and starts testing once prepping ends.	Supported	Supported	Supported	Supported
TEST	Starts testing.	Supported	Supported	Supported	Supported
HALT	Pauses testing.	Supported	Supported	Supported	Supported
RELEASE	Resumes testing.	Supported	Supported	Supported	Supported
HEATRETURN	Starts fluid temperature return.	Not supported	Not supported	Supported	Not supported
HRET-ON	Schedules fluid temperature return.	Not supported	Not supported	Supported	Not supported
HRET-CLR	Cancel scheduled fluid temperature return.	Not supported	Not supported	Supported	Not supported
BOXMOVE-H	Requests specimen basket horizontal movement.	Not supported	Not supported	Supported	Not supported
BOXMOVE-V	Requests specimen basket vertical movement.	Not supported	Not supported	Supported	Not supported
DEFROST	Defrosts the chamber.	Supported	Supported	Not supported	Supported
TAREAMOVE	Moves the test area.	Not supported	Supported	Not supported	Supported
DRY	Starts a drying operation.	Supported	Not supported	Not supported	Not supported
AMB-ON	Starts ambient temperature return.	Not supported	Not supported	Not supported	Supported
AMB-CLR	Cancel ambient temperature return.	Not supported	Not supported	Not supported	Supported

■To Start Ambient Temperature Return

Table 3.75 Ambient temperature return starting command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
OPEAMB-ON	—	—	＜Description＞ This command starts ambient temperature return.
			＜Setting data format＞ —
			＜Example command＞ "OPEAMB-ON" • Can be used only in the following operation states. • On standby • Testing paused • Test ended (chamber stopped) • Test ended (defrosting)

■To Cancel Ambient Temperature Return

Table 3.76 Ambient temperature return cancelling command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
OPEAMB-CLR	—	—	＜Description＞ This command cancels ambient temperature return.
			＜Setting data format＞ —
			＜Example command＞ "OPEAMB-CLR" • Can be used only in the ambient temperature return.

(3) Opening and Closing Test Patterns

■To Open a Test Pattern for Viewing Only

Table 3.77 Test pattern open (viewing only) command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
PRGMREAD	—	Test pattern No.	＜Description＞ This command opens the selected test pattern for viewing.
			＜Setting data format＞ "RAM:pattern No." or "ROM:pattern No."
			＜Example command＞ "PRGMREAD, RAM:02" ● Set the test pattern No. to a fixed 2-character length. ● To monitor a test pattern, it is necessary to first open it with this command. ● If another setting command is sent while a test pattern opened with this command is on the monitor, an error is returned and the open test pattern is forcefully closed.

■To Close a Test Pattern Opened for Viewing Only

Table 3.78 Test pattern closed (viewing only) command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
PRGMREAD END or READ END	—	—	＜Description＞ This command closes the test pattern open on the monitor.
			＜Setting data format＞ —
			＜Example command＞ "PRGMREADEND" ● OK is always returned for this command.

■To Open a Test Pattern for Editing

Table 3.79 Test pattern open (edit) command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
PRGMWRITE or PRGMCREATE	—	Test pattern No.	＜Description＞ This command opens the selected test pattern for editing.
			＜Setting data format＞ "RAM:pattern No."
			＜Example command＞ "PRGMWRITE, RAM:01" • Set the test pattern No. to a fixed 2-character length. • ROM patterns cannot be selected with this command. • To edit a test pattern, it is necessary to first open it with this command. • If another setting command is sent while a test pattern opened with this command is on the monitor, an error is returned and the open test pattern is forcefully closed. Edited settings are discarded.

■To Close a Test Pattern Opened for Editing

Table 3.80 Test pattern closed (edit) command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
PRGMWRITEEND or PRGMCREATEEND or WRITEEND or CREATEEND	—	Test pattern No.	＜Description＞ This command closes the test pattern open on the monitor.
			＜Setting data format＞ "RAM:pattern No."
			＜Example command＞ "PRGMWRITEEND, RAM:01" • Edited settings are updated when the test pattern is closed with this command.

(4) Setting Up Test Patterns

- To use test pattern setup commands, it is necessary to first open a test pattern on the monitor.
- Edited settings are updated when the test pattern is closed. If another setting command is sent before the test pattern has been closed, the open test pattern is forcefully closed and edited settings are discarded.

(Example: To edit test pattern No. 1)

"PRGMWRITE, RAM:01"
"TEMP, S100, -65"
"TIME, 00:00, 01:00, 01:30"
'
'
"PRGMWRITEEND"

■To Set Exposure Temperature

Table 3.81 Exposure temperature setting command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
TEMP	—	S high exposure temperature, low exposure temperature	＜Description＞ This command sets the high exposure temperature and low exposure temperature in the selected test pattern.
			＜Setting data format＞ "Sxxx, xxx"
			＜Example command＞ "TEMP, S100, -65" • Set exposure temperature to a fixed 3-character length. • When preheat/precool control is set to the auto mode, preheat/precool temperatures are updated automatically in line with exposure temperature.

■To Set Preheat/Precool Control

Table 3.82 Preheat/Precool control setting command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
PREAI	—	ON or OFF	＜Description＞ This command sets preheat/precool control in the selected test pattern to the auto or manual mode.
			＜Setting data format＞ "ON" or "OFF"
			＜Example command＞ "PREAI, ON"

■To Set Preheat/Precool Temperature

Table 3.83 Preheat/Precool temperature setting command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
PRE	—	preheat setting, precool setting	＜Description＞ This command sets preheat/precool temperature in the selected test pattern.
			＜Setting data format＞ "xxx, xxx"
			＜Example command＞ "PRE, 080, -30 " • Set preheat/precool temperature to a fixed 3-character length. • When preheat/precool control is set to the auto mode, preheat/precool temperatures cannot be set with this command.

■To Set Exposure Time

Table 3.84 Exposure time setting command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
TIME	—	ambient temperatures exposure time, high temperatures exposure time, low temperatures exposure time	＜Description＞ This command sets the exposure time in the selected test pattern.
			＜Setting data format＞ "xx:xx , xx:xx , xx:xx"
			＜Example command＞ "TIME, 00:00, 02:30, 01:00" ● Time is set as follows. For TSA chambers: "hours:minutes" For TSE chambers: "hours:minutes" For TSB chambers: "minutes:seconds" For TSD chambers: "hours:minutes" (Each time data item has a fixed 2-character length.) ● The following error is returned when a test pattern which uses the STT function is specified as viewing mode. "NA:PRGM WR ERR-21"

■To Set Test Cycles

Table 3.85 Test cycles setting command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
CYCLE	—	number of test cycles	＜Description＞ This command sets the number of test (repeat) cycles in the selected test pattern.
			＜Setting data format＞ "xxxx"
			＜Example command＞ "CYCLE, 0099" ● Set the number of test cycles to a fixed 4-character length.

■To Set Test Start Position

Table 3.86 Test start position setting command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
START POSITION	—	test start position	＜Description＞ This command sets the test start position in the selected test pattern.
			＜Setting data format＞ "H" or "L"
			＜Example command＞ "STARTPOSITION, H" • Set "H" to start from high temperature exposure and "L" to start from low temperature exposure. • The start position cannot be changed for a running test pattern.

■To Set Defrost Mode

Table 3.87 Defrost mode setting command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
DEFROST	—	number of test cycles or defrost mode	＜Description＞ This command sets the defrost mode in the selected test pattern.
			＜Setting data format＞ For cycle defrosting: "xxxx" (number of test cycles) For auto defrosting: "AI" To turn defrost control OFF: "OFF"
			＜Example command＞ "DEFROST, 0099" "DEFROST, AI" "DEFROST, OFF" • Set the number of test cycles to a fixed 4-character length.

■To Set Hot Box Defrost Standby Control

Table 3.88 Hot box defrost standby control setting command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
H-DEFCMP	—	ON or OFF	＜Description＞ This command turns hot box defrost standby control in the selected test pattern ON/OFF.
			＜Setting data format＞ "ON" or "OFF"
			＜Example command＞ "H-DEFCMP, ON" • When set to "ON", temperature of the hot box is controlled from the end of the current cycle until defrosting ends and the next low temperature cycle starts. • When set to "OFF", temperature of the hot box is not controlled from the end of the current cycle until defrosting ends and the next low temperature cycle starts.

■To Set Defrost Standby Position

Table 3.89 Defrost standby position setting command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
TEMP-L-DEFROST	—	defrost standby position	＜Description＞ This command sets the defrost standby position in the selected test pattern.
			＜Setting data format＞ "A" or "H"
			＜Example command＞ "TEMP-L-DEFROST, A" • When set to "A", the test area is controlled to ambient temperature from the end of the current cycle until defrosting ends and the next low temperature cycle starts. • When set to "H", the test area is controlled to the high exposure temperature from the end of the current cycle until defrosting ends and the next low temperature cycle starts. • With a 3-zone test pattern, an error is returned.

■To Schedule Test Pausing

Table 3.90 Test pause schedule command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
PAUSE	—	pause cycle or OFF	＜Description＞ This command schedules test pausing in the selected test pattern.
			＜Setting data format＞ To turn this feature OFF: "OFF" To turn this feature ON: "xxxx" (pause cycle)
			＜Example command＞ "PAUSE, OFF" "PAUSE, 0010" • Set the pause cycle to a fixed 4-character length.

■To Set Quick Exposure Control

Table 3.91 Quick exposure control setting command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
Q-EXP	—	ON or OFF	＜Description＞ This command sets quick exposure control in the selected test pattern.
			＜Setting data format＞ "ON" or "OFF"
			＜Example command＞ "Q-EXP, ON" • When guaranteed soak control is ON, quick exposure control cannot be used. • When the economized operation is ON, quick exposure control cannot be used. • The following error is returned when a test pattern which uses the STT function is specified as viewing mode. "NA:PRGM WR ERR-21"

■To Set Guaranteed Soak Control

Table 3.92 Guaranteed soak control setting command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
G-SOAK	—	ON or OFF	＜Description＞ This command sets guaranteed soak control in the selected test pattern.
			＜Setting data format＞ "ON" or "OFF"
			＜Example command＞ "G-SOAK, ON" • The following error is returned when a test pattern which uses the STT function is specified as viewing mode. "NA:PRGM WR ERR-21"

■To Set Economized Operation Control

Table 3.93 Economized operation control setting command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
ECONOMY	—	ON or OFF	＜Description＞ This command sets economized operation control in the selected test pattern.
			＜Setting data format＞ "ON" or "OFF"
			＜Example command＞ "ECONOMY, ON" • The following error is returned when a test pattern which uses the STT function is specified as viewing mode. "NA:PRGM WR ERR-21"

■To Set Sensor Position

Table 3.94 Sensor position setting command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
SENSOR	—	UP or DOWN	＜Description＞ This command sets sensor position in the selected test pattern.
			＜Setting data format＞ "UP" or "DOWN"
			＜Example command＞ "SENSOR, UP" • When "UP" is set, the upstream sensor is used. • When "DOWN" is set, the downstream sensor is used.

■To Set Auxiliary Cooling Control

Table 3.95 Auxiliary cooling control setting command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
AUXCOOLER	—	ON or OFF	＜Description＞ This command sets auxiliary cooling control in the selected test pattern.
			＜Setting data format＞ "ON" or "OFF"
			＜Example command＞ "AUXCOOLER, ON" • The auxiliary cooler is an option, therefore, if the chamber is not equipped with the cooler, an error is returned.

■To Set End Mode

Table 3.96 End mode setting command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
END	—	end mode	＜Description＞ This command sets end mode in the selected test pattern.
			＜Setting data format＞ To stop at test end: "OFF" To return fluid temperature at test end and then stop: "HEATRETURN" To prep at test end: "SETUP" To defrost at test end and then stop: "DEFROST" To run a dry operation at test end and then stop: "DRY" To restore ambient temperature at test end and then stop: "AMB"
			＜Example command＞ "END, OFF"

■To Name Test Patterns

Table 3.97 Test pattern name command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
NAME	—	test pattern name	＜Description＞ This command names the selected test patterns.
			＜Setting data format＞ name up to 14 characters
			＜Example command＞ "NAME, PATTERN001"

■To Set Overheat/Overcool Protection Temperature

Table 3.98 Overheat/Overcool protection temperature setting command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
TEMPLIMIT	—	overheat protection temperature, overcool protection temperature	＜Description＞ This command sets overheat protection temperature and overcool protection temperature in the selected test pattern.
			＜Setting data format＞ "xxx, xxx"
			＜Example command＞ "TEMPLIMIT, 180, -70" • Set each temperature to a fixed 3-character length.

■To Set External Output 1

Table 3.99 External output 1 setting command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
RELAY1	—	setting	＜Description＞ This command sets external output 1 in the selected test pattern.
			＜Setting data format＞ "x"
			＜Example command＞ "RELAY1, 8" ● External output 1 can be set from the following 1 to 11. (Which signals are available will differ according to chamber.) 1 : To send a signal at test start 2 : To send a signal during high temperature exposure 3 : To send a signal during low temperature exposure 4*: To send a signal at the end of high temperature exposure 5*: To send a signal at the end of low temperature exposure 6 : To send a signal only while the high exposure temperature is attained 7 : To send a signal only while the low exposure temperature is attained 8 : To send a signal if and while testing is paused 9 : To turn signal output OFF 10 : To send a signal during ambient temperature exposure 11*: To send a signal at the end of ambient temperature exposure * The signal is held for 5 sec.

■To Set External Output 2

Table 3.100 External output 2 setting command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
RELAY2	—	setting	＜Description＞ This command sets external output 2 in the selected test pattern.
			＜Setting data format＞ "x"
			＜Example command＞ "RELAY2, 8" ● External output 2 can be set from the following 1 to 11. (Which signals are available will differ according to chamber.) 1 : To send a signal at test start 2 : To send a signal during high temperature exposure 3 : To send a signal during low temperature exposure 4*: To send a signal at the end of high temperature exposure 5*: To send a signal at the end of low temperature exposure 6 : To send a signal only while the high exposure temperature is attained 7 : To send a signal only while the low exposure temperature is attained 8 : To send a signal if and while testing is paused 9 : To turn signal output OFF 10 : To send a signal during ambient temperature exposure 11*: To send a signal at the end of ambient temperature exposure * The signal is held for 5 sec.

■To Set Drying Mode Temperature and Time

Table 3.101 Drying mode temperature and time setting command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
DRYMODESET	—	drying mode temperature, drying mode time	＜Description＞ This command sets drying mode temperature and time in the selected test pattern.
			＜Setting data format＞ "xxx, xx:xx"
			＜Example command＞ "DRYMODESET, 050, 00:30" • Set temperature to a fixed 3-character length. • Set time in the below format. Set each time data to a fixed 2-character length. "hours:minutes"

■To Set Drying Mode Control

Table 3.102 Drying mode control setting command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
DRYMODE	—	drying mode control	＜Description＞ This command sets drying mode control in the selected test pattern.
			＜Setting data format＞ " drying mode control"
			＜Example command＞ "DRYMODE, ON, OFF" • When set to ON, drying mode control is used. • When set to OFF, drying mode control is not used.

■To Set STT Trigger Time

Table 3.103 STT trigger time setting command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
STT-TIME	—	ambient temperature exposure trigger time, high temperature exposure trigger time, low temperature exposure trigger time	＜Description＞ This command sets trigger time of a test pattern that uses the STT function.
			＜Setting data format＞ "XX:XX, XX:XX, XX:XX"
			＜Example command＞ "STT-TIME, 00:00, 00:10, 00:10" ● Set time to"hours:minutes". ● Time range is 00:00 to 99:59. ● Set each time data to a fixed 2-character length. ● Ambient temperature exposure trigger time is fixed to "00:00". ● When set to 00:01 or more, it becomes exposure time guarantee processing. ● When set to 00:00, it becomes the SKIP processing after exposure temperature is attained.

■To Set STT Sensor Using Mode

Table 3.104 STT sensor using mode setting command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
STT-MODE	—	STT sensor operation setting	＜Description＞ This command sets STT sensor operation setting in the selected test pattern.
			＜Setting data format＞ "MODE1" or "MODE2"
			＜Example command＞ "STT-MODE, MODE1" ● "MODE1": “ALWAYS” ● "MODE2": “5 CYCLES”

■To Set Test Pause and Ambient Temperature Return

Table 3.105 Test pause and ambient temperature return setting command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
P-AMB	—	ON or OFF	＜Description＞ Ambient temperature return is started at once when a test is paused.
			＜Setting data format＞ To turn this feature OFF: "OFF" To turn this feature ON: "ON"
			＜Example command＞ "P-AMB, ON" ● When test pause and ambient temperature return is OFF, ambient temperature return is not operated simultaneously with test pause.

■To Set Test End and Ambient Temperature Return

Table 3.106 Test end and ambient temperature return setting command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
E-AMB	—	ON or OFF	＜Description＞ Ambient temperature return is started at once when a test is ended.
			＜Setting data format＞ To turn this feature OFF: "OFF" To turn this feature ON: "ON"
			＜Example command＞ "E-AMB, ON" ● When end mode is HOLD SETUP, ambient temperature return is not operated simultaneously with test end.

■To Set STT Trigger Mode

Table 3.107 STT trigger mode setting command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
STT-TRG	—	“AUTO” or “SELECT”	＜Description＞ This command sets the STT trigger mode of a test pattern that uses the STT function.
			＜Setting data format＞ When set to automatic: “AUTO” When set to manual: Ranking from "1" to "2" (early order of setting value attainment)
			＜Example command＞ "STT-TRG, AUTO" "STT-TRG, 1" • When "AUTO" is set, a sensor with the slowest attainment is selected as trigger conditions. • The following selections are possible when it is set as manual setting. Standard specification: “1” When STT 3-point expansion (option) is equipped: “1” to “4”

■To Set Forced Step Shift Time

Table 3.108 Forced step shift time setting command

Setting command			Description/Setting data format/Example command
Main command	**Optional parameter**	**Setting data**	
STT-SHIFT-TIME	—	time	＜Description＞ This command sets the forced step shift time of a test pattern that uses the STT function.
			＜Setting data format＞ ”XX”
			＜Example command＞ "STT-SHIFT-TIME, 10" • Time is set up by "1" to "180."(by minutes) • Time is variable length.

Table 3.109 Setting command acceptance conditions

Setting command \ Chamber status	Control power OFF	Testing stopped	Timer running	Manual defrosting in progress	Drying operation in progress	Fluid temperature return in progress	Fluid recovery in progress	Ambient temperature return in progress	Prepping in progress	Prepping ended (Prior to test start)	Testing in progress	Defrosting during test	Fluid temperature return timer running	Testing paused	Ambient temperature return during test pause	Defrosting during test pause	Defrosting and ATR during test pause	Test ended, chamber stopped	Test ended, chamber stopped, ambient temperature return in progress	Test ended, prepping in progress
STABLETEMP	×	○	○			○	○		○	○	○		○	○				○		○
KEYPROTECT	×	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
STT-SET	○	○	○	○				○	○	○	○	○		○	○	○	○	○	○	○
OPESETUP	×	○	×	×	×	×	×	×	○	×	○	×	○	×	×	×	×	×	×	○
OPESETUPEND	×	○	×	×	○	×	×	×	○	×	○	×	○	×	×	×	×	×	×	○
OPEHEATRETURN	×	○	×			×	×		○	○	×		×	×				○		×
OPETEST	×	○	×	×	×	×	×	×	○	○	□	×	□	×	×	×	×	×	×	×
OPEHALT	×	×	×	×	×	×	×	×	×	×	○	○	○	□	□	□	□	×	×	×
OPERELEASE	×	×	×	×	×	×	×	×	×	×	×	×	×	○	×	○	×	×	×	×
OPECYCLERESET	×	○	○	○	×	○	×	○	○	○	×	×	×	×	×	×	×	×	×	×
OPESTANDBY	×	□	×	○	×	○	×	○	○	○	○	○	○	○	○	○	○	○	○	○
OPEDRY	×	○	×	×	×				○	○	○	×		○		×		○		○
OPEDEFROST	×	○	○	□	×			×	○	○	○	×		○	×	×	×	○	×	○
OPEPRESET-SETUP	×	○	×	○	×	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
OPEPRESET-TEST	×	○	×	○	×	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
OPEPRESET-ON	×	○	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
OPEPRESET-CLR	×	×	○	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
OPEPRESET-HRET-ON	×	×	×			×	×	×	×	×	○		×	○				×		×
OPEPRESET-HRET-CLR	×	×	×			×	×	×	×	×	×		○	×	×			×		×
OPEAMB-ON	×	○	×	×				×	×	×	×	×		○	×	○	×	○	×	×
OPEAMB-CLR	×	×	×	×				○	×	×	×	×		×	○	×	○	×	○	×
ASSIGN	×	○	×	×	○	○	×	○	○	○	×	×	×	×	×	×	×	×	×	×
MODE	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
PRGMREAD	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PRGMREADEND	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
READEND	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PRGMWRITE	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PRGMCREATE	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PRGMWRITEEND	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
WRITEEND	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

Test ended, prepping ended (Prior to test start)	Test ended, fluid temperature return in progress	Test ended, ambient temperature recovery in progress	Test ended, defrosting, ambient temperature return in progress	Test ended, defrosting in progress	Test ended, fluid recovery in progress	Test area moving	Specimen basket moving
○	○	／	／	／	○	／	○
○	○	○	○	○	○	○	○
○	／	／	○	○	／	○	／
○	×	×	×	×	×	×	×
○	×	×	×	×	×	×	×
×	×	／	／	／	×	／	×
×	×	×	×	×	×	×	×
×	×	×	×	×	×	×	×
×	×	×	×	×	×	×	×
×	×	×	×	×	×	×	×
○	○	○	○	○	×	×	×
○	／	○	／	×	／	／	／
○	／	○	×	×	／	×	／
○	○	○	○	○	○	○	○
○	○	○	○	○	○	○	○
×	×	×	×	×	×	×	×
×	×	×	×	×	×	×	×
×	×	／	／	／	×	／	×
×	×	／	／	／	×	／	×
×	／	／	×	○	／	×	×
×	／	／	○	×	／	×	×
×	×	×	×	×	×	×	×
▲	▲	▲	▲	▲	▲	▲	▲
○	○	○	○	○	○	○	○
○	○	○	○	○	○	○	○
○	○	○	○	○	○	○	○
○	○	○	○	○	○	○	○
○	○	○	○	○	○	○	○
○	○	○	○	○	○	○	○
○	○	○	○	○	○	○	○

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Setting command \ Chamber status	Control power OFF	Testing stopped	Timer running	Manual defrosting in progress	Drying operation in progress	Fluid temperature return in progress	Fluid recovery in progress	Ambient temperature return in progress	Prepping in progress	Prepping ended (Prior to test start)	Testing in progress	Defrosting during test	Fluid temperature return timer running	Testing paused	Ambient temperature return during test pause	Defrosting during test pause	Defrosting and ATR during test pause	Test ended, chamber stopped	Test ended, chamber stopped, ambient temperature return in progress	Test ended, prepping in progress
PRGMCREATEEND	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CREATEEND	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TEMP	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PERAI	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PRE	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TIME	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
STT-TRG	○	○	○	○	/	/	/	○	○	○	○	○	/	○	○	○	○	○	○	○
STT-MODE	○	○	○	○	/	/	/	○	○	○	○	○	/	○	○	○	○	○	○	○
CYCLE	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
STARTPOSITION	○	○	○	○	○	○	○	○	○	○	△	△	△	△	△	△	△	△	△	△
DEFROST	○	○	○	○	○	/	/	○	○	○	○	○	/	○	○	○	○	○	○	○
H-DEFCMP	○	○	○	○	/	/	/	○	○	○	○	○	/	○	○	○	○	○	○	○
TEMP-L-DEFROST	○	○	○	○	○	/	/	/	○	○	○	○	/	○	/	○	/	○	/	○
PAUSE	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
P-AMB	○	○	○	○	/	/	/	○	○	○	○	○	/	○	○	○	○	○	○	○
Q-EXP	○	○	○	○	○	/	/	○	○	○	○	○	/	○	○	○	○	○	○	○
G-SOAK	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
ECONOMY	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
SENSOR	○	○	○	○	○	/	/	○	○	○	○	○	/	○	○	○	○	○	○	○
AUXCOOLER	○	○	○	○	○	/	/	○	○	○	○	○	/	○	○	○	○	○	○	○
END	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
E-AMB	○	○	○	○	/	/	/	○	○	○	○	○	○	○	○	○	○	○	○	○
NAME	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TEMPLIMIT	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
RELAY1	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
RELAY2	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
DRYMODESET	○	○	○	○	○	/	/	○	○	○	○	○	/	○	○	○	○	○	○	○
DRYMODE	○	○	○	○	○	/	/	○	○	○	○	○	/	○	○	○	○	○	○	○
STT-TRG	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
STT-SHIFT-TIME	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

Test ended, prepping ended (Prior to test start)	Test ended, fluid temperature return in progress	Test ended, ambient temperature return in progress	Test ended, defrosting, ambient temperature return in progress	Test ended, defrosting in progress	Test ended, fluid recovery in progress	Test area moving	Specimen basket moving
○	○	○	○	○	○	○	○
○	○	○	○	○	○	○	○
○	○	○	○	○	○	○	○
○	○	○	○	○	○	○	○
○	○	○	○	○	○	○	○
○	○	○	○	○	○	○	○
○	○	○	○	○	○	○	○
○	○	○	○	○	○	○	○
○	○	○	○	○	○	○	○
△	△	△	△	△	△	○	○
○	/	○	○	○	/	○	/
○	/	/	○	○	/	○	/
○	/	○	/	○	/	/	/
○	○	○	○	○	○	○	○
○	/	/	○	○	/	○	/
○	/	○	○	○	/	○	/
○	○	○	○	○	○	○	○
○	○	○	○	○	○	○	○
○	/	○	○	○	/	○	/
○	/	○	○	○	/	○	/
○	○	○	○	○	○	○	○
○	/	/	○	○	○	○	○
○	○	○	○	○	○	○	○
○	○	○	○	○	○	○	○
○	○	○	○	○	○	○	○
○	○	○	○	○	○	○	○
○	/	○	○	○	/	/	/
○	/	○	○	○	/	/	/
○	○	/	○	○	○	○	○
○	○	/	○	○	○	○	○

Supported commands and chamber status vary according to chamber.

○: The command is accepted. "OK" is returned as the response.

X: The command is not accepted. "ERR" is returned as the response.

△: If the targeted test pattern is running, the command is not accepted. "ERR" is returned as the response.

▲: Depends on the type of data sent.

□: "OK" is returned as the response, but chamber status does not change.

Chapter 4
Example Applications

This chapter explains several applications with this communication function, by means of flowcharts. Explanations have been generalized, therefore use the communication function as permitted by your computer, computer language and other communication hardware. Troubleshooting and system protection have been left out of explanations, therefore before use, take what necessary measures you have to deal with system errors.

Note

- Set up communications between the chamber and computer before starting the programs described herein.
- Setting commands may not be properly received by the chamber in certain physical environments because of poor communication quality. Similarly, settings may not be updated if the key lock is ON or because of high or low limit alarms. Add processing capabilities that resend communications when an "OK: xxx" response is not returned.
- Ensure safety in and around the chamber before starting operation.

4.1 To Monitor Chamber Control Status from Computer

Chamber control status can be monitored from a computer using the monitor commands (see "3.2 Monitor Commands").
The below flowchart shows how to display operating mode.

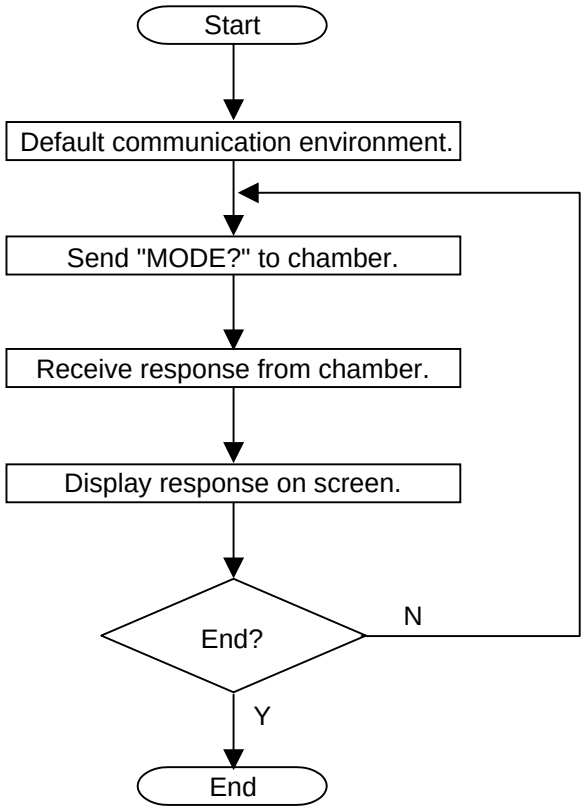

Fig. 4.1 Sample program 1

4.2 To Edit Test Setup from Computer

Test setup can be changed from a computer using the setting commands (see "3.3 Setting Commands").
The below flowchart shows how to rename a test pattern.

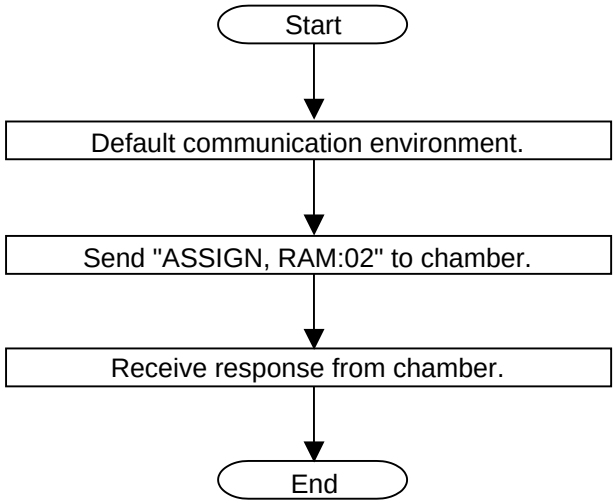

Fig. 4.2 Sample program 2

Chapter 5
Specifications

5.1 GPIB Specifications

Cable and Signal Lines

Cable and signal lines must conform to IEEE standard.

Table 5.1 Pin assignment

Pin No.	Signal	Connection
1	DI01	Connected
2	DI02	Connected
3	DI03	Connected
4	DI04	Connected
5	EOI	Connected
6	DAV	Connected
7	NRFD	Connected
8	NDAC	Connected
9	IFC	Connected
10	SRQ	Connected
11	ATN	Connected
12	Shield	Connected
13	DI05	Connected
14	DI06	Connected
15	DI07	Connected
16	DI08	Connected
17	REN	Connected
18	DAV ground	Connected
19	NRFD ground	Connected
20	NDAC ground	Connected
21	IFC ground	Connected
22	SRQ ground	Connected
23	ATN ground	Connected
24	EOI and REN ground	Connected

Address

Address can be selected from 1 to 16 and changed from the instrumentation panel.
It is not necessary to restart the system after changing the address.

Interface Support

Table 5.2 Interface support

Function	Level	Remarks
Source handshake	SH1	• Contains all source handshake capabilities.
Acceptor handshake	AH1	• Contains all acceptor handshake capabilities.
Talker	T6	• Basic talker • Serial port • Does not have talk only. • MLA talker cancel
Listener	L4	• Basic listener • Does not have listen only. • MTA listener cancel
Service request	SR1	• Service request
Remote-Local	RL2	• Contains all remote-local functions except local lockout. (However, does not support GTL address command.)
Parallel poll	PP0	• Does not have parallel poll.
Device clear	DC1	• Contains all device clear functions. (However, operates the same as in IFC reception.)
Device trigger	DT0	• Does not have device trigger.
Controller	C0	• Does not have system controller. • Does not have IFC send/controller-in-charge. • Does not have REN send. • Does not have SRQ response. • Does not have interface message. • Does not have control receive. • Does not have control relinquish. • Does not have self control receive/relinquish. • Does not have parallel poll. • Does not have control receive/relinquish in synch with handshake.

Control Bus Support

Table 5.3 Control bus support

Control bus	Support	Remarks
ATN	Supported	Conforms to IEEE-488.1.
IFC	Supported	Conforms to IEEE-488.1.
REN	Supported	Conforms to IEEE-488.1.
SRQ	Supported	Conforms to IEEE-488.1. (Supports serial poll but not parallel poll.)
EOI	Supported	Conforms to IEEE-488.1.

Universal Command Support

Table 5.4 Universal command support

Command	Support	Remarks
LLO	Not supported	Basically, to make communication control unconditional when communications are enabled.
DCL	Supported	Operates the same as in IFC reception.
PPU	Not supported	Does not have a parallel poll, so PPU support is unnecessary.
SPE	Supported	Supports SRQ, therefore SPE support is necessary.
SPD	Supported	Supports SRQ, therefore SPD support is necessary.

Address Command Support

Table 5.5 Address command support

Command	Support	Remarks
GTL	Not supported	
SDC	Supported	Confirms to IEEE-488.1.
PPC	Not supported	Does not have a parallel poll, so PPC support is unnecessary.
GET	Not supported	Basically, to make communication control unconditional when communications are enabled.
TCT	Not supported	Because does not have controller capabilities.

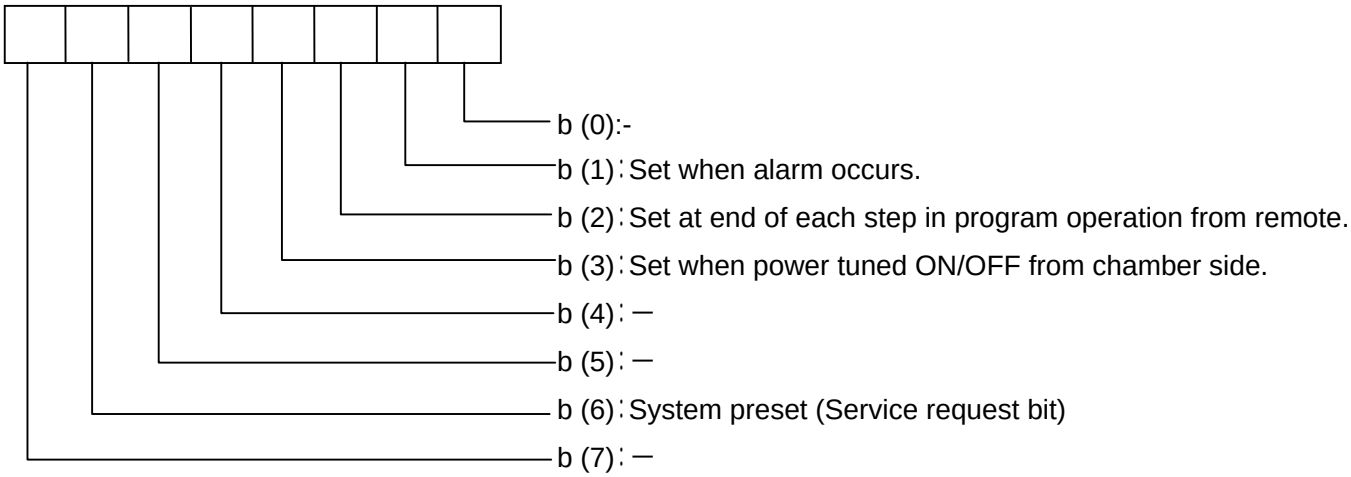

Fig 5.1 SRQ serial poll register

5.2 RS-232C Specifications

Cable and Signal Lines

The cable must conform to JIS (Japanese Industrial Standards) X5101. Use a straight cable for signal (modem) connections.

Table 5.6 RS-232C pin assignment

Pin No.	Signal (JIS)	Signal	Connection
1	FG	Protective ground or cable shield	Not connected
2	SD (TXD)	Transmission data	Connected
3	RD (RXD)	Reception data	Connected
4	DR (DSR)	Data set ready	Connected
5	SG	Signal line ground	Connected
6	ER (DTR)	Data terminal ready	Connected
7	CS (CTS)	Transmission enabled	Connected
8	RS (RTS)	Send request	Connected
9	GND	Ground	Not connected

Communication System

Synchronized modulated half-duplexing

Transmission Rate

Selectable between 4800, 9600 and 19200 bps. Can be selected from the instrumentation panel. It is not necessary to restart the system after changing the transmission rate.

Data Bit

Data length 7/8
Stop bits 1/2
Parity check None/Even/Odd
Can be selected from the instrumentation panel. It is not necessary to restart the system after changing the data bit.

Flow Control

Xon/Xoff control None
Si/So control None
The above setting cannot be changed by users.

Local Echo

Not supported

User's Manual

Thermal Shock Chamber

- Option -
(Communication Function)

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