EtherNet/IP Communication Converter

COM-ML [For SRZ] Quick Instruction Manual

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IMR02E06-E2

Thank you for purchasing this RKC product. In order to achieve maximum performance and ensure proper operation of your new instrument, carefully read all the instructions in this manual. Please place this manual in a convenient location for easy reference.
This manual describes the basic operation method of the COM-ML. For the installation, the communication data, the detail handling procedures and various function settings, please read if necessary the following separate manuals.

- COM-ML [For SRZ] Installation Manual (IMR02E05-E□): Enclosed with COM-ML
- COM-ML [For SRZ] Communication Data List (IMR02E07-E□): Enclosed with COM-ML
- COM-ML [For SRZ] Instruction Manual (IMR02E08-E□): Separate (Download or sold separately)

The above manuals can be downloaded from our website:
URL: http://www.rkcinst.com/english/manual_load.htm

1. PROCEDURE FOR USING THE COM-ML

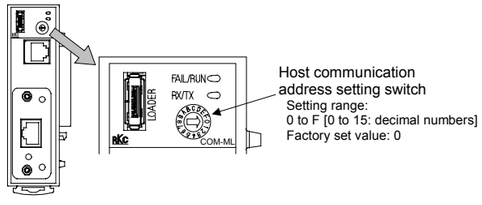
- **Host communication settings** → See **2. HOST COMMUNICATION SETTINGS**
- **Installation and wiring** → See **COM-ML [For SRZ] Installation Manual (IMR02E05-E□)**; For information on the SRZ, see **Z-TIO Instruction Manual (IMS01T01-E□)** and **Z-DIO Instruction Manual (IMS01T03-E□)**.
- **Controller (SRZ) settings** → See **4.2 Controller Settings**; See **Z-TIO Host Communication Quick Instruction Manual (IMS01T02-E□)** and **Z-DIO Instruction Manual (IMS01T03-E□)**
- **IP address settings** → See **3.1 IP Address Settings**
- **EtherNet/IP communication settings** → See **3.2 EtherNet/IP Communication Settings**; See **4.4 Tool Settings**
- **Other communication data settings** → See **3.3 Other Communication Data Settings**; See **COM-ML [For SRZ] Communication Data List (IMR02E07- E□)** and **COM-ML [For SRZ] Instruction Manual (IMR02E08- E□)**
- **EtherNet/IP communication** → See **4.5 I/O Communication**; See **4.6 Explicit Message Communication**

2. HOST COMMUNICATION SETTINGS

2.1 Address Settings

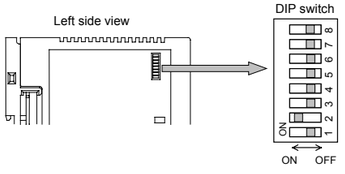
Set the address for host communication. Use a small flat-blade screwdriver to configure the setting.

Set the address such that it is different to the other addresses on the same line. Otherwise, problems or malfunction may result.



2.2 DIP Switch Settings

Use the DIP switch to set the speed and protocol of host communication, default IP address setting, and DIP switch enable/disable.



1	2	Host communication speed
OFF	OFF	4800 bps
ON	OFF	9600 bps
OFF	ON	19200 bps
ON	ON	38400 bps

← Factory set value: 19200 bps

3	Communication protocol/Data bit configuration
OFF	RKC communication (Data 8-bit, without parity, Stop 1-bit)
ON	Modbus (Data 8-bit, without parity, Stop 1-bit)

← Factory set value: RKC communication

6	7	Default IP address setting
OFF	OFF	Do not execute the default IP address setting
ON	OFF	**Do not set this one**
OFF	ON	**Do not set this one**
ON	ON	Execute the default IP address setting *

← Factory set value: Do not execute the default IP address setting

* See ■ **Default IP address setting** (follows).

8	DIP switch enable/disable
OFF	Enable (enable the DIP switch settings)
ON	Disable (enable the host communication or loader communication settings)*

← Factory set value: Enabled

* The only host communication or loader communication settings that are enabled are the host communication speed and protocol and the data bit configuration.

4	5	
OFF	OFF	Fixed

When the communication protocol is set with the DIP switch, the data bit configuration is automatically set to "data 8-bit, without parity, stop 1-bit." To change to another data bit configuration, set the configuration in host communication or loader communication.

If you wish to set the data bit configuration, host communication speed, and communication protocol in host communication or loader communication, first set DIP switch No. 8 to ON.

3. INITIAL COMMUNICATION DATA SETTINGS

Configure the initial communication data settings.

3.1 IP Address Settings

Set the IP address of the COM-ML.
The IP address can be set in host communication or loader communication.
Refer to the following RKC communication identifiers and Modbus register addresses to set the IP address.

Name	RKC identifier	Modbus register address HEX	Modbus register address DEC	Data range	Factory set value
First-byte of IP address	QB	801B	32795	0 to 255	192
Second-byte of IP address	QC	801C	32796	0 to 255	168
Third-byte of IP address	QD	801D	32797	0 to 255	1
Fourth-byte of IP address	QE	801E	32798	0 to 255	1

(Factory set value for COM-ML IP address: 192.168.1.1)

For the IP address, check with the administrator of the network (LAN) to which the COM-ML is connected.

For information on connecting the COM-ML to a host computer, see **COM-ML [For SRZ] Installation Manual (IMR02E05-E□)**.

■ Default IP address setting

The IP address can be set to the factory set value using the DIP switches.

1. Turn off the power of COM-ML.
2. Turn on No. 6 and No. 7 of DIP switch.
3. Turn on the power of COM-ML.
4. The FAIL/RUN lamp will flash green for about 5 seconds and then light solidly.
   At this point, the IP address changes to the factory set value "192.168.1.1" and the DHCP selection will change to "0: DHCP is invalid."

   For DHCP selection, see **COM-ML [For SRZ] Instrucation Manual (IMR02E08-E□)**.
5. Turn off the power of the COM-ML once again and return DIP switches No. 6 and No. 7 to OFF.

   If DIP switches No. 6 and No. 7 are left ON, the set IP address will revert to the factory set value every time the power is turned on.
6. Turn the power of the COM-ML back on. This completes the procedure.

3.2 EtherNet/IP Communication Settings

Configure settings necessary for EtherNet/IP communication.
In addition to host communication and loader communication, the settings can be used to enable EtherNet/IP explicit message communication.
Items configured are "Communication data items setting," "Number of measured data items (IN)," and "Number of setting data items (OUT)."

Name	RKC identifier	Modbus register address HEX	Modbus register address DEC	Data range (data size indicated in brackets [ ])	Factory set value
Communication data items setting	QG	8020 ⋮ 8051	32800 ⋮ 32849	RKC communication: 0 to 65535 Modbus: 0000H to FFFFH [50]	65535 (FFFFH)
Number of measured data items (IN)	QH	8052 ⋮ 8083	32850 ⋮ 32899	0 to 128 0: Not used [50]	0
Number of setting data items (OUT)	QI	8084 ⋮ 80B5	32900 ⋮ 32949	0 to 127 0: Not used [50]	0

EtherNet/IP communication methods supported by the COM-ML are "I/O Communication" and "Explicit Message Communication."

For information on explicit message communication, see **4.4 Tool Settings** and **4.6 Explicit Message Communication**.

■ Communication data items setting

Set the object model "Controller communication data item setting object (0xC5: C5Hex)" (hereafter called "0xC5").

- 0xC5 attributes 100 to 149 (50 items) correspond to CH1 to CH50 of identifier QG of RKC communication, and to Modbus register addresses 8020H to 8051H.
- In each item, set the Modbus register address (first address only) of all communication items used in EtherNet/IP communication (I/O communication and explicit message communication).
- Set items used in I/O communication (these can also be used in explicit message communication) in attributes 100 and following without any intervals, and then set items that are only used in explicit message communication.
- The data order in I/O communication is the same as the 0xC5 attribute order. Set the number of data used in each item in 0xC6 and 0xC7.
- Set 65535 (FFFFH) in unused items. Communication items following attributes set to 65535 (FFFFH) are not used in I/O communication.

For object models and register addresses of communication items, see **COM-ML [For SRZ] Communication Data List (IMR02E07-E□)** and **COM-ML [For SRZ] Instruction Manual (IMR02E08-E□)**.

■ Number of measured data items (IN)

Set the object model "Controller communication measurement item setting object (0xC6: C6Hex)" (hereafter called "0xC6").

- In the attribute numbers of 0xC6 that are the same as the attribute numbers of the communication items used in the measurement items (IN) of I/O communication (in the communication items set in 0xC5), set the data size used.
- 0xC6 attributes 100 to 149 (50 items) correspond to CH1 to CH50 of identifier QH of RKC communication and to Modbus register addresses 8052H to 8083H.
- Data up to a total of the set values in the attributes of 0xC6 (cumulative total from attribute 100) of 128 (0080H) are valid.

For object models, see **COM-ML [For SRZ] Communication Data List (IMR02E07- E□)** and **COM-ML [For SRZ] Instruction Manual (IMR02E08- E□)**.

■ Number of setting data items (OUT)

Set the object model "Controller communication setting item (OUT) setting object (0xC7: C7Hex)" (hereafter called "0xC7").

- In the attribute numbers of 0xC7 that are the same as the attribute numbers of the communication items used in the setting items (OUT) of I/O communication (in the communication items set in 0xC5), set the data size used.
- 0xC7 attributes 100 to 149 (50 items) correspond to CH1 to CH50 of identifier QI of RKC communication and to Modbus register addresses 8084H to 80B5H.
- Data up to a total of the set values in the attributes of 0xC7 (cumulative total from attribute 100) of 127 (007FH) are valid.

For object models, see **COM-ML [For SRZ] Communication Data List (IMR02E07- E□)** and **COM-ML [For SRZ] Instruction Manual (IMR02E08- E□)**.

[Setting example]
Using CH1 to CH4 of the measured value (PV) and set value (SV) of the Z-TIO module in I/O communication
Setting condition: Measured data items (IN): Measured value (PV), Set value (SV)
Setting data items (OUT): Set value (SV)
Assigned destination of communication item:
Measured value (PV): Attribute 100
Set value (SV): Attribute 101

RKC communication
- Communication item assignment (0xC5 setting)
  Measured value (PV): Setting position: CH1 of identifier QG
  Set value: 508 [First Modbus register address (DEC)]
  Set value (SV): Setting position: CH2 of identifier QG
  Set value: 2780 [First Modbus register address (DEC)]
- Number of measured data items (IN) (0xC6 setting)
  Measured value (PV): Setting position: CH1 of identifier QH
  Set value: 4 [For 4 channels]
  Set value (SV): Setting position: CH2 of identifier QH
  Set value: 4 [For 4 channels]
- Number of setting data items (OUT) (0xC7 setting)
  Measured value (PV): Setting position: CH1 of identifier QI
  Set value: 0 [Not used]
  Set value (SV): Setting position: CH2 of identifier QI
  Set value: 4 [For 4 channels]

Modbus
- Communication item assignment (0xC5 setting)
  Measured value (PV): Setting position: 8020H
  Set value: 01FCH [First Modbus register address (HEX)]
  Set value (SV): Setting position: 8021H
  Set value: 0ADCH [First Modbus register address (HEX)]
- Number of measured data items (IN) (0xC6 setting)
  Measured value (PV): Setting position: 8052H
  Set value: 0004H [For 4 channels]
  Set value (SV): Setting position: 8053H
  Set value: 0004H [For 4 channels]
- Number of setting data items (OUT) (0xC7 setting)
  Measured value (PV): Setting position: 8084H
  Set value: 0000H [Not used]
  Set value (SV): Setting position: 8085H
  Set value: 0004H [For 4 channels]

Set the data of CH1 to CH4 of the set value (SV) in the registers of each (RKC communication: CH1 to CH4 of identifier S1; Modbus: 0ADCH to 0ACFH). The data of the communication item set in each attribute of 0xC5 is also assigned to the same attribute of the "controller object" (0x64: 64Hex).

I/O communication does the sending and receiving of the data with Assembly object (0x04: 04Hex). Measured data items (IN) uses attribute 3 of instance 100, and setting data items (OUT) uses attribute 3 of instance 101. The tool is used in verification and setting of measured data items (IN) and setting data items (OUT).

- For the I/O communication that used a tool, see **4.4 Tool Settings** and **4.5 I/O Communication**.
- For the method of accessing 0x64, see **4.6 Explicit Message Communication**.

3.3 Other Communication Data Settings

Set communication data other than the items set in Section **3.2** (PID constants of the Z-TIO and Z-DIO modules, event set values, etc.) using host communication, loader communication, or explicit message communication of EtherNet/IP communication.

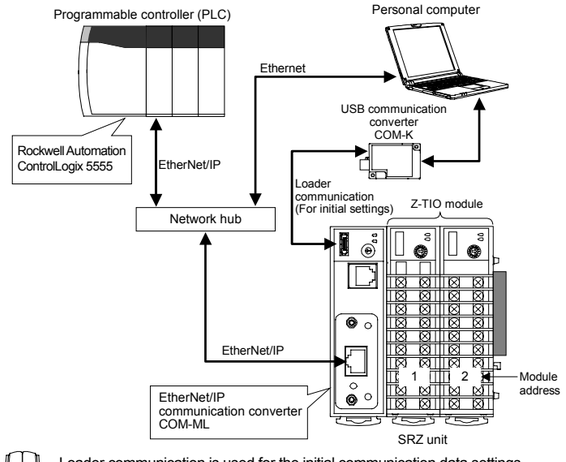
Host communication or loader communication is used to configure the IP address setting, and thus it is possible to continue configuring EtherNet/IP communication settings or other communication data settings after the IP address setting.

For each of the communication setting items, see **COM-ML [For SRZ] Communication Data List (IMR02E07-E□)** and **COM-ML [For SRZ] Instruction Manual (IMR02E08-E□)**.

4. USAGE EXAMPLE

The example given in this section is based on the system configuration below.

4.1 System Configuration



Loader communication is used for the initial communication data settings.

(Continued on the next page ➔)

■ Devices used

- EtherNet/IP communication converter: COM-ML: 1 unit
- Controller (SRZ): Z-TIO module: 2 units (4-channel type)
- Rockwell Automation PLC: ControlLogix 5555
  - Controller (CPU): 1756-L55
  - Power module: 1756-PA72/C
  - EtherNet/IP module: 1756-ENBT
  - Chassis: 1756-A4
- USB communication converter: COM-K (for loader communication)
- Network hub
- Various cables
- Personal computer
  RSLogix 5000 and RSLinx Classic Lite (RSLinx Classic is also acceptable) programming software (Rockwell Software) must be installed.

4.2 Controller Settings

The COM-ML and controllers (Z-TIO modules) are connected by internal communication, and settings for the Z-TIO modules such as communication speed, protocol, and data bit configuration are not necessary. The only setting that is configured for the controllers is the module address. The same is true when a Z-DIO module is used.

Module address: Z-TIO modules: 1, 2

In this example the initial settings for COM-ML communication data are configured using loader communication, and thus COM-ML host communication settings are not necessary

For the procedure for configuring settings, see **Z-TIO Host Communication Quick Instruction Manual (IMS01T02-E□)** and **Z-DIO Instruction Manual (IMS01T03-E□)**.

4.3 Initial Communication Data Settings

Use loader communication to configure the initial communication data settings.

[Set values]

IP address of COM-ML: 192.168.1.3

EtherNet/IP communication settings:

Measured data items (IN):	Measured value (PV)	[4 channels × 2 = 8 channels]
	Set value (SV)	[4 channels × 2 = 8 channels]
Setting data items (OUT):	Set value (SV)	[4 channels × 2 = 8 channels]
Assigned destination of communication item:		
	Measured value (PV):	Attribute 100
	Set value (SV):	Attribute 101
Other communication data:	Set other required items.	

For the setting procedures, see **3. Initial Communication Data Settings**. For information on each communication item, see **COM-ML [For SRZ] Communication Data List (IMR02E07-E□)** and **COM-ML [For SRZ] Instruction Manual (IMR02E08-E□)**.

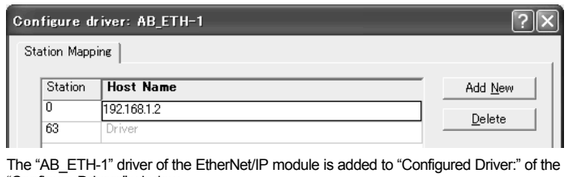
4.4 Tool Settings

The procedure for using RSLogix 5000 and RSLinx Classic Lite (or RSLinx Classic) programming software is shown below.

■ EtherNet/IP module driver settings

1. Start RSLinx Classic Lite.
2. Select “Configure Drivers” from “Communications” in the menu bar.
3. Select “Ethernet devices” in “Available Driver Types:” in the “Configure Drivers” window.

4. Click the Add New button to display “Add New RSLinx Classic Driver.”
   The driver name can be entered here; however, the displayed name “AB_ETH-1” will be used, so simply click OK.
5. In “Station Mapping” in the “Configure drivers: AB_ETH-1” window, enter the IP address of the EtherNet/IP module and click OK. In this example, the IP address of the EtherNet/IP module is set to “192.168.1.2.”

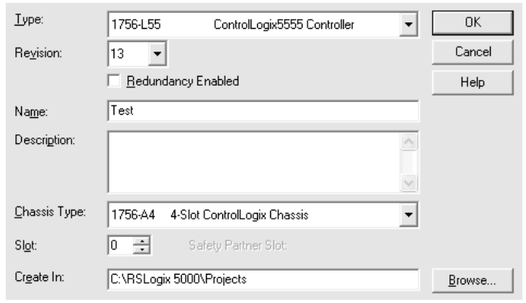


6. The “AB_ETH-1” driver of the EtherNet/IP module is added to “Configured Driver:” of the “Configure Drivers” window.

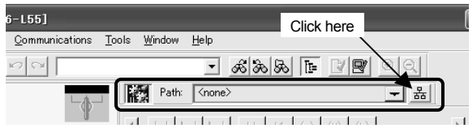
■ Creating a new project

1. Start the RSLogix 5000 programming software.
2. Select “New” from the “File” in the menu bar to open the “New Controller” window and create a new project.
3. Configure the following settings in “New Controller.”

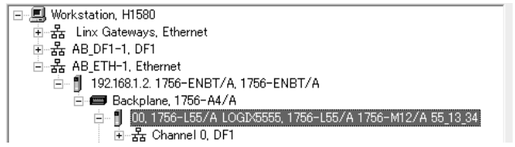
Type:	1756-L55	(CPU module type)
Revision:	13	(CPU module version)
Name:	Test	(Project name)
Chassis Type:	1756-A4	(Chassis type)
Slot:	0	(Chassis slot number where CPU module is inserted)



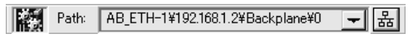
4. Click OK to store the project settings.
5. Set the path of the CPU module in the test project window. Click “Path” at the upper right of the screen to display the “Who Active” window.



6. Select CPU module “1756-L55” and click the Set Project Path button.

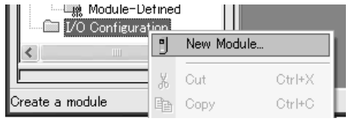


7. Click the Close button to store the path that is selected in Path on the test project screen.

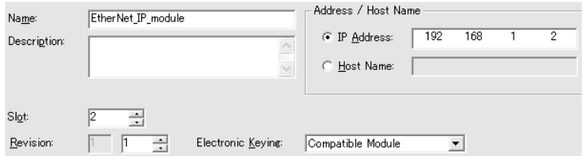


■ EtherNet/IP module settings

1. Select “I/O Configuration” from the tree on the left side of the test project screen and right-click “New Module.”



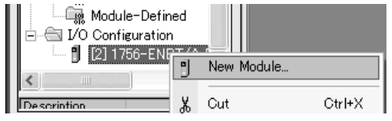
2. The “Select Module Type” window will open. Select EtherNet/IP module “1756-ENBT” and click OK.
3. The “Select Major Revision” window will open. Enter the current version number (Major Revision) of the EnterNet/IP module and click OK.
4. The “Module Properties” window will open. Set the name of the EtherNet/IP module, the IP address, the chassis slot number, and the version number (2nd digit).
   In this example, the name is set to “EtherNet_IP_module,” the IP address to “192.168.1.2,” the slot to “2,” and the revision to “1.”



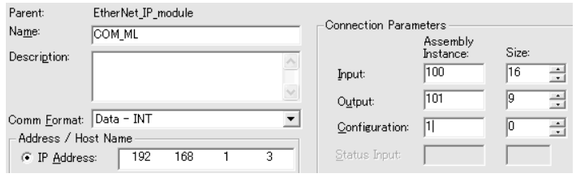
5. Click the Finish button to store the EtherNet/IP module settings.

■ COM-ML settings

1. Right-click “1756-ENBT/A” under “I/O Configuration” in the tree at the left side of the test project screen and select “New Module.”



2. The “Select Module Type” window will open. Select “ETHERNET-MODULE” and click OK.
3. The “Module Properties” window will open. Set the name of the ETHERNET-MODULE, the data format, and the IP address.
   In this example, “COM_ML” is set for the name, “Data-INT” is set for the data format (Comm Format), and “192.168. 1.3” is set for the IP address.
4. Configure the I/O communication settings (Connection Parameters).
   Set the assembly object instance numbers and the total data sizes of measured data items (IN) and setting data items (OUT) in Assembly Instance and Size of Input and Output.
   Input: Assembly Instance: 100, Size: 16
   [Measured value (PV): 8 channels + Set value (SV): 8 channels = 16]
   Output: Assembly Instance: 101, Size: 9
   [Setting state change (1 word)* + Set value (SV): 8 channels = 9]
   *Always assigned to setting data item (OUT).



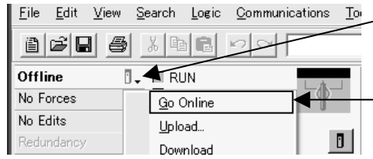
5. Click the Next button to display the next page.
   Set the “Requested Packet Interval (RPI),” which is the interval between message responses in I/O communication.
   In this example, Requested Packet Interval (RPI) is set to 100.0 ms.

6. Click the Finish button to store the COM-ML settings.

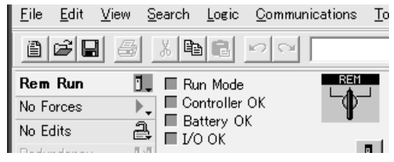
4.5 I/O Communication

The settings for I/O communication were completed in Section **4.4**, and thus I/O communication can now be executed and data verified as shown below.

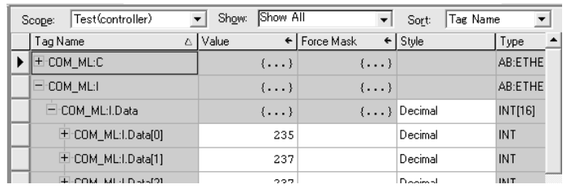
1. Click “Off line” at the upper left of the test project screen and select “Go Online” in the sub-menu.



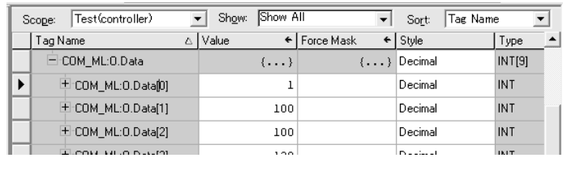
2. The “Connect To Go Online” window will open. Click the Download button. A confirmation window will appear. Click the Download button again.
3. “Off line” at the upper left of the test project screen will change to “Rem Run,” and I/O communication will be executed. The display to the right of “Rem Run” will change to Run Mode, Controller OK, Battery OK, and I/O OK.



4. Select “Controller Tags” under “Controller Test” in the tree at the left side of the test project screen.
5. “COM_ML: I” in Monitor Tags at the right side of the screen shows the measured value (IN) data.
   Values of COM_ML: I. Data [0] to [7]: Data of measured data value (PV) channels 1 to 8.
   Values of COM_ML: I. Data [8] to [15]: Data of set value (SV) channels 1 to 8.



6. “COM_ML: O” in Monitor Tags at the right side of the screen shows the set value (OUT) data. The Value cell of any data can be clicked to change the set value.
   Value of COM_ML: O. Data [0]: Setting state change data
   Values of COM_ML: O. Data [1] to [8]: Data of set value (SV) channels 1 to 8.

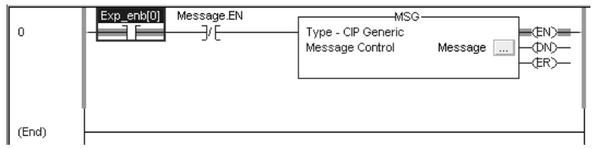


4.6 Explicit Message Communication

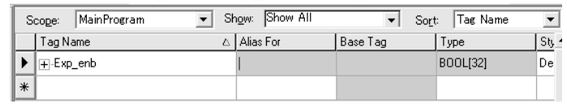
An example of using explicit message communication to set the value of set value (SV) channel 2 to “200” is shown below.

■ Creating a ladder program

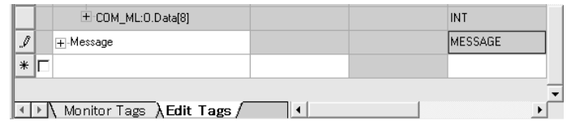
To send an explicit message, create a program similar to the program below.



1. Register the “Exp_enb” relay (contact a), which is the trigger for explicit message transmission, ahead of time in “Tasks” → “Main Task” → “Main Program” → “Program Tags” in the tree at the left side of the test project screen.
   In this example, the Tag Name is “Exp_enb” and the Type is “BOOL.”



2. Store “Message” in Edit Tags of “Controller Test” → “Controller Tags” in the tree at the left side of the test project screen.
   In this example, “Message” is entered for the Tag Name under “COM_ML: O” of I/O communication, and “MESSAGE” is selected for the Type.



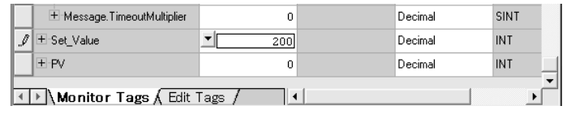
3. Create the program in the screen that appears when “Tasks” → “Main Task” → “Main Program” → “Main Routine” is selected in the tree on the left side of the test project screen.
4. Edit the commands in the screen using the icons.
   After assigning MSG, click [...] in the MSG frame to set the message configuration.
   In this example, the message configuration is set as follows:

Message Type:	CIP Generic	Attribute:	65 Hex
Service Type:	Set_Attribute_Single	Source Element:	Set_Value
Class:	64 Hex	Source Length:	2
Instance:	2		

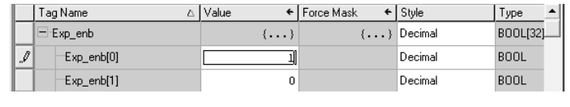
5. Click the New Tag button in the same screen to store the Set_Value of Source Element. In the “New Tag” window, specify “Set_Value” for the name and select “INT” for the Data Type.
6. Set the path in the Communication tag of the Message Confirmation window. Click the Browse button and select “ETHERNET-MODULE COM_ML” in the Message Path Browser window.
7. After the “Exp_enb” relay, connect the message output EN using contact b. This completes the program.

■ Running the program

1. Follow steps ***1*** and ***2*** of Section **4.5** to download the ladder program that was created.
2. In Monitor Tags of “Controller Test” → “Controller Tags” in the tree at the left side of the test project screen, set the value of “Set_Value” to “200.”



3. Set the value of “Exp_enb [0]” to “1” in “Tasks” → “Main Task” → “Main Program” → “Program Tags” in the tree at the left side of the test project screen. Explicit message communication will be executed, and the value of set value (SV) channel 2 will be “200.”



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