Contents

Introduction.....................................................1
Safety Information............................................1

Chapter 1 Specifications 3
  1.1 RS-232C Specifications .........................3
  1.2 GP-IB Specifications ..............................4
  1.3 USB Specifications ................................4
  1.4 LAN Specifications .................................4

Chapter 2 Model IM3570/IM3536 Connection and Setting 5
  2.1 Overview of Communication ..................5
  2.2 RS-232C Connection and Settings ........7
    ■ Connecting the RS-232C Cable ..............7
    ■ Setting RS-232C ..............................8
  2.3 GP-IB Connection and Settings ..........9
    ■ Connecting the GP-IB Cable .....................9
    ■ Setting GP-IB ..................................9
  2.4 USB Settings and Connection ..............11
    ■ Setting USB ...................................11
    ■ Connecting the USB Cable ...................12
  2.5 LAN Settings and Connection ..............13
    ■ LAN Settings ..................................13
    ■ Connecting a LAN Cable ....................18
  2.6 Remote Mode ..................................19

Chapter 3 Model IM3523/IM3523A Connection and Setting 21
  3.1 Overview of Communication ..............21
    ■ IM3523 ...........................................21
    ■ IM3523A .........................................22
  3.2 USB Settings and Connection ............23
    ■ Setting USB ...................................23

Chapter 4 Model IM3533/IM3533-01/IM3590 Connection and Setting 35
  4.1 Overview of Communication ..............35
  4.2 USB Settings and Connection ..........37
    ■ Setting USB ...................................37
    ■ Connecting the USB Cable ...................38
  4.3 GP-IB Connection and Settings
    (when connected to the Z3000) .........39
    ■ Connecting the GP-IB Cable ..............39
    ■ Setting GP-IB ..................................39
  4.4 RS-232C Connection and Settings
    (when connected to the Z3001) .........41
    ■ Connecting the RS-232C Cable ............41
    ■ Setting RS-232C ..............................42
  4.5 LAN Settings and Connection
    (when connected to the Z3002) .........43
    ■ LAN Settings ..................................43
    ■ Connecting a LAN Cable ....................48
  4.6 Remote Mode ..................................49
Chapter 5 Model IM7580 Connection and Setting 51

5.1 Overview of Communication ..........51
5.2 USB Settings and Connection ........53
   ▪ Setting USB ........................................ 53
   ▪ Connecting the USB Cable ............ 54
5.3 LAN Settings and Connection .......55
   ▪ LAN Settings ........................................ 55
   ▪ Connecting a LAN Cable .............. 60
5.4 GP-IB Connection and Settings (when connected to the Z3000) ....61
   ▪ Connecting the GP-IB Cable .......... 61
   ▪ Setting GP-IB ...................................... 61
5.5 RS-232C Connection and Settings (when connected to the Z3001) ....63
   ▪ Connecting the RS-232C Cable .......... 63
   ▪ Setting RS-232C ................................. 64
5.6 Remote Mode ................................. 65

Appendix A 1

Appendix 1 Checking the USB Virtual COM Port ......................... A 1
Introduction

This instruction manual provides details on the communication interfaces of the IM3523, IM3523A, IM3533, IM3533-01, IM3536 LCR Meter, IM3570, IM7580 Impedance Analyzer and IM3590 Chemical Impedance Analyzer.

In this document, the “instrument” means the IM3523, IM3523A, IM3533, IM3533-01, IM3536, IM3570, IM7580 and IM3590.

The latest edition of the instruction manual
The contents of this manual are subject to change, for example as a result of product improvements or changes to specifications.
The latest edition can be downloaded from Hioki’s website.
https://www.hioki.com/global/support/download/

Product registration
Register your product in order to receive important product information.
https://www.hioki.com/global/support/myhioki/registration/

Safety Information

This manual contains information and warnings essential for safe operation of the instrument and for maintaining it in safe operating condition. Before using it, be sure to carefully read the following safety precautions.

Safety Symbols

The following symbols in this manual indicate the relative importance of cautions and warnings.

- **WARNING** Indicates that incorrect operation presents a significant hazard that could result in serious injury or death to the user.
- **CAUTION** Indicates that incorrect operation presents a possibility of injury to the user or damage to the product.
- **NOTE** Advisory items related to performance or correct operation of the product.

Notation

Symbols in this manual

- **禁忌** Indicates the prohibited action.
- **(p. )** Indicates the location of reference information.
- ***** Indicates that descriptive information is provided below.
- **[ ]** Menus, commands, dialogs, buttons in a dialog, and other names on the screen and the keys are indicated in brackets.
- **CURSOR (Bold character)** Bold characters within the text indicate operating key labels.
- **Dialogue** Dialogue box represents a Windows dialog box.
### Mouse Operation

<table>
<thead>
<tr>
<th>Operation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Click</td>
<td>Press and quickly release the left button of the mouse.</td>
</tr>
<tr>
<td>Right-click</td>
<td>Press and quickly release the right button of the mouse.</td>
</tr>
<tr>
<td>Double click</td>
<td>Quickly click the left button of the mouse twice.</td>
</tr>
<tr>
<td>Drag</td>
<td>While holding down the left button of the mouse, move the mouse and then release the left button to deposit the chosen item in the desired position.</td>
</tr>
</tbody>
</table>
1.1 RS-232C Specifications

| Transmission Method | Communication method: Full duplex  
Synchronous method: Start-stop synchronization |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission Speed</td>
<td>9600 bps, 19200 bps, 38400 bps, 57600 bps</td>
</tr>
<tr>
<td>Data Bits</td>
<td>8 bits</td>
</tr>
<tr>
<td>Parity</td>
<td>None</td>
</tr>
<tr>
<td>Stop bit</td>
<td>1 bits</td>
</tr>
<tr>
<td>Message terminator</td>
<td>CR+LF, CR</td>
</tr>
<tr>
<td>(delimiter)</td>
<td></td>
</tr>
<tr>
<td>Flow control</td>
<td>Hardware (RTS/CTS control), software (XON/XOFF control)</td>
</tr>
<tr>
<td></td>
<td>&quot;Handshake (About Buffer Flow Control)&quot; (p. 3)</td>
</tr>
<tr>
<td></td>
<td>IM7580: Software (XON/XOFF control only)</td>
</tr>
<tr>
<td>Electrical</td>
<td></td>
</tr>
<tr>
<td>Specifications</td>
<td></td>
</tr>
<tr>
<td>Input voltage level</td>
<td>5 to 15 V, 5 to 9 V</td>
</tr>
<tr>
<td>Output voltage level</td>
<td>-15 to -5 V, -9 to -5 V</td>
</tr>
</tbody>
</table>

**Handshake (About Buffer Flow Control)**

**Control during Receiving**

**When using hardware (RTS/CTS control):**
- When the data in the receive buffer exceeds 85% of the buffer, CA(RTS) is set to OFF and the controller is notified that there is not much space remaining in the buffer.
- Processing of the data in the buffer continues, and then CA(RTS) is set to ON and the controller is notified that there is sufficient remaining space in the buffer when the amount of data becomes less than 25%.

**When using software (XON/XOFF control):**
- When the data in the receive buffer exceeds 75% of the buffer, XOFF(13H) is sent and the controller is notified that there is not much space remaining in the buffer.
- Processing of the data in the buffer continues, and then XON(11H) is sent and the controller is notified that there is sufficient remaining space in the buffer when the amount of data becomes less than 25%.

**Control during Sending**

**When using hardware (RTS/CTS control):**
- When CB(CTS) is confirmed to be OFF, the sending of data is halted. When it is confirmed to be ON, the sending of data is resumed.

**When using software (XON/XOFF control):**
- When XOFF is received, the sending of data is halted. When XON is received, the sending of data is resumed.
## 1.2 GP-IB Specifications

<table>
<thead>
<tr>
<th>Code</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>SH1</td>
<td>Supports all source handshake functions.</td>
</tr>
<tr>
<td>AH1</td>
<td>Supports all acceptor handshake functions.</td>
</tr>
<tr>
<td>T6</td>
<td>Supports standard talker functions.</td>
</tr>
<tr>
<td></td>
<td>Supports serial poll functions.</td>
</tr>
<tr>
<td></td>
<td>Talk only mode is not supported.</td>
</tr>
<tr>
<td></td>
<td>Supports the talker cancel function by MLA (My Listen Address).</td>
</tr>
<tr>
<td>L4</td>
<td>Supports standard listener functions.</td>
</tr>
<tr>
<td></td>
<td>Listener only mode is not supported.</td>
</tr>
<tr>
<td></td>
<td>Supports the listener cancel function by MTA (My Talk Address).</td>
</tr>
<tr>
<td>SR1</td>
<td>Supports all service request functions.</td>
</tr>
<tr>
<td>RL1</td>
<td>Supports all remote/local functions.</td>
</tr>
<tr>
<td>PP0</td>
<td>Parallel poll functions are not supported.</td>
</tr>
<tr>
<td>DC1</td>
<td>Supports all device clear functions.</td>
</tr>
<tr>
<td>DT1</td>
<td>Supports all device trigger functions.</td>
</tr>
<tr>
<td>C0</td>
<td>Controller functions are not supported.</td>
</tr>
</tbody>
</table>

Code used: ASCII code

## 1.3 USB Specifications

<table>
<thead>
<tr>
<th>Connector</th>
<th>Series B receptacle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compliance standard</td>
<td>USB2.0 (Full Speed/High Speed) (IM3523A: Full Speed only)</td>
</tr>
<tr>
<td>No. of ports</td>
<td>1</td>
</tr>
<tr>
<td>Class</td>
<td>Communication class</td>
</tr>
<tr>
<td>Supported OS</td>
<td>Windows 7, Windows 8, Windows 10, or Windows 11</td>
</tr>
</tbody>
</table>

## 1.4 LAN Specifications

<table>
<thead>
<tr>
<th>Connector</th>
<th>RJ-45 connector × 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compliance standard</td>
<td>IEEE 802.3-compliant Ethernet</td>
</tr>
<tr>
<td>Transfer system</td>
<td>10BASE-T/ 100BASE-TX Auto detected</td>
</tr>
<tr>
<td></td>
<td>IM7580: 10BASE-T/ 100BASE-TX/ 1000BASE-T Auto detected</td>
</tr>
<tr>
<td>Protocol</td>
<td>TCP/IP</td>
</tr>
<tr>
<td>Function</td>
<td>Command control</td>
</tr>
</tbody>
</table>
2.1 Overview of Communication

You can control the instrument with communication commands from a computer via the GP-IB, RS-232C, USB, and LAN interfaces.

There are the following four communication methods. To enable communication, the communication conditions need to be set on the instrument.

- **RS-232C communication (p. 7)**
  Printer can be connected to enable printing measurement values and screens.

- **GP-IB communication (p. 9)**
  - Commands common to IEEE-488-2 1987 (requirement) can be used.
  - The instrument complies with the following standard. (Compliance standard: IEEE-488.1 1987)
  - The instrument has been designed with reference to the following standard. (Reference standard: IEEE-488.2 1987)

- **USB communication (p. 11)**
  The instrument is communication class compatible.

- **LAN communication (p. 13)**
  Command control using the TCP/IP protocol is possible.

### WARNING
- Always turn both devices OFF when connecting and disconnecting an interface connector. Otherwise, an electric shock accident may occur.
- To avoid damage to the instrument, do not short-circuit the terminal and do not input voltage to the terminal.
- Failure to fasten the connectors properly may result in sub-specification performance or damage to the equipment.

### CAUTION
- To avoid damage, do not disconnect the communications cable while the instrument is sending or receiving data.
- Use a common ground for both the instrument and the computer. Grounding them to different ground points will result in a potential difference between the instrument's ground and the computer's ground. If the communications cable is connected while such a potential difference exists, it may result in equipment malfunction or failure.
- Before connecting or disconnecting any communications cable, always turn off the instrument and the computer. Failure to do so could result in equipment malfunction or damage.
- After connecting the communications cable, tighten the screws on the connector securely. Failure to secure the connector could result in equipment malfunction or damage.
2.1 Overview of Communication

**Screen Displayed while Setting Interfaces**

When you set an interface, the icon for the set interface is displayed on the right side of the screen.

- **RS232C**: When RS-232C is set
- **GPIB**: When GP-IB is set
- **USB**: When USB is set
- **LAN**: When LAN is set
- **PRINT**: When printer is set (only IM3570)
2.2 RS-232C Connection and Settings

Connecting the RS-232C Cable

Connect the RS-232C cable to the RS-232C connector.
(Recommended cable: 9637 RS-232C cable)

To connect the instrument to a controller (DTE), use a crossover cable compatible with the connectors on both the instrument and the controller. The I/O connector is a DTE (Data Terminal Equipment) configuration.

<table>
<thead>
<tr>
<th>Connector (D-sub) Pin No.</th>
<th>Interchange Circuit Name</th>
<th>CCITT Circuit No.</th>
<th>EIA Abbreviation</th>
<th>JIS Abbreviation</th>
<th>Common Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Unused</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Received Data</td>
<td>104</td>
<td>BB</td>
<td>RD</td>
<td>RxD</td>
</tr>
<tr>
<td>3</td>
<td>Transmitted Data</td>
<td>103</td>
<td>BA</td>
<td>SD</td>
<td>TxD</td>
</tr>
<tr>
<td>4</td>
<td>Unused</td>
<td>108/2</td>
<td>CD</td>
<td>ER</td>
<td>DTR</td>
</tr>
<tr>
<td>5</td>
<td>Signal Ground</td>
<td>102</td>
<td>AB</td>
<td>SG</td>
<td>GND</td>
</tr>
<tr>
<td>6</td>
<td>Unused</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Request to Send</td>
<td>105</td>
<td>CA</td>
<td>RS</td>
<td>RTS</td>
</tr>
<tr>
<td>8</td>
<td>Clear to Send</td>
<td>106</td>
<td>CB</td>
<td>CS</td>
<td>CTS</td>
</tr>
<tr>
<td>9</td>
<td>Unused</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Example: Connecting to a DOS/V PC

Specification: D-sub 9-pin female and female connector, reverse connection

![Interchange Circuit Diagram]

**Note**
Hardware control will not work properly if you use a cable that has CA(RTS) and CB(CTS) short-circuited.
2.2 RS-232C Connection and Settings

Setting RS-232C

Procedure
You can configure the setting from any of **LCR** mode and **ANALYZER** mode (only IM3570).

1. **LCR Measurement Screen**
   - Press **SYS** to confirm the setting.

2. **RS-232C Settings**
   - Select the baud rate setting:
     - OFF: No flow control
     - HARD: Hardware (RTS/CTS control)
     - XON/OFF: Software (XON/XOFF control)
     - BOTH: Hardware + software
   - Select the handshake setting:
     - OFF: No flow control
     - HARD: Hardware (RTS/CTS control)
     - XON/OFF: Software (XON/XOFF control)
     - BOTH: Hardware + software
   - Select the terminator setting:
     - CR+LF
     - CR
   - Press **EXIT** to confirm the setting.
2.3 GP-IB Connection and Settings

Connecting the GP-IB Cable

Connect the GP-IB cable to the GP-IB connector.

Recommended cable:
9151-02 GP-IB connection cable (2 m)

Setting GP-IB

Procedure
You can configure the setting from any of LCR mode and ANALYZER mode (only IM3570).
2.3 GP-IB Connection and Settings

2 Press GP IB.

3 Use ▲ or ▼ to set the GP-IB address.

Select the terminator setting.

- LF: LF with EOI
- CR+LF: LF with CR+EOI

4 Press EXIT to confirm the setting.
2.4 USB Settings and Connection

**NOTE**
To connect the instrument to a computer the first time, a dedicated USB driver must be installed. Before connecting the instrument to the computer, install the USB driver. The USB driver can be downloaded from the bundled CD, or our web site. The USB driver is compatible with the Windows 7 (32-bit, 64-bit version), Windows 8 (32-bit, 64-bit version), Windows 10 (32-bit, 64-bit version), and Windows 11 (64-bit version) operating systems. Additionally, do not put the computer into the sleep state while the instrument is connected to the computer.

**Setting USB**

**Procedure**
You can configure the setting from any of **LR** mode and **ANALYZER** mode (only IM3570).

1. LCR Measurement Screen
2. USB Setting

Press **USB**.
2.4 USB Settings and Connection

3. Select the terminator setting.

   ![USB Setting screen](image)

   - CR+LF
   - CR

4. Press **EXIT** to confirm the setting.

---

Connecting the USB Cable

Connect a USB cable (commercially available USB cable) to the USB port of the instrument.

![Connecting the USB Cable](image)
2.5 LAN Settings and Connection

LAN Settings

You can perform command control using the TCP/IP protocol.
Set the instrument to match your network environment in advance.

**NOTE**
- Make these settings before connecting to a network. Changing settings while connected can duplicate IP addresses of other network devices, and incorrect address information may otherwise be presented to the network.
- The instrument does not support DHCP (automatic IP address assignment) on a network.

### Setting Items

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IP address</strong></td>
<td>Identifies each device connected on a network. Each network device must be set to a unique address. The instrument supports IP version 4, with IP addresses indicated as four decimal octets, e.g., &quot;192.168.0.1&quot;.</td>
</tr>
<tr>
<td><strong>Subnet mask</strong></td>
<td>This setting is for separating the IP address into the network address that indicates the network and the host address that indicates the instrument. On this instrument, the subnet mask is represented as four decimal numbers separated by &quot;. &quot; such as &quot;255.255.255.0.&quot;</td>
</tr>
<tr>
<td><strong>Default Gateway</strong></td>
<td>When the computer and instrument are on different but overlapping networks (subnets), this IP address specifies the device to serve as the gateway between the networks. If the computer and instrument are connected one-to-one, no gateway is used, and the instrument's default setting &quot;0.0.0.0&quot; can be kept as is.</td>
</tr>
</tbody>
</table>

### Network Environment Configuration

**Example 1. Connecting the instrument to an existing network**

When connecting the instrument to an existing network, the network settings need to be confirmed in advance.
An IP address which is not the same as that of another network device needs to be assigned.
Confirm the following items with the network administrator, and write them down.

<table>
<thead>
<tr>
<th>IP Address</th>
<th>Subnet Mask</th>
<th>Default Gateway</th>
</tr>
</thead>
</table>

**Example 2. Connecting multiple instruments to a single computer using a hub**

When building a local network with no outside connection, the following private IP addresses are recommended.
Example of private IP address:
IP Address ..........Computer: 192.168.0.100
                     Instrument: 192.168.0.1, 192.168.0.2, 192.168.0.3...
                     (Set an IP address that differs from that of other network devices.)
Subnet Mask ..........255.255.255.0
Default Gateway ......OFF(0.0.0.0)

**Example 3. Connecting one instrument to a single computer using the 9642 LAN Cable**

The 9642 LAN Cable can be used with its supplied connection adapter to connect one instrument to one computer, in which case the IP address is freely settable. Use the recommended private IP addresses.
IP Address ..........Computer: 192.168.0.100
                     Instrument: 192.168.0.1 (Set to a different IP address than the computer.)
Subnet Mask ..........255.255.255.0
Default Gateway ......OFF(0.0.0.0)
2.5 LAN Settings and Connection

**Procedure**

You can configure the setting from any of **LIR** mode and **ANALYZER** mode (only IM3570).

1. **LCR Measurement Screen**

   - Press **SYS**.

2. **LAN Settings**

   - Press **LAN**.
   - Select the IP address.

3. **LAN Settings**

   - Press **SYS**.
2.5 LAN Settings and Connection

4 IP address Settings

Use ↑ or ↓ to set the IP address.

Press EXIT to confirm the setting.

5 LAN Settings

Select the subnet mask.

6 Subnet mask Settings

Use ↑ or ↓ to set the subnet mask, and press EXIT to confirm the setting.

NOTE Any of the following 30 subnet masks can be set for the instrument.

<table>
<thead>
<tr>
<th>Subnet Mask</th>
<th>128.000.000.000</th>
<th>192.000.000.000</th>
<th>224.000.000.000</th>
<th>252.000.000.000</th>
<th>254.000.000.000</th>
<th>255.000.000.000</th>
</tr>
</thead>
<tbody>
<tr>
<td>255.128.000.000</td>
<td>255.192.000.000</td>
<td>255.224.000.000</td>
<td>255.252.000.000</td>
<td>255.254.000.000</td>
<td>255.255.000.000</td>
<td>Initial setting</td>
</tr>
</tbody>
</table>
2.5 LAN Settings and Connection

Select the default gateway.

If the default gateway does not need to be set, for example, when connecting the instrument and computer on a one-to-one basis using a cross cable, leave this set to OFF.

Use \( \uparrow \) or \( \downarrow \) to set the default gateway.

Press EXIT to confirm the setting.

Select the port number.
2.5 LAN Settings and Connection

10 Port number Settings

- Use \[ \text{△} \] or \[ \downarrow \] to set the port number to use for communication commands.
- Settable range: 1024 to 65535
- Press \[ \text{EXIT} \] to confirm the setting.

11 LAN Settings

- Select the terminator setting.
  - CR+LF
  - CR
- Press \[ \text{EXIT} \] to confirm the setting.

12 Press \[ \text{EXIT} \] to confirm the setting.
2.5 LAN Settings and Connection

Connecting a LAN Cable

Use a LAN cable to connect the instrument and computer.

**CAUTION**

When connecting the instrument to your LAN using a LAN cable of more than 30 m or with the cable laid outdoors, take appropriate countermeasures that include installing a surge protector for LANs. Such signal wiring is susceptible to induced lighting, which can cause damage to the instrument.

Required items:

When connecting the instrument to an existing network (prepare any of the following):
- Straight-through Cat 5, 100BASE-TX-compliant Ethernet cable (up to 100 m, commercially available).
- Hioki 9642 LAN Cable (option)
  (A cross adapter cannot be used.)

For 10BASE communication, a 10BASE-T-compliant cable may also be used.

When connecting one instrument to a single computer (prepare one of the following):
- 100BASE-TX-compliant cross-over cable (up to 100 m)
- 100BASE-TX-compliant straight-through cable with cross-over adapter (up to 100 m)
- Hioki 9642 LAN Cable (option)

When connecting the instrument to a single computer (connect the instrument to the computer)

Connecting with the 9642 LAN Cable and crossover adapter (supplied with the 9642)

1. Connect the LAN Cable to the crossover adapter.
2. Connect the crossover adapter to the LAN interface on the instrument.
3. Connect the LAN Cable to the 100BASE-TX connector on the PC.

The MAC address of the LAN is displayed below the serial number. You can also check it on the instrument screen. See: “Checking the Version of the Instrument” in the instruction manual.

SPEED LED
On: Performing communication with 100BASE.
Off: Performing communication with 10BASE.

RX/TX LED
Flashes when data is being exchanged.
2.6 Remote Mode

When you connect a device to an interface and start communication, the mode becomes remote mode (remote operation state) and the keys on the LCD are disabled.

All of the keys except LOCAL are disabled.

Canceling Remote Mode

1. Press LOCAL to return to the normal state (local state).

2. The measurement screen is redisplayed.
2.6 Remote Mode
3.1 Overview of Communication

**WARNING**
- Always turn both devices OFF when connecting and disconnecting an interface connector. Otherwise, an electric shock accident may occur.
- To avoid damage to the instrument, do not short-circuit the terminal and do not input voltage to the terminal.
- Failure to fasten the connectors properly may result in sub-specification performance or damage to the equipment.

**CAUTION**
- To avoid damage, do not disconnect the communications cable while the instrument is sending or receiving data.
- Use a common ground for both the instrument and the computer. Grounding them to different ground points will result in a potential difference between the instrument's ground and the computer's ground. If the communications cable is connected while such a potential difference exists, it may result in equipment malfunction or failure.
- Before connecting or disconnecting any communications cable, always turn off the instrument and the computer. Failure to do so could result in equipment malfunction or damage.
- After connecting the communications cable, tighten the screws on the connector securely. Failure to secure the connector could result in equipment malfunction or damage.

**IM3523**

You can control the instrument with communication commands from a computer via the USB, GP-IB, RS-232C and LAN interfaces.

There are the following four communication methods. To enable communication, the communication conditions need to be set on the instrument.

- **USB communication (p. 23)**
  The instrument is communication class compatible.

- **GP-IB communication (when connected to the Z3000) (p. 25)**
  - Commands common to IEEE-488.2 1987 (requirement) can be used.
  - The instrument complies with the following standard. (Compliance standard: IEEE-488.1 1987)
  - The instrument has been designed with reference to the following standard. (Reference standard: IEEE-488.2 1987)
3.1 Overview of Communication

- RS-232C communication (when connected to the Z3001) (p. 27)
  Printer can be connected to enable printing measurement values and screens.

- LAN communication (when connected to the Z3002) (p. 30)
  Command control using the TCP/IP protocol is possible.

---

**IM3523A**

You can control the instrument with communication commands from a computer via the USB and LAN interfaces.

There are the following two communication methods. To enable communication, the communication conditions need to be set on the instrument.

- **USB communication** (p. 23)
  The instrument is communication class compatible.

- **LAN communication** (p. 30)
  Command control using the TCP/IP protocol is possible.
3.2 USB Settings and Connection

**NOTE**
IM3523
To connect the instrument to a computer the first time, a dedicated USB driver must be installed. Before connecting the instrument to the computer, install the USB driver. The USB driver can be downloaded from the bundled CD, or our web site. ([http://www.hioki.com](http://www.hioki.com))

IM3523A
When the instrument is connected to a computer, the USB driver is automatically installed. Since the OS standard driver is installed, it is not necessary to install another driver.

The USB driver is compatible with the Windows 7 (32-bit, 64-bit version), Windows 8 (32-bit, 64-bit version), Windows 10 (32-bit, 64-bit version), and Windows 11 (64-bit version) operating systems. Additionally, do not put the computer into the sleep state while the instrument is connected to the computer.

**Setting USB**

1. **Open the SYSTEM screen.**
   - The SYSTEM screen will be displayed.

2. **Select USB as the interface.**
   - Select USB.

IM3523
The display will vary with the installed options.

When an option is connected
- Using the Z3000
- Using the Z3001
- Using the Z3002
- Using the Z3000
- Using the Z3001
- Using the Z3002
3.2 USB Settings and Connection

3 Select the terminator setting.

<table>
<thead>
<tr>
<th>F1</th>
<th>F2</th>
<th>Select the terminator setting.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TERM</td>
<td>EOR</td>
<td>CR/LF</td>
</tr>
</tbody>
</table>

2 Connect a USB cable (commercially available USB cable) to the USB port of the instrument.

4 You will return to the measurement screen.

Connecting the USB Cable

Connect a USB cable (commercially available USB cable) to the USB port of the instrument.

IM3523

IM3523A
3.3 GP-IB Connection and Settings
(IM3523 only, when connected to the Z3000)

Connecting the GP-IB Cable
Connect the GP-IB cable to the GP-IB connector.

Setting GP-IB

1. Open the SYSTEM screen.

2. Select GP-IB as the interface.
3.3 GP-IB Connection and Settings (IM3523 only, when connected to the Z3000)

3. Select the terminator setting.

- LF with CR+EOI
- LF with EOI

4. Set the GP-IB address.
   Valid setting range: 0 to 30

5. You will return to the measurement screen.
3.4 RS-232C Connection and Settings (IM3523 only, when connected to the Z3001)

Connecting the RS-232C Cable

Connect the RS-232C cable to the RS-232C connector.
(Recommended cable: 9637 RS-232C cable)

![Male 9-pin D-sub Connector](image)

To connect the instrument to a controller (DTE), use a **crossover cable** compatible with the connectors on both the instrument and the controller. The I/O connector is a DTE (Data Terminal Equipment) configuration.

<table>
<thead>
<tr>
<th>Connector (D-sub) Pin No.</th>
<th>Interchange Circuit Name</th>
<th>CCITT Circuit No.</th>
<th>EIA Abbreviation</th>
<th>JIS Abbreviation</th>
<th>Common Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Unused</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Received Data</td>
<td>104</td>
<td>BB</td>
<td>RD</td>
<td>RxD</td>
</tr>
<tr>
<td>3</td>
<td>Transmitted Data</td>
<td>103</td>
<td>BA</td>
<td>SD</td>
<td>TxD</td>
</tr>
<tr>
<td>4</td>
<td>Data Terminal Ready</td>
<td>108/2</td>
<td>CD</td>
<td>ER</td>
<td>DTR</td>
</tr>
<tr>
<td>5</td>
<td>Signal Ground</td>
<td>102</td>
<td>AB</td>
<td>SG</td>
<td>GND</td>
</tr>
<tr>
<td>6</td>
<td>Unused</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Request to Send</td>
<td>105</td>
<td>CA</td>
<td>RS</td>
<td>RTS</td>
</tr>
<tr>
<td>8</td>
<td>Clear to Send</td>
<td>106</td>
<td>CB</td>
<td>CS</td>
<td>CTS</td>
</tr>
<tr>
<td>9</td>
<td>Unused</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Example: Connecting to a DOS/V PC**

Specification: D-sub 9-pin female and female connector, reverse connection

![Crossover Cable Diagram](image)

**NOTE** Hardware control will not work properly if you use a cable that has CA(RTS) and CB(CTS) short-circuited.
3.4 RS-232C Connection and Settings (IM3523 only, when connected to the Z3001)

Setting RS-232C

1. Open the SYSTEM screen.

2. Select RS-232C as the interface.

3. Select from the following baud rate setting:
   9600, 19200, 38400, 57600

4. Select the terminator setting.
3.4 RS-232C Connection and Settings (IM3523 only, when connected to the Z3001)

Select the handshake setting.

1. F1 → Select the handshake setting.
2. F2

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>No flow control</td>
</tr>
<tr>
<td>HARD</td>
<td>Hardware (RTS/CTS control)</td>
</tr>
<tr>
<td>XON/OFF</td>
<td>Software (XON/XOFF control)</td>
</tr>
<tr>
<td>BOTH</td>
<td>Hardware + software</td>
</tr>
</tbody>
</table>

You will return to the measurement screen.

F4
3.5 LAN Settings and Connection (IM3523 needs to be connected to the Z3002)

LAN Settings

You can perform command control using the TCP/IP protocol.
Set the instrument to match your network environment in advance.

**NOTE**
- Make these settings before connecting to a network. Changing settings while connected can duplicate IP addresses of other network devices, and incorrect address information may otherwise be presented to the network.
- The instrument does not support DHCP (automatic IP address assignment) on a network.

### Setting Items

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP address</td>
<td>Identifies each device connected on a network. Each network device must be set to a unique address. The instrument supports IP version 4, with IP addresses indicated as four decimal octets, e.g., “192.168.0.1”.</td>
</tr>
<tr>
<td>Subnet mask</td>
<td>This setting is for separating the IP address into the network address that indicates the network and the host address that indicates the instrument. On this instrument, the subnet mask is represented as four decimal numbers separated by “.” such as “255.255.255.0.”</td>
</tr>
<tr>
<td>Default Gateway</td>
<td>When the computer and instrument are on different but overlapping networks (subnets), this IP address specifies the device to serve as the gateway between the networks. If the computer and instrument are connected one-to-one, no gateway is used, and the instrument's default setting “0.0.0.0” can be kept as is.</td>
</tr>
</tbody>
</table>

### Network Environment Configuration

**Example 1. Connecting the instrument to an existing network**
When connecting the instrument to an existing network, the network settings need to be confirmed in advance.
An IP address which is not the same as that of another network device needs to be assigned.
Confirm the following items with the network administrator, and write them down.

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP Address</td>
<td></td>
</tr>
<tr>
<td>Subnet Mask</td>
<td></td>
</tr>
<tr>
<td>Default Gateway</td>
<td></td>
</tr>
</tbody>
</table>

**Example 2. Connecting multiple instruments to a single computer using a hub**
When building a local network with no outside connection, the following private IP addresses are recommended.
Example of private IP address:
IP Address ..............Computer: 192.168.0.100
Instrument: 192.168.0.1, 192.168.0.2, 192.168.0.3...
(Sub an IP address that differs from that of other network devices.)
Subnet Mask .............255.255.255.0
Default Gateway .......OFF(0.0.0.0)

**Example 3. Connecting one instrument to a single computer using the 9642 LAN Cable**
The 9642 LAN Cable can be used with its supplied connection adapter to connect one instrument to one computer, in which case the IP address is freely settable. Use the recommended private IP addresses.
IP Address ..............Computer: 192.168.0.100
Instrument: 192.168.0.1 (Set to a different IP address than the computer.)
Subnet Mask .............255.255.255.0
Default Gateway .......OFF(0.0.0.0)
3.5 LAN Settings and Connection (IM3523 needs to be connected to the Z3002)

1. Open the SYSTEM screen.

2. Select LAN as the interface.

3. Select the IP address.

4. Select the subnet mask.

---

**Note:** Any of the following 30 subnet masks can be set for the instrument.

<table>
<thead>
<tr>
<th>Subnet Mask</th>
<th>Initial Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>128.000.000.000</td>
<td>255.255.255.000</td>
</tr>
<tr>
<td>192.000.000.000</td>
<td>255.255.255.000</td>
</tr>
<tr>
<td>224.000.000.000</td>
<td>255.255.255.000</td>
</tr>
<tr>
<td>240.000.000.000</td>
<td>255.255.255.000</td>
</tr>
<tr>
<td>248.000.000.000</td>
<td>255.255.255.000</td>
</tr>
<tr>
<td>252.000.000.000</td>
<td>255.255.255.000</td>
</tr>
<tr>
<td>254.000.000.000</td>
<td>255.255.255.000</td>
</tr>
<tr>
<td>255.000.000.000</td>
<td>255.255.255.000</td>
</tr>
</tbody>
</table>

(HIOKI IM3570A983-08)
3.5 LAN Settings and Connection (IM3523 needs to be connected to the Z3002)

5. Select the default gateway.

- Set the default gateway to OFF (000.000.000.000).
- If the default gateway does not need to be set, for example, when connecting the instrument and computer on a one-to-one basis using a cross cable, leave this set to OFF.

6. Select the terminator setting.

7. Select the port number.

Settable range: 1024 to 65535

8. You will return to the measurement screen.
3.5 LAN Settings and Connection (IM3523 needs to be connected to the Z3002)

Connecting a LAN Cable

Use a LAN cable to connect the instrument and computer.

Required items:
When connecting the instrument to an existing network (prepare any of the following):
• Straight-through Cat 5, 100BASE-TX-compliant Ethernet cable (up to 100 m, commercially available).
For 10BASE communication, a 10BASE-T-compliant cable may also be used.
• Hioki 9642 LAN Cable (option)
(A cross adapter cannot be used.)
When connecting one instrument to a single computer (prepare one of the following):
• 100BASE-TX-compliant cross-over cable (up to 100 m)
• 100BASE-TX-compliant straight-through cable with cross-over adapter (up to 100 m)
• Hioki 9642 LAN Cable (option)

IM3523

The MAC address of the LAN is displayed above the serial number.
You can also check it on the instrument screen.

IM3523A

The LAN MAC address is shown to the right of the LAN terminal.
You can also check it on the instrument screen.

When connecting the instrument to a single computer (connect the instrument to the computer)
Connecting with the 9642 LAN Cable and crossover adapter (supplied with the 9642)

1. Connect the LAN Cable to the crossover adapter.
2. Connect the crossover adapter to the LAN interface on the instrument.
3. Connect the LAN Cable to the 100BASE-TX connector on the PC.
3.6 Remote Mode

When you connect a device to an interface and start communication, the mode becomes remote mode (remote operation state) and the keys on the LCD are disabled.

Remote status

<table>
<thead>
<tr>
<th>Mode</th>
<th>Resistance</th>
<th>Current</th>
<th>Volt</th>
<th>Hertz</th>
</tr>
</thead>
<tbody>
<tr>
<td>NORM</td>
<td>10.0020kΩ</td>
<td>0.079mΩ</td>
<td>99.3mV</td>
<td>0.1kHz</td>
</tr>
<tr>
<td>LOCAL</td>
<td>10.0020kΩ</td>
<td>0.079mΩ</td>
<td>99.3mV</td>
<td>0.1kHz</td>
</tr>
</tbody>
</table>

Keys other than [F1] are disabled.

Canceling Remote Mode

1. Press [F4] to cancel remote mode. You will return to the measurement screen.

2. Press [F4] again to return to the measurement screen.
4.1 Overview of Communication

You can control the instrument with communication commands from a computer via the USB, GP-IB, RS-232C and LAN interfaces. There are the following four communication methods. To enable communication, the communication conditions need to be set on the instrument.

- **USB communication (p. 37)**  
The instrument is communication class compatible.

- **GP-IB communication (when connected to the Z3000) (p. 39)**
  - Commands common to IEEE-488-2 1987 (requirement) can be used.
  - The instrument complies with the following standard. (Compliance standard: IEEE-488.1 1987)
  - The instrument has been designed with reference to the following standard. (Reference standard: IEEE-488.2 1987)

- **RS-232C communication (when connected to the Z3001) (p. 41)**  
  Printer can be connected to enable printing measurement values and screens.

- **LAN communication (when connected to the Z3002) (p. 43)**  
  Command control using the TCP/IP protocol is possible.

**WARNING**

- Always turn both devices OFF when connecting and disconnecting an interface connector. Otherwise, an electric shock accident may occur.
- To avoid damage to the instrument, do not short-circuit the terminal and do not input voltage to the terminal.
- Failure to fasten the connectors properly may result in sub-specification performance or damage to the equipment.

**CAUTION**

- To avoid damage, do not disconnect the communications cable while the instrument is sending or receiving data.
- Use a common ground for both the instrument and the computer. Grounding them to different ground points will result in a potential difference between the instrument's ground and the computer's ground. If the communications cable is connected while such a potential difference exists, it may result in equipment malfunction or failure.
- Before connecting or disconnecting any communications cable, always turn off the instrument and the computer. Failure to do so could result in equipment malfunction or damage.
- After connecting the communications cable, tighten the screws on the connector securely. Failure to secure the connector could result in equipment malfunction or damage.
4.1 Overview of Communication

Screen Displayed while Setting Interfaces

When you set an interface, the icon for the set interface is displayed on the right side of the screen.
4.2  USB Settings and Connection

**NOTE** To connect the instrument to a computer the first time, a dedicated USB driver must be installed. Before connecting the instrument to the computer, install the USB driver. The USB driver can be downloaded from the bundled CD, or our web site. The USB driver is compatible with the Windows 7 (32-bit, 64-bit version), Windows 8 (32-bit, 64-bit version), Windows 10 (32-bit, 64-bit version), and Windows 11 (64-bit version) operating systems. Additionally, do not put the computer into the sleep state while the instrument is connected to the computer.

**Setting USB**

The display will vary with the installed options.

**Procedure**

You can configure the setting from any of the **LCR**, **ANALYZER**, and **TRANSFORMER** modes.

1. **LCR Measurement Screen**

2. **USB Setting**

   **Press**

   **USB**.

   When an option is connected

   Using the Z3000

   Using the Z3001

   Using the Z3002
4.2 USB Settings and Connection

**Connecting the USB Cable**

Connect a USB cable (commercially available USB cable) to the USB port of the instrument.

1. Connect a USB cable (commercially available USB cable) to the USB port of the instrument.
2. Select the terminator setting.
   - CR+LF
   - CR
3. Press **EXIT** to confirm the setting.

![Diagram of USB connection]
4.3  GP-IB Connection and Settings (when connected to the Z3000)

Connecting the GP-IB Cable

Connect the GP-IB cable to the GP-IB connector.

Recommended cable:
9151-02 GP-IB connection cable (2 m)

Setting GP-IB

Procedure
You can configure the setting from any of LCR mode, ANALYZER mode, and TRANSFORMER mode.

1. LCR Measurement Screen
2. Interface Settings
4.3 GP-IB Connection and Settings (when connected to the Z3000)

2. Press GP IB.

3. Use ▲ or ▼ to set the GP-IB address. Select the terminator setting.

4. Press EXIT to confirm the setting.
4.4 RS-232C Connection and Settings (when connected to the Z3001)

Connecting the RS-232C Cable

Connect the RS-232C cable to the RS-232C connector.
(Recommended cable: 9637 RS-232C cable)

<table>
<thead>
<tr>
<th>Connector (D-sub) Pin No.</th>
<th>Interchange Circuit Name</th>
<th>CCITT Circuit No.</th>
<th>EIA Abbreviation</th>
<th>JIS Abbreviation</th>
<th>Common Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Unused</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Received Data</td>
<td>104</td>
<td>BB</td>
<td>RD</td>
<td>RxD</td>
</tr>
<tr>
<td>3</td>
<td>Transmitted Data</td>
<td>103</td>
<td>BA</td>
<td>SD</td>
<td>TxD</td>
</tr>
<tr>
<td>4</td>
<td>Data Terminal Ready</td>
<td>108/2</td>
<td>CD</td>
<td>ER</td>
<td>DTR</td>
</tr>
<tr>
<td>5</td>
<td>Signal Ground</td>
<td>102</td>
<td>AB</td>
<td>SG</td>
<td>GND</td>
</tr>
<tr>
<td>6</td>
<td>Unused</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Request to Send</td>
<td>105</td>
<td>CA</td>
<td>RS</td>
<td>RTS</td>
</tr>
<tr>
<td>8</td>
<td>Clear to Send</td>
<td>106</td>
<td>CB</td>
<td>CS</td>
<td>CTS</td>
</tr>
<tr>
<td>9</td>
<td>Unused</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Example: Connecting to a DOS/V PC
Specification: D-sub 9-pin female and female connector, reverse connection

| BB (RxD) | 1   | BB (RxD) |
| BA (TxD) | 2   | BA (TxD) |
| CD (DTR) | 3   | AB (GND) |
| AB (GND) | 4   | CC (DSR) |
| CA (RTS) | 5   | AB (GND) |
| CB (CTS) | 6   | CA (RTS) |
| SHELL    | 7   | CB (CTS) |

**NOTE**

Hardware control will not work properly if you use a cable that has CA(RTS) and CB(CTS) short-circuited.
4.4 RS-232C Connection and Settings (when connected to the Z3001)

**Setting RS-232C**

**Procedure**
You can configure the setting from any of **LCR** mode, **ANALYZER** mode, and **TRANSFORMER** mode.

1. **LCR Measurement Screen**

2. **Interface Settings**

3. **Select the baud rate setting.**

4. **Select the handshake setting.**

5. **Select the terminator setting.**

4.2 Setting RS-232C

Press **RS232C**.

Press **EXIT** to confirm the setting.
LAN Settings

You can perform command control using the TCP/IP protocol.
Set the instrument to match your network environment in advance.

Example 1. Connecting the instrument to an existing network
When connecting the instrument to an existing network, the network settings need to be confirmed in advance.
An IP address which is not the same as that of another network device needs to be assigned.
Confirm the following items with the network administrator, and write them down.

Example 2. Connecting multiple instruments to a single computer using a hub
When building a local network with no outside connection, the following private IP addresses are recommended.
Example of private IP address:
IP Address ...............Computer: 192.168.0.100
Instrument: 192.168.0.1, 192.168.0.2, 192.168.0.3...
Set an IP address that differs from that of other network devices.
Subnet Mask............255.255.255.0
Default Gateway ......OFF(0.0.0.0)

Example 3. Connecting one instrument to a single computer using the 9642 LAN Cable
The 9642 LAN Cable can be used with its supplied connection adapter to connect one instrument to one computer, in which case the IP address is freely settable. Use the recommended private IP addresses.
Example of private IP address:
IP Address ...............Computer: 192.168.0.100
Instrument: 192.168.0.1 (Set to a different IP address than the computer.)
Subnet Mask............255.255.255.0
Default Gateway ......OFF(0.0.0.0)
4.5 LAN Settings and Connection (when connected to the Z3002)

Procedure

You can configure the setting from any of LOR mode, ANALYZER mode, and TRANSFORMER mode.

1. **LCR Measurement Screen**

   Press .

2. **LAN Settings**

   Press .

3. **LAN Settings**

   Select the IP address.
4.5 LAN Settings and Connection (when connected to the Z3002)

**IP address Settings**

Use ▲ or ▼ to set the IP address. Press EXIT to confirm the setting.

**LAN Settings**

Select the subnet mask.

**Subnet mask Settings**

Use ▲ or ▼ to set the subnet mask, and press EXIT to confirm the setting.

---

**NOTE**

Any of the following 30 subnet masks can be set for the instrument.

<table>
<thead>
<tr>
<th>Subnet Mask</th>
<th>Initial Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>128.000.000.000</td>
<td>255.255.255.255</td>
</tr>
<tr>
<td>192.000.000.000</td>
<td>255.255.255.255</td>
</tr>
<tr>
<td>224.000.000.000</td>
<td>255.255.255.255</td>
</tr>
<tr>
<td>240.000.000.000</td>
<td>255.255.255.255</td>
</tr>
<tr>
<td>248.000.000.000</td>
<td>255.255.255.255</td>
</tr>
<tr>
<td>252.000.000.000</td>
<td>255.255.255.255</td>
</tr>
<tr>
<td>254.000.000.000</td>
<td>255.255.255.255</td>
</tr>
<tr>
<td>255.000.000.000</td>
<td>255.255.255.255</td>
</tr>
<tr>
<td>255.128.000.000</td>
<td>255.255.255.255</td>
</tr>
<tr>
<td>255.192.000.000</td>
<td>255.255.255.255</td>
</tr>
<tr>
<td>255.224.000.000</td>
<td>255.255.255.255</td>
</tr>
<tr>
<td>255.240.000.000</td>
<td>255.255.255.255</td>
</tr>
<tr>
<td>255.248.000.000</td>
<td>255.255.255.255</td>
</tr>
<tr>
<td>255.252.000.000</td>
<td>255.255.255.255</td>
</tr>
<tr>
<td>255.254.000.000</td>
<td>255.255.255.255</td>
</tr>
<tr>
<td>255.255.000.000</td>
<td>255.255.255.255</td>
</tr>
<tr>
<td>255.255.128.000</td>
<td>255.255.255.255</td>
</tr>
<tr>
<td>255.255.192.000</td>
<td>255.255.255.255</td>
</tr>
<tr>
<td>255.255.224.000</td>
<td>255.255.255.255</td>
</tr>
<tr>
<td>255.255.240.000</td>
<td>255.255.255.255</td>
</tr>
<tr>
<td>255.255.248.000</td>
<td>255.255.255.255</td>
</tr>
<tr>
<td>255.255.252.000</td>
<td>255.255.255.255</td>
</tr>
<tr>
<td>255.255.254.000</td>
<td>255.255.255.255</td>
</tr>
<tr>
<td>255.255.255.000</td>
<td>255.255.255.255</td>
</tr>
<tr>
<td>255.255.255.128</td>
<td>255.255.255.255</td>
</tr>
<tr>
<td>255.255.255.192</td>
<td>255.255.255.255</td>
</tr>
<tr>
<td>255.255.255.224</td>
<td>255.255.255.255</td>
</tr>
<tr>
<td>255.255.255.240</td>
<td>255.255.255.255</td>
</tr>
<tr>
<td>255.255.255.248</td>
<td>255.255.255.255</td>
</tr>
<tr>
<td>255.255.255.252</td>
<td>255.255.255.255</td>
</tr>
<tr>
<td>255.255.255.254</td>
<td>255.255.255.255</td>
</tr>
<tr>
<td>255.255.255.255</td>
<td>255.255.255.255</td>
</tr>
</tbody>
</table>
4.5 LAN Settings and Connection (when connected to the Z3002)

7 Select the default gateway.
If the default gateway does not need to be set, for example, when connecting the instrument and computer on a one-to-one basis using a cross cable, leave this set to OFF.

8 Use or to set the default gateway.
Press to confirm the setting.

9 Select the port number.
4.5 LAN Settings and Connection (when connected to the Z3002)

**Port number Settings**

Use ↑ or ↓ to set the port number to use for communication commands.

Settable range: 1024 to 65535

Press **EXIT** to confirm the setting.

**LAN Settings**

Select the terminator setting.

- CR+LF
- CR

Press **EXIT** to confirm the setting.
4.5 LAN Settings and Connection (when connected to the Z3002)

Connecting a LAN Cable

Use a LAN cable to connect the instrument and computer.

**Required items:**

When connecting the instrument to an existing network (prepare any of the following):
- Straight-through Cat 5, 100BASE-TX-compliant Ethernet cable (up to 100 m, commercially available).
- For 10BASE communication, a 10BASE-T-compliant cable may also be used.
- Hioki 9642 LAN Cable (option)
  (A cross adapter cannot be used.)

When connecting one instrument to a single computer (prepare one of the following):
- 100BASE-TX-compliant cross-over cable (up to 100 m)
- 100BASE-TX-compliant straight-through cable with cross-over adapter (up to 100 m)
- Hioki 9642 LAN Cable (option)

**MAC address of the LAN**

The MAC address of the LAN is displayed above the serial number.
You can also check it on the instrument screen.

**See:** “Checking the Version of the Instrument” in the instruction manual.

When connecting the instrument to a single computer (connect the instrument to the computer)

Connecting with the 9642 LAN Cable and crossover adapter (supplied with the 9642)

1. Connect the LAN Cable to the crossover adapter.
2. Connect the crossover adapter to the LAN interface on the instrument.
3. Connect the LAN Cable to the 100BASE-TX connector on the PC.
4.6 Remote Mode

When you connect a device to an interface and start communication, the mode becomes remote mode (remote operation state) and the keys on the LCD are disabled.

All of the keys except LOCAL are disabled.

Canceling Remote Mode

Procedure

1. Press LOCAL to return to the normal state (local state).

2. The measurement screen is redisplayed.
4.6 Remote Mode
5.1 Overview of Communication

You can control the instrument with communication commands from a computer via the USB, GP-IB, RS-232C and LAN interfaces.

There are the following four communication methods. To enable communication, the communication conditions need to be set on the instrument.

- **USB communication (p. 53)**
  The instrument is communication class compatible.

- **LAN communication (p. 55)**
  Command control using the TCP/IP protocol is possible.

- **GP-IB communication (when connected to the Z3000) (p. 61)**
  - Commands common to IEEE-488-2 1987 (requirement) can be used.
  - The instrument complies with the following standard. (Compliance standard: IEEE-488.1 1987)
  - The instrument has been designed with reference to the following standard. (Reference standard: IEEE-488.2 1987)

- **RS-232C communication (when connected to the Z3001) (p. 63)**

**WARNING**
- Always turn both devices OFF when connecting and disconnecting an interface connector. Otherwise, an electric shock accident may occur.
- To avoid damage to the instrument, do not short-circuit the terminal and do not input voltage to the terminal.
- Failure to fasten the connectors properly may result in sub-specification performance or damage to the equipment.

**CAUTION**
- To avoid damage, do not disconnect the communications cable while the instrument is sending or receiving data.
- Use a common ground for both the instrument and the computer. Grounding them to different ground points will result in a potential difference between the instrument's ground and the computer's ground. If the communications cable is connected while such a potential difference exists, it may result in equipment malfunction or failure.
- Before connecting or disconnecting any communications cable, always turn off the instrument and the computer. Failure to do so could result in equipment malfunction or damage.
- After connecting the communications cable, tighten the screws on the connector securely. Failure to secure the connector could result in equipment malfunction or damage.
5.1 Overview of Communication

Screen Displayed while Setting Interfaces

When you set an interface, the icon for the set interface is displayed on the right side of the screen.

- **USB**: When USB is set
- **GPIB**: When GP-IB is set
- **RS232C**: When RS-232C is set
- **LAN**: When LAN is set
5.2 USB Settings and Connection

**NOTE**
To connect the instrument to a computer the first time, a dedicated USB driver must be installed. Before connecting the instrument to the computer, install the USB driver. The USB driver can be downloaded from the bundled CD, or our website (http://www.hioki.com). The USB driver is compatible with the Windows 7 (32-bit, 64-bit version), Windows 8 (32-bit, 64-bit version), Windows 10 (32-bit, 64-bit version), and Windows 11 (64-bit version) operating systems. Additionally, do not put the computer into the sleep state while the instrument is connected to the computer.

**Setting USB**
The display will vary with the installed options.

**Procedure**
You can configure the setting from any of LCR mode and ANALYZER mode.

1. **LCR Measurement Screen**
   Press .

2. **USB Setting**
   Press USB .
5.2 USB Settings and Connection

3 Connect a USB cable (commercially available USB cable) to the USB port of the instrument.

4 Press **EXIT** to confirm the setting.

### Connecting the USB Cable

Connect a USB cable (commercially available USB cable) to the USB port of the instrument.

![Diagram of USB connection](image)
5.3 LAN Settings and Connection

LAN Settings

You can perform command control using the TCP/IP protocol.
Set the instrument to match your network environment in advance.

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Make these settings before connecting to a network. Changing settings while connected can duplicate IP addresses of other network devices, and incorrect address information may otherwise be presented to the network.</td>
</tr>
<tr>
<td>• The instrument does not support DHCP (automatic IP address assignment) on a network.</td>
</tr>
</tbody>
</table>

Setting Items

<table>
<thead>
<tr>
<th>Setting Items</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP address</td>
<td>Identifies each device connected on a network. Each network device must be set to a unique address. The instrument supports IP version 4, with IP addresses indicated as four decimal octets, e.g., “192.168.0.1”.</td>
</tr>
<tr>
<td>Subnet mask</td>
<td>This setting is for separating the IP address into the network address that indicates the network and the host address that indicates the instrument. On this instrument, the subnet mask is represented as four decimal numbers separated by “.” such as “255.255.255.0.”</td>
</tr>
<tr>
<td>Default Gateway</td>
<td>When the computer and instrument are on different but overlapping networks (subnets), this IP address specifies the device to serve as the gateway between the networks. If the computer and instrument are connected one-to-one, no gateway is used, and the instrument's default setting “0.0.0.0” can be kept as is.</td>
</tr>
</tbody>
</table>

Network Environment Configuration

Example 1. Connecting the instrument to an existing network

When connecting the instrument to an existing network, the network settings need to be confirmed in advance.
An IP address which is not the same as that of another network device needs to be assigned.
Confirm the following items with the network administrator, and write them down.

<table>
<thead>
<tr>
<th>IP Address</th>
<th>Subnet Mask</th>
<th>Default Gateway</th>
</tr>
</thead>
<tbody>
<tr>
<td>__________</td>
<td>__________</td>
<td>__________</td>
</tr>
</tbody>
</table>

Example 2. Connecting multiple instruments to a single computer using a hub

When building a local network with no outside connection, the following private IP addresses are recommended.
Example of private IP address:
IP Address .......... Computer: 192.168.0.100
                     Instrument: 192.168.0.1, 192.168.0.2, 192.168.0.3...
                     (Set an IP address that differs from that of other network devices.)
Subnet Mask .......... 255.255.255.0
Default Gateway ...... OFF(0.0.0.0)

Example 3. Connecting one instrument to a single computer using the 9642 LAN Cable

The 9642 LAN Cable can be used with its supplied connection adapter to connect one instrument to one computer, in which case the IP address is freely settable. Use the recommended private IP addresses.
IP Address .......... Computer: 192.168.0.100
                     Instrument: 192.168.0.1 (Set to a different IP address than the computer.)
Subnet Mask .......... 255.255.255.0
Default Gateway ...... OFF(0.0.0.0)
5.3 LAN Settings and Connection

You can configure the setting from any of [LCR] mode and [ANALYZER] mode.

Procedure

1. LCR Measurement Screen
2. Press [LAN].
3. LAN Settings
   - Select the IP address.
5.3 LAN Settings and Connection

4. IP address Settings

Use ▲ or ▼ to set the IP address.

Press EXIT to confirm the setting.

5. LAN Settings

Select the subnet mask.

NOTE

Any of the following 30 subnet masks can be set for the instrument.

<table>
<thead>
<tr>
<th>Subnet Mask</th>
<th>Subnet Mask</th>
<th>Subnet Mask</th>
<th>Subnet Mask</th>
<th>Subnet Mask</th>
</tr>
</thead>
<tbody>
<tr>
<td>128.000.000.000</td>
<td>255.128.000.000</td>
<td>255.255.128.000</td>
<td>255.255.255.128</td>
<td></td>
</tr>
<tr>
<td>192.000.000.000</td>
<td>255.192.000.000</td>
<td>255.255.192.000</td>
<td>255.255.255.192</td>
<td></td>
</tr>
<tr>
<td>224.000.000.000</td>
<td>255.224.000.000</td>
<td>255.255.224.000</td>
<td>255.255.255.224</td>
<td></td>
</tr>
<tr>
<td>240.000.000.000</td>
<td>255.240.000.000</td>
<td>255.255.240.000</td>
<td>255.255.255.240</td>
<td></td>
</tr>
<tr>
<td>248.000.000.000</td>
<td>255.248.000.000</td>
<td>255.255.248.000</td>
<td>255.255.255.248</td>
<td></td>
</tr>
<tr>
<td>252.000.000.000</td>
<td>255.252.000.000</td>
<td>255.255.252.000</td>
<td>255.255.255.252</td>
<td></td>
</tr>
<tr>
<td>254.000.000.000</td>
<td>255.254.000.000</td>
<td>255.255.254.000</td>
<td>255.255.255.254</td>
<td></td>
</tr>
<tr>
<td>255.000.000.000</td>
<td>255.255.000.000</td>
<td>255.255.255.000</td>
<td>255.255.255.255</td>
<td></td>
</tr>
<tr>
<td>(Initial setting)</td>
<td>(Initial setting)</td>
<td>(Initial setting)</td>
<td>(Initial setting)</td>
<td></td>
</tr>
</tbody>
</table>
5.3 LAN Settings and Connection

7 LAN Settings

Select the default gateway.
If the default gateway does not need to be set, for example, when connecting the instrument and computer on a one-to-one basis using a cross cable, leave this set to OFF.

8 Default gateway Settings

Use ↑ or ↓ to set the default gateway.
Press EXIT to confirm the setting.

9 LAN Settings

Select the port number.
5.3 LAN Settings and Connection

10 Port number Settings

Use ▲ or ▼ to set the port number to use for communication commands.

Settable range: 1024 to 65535

Press EXIT to confirm the setting.

11 LAN Settings

Select the terminator setting.

Select CR+LF or CR.

12 Press EXIT to confirm the setting.
5.3 LAN Settings and Connection

Connecting a LAN Cable

Use a LAN cable to connect the instrument and computer.

Required items:

When connecting the instrument to an existing network (prepare any of the following):

- Straight-through Cat 5, 1000BASE-T-compliant Ethernet cable (up to 100 m, commercially available).
  For 100BASE/10BASE communication, a 100BASE-TX/10BASE-T-compliant cable may also be used.
- Hioki 9642 LAN Cable (option)
  (A cross adapter cannot be used.)

When connecting one instrument to a single computer (prepare one of the following):

- 1000BASE-T-compliant cross-over cable (up to 100 m)
- 1000BASE-T-compliant straight-through cable with cross-over adapter (up to 100 m)
- Hioki 9642 LAN Cable (option)

The MAC address of the LAN is displayed below the serial number.
You can also check it on the instrument screen.


When connecting the instrument to a single computer (connect the instrument to the computer)

Connecting with the 9642 LAN Cable and crossover adapter (supplied with the 9642)

1 Connect the LAN Cable to the crossover adapter.

2 Connect the crossover adapter to the LAN interface on the instrument.

3 Connect the LAN Cable to the 100BASE-TX connector on the PC.
5.4 GP-IB Connection and Settings (when connected to the Z3000)

Connecting the GP-IB Cable

Connect the GP-IB cable to the GP-IB connector.

Recommended cable: 9151-02 GP-IB connection cable (2 m)

Setting GP-IB

Procedure

You can configure the setting from any of LCR mode and Analyzer mode.

1. LCR Measurement Screen
2. Interface Settings

HIOKI IM3570A983-08
5.4 GP-IB Connection and Settings (when connected to the Z3000)

2 Press GPIB.

3 Use ▲ or ▼ to set the GP-IB address.
Select the terminator setting.
- LF
- CR+LF

4 Press EXIT to confirm the setting.
5.5 RS-232C Connection and Settings (when connected to the Z3001)

Connecting the RS-232C Cable

Connect the RS-232C cable to the RS-232C connector.
(Recommended cable: 9637 RS-232C cable)

To connect the instrument to a controller (DTE), use a **crossover cable** compatible with the connectors on both the instrument and the controller. The I/O connector is a DTE (Data Terminal Equipment) configuration.

<table>
<thead>
<tr>
<th>Connector (D-sub) Pin No.</th>
<th>Interchange Circuit Name</th>
<th>CCITT Circuit No.</th>
<th>EIA Abbreviation</th>
<th>JIS Abbreviation</th>
<th>Common Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Unused</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Received Data</td>
<td>104</td>
<td>BB</td>
<td>RD</td>
<td>RxD</td>
</tr>
<tr>
<td>3</td>
<td>Transmitted Data</td>
<td>103</td>
<td>BA</td>
<td>SD</td>
<td>TxD</td>
</tr>
<tr>
<td>4</td>
<td>Data Terminal Ready</td>
<td>108/2</td>
<td>CD</td>
<td>ER</td>
<td>DTR</td>
</tr>
<tr>
<td>5</td>
<td>Signal Ground</td>
<td>102</td>
<td>AB</td>
<td>SG</td>
<td>GND</td>
</tr>
<tr>
<td>6</td>
<td>Unused</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Unused</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Unused</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Unused</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Example: Connecting to a DOS/V PC**

Specification: D-sub 9-pin female and female connector, reverse connection
5.5 RS-232C Connection and Settings (when connected to the Z3001)

**Setting RS-232C**

**Procedure**
You can configure the setting from any of LCR mode and ANALYZER mode.

1. **LCR Measurement Screen**
   - Press .

2. **RS-232C Settings**
   - Press RS23C .
   - Select the baud rate setting.
   - Select the handshake setting.
     - OFF: No flow control
     - XON/OFF: Software (XON/XOFF control)
   - Select the terminator setting.
     - CR+LF
     - CR

3. **RS-232C Settings**
   - Select the baud rate setting.
   - Select the handshake setting.
   - Select the terminator setting.

4. Press EXIT to confirm the setting.
5.6 Remote Mode

When you connect a device to an interface and start communication, the mode becomes remote mode (remote operation state) and the keys on the LCD are disabled.

All of the keys except LOCAL are disabled.

Canceling Remote Mode

Procedure

1. Press LOCAL to return to the normal state (local state).

2. The measurement screen is redisplayed.
5.6 Remote Mode
Appendix 1 Checking the USB Virtual COM Port

The instrument’s USB interface supports communications-class performance, allowing control operations on par with RS-232C to be performed from a computer. When you connect the instrument to a computer and set its interface to USB, it will be recognized as a virtual COM port on the computer.

Device Manager starts.

Check the COM number on the right of “HIOKI IM3570 Impedance Analyzer” port in the [Ports (COM & LPT)] list.
- When the IM3523, IM3523A, IM3533, IM3533-01, IM3590 and IM7580 : Check the COM number to the right of “HIOKI USB Device” in the [Ports (COM & LPT)] list.
- When the IM3570 : Check the COM number to the right of “HIOKI IM3570 Impedance Analyzer” in the [Ports (COM & LPT)] list.

**NOTE**

The procedure to start Device Manager differs depending on the version of the Windows operating system.
For details, refer to Help of the operating system.
Appendix 1 Checking the USB Virtual COM Port