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Warning

All installation works must be performed by a qualified installer and must comply with applicable laws and regulations.

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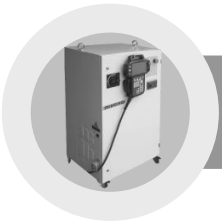
Hi5aIE230427FMEN3



Hi5a Controller Function Manual

CC-Link IE Field Slave

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1 Overview

1.1. Prior Knowledge

It is required to have the following knowledge to understand this manual well.

- Method to use the Hi5a robot controller
- Basic knowledge about the CC-Link IE Field

1.2. Exterior of the BD525 Board

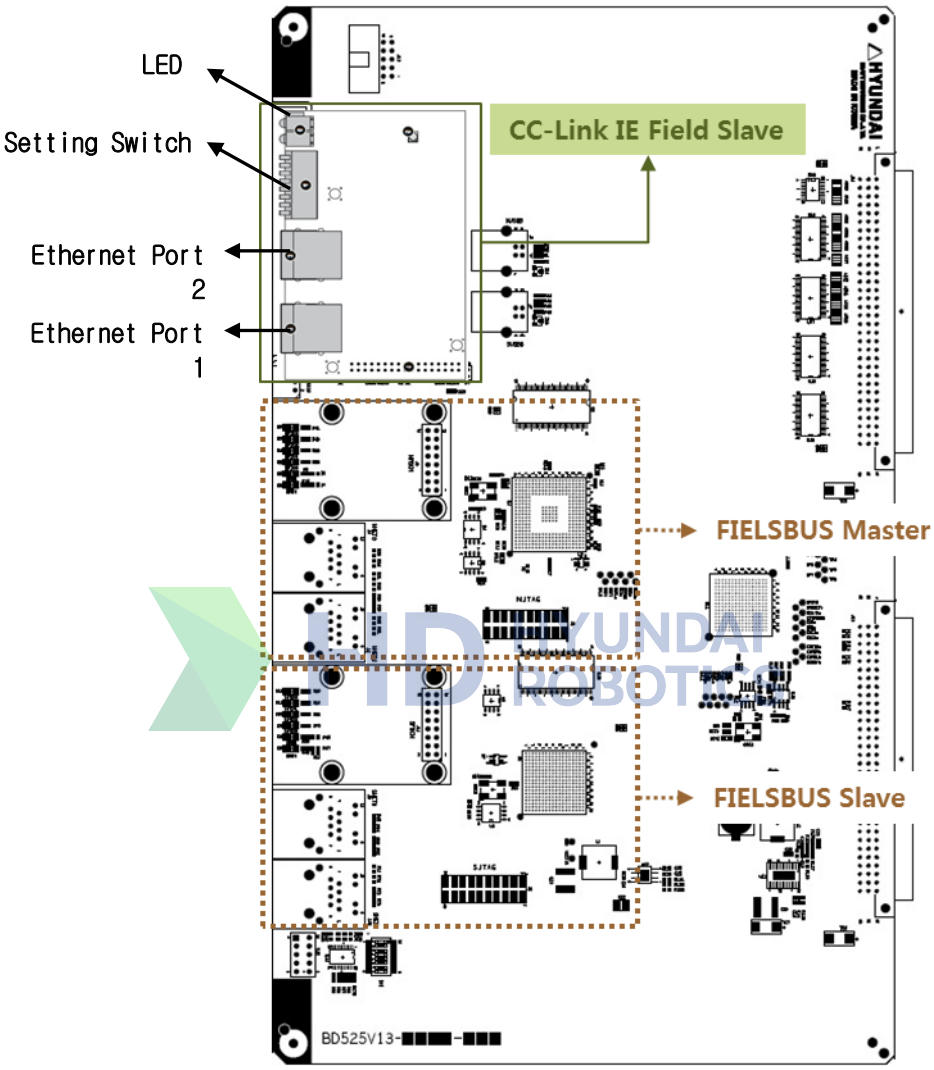


Figure 1.1 CC-Link IE Field Communication Board

The BD525 multi-protocol communication board can support up to three industrial communication channels simultaneously, including CC-Link IE Field slaves, fieldbus or real-time Ethernet masters and slaves. For other fieldbus or real-time Ethernet than CC-Link IE, refer to the relevant protocol functional manual.

The CC-Link IE Field Slave communication board is piggybacked on the BD525 board and has a setting switch, four LEDs, and two Ethernet ports.

※ Reference) CC-Link IE Field slave is supported in a BD525 board of hardware version V1.3 or later.

(1) Setting Switch

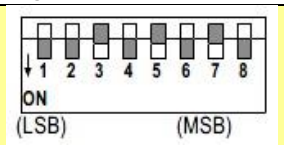
You can select the node number and LED indication items by using the setting switch. If the pins #1 ~ #7 of the switch are all on (setting value = 127), the node number value set in the main board will be used as the node number and can be changed by using the teach pendant. (Please refer to 3.1 CC-Link IE Slave Setting)

If the setting value of the pins #1 ~ #7 of the switch is within the range of 1 ~ 120, the node number value set by using the switch will be used as the node number and cannot be changed by using the teach pendant.

When the pin #8 of the switch is on, LED3 and LED4 will respectively indicate the link status of the Ethernet port.

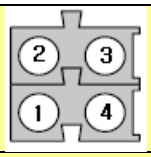
If pin 8 of the switch is off, LED3 and LED4 will respectively indicate data transmission / reception status.

Table 1-1 Setting Switch

			Description	Remarks
Pin number	**Usage**	**Value**		
1~7	**Node number**	**0**	Error (Error LED on)	The change will be reflected after the power is reset.
		1~120	Node number	
		121~126	Error (Error LED on)	
		127	**Node number setting by TP (Default)**	
8	**LED indication**	**1(On)**	LED3: Link1, LED4: Link2	The change will be reflected immediately.
		0(Off)	**LED3: RD. LED4: SD (Default)**	

(2) LED

Table 1-2 LED Status

			Description
Number	Indication	Status	
1	Run	Off	- No power supplied - No network detected - Network timed out
		Green	- Normal operation
	Error	Off	- Normal operation - No power supplied
		Red	- Station in abnormal operation - Node number duplicated - Master parameter error - Abnormal station address during initialization
		Red blinking	- Link error
3	RD LED (Setting switch pin 8 = Off)	Off	- No data received - No power supplied
		Green	- Data received
	Link 2 (Setting switch pin = On)	Off	- No data linked - No power supplied
		Green	- Ethernet link connected
4	SD LED (Setting switch pin = Off)	Off	- No data transmitted - No power supplied
		Green	- Data transmitted
	Link 1 (Setting switch pin = On)	Off	- No data linked - No power supplied
		Green	- Ethernet link connected

1.3. Specification of BD525 CC-Link IE Field Slave

Table 1-3 Specification of CC-Link IE Field Slave

System type	Intelligent device station
Communication speed	1 Gbps (fixed)
Topology	Line type, star type, Line and Star types combined and Ring type
Connection cable	- Cat.5e or higher (1000BASE-T compliant Ethernet cable) - Dual shielded type is recommended.
Node number	1 ~ 120
Network number	1 ~ 239
Connector specification	Shielded RJ-45
Data communication	- Cyclic transmission: RWw, RY, RWr and RX - Transient transmission: Not supported

1.4. Hi5a CSP+ File

Installing the Hi5a BD525 CC-Link IE Field Slave CSP+ file will make it possible to set the network in a graphic environment.

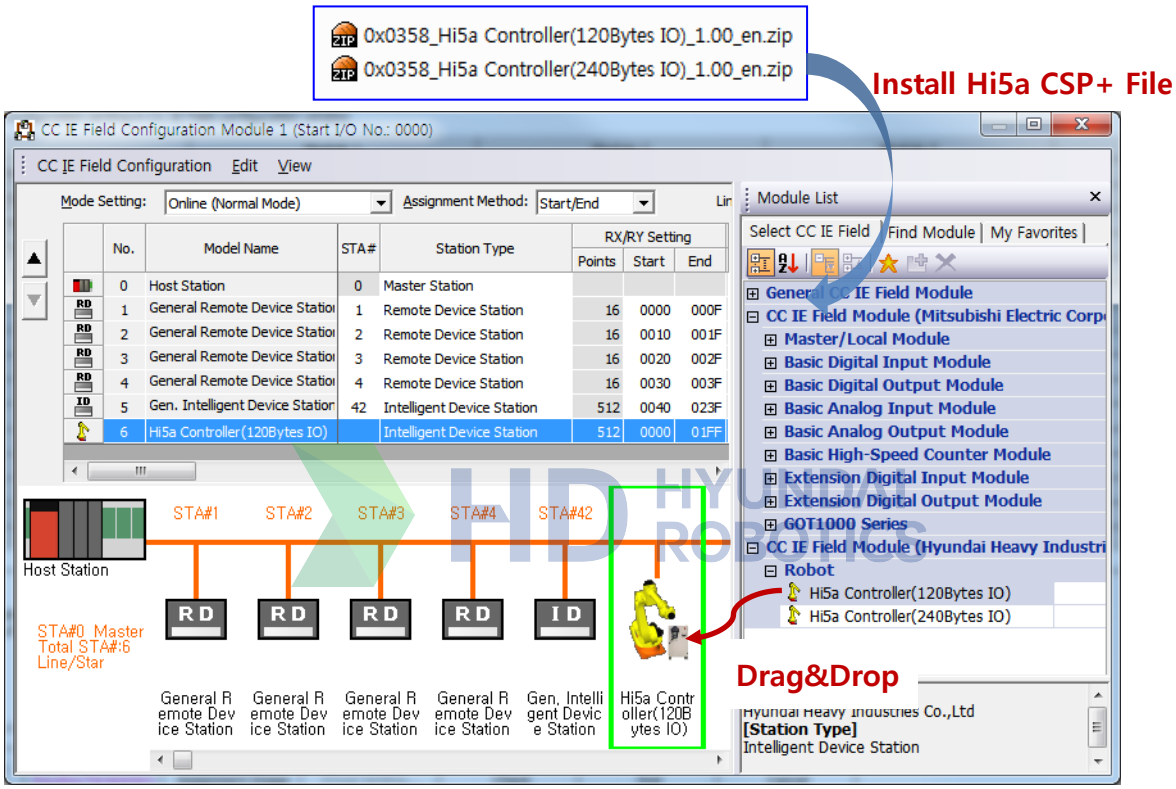


Figure 1.2 CC-Link IE Network Setting

The BD525 CC-Link IE Field Slave can be used with 120 bytes or 240 bytes respectively for input and output depending on the setting. Therefore, it is required to install two CSP+ files or install the CSP+ file that matches the setting before using the slave.

Table 1-4 CSP+ File

Data mapping	CSP+ file	Module to use
RX/RY/ RWr/RWw=FB5	0x0358_Hi5a Controller(120Bytes IO)_x.xx_en.zip	Hi5a Controller(120Bytes IO)
RX/RY=FB5 RWr/RWw=FB3	0x0358_Hi5a Controller(240Bytes IO)_x.xx_en.zip	Hi5a Controller(240Bytes IO)

The Hi5a BD525 CC-Link IE Field slave CSP+ files can be downloaded from the following website. Click on **FieldbusConfig** on the website and download and decompress the file. Then, use the CSP+ file in the [**BD525 CC-Link IE Field Slave CSP File**] folder.

- Korean: http://www.hyundai-engine.com/korean/robot/robot06.asp
- English: http://www.hyundai-engine.com/robot/robot06.asp

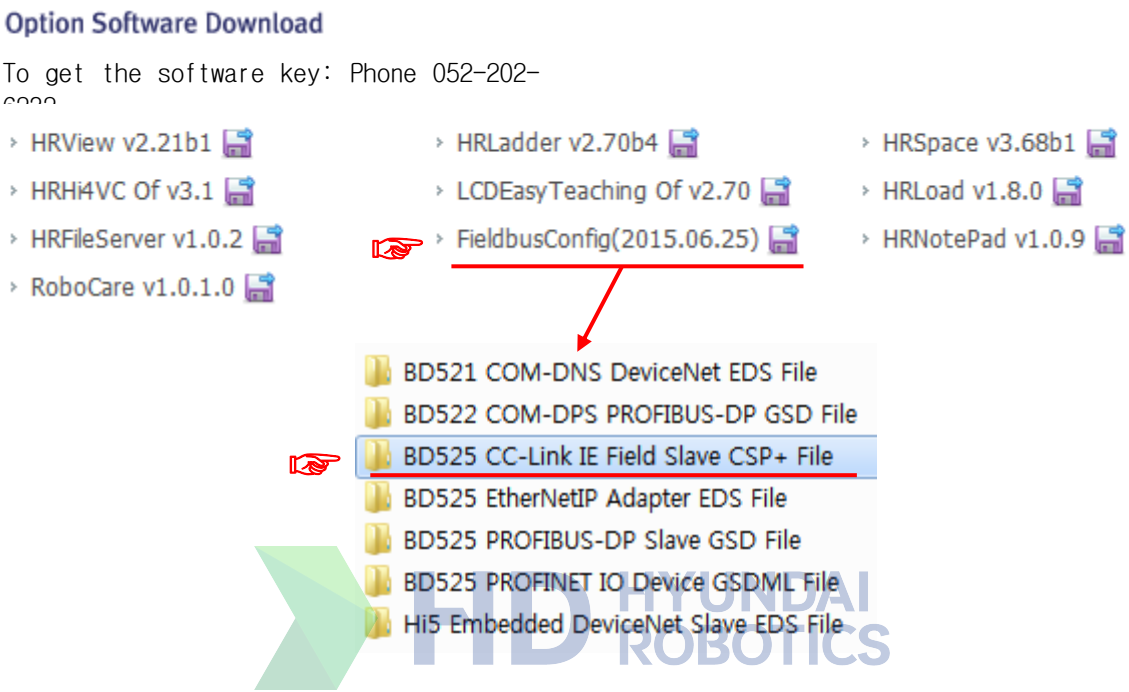


Figure 1.3 CSP+ File Downloading

Refer to 3.3 Example of CC-Link IE Field Setting for details on installing CSP + files.

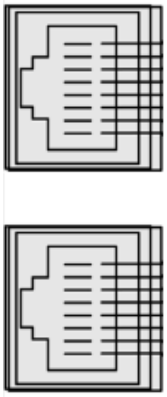
2

Connection of Communication Cables

2.1. Communication Connector

The BD525 CC-Link IE Field Slave provides two RJ45 sockets. It is required to use a shielded RJ45 connector in compliance with ANSI / TIA / EIA-568-B (Category 5e) for connecting the communication cables.

Table 2-1 RJ45 Connector Pin Map

	Pin number	Signal	Meaning
	1	TD+	Transmitted data +
	2	TD-	Transmitted data -
	3	RD+	Received data +
	4	Termination	
	5	Termination	
	6	RD-	Received data -
	7	Termination	
	8	Termination	

2.2. Communication Cable

It is required to use a CLPA-recommended cable that has passed the CLPA test among the ANSI / TIA / EIA standard Ethernet cables of Category 5e or higher. For the installation of CC-Link IE Field communication cable, is required to comply with the CLPA "**CC-Link IE Field Network Cable Installation Manual**".

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3

CC-Link IE Setting and Diagnosis

3.1. Setting of the CC-Link IE Slave

Set the node number and network number to use the CC-Link IE Field Slave. Carry out the setting according to the following procedures.

(1) Select 『[F2]: System』 → 『2: Control Parameters』 → 『2: Input and Output Signal Setting』 → 『16: CC-Link IE Slave Setting and Diagnosis』.

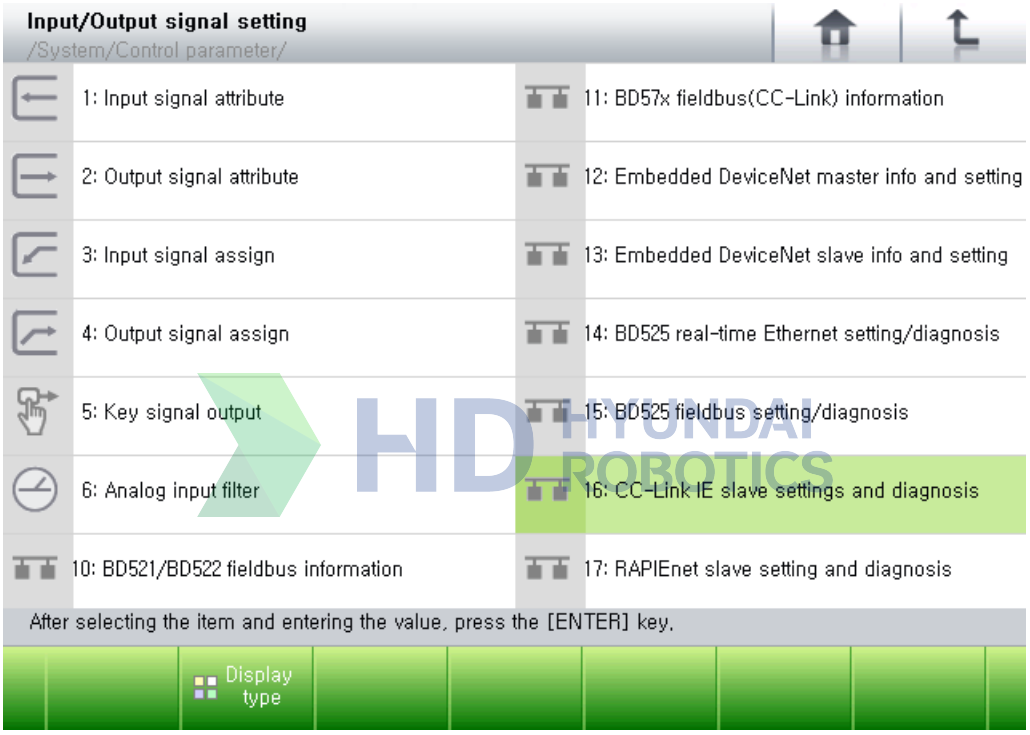

Figure 3.1 CC-Link IE Slave Setting and Diagnosis Menu

(2) In the CC-Link IE Slave Setting and Diagnosis screen, set the items such as input in case of an error, node number, network number and input and output data mapping, and then click Apply button.

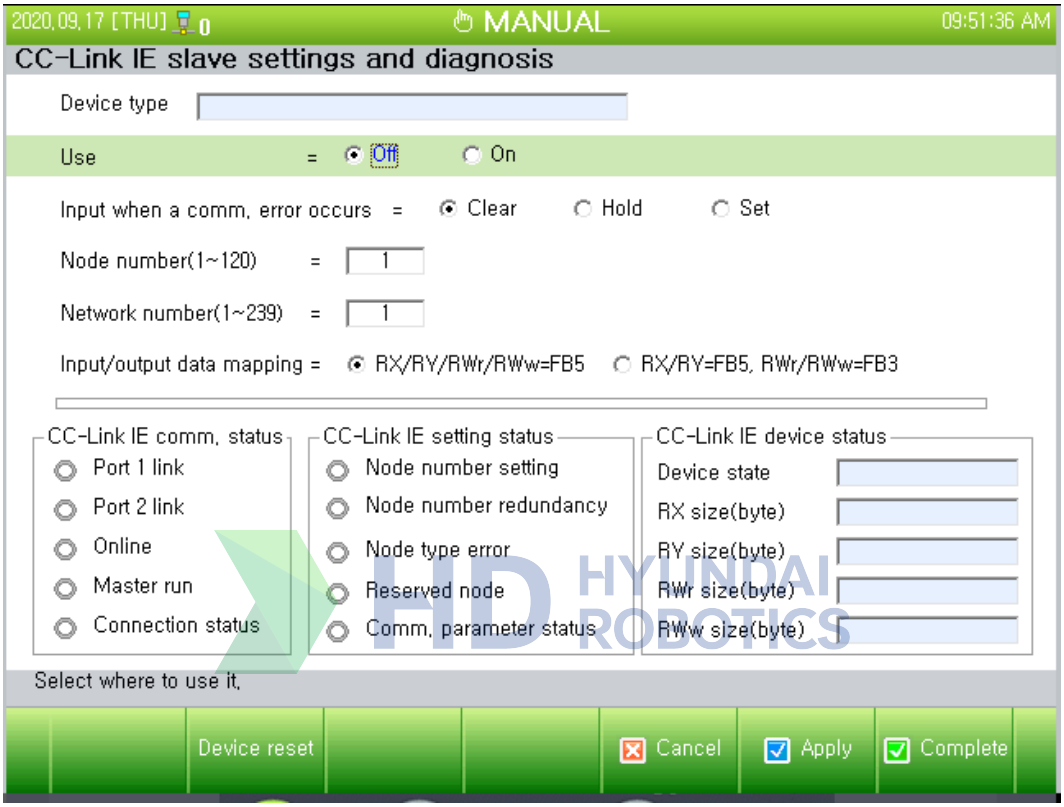

Figure 3.2 CC-Link IE Field Slave Setting Screen

- Whether to use:
  Set this option to On to use CC-Link IE Field slave communication.

- Input in case of communication error:
  This option is to process the input data (FB5.X or FB3.X) when an error occurs to CC-Link IE Field slave communication. If it is set to Clear, all input data will be cleared to 0 when a communication error occurs. If it is set to Hold, the last valid value will be maintained when a communication error occurs. When it is set to Set, all input signals will be set to 1 when a communication error occurs.

- Node number:
  The valid range of the CC-Link IE Field slave node numbers is 1 ~ 120. It is required to set the number in a way that it can match the settings of the master.

  This setting will be valid only when all DIP switch pins #1 ~ #7 of the CC-Link IE communication board are ON. If the DIP switch pins #1 ~ #7 of the communication board are set within the range of 1 ~ 120, the value will become node number.

- Network number:
  The valid range for the CC-Link IE Field slave network number is 1 ~ 239. Set it in a way that it can match the setting of the master.

- Input and output data mapping:
  Set which object of the Hi5a controller will be mapped to the RX / RY / RWr / RWw of CC-Link IE Field Master.

Table 3-1 I/O Mapping

CC-Link IE master	Input and output data mapping	
	RX/RY/RWr/RWw=FB5	RX/RY=FB5, RWr/RWw=FB3
RX	FB5.Y1~512 FB5.YB1~64 FB5.YW1~32 FB5.YL1~16 FB5.YF1~16	FB5.Y1~960 FB5.YB1~120 FB5.YW1~60 FB5.YL1~30 FB5.YF1~30
RX	FB5.X1~512 FB5.XB1~64 FB5.XW1~32 FB5.XL1~16 FB5.XF1~16	FB5.X1~960 FB5.XB1~120 FB5.XW1~60 FB5.XL1~30 FB5.XF1~30
RWr	FB5.Y513~960 FB5.YB65~120 FB5.YW33~60 FB5.YL17~30 FB5.YF17~30	FB3.Y1~960 FB3.YB1~120 FB3.YW1~60 FB3.YL1~30 FB3.YF1~30
RWw	FB5.X513~960 FB5.XB65~120 FB5.XW33~60 FB5.XL17~30 FB5.XF17~30	FB3.X1~960 FB3.XB1~120 FB3.XW1~60 FB3.XL1~30 FB3.XF1~30

After changing the settings, you must click the 『[F6]: Apply』 button to reflect and store the settings in the controller. If you change the settings while the 'Whether to use' option is set the On state, the change will be reflected after the system or the controller is rebooted.

3.2. Diagnosis of CC-Link IE Field Slave

The CC-Link IE Slave Setup and Diagnosis screen makes it possible to diagnose the status related to communication, settings and system.

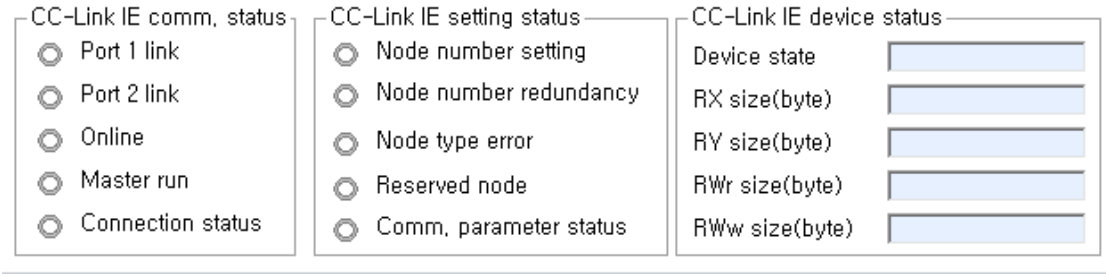

Figure 3.3 CC-Link IE Slave Diagnosis Screen

(1) CC-Link IE Communication Status

Table 3-2 CC-Link IE Communication Status

Item	Status	Description
Port1 Link	Off	Ethernet not linked
	Green	Ethernet linked
Port2 Link	Off	Ethernet not linked
	Green	Ethernet linked
Online	Off	CC-Link IE offline - Communication cable connection defective. - The setting of the master not matching with the node number
	Green	CC-Link IE online
Mater Run	Off	CC-Link IE master stop
	Green	CC-Link IE master run
Connection Status	Red	Communication connection defective - Communication cable connection defective - The setting of the master not matching with the network number

	Green	Communication connection normal

(2) CC-Link IE Setting Status

Table 3-3 CC-Link IE Setting Status

Item	Status	Description
Node number setting	**Red**	Invalid node number - Exceeding the setting range of the node number - Not matching between the mater and the node number
	Green	Node number normal
Node number duplication	**Red**	Node number duplication
	Off	No node number duplicated
Node type error	**Red**	Node type error - Not matching between the master and IO - Not matching with the master node type setting
	Off	Node type normal
Preset node	**Yellow**	Preset node
	Off	Not preset node
Communication parameter setting	**Red**	Received parameter not valid - Network number not matched
	Yellow	Parameter check in progress
	Green	Received parameter normal
	Off	No parameter existent - Communication cable connection defective - Wrong parameter ID

(3) CC-Link IE System Status

Table 3-4 CC-Link IE System Status

Item	Status	Description
System status	Not mounted	CC-Link IE communication board not mounted
	Off	CC-Link IE slave use off
	Reset	CC-Link IE communication board resetting in progress
	Initialize	CC-Link IE communication initialization in progress
	Error	CC-Link IE communication error
	Malfunction	CC-Link IE communication board malfunctioning
	Initialization Failure	CC-Link IE communication failed
	Normal	CC-Link IE communication normal
RX size	Number of bytes	CC-Link IE offline ⇨ Size of the set data CC-Link IE online ⇨ Size of the data being exchanged with the master
RY size	Number of bytes	
RWr size	Number of bytes	
RWw size	Number of bytes	

3.3. Example of CC-Link IE Field Setting

This example describes how to set up a network on the graphic screen (CC-Link IE Field Configuration window) of GX Works2.

(1) Install the BD525 CC-Link Field Slave CSP+ file by executing the Register Profile menu of GX Works2.

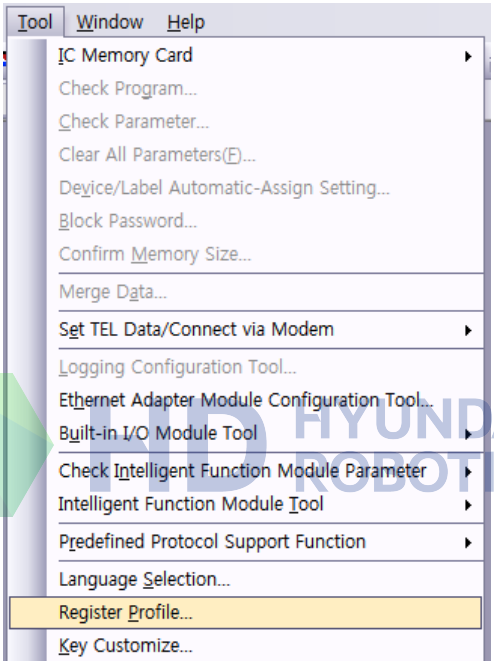

Figure 3.4 CSP+ File Installment

CSP+ files are provided in a form of compressed file (* .zip). Select the CSP+ file and click the Register button to install (Caution: Select the file without extracting it).

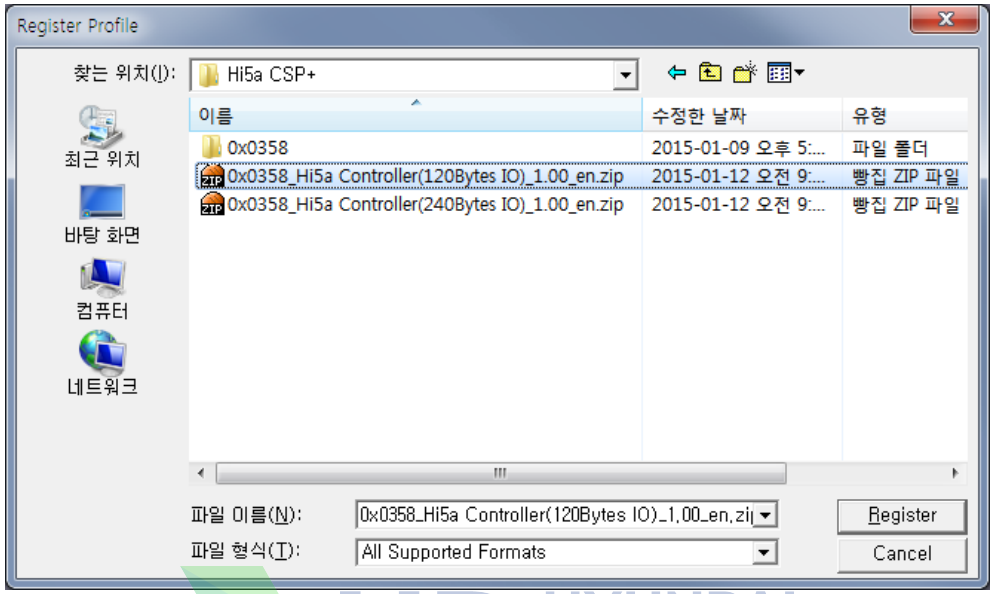

Figure 3.5 CSP+ File Selection

(2) Check the "Set network configuration setting in CC IE Field configuration window".

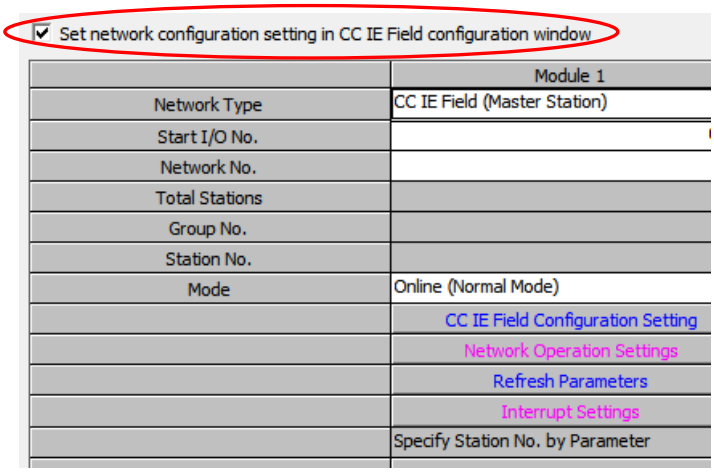

Figure 3.6 Graphic Screen Setting Selection

(3) Execute the setting screen by clicking “CC IE Field Configuration Setting”.

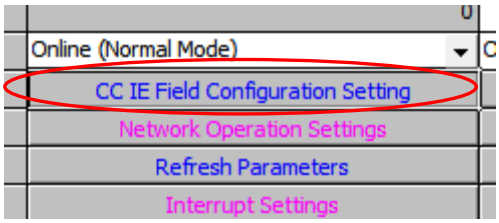

Figure 3.7 CC-Link IE Configuration Setting Execution

(4) Drag and drop the Hi5a Controller from the Robot menu under the CC IE Field Module (Hyundai Heavy Industries Co., Ltd) menu in the Module List.

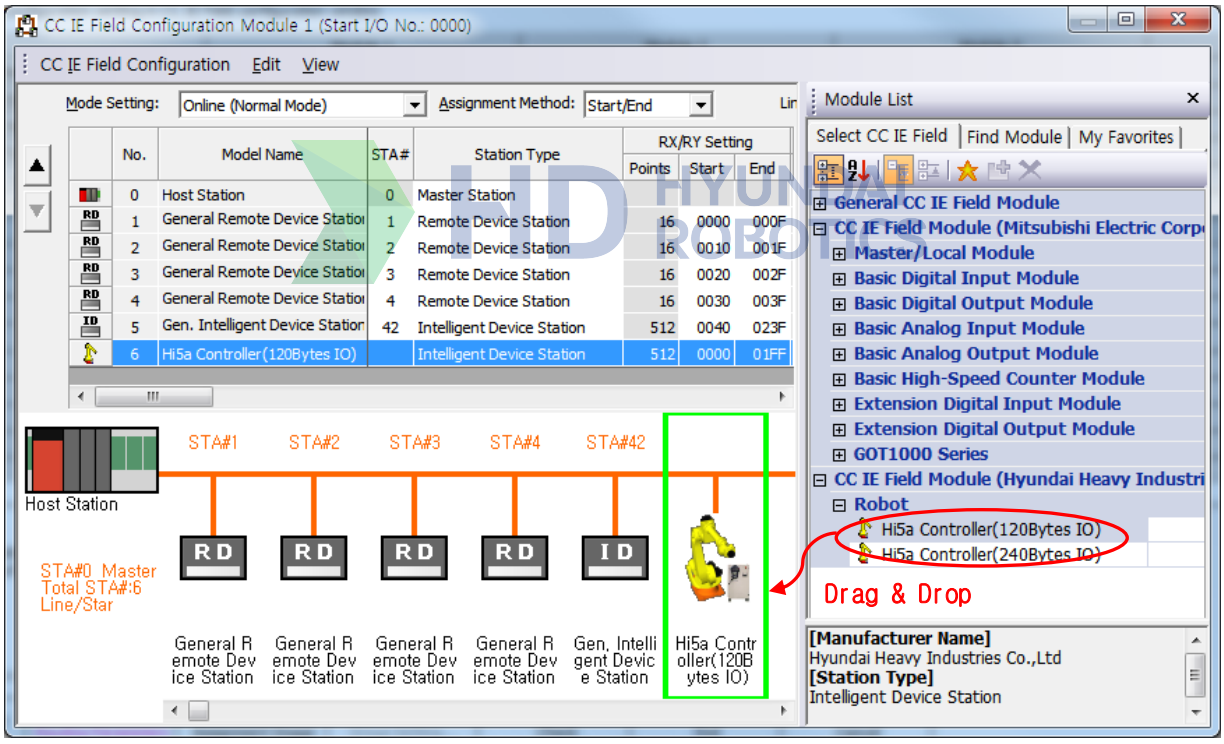

Figure 3.8 CC-Link IE Field Network Configuration

(5) Close the screen where mapping setting for R, RY, RWw, Rwr, etc. is completed.

GRC: 경기도 성남시 분당구 분당수서로 477
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