
**User's
Manual**

**GP-IB Controller Module
WE7021**

Thank you for purchasing the GP-IB Controller Module WE7021 for the PC-based measurement instruments, WE7000.

This User's Manual contains useful information about the function, connection to the measuring station, operations of the software on the PC, and troubleshooting of the WE7021. This manual assumes that you will be using the WE7000 Control Software that is included with the measuring station.

For general information about the WE7000 (primarily the operations of the measuring station, the optical interface module, the optical interface card, and the WE7000 Control Software) see the following manual that is included with the measuring station.

| Manual Title | Manual No. |
|----------------------|--------------|
| WE7000 User's Manual | IM707001-01E |

To ensure the correct use, please read this manual thoroughly before operation. Keep this manual in a safe place for quick reference in the event a question arises.

Notes

- **The contents of this manual describe WE7000 Control Software Ver. 4.0.1.0 and module software Ver 3.04. If you are using another version of the software, the operating procedures or the figures given in this manual may differ from the actual software.**
- The contents of this manual are subject to change without prior notice as a result of continuing improvements to the instrument's performance and functions.
- Every effort has been made in the preparation of this manual to ensure the accuracy of its contents. However, should you have any questions or find any errors, please contact your nearest YOKOGAWA dealer.
- Copying or reproducing any or all of the contents of this manual without YOKOGAWA's permission is strictly prohibited.

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- Other product names are trademarks or registered trademarks of their respective holders.

Revisions

1st Edition: February 1999

2nd Edition: July 1999

3rd Edition: August 2000

Checking the Contents of the Package

Unpack the box and check the contents before operating the instrument. If the contents are not correct or missing or if there is physical damage, contact the dealer from which you purchased them.

Module

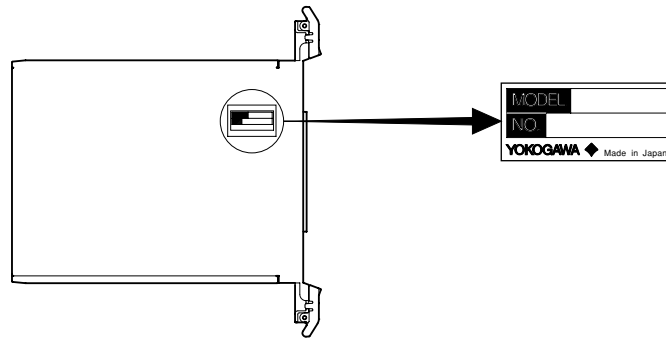
Check that the model name given on the name plate matches those on the order.

MODEL

| Model | Suffix Code | Description |
|--------|-------------|--------------------------------|
| 707021 | | WE7021 GP-IB Controller Module |
| | /HE | English help message |

NO.

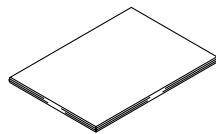
When contacting the dealer from which you purchased the instrument, please quote the instrument No.



Standard Accessories

The following standard accessories are supplied with the instrument. Make sure that all items are present and undamaged.

User's Manual (1)
IM707021-01E



How to Use This Manual

Structure of the Manual

This User's Manual consists of the following five chapters and an index.

| Chapter Title | Description |
|-----------------------------------|--|
| 1 Explanation of Functions | Explains the system configuration and functions. |
| 2 Hardware Preparation | Explains how to install the module into the measuring station and how to connect the input/output. |
| 3 Software Operation | Explains how to operate the operation panel on the PC. |
| 4 Troubleshooting and Maintenance | Explains the procedures for troubleshooting and self testing. |
| 5 Specifications | Explains the specifications of the module. |
| Index | Index of contents. |

Conventions Used in This Manual

Unit

k Denotes 1000. Example: 100 kHz

K Denotes 1024. Example: 720 KB

Displayed characters

Alphanumeric characters enclosed with [] usually refer to characters or settings that are displayed on the screen.

Symbols

The following symbol marks are used to attract the operator's attention.



Affixed to the instrument. Indicates danger to personnel or to the instrument. The operator must refer to the User's Manual. The symbol is used in the User's Manual to indicate the reference.

WARNING

Describes precautions that should be observed to prevent injury or death to the user.

CAUTION

Describes precautions that should be observed to prevent minor or moderate injury, or damage to the instrument.

Note

Provides information that is important for operating the instrument properly.

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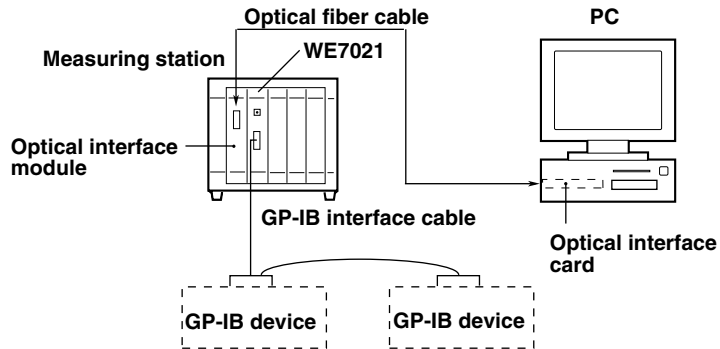
5

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1.1 System Configuration

System Configuration

The following is an example in which the WE7021 GB-IB Controller Module is installed in the measuring station and the measuring station and a PC are connected with an optical fiber cable. The WE7021 becomes the controller for the GP-IB devices that are connected.



Description of the Operation

The WE7021 GP-IB Controller Module operates as a system controller as well as an active controller over the GP-IB. It exchanges commands and data with connected GP-IB devices and controls them according to instructions received from the PC.

In addition, it can send interface messages to the GP-IB devices such as GET (Group Execute Trigger), LLO (Local Lockout), and DCL (Device Clear).

It can also perform serial polling of the GP-IB devices and read status bytes.

1.2 Sending/Receiving Character Strings

Specifying the Target Address

This module can control the GP-IB device that is specified in the [Target Address] list box.



Registering the String to Be Sent/Sending the String

Messages can be sent to change the settings of or to request output from a GP-IB device that is specified in the [Target Address] list box. Up to 256 characters can be sent.



Receiving Messages

Messages can be received from a device that is specified in the [Target Address] list box after an output request message is sent. Up to 256 characters can be received.



1.3 Interface Messages

What Is an Interface Message

Interface messages are also referred to as interface commands or bus commands. They are commands that are issued from the controller (this module) to the GP-IB devices. They are grouped as follows:

• Uni-line messages

The messages are sent over one control line. There are three types.

- IFC(Interface Clear) : Initializes the interface functions.
- REN(Remote Enable) : Switches the remote/local mode.
- IDY(Identify) : Not supported.

• Multi-line messages

The messages are sent over eight control lines. They are classified as follows.

Address commands

These commands are valid when the devices are set to listener or talker. The following five types are available.

Commands that are valid for devices specified as listener

- GTL(Go To Local) : Sets the device to local mode.
- GET(Group Execute Trigger) : Executes a trigger.
- SDC(Selected Device Clear) : Clears the program message (command) being received and the output queue.
- PPC(Parallel Poll Configure) : Not supported.

Commands that are valid for devices specified as talker

- TCT(Take Control) : Not supported.

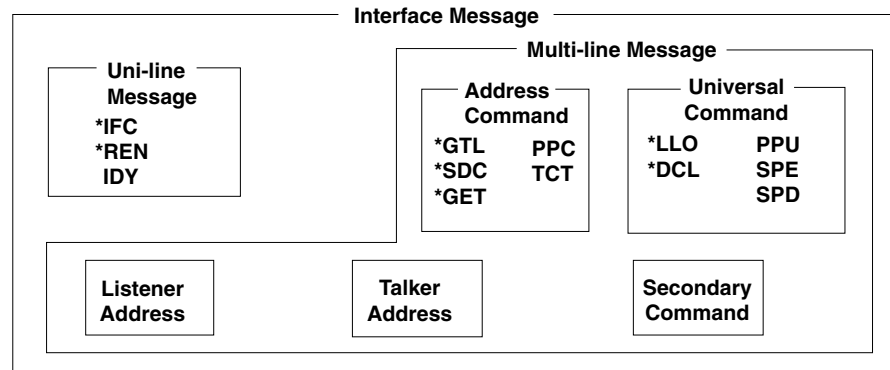
Universal commands

These commands are valid for all devices regardless of the listener/talker specification. The following five types are available.

- LLO(Local Lockout) : Prohibits the transition to the local mode from the operation panel (local lockout).
- DCL(Device Clear) : Performs the same operation as the SDC command on all connected GP-IB devices.
- PPU(Parallel Poll Unconfigure) : Not supported.
- SPE(Serial Poll Enable) : Not supported.
- SPD(Serial Poll Disable) : Not supported.

1.3 Interface Messages

In addition, there are the following interface messages: listener address, talker address, and secondary commands.



* mark indicates the interface messages that are supported by this module.

Note

The difference between SDC and DCL

Of the multi-line messages, SDC is an address command that requires talker/listener specification while DCL is a universal command that does not need the talker/listener specification. Therefore, the SDC command is used on a particular device while the DCL command is used on all devices on the bus.

1.4 Other Functions

Reading the Status Byte

The status byte, which indicates the condition of the GP-IB devices, can be read. For information on the format of the status byte, see the instruction manual for the device.

Selecting the Terminator and Timeout Time

- Terminator
The terminator is a symbol that indicates the end of the data. The following characters are available.
CR, LF, CR+LF, EOI
- Timeout time
The timeout time indicates how long to wait for a response to be received from the remote device. If a response is not received within the timeout time, a timeout error occurs and the communication is disconnected.

Error Indication/Clearing

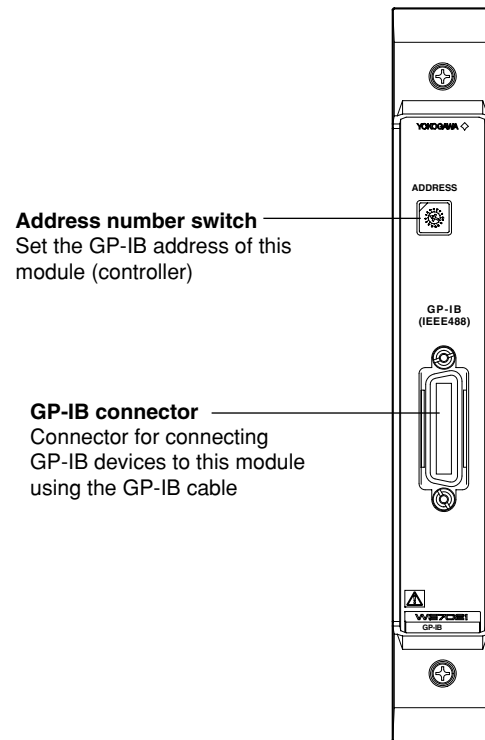
- Error indication
When the following communication errors occur, the indicator corresponding to the [Error Status] box turns from gray (no error) to red.
 - Time-out : Occurs when a response is not received from the device within the specified timeout time.
 - No Active Device : Occurs when the specified GP-IB device is not connected or it is turned OFF.
- Clearing the error indication
Resets the indicator to the initial condition (gray: no error).

Displaying the Operation Panel of the GP-IB Device

By using the driver file provided by YOKOGAWA for the WE7021, the operation panel of a YOKOGAWA measurement instrument that is connected via the GP-IB cable can be displayed. For information about the driver file, contact the dealer from which you purchased the module.

1.5 Names and Functions of Sections

Front Panel

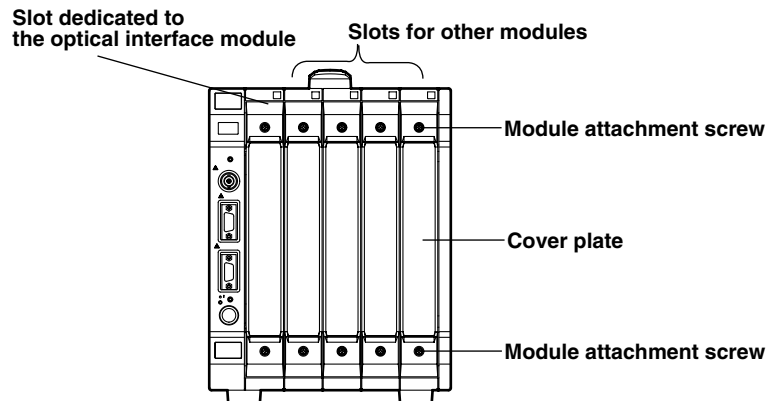


2.1 Installing the Module into the Measuring Station

Preparing to Install the Module

When the measuring station is first purchased, each slot is covered with a cover plate as shown in the figure below. Verify that the power supply is not connected to the measuring station, then loosen the module attachment screws (2 locations) and remove the cover plate from the slot where the module is going to be installed. Please note that the slot on the left end is dedicated to the communication module and therefore this module cannot be installed there.

* The following figure shows an example of the measuring station WE400.



Installing the GP-IB Controller Module



WARNING

- Make sure to fasten the top and bottom attachment screws. If you connect the GP-IB cable without fastening the attachment screws, the protective grounding of the measuring station provided by the power cord is compromised and may cause electric shock.



CAUTION

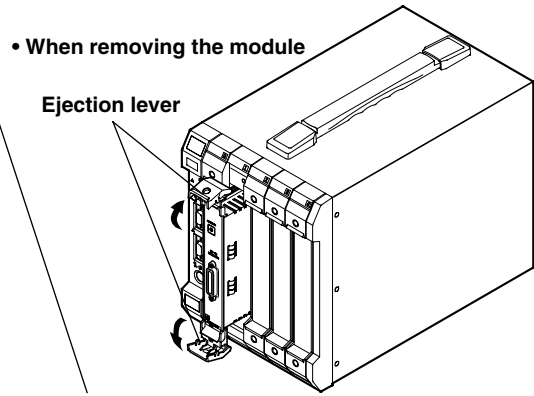
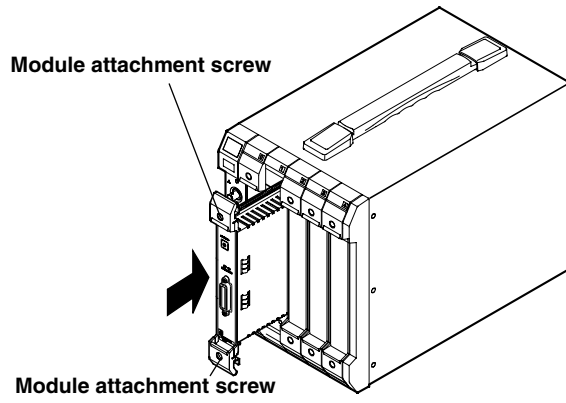
- To avoid damaging the instrument when installing modules, make sure to turn OFF the standby power switch of the measuring station.
- Be careful not to get your fingers caught in the ejection lever when inserting the module. In addition, do not put your hand inside the slot, because there are protrusions along the module guide that may injure your fingers.
- Do not remove the cover plates from unused slots. It can cause overheating and malfunction. The cover plates are also needed to minimize the influence of electromagnetic interference.

Insert the module along the guide rail of the slot from which you removed the cover plate. Insert the module until it clicks into the connector. Be careful not to get your fingers caught in the ejection lever while inserting the module. When the module is securely inserted, fasten the module attachment screws (tightening torque: 0.6 to 0.7 N-m).

To remove the module, loosen the module attachment screws and pull the ejection lever from the inside to the outside. This will force the module out of the slot.

<There is an illustration on the next page.>

2.1 Installing the Module into the Measuring Station



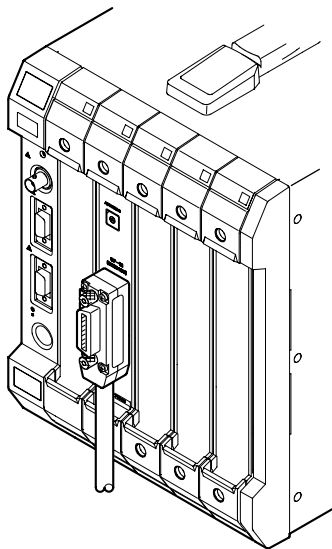
2.2 Connecting the GP-IB Interface Cable

GP-IB Cable

The GP-IB connector on the module is a 24-pin connector that conforms to the IEEE Standard 488-1978. Use only a GP-IB cable that conforms to this standard.

Connection Method

Connect the cable as shown below.



Notes on Connecting the Cable

- Firmly tighten the screws on the GP-IB cable connector.
- You can use multiple cables to connect multiple devices. However, the maximum number of devices that can be connected on a single bus is 15 including the controller (this module).
- When connecting multiple devices, each device must have its own unique address.
- The length of the cable connecting the devices should be 4 m or less in length.
- Keep the total length of the cable under 20 m or “2 m × the number of connected devices.”
- When carrying out communication, have at least two-thirds of the devices that are connected turned ON.
- When connecting multiple devices, connect them in a star or line fashion. Connecting them in a loop or parallel fashion is not allowed.



CAUTION

- When connecting or removing a cable, make sure to turn OFF the standby power switch of the measuring station as well as the power of the devices connected to the GP-IB cable. Otherwise, erroneous operation or damage to the internal circuit may result.

2.3 Setting the Address

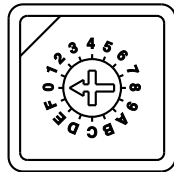
Setting the Address

Each device that is connected to the GP-IB cable has a unique address within the GP-IB system. This address is used to distinguish each device. Therefore, when connecting this module (controller) to the GP-IB device, you must make sure that the address of this module does not coincide with the address of another device. You can change the address setting as follows.

Using a screwdriver, turn the address number switch on the front panel to set the address of the module. The number to which the arrow is pointing is the address number.

The selectable range of addresses is 0 to 15. The factory default address is 0.

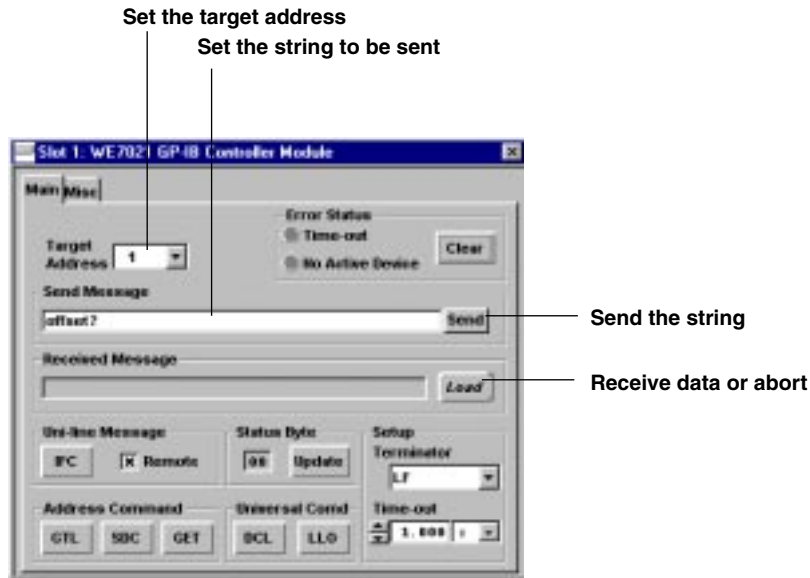
ADDRESS



The letters A to F correspond to numbers 10 to 15.

3.1 Operations Required to Send and Receive Strings

In this section, you will be using the operation panel that appears by double-clicking the module icon in the station list window as shown in the figure below.



Specifying the Target Address

In the [Target Address] list box, specify the address of the GP-IB module with which to communicate.

The range of addresses that can be specified is 0 to 30.

Note

Do not specify the GP-IB address of this module.

Set the String to Send

Enter the string that you wish to send in the [Send Message] entry box.

Up to 256 characters can be sent.

Sending the String

After entering the string in the [Send Message] entry box, click [Send] or press the Enter key on the PC's keyboard. The string data is sent to the GP-IB device that is specified in the [Target Address] list box.

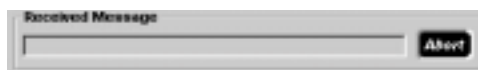
Receiving a Message

Clicking [Load] changes the [Load] button to an [Abort] button and a message is received from the GP-IB device that was specified in the [Target Address] list box. The received message is displayed in the [Received Message] text box.

To cancel the message reception, click [Abort]. The [Abort] button changes to a [Load] button, and aborts receiving the message.

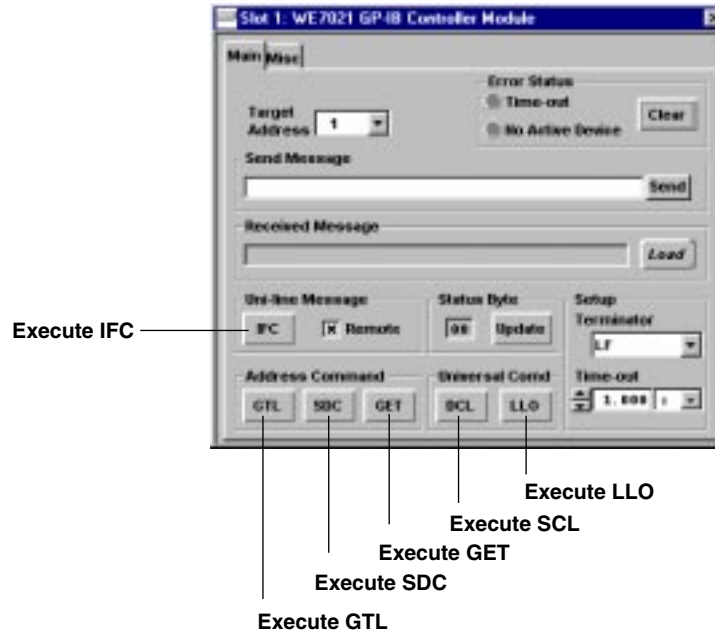
The [Load] button and the [Abort] button are displayed alternately (toggle button).

Up to 256 characters can be received.



3.2 Sending an Interface Message

In this section, you will be using the operation panel that appears by clicking the Main tab.



Sending an Uni-line Message

Execute IFC

Clicking [IFC] initializes the interface functions.

Set the Device to Remote Mode

Sending a message after selecting the [Remote] check box sets the device into remote mode. Removing the check sets the device back to local mode.

Sending an Address Command

Execute GTL

Clicking [GTL] causes the GP-IB device that is specified in the [Target Address] list box to enter into the local mode.

Execute SDC

Clicking [SDC] clears the program message (command) being received and the output queue of the device that is specified in the [Target Address] list box.

Execute GET

Clicking [GET] triggers the devices that are specified in the [Target Address] list box.

Sending a Universal Command

Execute LLO

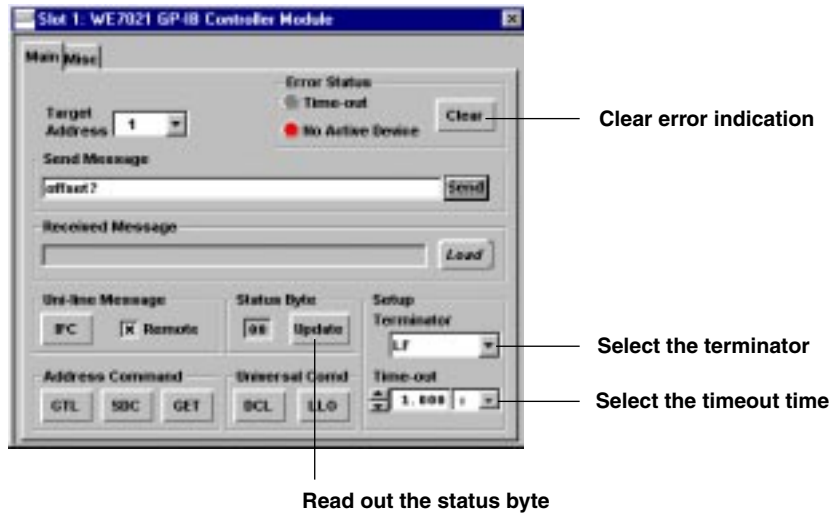
Clicking [LLO] prohibits one from changing to the local mode using the operation panel (local lockout).

Execute DCL

Clicking [DCL] performs the same operation as the SDC button, but on all connected GP-IB devices.

3.3 Various Settings for Sending and Receiving Messages

In this section, you will be using the operation panel that appears by clicking the Main tab.



Reading the Status Byte

Clicking [Update] in the [Status Byte] frame displays the current status byte of the GP-IB device that is specified in the [Target Address] list box.

Selecting the Terminator

Select the terminator using the [Terminator] list box in the [Setup] frame. Select from the following choices.

CR, LF, CR+LF, EOI

Setting the Timeout Time

Enter the timeout time in the [Time-out] entry box in the [Setup] frame. The selectable range of values is as follows. 10 ms to 60 s (1 ms resolution, 100 ms default)

Clearing the Error Indication

If an error occurs, the [Time-out] or the [No Active Device] indicator in the [Error Status] frame turns red. Clicking [Clear] resets the indicator back to gray (initial condition).

The following are the two types of errors.

Time-out : When a response is not received from the device within the specified timeout time during a data transfer.

No Active Device : When the specified GP-IB device with which to carry out the data transfer is not connected or is turned OFF.

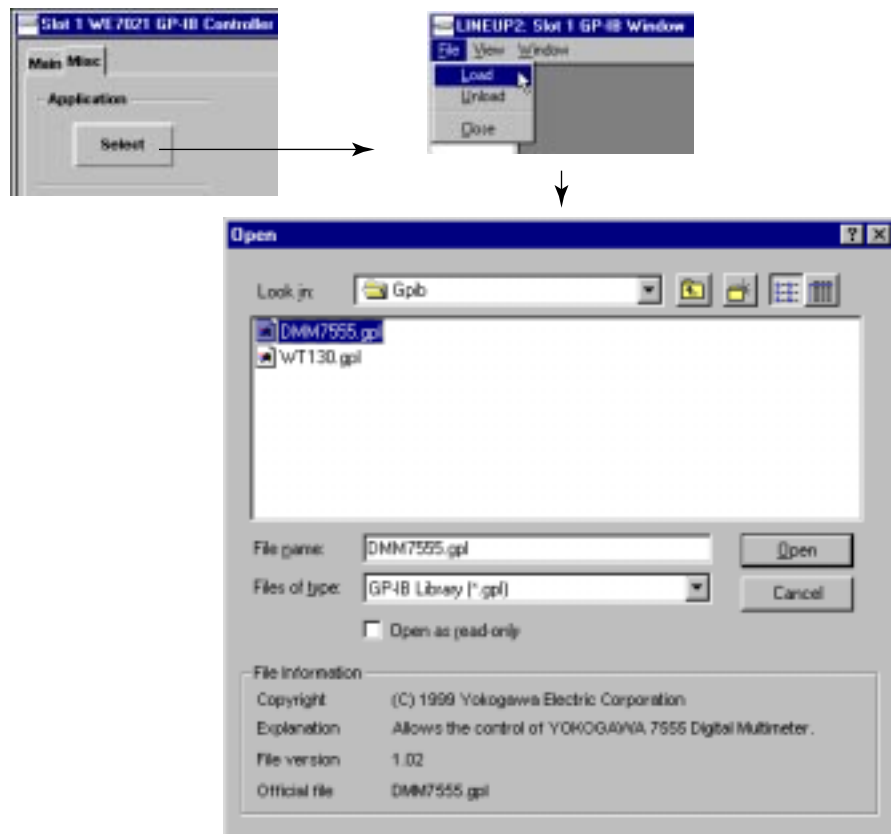
3.4 Displaying the Operation Panel of GP-IB Devices

Displaying the Operation Panel of GP-IB Devices


The GP-IB window is opened by selecting [Start GP-IB window] in the menu shown below. This menu appears by clicking the right mouse button on the GP-IB controller module icon that is displayed in the station list window or by selecting [Active Module] in the station window. The GP-IB window can also be opened by clicking the [Select] button on the Misc panel that appears by clicking the Misc tab on the operation panel.



In the menu that appears by selecting [File] in the GP-IB window, select [Load] to display the [Open] dialog box. Select the file (with [.gpl] extension) corresponding to the GP-IB device that you wish to operate and click the [Open] button. A dedicated operation panel for the corresponding GP-IB device appears in the GP-IB window.



Note

- The [.gpl] files that are installed from the WE7000 Control Software CD-ROM are placed in the We7000/ GPIB folder as default.
- Up to 14 GP-IB devices can be loaded.
- Only one GP-IB window can be displayed for each GP-IB controller module.
- While the GP-IB window is open, the operation panel for the GP-IB controller module disappears from the station window. In addition, the operation panel will not appear even if the module icon in the station window is double-clicked. However, if the  icon in the GP-IB window is clicked, the Main panel of the GP-IB controller module is displayed in the GP-IB window. Clicking the same icon again closes the Main panel.
- When loading multiple devices, make sure the GP-IB address of each device is unique.

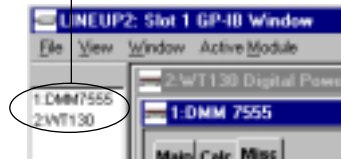
Loading the Setup Data of GP-IB Devices

A list of loaded GP-IB devices (up to 14 units possible) is displayed in the GP-IB window. Clicking the device from the list that you wish to operate opens the operation panel of that device in the GP-IB window.

Loading Setup Data

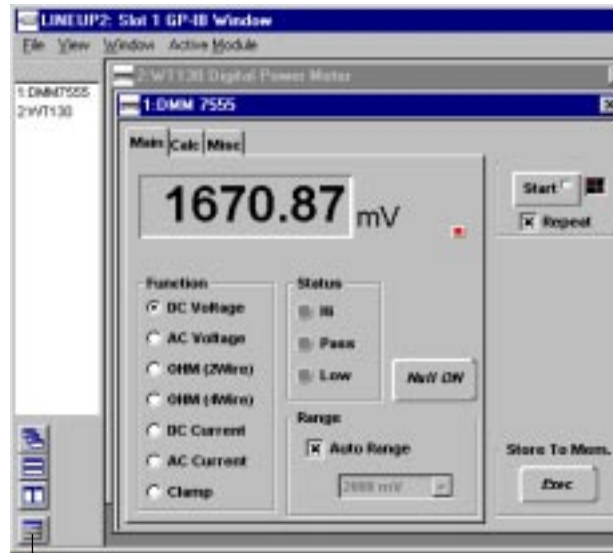
The setup data are loaded using the Misc panel that appears by clicking the Misc Tab of the operation panel. In the [GP-IB Address] list box, specify the address of the GP-IB device with which to communicate and click the [Setup] button. The current setup data of the GP-IB device are loaded and reflected in the operation panel's settings. The selectable address range is 0 to 30.

Click the device whose operation panel you wish to display.



This operation must be carried out first. Otherwise, you will not be able to control the GP-IB device from the operation panel.

Display example of the operation panel of YOKOGAWA's Digital Multimeter 7555



To open the Main panel of the GP-IB controller module

For details on how to set the operation panel of the GP-IB window, see the additional information that is provided for each device.

Note

- If the GP-IB device that is specified in the [GP-IB Address] list box and the .gpl file do not match, an error occurs.
- The [Execute Default] and [Load Setup Data] commands in the GP-IB window's [Active Module] menu take time to execute. The message "Changing setup information. Please, wait." is displayed during execution.
- There is a [Properties] item in the GP-IB window's [Active Module] menu. You can select this item to check the software version and other information about the loaded device.
- Clicking the right mouse button on the list of loaded GP-IB devices displays the same menu as when the right mouse button is clicked on the module icon.

Terminating the Operation

Simply closing the window will not terminate the GP-IB operation. For example, data loading operation continues even if the window is closed. Therefore, when all measurements have been completed, terminate the GP-IB window. There are two methods to terminate the window.

Terminate only the operation of the active device

Selecting [Active Module] > [Unload] will terminate the operation of the active device.

Terminate the operation of all GP-IB devices that are loaded

Selecting [File] > [Unload] will terminate all operations and exit from the GP-IB window.

4.1 Troubleshooting

- If servicing is necessary, or if the instrument is not operating correctly after performing the following corrective actions, contact your nearest YOKOGAWA dealer.
- To verify that the module is operating correctly, perform the self test as described on the next page.

| Problem | Probable Cause/Corrective Action | Reference |
|--------------------------------------|---|------------------------|
| Module does not operate. | Check to see that the module is installed correctly into the station. Also, install the module into another slot, and check whether it will operate there. If it operates in the other slot, the measuring station is likely to have malfunctioned. If the module is installed correctly and does not operate, the connector might be bad, or the IC may have malfunctioned. In any case, contact your nearest YOKOGAWA dealer to have it repaired. | 2-1, 3-1, * |
| Commands cannot be sent or received. | <ul style="list-style-type: none"> • Check whether the GP-IB cable connector is properly connected. • Check whether the target address, the address of the GP-IB device, and the address of this module are set properly. • Use the module in a way that complies with the electrical and mechanical specifications. • Send the correct command. | 2-3 2-4, 3-1 5-1 |

* See the WE7000 User's Manual (IM 707001-01E).

4.2 Self Test

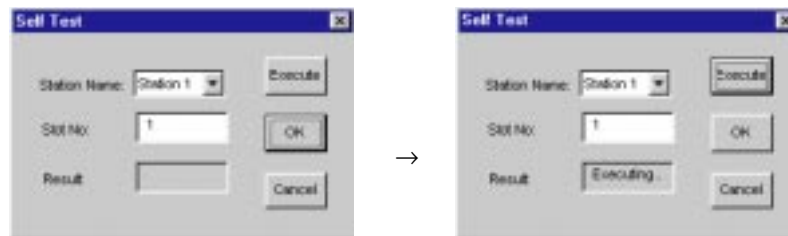
If you believe that the module is not operating correctly, perform the self test according to the following steps.

Executing Self Test

1. Remove the cable that is connecting the module and the GP-IB device.
2. Select [Self Test] from the [System] menu of the WE7000 Control Software.



2. In the [Self Test] dialog box that appears, select the station name and enter the slot number corresponding to the module, and click the [Execute] button. "Executing..." is displayed in the [Result] display box.



Verifying Test Results

If a value other than "0" is displayed in the [Result] display box of the [Self Test] dialog box, the module is probably malfunctioning. Please contact your nearest YOKOGAWA dealer.

4.3 Maintenance

Maintenance of Parts

There are no parts in this module that require periodic replacement.

5.1 Performance Specifications

Electrical/Mechanical Specifications

Conforms to IEEE St'd 488-1978 (JIS C 1901-1987)

Functional Specifications

| Function | Subset Name | Description |
|-------------------------------|---------------------|---|
| Source handshake | SH1 | All transmission handshaking functions available |
| Acceptor handshake | AH1 | All reception handshaking functions available |
| Talker | T6 | Basic talker functions, serial polling, talker release function using MLA (My Listen Address) is available. |
| Listener | L4 | Basic listener functions, listener release function using MTA (My Talk Address) is available, no listen only function. |
| Service request | SR0 | No service request function |
| Remote/local | RL0 | No remote/local function |
| Parallel polling | PP0 | No parallel polling function |
| Device clear | DC0 | No device clear function |
| Device trigger | DT0 | No device trigger function |
| Controller | C1, C2, C3, C4, C28 | C1: controller, C2: IFC transmission/controller charge, C3: REN transmission, C4: Response to SRQ, C28: Interface message transmission functions available. |
| Electrical characteristics E1 | | Open collector |

Used Code

ISO (ASCII) code

Protocol

Conforms to IEEE-St'd 488 and IEEE-St'd 488.2

Transfer Format

IEEE-488 (GP-IB)

Signal Logic

Negative logic

"L" level : 0.8 V or less

"H" level: 2.0 V or more

Total Cable Length

20 m or less

Cable Length between Devices

4 m or less

Number of Connections

15 devices or less

5.2 Default Values (Factory Default Settings)

| | |
|----------------|--------|
| Target address | 1 |
| Terminator | LF |
| Remote mode | ON |
| Timeout Time | 100 ms |

5.3 General Specifications

Safety Standards

Complies with CSA C22.2 No.1010.1 and EN61010-1, conforms to JIS C1010-1

- Overvoltage Category: CAT I and II^{*1}
- Pollution Degree: 1 and 2^{*2}

EMC Standards

Emission

Complying Standard

EN55011 Group 1 Class A

This product is a Class A (for commercial environment) product. Operation of this product in a residential area may cause radio interference in which case the user is required to correct the interference.

Immunity

Complying Standard

EN50082-2

Testing Condition

Connect to the Digital Multimeter 755501 (YOKOGAWA) with 3 m GP-IB Cable.

Operating Conditions

Same as that of the measuring station

Storage Conditions

Temperature: -20 to 60°C

Humidity: 20 to 80%RH (no condensation)

Power Consumption

1 VA (Typical value at 100 V/50 Hz ^{*3})

Weight

About 0.6 kg

External Dimensions

Approx. 33(W) × 243(H) × 232(D) mm (projections excluded)

Number of Used Slots

1

Standard Accessories

User's Manual (1)

^{*1} Overvoltage Categories define transient overvoltage levels, including impulse withstand voltage levels.

Overvoltage Category I: Applies to equipment supplied with electricity from a circuit containing an overvoltage control device.

Overvoltage Category II: Applies to equipment supplied with electricity from fixed installations like a distribution board.

^{*2} Pollution Degree: Applies to the degree of adhesion of a solid, liquid, or gas which deteriorates withstand voltage or surface resistivity.

Pollution Degree 1: Applies to closed atmospheres (with no, or only dry, non-conductive pollution).

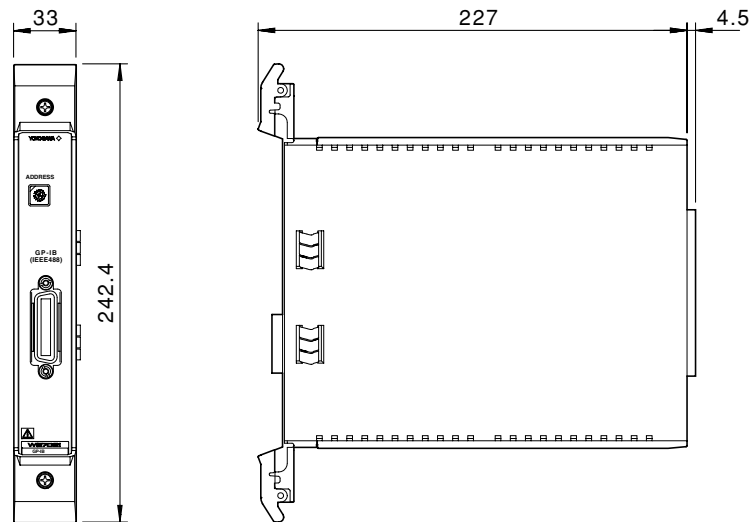
Pollution Degree 2: Applies to normal indoor atmospheres (with only non-conductive pollution).

^{*3} Typical value represents a typical or average value. It is not strictly guaranteed.

5.4 Dimensional Drawings

Unit: mm

GP-IB Controller Module (WE7021)



If not specified, the tolerance is $\pm 3\%$. However, in cases of less than 10 mm, the tolerance is ± 0.3 mm.

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