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We would like to thank our customers for using M2I's "Touch Operation Panel (M2I TOP) Series". Read this manual and familiarize yourself with the connection method and procedures of the "TOP and external device".

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Describes the devices required for connection, the setting of each device, cables, and configurable systems.

2. External device selection [Page 3](#)

Select a TOP model and an external device.

3. TOP communication setting [Page 4](#)

Describes how to set the TOP communication.

4. Cable table [Page 9](#)

Describes the cable specifications required for connection.

5. Supported addresses [Page 10](#)

Refer to this section to check the addresses which can communicate with an external device.

1. System configuration

The system configuration of TOP and "Keyence KV Series" is as follows:

Series	CPU	Link I/F	Communication method	Communication setting	Cable
KV-Nano Series	KV-N14 KV-N24 KV-N40 KV-N60 KV-NC32	CPU Direct	RS-232C	3. TOP communication setting 4. External device setting	5.1. Cable table 1

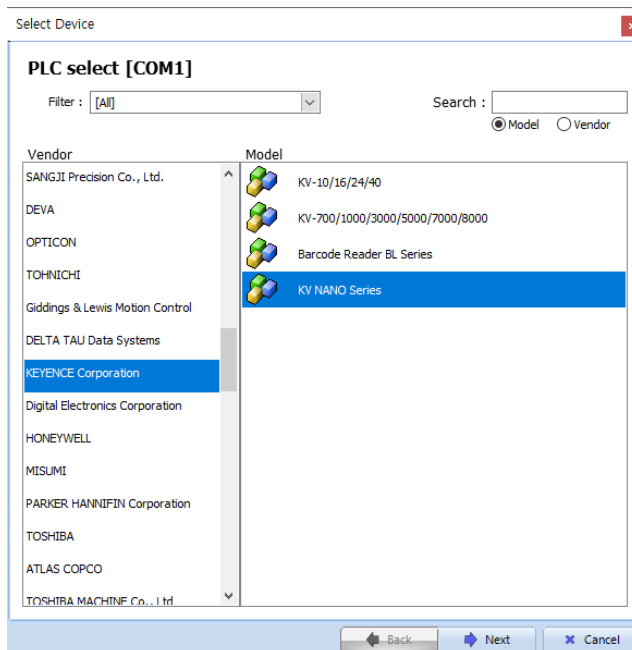
■ Connection configuration

- 1:1 (one TOP and one external device) connection



2. External device selection

- Select a TOP model and a port, and then select an external device.



Settings		Contents					
TOP	Model	Check the TOP display and process to select the touch model.					
External device	Vendor	Select the vendor of the external device to be connected to TOP. Select "KEYENCE > KV Nano Series".					
	PLC	Select an external device to connect to TOP. <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Model</th> <th>Interface</th> <th>Protocol</th> </tr> </thead> <tbody> <tr> <td>KEYENCE KV Nano Series</td> <td>Serial</td> <td>CPU Direct</td> </tr> </tbody> </table> <p>Please check the system configuration in Chapter 1 to see if the external device you want to connect is a model whose system can be configured.</p>	Model	Interface	Protocol	KEYENCE KV Nano Series	Serial
Model	Interface	Protocol					
KEYENCE KV Nano Series	Serial	CPU Direct					

3. TOP communication setting

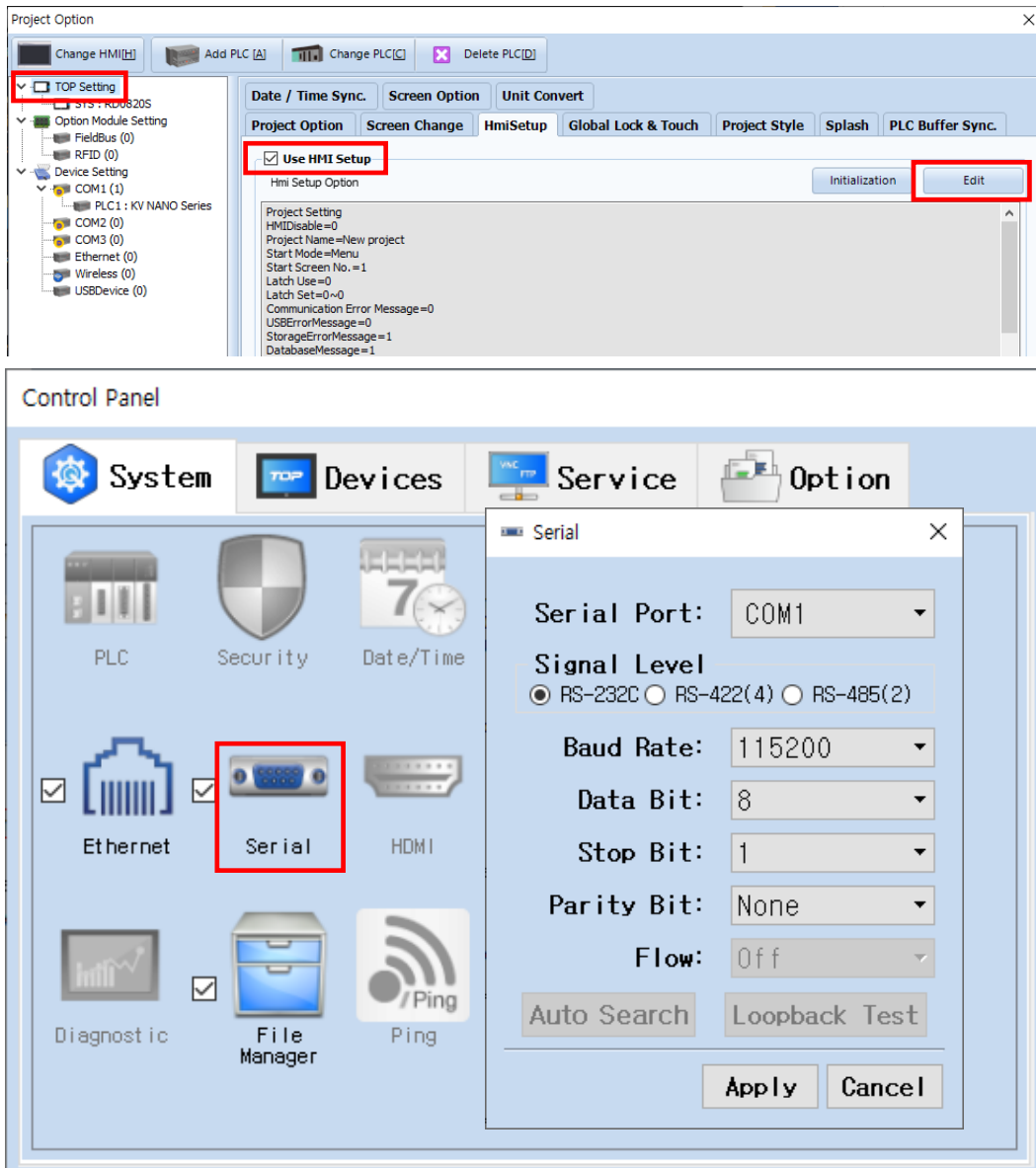
The communication can be set in TOP Design Studio or TOP main menu. The communication should be set in the same way as that of the external device.

3.1 Communication setting in TOP Design Studio

(1) Communication interface setting

■ [Project > Project Property > TOP Setting] → [Project Option > "Use HMI Setup" Check > Edit > Serial]

– Set the TOP communication interface in TOP Design Studio.



Items	TOP	External device	Remarks
Signal Level (port)	RS-232C	RS-232C	
Baud Rate		115200	
Data Bit		8	
Stop Bit		1	
Parity Bit		Even	

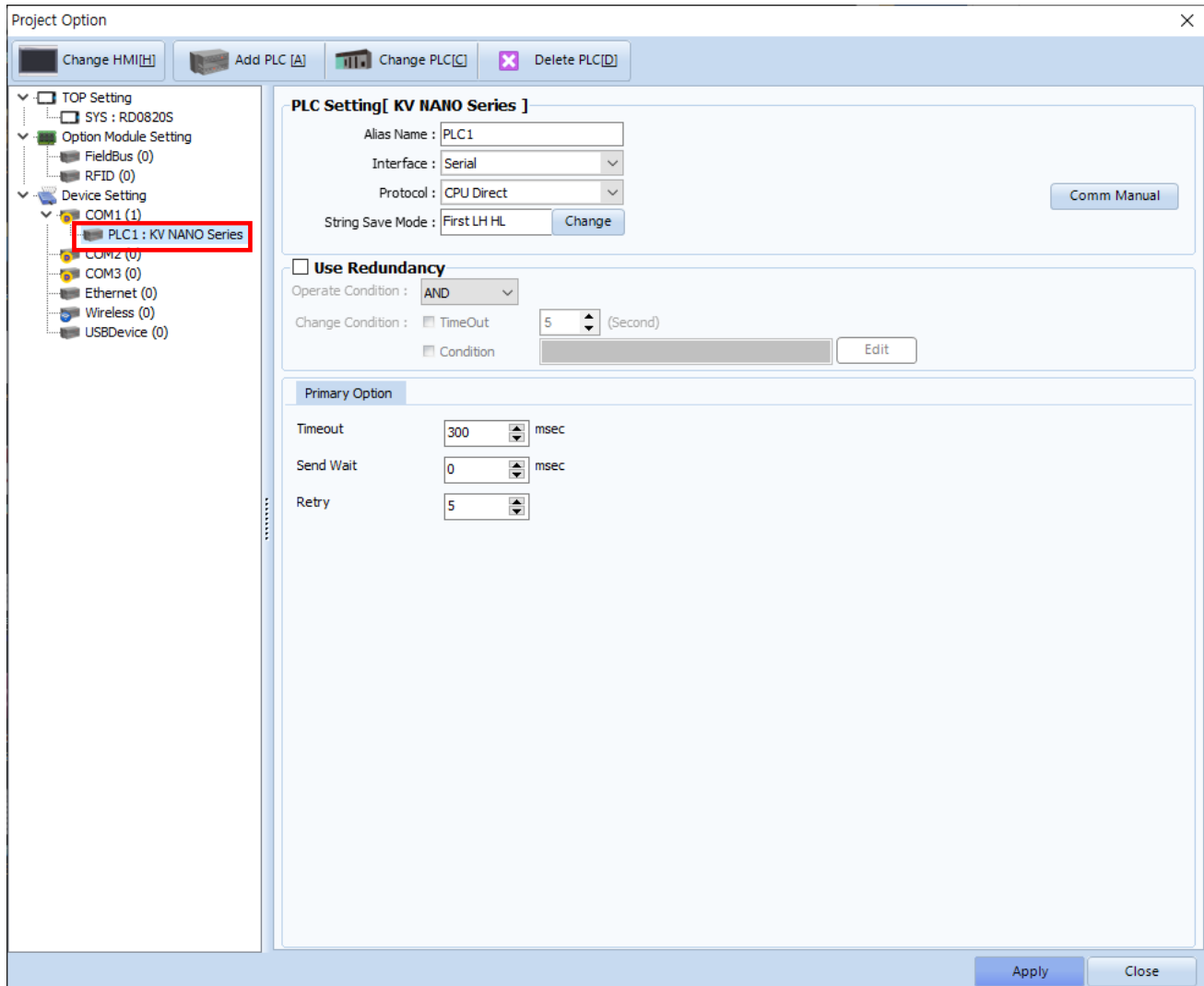
* The above settings are examples recommended by the company.

Items	Description
Signal Level	Select the serial communication method between the TOP and an external device.
Baud Rate	Select the serial communication speed between the TOP and an external device.
Data Bit	Select the serial communication data bit between the TOP and an external device.
Stop Bit	Select the serial communication stop bit between the TOP and an external device.
Parity Bit	Select the serial communication parity bit check method between the TOP and an external device.

(2) Communication option setting

- [Project > Project Property > Device Setting > COM1 > PLC1 : KV Nano Series]

Set the options of the communication driver in TOP Design Studio.



Items	Settings	Remarks
Interface	Configure the communication interface between the TOP and an external device.	Refer to "2. External device selection" .
Protocol	Configure the communication protocol between the TOP and an external device.	
TimeOut (ms)	Set the time for the TOP to wait for a response from an external device.	
SendWait (ms)	Set the waiting time between TOP's receiving a response from an external device and sending the next command request.	
Retry	Configures the number of attempts for response reception by the TOP upon failure.	

3.2. Communication setting in TOP

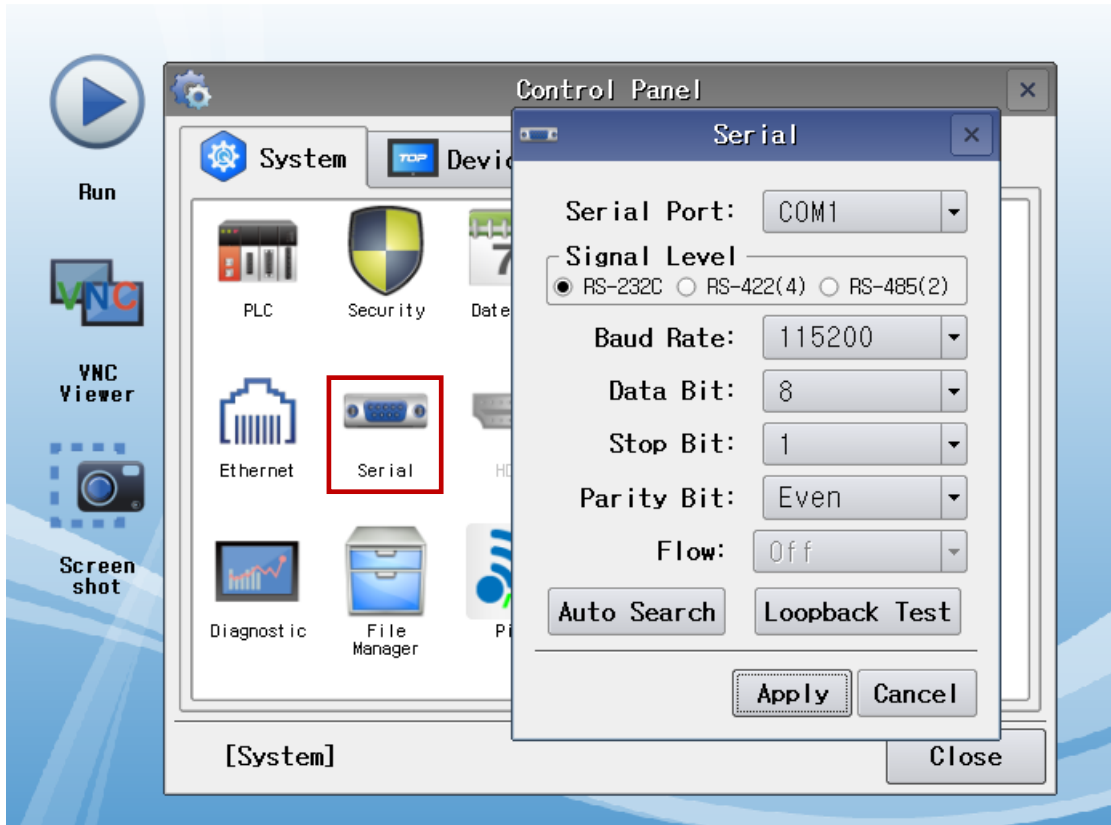
* This is a setting method when "Use HMI Setup" in the setting items in "3.1 TOP Design Studio" is not checked.

- Touch the top of the TOP screen and drag it down. Touch "EXIT" in the pop-up window to go to the main screen.



(1) Communication interface setting

- [Main Screen > Control Panel > Serial]



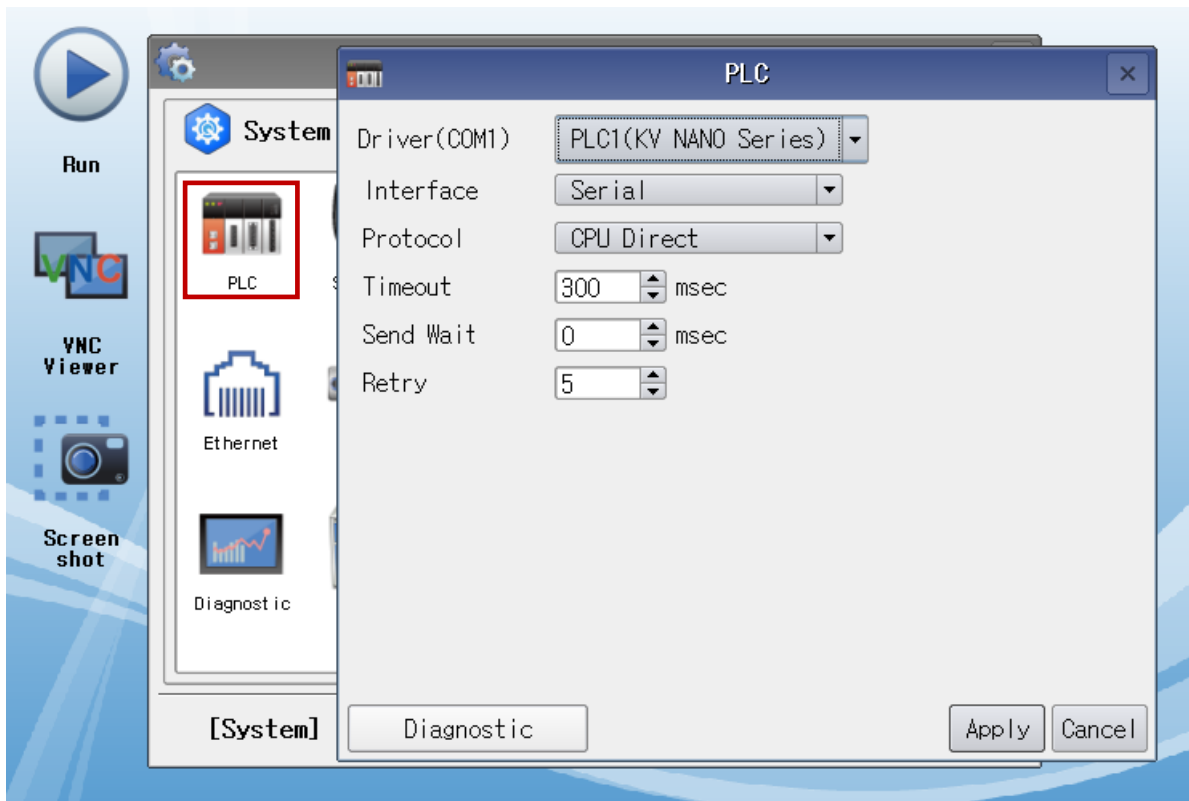
Items	TOP	External device	Remarks
Signal Level (port)	RS-232C	RS-232C	
Baud Rate	115200		
Data Bit	8		
Stop Bit	1		
Parity Bit	Even		

* The above settings are setting examples recommended by the company.

Items	Description
Signal Level	Select the serial communication method between the TOP and an external device.
Baud Rate	Select the serial communication speed between the TOP and an external device.
Data Bit	Select the serial communication data bit between the TOP and an external device.
Stop Bit	Select the serial communication stop bit between the TOP and an external device.
Parity Bit	Select the serial communication parity bit check method between the TOP and an external device.

(2) Communication option setting

■ [Main Screen > Control Panel > PLC]



Items	Settings	Remarks
Interface	Configure the communication interface between the TOP and an external device.	Refer to "2. External device selection".
Protocol	Configure the communication protocol between the TOP and an external device.	
TimeOut (ms)	Set the time for the TOP to wait for a response from an external device.	
SendWait (ms)	Set the waiting time between TOP's receiving a response from an external device and sending the next command request.	
Retry	Configures the number of attempts for response reception by the TOP upon failure.	

3.3 Communication diagnostics

- Check the interface setting status between the TOP and an external device.
 - Touch the top of the TOP screen and drag it down. Touch "EXIT" in the pop-up window to go to the main screen.
 - Check if the COM port settings you want to use in [Control Panel > Serial] are the same as those of the external device.

- Diagnosis of whether the port communication is normal or not
 - Touch "Communication diagnostics" in [Control Panel > PLC].
 - The Diagnostics dialog box pops up on the screen and determines the diagnostic status.

OK	Communication setting normal
Time Out Error	Communication setting abnormal - Check the cable, TOP, and external device setting status. (Reference: Communication diagnostics sheet)

■ Communication diagnostics sheet

- If there is a problem with the communication connection with an external terminal, please check the settings in the sheet below.

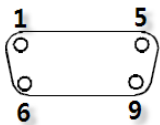
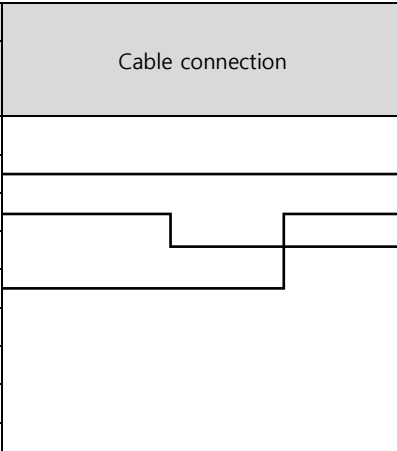
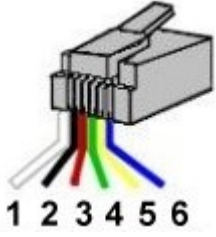
Items	Contents	Check		Remarks	
System configuration	How to connect the system	OK	NG	1. System configuration	
	Connection cable name	OK	NG		
TOP	Version information	OK	NG	2. External device selection 3. Communication setting	
	Port in use	OK	NG		
	Driver name	OK	NG		
	Other detailed settings	OK	NG		
	Relative prefix	Project setting	OK		NG
		Communication diagnostics	OK		NG
	Serial Parameter	Transmission Speed	OK		NG
Data Bit		OK	NG		
Stop Bit		OK	NG		
Parity Bit		OK	NG		
External device	CPU name	OK	NG	4. External device setting	
	Communication port name (module name)	OK	NG		
	Protocol (mode)	OK	NG		
	Setup Prefix	OK	NG		
	Other detailed settings	OK	NG		
	Serial Parameter	Transmission Speed	OK		NG
		Data Bit	OK		NG
		Stop Bit	OK		NG
Parity Bit		OK	NG		
Check address range	OK	NG	6. Supported addresses (For details, please refer to the PLC vendor's manual.)		

4. Cable table

This chapter introduces a cable diagram for normal communication between the TOP and the corresponding device.

5.1. Cable table 1

■ RS-232C (1:1 connection)

COM1			Cable connection	Main Controller		
Pin arrangement* Note 1)	Signal name	Pin number		Pin number	Signal name	Pin arrangement* Note 1)
 <p>Based on communication cable connector front, D-SUB 9 Pin male (male, convex)</p>	RS422	1		1		 <p>RJ-12 6-pin connector</p>
	RXD	2		2	TXD	
	TXD	3		3	SG	
	RS422	4		4	RXD	
	SG	5		5		
	RS422	6		6		
	5V	7				
	GND	8				
	RS422	9				

***Note 1)** Pin arrangement is depicted as facing the interface of the cable connector in this figure. Unused pins are not connected.



5. Supported addresses

The devices available in TOP are as follows:

The device range (address) may differ depending on the CPU module series/type. The TOP series supports the maximum address range used by the external device series. Please refer to each CPU module user manual and be take caution to not deviate from the address range supported by the device you want to use.

- KV-Nano Support Address

Contents		Bit Address	Word Address	Note
DM	Data Memory	—	00000 – 32767	
CM	Control Memory	—	00000 – 8999	
TM	Temporary Data Memory	—	000 – 511	
TRM	Digital Trimmer	—	0 – 7	32 Bit
CTH	High-speed Counter (Current value)	—	0 – 3	32 Bit
CTC	High-speed Counter Comparator (Configured value)	—	0 – 7	32 Bit
TS	Timer (Configured value)	—	0000 – 511	32 Bit
CS	Counter (Configured value)	—	0000 – 255	32 Bit
TC	Timer (Current value)	—	0000 – 511	32 Bit
CC	Counter (Current value)	—	0000 – 255	32 Bit
-(R)	Relay	000 – 599.15	000 – 599	
CR	Control Relay	00 – 89.15	00 – 89	
T	Timer (contact)	0000 – 3999	—	
C	Counter	0000 – 3999	—	
CTC	High-speed Counter comparator (contact)	—	0 – 7	Only Read
MR	Internal Auxiliary Relay	000 – 599.15	000 – 599	
LR	Latch Relay	000 – 199.15	000 – 199	
EM	Extension Data Memory	—	00000 – 32767	
VM	Work Memory	—	0000 – 9999	
Z	Index Register	—	1–12	32 Bit
W	Link Register	0–3FFFF	0–3FFF	
B	Link Lelay	0–1FFFF	0–1FFF	