YASKAWA Electric Corporation
Machine Controller MP900 Series
Serial Driver

Supported version TOP Design Studio V1.0 or higher

CONTENTS

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".

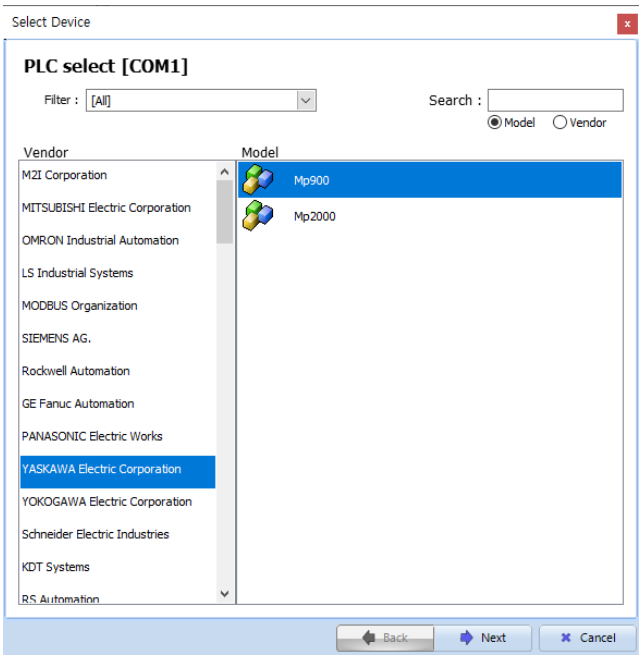
1. System configuration

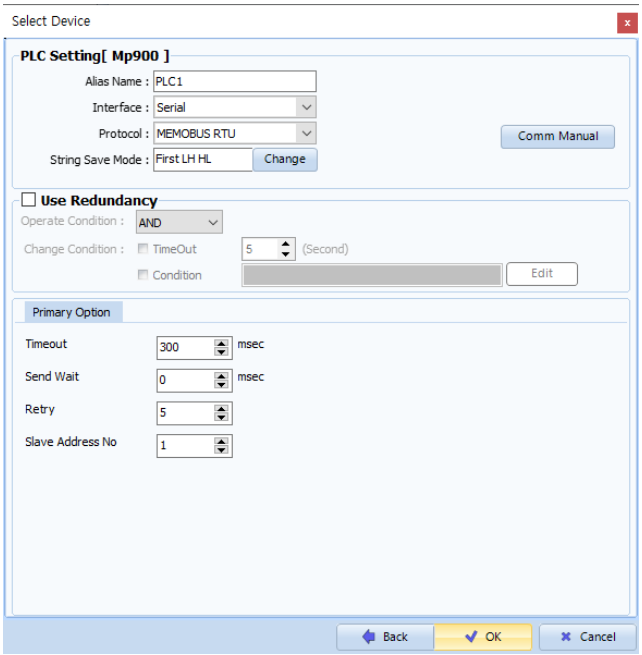
The system configuration of TOP and "YASKAWA Electric Corporation – MP900 Series Serial" is as follows.

Series	CPU	Link I/F	Communication method	System setting	Cable
MP900	MP920	PORT1, PORT2 on the CPU unit	RS-232C	3. TOP communication setting 4. External device setting	5.1. Cable table 1
		CN1, CN2 on "217IF"	RS-232C		
		CN3 on "217IF"	RS-422 (4 wire)	3. TOP communication setting 4. External device setting	5.2. Cable table 2
			RS-485 (2 wire)		
	MP930	PORT1, PORT2 on the CPU unit	RS-232C	3. TOP communication setting 4. External device setting	5.1. Cable table 1
	MP940	PORT1 on the CPU unit	RS-232C	3. TOP communication setting 4. External device setting	5.3. Cable table 3
		PORT2 on the CPU unit	RS-422 (4 wire)		
			RS-485 (2 wire)		

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. Please select "YASKAWA Electric Corporation".
	PLC	Select an external device to connect to TOP.

Model	Interface	Protocol
Mp900	Serial	Set Users

Supported Protocol	
MEMOBUS ASCII	MEMOBUS RTU

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.

3. TOP communication setting

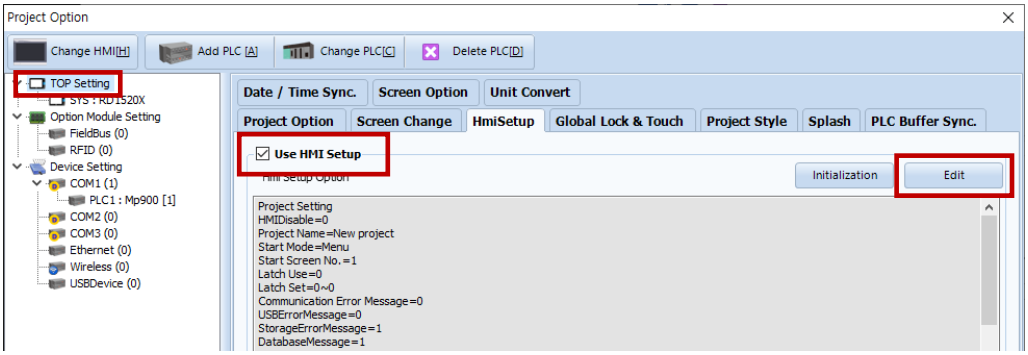
The communication can be set in TOP Design Studio or TOP main menu. The communication should be set in the same way as that of the external device.

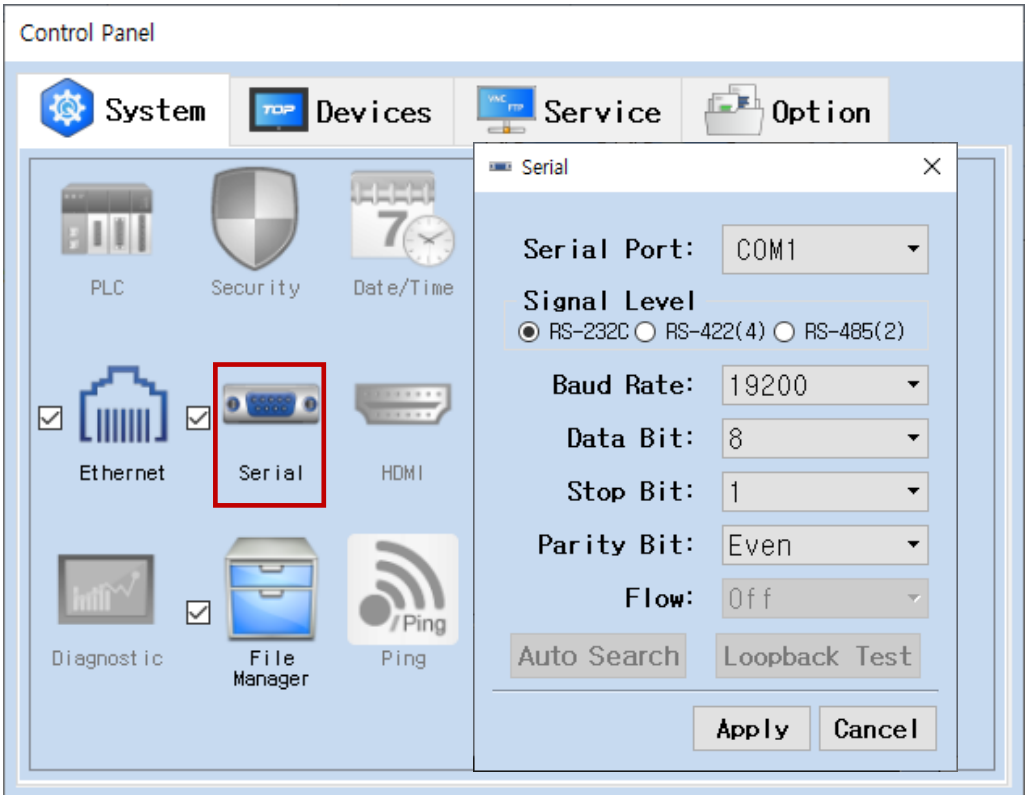
3.1 Communication setting in TOP Design Studio

(1) Communication interface setting

■ [Project > Project properties > TOP settings] → [Project option > Check "Use HMI settings" > Edit > Serial]

– Set the TOP communication interface in TOP Design Studio.





Items	TOP			External device	Remarks
Signal Level (port)	RS-232C	RS-422	RS-485	RS-232C RS-422/485	
Baud Rate	19200				
Data Bit	8				
Stop Bit	1				
Parity Bit	Even				

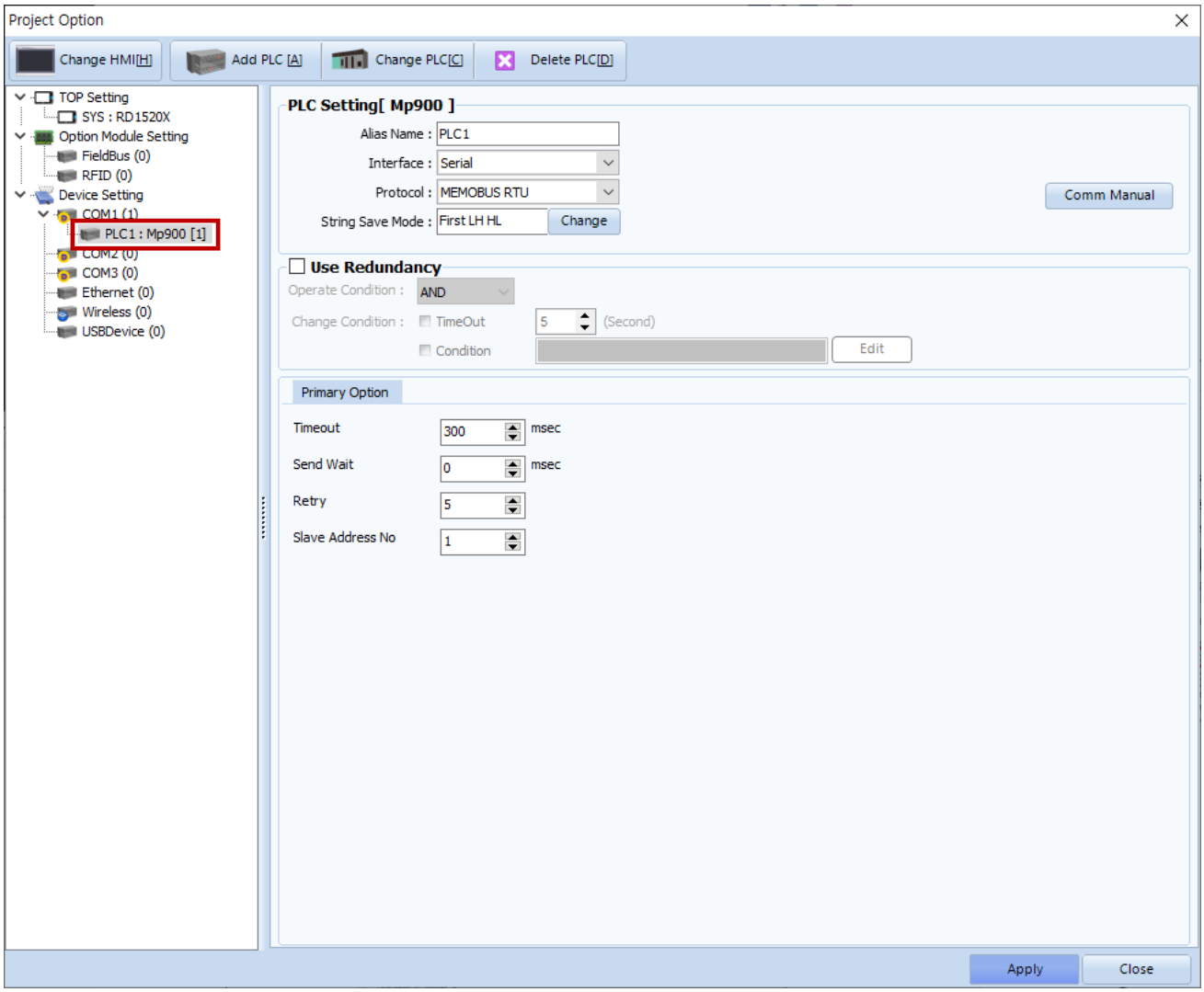
* The above settings are examples recommended by the company.

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 properties > PLC settings > COM > "PLC1 : Mp900"]

– Set the options of the communication driver of MP900 Series Serial in TOP Design Studio.

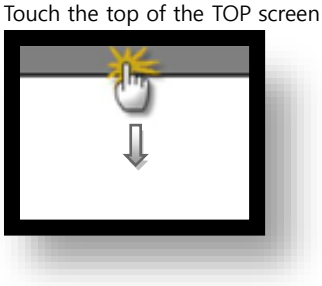


Items	Settings	Remarks
Interface	Select "Serial".	Refer to "2. External device selection".
Protocol	Select the serial communication protocol between the TOP and an external device.	
TimeOut (ms)	Set the time for the TOP to wait for a response from an external device.	
SendWait (ms)	Set the waiting time between TOP's receiving a response from an external device and sending the next command request.	
Slave Address No	Enter the prefix number of an external device (Slave).	

3.2. Communication setting in TOP

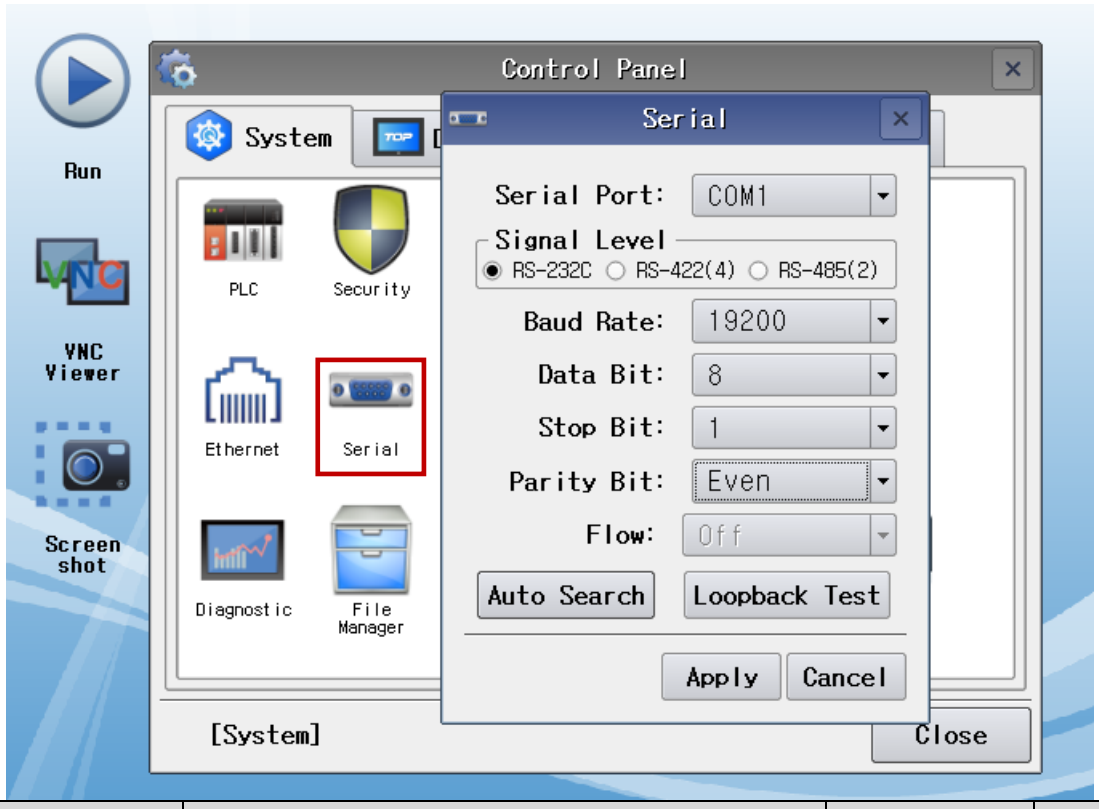
*** This is a setting method when "Use HMI Setup" in the setting items in "3.1 TOP Design Studio" is not checked.**

■ 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]



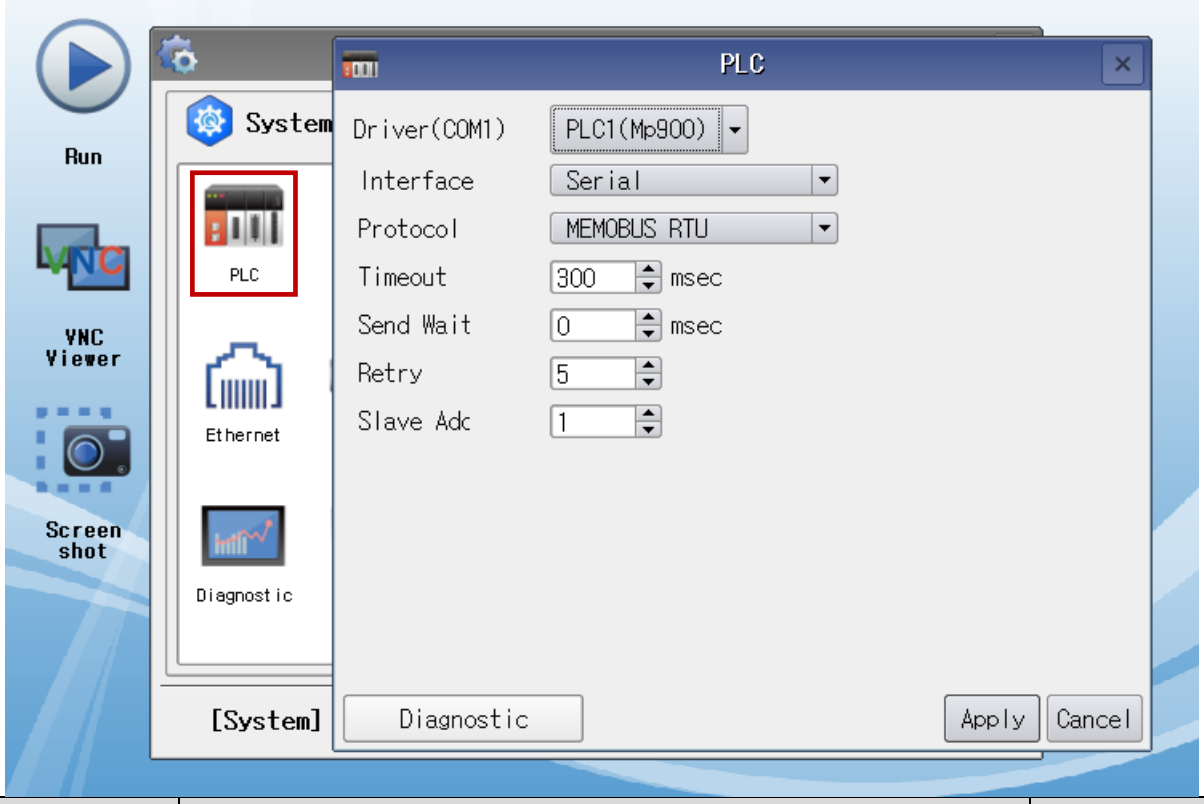
Items	TOP			External device	Remarks
Signal Level (port)	RS-232C	RS-422	RS-485	RS-232C RS-422/485	
Baud Rate	19200				
Data Bit	8				
Stop Bit	1				
Parity Bit	Even				

* 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	Select “Serial”.	Refer to “2. External device selection”.
Protocol	Select the serial 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.	
Slave Address No	Enter the prefix number of an external device (Slave).	

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. External device setting

Set as below using "MP Series" Ladder Software "MPE720". For more detailed setting method than that described in this example, refer to the PLC user manual.

> – In case of setting "Automatically Reception" of "Procedure Ⅱ" to "Enable" in the setting procedure below, it is possible to connect without "Procedure Ⅲ".
>
> – The example of "Procedure Ⅲ: Ladder Program" is an example of communication setting for one port on the external device side. In case of simultaneous communication of multiple ports, a separate ladder program is required. Please contact the manufactorer for details.

■ **Operation Ⅰ** : "**PC and PLC connection method**" : set communications as follows(Operation Ⅱ, Operation Ⅲ), but before connect PC and PLC.

1. Run "Communication Manager" program.

(Path : Start → Program → "YE_Applications" → "Communication Manager")

2. Run "Logical Port Setting" to set the port type and details.

(Path : File → Setting...)

3. After PC and PLC are connected, save, and follow below operation.

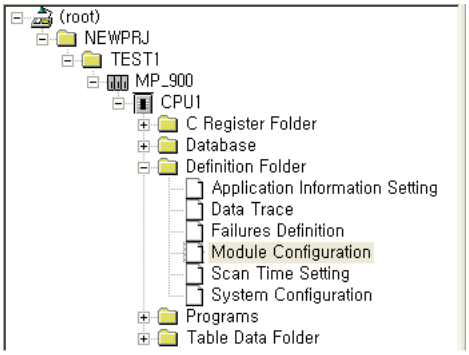
■ **Operation Ⅱ** : **"MPE720" Create Project** : (root) > [Group Folder] > [Order Folder] > [Controller Folder] Register

1. To register the device you want to use in "MPE720", follow "[Group Folder] > [Order Folder] > [Controller Folder]" path.

(Caution) In the "MPE720" left project window, Right–Click, and follow the parent path through the [New] entry.

2.Register the Controller Type for the device you wish to use in the Controller Configuration window, which appears when registering a new [Controller Folder]

3. Double-click the newly registered [Controller Folder] to bring up the [Log on to the controller] window and enter "User Name" and "Password" to form project folders as shown on the left.

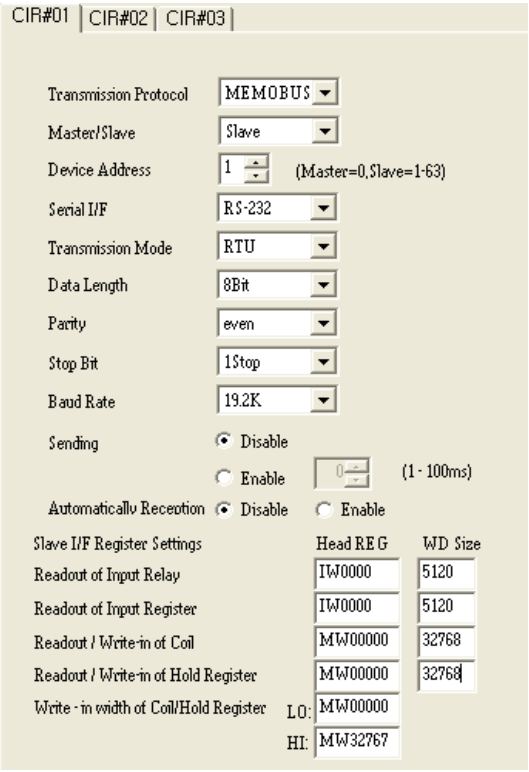


■ **Operation Ⅲ** : "**Communication Setting**" : [Engineering Manager] – [Module Configuration] window

4. Double-click [Definition Folder] – [Module Configuration] to display the [Engineering Manager] – [Module Configuration] window.

5. Register the [Module Type] of the corresponding [Rack] – [Slot] position in the [Module Configuration] window.

6. Double-click the corresponding [Slot] area to display the setting window. Matters to be set are as follows.



Items	Settings	Remarks
Transmission Protocol	MEMOBUS	Fixed
Master/Slave	Slave	Fixed
Device Address	1	Set Users
Serial I/F	RS-232	User setting *Note 1)
Transmission Mode	RTU	User setting *Note 2)
Data Length	8Bit	Set Users
Parity	even	Set Users
Stop Bit	1Stop	Set Users
Baud Rate	19.2K	Set Users
Sending	Disable	Set Users
Automatically Reception	Disable	User setting *Note 3)
Slave I/F Register Settings	——	Set Users

***Note 1)** Select the communication method of the external device (RS-232C/RS-422/RS-485).

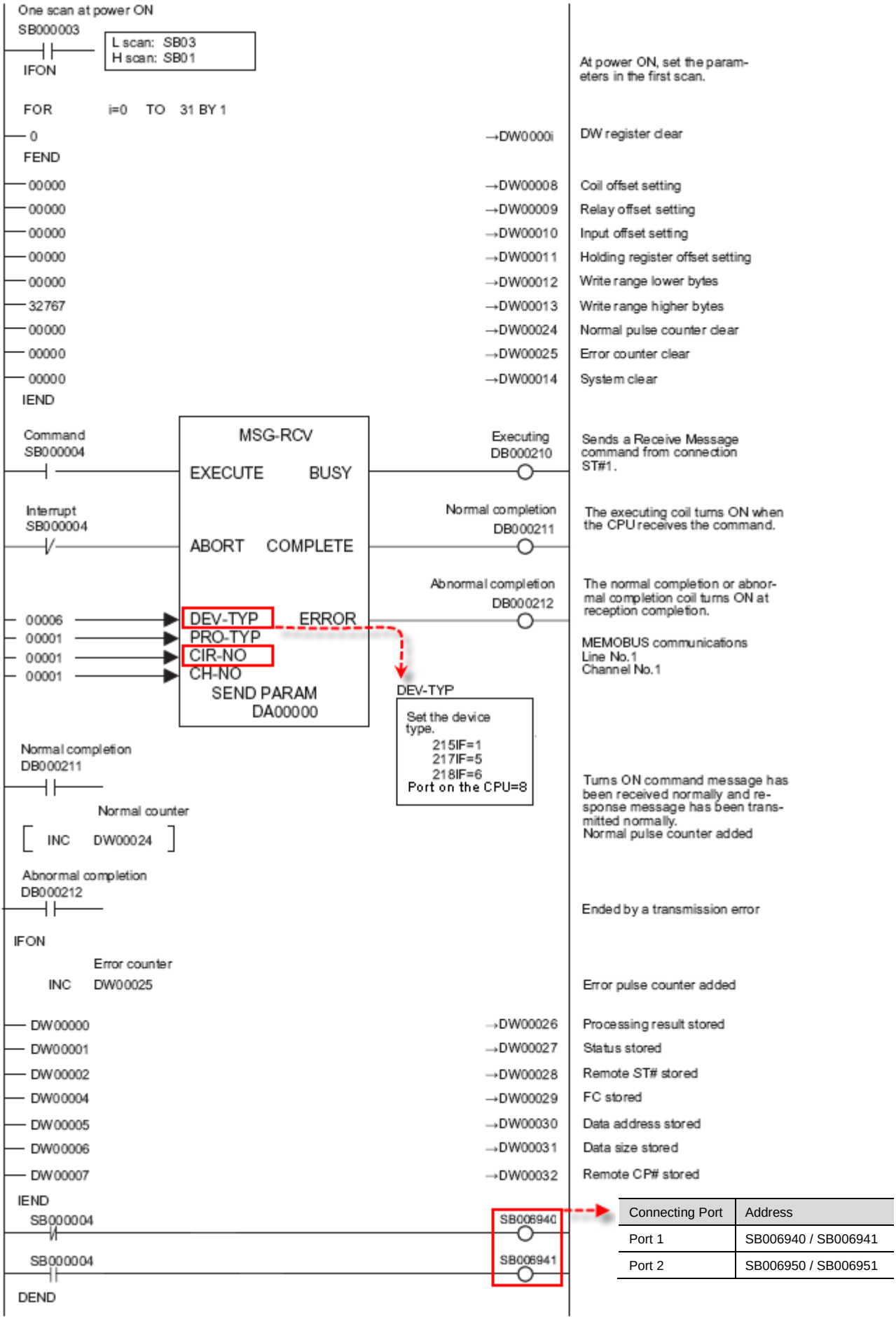
***Note 2)** Select the communication mode (ASCII/RTU) you want to use.

***Note 3)** When setting Disable, you must register a separate Ladder Software.

If enabled, a separate Ladder Software is not required. However, the communication speed may be slow.

■ Operation IV : Ladder Program : MSG-RCV function

7. Register the [MSG–RCV] function ([Instruction Pallete] menu – [System] tab) on the [Ladder Works] Software. Refer to the example below. For more detailed setting method, refer to the Ladder Software manual.



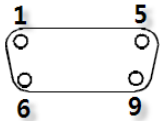
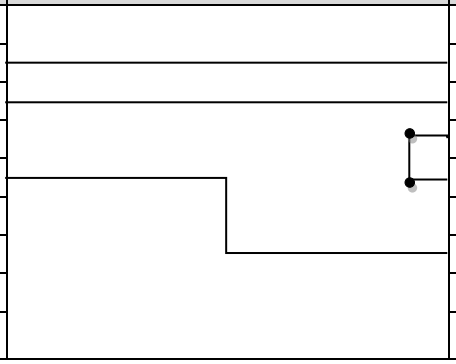
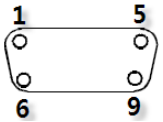
Connecting Port	Address
Port 1	SB006940 / SB006941
Port 2	SB006950 / SB006951

5. Cable table

This chapter introduces a cable diagram for normal communication between the TOP and the corresponding device.
(The cable diagram described in this chapter may differ from the recommendations of "YASKAWA Electric Corporation".)

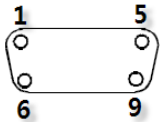
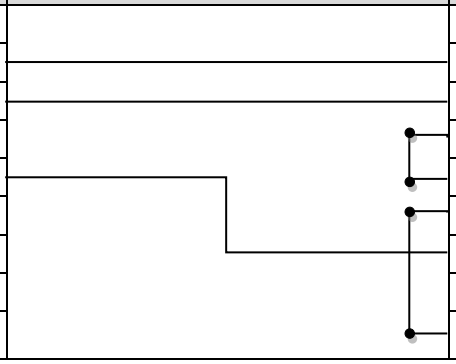
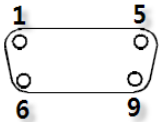
5.1. Cable table 1

■ RS-232C [MP920/930 CPU embedded PORT1, PORT2] (1 : 1 connection)

COM			Cable connection	External device		
Pin arrangement*Note 1)	Signal name	Pin number		Pin number	Signal name	Pin arrangement*Note 1)
 Based on communication cable connector front, D-SUB 9 Pin male (male, convex)	CD	1		1	FG	 Based on communication cable connector front, D-SUB 9 Pin male (male, convex)
	RD	2		2	SD	
	SD	3		3	RD	
	DTR	4		4	RS	
	SG	5		5	CS	
	DSR	6		6	N/C	
	RTS	7		7	SG	
	CTS	8		8	N/C	
		9		9	N/C	

*Note 1) The pin arrangement is as seen from the connecting side of the cable connection connector.

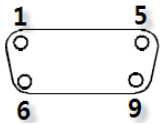
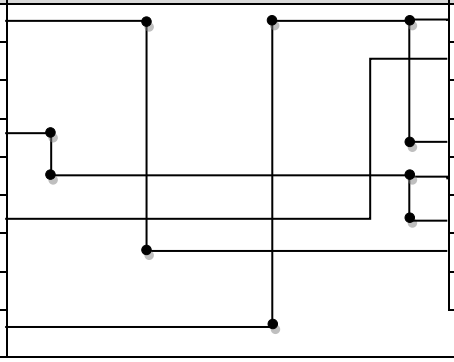
■ RS-232C [CN1, CN2 on 2171F] (1 : 1 connection)

COM			Cable connection	External device		
Pin arrangement*Note 1)	Signal name	Pin number		Pin number	Signal name	Pin arrangement*Note 1)
 Based on communication cable connector front, D-SUB 9 Pin male (male, convex)	CD	1		1	FG	 Based on communication cable connector front, D-SUB 9 Pin male (male, convex)
	RD	2		2	SD	
	SD	3		3	RD	
	DTR	4		4	RS	
	SG	5		5	CS	
	DSR	6		6	DR	
	RTS	7		7	SG	
	CTS	8		8	N/C	
		9		9	ER	

*Note 1) The pin arrangement is as seen from the connecting side of the cable connection connector.

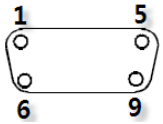
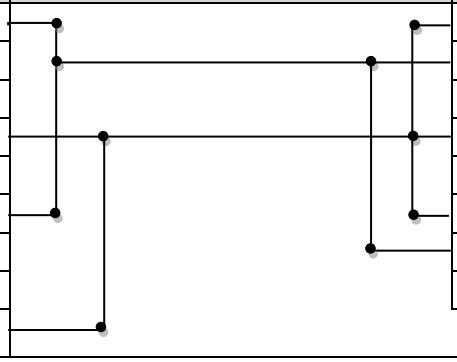
5.2. Cable table 2

■ RS-422 [CN3 on 2171F] (1 : 1 connection)

COM			Cable connection	External device		
Pin arrangement*Note 1)	Signal name	Pin number		Pin number	Signal name	Pin arrangement*Note 1)
 Based on communication cable connector front, D-SUB 9 Pin male (male, convex)	RDA	1		1	RX–	Based on communication cable connector front, MR–8 (Plug)
		2		2	RX+	
		3		3	SH	
	RDB	4		4	RXR	
		5		5	TXR	
	SDA	6		6	TX–	
		7		7	TX+	
		8		8	N/C	
	SDB	9				

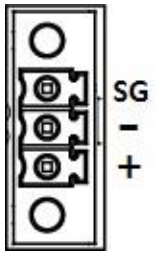
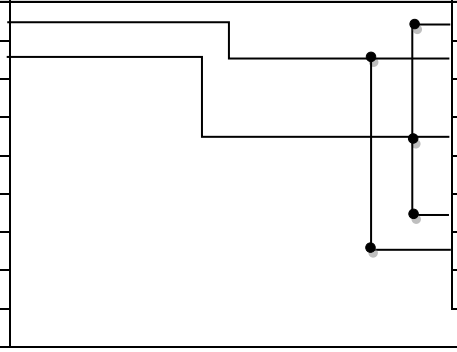
*Note 1) The pin arrangement is as seen from the connecting side of the cable connection connector.

■ RS-485 [CN3 on 2171F] (1 : 1 connection)

COM			Cable connection	External device		
Pin arrangement*Note 1)	Signal name	Pin number		Pin number	Signal name	Pin arrangement*Note 1)
 Based on communication cable connector front, D-SUB 9 Pin male (male, convex)	RDA	1		1	RX–	Based on communication cable connector front, MR–8 (Plug)
		2		2	RX+	
		3		3	SH	
	RDB	4		4	RXR	
		5		5	TXR	
	SDA	6		6	TX–	
		7		7	TX+	
		8		8	N/C	
	SDB	9				

*Note 1) The pin arrangement is as seen from the connecting side of the cable connection connector.

■ RS-485 [CN3 on 2171F] (1 : 1 connection)

COM		Cable connection	External device		
Pin arrangement	Signal name		Pin number	Signal name	Pin arrangement*Note 1)
	+		1	RX–	Based on communication cable connector front, MR–8 (Plug)
	-		2	RX+	
	SG		3	SH	
			4	RXR	
			5	TXR	
			6	TX–	
			7	TX+	
			8	N/C	

*Note 1) The pin arrangement is as seen from the connecting side of the cable connection connector.

■ **RS-422** 1 : N connection - Refer to 1:1 connection to connect in the following method.

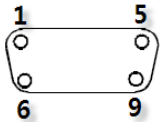
TOP	Cable connection and signal direction	External device	Cable connection and signal direction	External device
Signal name		Signal name		Signal name
RDA		SDA		SDA
RDB		SDB		SDB
SDA		RDA		RDA
SDB		RDB		RDB
SG		SG		SG

■ **RS-485** 1 : N connection - Refer to 1:1 connection to connect in the following method.

TOP	Cable connection and signal direction	External device	Cable connection and signal direction	External device
Signal name		Signal name		Signal name
RDA		SDA		SDA
RDB		SDB		SDB
SDA		RDA		RDA
SDB		RDB		RDB
SG		SG		SG

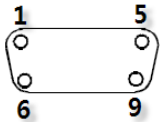
5.3 Cable table 3

■ RS-232C [MP940 CPU embedded PORT1] (1 : 1 connection)

COM			Cable connection	External device		
Pin arrangement*Note 1)	Signal name	Pin number		Pin number	Signal name	Pin arrangement*Note 1)
 Based on communication cable connector front, D-SUB 9 Pin male (male, convex)	CD	1		1	TXD	Based on communication cable connector front, MR–8 (Plug)
	RD	2		3	RXD	
	SD	3		6	CTS	
	DTR	4		12	RTS	
	SG	5		14	GND	
	DSR	6				
	RTS	7				
	CTS	8				
		9				

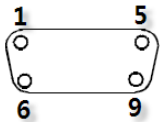
*Note 1) The pin arrangement is as seen from the connecting side of the cable connection connector.

■ RS-422 [MP940 CPU embedded PORT2] (1 : 1 connection)

COM			Cable connection	External device		
Pin arrangement*Note 1)	Signal name	Pin number		Pin number	Signal name	Pin arrangement*Note 1)
 Based on communication cable connector front, D-SUB 9 Pin male (male, convex)	RDA	1		1	TX+	Based on communication cable connector front, MR–14 (Plug)
		2		2	TX–	
		3		3	RX+	
	RDB	4		4	RX–	
		5		7	RXR	
	SDA	6		11	TXR	
		7		14	GND	
		8				
	SDB	9				

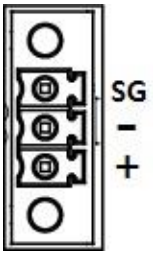
*Note 1) The pin arrangement is as seen from the connecting side of the cable connection connector.

■ RS-485 [MP940 CPU embedded PORT2] (1 : 1 connection)

COM			Cable connection	External device		
Pin arrangement*Note 1)	Signal name	Pin number		Pin number	Signal name	Pin arrangement*Note 1)
 Based on communication cable connector front, D-SUB 9 Pin male (male, convex)	RDA	1		1	TX+	Based on communication cable connector front, MR–14 (Plug)
		2		2	TX–	
		3		3	RX+	
	RDB	4		4	RX–	
		5		6	RX–	
	SDA	6		8	TX+	
		7		9	TX–	
		8		10	RX+	
	SDB	9		14	GND	

*Note 1) The pin arrangement is as seen from the connecting side of the cable connection connector.

■ RS-485 [MP940 CPU embedded PORT2] (1 : 1 connection)

COM		Cable connection	External device		
Pin arrangement	Signal name		Pin number	Signal name	Pin arrangement*Note 1)
	+		1	TX+	Based on communication cable connector front, MR–8 (Plug)
	-		2	TX–	
	SG		3	RX+	
			4	RX–	
			6	RX–	
			8	TX+	
			9	TX–	
			10	RX+	
			14	GND	

*Note 1) The pin arrangement is as seen from the connecting side of the cable connection connector.

■ RS-422 1 : N connection - Refer to 1:1 connection to connect in the following method.

TOP	Cable connection and signal direction	External device	Cable connection and signal direction	External device
Signal name		Signal name		Signal name
RDA		SDA		SDA
RDB		SDB		SDB
SDA		RDA		RDA
SDB		RDB		RDB
SG		SG		SG

■ RS-485 1 : N connection - Refer to 1:1 connection to connect in the following method.

TOP	Cable connection and signal direction	External device		Cable connection and signal direction	External device	
Signal name		Signal name			Signal name	
RDA		1	TX+		1	TX+
RDB		2	TX–		2	TX–
SDA		6	RX–		6	RX–
SDB		10	RX+		10	RX+
SG		14	GND		14	GND

(**Caution**) For 1:N connection, short the pin arrangement of (1) and (2) items out of 14 pins for terminating devices. (1) 4–7–9 (2) 3–8

6. 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.

Device		Bit Address	Word Address	32bit	Remarks
MB	Coil	MB000000 ~ MB65535F	MB00000 ~ MB65535	L/H	
IB	Discrete Input	IB00000 ~ IBFFFFF	IB0000 ~ IBFFFF		*Note 1)
IW	Input register	-	IW0000 ~ IWFFFF		*Note 1)
MW	Holding Register	-	MW00000 ~ MW65535		

*Note 1) Cannot be written