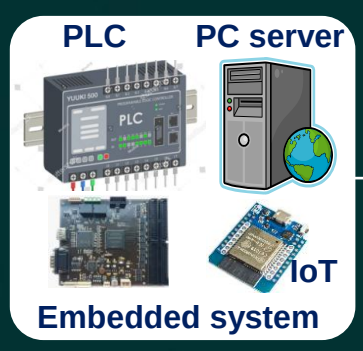
İndustrial LED Message Display Solution for PLC, PC, Embedded system



LED Message Display protocol

RS232/485/TTL, Ethernet

Real time message data | Page messages(Max.10 pages) | with Background images(Max.255) | 7-color multi-language font

Manual - LEDmsg Protocol Simulator

Contents

1. Introduction Page 2
2. Preparation 2
3. Message Simulation 3
4. Settings and Special Commands 4

Attachment

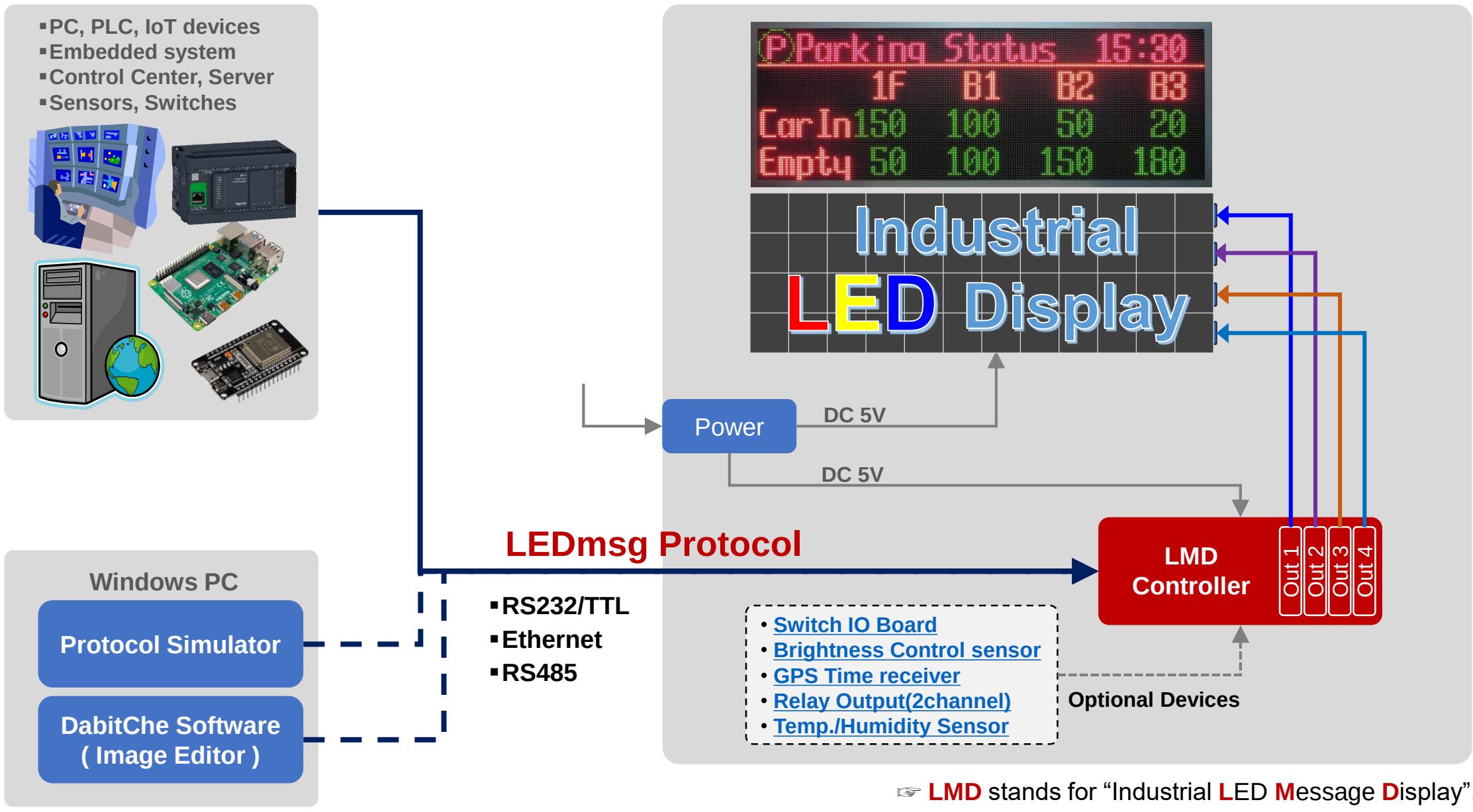
A-1. Communication Setting : RS-232 Page 5
A-2. Communication Setting : RS-485 6
A-3. Communication Setting : TCP server 7
A-4. Communication Setting : TCP client 9
A-5. Communication Setting : UDP 10
A-6. How to set Screen Size 11
A-7. How to set LED Display Signal Type 12
A-8. How to set Controller System Font 13
A-9. How to set Board Function 14
A-10. How to do Firmware Upgrade 15

References

1. LEDmsg Protocol document(html, pdf)
2. LEDmsg Protocol Simulator(software, manual)
3. DabitChe Editing Program(software, manual)

1. Introduction

Home



☞ **LMD** stands for “Industrial **L**ED **M**essage **D**isplay”.

LEDmsg Protocol Simulator(DABIT simulator) is to set the configuration of the LMD controller and simulate messages of “LEDmsg Protocol”.

The best way to easily understand the LEDmsg Protocol and apply it to the customer's system is to purchase a simple LED message display kit and demonstrate it as follows.

1. To set up the communication(RS232/485, Ethernet)
2. To set up the controller
3. To execute the simulation of the LEDmsg Protocol

2. Preparation

Home

1. Connect your PC to the LMD signboard with RS232 or Ethernet cable, and supply the power(DC5V).
2. After downloading the LEDmsg Protocol simulator to your PC(Window only), double-click **DABITsimulator.exe** to run it.
3. Click “**Special Function > Communication Method**” to open the “Communication setting” window and set the communication (RS232 or Ethernet...) by referring to “A-1 ~ A-5”.
4. In “**Special Function**” section, proceed the below settings(as for LMD-Display-Kit):
   1) Set **Screen Size** to “Vertical **2** x 16, Horizontal **6** x 16 pixels, **3**BPP, **Horizontal**(default)” by referring to “A-6”.
   2) Set **LED Signal Type** to “**16D-P16D1S11**, **RGB**” by referring to “A-7”.

Now you are ready to simulate the messages and special commands of “LEDmsg Protocol”.

3. Message Simulation

Here, you can enter various Real-time message and Page message packets of "LEDmsg Protocol document" and preview them or send them directly to the LED sign board to see how it works.

First, try to simulate the basic sample messages. Then, develop the message protocol matching to your LED message sign.

1. Click "**ASCII Message**" tab.
2. Enter the message protocol in a text input box.
3. Click "**Save"**.
4. Click "**Preview**".

   Then, a preview window appears, showing the message display image. Preview may differ from the actual display image on the LED signboard.

   To make the preview disappear, click the Preview button again.
5. Click "**Send**".

   Then, the message is displayed on the LED display board, and the actual transmitted/received protocol packets appear in the log window.

When you click "**Reset Messages**", the text input boxes are reset.

"**Set Message Properties**" is only used under our technical support.

4. Settings and Special Commands

Home

Here, you can set the “communication method”, “program user option”, “controller configuration”, and execute “special commands” of LEDmsg Protocol. For more details, refer to the linked page or document.

A Setting: Communication Method

Click the button and set the communication method between the simulator(window PC) and the sign controller for your requirement.

- RS232 ☞ Refer to “A-1”
- RS485 ☞ Refer to “A-2”
- Ethernet ☞ Refer to “A-3, A-4, A-5”

B Setting: Program User Option

- **Type of Protocol**: Select “ASCII Message” only.
- **Language**: Select “English” for non-Korean users.

C Setting: Controller Configuration

a. “**Screen Setting**” is to set the screen size, color and LED module array. For details, refer to “A-6”.

b. “**Set Page Messages**” is to allocate the total page memories or reset the pages. For details, refer to “LEDmsg Protocol, Chapter 7-L/M”.

c. “**Set Brightness**” is to set the brightness of LED screen. The default is 100%. For details, refer to “LEDmsg Protocol, Chapter 7-J”.

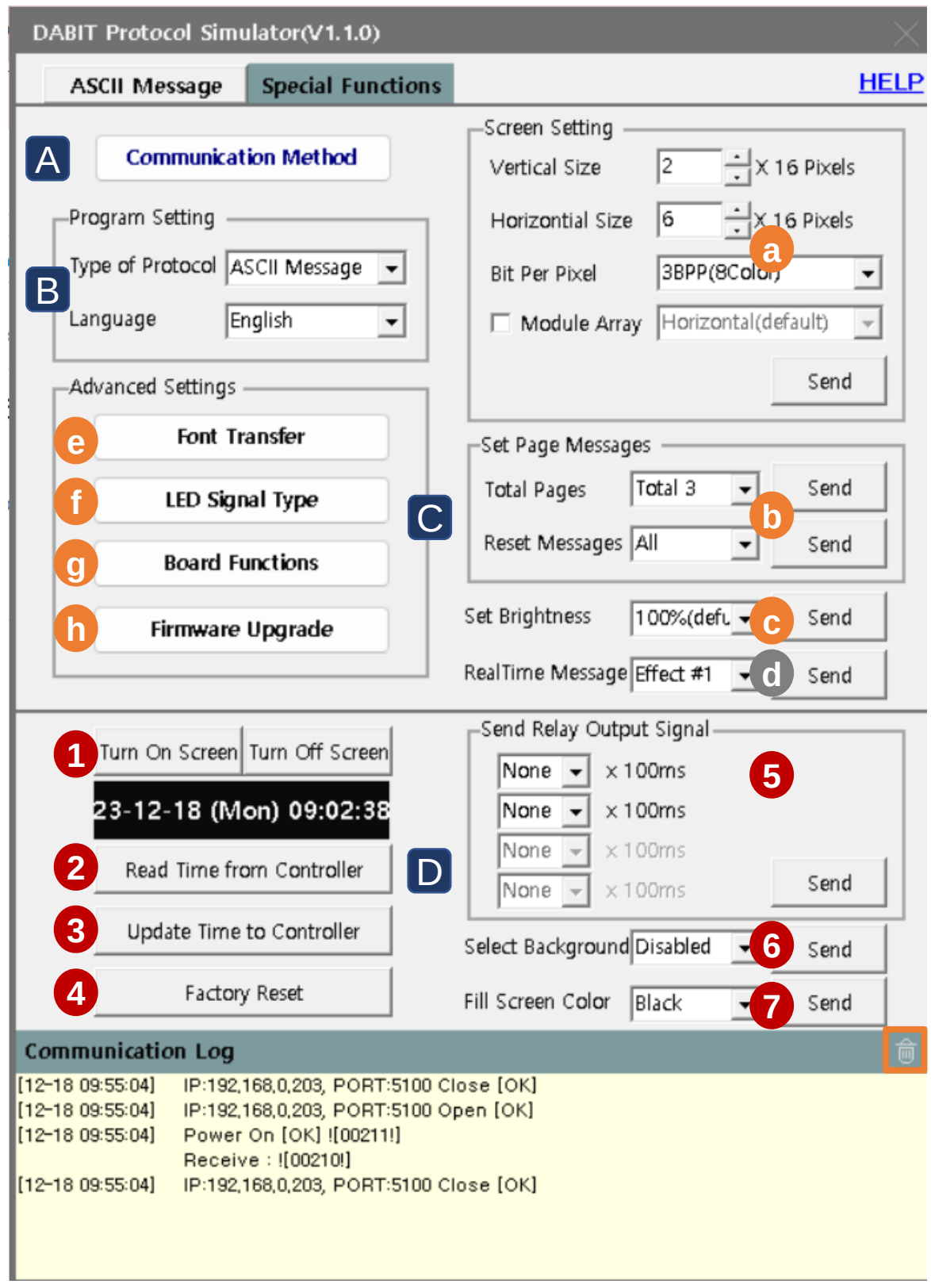
d. “**Real time Message(effect option)**” is only for special application. Do not change it.

e. “**Font Transfer**” is to send the system font files. ☞ Refer to “A-8”

f. “**LED Signal Type**” is to set the signal type of the LED module which is different from LED chip, scan rate, manufacturer, etc. ☞ Refer to “A-7”

g. “**Board Functions**” is to set the port functions, communication speed, etc of the LMD controller. ☞ Refer to “A-9”

h. “**Firmware Upgrade**” is to read the firmware version information and upgrade it under our technical support. ☞ Refer to “A-10”



D Special Commands Simulation ☞ refer to “LME Protocol, Chapter 7”.

① “**Turn On/Off Screen**” is to turn the screen ON/OFF.

② “**Read Time from Controller**” is to read the controller time and display them on the black display box above.
When the power is reset, the time is reset to "2070-01-01 00:00:00".

③ “**Update Time to Controller**” is to update the controller time to the current time of your PC..

④ “**Factory Reset**” is to reset the all message and file data of the controller. But the fonts and setting parameters are maintained

⑤ ”**Send Relay Output Signal**” is to send ON/OFF signals to relays which can control the power for electric buzzer, lamp, devices.
☞ In this application, refer to “How to use Relays”

⑥ “Select Background” is to call the background image file number to display it on LED screen. ☞ Refer to “DabitChe manual, 4 & A-6”

⑦ “**Fill Screen Color**” is to fill the screen with the selected color.

In the “Communication log” window, you can see all the transmitted/received protocol data which you can apply to your messaging program.
If you want to delete all the log data, click the trash can icon .
If you click “Help”, you can refer to the Korean user manual of LMD Simulator. If you want to see it in English version, click here.

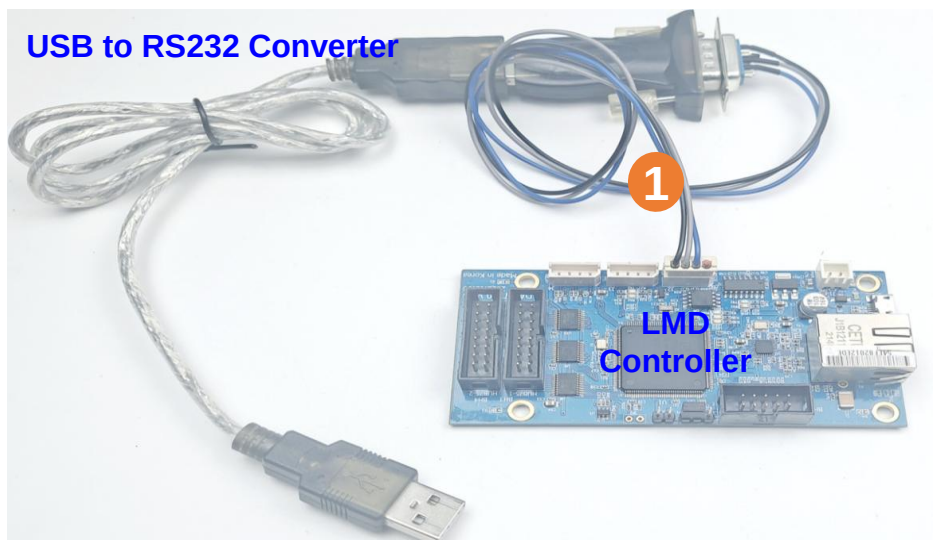
A-1. Communication Setting : RS-232

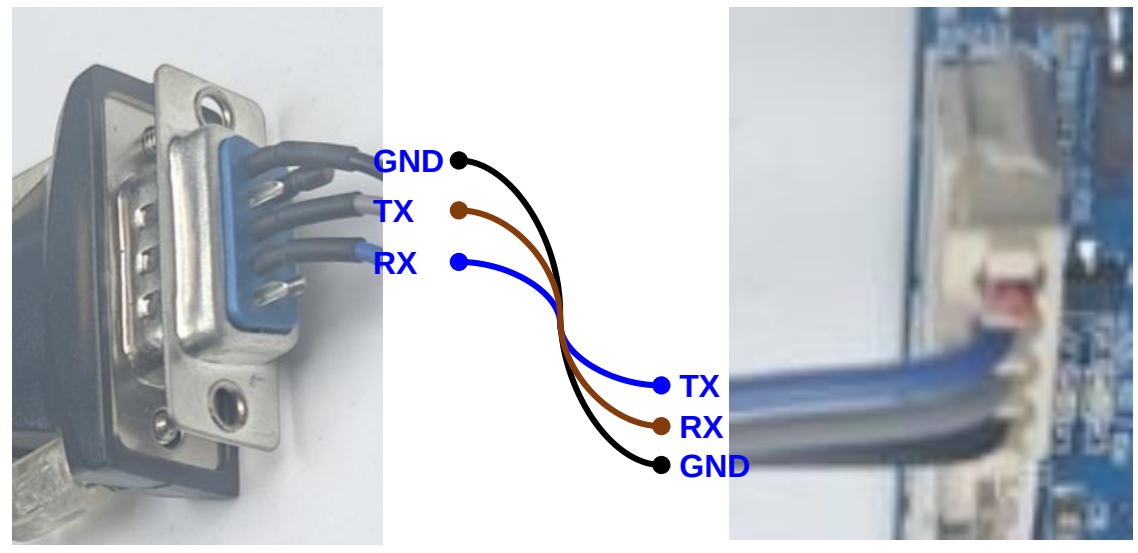
Here describe how to connect your PC running LEDmsg Protocol simulator to the LMD controller via RS232 communication.

On the simulator, click “Special Function > Communication Method” to open the “Communication Setting” window and proceed as follows.

① Connect the LMD controller(“J2” port) and PC with a USB to RS232 converter cable.

- For RS232 communication port location, refer to LMD controller specification.
- You can use the common USB to RS232 converter having “TX, RX, GND” terminal.
  The cable connector is provided free of charge upon request when ordering the product.
- **UART(TTL) communication :** To use UART communication with embedded controllers(Raspberry Pi, ESP32, etc.), connect the connection cable to the “TTL port (**J3**)” of the controller and proceed the same as follows.





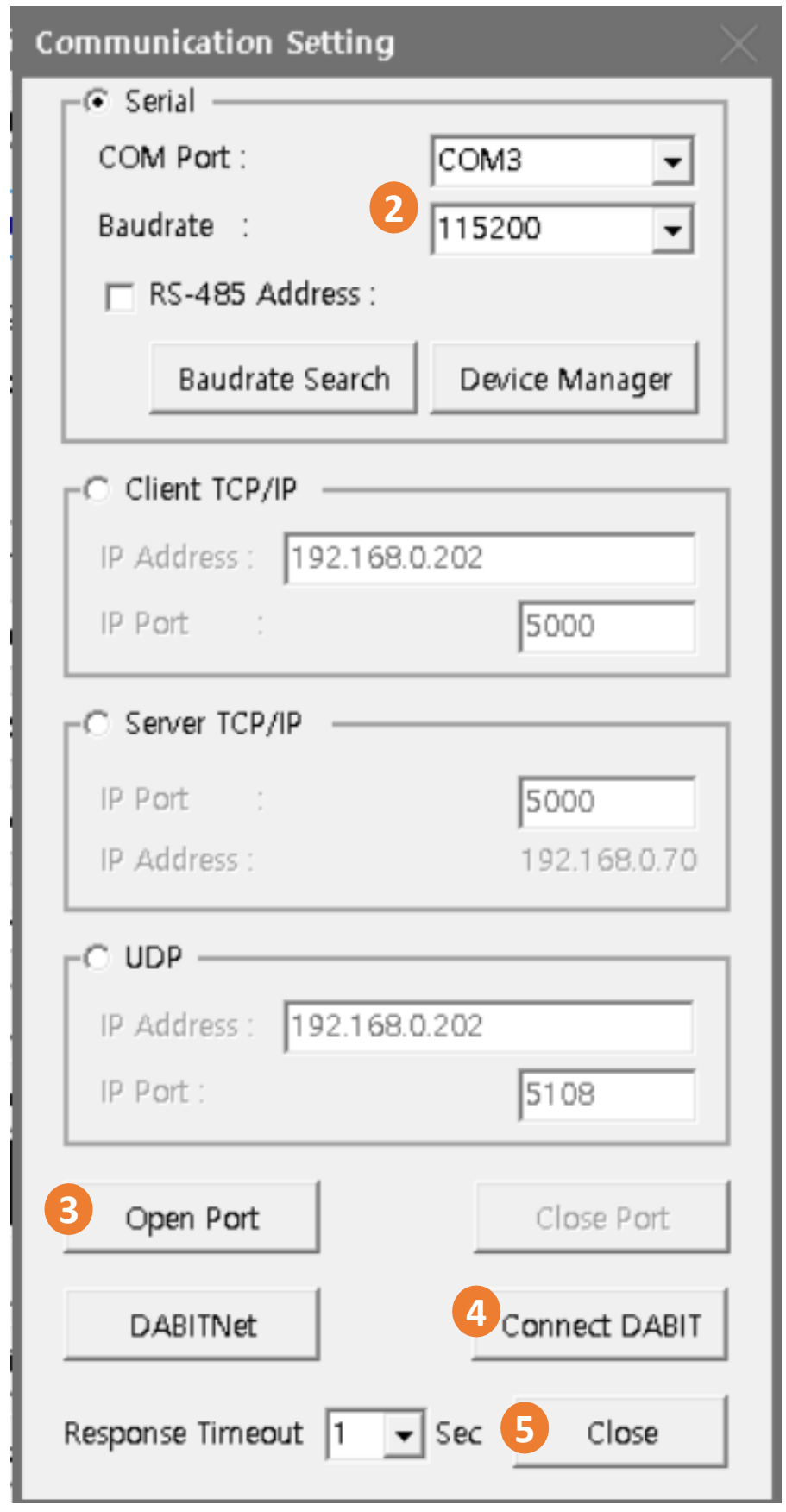
② Select “**Serial**” and proceed to set as follows.

- Set **COM Port**.(Ex. COM3).
  If you click “**Device Man**ager”, you can check the RS232 communication port number connected to the PC. If the port does not appear, you must install the driver for the corresponding RS232 communication converter.
- Set **Baud rate**. The default is “115200bps”.
  If you click "**Baudrate Search**", the communication speed of the currently connected COM port is found.
  To change the baud rate, please refer to “A-9”.

③ Click “**Open Port**” and confirm the message below in the log window.
>>”COM3 : 115,200bps, 8, 1, N - **ComPort Open [OK]**”

④ Click “**Connect DABIT**” and confirm the message below in the log window“.
>>“**DIBD Connecting... [OK]** 10 02 00 00 0B 6A 30 31 32 33 34 35 36 37 38 39 10 03”
>>“Receive : **10 02 00 00 0B 6A 30 31 32 33 34 35 36 37 38 39 10 03”**

⑤ Click “**Close**” to close the “Communication setting” window.

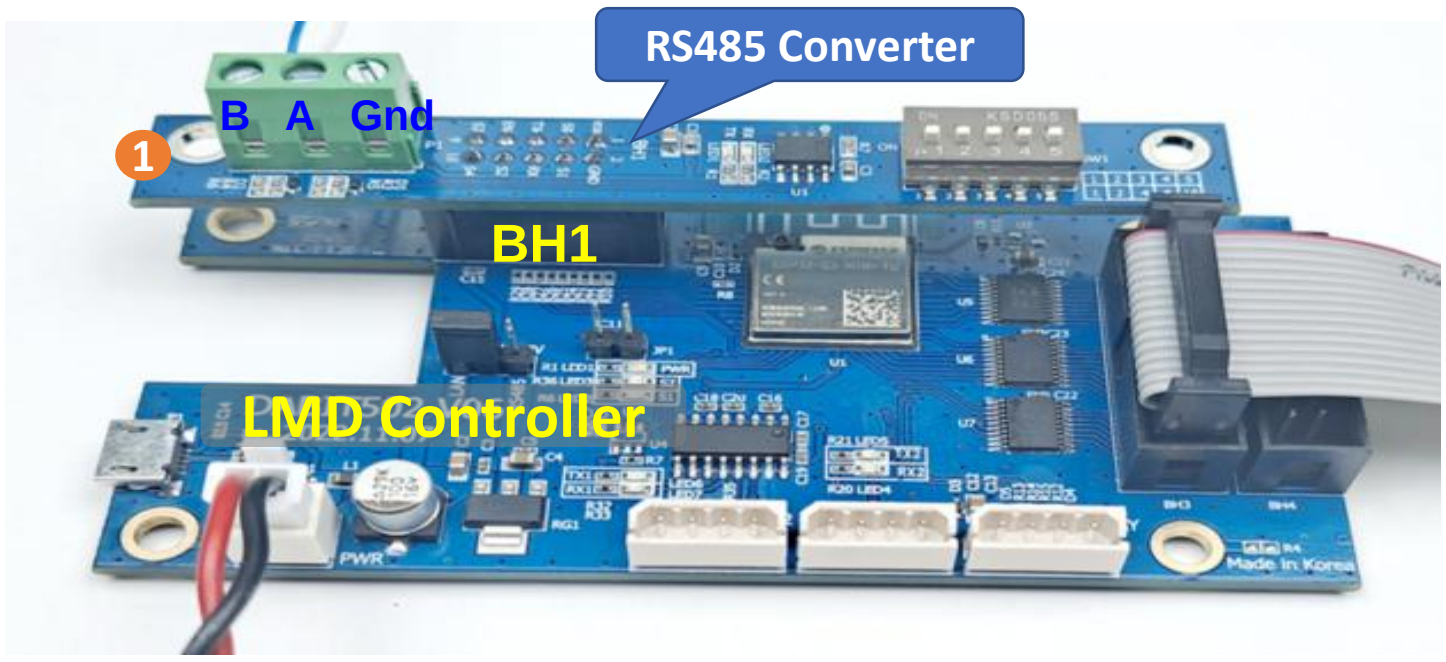


A-2. Communication Setting : RS-485

Here describe how to connect your PC running LEDmsg Protocol simulator to the LMD controller via RS485 communication.

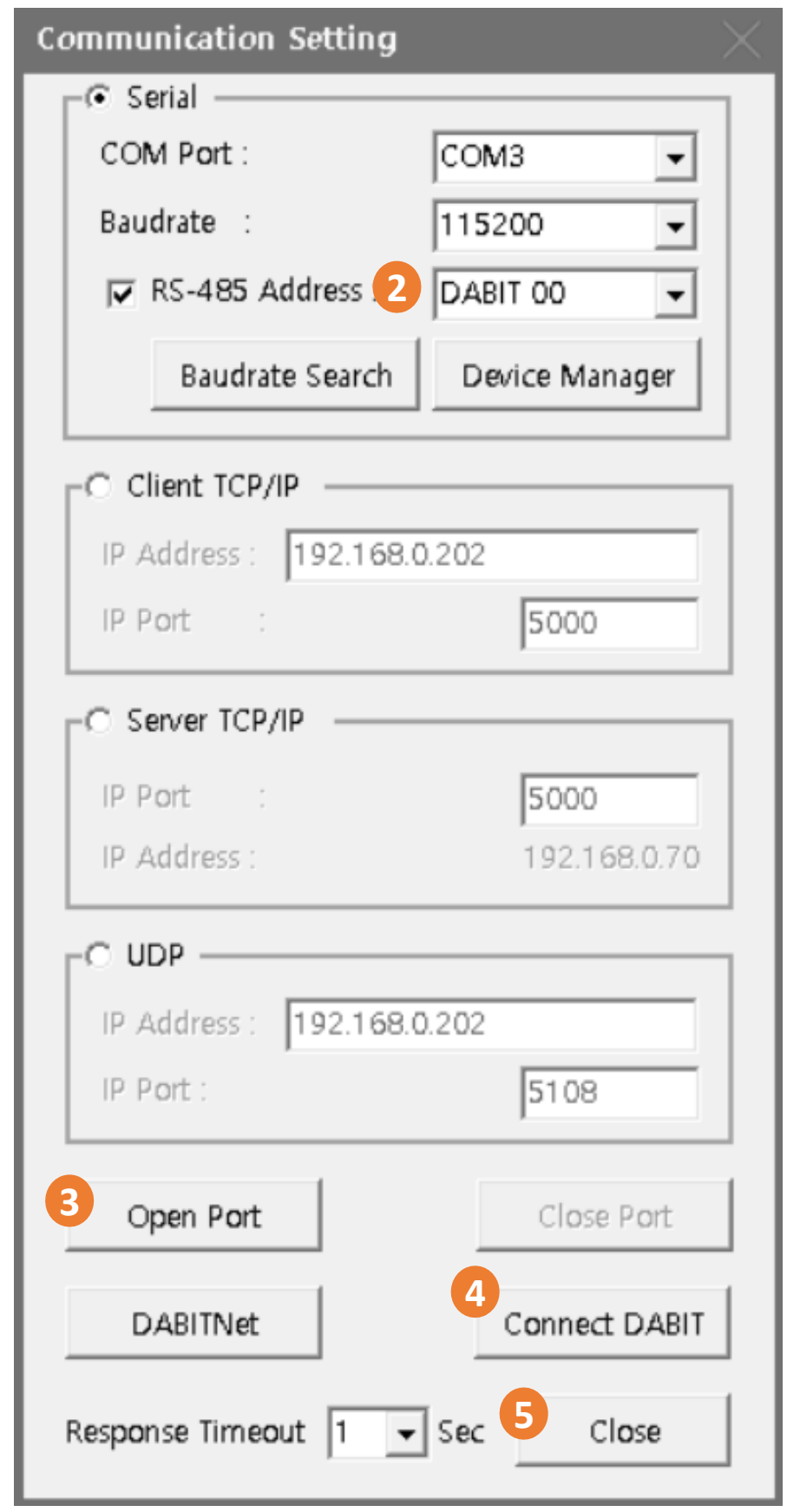
On the simulator, click “Special Function > Communication Method” to open the “Communication Setting” window and proceed as follows.

① Insert the RS485 communication gender into the “BH1” port of the controller, and connect RS485 cable to the terminal “A, B”.
For more details, see “How to use RS485 converter”.



② Select “**Serial > RS-485**“ and proceed to set as follows.

- Set **COM Port**.(Ex. COM3).
  If you click “**Device Man**ager”, you can check the RS232 communication port number connected to the PC. If the port does not appear, you must install the driver for the corresponding RS232 communication converter.
- Set **Baud rate**. The default is “115200bps”.
  If you click "**Baud rate Search**", the communication speed of the currently connected COM port is found.
  To change the baud rate, please refer to “A-9”.
- Set the address. The default is “00”.
  Up to 31 addresses can be set using dip switches on the RS485 communication gender. For details, refer to “How to use RS485 converter”.



③ Click “**Open Port**” and confirm the message below in the log window.
>>”COM3 : 115,200bps, 8, 1, N - **ComPort Open [OK]**”

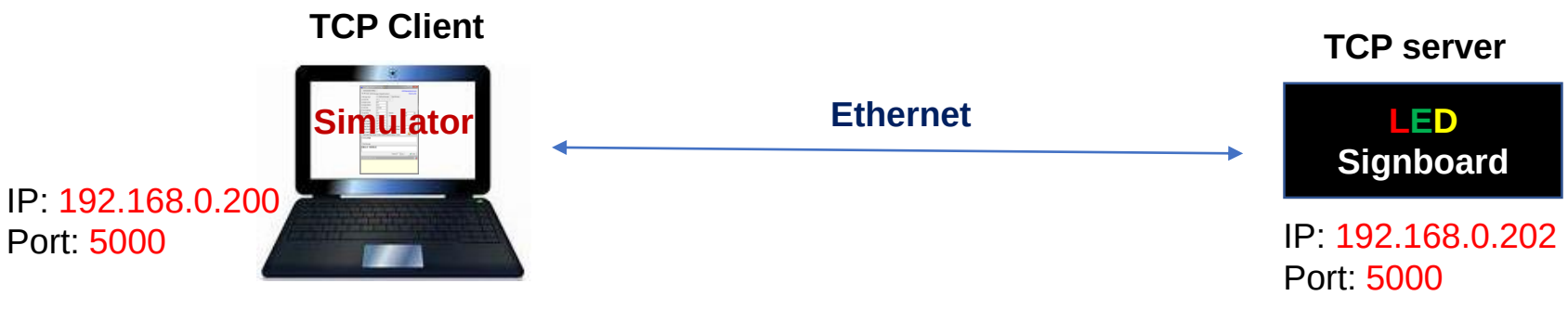
④ Click “**Connect DABIT**” and confirm the message below in the log window“.
>>“**DIBD Connecting... [OK]** 10 02 00 00 0B 6A 30 31 32 33 34 35 36 37 38 39 10 03”
>>“Receive : **10 02 00 00 0B 6A 30 31 32 33 34 35 36 37 38 39 10 03”**

⑤ Click “**Close**” to close the “Communication setting” window.

A-3-1. Communication Setting : TCP server

Here describe how to set up communication by directly connecting your laptop(TCP client) to the LED signboard(**TCP server**) with a RJ45 Ethernet cable.

The default of the LMD controller is "IP: **192.168.0.202**(or 201), Port: 5000, Server mode" and can be checked and changed as follows.



1. Connect the laptop and the device(LED controller) with an RJ45 cable and supply the power to the device.

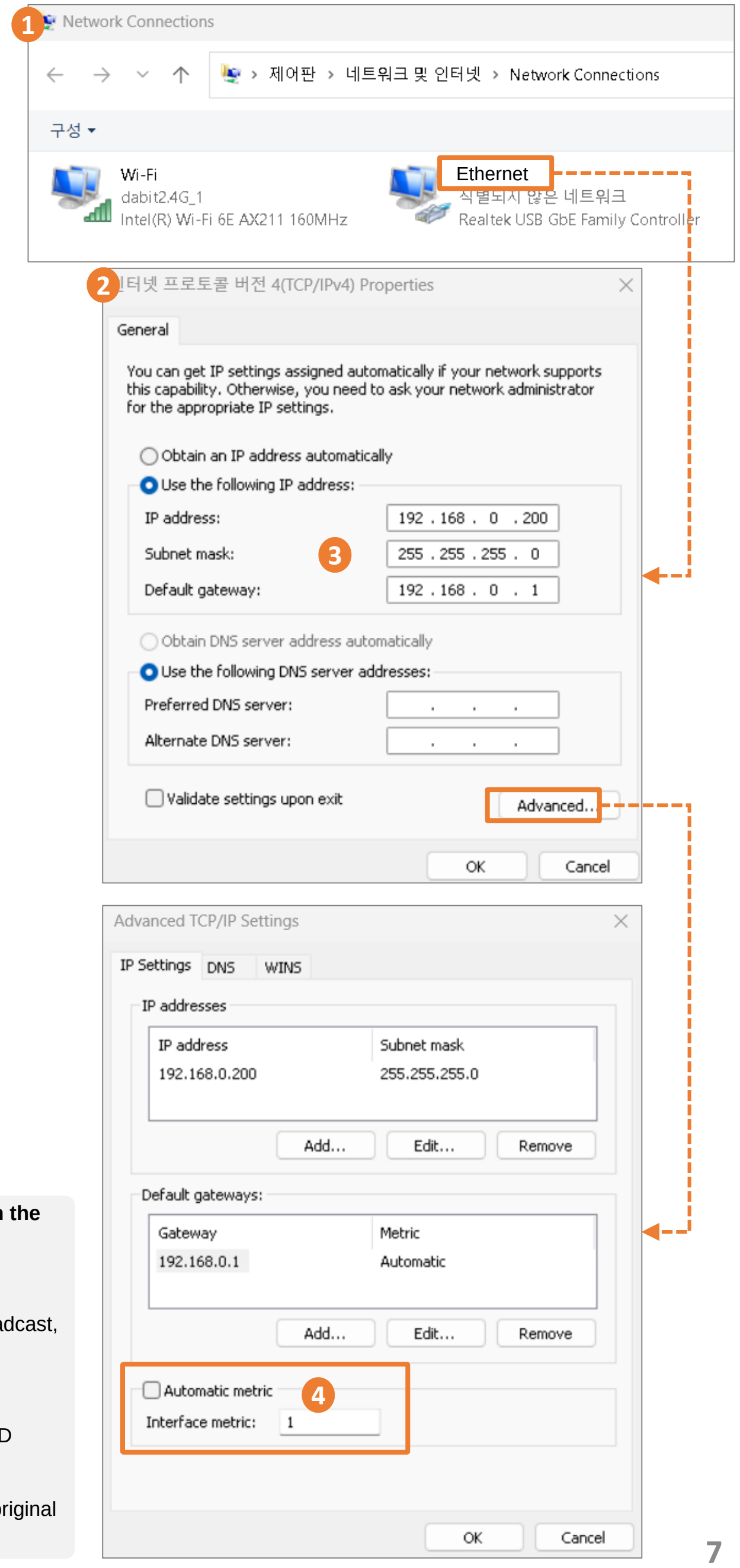
2. Manually set the laptop's IP as follows (Windows 11) [1]

   ① Go to "**Control Panel > Network and Internet > Network and Sharing Center > Change adapter settings**" to open the "**Network Connections**" window.

   ② Right-click on "Ethernet" and click "**Properties > Internet Protocol Version 4 (TCP/IPv4) > Properties**."
   Then, the "Properties" setting window appears.

   ③ Select "**Use the following IP address**" and set the IP of the laptop as below **example**.
   - IP address: 192.168.0.200
   - Subnet mask: 255.255.255.0
   - Gateway: 192.168.0.1

   ④ If there are two or more network adapters connected to the laptop(or PC), perform additional steps as follows.[2]
   1) Click "Advanced..." to open "**Advanced TCP/IP Settings**" window.
   2) After unchecking "Automatic metric", enter "Interface metric" as the highest priority, "**1**".
   3) Click "OK" to close the setting window.

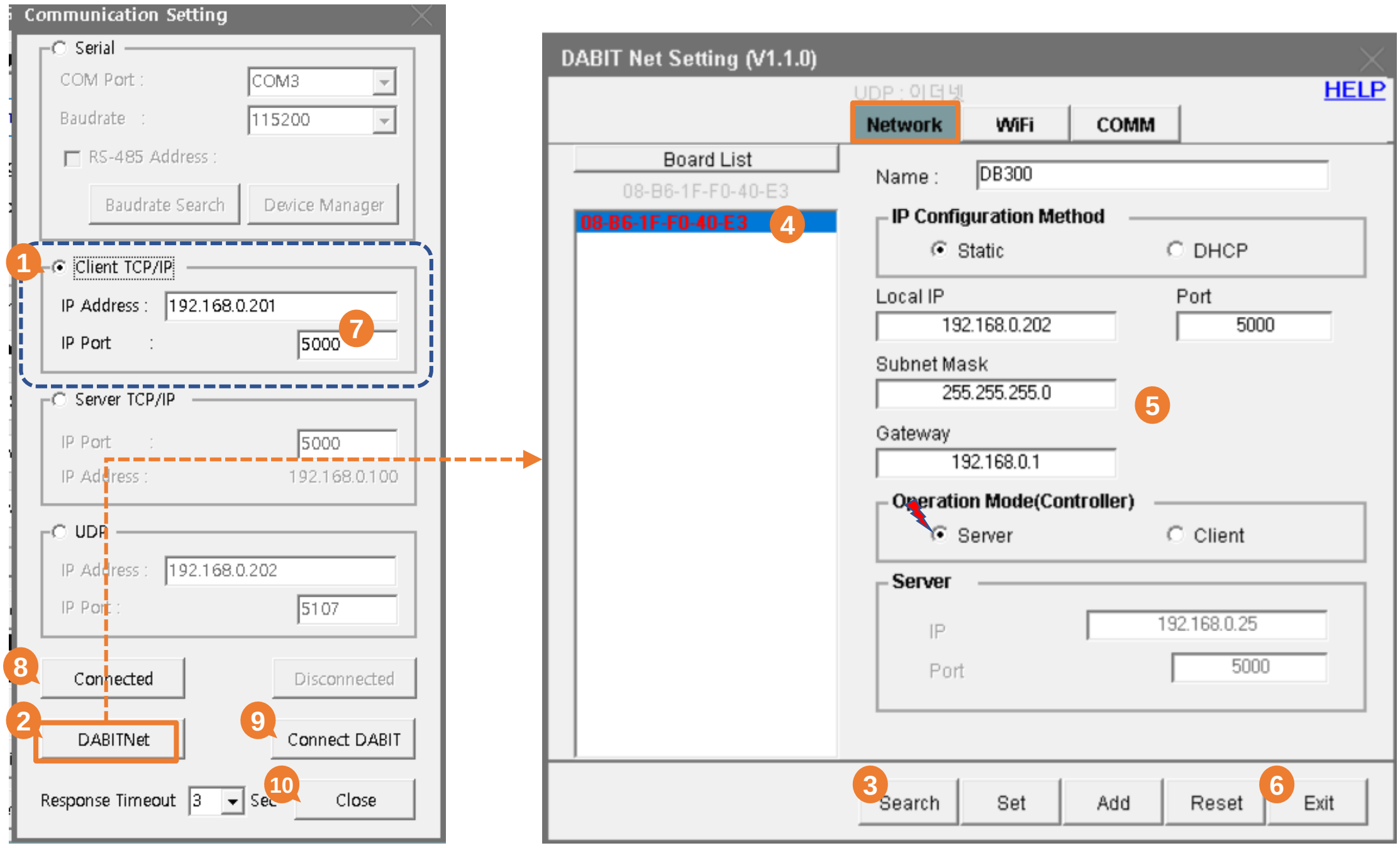


[Note 1] If the laptop and the LED sign are connected through **a router on the same network, steps "2.① ~ 2.④" are omitted.**

[Note 2] The LMD Net program searches for controllers through UDP broadcast, and if there are more than two network adapters connected to the laptop, problems with UDP communication priority may occur.
Therefore, change the Interface metric of the adapter connected to the LED signboard to the highest priority "**1**" and use the LMD Net program.
After using the program, don't forget to restore "**Automatic metric**" to its original state.

A-3-2. Communication Setting : TCP server

3. On the simulator, click “Special Function > Communication Method” to open the “Communication Setting” window and proceed as follows.



① Set your laptop to “**Client TCP/IP**” mode as the controller is **Server** by default.

Input the default IP “**192.168.0.201** or 202” and port number “**5000**”.

If you want to change the IP or port,

follow the guidance below. if you do not want to chang them, just go to step “⑦”.

- For the users of LMD-S2E Ethernet converter, follow the steps below “②~⑥”.
- **For the users of LMD-E1 Ethernet converter, ignore steps below “②~⑥” and refer to “LMD-E1 manual.**

② Click [DABITNet] to open “LMD Net Setting” window.

☞ If the LMD net program does not run, go to "Windows Security", disable "Virus & threat protection" or "Firewall & network protection", and then restart the program.

③ Click [Search]. Then, the list of all devices connected to the same network appears in the “Board List”.

④ Click the MAC address in the list. Then, the IP information of the device appears in the right area under “Network” tab.

The default is as follows.

- Local IP : 192.168.0.**201**(or **202**) - Port : **5000** - Gateway : **192.168.0.1** - Operation Mode : **Server**

⑤ **If you want to change the IP information of the device(in Server mode) to suit your network environment, proceed as follows.**

a. Click the **device MAC address**.

b. Among the IP information on the right section, change the desired items (IP, Port, Gateway, etc.) and click **[Set].** Then, the changed information is updated on the device (takes about 5 seconds).

c. Click **[Search]** again. Then, the changed information is applied and displayed.

⑥ Click [Exit] to close “LMD Net Setting” window.

⑦ **Enter IP Address and Port number in “Client TCP/IP” section. (e.g. 192.168.0.201/202, #5000)**

⑧ Click [Connected]. If the message below appears in the “Log” window, the server port is normally opened.

>> “IP:192.168.0.202, PORT:5000 Open [OK]”

⑨ Click [Connect DABIT]. If the message below appears in the “Log” window, the TCP connection is OK.

>>“**DIBD Connecting... [OK]** 10 02 00 00 0B 6A 30 31 32 33 34 35 36 37 38 39 10 03”

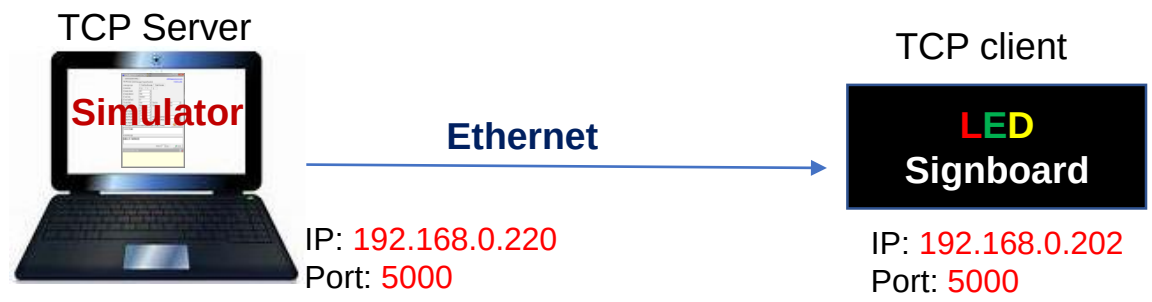
>>“Receive : **10 02 00 00 0B 6A 30 31 32 33 34 35 36 37 38 39 10 03”**

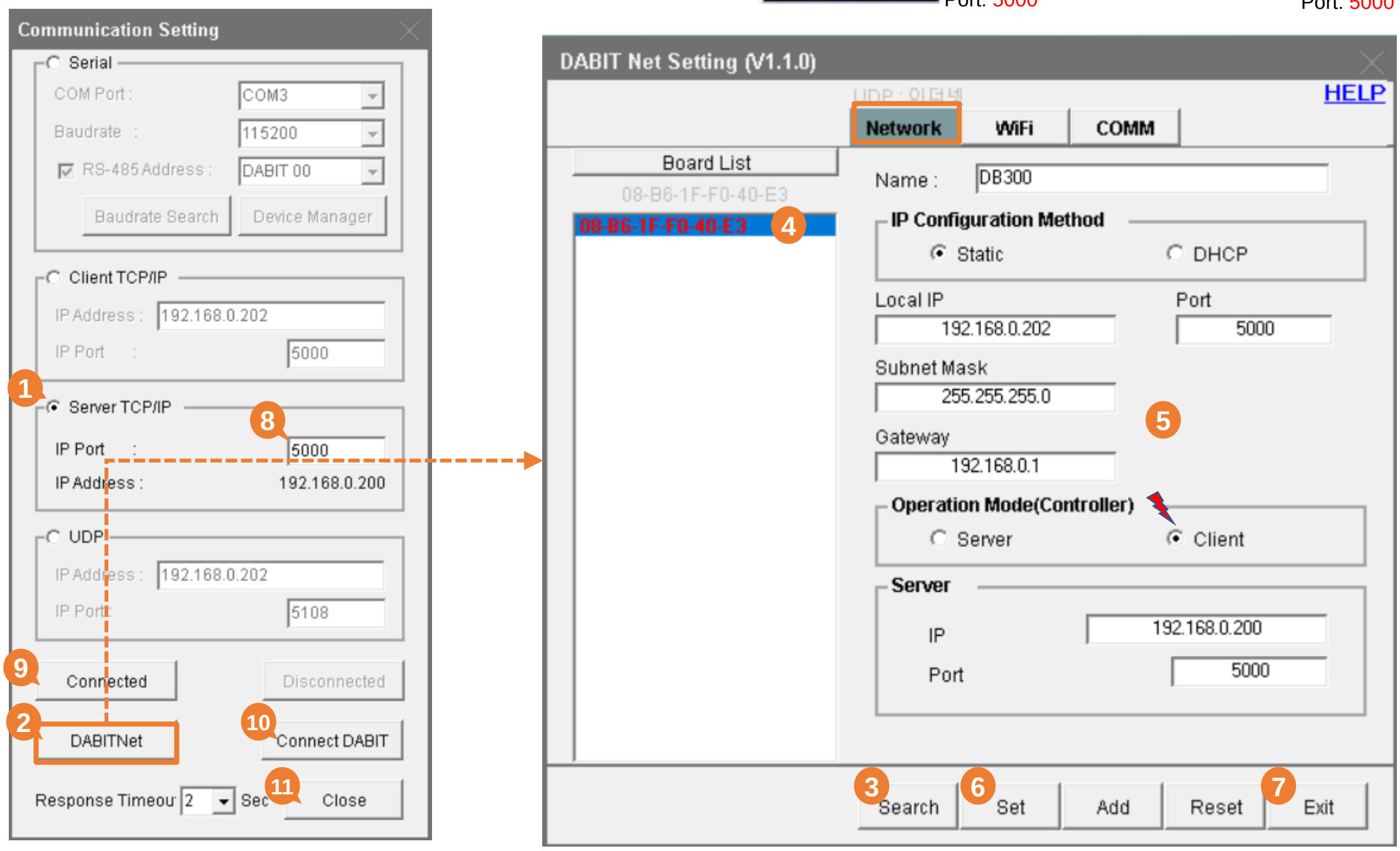
⑩ Click [Close] to close “Communication Setting” window.

A-4. Communication Setting : TCP client

Here, we will explain how to set up communication by directly connecting your laptop(TCP server) and the LED signboard(**TCP client**) with a RJ45 Ethernet cable.

1. Execute “Step 1,2” of “A-3-1” above.
2. Run the simulator and click “Special Function > Communication Method” to open the “Communication Setting” window and proceed as follows.





① Set your laptop to “**Server TCP/IP**” mode.

② Click [DABITNet] to open “LMD Net Setting” window.

☞ If the LMD net program does not run, go to "Windows Security", disable "Virus & threat protection" or "Firewall & network protection", and then restart the program.

☞ If you are using an **Ethernet-TTL converter**(LMD-E1), ignore steps “②~ ⑦ ” and follow the LMD-E1 user manual. Then go to step “⑧”.

③ Click [Search]. Then, the list of all devices connected to the same network appears in the “Board List”.

④ Click the MAC address in the list. Then, the IP information of the device appears in the right area under “Network” tab.

The default is “Local IP: 192.168.0.**201**(or **202**), Port: **5000**, Gateway: **192.168.0.1**, Device Operation Mode: **Server** **“**

⑤ Change the **Operation Mode(Controller)** to “**Client**”. Then, “Server IP, Port” input boxes are enabled.

Depending on your network environment, set the Local IP, Port, and Gateway of the Client (controller) and the IP & Port of the Server (laptop) .

Here, as an example, enter only the IP and port of the server laptop as "192.168.0.200, Port “5000".

The server IP can also be entered in the form of a domain(e.g. www.LEDmsg.com).

You can check the laptop’s IP by opening the “CMD” window and typing/entering “ipconfig.” >>How to find your IP address

⑥ Click [Set]. After about 5 seconds, click [Search] again. Then, you can confirm that the changed information has been applied.

⑦ Click [Exit] to close “LMD Net Setting” window.

⑧ Enter the Port number. (e.g. #5000)

⑨ Click [Connected]. If the message below appears in the “Log” window, the server port is normally opened.

>> “IP:192.168.0.202, PORT:5000 Open [OK]”

⑩ Click [Connect DABIT]. If the message below appears in the “Log” window, the TCP connection is OK.

>>“**DIBD Connecting... [OK]** 10 02 00 00 0B 6A 30 31 32 33 34 35 36 37 38 39 10 03”

>>“Receive : **10 02 00 00 0B 6A 30 31 32 33 34 35 36 37 38 39 10 03”**

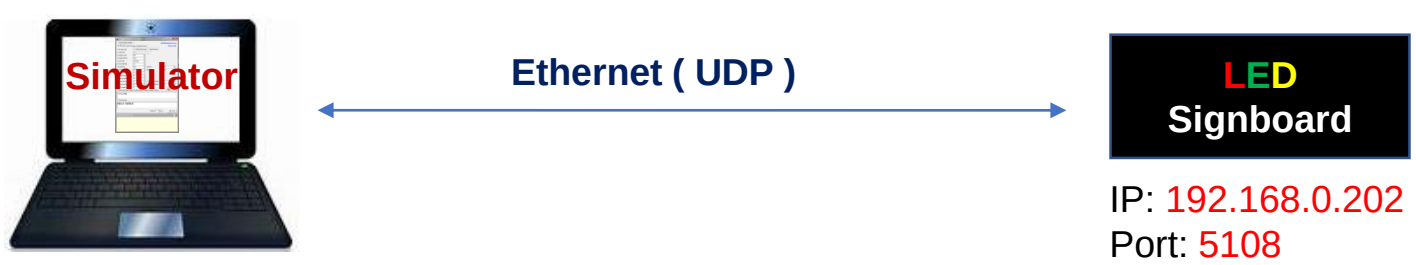
⑪ Click [Close] to close “Communication Setting” window.

A-5. Communication Setting : UDP

LMD-C2/C3 controllers can use both TCP and UDP communications.

Generally, TCP communication is used, but UDP communication can also be used when there is a problem with TCP communication.

Here, we describe how to communicate with the LEDmsg Protocol simulator using UDP.



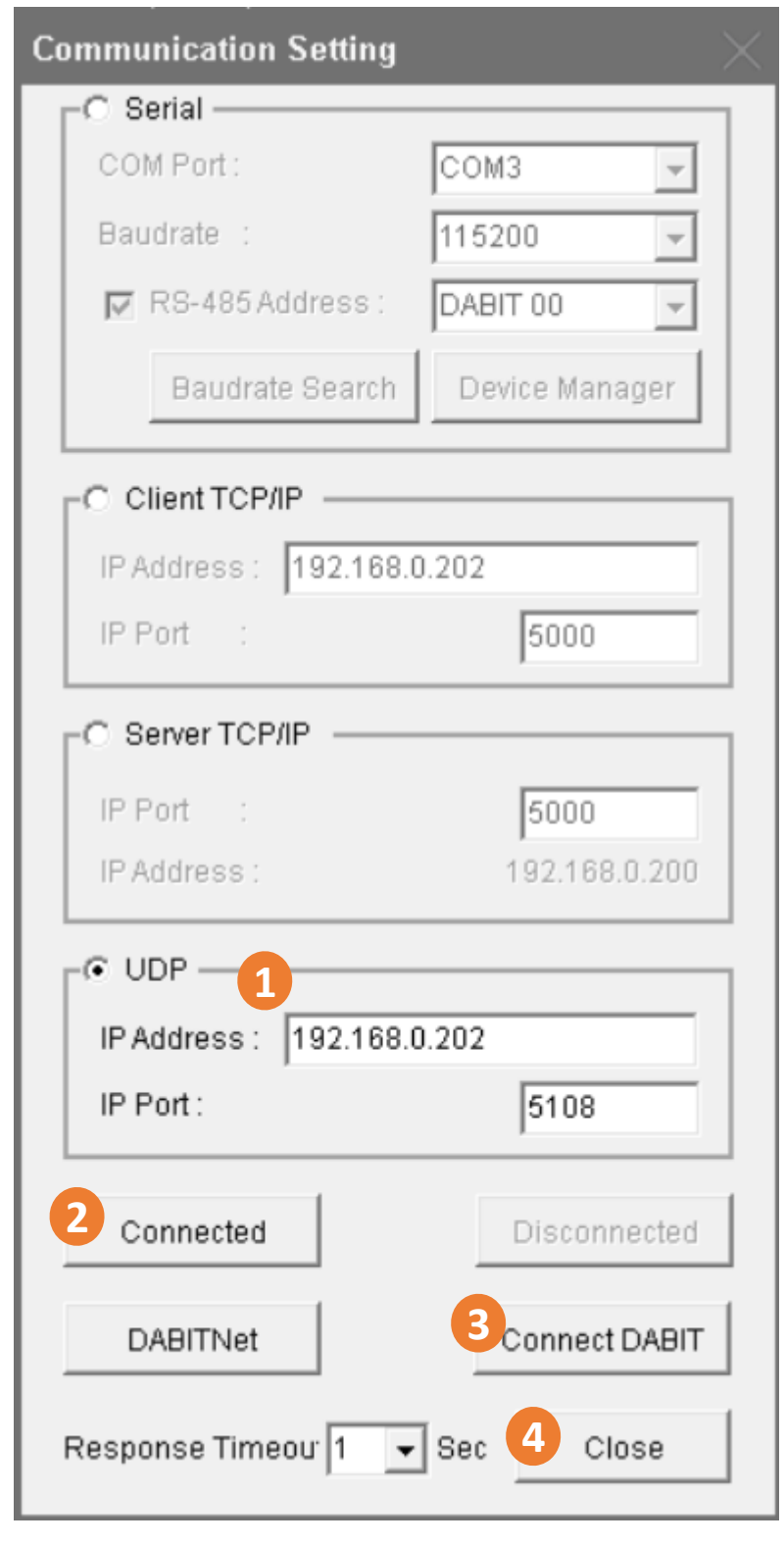
1. Execute “Step 1,2” of “Attachment 3-1”.
2. Run the simulator and click “Special Function > Communication Method” to open the “Communication Setting” window and proceed as follows.

   ① Select “**UDP**” mode.
   And enter the IP address and Port number.
   - IP address : 192.168.0.202 (You can change it as “⑤” of “A-3-2”
   - UDP port is fixed to “**5108**”.

   ② Click [Connected]. If the message below appears in the “Log” window, the server port is normally opened.
   >> “UDP IP:192.168.0.202, Remote PORT:5108, Local PORT:5109 UDP Open **[OK]**”

   ③ Click [Connect DABIT]. If the message below appears in the “Log” window, the TCP connection is OK.
   >>“**DIBD Connecting... [OK]** 10 02 00 00 0B 6A 30 31 32 33 34 35 36 37 38 39 10 03”
   >>“Receive : **10 02 00 00 0B 6A 30 31 32 33 34 35 36 37 38 39 10 03”**

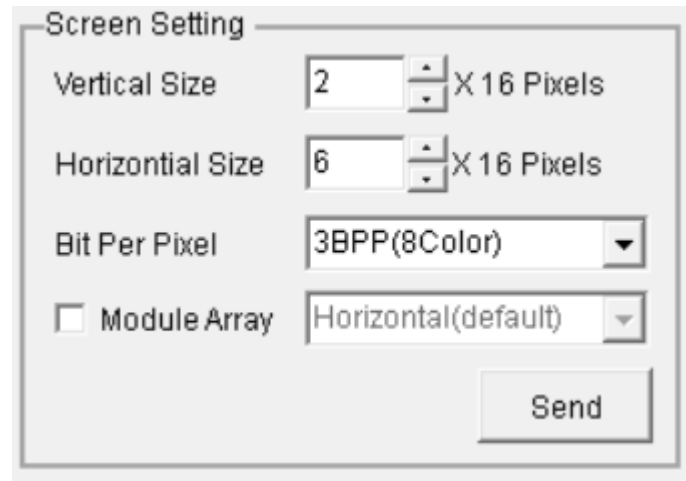
   ④ Click [Close] to close “Communication Setting” window.



A-6. How to set Screen Size

The LMD controller must set the screen size after connecting the HUB75 dot matrix LED module.

Run “LEDmsg Protocol Simulator” and set it at “Special Function > Screen Setting” section. >>>



“Bit Per Pixel” is fixed to “**3BPP** (8 Color)”.

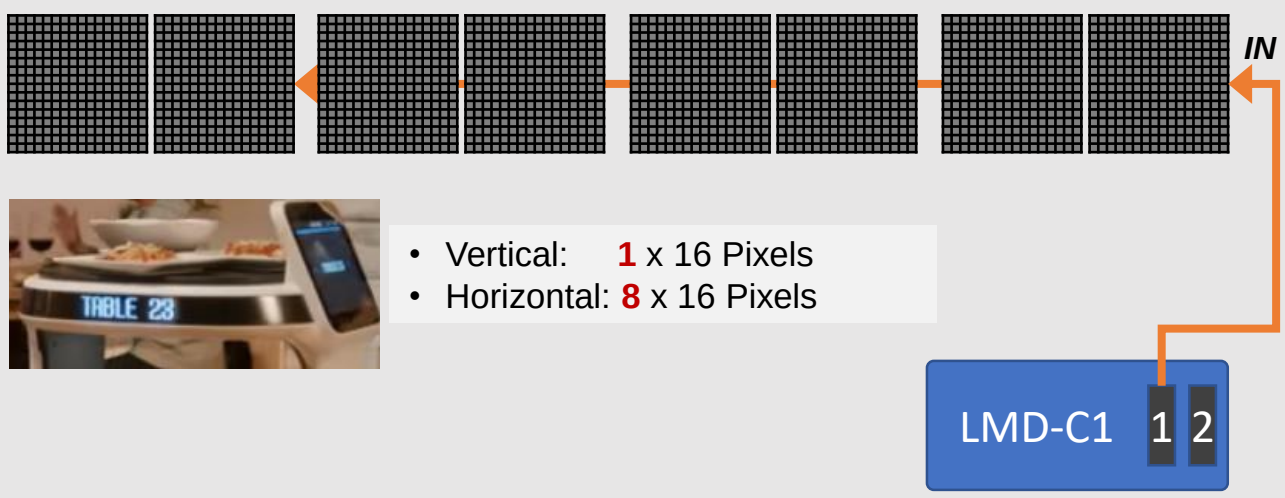
Module Array is generally set to “**Horizontal** (default)”, and when using a double-sided screen, it is set to “Horizontal Twin” according to our technical support.

In this regard, refer to the following features of HUB75 dot matrix LED module.

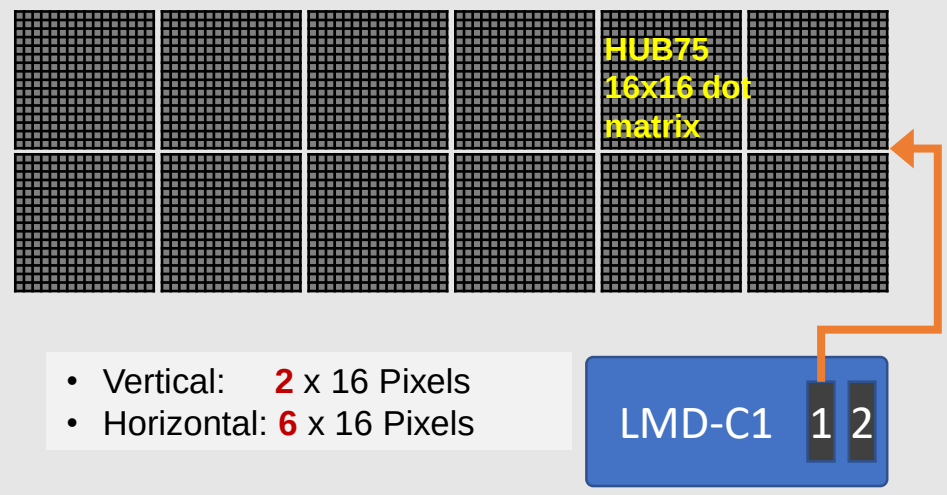
1. LED module is manufactured in various sizes in multiples of “**16x16**“ pixel.
2. The pitch between pixels varies from “2,3,4,5,6,8,10mm”.
3. Those with a pitch of **4mm** or less are mainly used **indoors** with a viewing distance of **12m** or less and a brightness of **1200nit** or less.
4. Those with a pitch of **6mm** or more are mainly used for **outdoor** applications with a viewing distance of **10 ~ 30m** and a brightness of **4000nit** or more.
5. The display color supports RGB full color.
6. Each module has two data connectors(16-Pin IDC, IN/OUT) and one power connector(4-pin, DC 5V).

Here are the examples of connecting and setting the LMD controller and LED modules with 16-pin data cables.

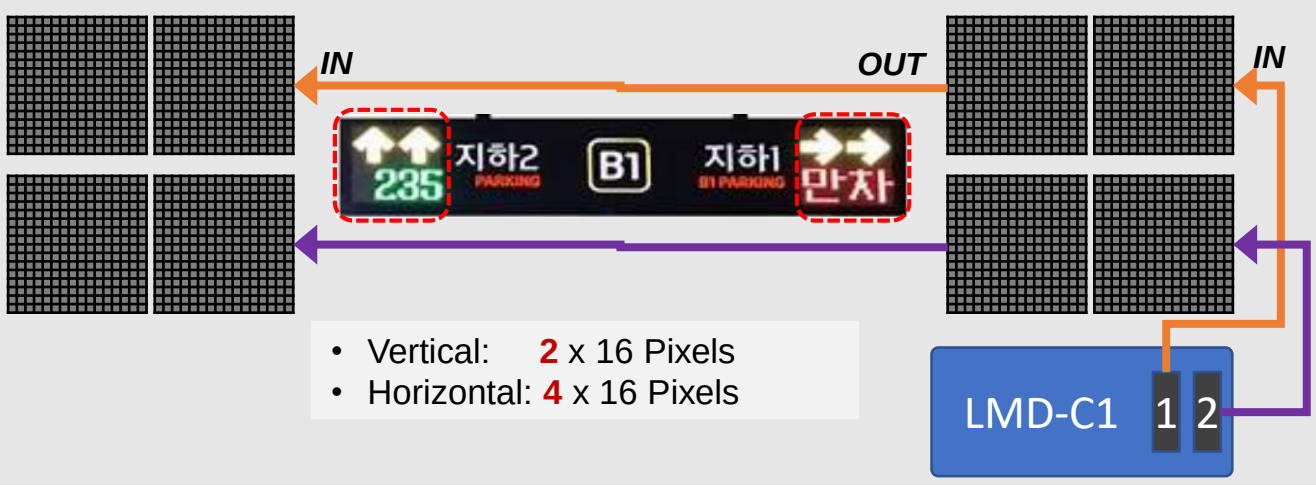
CASE 1: 1 Row x 8 Column (Front view)



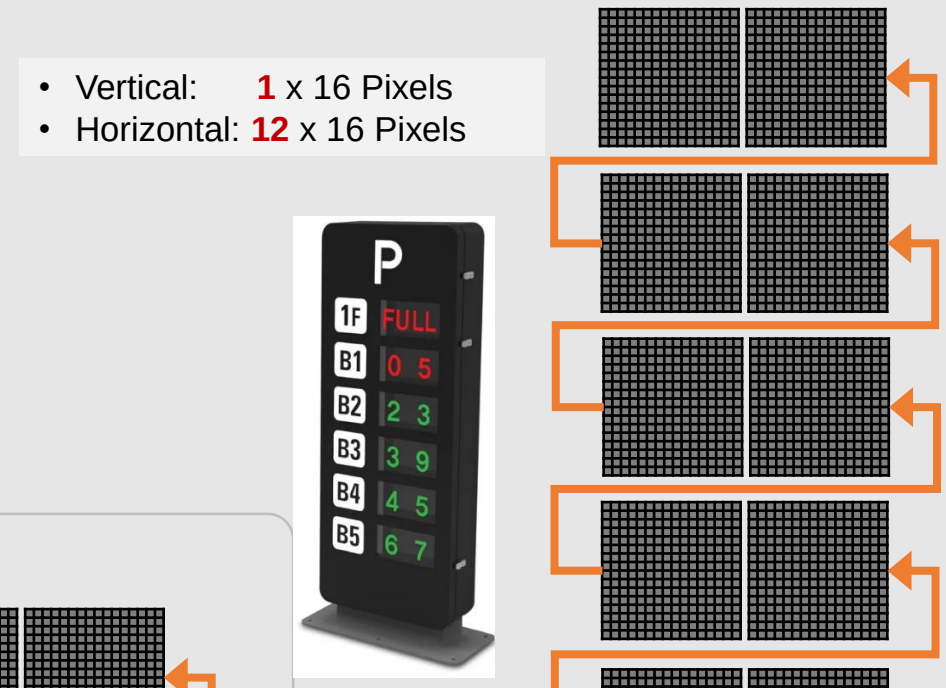
CASE 2: 2 Row x 6 Column



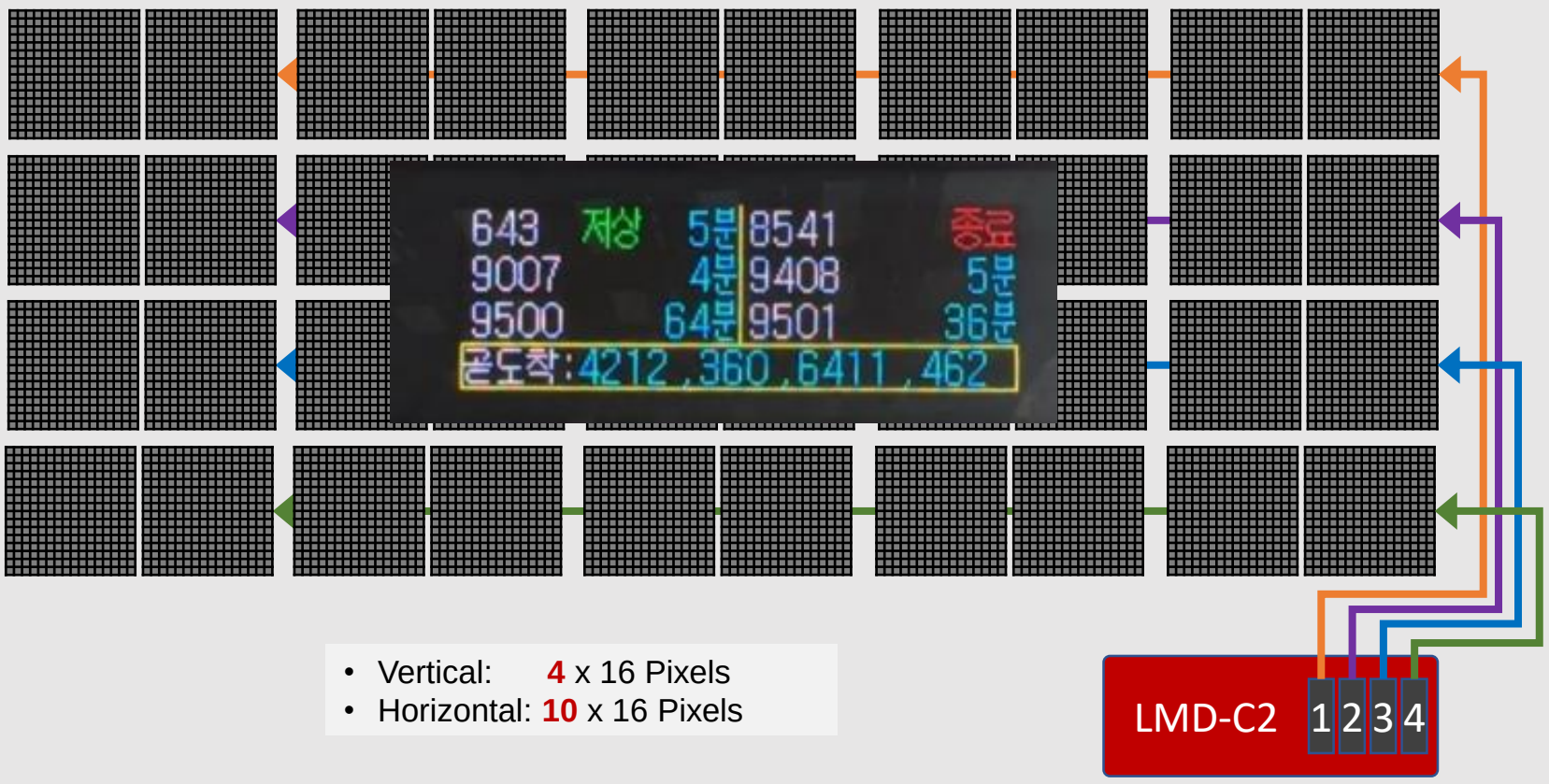
CASE 3: 2 Row x 4 Column



CASE 4: 1 Row x 12 Column



CASE 5: 4 Row x 10 Column

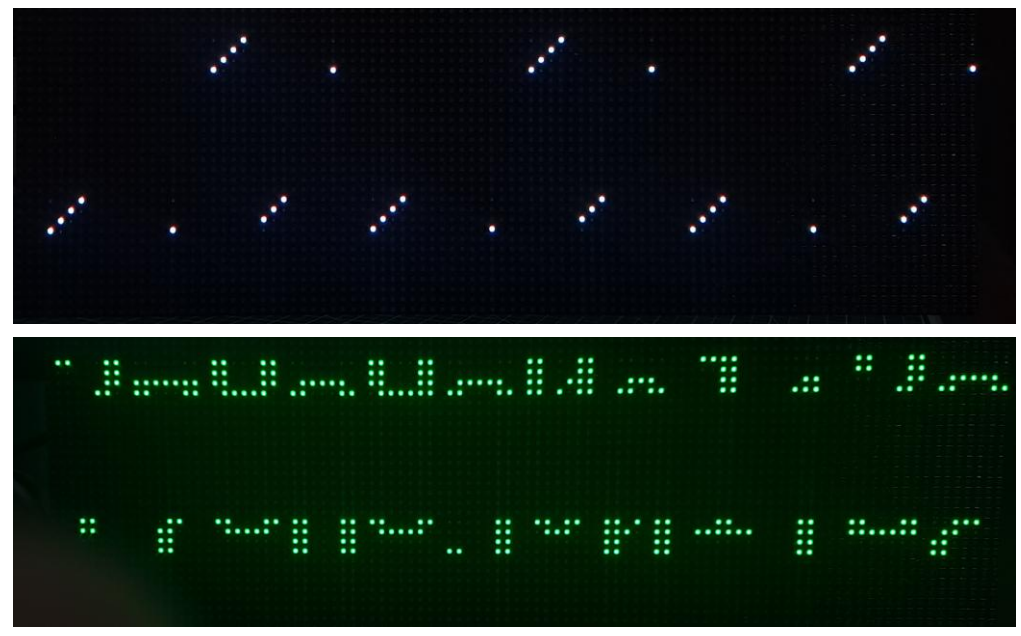


A-7. How to set LED Display Signal Type

To use the LMD controller, you must select the Display Signal Type that matches the LED module. Display signal type is a method of sending a display signal from the LMD controller to the LED module and varies for each LED module. When the signal type is set correctly, straight LED bars are displayed in “up and down, left and right, and diagonal” directions as follows.
However, if the signal type is incorrect, the shape of the LED bars is distorted and the characters are displayed brokenly.

The display signal type is set to normal.

The display signal type is set to abnormal.



The LMD controller is programmed with various signal types to meet various kinds of HUB75 RGB 16x16 matrix LED modules.
However, many of the HUB75 LED modules in the market may not yet be compatible with our LMD controllers.
For information about Display Signal type of LMD LED modules, please see >>**here**<<.

If you want to check whether the HUB75 LED module you want to use is compatible with the LMD controller, follow the steps below:

① Click “Special Functions > LED Signal Type” to open “LED Signal Setting” window.

② Select the right “Signal Type”.

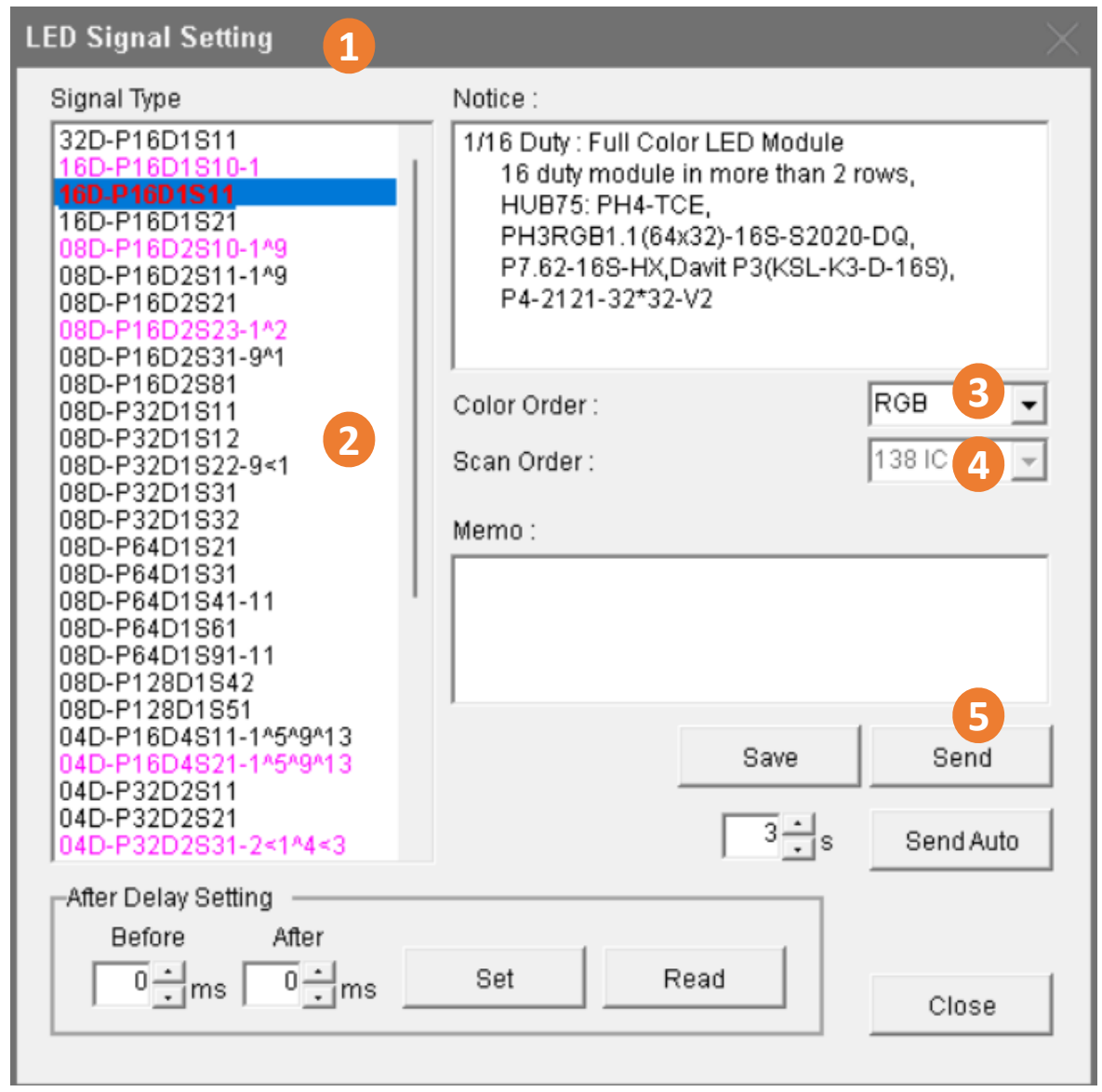
Signal Type	Applicable LED modules
16D...	HUB75 P3, P4, P5 LED modules with **1/16** scan
08D...	HUB75 P4, P5, P6 LED modules with **1/8** scan
04D...	HUB75-P8, P10 LED modules with **1/4** scan
32D/02D /01D...	Not generally used for HUB75 LED modules

- The default setting for LMD controller is “**16D-P16D1S11**”.
- Signal types shown in pink are not for HUB75 LEDs.

③ Select “Color Order”. This is usually set to **RGB**.

④ Select “Scan Order”.
In general, the setting is disabled and no need to select.
But if it is enabled when you select specific signal type(e.g. “08D-P64D1S21”), you must select the right “Scan order”.

⑤ Click “Send” and check whether the display image of the LED bars or text is correct as the picture above.



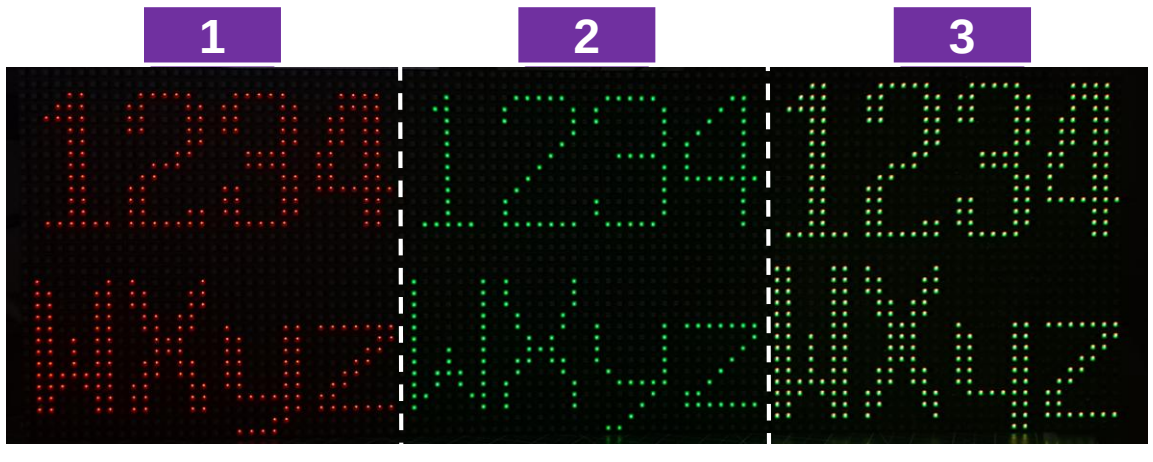
A-8. How to set Controller System Font

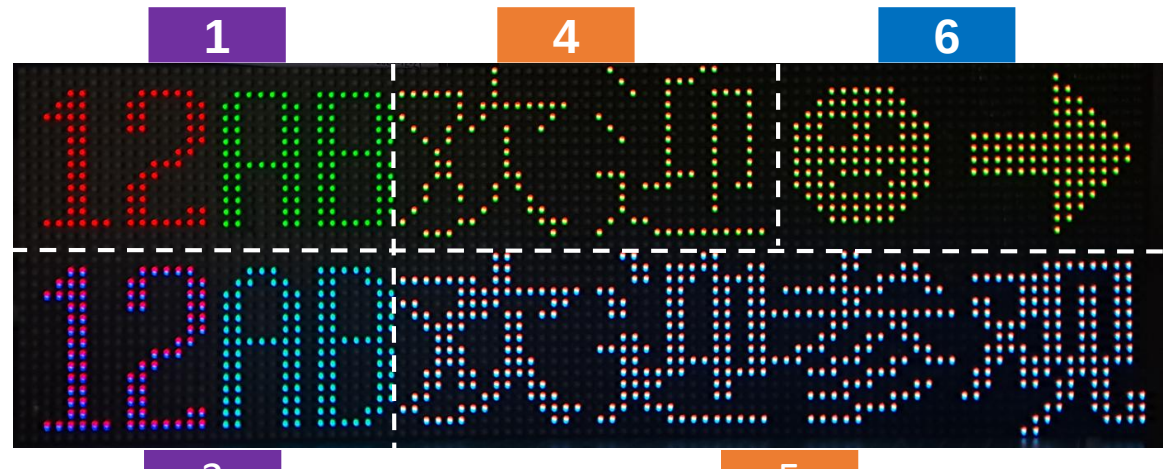
The LMD controller displays various characters using the following three types of system fonts pre-stored in Flash ROM.

Various font files are stored in the “LEDmsg Protocol simulator> Sys > Font” folder, so the user can select and change it if necessary.

Type	Pixels (H x W)	Display Characters	Font files
English(ASCII)	8 x 16	ASCII characters (numbers, alphabets, etc.)	**ENG 08x16-Gothic.fnt (default)** 1 ENG 08x16-Slim.fnt 2 ENG 08x16-STD.fnt 3
UniCode	16 x 16	Korean, Chinese, Japanese, Greek, etc.	**UNI_ALL_16x16_STD1.fnt (default)** 4 UNI_ALL_16x16_STD2.fnt 5
User Font	16 x 16	Special symbols, wide numbers/characters, etc.	**USER 16x16-STD.fnt (default)** 6

The actual display images of the above font files are as follows. The default font files for each type are “1, 4, and 6.”





Background images (text, graphics, animation) edited and transmitted using the Dabitche program are displayed regardless of these system font.

Here's how to change the font file:

① Run the LEDmsg Protocol Simulator.

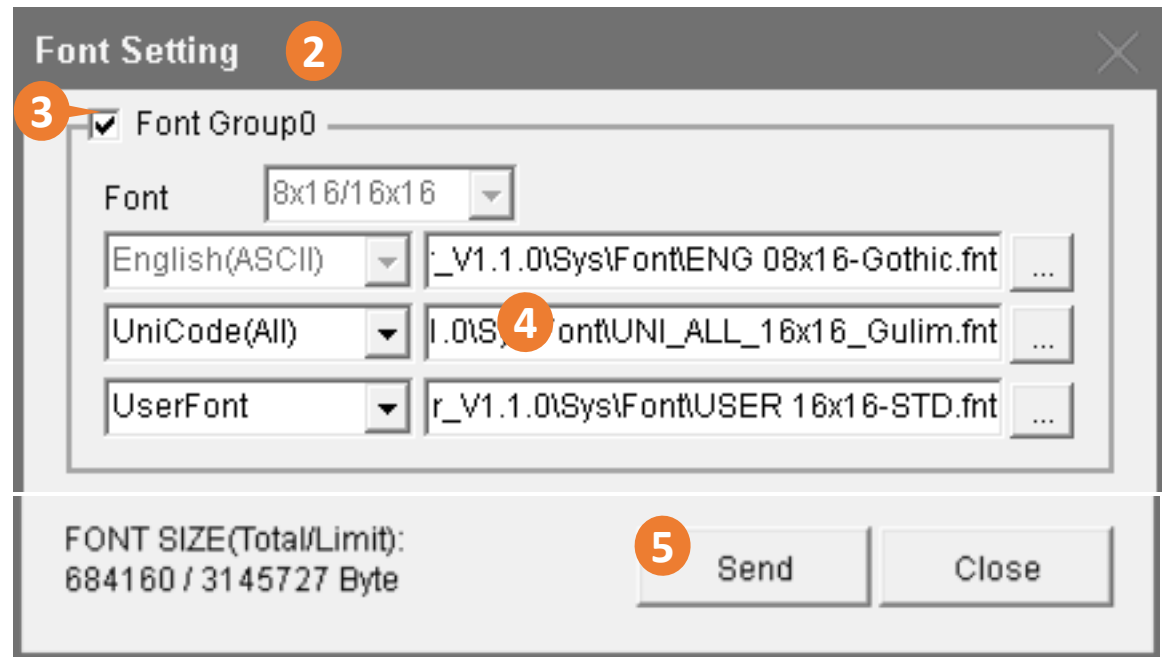
② Click “Special Functions > Font Transfer” to open the “Font Setting” window on the right.

③ Check “Font Group 0”.

④ Select the desired font file for each type.

⑤ Click “Send”.

Then, the font file of the corresponding type is stored in the flash memory of the controller.



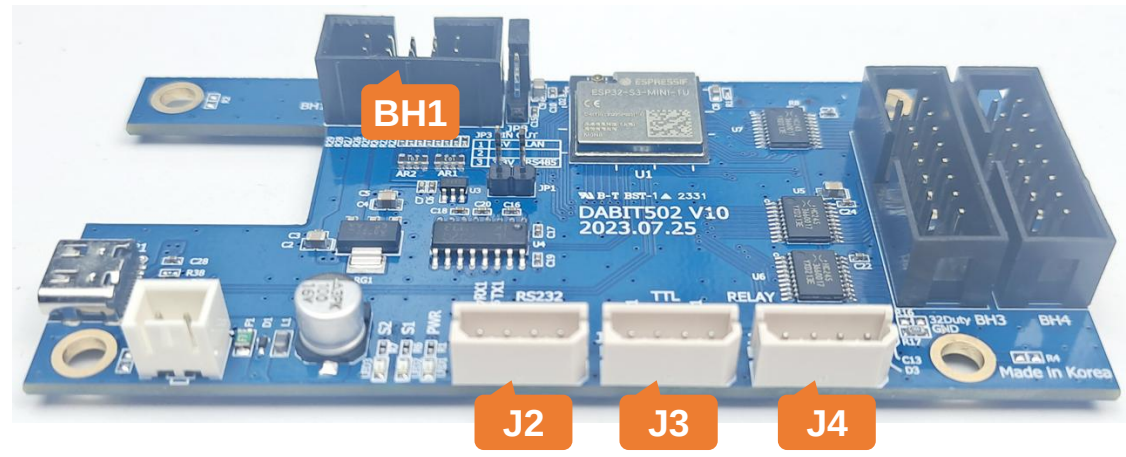
Customers who require the advanced information below, please contact us.

- ✓ How to use European extended fonts
- ✓ How to display wide (16x16) ASCII characters
- ✓ How to edit font files
- ✓ How to transmit several font groups and display them individually

A-9. How to set Board Function

You can change the function and speed of the ports on the LMD controller.

Port	BH1	J2	J3	J4
Default value	TTL/RS485	RS232 115200bps	TTL 115200bps	Relay Signal Output



The following are examples of port function changes from the above default.

1. How to change the RS232 communication speed of “J2” port to 9600bps

① Click “Special Functions > Board Functions” to open “Board Functions” setting window.

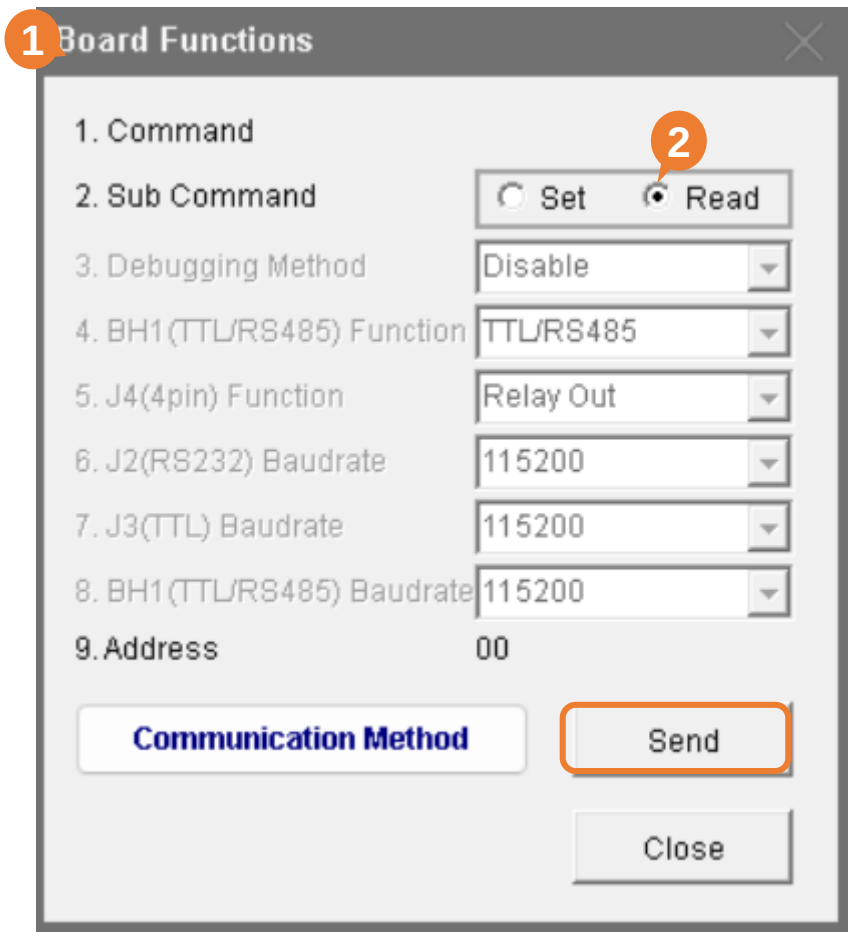
② Select “**Read**” in “2.Sub Command” and click “Send”.
Then, you can see the current setting value of each port.

③ Select “2.Sub Command” to “**Set**”.

④ Change “6.J2(RS232) Baudrate” to “9600”. Then, click “Send”.

⑤ Click “Communication Method” to open “Communication Setting’ window.

⑥ You can start communication by checking "Serial", setting the COM port, and changing the Baud rate to "9600bps".



In this way, the communication speed of “J3 (TTL), BH1 (RS485)” can also be changed.

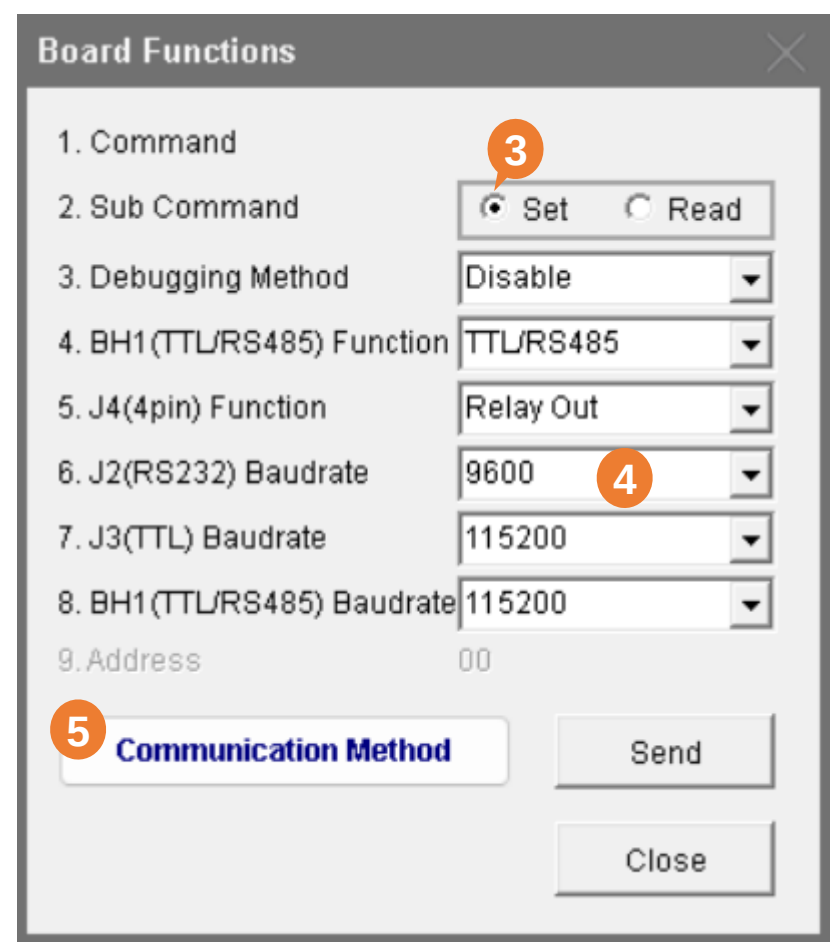
2. How to change “J4” port from “Relay out” to “CdS sensor” use mode

A. Proceed the step “1-①②③” as the same as the above.

B. Change “5.J4 Function” from “Relay out” to “CDS”. Then, click “Send”.

C. Select “**Read**” in “2.Sub Command” and click “Send”.
Then, you see that the function of “J4” port has been changed to “CDS”.

Now, you can automatically adjust the brightness of the LED screen by connecting the cable(2 pin) of the CdS cell to the J4 port of the LMD controller. For further details, please refer to “How to use CdS sensor“.

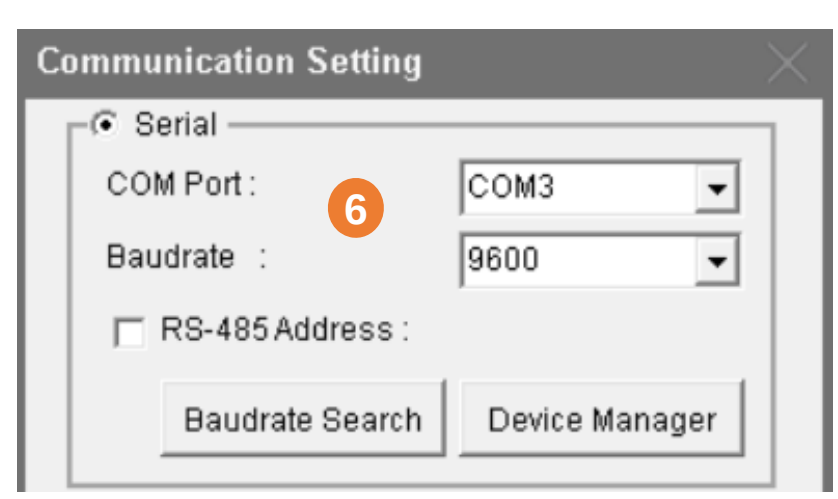


3. How to change “BH1” port ” to “8Pin Input(HEX)” use mode

A. Proceed the step “1-①②③” as the same as the above.

B. Change “8.BH1 Function” from “TTL/RS485(default)” to “8Pin Input(HEX)”. Then, click “Send”.

C. Select “**Read**” in “2.Sub Command” and click “Send”.
Then, you see that the function of “BH1” port has been changed to “8Pin Input(HEX)”.



Now, by connecting the cable (10 pin) of the LMD Switch IO board to the BH1 port of the LMD controller, you can directly receive signals from PLC/Switches, etc. and display the corresponding image file of BG playist. For further details, please refer to **How to use Switch IO Board**.

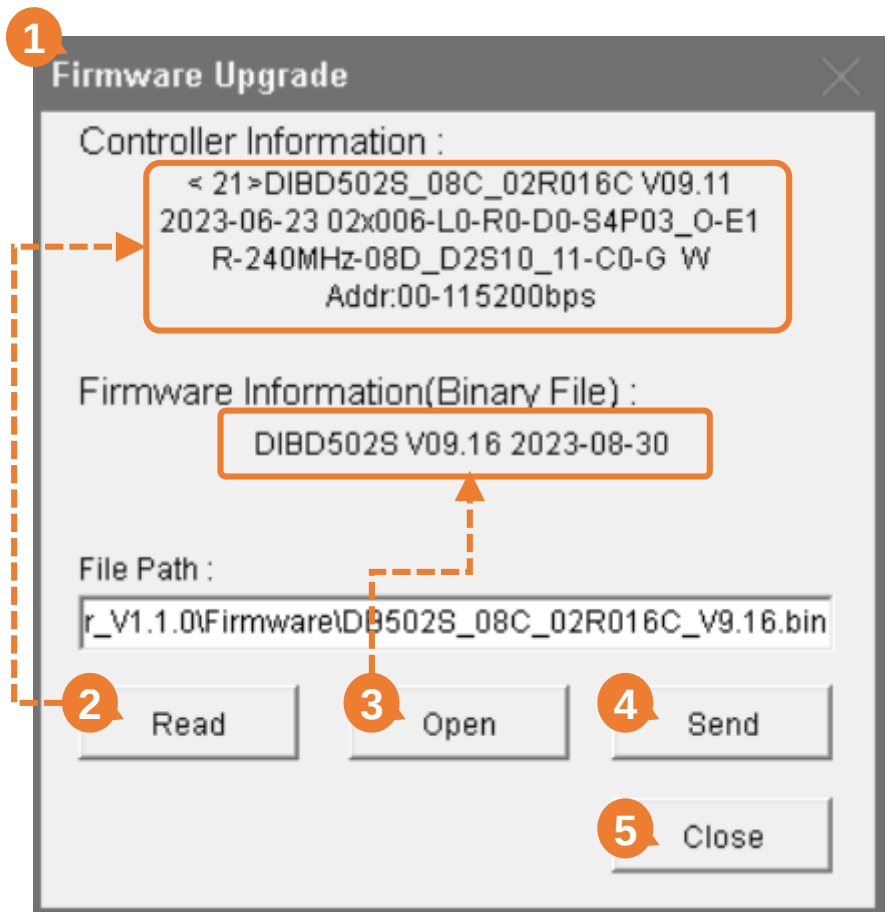
A-10. How to do Firmware Upgrade

Home

Firmware upgrades for LMD controllers should only be performed under our technical support in the following cases:

- When you need to change to the latest version of firmware
- When you need to change the firmware to reflect the your special requirements

Even if you change the firmware, the existing setting information is maintained.

The firmware upgrade method is as follows.

1. Save the firmware file of the form below provided by us in the “LEDmsg Protocol simulator> Firmware” folder.
   >> DB502S_08C_02R016C_V9.16.bin
2. Run “LMD Simulator” and proceed as follows:
   ① Click “Special Functions > Firmware Upgrade” to open “Firmware Upgrade” window.
   ② Click “Read” to see the current firmware information.
   ③ Click “Open”.
   When the “search box” appears, select the firmware you want to upgrade.
   ④ Click “Send” to upgrade the LMD controller with the new firmware within a minute.
   ⑤ Click “Close” to close the window.