

Hardware Manual for 3 Color LED Sign Controller (DIBD500N-3C)



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Read Me First

Thank you for using DIBD(Display Intelligent Board) of 3 color LED sign controller.

With this manual, we expect you get to know about DIBD and its setting method at ease.

Contents of this manual may be partially changed by manufacturer's purpose without prior notice.

Images and screenshots in this manual may differ in appearance from the actual product.

For more information, please contact us at davitsol@gmail.com or get from www.davitsol.com.

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1. Products

1.1 Controller

Controller for General LED sign

Sign Color	Max. Sign Size (Row x Col.)	Controller Type	Remarks
3 Color Sign	1R x 20C	DIBD120N-3C-1R20C	① Com. Port for RS232(2pcs) ② Duty ratio : 1/16, 1/8, 1/4 ③ Options : RS422/485 or LAN converter, Temperature/Humidity/Photo sensor
	2R x 20C	DIBD160N-3C-2R20C	
	2R x 32C	DIBD260N-3C-64M	
	3R x 21C		
	4R x 16C		
	2R x 48C		
4R x 24C	<u>DIBD500N-3C-4R24C</u>	⑦ Same as above "④⑤" ⑧ CF memory embedded. ⑨ Options : RS422/485 or LAN converter, Temp./Humidity sensor, GPS time receiver ⑩ With Section controllers, it can display up to 16Rx255C(or 510 modules) of LED sign.	
Full Color Sign	2R x 8C	DIBD500N-FC-2R08C	⑪ Same as above "④⑧⑨" ⑫ Duty ratio : 1/8, 1/4
	2R x 16C	DIBD500N-FC-4R08C	⑬ Same as above "④⑧⑨" ⑭ Duty ratio : 1/8, 1/4
	4R x 8C		⑮ With Section controllers, it can display up to 16Rx32C(or 160 modules) of LED sign.

☞ "General LED sign" is to display general forms(text/graphic/animation) of messages created/converted by the sign software(DIBD Manager) installed in PC.

Controller for Protocol LED sign

Sign Color	Max. Sign Size (Row x Col.)	Controller Type	Remarks
3 Color LED Sign	2R x 20C	DIBD220P-3C-2R20C	① Com. Ports for RS232(2pcs) and RS485(1pc) ② Duty ratio : 1/16, 1/8, 1/4 ③ Options : RS422/485 or LAN converter, Temp./Humidity/Photo sensor, GPS time receiver, SD memory ④ Most commonly used for Special(Protocol) LED sign
	2R x 32C	DIBD260P-3C-64M	
	3R x 21C		⑤ Same as above "①②③"
	4R x 16C		DIBD500P-3C-4R24C
	2R x 48C	⑥ Same as above "①②" ⑦ CF memory is embedded. ⑧ Options : RS422/485 or LAN converter, Temp./Humidity sensor, GPS time receiver ⑨ With Section controllers, it can display up to 16Rx255C(or 510 modules) of LED sign.	
4R x 24C			
Full Color LED Sign	4R x 08C	DIBD500P-FC-4R8C	⑩ Same as above "①⑦⑧" ⑪ Duty ratio : 1/8, 1/4 ⑫ With Section controllers, it can display up to 16Rx32C(or 160 modules) of LED sign.

☞ "Protocol LED sign" is to display message data transmitted from the external systems such as web server, imbedded system, Control center, measuring devices, PLC, etc. Generally, the data is transmitted by DIBD protocol format. But, the simple switching(ON/OFF) signal could be used to display reserved images.

1.2 Software

DIBD Manager : This is a software to setup the system configuration, edit Contents(text/graphic/animation, information text), make a Playlist, and upload them to LED sign. You can install this software at PC connected to the LED sign and control the sign in individual or group mode.

There are several versions which could not be compatible with each other. When you reinstall the software with higher version, you are strongly required to consult the sign manufacturer on the compatibility between you sign controller and the software version.

1.3 Options

Customers can select/buy various options depending on the controller as follows.

Kinds of Options

Options	Names	Remarks
RS	RS-422/485 Converter	This option makes it possible to have a long distance communication or multi-communication by converting the RS-232 signals of sign board controller to RS-422 or RS-485.
LAN	LAN Converter	This option makes it possible to have LAN communication by converting the RS-232 signals of sign board.
SD	SD Memory Card	3-Color controller's memory can be extended, including SD slot. (2GB) Full Color controller has an embedded CF memory as standard.
BD	Switching Signal Conversion Board	This option converts the switching signal 12/24VDC of PLC(Programmable Logical Converter) to 5VDC and then send it to a controller. With this, LED sign board can display various reserved text/graphic messages corresponding to PLC signal.
CdS	Photo Sensor	This option senses the brightness of surroundings and automatically controls the brightness of LED module.
T	Temperature Sensor	This option senses the temperature of surroundings and displays it onto sign board.
T+H	Temperature & Humidity Sensor	This option senses the temperature and humidity of surroundings and displays them onto sign board.
GPS	GPS Time Receiver	This option receives accurate GPS time and displays it onto sign board.
AMP	Amplifier Board	If the distance between controller and LED module is over 5~8 meters, this option amplifies its signal.
BUF	Buffer Board	This option can be sold when there is a need to have additional buffer board instead of basic one provided. Its specification differs, depending on the LED module and duty ratio(1/16, 1/4, 1/8).

Applicable Options by Controller Type

Color	Controller Type	RS	LAN	SD	BD	CdS	T	T+H	GPS	AMP	BUF
3-Color	DIBD120N-3C-1R20C	○	○			○	○	○		○	○
	DIBD160N-3C-2R20C	○	○	○		○	○	○		○	○
	DIBD220P-3C-2R20C	○	○	○	○	○	○	○	○	○	○
	DIBD260P-3C-64M	○	○	○		○	○	○	○	○	○
	DIBD260N-3C-64M	○	○	○		○	○	○	○	○	○
	DIBD500N-3C-4R24C DIBD500P-3C-4R24C	○	○	[1]			○	○	○		○
Full Color	DIBD500N-FC-2R08C		○	[1]			○	○	○		○
	DIBD500N-FC-4R08C		○	[1]			○	○	○		○
	DIBD500P-FC-4R08C		○				○	○	○		○

[1] CF memory card is embedded as standard.

2. Configuration

2.1 Configuration (Basic Mode)

DIBD500N-3C is a controller installed inside the 3 color LED sign to display various forms(text/graphic/animation) of messages created by the sign software(DIBD manager) installed in PC. This can control the tri-color LED sign with up to "4Row x 24Col." of modules(or 2Row x 48Col.). Basic configuration is as follows.

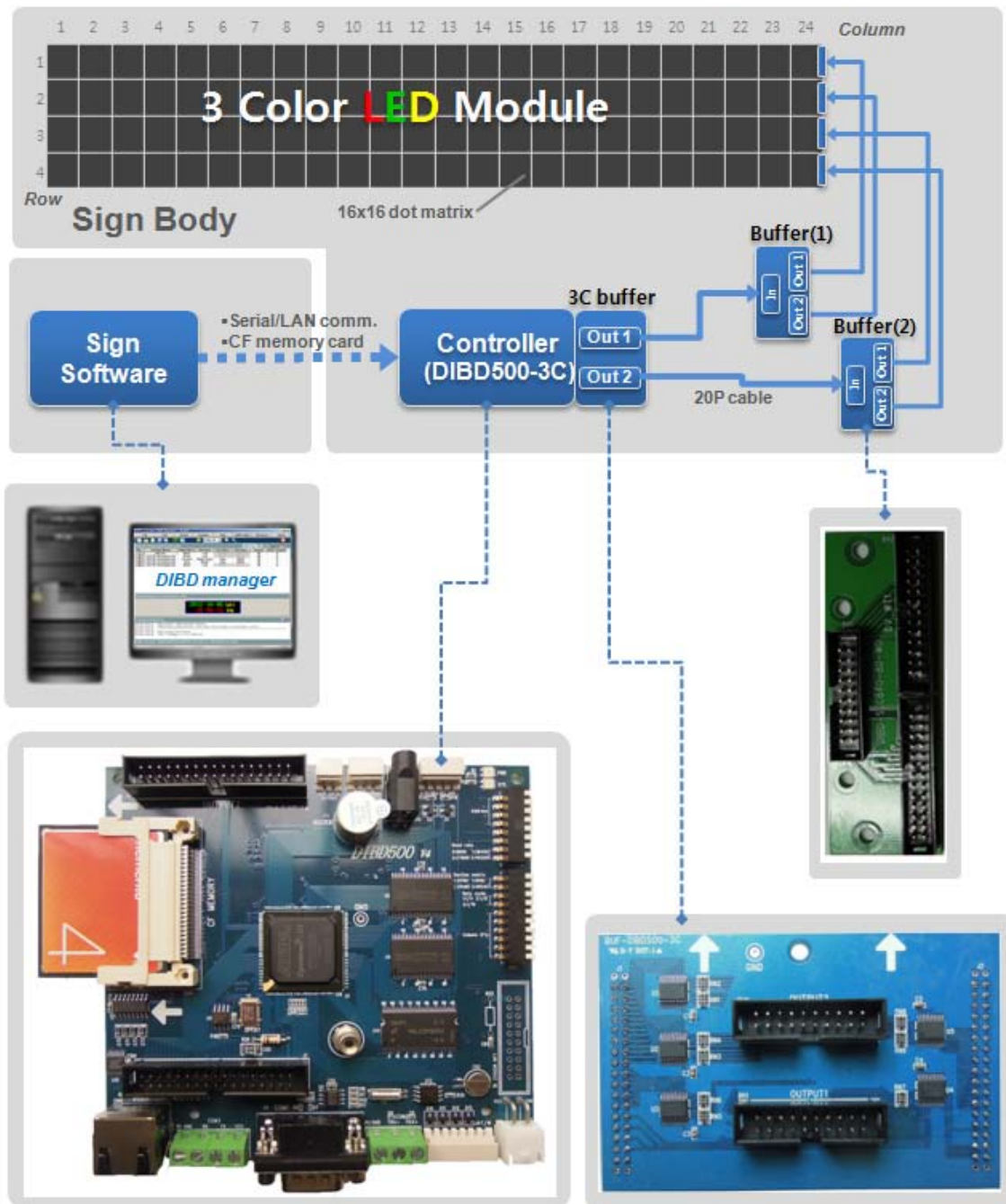


Fig. 1 Configuration of 3 Color LED sign with DIBD500N-3C (Basic Mode)

- ✓ DIBD manager : To setup system, create Contents & Playlist, and upload them to the sign.
- ✓ DIBD(Display Intelligent Board) : The type depends on the sign's size and color. You need to set up Baud rate, DIBD Address, Display columns, Scanning method and so on by dip switches.
- ✓ Buffer Board : Appropriate ones to be delivered depending on the LED manufacturer or Duty ratio(1/16D, 1/8D, 1/4D).

2.2 Configuration (Extension Mode)

By the way of connecting Section Controller(SCU500) to main DIBD500N-3C controller, 3-Color Sign Board can display the maximum "16Row x 255Col.(or 510 modules)" of LED modules.

- ✓ DIBD manager : To setup system, create Contents & Playlist, and upload them to the sign.
- ✓ Controller(Display Intelligent Board) : To save the data at FLASH memory and let them displayed on the sign. The type depends on the sign's size and color. You shall set up Baud rate, DIBD Address, etc.
- ✓ Section Controller : You shall set up Group X/Y value for Section Controller, etc.
- ✓ 3Color Buffer Board : To convert output signal of controller to tri-color image.
- ✓ Buffer Board : Appropriate ones to be delivered by LED manufacturer or Duty ratio(1/16D, 1/8D, 1/4D).

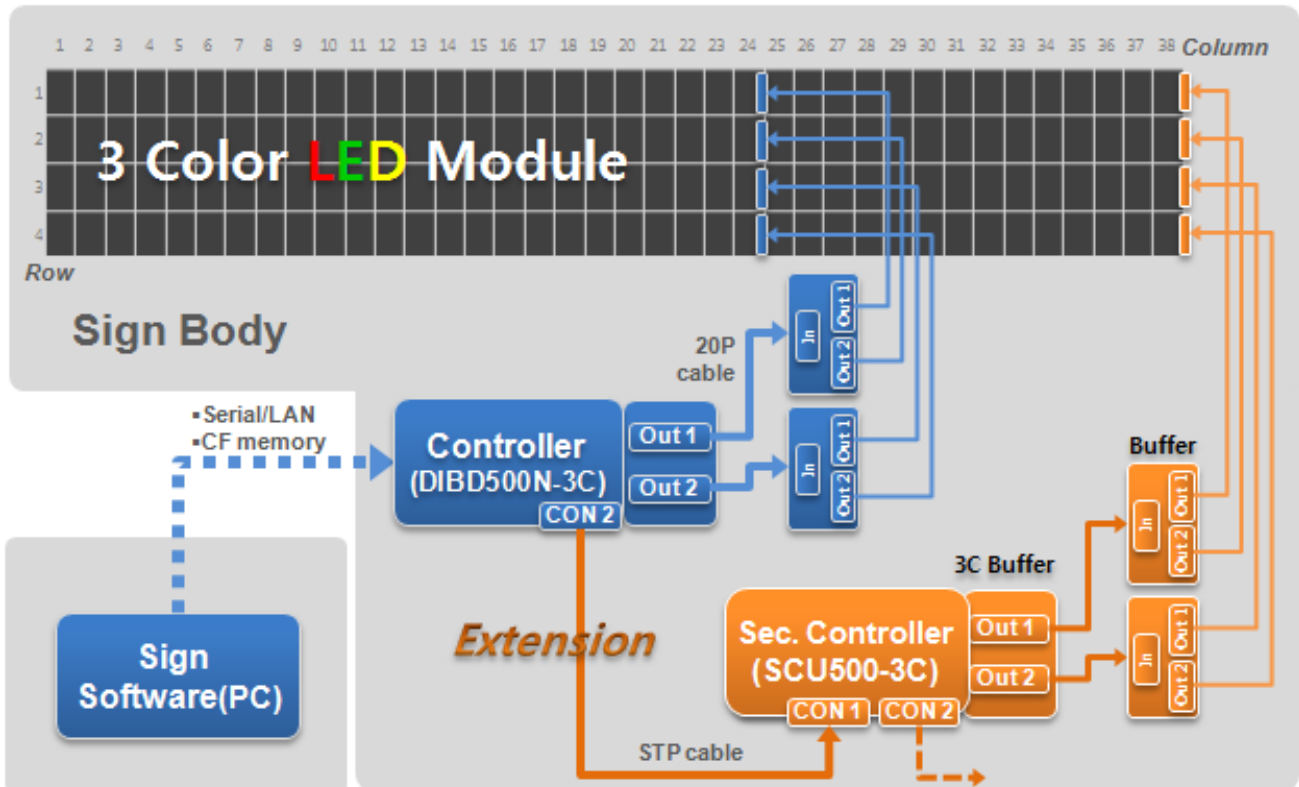


Fig. 2 Configuration of 3 Color LED sign with DIBD500N-3C/SCU500-3C (Extension Mode)

- The sign can be grouped into two: the first group(4Rx24C) is controlled by a main controller, the second by a section controller.
In regards, please refer to "Group Positioning for Section Controller[6][7]" in "Chapter 3".
- CON2 of the main controller shall be connected to CON1 of the section controller. Output signal of each controller goes "3C Buffer -> Buffer -> LED module(right end)"

2.3 System Check Points

2.3.1 Check for the DIBD(Controller)

- A. When the power is supplied to the DIBD, check if Power LED(red) is turned on.
- B. When the system is working normally, check if System LED(green) is blinking at every 500ms.
- C. Check if power is stably supplied with 5VDC. Unstable power frequently causes system malfunction.

- D. Check the insulation between power terminals(+/-) and the sign's body. Poor insulation frequently causes communication error or noise.

2.3.2 Check for the Communication Status

- A. Confirm the address of PC and DIBD, and check the communication port and the communication speed. In case of RS-422/485 multi-communication, DIBD's address shall be set from "address 1" as the PC has already occupied "address 0".
- B. Confirm the settings of wire/wireless communication terminal (or converter), and check the function.
- C. Check the connection of wire/wireless communication line, and confirm the communication distance. As for RS-232 communication, 115,200bps can be achieved at less than 16m of communication distance. Communication speed is inversely proportional to the communication distance. If the communication distance becomes double, the communication speed falls down to the half. As for LAN communication, 10 Mbps will be achieved at less than 100m communication distance.
- D. Try to send simple command packet such as "power on", "power off", and check if LED sign works properly by those commands. And then, try to send bigger size of command packet like "DIBD upload", and check if it works normally also.

2.3.3 Check for LED modules & the Cabling

- A. Check the connection between connectors and cables.
- B. Check power supply and part condition of each LED driver for LED module,
- C. Check whether all images are well displayed on the LED Sign without blurred or omitted pixels. Check any short-circuit or disconnection of LED and any foreign objects in LED PCB. If abnormal, try to change LED driver to see any differences of the function.
- D. Check whether the image is naturally displayed on the LED Sign from right to left direction from the front view(See **Fig.3** below).

When you can't see image on the LED modules at "1-2, 1-1" while you see image at "1-6, 1-5, 1-4, 1-3", you need to check the data cable & LED driver between "1-3" and "1-2". It is good practice to change each of cable or driver with good one to troubleshoot.

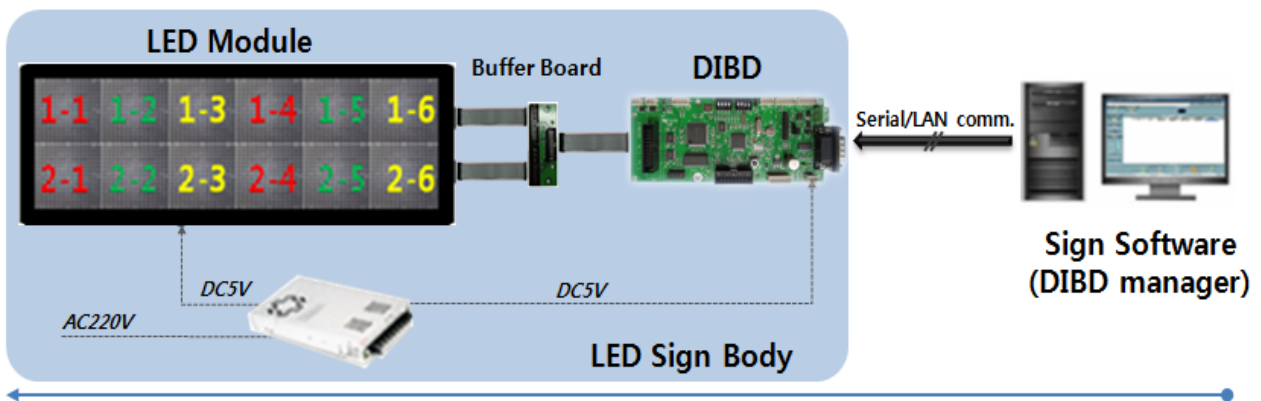


Fig. 3 Data Flow of LED Sign System

3. Specification

DIBD(Display Intelligent Board) is a controller that stores various data(Contents, Playlist, Parameters, etc.) created by DIBD manager at its embedded Flash ROM or CF memory, and makes them displayed on the LED sign according to the order & effect of the Playlist.

DIBD500N-3C can display **tri-color** images on the LED sign up to "4Rx24C(or 2Rx48C)" in 16x16 DOT matrix module. When the size of LED Sign is bigger than that, Section Controller can be connected to extend the display coverage. One Section Controller can display images on the same quantity of modules as one DIBD can display. In this way, up to "16Rx255C(or 510 modules)" of LED sign can be displayed. The specification of the controller is as follows.

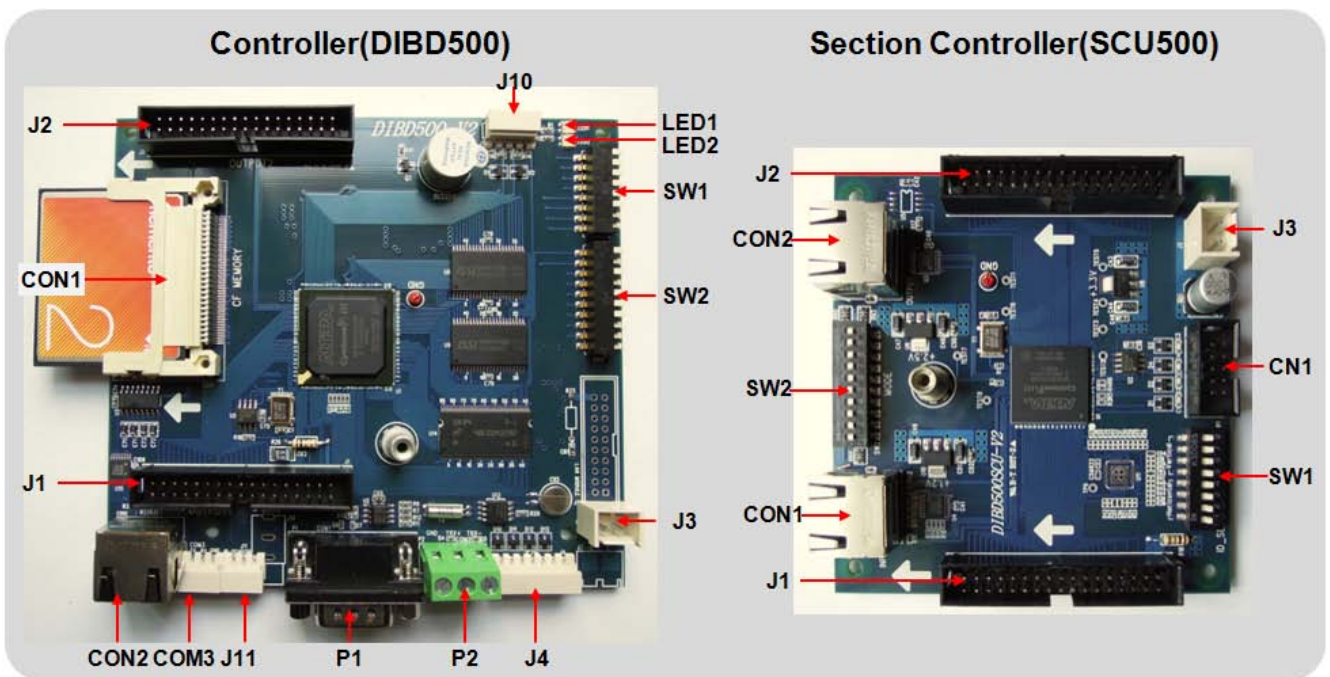


Fig.4 DIBD500 Controller and SCU500 Section Controller

3.1 Parts for DIBD500 Controller

Items	Description	Item	Description
P1	COM1 Port for RS232 2:RXD,3:TXD,5:GND	P2	COM2 Port for RS485 1:GND, 2:TRX+, 3:TRX-
LED1	Power LED (Red) Indication Power ON	LED2	System LED (Green) Flickering every 500ms under normal condition
COM3	Additional port for RS232	J1,J2	Image Output to LED
J3	Power Supply(DC 5V)	J10	Port for Temp./Humidity sensor
SW1	Dip Switches to set: - Baud Rate : #1~2 - DIBD Address : #5~8	SW2	Dip Switches to set: - Column Q'ty under control : #1~6 - Scan Method : #7~8 - Display Module Matrix : #9~10
CON1	CF Memory Slot	CON2	Video Output to Section Unit (in case of extension mode)

3.2 Parts for SCU500 Controller

Items	Description	Items	Description
J1,J2	Video Output to LED	J3	Power Supply(DC 5V)
CON1	Video Input from DIBD	CON2	Video Output to other Section Unit
SW1	Dip Switches to set: - Horizontal Module Position : #1~4 - Vertical Module Position : #5~8	SW2	Dip Switches to set: - Column Q'ty under control : #1~6 - Scan Method : #7~8 - Display Module Matrix : #9~10

3.3 Specification of Controller

Main Controller(DIBD500-3C)

- Main Process Nios® II Embedded Processor Full 32-bit instruction set, data path, and address space,S32Bit RISC CPU FPGA 15K Les, 4MByte Serial Flash ROM
- Memory 8MByte Flash memory, 8MByte SDRAM, 2GByte CF memory
- Range 3 Color LED sign with 96 modules(2R48C, 4R24C)
- Scan mode(Duty Ratio) 1/16D, 1/8D, 1/4D
- Display Image format Text/Bitmap/Animation in 3 Color, Analog/Digital clock, D-day counter
- Image number to display No limitation with CF memory
- Multi-communication Max. 32 signs supported
- Comm. interface RS-232/485 Port, RJ45 connector for video output, GPIO Port
- Extended interface CF memory, Built-in clock, one port to control external device(Fan, Buzzer..)
- Options Temperature/Humidity sensor, GPS time receiver.
- Environments Industrial at -20°C~80°C
- Power consumption DC 5V, 0.5A, 4W

Section Controller(SCU500-3C)

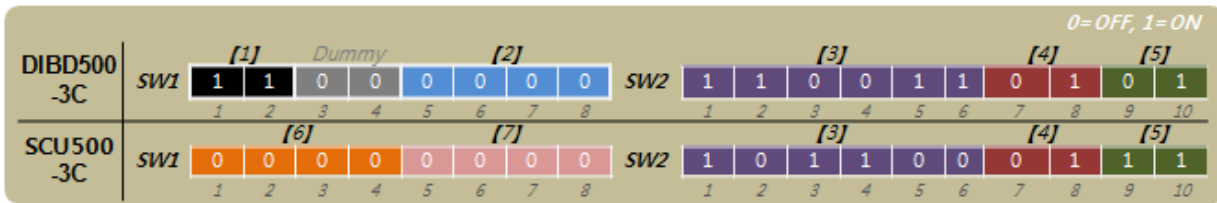
- Main Process Nios® II Embedded Processor Full 32-bit instruction set, data path, and address space,S32Bit RISC CPU FPGA 15K Les, 4MByte Serial Flash ROM
- Range 3 Color LED sign with 96 modules(2R48C, 4R24C)
- Scan mode(Duty Ratio) 1/16D, 1/8D, 1/4D
- Display Image format Text/Bitmap/Animation in 3 Color, Analog/Digital clock, D-day counter
- Environments Industrial at -20°C~80°C
- Power consumption DC 5V, 0.1A, 0.5W

3.4 Specification of Communication

- Topology Asynchronous Link
- Communication method RS-232(COM1), RS-485(COM2), LAN(Option)
- Transmission Mode Full/Half Duplex
- Baud Rate 9,600 / 38,400 / 57,600 /115,200 bps
- Communication Mode N(Parity check), 8(Data bit), 1(Stop bit)
- Signal Pin Name COM1(RS232) - 2:RXD,3:TXD,5:GND
COM2(RS485) – 1:GND, 2: A(TRX+), 3:B(TRX-)

4. How to Set Dip Switches

It is necessary to set up the followings by using the dip switches of **SW1** & **SW2** of each controller.



[1] Baud Rate¹⁾

Baud Rate	Hex Value	Dip Switch Set. (0=OFF, 1=ON)	
9,600 bps	0	0	0
38,400 bps	1	1	0
57,600 bps	2	0	1
115,200 bps	3	1	1

Dip Switch No. 1 2

[2] Sign address²⁾

Sign address	Hex Value	Dip Switch Setting (0=OFF, 1=ON)			
Default	0	0	0	0	0
1	1	1	0	0	0
7	7	1	1	1	0
15	15	1	1	1	1

Dip Switch No. 5 6 7 8

[3] Column Q'ty under control

Column Q'ty	Hex Value	Dip Switch Setting (0=OFF, 1=ON)					
1	0	0	0	0	0	0	0
4	3	1	1	0	0	0	0
8	7	1	1	1	0	0	0
10	9	1	0	0	1	0	0
12	11	1	1	0	1	0	0
14	13	1	0	1	1	0	0
20	19	1	1	0	0	1	0
24	23	1	1	1	0	1	0
34	33	1	1	0	0	1	1
48	47	1	1	1	1	0	1

Dip Switch No. 1 2 3 4 5 6

[4] Scan Method

Scan Method	Hex Value	Dip Switch Set. (0=OFF, 1=ON)	
1/4 Duty	1	1	0
1/8 Duty	2	0	1
1/16 Duty	3	1	1

Dip Switch No. 7 8

[5] Display Matrix

Row x Column	Hex Value	Dip Switch Set. (0=OFF, 1=ON)	
2R x 48C	2	0	1
4R x 24C	3	1	1

Dip Switch No. 9 10

[6][7] Group Positioning for Section Controller³⁾

Sample A: DIBD500 (no need to set) | SCU500 (0, 1)

Sample B: DIBD500 (no need to set) | SCU500 (1, 0)

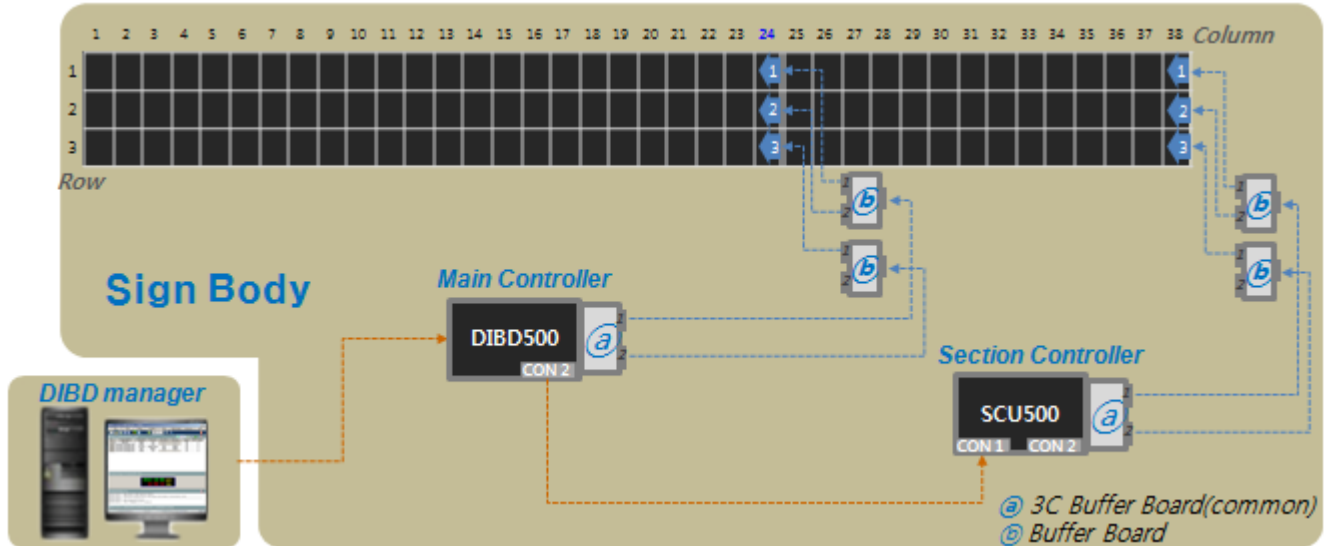
Sign size	Display Matrix	Control Position			[6] Dip Switch Set. (X)				[7] Dip Switch Set. (Y)				
		Section Controller	Columns	Rows	Hex Value	#1	#2	#3	#4	Hex Value	#5	#6	#7
A 8R 24C	4R x 24C	NO.1	1~24	4~8	0	0	0	0	7	1	0	0	0
		NO.2											
B 2R 64C	2R x 48C	NO.1	49~62	1~2	7	1	0	0	0	0	0	0	0
		NO.2											

- To set up the communication speed between PC and DIBD500 controller.
- To set up DIBD address for multi-communication.
- To set up coordinates of LED module group on which individual Section Controller shall control to display image. For this setting, the followings should be done correctly in advance.
 - To set up the total module number of the sign with the color at **[System]>[Screen Set]**.
 - To select "Display Matrix" among "2Rx48C" or "4Rx24C".

[Appendix A]: Setting Example of Dip Switch for tri-color LED Sign(3Rx38C)

You can connect the cables and set up Dip Switches, as below, in a way that a DIBD500-3C and a SCU500-3C can control the whole LED modules.

How to Connect the Output Signal



How to Set up Dip Switches

0=OFF, 1=ON

Controller	SW1	SW2	Setting Items	Hex Value	Remark
DIBD500	SW1	1,2	Baud Rate	3	115,200bps
		5,6,7,8	Sign address	0	DIBD address
	SW2	1,2,3,4,5,6	Column Q'ty under control	23	24 Columns
		7,8	Scan Method	1	1/4 Duty
		9,10	Display Matrix	3	4 x 24
SCU500	SW1	1,2,3,4	Group X value	1	25~38 Columns
		5,6,7,8	Group Y value	0	1~3 Rows
	SW2	1,2,3,4,5,6	Column Q'ty under control	13	14 Columns
		7,8	Scan Method	1	1/4 Duty
		9,10	Display Matrix	3	4R x 24C

Thanks