

Mitsubishi Industrial Robot

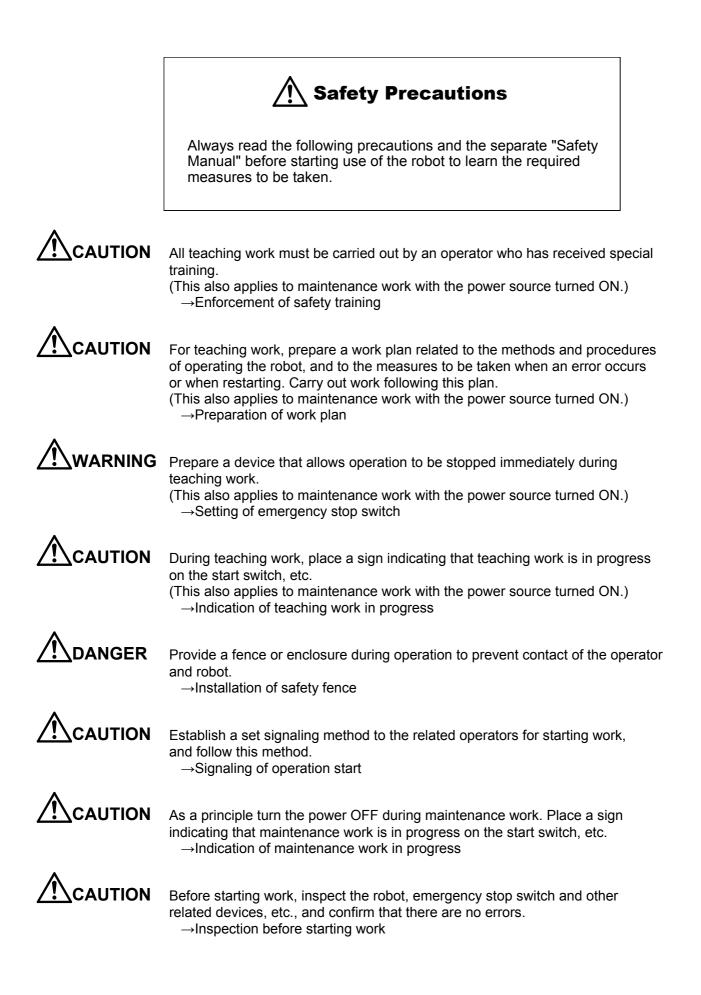
CR750-D/CR751-D series controller CRnD-700 series controller

Network Base Card

Instruction Manual

2D-TZ535





The points of the precautions given in the separate "Safety Manual" are given below. Refer to the actual "Safety Manual" for details.



When automatic operation of the robot is performed using multiple control devices (GOT, programmable controller, push-button switch), the interlocking of operation rights of the devices, etc. must be designed by the customer.



N Use the robot within the environment given in the specifications. Failure to do so could lead to faults or a drop of reliability. (Temperature, humidity, atmosphere, noise environment, etc.)



Transport the robot with the designated transportation posture. Transporting the robot in a non-designated posture could lead to personal injuries or faults from dropping.



Always use the robot installed on a secure table. Use in an instable posture could lead to positional deviation and vibration.



Wire the cable as far away from noise sources as possible. If placed near a noise source, positional deviation or malfunction could occur.



Do not apply excessive force on the connector or excessively bend the cable. Failure to observe this could lead to contact defects or wire breakage.

AUTION

Make sure that the workpiece weight, including the hand, does not exceed the rated load or tolerable torque. Exceeding these values could lead to alarms or faults.



Securely install the hand and tool, and securely grasp the workpiece. Failure to observe this could lead to personal injuries or damage if the object comes off or flies off during operation.



G Securely ground the robot and controller. Failure to observe this could lead to malfunctioning by noise or to electric shock accidents.



Indicate the operation state during robot operation. Failure to indicate the state could lead to operators approaching the robot or to incorrect operation.



When carrying out teaching work in the robot's movement range, always secure the priority right for the robot control. Failure to observe this could lead to personal injuries or damage if the robot is started with external commands.



Keep the jog speed as low as possible, and always watch the robot. Failure to do so could lead to interference with the workpiece or peripheral devices.



After editing the program, always confirm the operation with step operation before starting automatic operation. Failure to do so could lead to interference with peripheral devices because of programming mistakes, etc.



Make sure that if the safety fence entrance door is opened during automatic operation, the door is locked or that the robot will automatically stop. Failure to do so could lead to personal injuries.



Never carry out modifications based on personal judgments, non-designated maintenance parts. Failure to observe this could lead to faults or failures.



IG When the robot arm has to be moved by hand from an external area, do not place hands or fingers in the openings. Failure to observe this could lead to hands or fingers catching depending on the posture.



Do not stop the robot or apply emergency stop by turning the robot controller's main power OFF. If the robot controller main power is turned OFF during automatic operation, the robot accuracy could be adversely affected. Also a dropped or coasted robot arm could collide with peripheral devices.



Do not turn OFF the robot controller's main power while rewriting the robot controller's internal information, such as a program and parameter. Turning OFF the robot controller's main power during automatic operation or program/parameter writing could break the internal information of the robot controller.

ANGER Do not connect the Handy GOT when using the GOT direct connection function of this product. Failure to observe this may result in property damage or bodily injury because the Handy GOT can automatically operate the robot regardless of whether the operation rights are enabled or not.

ER Do not connect the Handy GOT to a programmable controller when using an iQ Platform compatible product with the CR750-Q/CR751-Q controller. Failure to observe this may result in property damage or bodily injury because the Handy GOT can automatically operate the robot regardless of whether the operation rights are enabled or not.

Do not remove the SSCNET III cable while power is supplied to the multiple CPU system or the servo amplifier. Do not look directly at light emitted from the tip of SSCNET III connectors or SSCNET III cables of the Motion CPU or the servo amplifier. Eye discomfort may be felt if exposed to the light. (Reference: SSCNET III employs a Class 1 or equivalent light source as specified in JIS C 6802 and IEC60825-1 (domestic standards in Japan).)



Do not remove the SSCNET III cable while power is supplied to the controller. Do not look directly at light emitted from the tip of SSCNET III connectors or SSCNET III cables. Eye discomfort may be felt if exposed to the light. (Reference: SSCNET III employs a Class 1 or equivalent light source as specified in JIS C 6802 and IEC60825-1 (domestic standards in Japan).)



Attach the cap to the SSCNET III connector after disconnecting the SSCNET III cable. If the cap is not attached, dirt or dust may adhere to the connector pins, resulting in deterioration connector properties, and leading to malfunction.

Make sure there are no mistakes in the wiring. Connecting differently to the way specified in the manual can result in errors, such as the emergency stop not being released. In order to prevent errors occurring, please be sure to check that all functions (such as the teaching box emergency stop, customer emergency stop, and door switch) are working properly after the wiring setup is completed.



Use the network equipments (personal computer, USB hub, LAN hub, etc) confirmed by manufacturer. The thing unsuitable for the FA environment (related with conformity, temperature or noise) exists in the equipments connected to USB. When using network equipment, measures against the noise, such as measures against EMI and the addition of the ferrite core, may be necessary. Please fully confirm the operation by customer. Guarantee and maintenance of the equipment on the market (usual office automation equipment) cannot be performed.

Revision History

Print date	Instruction manual No.	Revision content
2011-09-20	BFP-A8872	First print
2013-08-19	BFP-A8872-A	Addition of PROFINET IO module
2014-07-25	BFP-A8872-B	Addition of amplification

Introduction

Thank you for purchasing Mitsubishi Electric industrial robot.

This instruction manual explains network base card (2D-TZ535) option.

The network base card is an option which realizes various communication interfaces when the HMS Anybus-CompactCom module is mounted on the card.

The mountable modules are listed in Chapter 2-3 for reference.

Always read this manual thoroughly and understand the contents before starting use of the network base card (2D-TZ535).

The information contained in this document has been written to be accurate as much as possible. Please interpret that items not described in this document "cannot be performed."

Note that this instruction manual has been prepared for use by operators who understand the basic operations and functions of the Mitsubishi industrial robot.

Refer to the separate "Instruction Manual, Detailed Explanation of Functions and Operations" for details on basic operations.

*Symbols in instruction manual



Precaution indicating cases where there is a risk of operator fatality or serious injury if handling is mistaken. Always observe these precautions to safely use the robot.



Precaution indicating cases where the operator could be subject to fatalities or serious injuries if handling is mistaken. Always observe these precautions to safely use the robot.



Precaution indicating cases where operator could be subject to injury or physical damage could occur if handling is mistaken. Always observe these precautions to safely use the robot.

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1. Before Use

This chapter describes items to be checked and precautions to be taken before start using the network base card (2D-TZ535).

1.1. Terminology

Table 1-1 Terminology

Term	Explanation	
ODVA	Abbreviation of Open DeviceNet Vendor Association. A non-profit organization in the United States established by development vendors to globally promote Common Industrial Protocol (CIP) technology and products incorporating this technology.	
CIP	Abbreviation of Common Industrial Protocol, a common protocol used in the OSI application layer for industrial purposes. This protocol is common for EtherNet/IP which handles information-related information, DeviceNet which handles device-related information, and CompoNet which controls sensors and actuators.	
EtherNet/IP	An industrial network standard using commercially-available Ethernet communication chips and physical media. "IP" is the abbreviation for Industrial Protocol. An open protocol is used in the application layer.	
DeviceNet	A connection method promoted by ODVA. It is used to connect control devices such as personal computers, PLCs, sensors and actuators, and to connect field devices between controllers.	
PI	Abbreviation of PROFIBUS & PROFINET International	
PROFINET	This is a communication standard for the automation that PI (PROFIBUS & PROFINET International) made. This is provided by International Standard IEC61158 and IEC61784. There are two kinds of PROFINET about PROFINET CBA and PROFINET IO.	

1.2. How to Use the Instruction Manual

This manual is organized as follows and describes functions of the 2D-TZ535 card. For information about the functions provided for standard robot controllers and how to operate them, refer to the instruction manual that comes with the robot controller.

Chapter	Title	Description
1	Before Use	Chapter 1 describes how to use this manual (Network Base Card Instruction Manual). Please read here before actually starting to use the 2D-TZ535 card.
2	Flow of Operations	Chapter 2 describes the operations required to configure a network system. Make sure to perform all of the required operations.
3	Features of Network Base Card (2D-TZ535)	Chapter 3 describes the features of the TZ535 card and for mounting the module.
4 5	2D-TZ535 Card and Ethernet/IP Module Specifications	Chapter 4 - 5 describes the specifications of the TZ535 card.
6	Items to Be Checked Before Using This Product	Before purchasing the TZ535 card, check the required devices and the version of the robot controller.
7	Hardware Settings	This product has no hardware settings.
8	Connections and Wiring	Chapter 8 describes how to connect the TZ535 card and the master station using cables.
9	Procedures for Starting Operation	Chapter 9 describes the procedures up to operating the network system with the module mounted.
10	Troubleshooting	Chapter 10 describes how to resolve problems that may occur when using the TZ535 card, such as malfunctions and errors. Please refer to this chapter as needed.
11	Appendix	Chapter 11 describes the methods of displaying the TZ535 card information with RT ToolBox2.

 Table 1-2
 Contents of the instruction manual

2. Flow of operations

The flowchart below shows the flow of operations necessary for configuring a network base card system. Use it as a reference to perform the required operations without any excess or deficiency.

2.1. Work Procedures

1	Determining the Network Specifications With an understanding of the network base card and communication interface related to the system signals using the communication mo I/O signals, specification of general-purpose I/O signals).	n module specifications, determine the
2	Checking Products Check the product you have purchased and prepare other products	
3	Mounting Module onto Network Base Card See Mount the communication module onto 2D-TZ535.	e Section 7.1 of this manual.
4	Setting Hardware and Mounting onto Robot Controller	
5	Wiring and Connections Wire the 2D-TZ535 card mounted on the robot controller to the mas	See Chapter 8 of this manual. ter station using an Ethernet cable.
6	Setting Master Station Parameters Set the IP address with the master station.	See Chapter 9 of this manual.
7	Setting Robot Controller Parameters Set the IP address on the robot controller side.	See Chapter 9 of this manual.
8	Creating Robot Programs Create a robot program, and run it with automatic operation.	See Section 9.3 of this manual.
9	Troubleshooting	See Chapter 10 of this manual.

10 Completion of Operations

3. Features of Network Base Card (2D-TZ535)

3.1. What is a Network Base Card?

The network base card is an optional card for the robot controller. By mounting a HMS's Anybus-CompactCom module on the card, various communication interfaces can be realized.

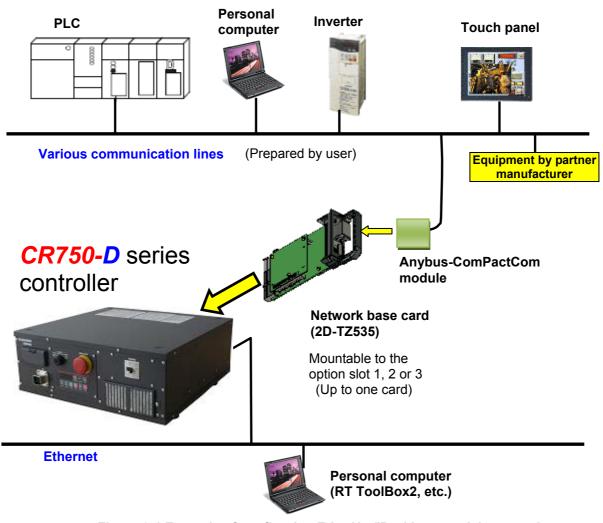


Figure 3-1 Example of configuring EtherNet/IP with network base card

3.2. Mountable Modules

The modules which can be mounted on the network base card (2D-TZ535) are shown below.

	EtherNet/IP module (AB6314)
Mountable module	PROFINET IO 2-Port module (AB6489-B)
	(*) It is different from the model described in the catalog of the HMS Co. because of the model that fixes the version of the firmware.

3.3. Features when Module is Mounted

3.3.1. Features when EtherNet/IP module is mounted



The following features are enabled when the EtherNet/IP module is mounted on the 2D-TZ535 card.

(1) Connection

Connection to EtherNet/IP network is possible.

EtherNet/IP is one of the three official network standards (DeviceNet, ControlNet, EtherNet/IP), and uses the "Common Industrial Protocol" (CIP) application layer.

Control from a field level and direct connection of automation products in the factory level are enabled by this common application layer, open software, and hardware interfaces. This is also called "Industrial Ethernet".

(2) Transmission style

10/100Mbps Semi/full duplex transmission supported

(3) Data

Real-time I/O data (max. 2048 points each) transmission/reception is possible using UDP/IP.

(4) The table below shows differences of the functions which are available with the EtherNet/IP module, and with the Ethernet provided with the robot controller as a standard.

No.	Functio	on name	Explanation of function	EtherNet/IP module	Standard Ethernet
1	General-purpose	e I/O signal	Function which handles up to 2048 I/O signal points each via Ethernet.	•	-
2		Communication with RT2	Function which communicates with RT ToolBox2 via Ethernet	_	•
3	TCP/IP communication	Data link	Function which communicates with other devices, such as a network vision sensor, via Ethernet	_	•
4		Real-time external control	Function which controls the robot from a personal computer, etc.	_	•

3.3.2. Features when PROFINET IO 2-Port module is mounted



The following features are enabled when the PROFINET IO 2-Port module is mounted on the 2D-TZ535 card.

(1) Connection

Connection to PROFINET network is possible. PROFINET is a strong network where a real-time communication and the IT communication are achieved at the same time as industrial Ethernet by the communication standard for the automation that PI made.

(2) Transmission style

10/100Mbps Semi/full duplex transmission supported

(3) Data

Real-time I/O data (max. 2040 points each) transmission/reception is possible using UDP/IP.

(4) The table below shows differences of the functions which are available with the PROFINET IO 2-Port module, and with the Ethernet provided with the robot controller as a standard.

No.	Functio	on name	Explanation of function	PROFINET IO 2-Port module	Standard Ethernet
1	General-purpose	e I/O signal	Function which handles up to 2040 I/O signal points each via Ethernet.	•	-
2		Communication with RT2	Function which communicates with RT ToolBox2 via Ethernet	_	•
3	TCP/IP communication	Data link	Function which communicates with other devices, such as a network vision sensor, via Ethernet	_	•
4		Real-time external control	Function which controls the robot from a personal computer, etc.	_	•

(5) Certification

This product is certificated by PROFIBUS and PROFINET International (PI).

Certification items	Contents
Certificate No	Z10801
Conformance Class	В

3.4. Hardware of the 2D-TZ535 Card

The 2D-TZ535 card hardware is explained in this section. An Anybus-CC module is mounted on the network base card.

3.4.1. Card overview

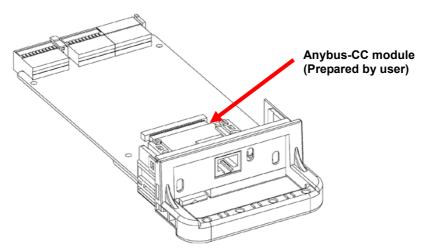


Figure 3-2 Overall view of 2D-TZ535 card

3.4.2. LED

There are three LEDs on the 2D-TZ535 card, and the operating state of the interface card can be confirmed by each on/off.

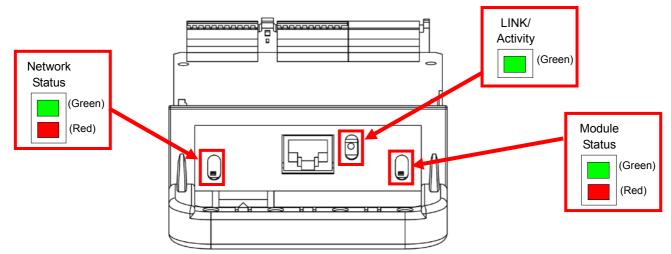


Figure 3-3 Layout of LEDs

The meaning of each LED on, flash and off state is shown below. Please confirm specifications of the HMS Co. about details.

Table 3-1 Description of LED

Details of Network Status LED

LED status	Details	
Off	Power is not ON, or there is no IP address.	
Green (on)	Online with one or more connection established (CIP Class 1 or 3).	
Green (flash)	Online with no connection established.	
Red (on)	IP address duplicate, FATAL error.	
Red (flash)	One or more connection has timed out (CIP Class 1 or 3).	

Details of Module Status LED

LED status	Details	
Off	Power is not ON.	
Green (on)	Controlling with RUN state scanner.	
Green (flash)	Configuration incomplete, or scanner is idle.	
Red (on)	Serious error (EXCEPTION state, FATAL error, etc.).	
Red (flash)	Recoverable error.	

Details of LINK/Activity LED [Reference]

LED status	Details
Off	Link not established, data not exchanged.
Green (on)	Link established.
Green (flash)	Exchanging data.

It takes some time for the communication line to be established after the robot controller power is turned ON.

It takes about one minute for the communication line to be established (for the Network Status LED to turn on) after the robot controller power is turned ON. If automatic operation is started immediately after turning the power ON, L6130 (network communication error) will occur. Wait for a short time before starting automatic operation.

It takes some time for the communication line to be established after the cable is connected.

It takes about one minute for the communication line to be established (for the Network Status LED to turn on) after the cable is connected to the Anybus-CC module on the TZ535 card.

3.5. Software configuration

3.5.1. For the EtherNet/IP module

The software configuration of this product is shown below.

Table 3-2 Compatible versions for EtherNet/IP

Name)	Version			
Robot controller		Version S2 and above			
Teaching pendant	R32TB/R33TB	1.0 and above			
	R56TB/R57TB	1.0 and above			
Personal computer	RT ToolBox2	1.0 and above			
support software	RT ToolBox	Version G3 and above			

3.5.2. For the PROFINET IO 2-Port module

The software configuration of this product is shown below.

Name	;	Version
Robot controller		Version S5k and above
Teaching pendant	R32TB/R33TB	1.0 and above
	R56TB/R57TB	1.0 and above
Personal computer	RT ToolBox2	1.0 and above
support software	RT ToolBox	Version G3 and above

Table 3-3 Compatible versions for PROFINET IO 2-Port

PROFINET IO

EtherNet/IP

4. EtherNet/IP module and 2D-TZ535 card specifications

4.1. Specifications list

The specifications which apply when the EtherNet/IP card is mounted on the network base card are shown below.

lte	em	Specification	Remarks			
Network base interface ca	ard board model	2D-TZ535				
Mountable slot expansion	option slot	Slot 1 to 3	CR75x-D:Slot 1 – 2 CR1D:Slot 1 only CR2D/CR3D:Slot 1 - 3			
Number of 2D-TZ535 card at the same time	ds that can be installed	1 card (*1)				
Coexistence with other fie (CC-Link/PROFIBUS/Dev		Not possible (*2)	Parallel I/O interface card (TZ368/TZ378) can coexist.			
Transmission	Media access method	CSMA/CD				
specifications	Modulation method	Base band				
	Transmission path style	Star type				
	Transmission speed	100Mbit/s (100BASE-TX) 10Mbit/s (10BASE-TX)	100BASE-TX recommended			
	Transmission medium	Twisted pair cable				
	Transmission distance	100m	Distance between switching hub and node			
	Number of cascaded modules	No limits when using switching hub				
Communication function	Cyclic communication	Yes				
Communication instance	Input instance	100				
	Output instance	150				
Number of I/O	Send	Max. 2048 points	Max. 256 bytes			
communication points per robot controller	Receive	Max. 2048 points	Max. 256 bytes			
Start I/O number of robot	controller	Address 2000 and later	Overlapping with PROFIBUS area and DeviceNet area			
MELFA BASIC	I/O signal access	M_In/M_InB/M_InW/M_In32 M_Out/M_OutB/M_OutW/ M_Out32	Handled as general I/O area			
RT ToolBox	Option information read	Yes				

Table 4-1 2D-TZ535 card specifications

(*1) An error will occur if multiple 2D-TZ535 cards are inserted. (Error 6110)

(*2) An error will occur if CC-Link/PROFIBUS/DeviceNet coexists. (Error 6111)

4.2. List of robot parameters

Parameter name	Initial value	Setting range	Explanation
STOP2	-1,-1	-1/ 2000 to 4047	Parameter which sets a dedicated input signal number for stopping the robot program. (Parameter "STOP" is fixed to "0", so "STOP2" is used with the 2D-TZ535 card to define a stop signal from an external source.)
ORST2000 ORST2032 : ORST4015	00000000,000 00000, 00000000,000 00000	0/1/*	Set the output transmission data used in the 2D-TZ535 card when resetting the signal output. Refer to " <u>4.6 Output Signal Reset Pattern</u> " for details.
EPSDLN	8	1 to 256	Set the number of I/O communication transmission bytes used with EtherNet/IP.
EPRDLN	8	1 to 256	Set the number of I/O communication reception bytes used with EtherNet/IP.
EPIP	192.168.0.200	0.0.0.0 to 255.255.255.255	Designate the IP address for EtherNet/IP. (*1)
EPMSK	255.255.255.0	0.0.0.0 to 255.255.255.255	Designate the sub-net mask for EtherNet/IP. (*1)
EPGW	192.168.0.254	0.0.0.0 to 255.255.255.255	Designate the Gateway IP address for EtherNet/IP. (*1)

Table 4-2 List of robot parameters related to EtherNet/IP

(*1) Set in the range of Class A to C.

4.3. Robot controller I/O signals

The I/O signals handled in the robot controller are the maximum 2048 points between address 2000 and 4047 for input and output regardless of the EtherNet/IP node or station number.

4.3.1. I/O signal number map

The I/O signal data size is set as a byte number with a parameter for input and for output. (Set in the range of 1 to 256 bytes.)

Byte number	Usable number of points	Start		End	Byte number	Usable number of points	Start		End	Byte number	Usable number of points	Start		End
0	0	-	to	-	43	344	2000	to	2343	86	688	2000	to	2687
1	8	2000	to	2007	44	352	2000	to	2351	87	696	2000	to	2695
2	16	2000	to	2015	45	360	2000	to	2359	88	704	2000	to	2703
3	24	2000	to	2023	46	368	2000	to	2367	89	712	2000	to	2711
4	32	2000	to	2031	47	376	2000	to	2375	90	720	2000	to	2719
5	40	2000	to	2039	48	384	2000	to	2383	91	728	2000	to	2727
6	48	2000	to	2047	49	392	2000	to	2391	92	736	2000	to	2735
7	56	2000	to	2055	50	400	2000	to	2399	93	744	2000	to	2743
8	64	2000	to	2063	51	408	2000	to	2407	94	752	2000	to	2751
9	72	2000	to	2071	52	416	2000	to	2415	95	760	2000	to	2759
10	80	2000	to	2079	53	424	2000	to	2423	96	768	2000	to	2767
11	88	2000	to	2087	54	432	2000	to	2431	97	776	2000	to	2775
12	96	2000	to	2095	55	440	2000	to	2439	98	784	2000	to	2783
13	104	2000	to	2103	56	448	2000	to	2447	99	792	2000	to	2791
14	112	2000	to	2111	57	456	2000	to	2455	100	800	2000	to	2799
15	120	2000	to	2119	58	464	2000	to	2463	101	808	2000	to	2807
16	256	2000	to	2127	59	472	2000	to	2471	102	816	2000	to	2815
17	136	2000	to	2135	60	480	2000	to	2479	103	824	2000	to	2823
18	144	2000	to	2143	61	488	2000	to	2487	104	832	2000	to	2831
19	152	2000	to	2151	62	496	2000	to	2495	105	840	2000	to	2839
20	160	2000	to	2159	63	504	2000	to	2503	106	848	2000	to	2847
21	168	2000	to	2167	64	512	2000	to	2511	107	856	2000	to	2855
22	176	2000	to	2175	65	520	2000	to	2519	108	864	2000	to	2863
23	184	2000	to	2183	66	528	2000	to	2527	109	872	2000	to	2871
24	192	2000	to	2191	67	536	2000	to	2535	110	880	2000	to	2879
25	200	2000	to	2199	68	544	2000	to	2543	111	888	2000	to	2887
26	208	2000	to	2207	69	552	2000	to	2551	112	896	2000	to	2895
27	216	2000	to	2215	70	560	2000	to	2559	113	904	2000	to	2903
28	224	2000	to	2223	71	568	2000	to	2567	114	912	2000	to	2911
29	232	2000	to	2231	72	576	2000	to	2575	115	920	2000	to	2919
30	240	2000	to	2239	73	584	2000	to	2583	116	928	2000	to	2927
31	248	2000	to	2247	74	592	2000	to	2591	117	936	2000	to	2935
32	256	2000	to	2255	75	600	2000	to	2599	118	944	2000	to	2943
33	264	2000	to	2263	76	608	2000	to	2607	119	952	2000	to	2951
34	272	2000	to	2271	77	616	2000	to	2615	120	960	2000	to	2959
35	280	2000	to	2279	78	624	2000	to	2623	121	968	2000	to	2967
36	288	2000	to	2287	79	632	2000	to	2631	122	976	2000	to	2975
37	296	2000	to	2295	80	640	2000	to	2639	123	984	2000	to	2983
38	304	2000	to	2303	81	648	2000	to	2647	124	992	2000	to	2991
39	312	2000	to	2311	82	656	2000	to	2655	125	1000	2000	to	2999
40	320	2000	to	2319	83	664	2000	to	2663	126	1008	2000	to	3007
41	328	2000	to	2327	84	672	2000	to	2671	127	1016	2000	to	3015
42	336	2000	to	2335	85	680	2000	to	2679	128	1024	2000	to	3023

Table 4-3 EtherNet/IP signal table

<u>د</u>	Usable				[L	Usable				<u>د</u>	Usable			
Byte number	number	Start		End		Byte number	number	Start		End	Byte number	number	Start		End
B	of points					B nur	of points				B	of points			
129	1032	2000	to	3031		172	1376	2000	to	3375	215	1720	2000	to	3719
130	1040	2000	to	3039		173	1384	2000	to	3383	216	1728	2000	to	3727
131	1048	2000	to	3047		174	1392	2000	to	3391	217	1736	2000	to	3735
132	1056	2000	to	3055		175	1400	2000	to	3399	218	1744	2000	to	3743
133	1064	2000	to	3063		176	1408	2000	to	3407	219	1752	2000	to	3751
134	1072	2000	to	3071		177	1416	2000	to	3415	220	1760	2000	to	3759
135	1080	2000	to	3079		178	1424	2000	to	3423	221	1768	2000	to	3767
136	1088	2000	to	3087		179	1432	2000	to	3431	222	1776	2000	to	3775
137	1096	2000	to	3095		180	1440	2000	to	3439	223	1784	2000	to	3783
138	1104	2000	to	3103		181	1448	2000	to	3447	224	1792	2000	to	3791
139	1112	2000	to	3111		182	1456	2000	to	3455	225	1800	2000	to	3799
140	1120	2000	to	3119		183	1464	2000	to	3463	226	1808	2000	to	3807
141	1128	2000	to	3127		184	1472	2000	to	3471	227	1816	2000	to	3815
142	1136	2000	to	3135		185	1480	2000	to	3479	228	1824	2000	to	3823
143	1144	2000	to	3143		186	1488	2000	to	3487	229	1832	2000	to	3831
144	1152	2000	to	3151		187	1496	2000	to	3495	230	1840	2000	to	3839
145	1160	2000	to	3159		188	1504	2000	to	3503	231	1848	2000	to	3847
146	1168	2000	to	3167		189	1512	2000	to	3511	232	1856	2000	to	3855
147	1176	2000	to	3175		190	1520	2000	to	3519	233	1864	2000	to	3863
148	1184	2000	to	3183	ŀ	191	1528 1536	2000	to	3527 3535	234 235	1872	2000 2000	to to	3871
149 150	1192 1200	2000 2000	to to	3191 3199		192 193	1536	2000 2000	to to	3543	235 236	1880 1888	2000	to to	3879 3887
150	1200	2000	to	3207		193	1544	2000	to	3551	230	1896	2000	to	3895
152	1206	2000	to	3215	ŀ	194	1560	2000	to	3559	237	1904	2000	to	3903
152	1210	2000	to	3223		195	1568	2000	to	3567	230	1904 1912	2000	to	3903 3911
154	1224	2000	to	3231	-	190	1576	2000	to	3575	235	1912	2000	to	3919
155	1232	2000	to	3239	-	197	1570	2000	to	3583	240	1920	2000	to	3927
156	1248	2000	to	3247		199	1592	2000	to	3591	242	1936	2000	to	3935
157	1256	2000	to	3255		200	1600	2000	to	3599	243	1930	2000	to	3943
157	1250	2000	to	3263		200	1608	2000	to	3607	243	1944	2000	to	3951
159	1204	2000	to	3271		201	1616	2000	to	3615	245	1960	2000	to	3959
160	1280	2000	to	3279		202	1616	2000	to	3623	246	1968	2000	to	3967
161	1288	2000	to	3287		204	1632	2000	to	3631	247	1976	2000	to	3975
162	1296	2000	to	3295		205	1640	2000	to	3639	248	1984	2000	to	3983
163	1304	2000	to	3303		206	1648	2000	to	3647	249	1992	2000	to	3991
164	1312	2000	to	3311		207	1656	2000	to	3655	250	2000	2000	to	3999
165	1320	2000	to	3319		208	1664	2000	to	3663	251	2008	2000	to	4007
166	1328	2000	to	3327		209	1672	2000	to	3671	252	2016	2000	to	4015
167	1336	2000	to	3335		210	1680	2000	to	3679	253	2024	2000	to	4023
168	1344	2000	to	3343		211	1688	2000	to	3687	254	2032	2000	to	4031
169	1352	2000	to	3351		212	1696	2000	to	3695	255	2040	2000	to	4039
170	1360	2000	to	3359		213	1704	2000	to	3703	256	2048	2000	to	4047
171	1368	2000	to	3367		214	1712	2000	to	3711					

4.3.2. Flow of I/O signal

The mapping for the master and slave signals is shown below.

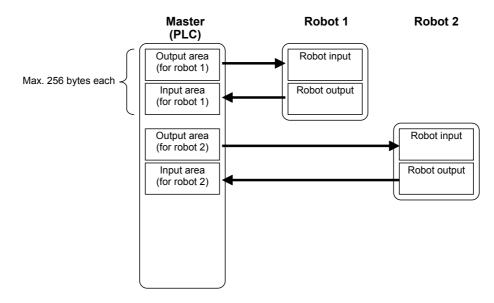


Figure 4-1 Flow of I/O signal

4.3.3. Deducated Input/Output

Dedicated inputs and outputs can be used by assigning the signal numbers of the 2D-TZ535 card to the dedicated I/O signal parameters. Refer to "6 External Input/Output Functions" in the separate "Instruction Manual, Detailed Explanation of Functions and Operations" for details on using the dedicated inputs and outputs.

4.3.4. Output signal Reset pattern

In the factory setting, all general-purpose output signals start at OFF (0). The status of the general-purpose output signal at power ON can be changed by changing the following parameters. These parameters are also used for the general-purpose output signal reset operation (executed with dedicated input signal, etc.) and for the reset pattern when the "Clr" instruction is executed.

The settings are [OFF], [ON] and [Hold]. A list of general-purpose output reset parameters related to the 2D-TZ535 card is given below.

Parameter name	Start number	End number
ORST2000	2000	2031
ORST2032	2032	2063
ORST2064	2064	2095
ORST2096	2096	2127
ORST2128	2128	2159
ORST2160	2160	2191
ORST2192	2192	2223
ORST2224	2224	2255
ORST2256	2256	2287
ORST2288	2288	2319
ORST2320	2320	2351
ORST2352	2352	2383
ORST2384	2384	2415
ORST2416	2416	2447
ORST2448	2448	2479
ORST2480	2480	2511
ORST2512	2512	2543
ORST2544	2544	2575
ORST2576	2576	2607
ORST2608	2608	2639
ORST2640	2640	2671
ORST2672	2672	2703
ORST2704	2704	2735
ORST2736	2736	2767
ORST2768	2768	2799
ORST2800	2800	2831
ORST2832	2832	2863
ORST2864	2864	2895
ORST2896	2896	2927
ORST2928	2928	2959
ORST2960	2960	2991
ORST2992	2992	3023

 Table 4-4
 List of output signal reset pattern parameters

Parameter name	Start number	End number
ORST3024	3024	3055
ORST3056	3056	3087
ORST3088	3088	3119
ORST3120	3120	3151
ORST3152	3152	3183
ORST3184	3184	3215
ORST3216	3216	3247
ORST3248	3248	3279
ORST3280	3280	3311
ORST3312	3312	3343
ORST3344	3344	3375
ORST3376	3376	3407
ORST3408	3408	3439
ORST3440	3440	3471
ORST3472	3472	3503
ORST3504	3504	3535
ORST3536	3536	3567
ORST3568	3568	3599
ORST3600	3600	3631
ORST3632	3632	3663
ORST3664	3664	3695
ORST3696	3696	3727
ORST3728	3728	3759
ORST3760	3760	3791
ORST3792	3792	3823
ORST3824	3824	3855
ORST3856	3856	3887
ORST3888	3888	3919
ORST3920	3920	3951
ORST3952	3952	3983
ORST3984	3984	4015
ORST4016	4016	4047

For example, if ORST2000 = "*00000001, 00000000, 11110000, 00000000" is set and the general-purpose output signal is reset, the following state will result:

Output No. 2000: Holds state before output signal reset Output No. 2007: ON Output No. 2016 to 2019: ON

4.3.5. Specifications related to Robot language

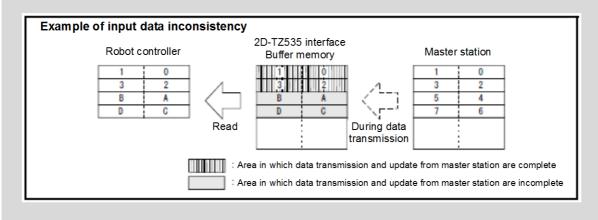
The robot language (MELFA-BASIC V) used with the 2D-TZ535 card is explained below.

ltem	Туре	Function	Read/Write
M_In	Integer 1	Reads 1 bit of data from designated input signal	Read
M_Out	Out Integer 1 Writes 1 bit of data to designated output signal		Write
M_Inb	Integer 1 Reads 8 bits of data from designated input signal		Read
M_Outb	Integer 1	Writes 8 bits of data to designated output signal	Write
M_Inw	Integer 1	Reads 16 bits of data from designated input signal	Read
M_Outw	Integer 1	Writes 16 bits of data to designated output signal	Write
M_In32	_In32 Integer 1 Reads 32 bits of data from designated input signal		Read
M_Out32	Integer 1	Writes 32 bits of data to designated output signal	Write

Table 4-5 List of system status variables used for data input/output
--

◊♦◊ Inconsistency of input/output data ◊♦◊

If data read/write is started with the robot program before the master stations finishes data transmission, data inconsistency (state in which robot controller's input/output data is not consistent with master station side's input/output data) will occur. For example, if an application which continuously writes data to the same output address is written, in actual cases only the value written last may be notified to the partner. The following is an example of data inconsistency which occurs if data reading is executed from the robot controller while transmitting data from the master station to the buffer memory.



To prevent data inconsistency, the following type of data read/write interlock must be provided in the application (robot program or PLC ladder). An example of using the interlock when sending one-word data from the master station to the robot is given.

Meaning	Master station (*1)	Robot
Data send/receive area	Data send area	Input 2000 to 2015
PLC data write complete flag	WRTFLG	Input No. 2016
Robot data read complete flag	RDFLG	Output No. 2020

Table 4-6	Example of assigning master station and robot I/O signals
	Example of doorgrining macter of after and report i o orginale

(*1) Names are given to the master station I/O signal assignments for convenience. In actual use, refer to the master station instruction manual and make arbitrary assignments of the I/O signals.

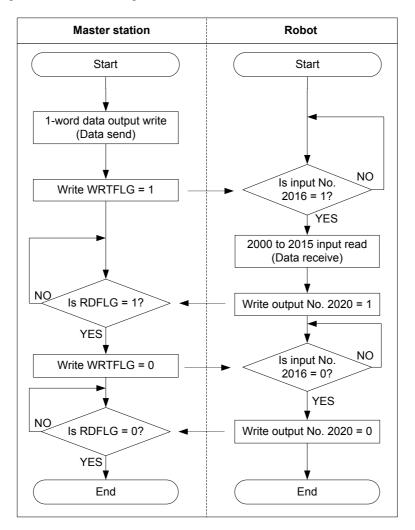


Figure 4-2 Example of using interlock

An example of the robot program corresponding to Figure 4-2 flow chart is given below. Refer to the instruction manual for the device in use for details on the master station side programs (ladder, etc.).

*Loop1: If M_In(2016) = 0 Then *Loop1 Mdata = M_InW(2000) M_Out(2020) = 1 *Loop2: If M_In(2016) = 1 Then *Loop2 M_Out(2016) = 0

PROFINET IO

5. PROFINET IO 2-Port module and 2D-TZ535 card specifications

5.1. Specifications list

The specifications which apply when the PROFINET IO 2-Port card is mounted on the network base card are shown below.

lte	em	Specification	Remarks
Network base interface ca	ard board model	2D-TZ535-PN	
Mountable slot expansion	option slot	Slot 1 to 3	CR75x-D:Slot 1 – 2 CR1D:Slot 1 only CR2D/CR3D:Slot 1 - 3
Number of 2D-TZ535 care at the same time	ds that can be installed	1 card (*1)	
Coexistence with other fie (CC-Link/PROFIBUS/Dev		Not possible (*2)	Parallel I/O interface card (TZ368/TZ378) can coexist.
Transmission	Media access method	CSMA/CD	
specifications	Auto-MDI/MDI-X(*3)	Yes	
	Modulation method	Base band	
	Transmission path style	Star type	
	Transmission speed	100Mbit/s (100BASE-TX)	
	Transmission medium	Twisted pair cable	
	Transmission distance	100m	Distance between switching hub and node
	Number of cascaded modules	No limits when using switching hub	
Communication function	Cyclic communication	Yes	
Number of I/O	Send	Max. 2040 points	Max. 255 bytes
communication points per robot controller	Receive	Max. 2040 points	Max. 255 bytes
Start I/O number of robot controller		Address 2000 and later	Overlapping with PROFIBUS area, DeviceNet area and EtherNet/IP.
MELFA BASIC	I/O signal access	M_In / M_InB / M_InW / M_In8 / M_In16 / M_In32 M_Out / M_OutB / M_OutW / M_Out8 / M_Out16 / M_Out32	Handled as general I/O area
RT ToolBox	Option information read	Yes	

(*1) An error will occur if multiple 2D-TZ535 cards are inserted. (Error 6110)

(*2) An error will occur if CC-Link/PROFIBUS/DeviceNet coexists. (Error 6111)

(*3) A function that identifies straight/cross cable by the automatic operation, and configures the connection appropriately.

5.2. List of robot parameters

Table 5-2	List of robot parameters related to PROFINET IO
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Parameter name	Initial value	Setting range	Explanation
STOP2	-1,-1	-1/ 2000 to 4039	Parameter which sets a dedicated input signal number for stopping the robot program. (Parameter "STOP" is fixed to "0", so "STOP2" is used with the 2D-TZ535 card to define a stop signal from an external source.)
ORST2000 ORST2032 : ORST4015	00000000,000 00000, 00000000,000 00000	0/1/*	Set the output transmission data used in the 2D-TZ535 card when resetting the signal output. Refer to " <u>4.6 Output Signal Reset Pattern</u> " for details.
PNIOLN	16	8 / 16 / 32 / 64 / 128 / 255	Set the number of I/O communication transmission bytes used with PROFINET IO.

5.3. Robot controller I/O signals

The I/O signals handled in the robot controller are the maximum 2040 points between address 2000 and 4039 for input and output regardless of the PROFINET IO station number.

5.3.1. I/O signal number map

The I/O signal data size is set as a byte number with a parameter for input and for output. (Set in the range of 8 / 16 / 32 / 64 / 128 / 255bytes.)

Byte number	Usable number of points	Start		End
8	64	2000	to	2063
16	256	2000	to	2127
32	256	2000	to	2255
64	512	2000	to	2511
128	1024	2000	to	3023
255	2040	2000	to	4039

Table 5-3 PROFINET IO signal table

5.3.2. Flow of I/O signal

The mapping for the master and slave signals is shown below.

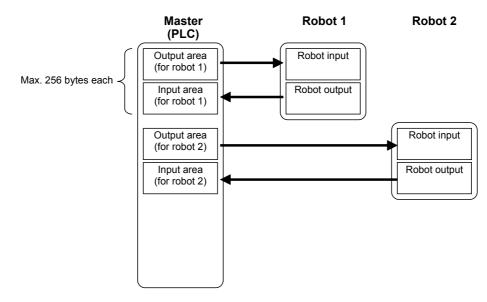


Figure 5-1 Flow of I/O signal

5.3.3. Deducated Input/Output

Dedicated inputs and outputs can be used by assigning the signal numbers of the 2D-TZ535 card to the dedicated I/O signal parameters. Refer to "6 External Input/Output Functions" in the separate "Instruction Manual, Detailed Explanation of Functions and Operations" for details on using the dedicated inputs and outputs.

5.3.4. Output signal Reset pattern

In the factory setting, all general-purpose output signals start at OFF (0). The status of the general-purpose output signal at power ON can be changed by changing the following parameters. These parameters are also used for the general-purpose output signal reset operation (executed with dedicated input signal, etc.) and for the reset pattern when the "Clr" instruction is executed.

The settings are [OFF], [ON] and [Hold]. A list of general-purpose output reset parameters related to the 2D-TZ535 card is given below.

Parameter name	Start number	End number
ORST2000	2000	2031
ORST2032	2032	2063
ORST2064	2064	2095
ORST2096	2096	2127
ORST2128	2128	2159
ORST2160	2160	2191
ORST2192	2192	2223
ORST2224	2224	2255
ORST2256	2256	2287
ORST2288	2288	2319
ORST2320	2320	2351
ORST2352	2352	2383
ORST2384	2384	2415
ORST2416	2416	2447
ORST2448	2448	2479
ORST2480	2480	2511
ORST2512	2512	2543
ORST2544	2544	2575
ORST2576	2576	2607
ORST2608	2608	2639
ORST2640	2640	2671
ORST2672	2672	2703
ORST2704	2704	2735
ORST2736	2736	2767
ORST2768	2768	2799
ORST2800	2800	2831
ORST2832	2832	2863
ORST2864	2864	2895
ORST2896	2896	2927
ORST2928	2928	2959
ORST2960	2960	2991
ORST2992	2992	3023

 Table 5-4
 List of output signal reset pattern parameters

	-	
Parameter name	Start number	End number
ORST3024	3024	3055
ORST3056	3056	3087
ORST3088	3088	3119
ORST3120	3120	3151
ORST3152	3152	3183
ORST3184	3184	3215
ORST3216	3216	3247
ORST3248	3248	3279
ORST3280	3280	3311
ORST3312	3312	3343
ORST3344	3344	3375
ORST3376	3376	3407
ORST3408	3408	3439
ORST3440	3440	3471
ORST3472	3472	3503
ORST3504	3504	3535
ORST3536	3536	3567
ORST3568	3568	3599
ORST3600	3600	3631
ORST3632	3632	3663
ORST3664	3664	3695
ORST3696	3696	3727
ORST3728	3728	3759
ORST3760	3760	3791
ORST3792	3792	3823
ORST3824	3824	3855
ORST3856	3856	3887
ORST3888	3888	3919
ORST3920	3920	3951
ORST3952	3952	3983
ORST3984	3984	4015
ORST4016	4016	4047

For example, if ORST2000 = "*00000001, 00000000, 11110000, 00000000" is set and the general-purpose output signal is reset, the following state will result:

Output No. 2000: Holds state before output signal reset Output No. 2007: ON Output No. 2016 to 2019: ON

5.3.5. Specifications related to Robot language

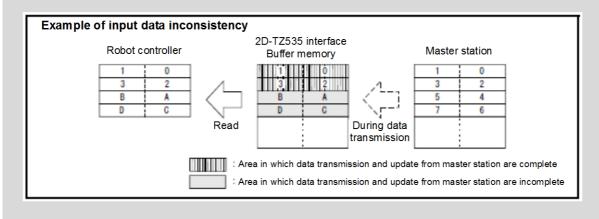
The robot language (MELFA-BASIC V) used with the 2D-TZ535 card is explained below.

ltem	Туре	Function	Read/Write
M_In	Integer 1	Reads 1 bit of data from designated input signal	Read
M_Out	Integer 1	Writes 1 bit of data to designated output signal	Write
M_Inb	Integer 1	Reads 8 bits of data from designated input signal	Read
M_Outb	Integer 1	Writes 8 bits of data to designated output signal	Write
M_Inw	Integer 1	Reads 16 bits of data from designated input signal	Read
M_Outw	Integer 1	Writes 16 bits of data to designated output signal	Write
M_In32	Integer 1	Reads 32 bits of data from designated input signal	Read
M_Out32	Integer 1	Writes 32 bits of data to designated output signal	Write

Table 5-5	List of system status variables used for data input/output

◊♦◊ Inconsistency of input/output data ◊♦◊

If data read/write is started with the robot program before the master stations finishes data transmission, data inconsistency (state in which robot controller's input/output data is not consistent with master station side's input/output data) will occur. For example, if an application which continuously writes data to the same output address is written, in actual cases only the value written last may be notified to the partner. The following is an example of data inconsistency which occurs if data reading is executed from the robot controller while transmitting data from the master station to the buffer memory.



To prevent data inconsistency, the following type of data read/write interlock must be provided in the application (robot program or PLC ladder). An example of using the interlock when sending one-word data from the master station to the robot is given.

Meaning	Master station (*1)	Robot
Data send/receive area	Data send area	Input 2000 to 2015
PLC data write complete flag	WRTFLG	Input No. 2016
Robot data read complete flag	RDFLG	Output No. 2020

Table 5-6	Example of assigning master station and robot I/O signals
-----------	---

(*1) Names are given to the master station I/O signal assignments for convenience. In actual use, refer to the master station instruction manual and make arbitrary assignments of the I/O signals.

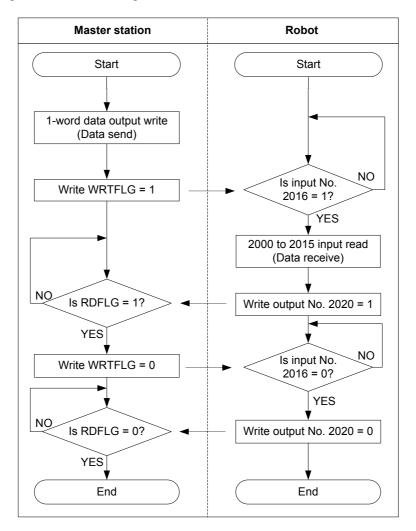


Figure 5-2 Example of using interlock

An example of the robot program corresponding to Figure 5-2 flow chart is given below. Refer to the instruction manual for the device in use for details on the master station side programs (ladder, etc.).

*Loop1: If M_In(2016) = 0 Then *Loop1 Mdata = M_InW(2000) M_Out(2020) = 1 *Loop2: If M_In(2016) = 1 Then *Loop2 M_Out(2016) = 0

6. Items to Be Checked Before Using This Product

6.1. Checking the Product

The product (2D-TZ535) you purchased consists of the following items as standard. Please verify the items.

Table 6-1	List of the standard items in the product (2D-TZ535)
-----------	--

No.	Name	Model	Quantity
(1)	Instruction Manual (this CD-ROM)	BFP-A8872	1
(2)	Network base card (2D-TZ535 card)	TZ535	1
(3)	Module fixing parts (module mount, screws)		1 set

Note) The numbers in the table correspond with the numbers in the following figure.

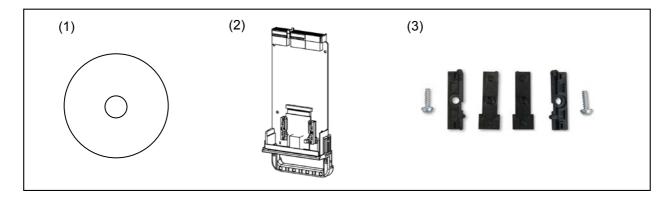


Figure 6-1 Items contained in the delivered product

EtherNet/IP

6.2. Devices to be Prepared by the Customer

6.2.1. For the EherNet/IP module

The devices which must be prepared by the customer to use the EtherNet/IP module with the Mitsubishi 2D-TZ535 card are listed below.

Device to be prepared	Condition
Master station	Master station compatible with EtherNet/IP
EtherNet/IP module	An Anybus-CompactCom module by HMS Anybus-CC EtherNet/IP module (AB6314)
Ethernet cable	This cable must conform to the specification of EtherNet/IP.
Switching hub	Always use a switching hub when using the I/O signal function. * I/O signal data collisions will increase if a repeater hub is used.
Driver for hex lobular (torques) screw	Driver for module fixing part screws. Prepare a size "T-10" screwdriver.
Cross-point driver	Used for card handle fixing screw.

 Table 6-2
 List of the standard items in the product (2D-TZ535)

PROFINET IO

6.2.2. For the PROFINET IO 2-Port module

The devices which must be prepared by the customer to use the PROFINET IO 2-Port module with the Mitsubishi 2D-TZ535 card are listed below.

Table 6-3	Devices	prepared	by the customer

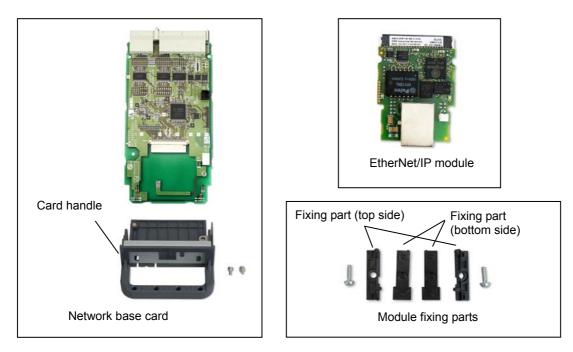
Device to be prepared	Condition
Master station	Master station compatible with PROFINET IO
PROFINET IO 2-Port module	An Anybus-CompactCom module by HMS Anybus-CC PROFINET IO 2-Port module (AB6489-B)
Ethernet cable	This cable must conform to the specification of PROFINET IO 2-Port.
Switching hub	Always use a switching hub when using the I/O signal function. * I/O signal data collisions will increase if a repeater hub is used.
Driver for hex lobular (torques) screw	Driver for module fixing part screws. Prepare a size "T-10" screwdriver.
Cross-point driver	Used for card handle fixing screw.

7. Hardware Settings

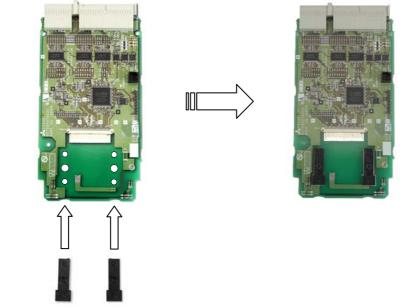
7.1. Module Mounting Procedures

The example of installing the EtherNet/IP module on the network base card (2D-TZ535) is shown below.

(1) Prepare the network base card (2D-TZ535), EtherNet/IP module and module fixing parts. Remove the card handle fixing screws from the network base card (2D-TZ535), and separate the card from the card handle.

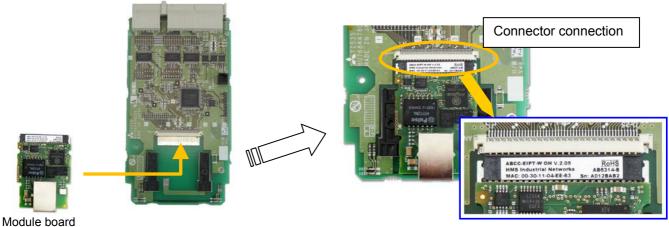


(2) Insert the protrusions on the module fixing parts (bottom side) into the holes on the card.



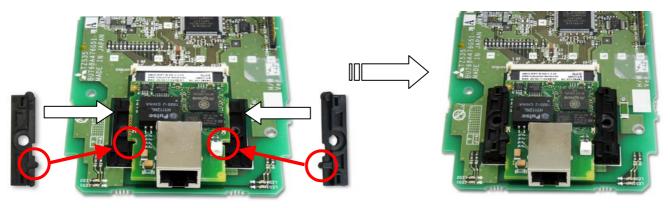
Module fixing parts (bottom side)

(3) Place the EtherNet/IP module onto the fixing parts, and slide it to connect its module connector with pins on the card side.

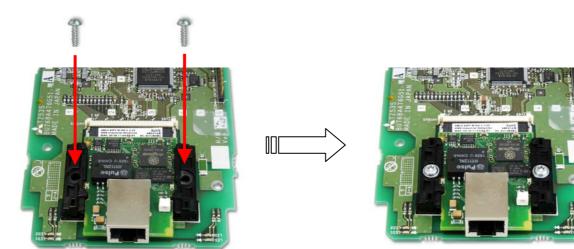


(4) Align the protrusions on the module fixing parts (top side) with the slits on the module, and mount the module as if sandwiching it from the left, right and top. Adjust the position of the module so that the screw holes on the top fixing parts and bottom fixing parts are

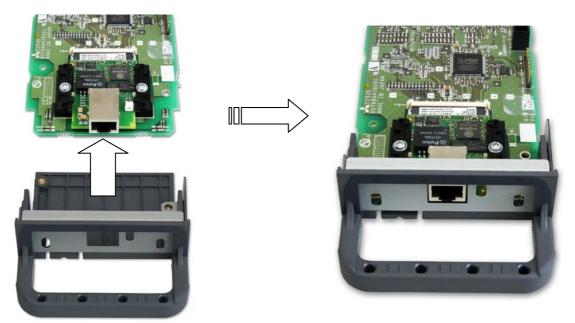
Adjust the position of the module so that the screw holes on the top fixing parts and bottom fixing parts are aligned. There may be a small opening at the connector section between the module and card, but this is not a problem.



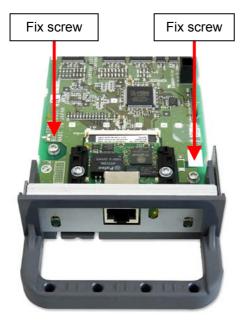
(5) Fasten the module fixing parts with screws. Use the hex lobular driver.



(6) Mount the card handle. Fit the handle so that the network connector of the module board fits into the hole on the card handle plate.



(7) Fasten the card and card handle with screws. This completes the module mounting process. Tighten the screws with a cross-point driver.





7.2. Setting the 2D-TZ535 Card Hardware

The 2D-TZ535 card does not have any hardware settings. All settings are completed with the master station parameters and robot controller parameters. Refer to "9.1 Parameter Settings" for details.

8. Connections and Wiring

8.1. Mounting 2D-TZ535 Card onto Robot Controller

One 2D-TZ535 card can be mounted in **the option slot** (*1) of the robot controller. If two or more cards are mounted, the H.6110 error (multiple network base cards mounted) will occur.

8.1.1. CR750-D/CR751-D controller

Remove one interface cover of the option slots 1-2 in the robot controller front or rear, and mount the 2D-TZ535 card there. Please use the handle of the interface card at mounting of the interface card.

<CR750 controller (Rear side)>

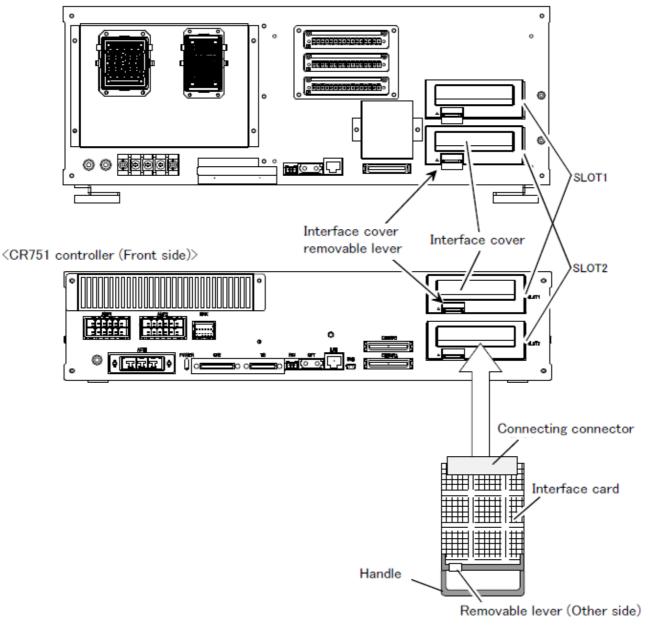


Figure 8-1 Mounting of the 2D-TZ535 card (CR750-D/CR751-D controller)

8.1.2. CR1D-700 controller

Remove one interface cover of the option slots 1 in the robot controller rear, and mount the 2D-TZ535 card there. Please use the handle of the interface card at mounting of the interface card.

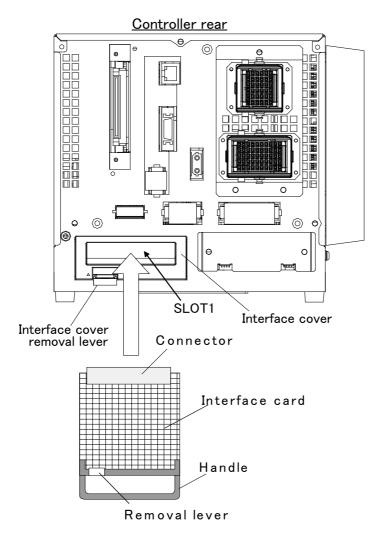


Figure 8-2 Mounting of the 2D-TZ535 card (CR1D controller)

8.1.3. CR2D-700 controller

Remove one interface cover of the option slots 1-3 in the robot controller rear, and mount the 2D-TZ535 card there. Please use the handle of the interface card at mounting of the interface card.

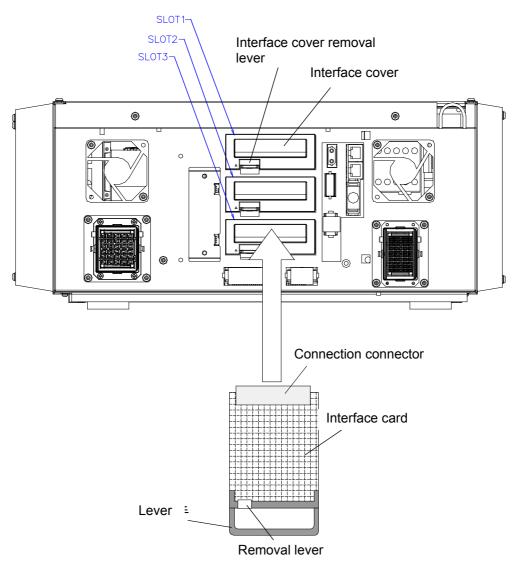


Figure 8-3 Mounting of the 2D-TZ535 card (CR2D controller)

8.1.4. CR3D-700 controller

Open the door of the robot controller.

The R700CPU unit is installed in the right end. Remove one interface cover of the option slots 1-3 in the CPU unit, and mount the 2D-TZ535 card there.

Please use the handle of the interface card at mounting of the interface card.

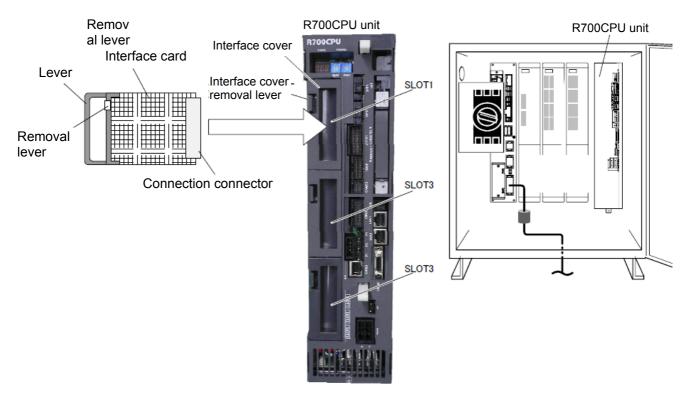


Figure 8-4 Mounting of the 2D-TZ535 card (CR3D controller)

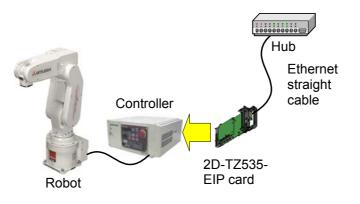
8.2. Wiring



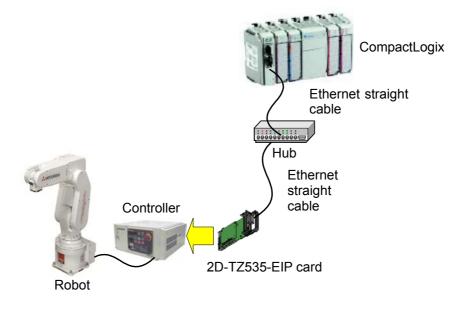
8.2.1. For the EtherNet/IP module

An example of connecting the 2D-TZ535 card and Rockwell PLC (CompactLogix L35E) one-on-one with an Ethernet cable is explained below.

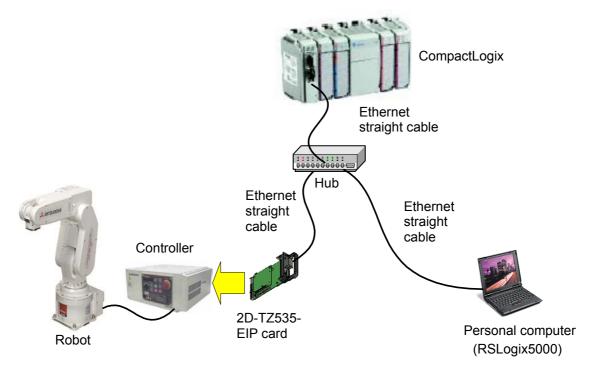
- (1) Connect the Ethernet straight cable connector to the 2D-TZ535 card.
- (2) Connect the other connector to the hub.



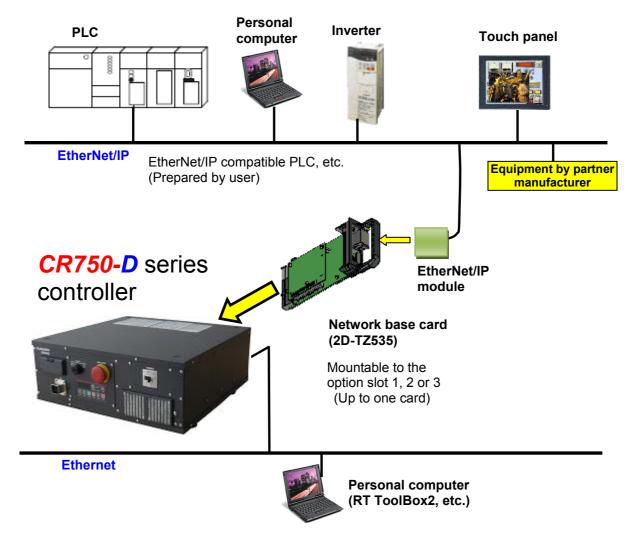
- (3) Connect the Ethernet straight cable connector to the EtherNet/IP connector on CompactLogix L35E (PLC by Rockwell).
- (4) Connect the other connector to the hub.



- (5) Connect the Ethernet straight cable connector to the personal computer in which RSLogix5000 (Rockwell support software) is installed.
- (6) Connect the other connector to the hub.



The whole image of the connection is shown below. Please refer to it.



Check the following connections again before using the 2D-TZ535 card.

No.	Check item	Check
1	Is the 2D-TZ535 card securely mounted into the controller slot?	
2	Are the Ethernet cables between the 2D-TZ535 card and prepared external devices correctly connected?	

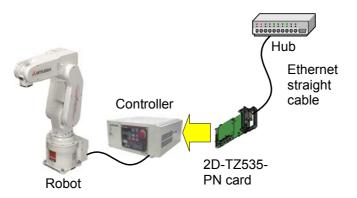
Table 8-1 Checking connections

8.2.2. For the PROFINET IO 2-Port module

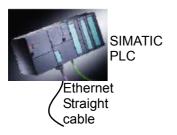


An example of connecting the 2D-TZ535 card and Siemens PLC (SIMATIC) one-on-one with an Ethernet cable is explained below.

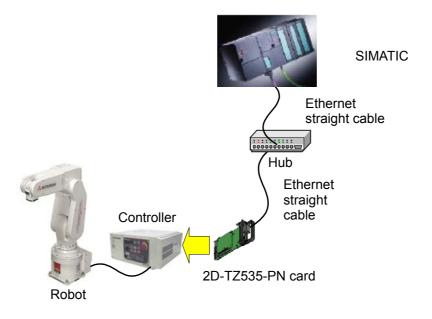
- (1) Connect the Ethernet straight cable connector to the 2D-TZ535 card.
- (2) Connect the other connector to the hub.



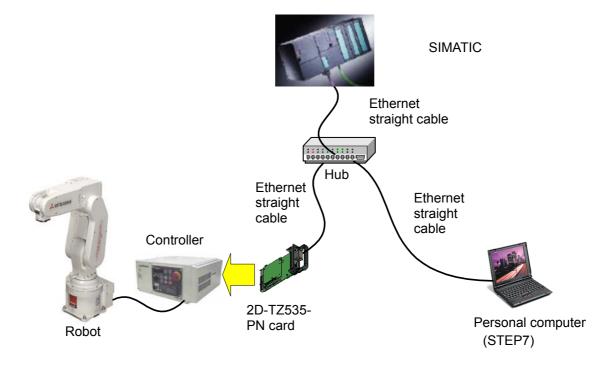
(3) Connect the Ethernet straight cable connector to the PROFINET IO connector on SIMATIC PLC (PLC by Siemens).



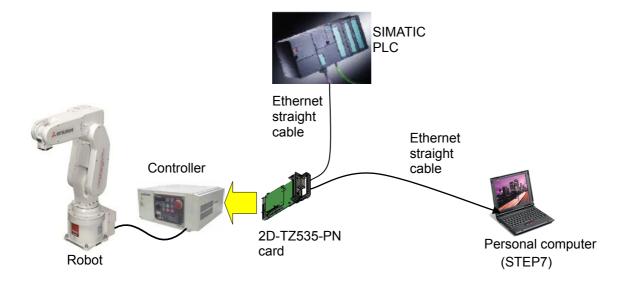
(4) Connect the other connector to the hub.



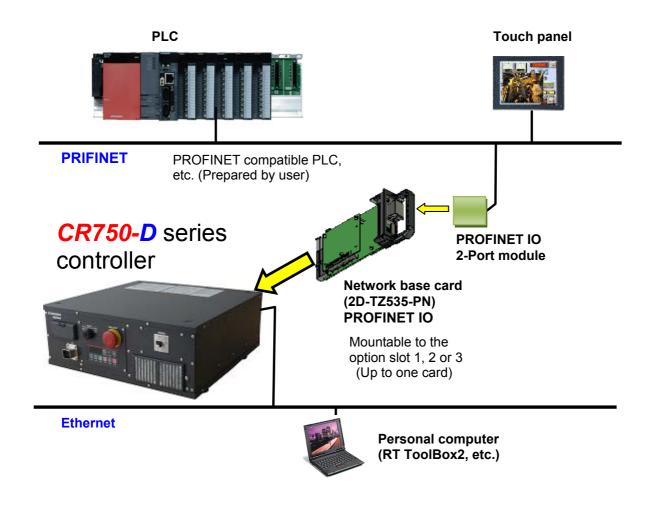
- (5) Connect the Ethernet straight cable connector to the personal computer in which STEP7 (Siemens support software) is installed.
- (6) Connect the other connector to the hub.



Because the PROFINET IO 2-Port module has two connectors, the following connections are possible.



The whole image of the connection is shown below. Please refer to it.



Check the following connections again before using the 2D-TZ535 card.

Table 8-2	Checking c	onnections
-----------	------------	------------

No.	Check item	Check
1	Is the 2D-TZ535 card securely mounted into the controller slot?	
2	Are the Ethernet cables between the 2D-TZ535 card and prepared external devices correctly connected?	

9. Procedures for Starting Operation

The procedures for starting operation with the Anybus-CompactCom module are shown below.

In this example, the 2D-TZ535 card and the PLC are connected one-on-one with an Ethernet cable, and an operation to confirm the I/O signal is performed.

For more information on the PLC, refer to the manual enclosed with the PLC.

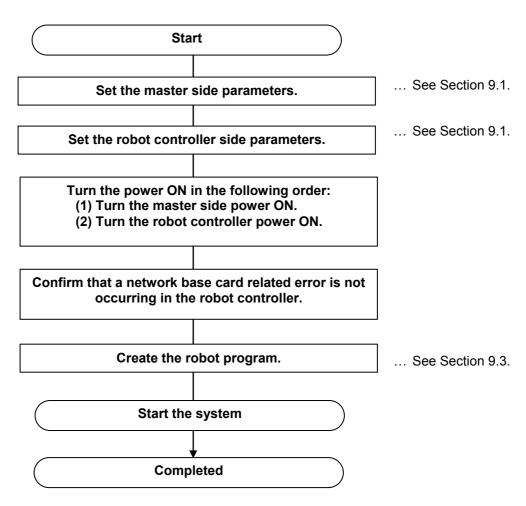


Figure 9-1 Procedures for starting operation

9.1. Setting the Parameters

9.1.1. For the EtherNet/IP module

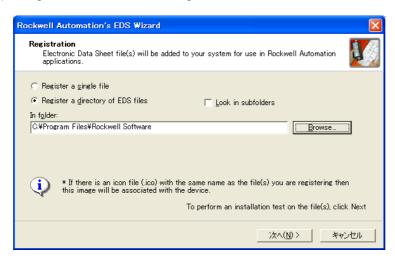
- (1) Set the IP address and upgrade the firmware version as explained in the "Installation Guide" enclosed with CompactLogix.
- (2) Download the EDS file from the HMS's web site. ([Home]-[PRODUCTS]-[Anybus CompactCom]-[Read more about the 30-series]-[File/Doc Downloads]-[Ethernet IP IT version Plug-In Module]-[Next] -> Download the ABCC EIPT EDS file)
 - a) Start the EDS Hardware Installation Tool.

💼 Rockwell Software		BOOTP-DHCP Server	×			
m DriveTools	•) FactoryTalk Tools	•			
📷 FLASH Programming Tools		RSLinx	►	🖮 Tools 🔹 🕨	é	BDS Hardware Installation Tool
m HMS I	•	RSLogix 5000 Enterprise Series	×	🎨 RSLinx Classic	Ż	≴ OPC Test Client
	6	Utilities	×	🇞 RSLinx Classic Backup Restore Utility		OPCTest Document
	6] RSNetWorx	×	🌯 RSLinx Classic Launch Control Panel		
	6	FactoryTalk Activation	Þ	👔 RSLinx Classic Online Reference		

b) Click the [Add] button.

Rockwell Automation - Hardware Installation Tool					
This tool allows you to change the hardware description information currently installed on your computer.					
Add i	Launch the EDS Wizard and add selected hardware description files and associated components only. Launch the EDS Wizard and remove selected hardware description files and associated components only. Remove all previously installed hardware description files and associated components from your computer.				
	<u> </u>				

c) Designate the folder containing the EDS file.



d) Click the [Next] button to complete the process.

(If necessary, the icon which indicates that the PLC has recognized the 2D-TZ535 card can be changed.)

(3) Set the IP address for the robot controller EtherNet/IP in the robot controller parameter "EPIP".

Set the IP address for EtherNet/IP in parameter "EPIP" on the RT ToolBox2 "Parameter list" screen.

🖷 Parameter	list 1:TVS (Online)		
Robot1 Parameter <u>N</u> ar	I : RV-6SD Read Read	Vįew ⊙ All ○ Changed	Parameter list A
Parameter	Explanation		~
EPGW EPIP EPMSK EPRDLN EPSDLN ERROUT ERRESET EXTENC FSPJOGMD GOTPORT	EtherNet/IP Gateway IP Address EtherNet/IP IP Address EtherNet/IP Subnet mask EtherNet/IP Receive data size (1 to 256) EtherNet/IP Send data size (1 to 256) Err. No. output requirement INPUT,During output Error reset INPUT,During error OUTPUT No. of external encodor Jog mode of passage of a singular point(disable(0), Ethernet Port number for GOT1000		
<			<u>></u>
•			

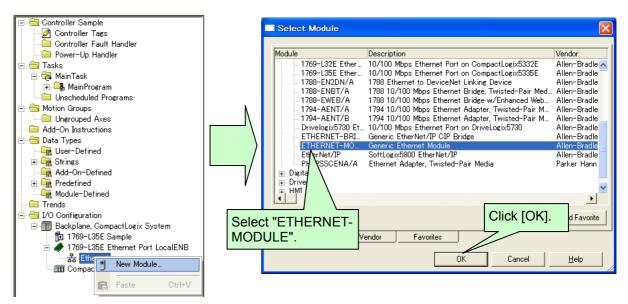
(4) Set the system configuration using RSLogix5000.

e)	Start RSLo	ogix5000, and click [New] under the [I	Select the PLC type.	
	New Controll	er		
	Vendor:	Allen-Bradley -		
	<u>Т</u> уре:	1769-L35E CompactLogix5335E Controller	ОК	Select the PLC revision.
	Re <u>v</u> ision:	16 ▼ □ Bedundancy Enabled	Help	
	Na <u>m</u> e:	Sample		
	Descri <u>p</u> tion:			Designate the project name.
	<u>C</u> hassis Type:			
	Sl <u>o</u> t: Cr <u>e</u> ate In:	Safety Partner Slot: C:\RSLogix 5000\Projects	Browse	
	_	J		
]

f) Click [Who Active] under the [Communications] menu, click "CompactLogix Processor", and then click [Set Project Path].

👪 Who Active		
Autobrowse Refresh Workstation,	<u>G</u> o Online <u>U</u> pload <u>P</u> owrniGad Update <u>F</u> irmware <u>C</u> lose Help	Select the Processor.
Path: AB_ETHIP-1\####################################	Set Project Path	Click Set Project Path.

g) Right-click [Ethernet] in the project tree [I/O Configuration], and click [New Module].



h) Complete the 2D-TZ535 card settings on the "New Module" screen.

	Input the name.	New Module		Input "100" for
		Type: ETHERNET-MODULE Generic Ethern Vendor: Allen-Bradley Paraet: LocalENB Name: TZ535_1	Connection Parameters Assembly	Input, "150" for Output, and "1" for Configuration.
Sel	ect "Data-SINT".	Description:	Instance: Size: Input: 100 8 - (8-bit)	
			Output: 150 8 - (8-	For Size, input the
		Comme Eormat: Data - SINT	Configuration: 1 0 🔆 (8-bit)	values set in
Inn	ut the IP address	IP Address: 192 . 168 . 0 . 200	Status Input:	parameters "EPSDLN" and
des	signated in address ameter "EPIP".	C Host Name:	Status Output:	"EPRDLN".
par		C Open Module Properties	OK Cancel Help	

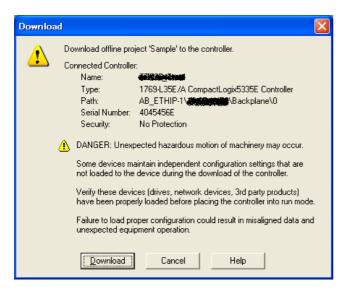
i) Set RPI.

Set RPI on the following screen which opens.

Module Properties: LocalENB (ETHERNET-MODULE 1.1)	
General Connection* Module Info	
Requested Packet Interval (RPI): 1 0.0 + ms (1.0 - 3200.0 ms)	Set "10".
Inhibit Module	
Major Fault On Controller If Connection Fails While in Run Mode	
Module Fault	
Status: Offline OK Cancel Apply Help	

If the above screen does not open, right-click "ETHERNET-MODULE arbitrary name" in the project tree, click [Properties], and click the [Connection] tab.

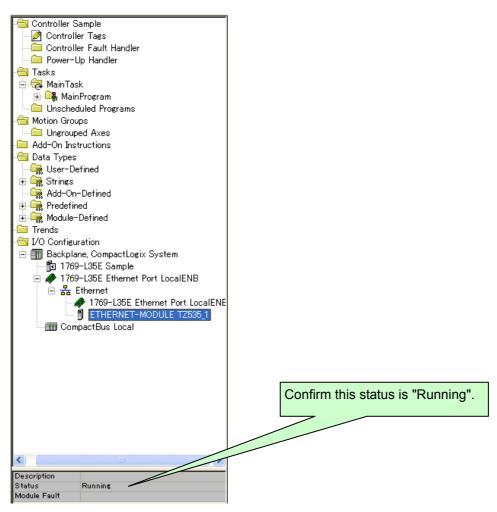
j) Click [Download] under the [Communications] menu, and click the [Download] button.



(7) Confirm that the status for the added "ETHERNET-MODULE" is "Running".

Click "ETHERNET-MODULE arbitrary name" in the project tree, and confirm that the "Status" display is "Running".

If the status is not "Running" and an error is displayed, refer to the PLC help and remove the cause of the error.



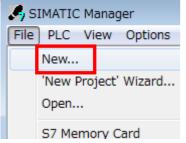
9.1.2. For the PROFINET IO 2-Port module

(1) Make the project of PLC newly.

Start "SIMATIC Manager".

For the wizard, click the [Cancel] button. And, click [File]-[New] from the menu.





Fill in the project name. Then click the [OK] button.

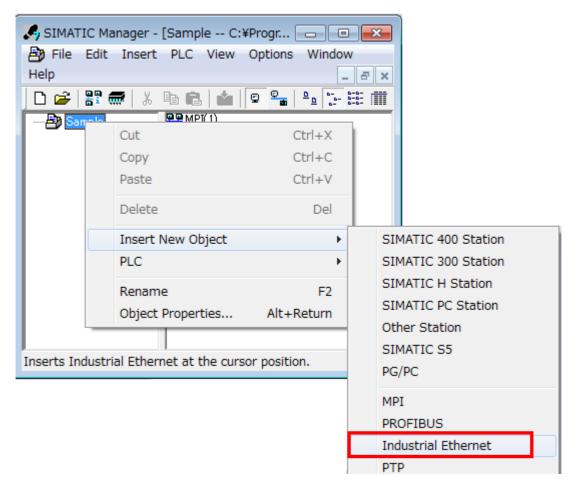
New Project	×
User projects Libraries Multiprojects	
Name Storage path	
B.	
Add to current multiproject	_
Na <u>m</u> e:	Type:
Sample	Project
Storage location (path):	🔲 <u>F</u> Library
C:¥Program Files¥Siemens¥Step7¥s7proj	Browse
ок	Cancel Help

(2) Set the hardware configuration of PLC.

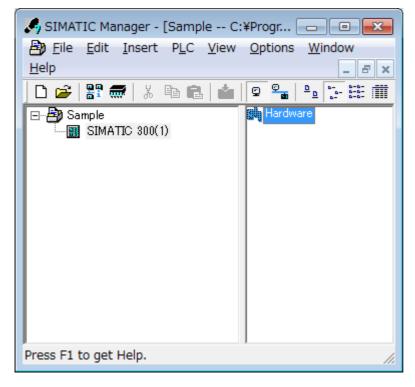
In a left frame with the displayed screen, right-clicking in the icon of the project name, and click the menu [Insert New Object] – [SIMATIC*** Station] (*** = Series number).

SIMA					
File Help	Edi	t Insert PLC Viev	v Options Windo	- 8 ×	
🗋 🗅 🚔		🛲 X 🖻 🛍 🎽			
	ample	PP MPI(1)		,	
		Cut	Ctrl+X	1	
		Сору	Ctrl+C		
		Paste	Ctrl+V		
		Delete	Del		
		Insert New Object	۱.	SIMA	TIC 400 Station
		PLC	+	SIMA	TIC 300 Station
		Rename	F2	SIMA	TIC H Station
		Object Properties	Alt+Return	SIMA	TIC PC Station

Again, right-clicking in the icon of the project name, and click the menu [Insert New Object] – [Industrial Ethernet].



Click [SIMATIC ***] in a left frame, and double-click [Hardware] displayed in a right frame.



Drag "Rail" that exists in [SIMATIC***] – [RACK-***] of "HW catalog" frame, and drop to the frame on the left on the displayed "HW configuration" screen. Similarly drag other units, and drop to a left frame. For instance, drag "PS 307 2A" of the power supply unit, and drop to slot 1 of "Rail". In addition, drag CPU, and drop to slot 2.

🖳 HW Config - [SIMATIC 300(1) (Configuration) Sample]	
🕅 <u>S</u> tation <u>E</u> dit <u>I</u> nsert <u>P</u> LC <u>V</u> iew <u>O</u> ptions <u>W</u> indow <u>H</u> elp	_ & ×
] D 🍃 🗣 🖳 👫 🚭 🛍 🛍 🎒 📼 🎇 K?	
A	
=	Eind: Mt Mi
	Profile: Standard 💌
	PROFIBUS DP PROFIBUS-PA
	🕀 🐨 PROFINET IO
	E III SIMATIC 300
	Ē Ē CP-300 ■
	⊕ 💼 CPU-300 ⊕ 💼 FM-300
	Gateway IM-300
•	
SIMATIC 300(1)	ACK-300
SI Designation	6ES7 390-1???0-0AA0 Available in various lengths
Press F1 to get Help.	

🖳 HW Config - [SIMATIC 300(1) (Configuration) Sample]		
M Station Edit Insert PLC View Options Window Help		_ & ×
D 🛩 📽 🖳 🦓 😂 🛍 🛍 🚯 📼 🔀 ½		
	•	
	Ξ	Eind: Mt Mi
፹(0) UR		Profile: Standard 💌
1 PS 307 2A		E
	<u> </u>	
5		IM-300
6		PS-300
		PS 307 10A
	-	📕 🖣 AS 307 10A
4		PS 307 2A PS 307 2A
		PS 307 5A
(0) UR		PS 307 5A
Sl Module Order Fi M I Q C.		
1 1 PS 307 2A 6ES7 307	^	6ES7 307-1BA01-0AA0 Load supply voltage 120/230 VAC: 24 VDC / 2 A
	Ŧ	VNO. 24 VDO 7 2 M
Insertion possible		

HW Config - [SIMATIC 300(1) (Configuration) Sample]	
Insert PLC View Options Window Help	_ & ×
D 😅 2~ 🖩 🖏 🚑 🖻 💼 🏜 🏜 🖺 🗔 🎇 💦	
Ethernet(1): PROFINET-IO-System (100)	
E	Eind: Mt Mi
코(0) UR	Profile: Standard 💌
1 PS 307 2A 2 CPU 314C-2 PN/DP	⊕ CPU 312
X1 MPL/DP X2 PN-IO	⊕
X2 P1 R Port 1 X2 P2 R Port 2	⊕
	⊕ CPU 313C-2 PtP ⊕ 🔁 CPU 314
-	⊞ ⊡ CRU 314 IFM ⊞
4	
(0) UR	È
SI Module Order Fi M I Q C	
1 D PS 307 2A 6ES7 307	6ES7 314-6EH04-0AB0 Work memory 192KB; 0.06ms/1000 instructions;
2 CPU 314C-2 PN/DP 6ES7 3 V3.3 2	0.06ms/1000 instructions; DI24/DO16; AI5/AO2
Insertion possible	

When CPU is dropped, the following properties(network setting) screen is displayed. Set a necessary item. Select "Ethernet(1)" displayed in the subnet item.

Properties - Ethernet interface PN-IO (R0/S2.2)	×
General Parameters	
	If a subnet is selected, the next available addresses are suggested.
IP address: 192.168.0.1 Subnet mask: 255.255.255.0	Gateway © <u>D</u> o not use router
Use different method to obtain IP address	C Use router Address:
Subnet:	
Ethernet(1)	<u>N</u> ew
Contract ()	Properties
	Delete
ОК	Cancel Help

(3) Set the "Size of the process-image area" of PLC.

Double-click dropping CPU. "Properties" screen is displayed.

Click [Cycle/Clock Memory] tab, and change the size of the process image input area and the size of the process image output area to "512".

🖳 HW Config - [SIMATIC 300(1) (Configuration) S	ample]		
Station Edit Insert PLC View Options	Window Help	_ 8 ×	
□ □ </td <td>· · · · · · · · · · · · · · · · · · ·</td> <td>Diagnostics/Clock Pr</td> <td></td>	· · · · · · · · · · · · · · · · · · ·	Diagnostics/Clock Pr	
(0) UR (0) UR SI Module Order F 1 PS 307 2A 6ES7 307 2 CPU 314C-2 PN/DP 6ES7 3 VS	Minimum scan cycle time [ms]: Scan cycle load from communication [%]: Prioritized OCM communication Size of the process-image input area: Size of the process-image output area: QB85 - call up at I/O access error: Clock Memory QB06k memory	0 20 512 512 No OB85 call up	
Slot is occupied, module is too wide, or the function	Memory byte:	0	Cancel Help

After that, Click the [OK] button. The screen is closed.

(4) Install the GSDML file for the robot.

Click [Options] – [Install GSD File...] from the menu.

🖳 HW Config - [SIMATIC 300(1) (Configuration) Sample]				
💵 Station Edit Insert PLC View	Options Window Help			
] D 😅 🐎 🔍 🛼 🎒 🖻 💼 🏙	Customize Ctrl+Alt+E			
Ethernet(1): PROFINET-IO-System (100	Specify Module			
	Configure Network			
🚍(0) UR	Symbol Table Ctrl+Alt+T			
1 S 307 2A	Report System Error			
2 CPU 314C-2 PN/D X1 MPVDP	Edit Catalog Profile			
X1 10F2 0F X2 PN-10	Update Catalog			
X2 P1 R Port 1	Install HW Updates			
X2 P2 R Port 2	Install GSD File			
	Find in Service & Support			

The GSD file is in CD-ROM of the attachment. The file name is "GSDML-V"Version" -MITSUBISHI-TZ535_PN -"Update day".xml. The Bmp file name is "GSDML-021C-3B01-TZ535_PN.bmp".

Select the corresponding GSD file and click [Install] button.

Install GSD Files	- Sector 1		X
Install GSD Files:	from the directory	•	
ļ <u>.</u>			<u>B</u> rowse
File	Release	Version Languag	es
GSDML-\ GSDML-\			
GSDML-V			
GSDML-V GSDML-V2.3-MITSUBISH	I-TZ585_PN-20140619×ml 06/19/2014 12:00:00 AM	V2.3 English	
Install	Show Log Select <u>A</u> ll <u>D</u> e:	select All	
Close			Help

When the installation is completed, the following screens are displayed.

Install GSD File (13:4986)
Installation was completed successfully.
OK I

Click the [OK] button. And Click [Close] button on [Install GSD Files] screen.

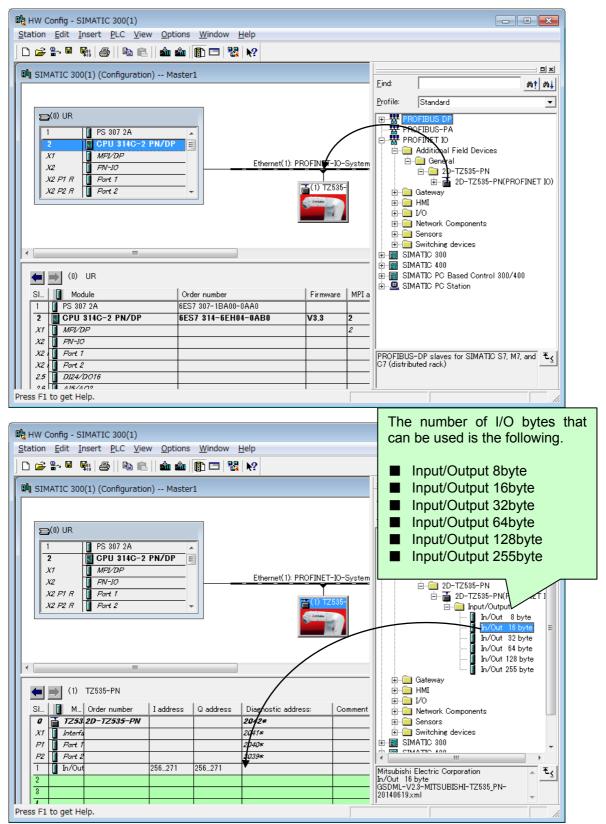
(5) Add the robot to the H/W configuration.

There is "2D-TZ535-PN(PROFINET IO)" icon for the Mitsubishi robot in the HW catalog frame ([PROFINET IO] – [Additional Field Devices] – [General] – [2D-TZ535-PN]).

Drag it, and drop to "Ethernet(1)".

Next, click [+] sign of the "2D-TZ535-PN(PROFINET IO)" icon. Then six items are displayed.

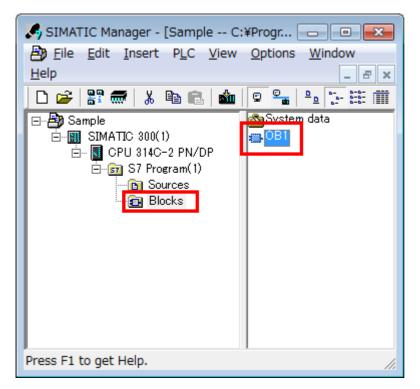
Drag the icon of a corresponding number of bytes to robot controller's parameter "PNIOLN", and drop to slot 1.



Save the setting clicking [Station] - [Save] from the menu.

(6) Make the program of PLC.

Click the [Blocks] icon of a left frame, and double-click [OB1] icon displayed in a right frame on the SIMATIC Manager screen.



Set the following content when the following "Properties - Organization Block" screen is displayed. •Fill in the [Symbol Name] on "General – Part1" tab.

•Change the [Created in Language] to "LAD".

Properties - Organization I	Block	a Cartaria	×
General - Part 1 General	- Part 2 Calls Attributes		
<u>N</u> ame:	OB1		
<u>S</u> ymbolic Name:	test		
Symbol <u>C</u> omment:		-	
Created in <u>L</u> anguage:	LAD 💌		
Project path: Storage location of project:	C:¥Program Files¥Siemens¥Step7¥	s7proi¥Sample	
Date created:	Code 08/08/2013 10:51:31 AM	Interface	
Last modified:	02/07/2001 03:03:43 PM	02/15/1996 04:51:12 PM	
C <u>o</u> mment:	"Main Program Sweep (Cycle)"		*
ОК		Cancel	Help

Click the [OK] button.

Drag SFC20 from [Libraries] - [Standard Library] – [System Function Blocks] of a left frame, and drop to a right frame on the displayed "Program window" screen.

LAD/STL/FBD - [OB1 "test" Sam			
Eile Edit Insert PLC Debug			_ & ×
	× 0 % m ⊂ × ∞ !≪	:>>! 🔲 🖪 🛤 ++ ++ -0 🕾 🕞	F(\?
		Contents Of: 'Environment¥Int	erface'
	⊡-@ Interface	Name	
E Status bits	Ē =⊞ - TEMP		
É inters]_	I
E Word logic ≡	OB1 : "Main Program	Sweep (Cycle)″	<u>^</u>
E B blocks	Comment:		
E → E blocks	oommerre.		
E SFB blocks	Network 1: Title:		
SFC blocks Multiple instances	Comment:		
	oomment.		
in the statis			
Standard Library			
PROFIenergy Blocks			
E Communication Block			
Organization Blocks			
E S5-S7 Converting Blc			
9-1 System Function Blo			
SFBU CIU IEC			
System Function Blocks			
<u> </u>			-
Program eleme 🖁 Call structure	•		
×			
I: Error 2: Info	3: Cross-references 入 4	⊹Address in fo. λ, 5:Modify λ, 6:Dia	enostics)∖ 7:Con
		. ·	
Press F1 to get Help.		© offline	Abs < 5.2
Press F1 to get Help.		<u> </u>	Abs < 5.2 //
		© offline	Abs < 5.2 //
🎼 LAD/STL/FBD - [0B1 "test" Sam		© offline 4C-2 PN/DP¥¥OB1]	Abs < 5.2
III LAD/STL/FBD - [OB1 "test" Sam ⊕ Eile Edit Insert PLC Debug V	iew <u>O</u> ptions <u>W</u> indow <u>H</u> e	© offline 4C-2 PN/DP¥¥OB1] Ip	
III LAD/STL/FBD - [OB1 "test" Sam ⊕ Eile Edit Insert PLC Debug V	iew <u>O</u> ptions <u>W</u> indow <u>H</u> e	© offline 4C-2 PN/DP¥¥OB1]	
III LAD/STL/FBD - [OB1 "test" Sam ⊕ Eile Edit Insert PLC Debug V	iew <u>O</u> ptions <u>W</u> indow <u>H</u> e	© offline 4C-2 PN/DP¥¥OB1] Ip	- = × - = ×
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LAD/STL/FBD - [OB1 "test" San Elie Edit Insert PLC Debug V SFC7 DP_PRAL SFC9 EN_MSG SFC10 DIS_MSG SFC10 DIS_MSG SFC11 DPSYC_F SFC12 D_ACT_L SFC13 DPNRMI SFC13 DPNRMI SFC14 DPRD_D/ SFC15 DPWR_D. SFC15 DPWR_D. SFC17 ALARM_S SFC18 ALARM_S SFC19 ALARM SFC20 BLKMOV SFC21 FILL MU SFC22 CREAT_L SFC23 DEL_DB SFC24 TEST_DE SFC25 COMPRES SFC25 COMPRES SFC25 COMPRES SFC26 LIDDAT_F BLKMOV / MOVE SEC41 Structure	iew Options Window He Comment: Comment: P#I 256.0 P#I 255 - SRCBLk		- ■ × - ■ × erface'

```
Specify the following content in the displayed "SFC20 block".

•[SRCBLK]:"P#I256.0 BYTE 255"

•[DSTBLK]:"P#Q256.0 BYTE 255"

•RET_VAL: Arbitrary variable (for instance, "MW10")
```

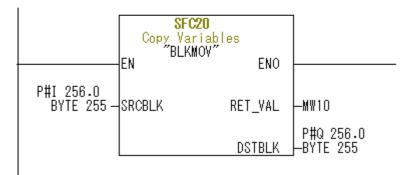
This program returns the signal that the robot output to the input signal of the robot as it is.

```
OB1 : "Main Program Sweep (Cycle)"
```

Comment:

Network 1: Title:

Comment:



(7) Specify the Ethernet card of the personal computer to make PLC communicated with the personal computer.

Click [Options] – [Configure Network] from the menu on "HW Config" screen.

🖳 HW Config - [SIMATIC 300(1) (Configuration) Sample]				
🕅 Station Edit Insert PLC View Op	🕅 Station Edit Insert PLC View Options Window Help			
D 🚅 🔓 🖩 🖏 🎒 🛍 🛍 🏙	Customize	Ctrl+Alt+E		
	Specify Module			
Ether	Configure Network			
🚍(0) UR	Symbol Table	Ctrl+Alt+T		
1 S 307 2A	Report System Error			
2 CPU 314C-2 PN/D X1 MPV/DP X2 PN-JO	Edit Catalog Profile Update Catalog			
X2 P1 R Port 1 X2 P2 R Port 2	Install HW Updates Install GSD File			

Click [Options] - [Set PG/PC Interface] from the menu on the displayed "NetPro" screen.

🔡 NetPro - [Sample (Network) C:¥Program Files¥¥Step7¥s7proj¥Sample]					
Network Edit Insert PLC View	Options Window Help				
🚰 🗟 🖏 🎒 🖻 💼 🏜 🏜 🔏 🛉	Customize	Ctrl+Alt+E			
Ethernet(1) Industrial Ethernet	Define Global Data				
MPI(1)	Set PG/PC Interface				

Select the Ethernet card of the personal computer that connects PLC with Hub, and click [OK] button.

Access Path LLDP / DCP PNIO Adapter					
Access Point of the Application:					
S7ONLINE (STEP 7)> TCP/IP ->					
(Standard for STEP 7)					
Interface <u>P</u> arameter Assignment Used: TCP/IP -> Atheros AR8131 PCI-E G., <activ< td=""><td>Properties</td></activ<>	Properties				
	Diagnostics				
	Copy				
	Delete				
(Assigning Parameters to Your NDIS CPs with TCP/IP Protocol (RFC-1006))					
Interfaces					
Add/Remove:	Sele <u>c</u> t				
ОК	Cancel Help				

(8) Set information on Internet Protocol address etc. of PLC and the robot (for TZ535-PN).

Click [PLC] – [Ethernet] – [Edit Ethernet Node] from the menu on "HW Config" screen.

HW Config - [SIMATIC 300(1			_ 0
Station Edit Insert PLC	View Options Window Help		_
] D 😅 ≌∼ 🗳 🗣 🎒	Download Upload	Ctrl+L	
=(0) UR	Download Module Identification Upload Module Identification to PG		e: Standard
1 PS 307 2 S CPU :	Faulty Modules		PROFINET IO
X1 MPL/D	Module Information	Ctrl+D	Haditional Theid Devices Eneral
X2 🗍 PN-10	Operating Mode	Ctrl+I	
X2 P1 R 🚺 Part 1	Clear/Reset		
X2 P2 R 📲 Port 2	Set Time of Day		È… on 2D-TZ535-PN(PROFINE
<	Monitor/Modify		In/Out 8 byte
(1) TZ535-PN	Update Firmware		In/Out 32 byte
SI M Order numb	Save Device Name to Memory Card		In/Out 128 byte
0 TZ53 2D-TZ535- X1 Interfa	Ethernet	•	Edit Ethernet Node
P1 Part 1	PROFIBUS	•	Verify Device Name
P2 Port 2	Save Service Data		Assign Device Name

Click [Browse] button on the displayed "Edit Ethernet Node" screen.

Edit Ethernet Node	X
Ethernet node	
MAC <u>a</u> ddress:	Nodes accessible online Browse

Select the node that corresponds to TZ535-PN. And, click [OK] button.

Browse Network - 2 No	odes			×
<u>Start</u> S <u>t</u> op	! IP address 192,168,0,1 192,168,0,2	MAC address	Device type S7-300 2D-TZ535-PN	Name pn-io tz535-pn
▼ F <u>a</u> st search				
	•			4
<u> </u>	MAC address:	00-30-11-09-12-61	_	
ок			Cancel	Help

Click the [Assign IP Configuration] button after inputting the "IP address" and "Subnet mask". Click the [Assign Name] button after Inputting the "Device name".

Ethomat words		
Ethernet node		Nodes accessible online
MAC <u>a</u> ddress:		<u>B</u> rowse
-Set IP configuration		
Use IP parameters		
IP address: Subnet mas <u>k</u> :	192.168.0.2 255.255.255.0	vateway ♥ Do not use router ♥ Use router Address:
	DUOD	- ,
○ Obtain IP address <u>fr</u> ☐ Identified by —	om a DHCP server	
Client ID	C MAC address	
AS ATION TO	 Intro dadress 	C De <u>v</u> ice name
Client ID:		C De <u>v</u> ice name
		C De <u>v</u> ice name
Client ID:		C De <u>v</u> ice name
Clie <u>n</u> t ID: A <u>s</u> sign IP Configur		C Degice name
Clie <u>n</u> t ID: A <u>s</u> sign IP Configur Assign device name Device name:	tz535-pn	
Clie <u>n</u> t ID:	tz535-pn	

Similarly, set "IP address" and "Subnet mask" etc. of PLC.

Ethernet node		
		Nodes accessible online
MAC <u>a</u> ddress:		<u>B</u> rowse
Set IP configuration		
 Use IP parameters 		
IP address:	192.168.0.1	Gateway C Do not use router
Subart modu	255,255,255,0	C Use router
Subnet mas <u>k</u> :	200.200.200.0	Address:
Obtain IP address <u>f</u>	from a DHCP server	
Identified by ———		
Client ID	C <u>M</u> AC address	C De <u>v</u> ice name
Clie <u>n</u> t ID:		
Assiss ID Config	meting [
A <u>s</u> sign IP Configu	ration	
	uration	
Assign device name —		
	pn-io	Assign Name
Assign device name — Device name:	pn-io	Assign Name
Assign device name — Device name:	pn-io	
Assign device name —	pn-io	Assign Name

(9) Download the set content to PLC.

Click [PLC] – [Download] from the menu on "HW Config" screen.

🖳 HW Config - [SIMATIC 300(1) (Configuration) Sample]						
🕅 Station Edit Insert	PLC	View	Options	Window	Help	
		Downlo	ad			Ctrl+L
		Upload.				

Select Target Module		x
Target modules:		
Module	Racks	Slot
OPU 314C-2 PN/DP	0	2
Select All		
OK Cancel	н	elp

Select corresponding PLC and click [OK] button.

Select Node Address					×	
Over which station address is the programming device connected to the module CPU 314C-2 PN/DP?						
<u>R</u> ack: Slot:						
Target Station:	 Local C Can be reached by r 	neans of gatewa;	У			
Enter connection to	target station:					
IP address	MAC address	Module type	Station name	Module name	Pla	
192.168.0.1						
•	III				P.	
Accessible Nodes						
•					P.	
		⊻iew				
ОК			Cancel	Help		

(10) Confirm the value of robot controller's parameter "PNIOLN".

Confirm the value of parameter "PNIOLN" by turning on robot controller's power supply, and using RT ToolBox2.

RT ToolBox2 - Conline)	
WorkSpace View Online Parameter Window Help	
RoboSim 🗸 🔯 🖉 🎘 📷	
Workspace × Parameter list 2:	
Robot1 I : RV-7FL-D View Parameter Name : PNIOLN Read Changed	Parameter list Read
Parameter Explanation	Attribute ^
OVRDMD OVRD after change MODE(TEACH->AUTO,AUTO->TEACH) OVRDOUT OVRD output requirement INPUT,During output OVRD OUTPUT	Common Common
Parameter edit Parameter name : PNIOLN Robot# : 0 Explanation : PROFINET IO Sending and Receiving data size (8/16/32/64/12	28/255)
Project Property × 1: 16	
Attribute Data	
Name RoboSim Language	
Communication TCP/IP: Ad Print Print	/rite Close
Ready Online	

(11) Confirm LED on PLC.

Change the switch of Siemens PLCfrom [STOP] to [RUN]. Confirm turning off LED SF, BF1, and BF2 on PLC.

The error occurs when LED lights red. Please correspond according to the content of the error.

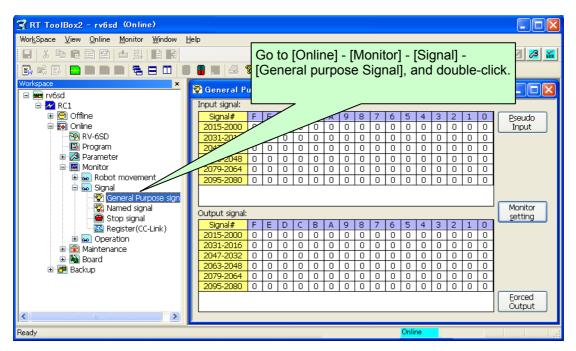
9.2. Checking the I/O Signals

9.2.1. For the EtherNet/IP module

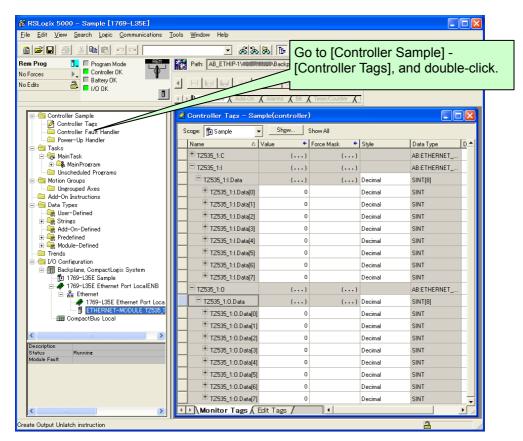
EtherNet/IP

Check the exchange of I/O signals using RT ToolBox2 and the RSLogix5000 "Controller Tags" screen.

(1) Start the RT ToolBox2 "General purpose Signal" monitor.



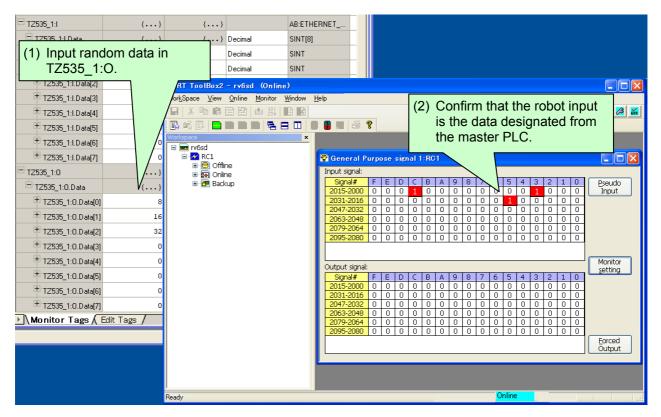
(2) Open the RSLogix5000 "Controller Tags" screen.



(3) Click [Bit Forced Output] button on the RT ToolBox2 "General-purpose OUTPUT signal" monitor, and test a random output.

Controller Tags - Sample(controller	RT ToolBox2 - rv6sd (Online) WorkSpace View Online Monitor Window Help
Scoge: Image: Stage Shage Shage Name △ Value ◆ Image: TZ535_1:C () ↓ ↓ Image: TZ535_1:I () ↓ ↓ Image: TZ535_1:I () ↓ ↓	General-purpose OUTPUT signal << Forced OUTPUT >> Head signal #: 2000 Set Bet 2015 2000 (2) Select random signals, and click [Bit Forced Output] button.
+ TZ535_1:1.Data[0] 1 + TZ535_1:1.Data[1] 2 + TZ535_1:1.Data[2] 3 + TZ535_1:1.Data[2] 4 + TZ535_1:1.Data[2] 4 + TZ535_1:1.Data[3] 4 + TZ535_1:1.Data[4] 0 + TZ535_1:1.Data[5] 0	2031 - 2016 0 <td< th=""></td<>
(3) Confirm that robot output is input into master PLC	Image: Signal # F E D C B A 9 8 7 6 5 4 3 2 1 0 Ut Signal # F E D C B A 9 8 7 6 5 4 3 2 1 0 2015-2000 0 0 0 0 0 0 0 0 0 0 1 1 0 1 1 0 0 1
+ T2535_1:0.Data[1] 0 + T2535_1:0.Data[2] 0 + T2535_1:0.Data[2] 0 + T2535_1:0.Data[3] 0 + T2535_1:0.Data[4] 0	2005-2080 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
+ TZ535_1:0.Data[5] 0 + TZ535_1:0.Data[6] 0 + TZ535_1:0.Data[7] 0	Decimal SINT Decimal SINT Decimal SINT Decimal SINT Decimal SINT
Monitor Tags / Edit Tags /	

(4) On the RSLogix5000 "Controller Tags" screen, execute a random output and confirm the input on the RT ToolBox2 general-purpose monitor.

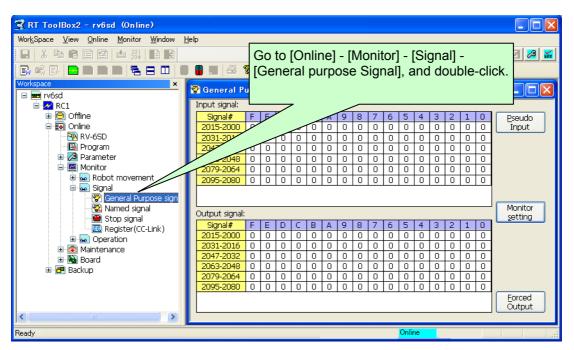


9.2.2. For the PROFINET IO 2-Port module

PROFINET IO

Check the exchange of I/O signals using RT ToolBox2 and the ""screen on SIMATIC Manager.

(1) Start the RT ToolBox2 "General purpose Signal" monitor.



(2) Click the [TZ535-PN] on "HW Config" screen.

🖎 HW Config - SIMATIC 300(1)					
<u>S</u> tation <u>E</u> dit <u>I</u> nsert <u>P</u> LC <u>V</u> iew <u>O</u> ptions <u>W</u> indow <u>H</u> elp					
D 😅 💱 🖩 🙀 🎒 🗈 🗈 🖄 🏜 🚯 📼 👯 📢					
SIMATIC 300(1) (Configuration) Master1	Click the	e [TZ535-PN] icon.			
		Profile: Standard 🗨			
(0) UR		PROFIBUS DP			
1 PS 307 2A		PROFIBUS-PA			
2 CPU 314C-2 PN/DP		Additional Field Devices			
x1 1 10P2/0P x2 1 PN-10	Ethernet(1): PR(INET-IO-:	System General			
X2 P1 R Port 1		É 2D-TZ535-PN È 届 2D-TZ535-PN(PROFINET)			
X2 P2 R Port 2 -	(1) TZ535-				
	Annae	In/Out 8 byte			
		In/Out 64 byte			
- III		In/Out 128 byte			
		In/Out 255 byte			
(1) TZ535-PN		HMI HMI			
SI., M., Order number I address Q a	dress Diagnostic address: Co	mment Roman Network Components			
0 ₩ 1253 2D-12535-PN	2042*	omment Network Components			
X1 Interfa	2041*	👘 💼 Switching devices			
P1 Port 1	2040*				
P2 1 Part 2	2039*				
1 🚺 In/Out 256271 256	271	Mitsubishi Electric Corporation			
		In/Out 16 byte GSDML-V2.3-MITSUBISHI-TZ535_PN-			
		20140619×ml			
Press F1 to get Help.					

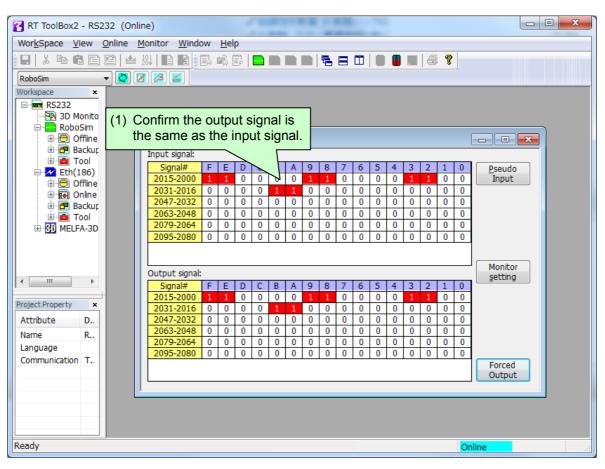
(3) Right-click ir	"In/Out **byte"	of slot 1, and click	[Monitor/Modify] button.
--------------------	-----------------	----------------------	--------------------------

ш́. М	1oni	itor/	/Modify	/ - In/Out	16 byte - (R-/S1)				×
Onli	Online via assigned CPU services								
<u>P</u> atł	n:		Samp	le¥SIMATIC	300(1)¥CPU 314C-2 P	N/DP			
	1	Add	ress	Symbol		Display format	Status value	Modify value	^
1		\mathbb{B}	256			HEX			
2		B	257			HEX			=
3		B	258			HEX			
4		B	259			HEX			
5		B	260			HEX			
6		B	261			HEX			
7		\mathbb{B}	262			HEX			
8		B	263			HEX			
9		\mathbb{B}	264			HEX			
10		\mathbb{B}	265			HEX			
11		B	266			HEX			+
R	un c	-	tionally	ifective	Update Force Syn Run immediately & Status Value		able Peripheral	Outputs	
۲ و	Mo	odify <u>T</u> i	rigger		Mod <u>i</u> fy Value) <u>D</u> isplay	RUNNING	_
	CI	ose						Help	

(4) Click [Bit Forced Output] button on the RT ToolBox2 "General-purpose OUTPUT signal" monitor, and test a random output.

	RT Too	olBox2 - RS23	2 (Online)				_									<u>لا</u> ال
			nline Monitor				()								nd cli	ck 📃
	RoboSim				JEW WWE	× 📥 🗉		լե	Bit Fo	orce		ιτρι	itj d	utto	n.	
	Workspace	×						_/	7			_	_			x
Monitor/Modify - In/Out 16 byte - (R-/S1)	R	\$232	General	-purpo	se OUTPU	r signal	<< For	ced /								
Online via assigned CPU services					#: 3	2000	\square				R	efresh			C	ose
-	1/0.0						\checkmark									<u> </u>
						2015						2000				
		Status value B#16#0C	Modify value	<u></u>	2000	1 1 0		0 1 1	- 0	οο	11	0 0	=	C	30C (H	lex)
	HEX HEX	B#16#0C B#16#C3		1	Click on -> theck box.			V V			V V	2016			Set	
	HEX	B#16#00		=	2016				- 00				_			
	HEX	B# 1 6#0C		1	Click on ->									0	C00 (H	lex)
	HEX	#00		-	heck box.						Bit Force				Port Force	_
D	HEX HEX	#00		-											OUTPUT	·
10 202		00		-												
	HEX /	po													-	
10 B 265 (2) Confirm t	<u> </u>			1												
11 B 266 (3) Confirm t		•	L	Ŧ	utput sign	al:									Mor set	
Row Not Effective is input in	to mast	ter PLC.			Signal#	F E	DC	B	A 9 :	B 7	6 5	4	3 2	1 0		.ing
					2015-2000		0 0		0 1	1 0	0 0	0	1 1)	
Run conditionally Run immediately					2031-2016				-	0 0	0 0		0 0	0 (-	
Monitor		able Peripheral C	Jutputs		2047-2032					00	0 0		00)	
Modify Modify Value	I/0	<u>D</u> isplay			2003-2040					0 0	0 0	-	0 0		5	
Strigger		A 1			2095-2080	0 0	0 0	0	0 0	0 0	0 0	0	0 0	0 ()	
			RUNNING	-		(1)	Click	(Eo	rood		nut1			~	For	
Close			Lie I-	1				-	lea	Out	pulj			-		put
UIUSE			Help				butto	n.							_	
	LINEQUV				_								Onlin	0		

(5) Confirm the output signal has returned to the input as it is on the RT ToolBox2 general-purpose monitor.



9.3. Execution of robot program

9.3.1. Setting the dedicated input/output

Set the dedicated input/output as shown below. After changing the parameters, turn the power OFF and ON once.

Refer to the separate "Instruction Manual, Detailed Explanation of Functions and Operations" for details on the settings.

Parameter	Input		Output		
name	Meaning	No.	Meaning	No.	
IOENA	Operation rights enable	2000	Operation rights enabled	2000	
START	Program start	2001	Program starting	2001	
STOP2	Stop	2002	Stopping	2002	
SLOTINIT	Program reset	2003	Program selection enabled	2003	
SRVON	Servo power ON	2004	Servo ON	2004	
SRVOFF	Servo power OFF	2005			

 Table 9-1
 Setting the dedicated input/output

9.3.2. General-purpose input/output

The general-purpose inputs and outputs can be accessed with the I/O system variables such as M_In and M_Out.

Note that when accessing multiple bits with a variable such as M-Inb, M_Inw, M_Outb or M_Outw, the access cannot extend over an area used by EtherNet/IP, such as the number 1999. Always create the program to fit within the area between 2000 and 4047.

Correct example) M_In(2000), M_Inb(2010), M_Out(3000), M_Outb(3010), etc. Incorrect example) M_Inb(1999), M_Inw(5070), M_Outb(1999), M_Outw(1999), etc.

9.3.3. Example of robot program creation (using general-purpose input/output)

*LBL1:If M_In(2008) = 0 Then GoTo *LBL1 M1 = M_Inb(2000) M_Out(2009) = 1 *LBL2:If M_In(2008) = 1 Then GoTo *LBL2 M_Out(2009) = 0 Select M1	Input No. 2008 and output No. 2009 are used as interlocks. Refer to "4.5.1 Robot system status variables for 2D-TZ535 card" for details on the interlock.
Case 1 GoSub *LOAD break	- When M1(*1) is 1, jumps to the label *LOAD line.
Case 2 GoSub *UNLOAD break Case 3	When M1(*1) is 2, jumps to the label *UNLOAD line.
GoSub *GOHOME	When M1(*1) is 3, jumps to the label *GOHOME line.
End Select End *LOAD	(*1) M1 is byte data received via EtherNet/IP. (Refer to the second line of the program.)
: Return *UNLOAD	Describe the process in the label *LOAD.
: Return [●] *GOHOME	Describe the process in the label *UNLOAD.
: Return [◀]	Describe the process in the label *GOHOME.

9.3.4. Sample program for input/output confirmation

A sample program for confirming the 2D-TZ535 card input/output is shown below. Use this as necessary for startup adjustment, etc.

Robot side input (master station output)	Input 2000 to 4047 (256 bytes)
Robot side output (master station input)	Output 2000 to 4047 (256 bytes)

Robot program specifications

Copy all input bits to the output bits.

```
[Program example 1]
'Loop the input signal to the robot back to the output signal. (For bit checking)
For M1 = 2000 To 4047
  M_Out(M1) = M_In(M1) 'Copy with bit variable
Next M1
End
[Program example 2]
'Loop the input signal to the robot back to the output signal. (For byte checking)
For M1 = 2000 To 4040 Step 8
  M_Outb(M1) = M_Inb(M1) 'Copy with byte variable
Next M1
End
[Program example 3]
'Loop the input signal to the robot back to the output signal. (For word checking)
For M1 = 2000 To 4032 Step 16
  M_Outw(M1) = M_Inw(M1) 'Copy with word variable
Next M1
End
```

Execute this program and check the signals looped back to the master station side.

10. Troubleshooting

Please read this chapter first if you suspect that some failure has occurred.

10.1. List of Errors

 \wedge

♦♦♦ The meanings of the error numbers are shown below. ♦♦♦ □ 0000 *	
An error marked with an asterisk (*) requires por Perform the actions indicated in the countermea	
• The error type is shown with a 4-digit number.	
• The errors are categorized into three types.	
H: High-level error Servo-OFF is perf	ormed.
L: Low-level error Operation stops. C: Warning Operation continu	es.

Table 10-1 List of errors related to the network base card

Error No.		Error cause and measures					
H.6100	Error message Cause	Module is not mounted. A module board by HMS must be mounted in the network base card. A module board is not mounted in the network base card.					
	Measures	Mount a module suitable for the network base card.					
H.6101	Error message Cause Measures	Unsupported module mounted error An unsupported HMS module board is mounted in the network base card. Replace the module.					
H.6110	Error message Cause Measures	Multiple network base cards are mounted.Only one network base card can be mounted.Two or more are currently mounted in the option slot.Mount only one network base card.					
H.6111	Error message Cause Measures	Another fieldbus card is mounted. Only one fieldbus card can be mounted. A CC-Link card, PROFIBUS card or DeviceNet card is mounted. Mount only one fieldbus card.					
	Error message	Network base card error n. (n is a number between 1 and 4.)					
H.6120	Cause	A network base card error has been detected. n=1: A watch dog timeout has occurred with the communication module. n=2: An unsupported object, instance or command has been issued. n=3: The received form is incorrect. n=4: The I/O offset amount is incorrect. n=5: IP address is incorrect. n=6: Subnet mask IP address is incorrect. n=7: Gateway IP address is incorrect.					
	Measures	Replace the network base card. Contact the manufacturer when replacing the card.					

Error No.	Error cause and measures						
	Error message	Network communication error n. (n is a number between 1 and 2.)					
H.6130	Cause Line error or invalid parameter. This can occur if communication is not established when: (1) T program is started, (2) Continuous operation is attempted with execution from the RT ToolBox2, or (3) An execution program while an error is occurring. n=1: Ethernet cable is disconnected. n=2: IP address is not established.						
	Measures	Check the cable and parameters.					
	_						
	Error message	Parameter error (parameter name)					
H.6140	Error message Cause	The parameter setting is invalid. The parameter value is not within range, or the data is invalid and cannot be read.					
H.6140		The parameter setting is invalid. The parameter value is not within range, or the data is invalid and cannot be					
H.6140	Cause	The parameter setting is invalid. The parameter value is not within range, or the data is invalid and cannot be read.					
H.6140 H.6190	Cause Measures	The parameter setting is invalid. The parameter value is not within range, or the data is invalid and cannot be read. Check the parameter setting value.					

11. Appendix

11.1. Displaying the Option Card Information

The option card information can be displayed with the RT ToolBox2 (option).

In the online state, click "Online" in the work space tree, and click "Slot n (n=1 to 3): Network Base" under "Board". The 2D-TZ535 card information will be read into the properties window.

* The option card information in the properties window is not updated automatically. To update the information, go offline and then online and repeat the above steps.

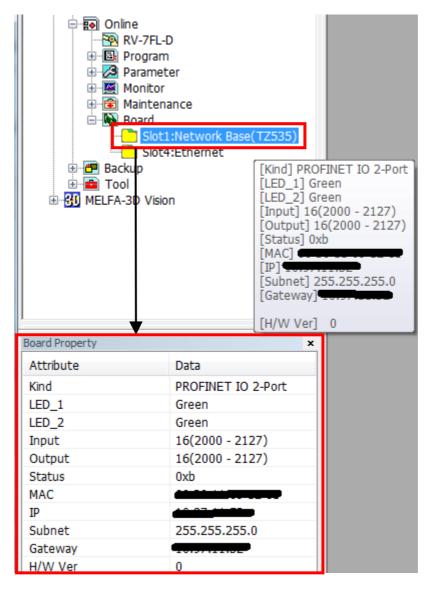


Figure 11-1 Example of displaying option card information with RT ToolBox2

11.1.1. For the EtherNet/IP module

EtherNet/IP

Table 11-1	2D-TZ535 card information(For EtherNet/IP modu	ıle)
------------	--	------

	Display item	Display example	Meaning	Remarks
	Card name	Network Base (TZ535)	Card name	
	[Kind]	EtherNet/IP	Name of Anybus-CC module on network base card	
	[LED_1]	Green	Module Status LED status	
	[LED_2]	Green	Network Status LED status	
	[Input]	8 (2000 - 2063)	Number of received bytes (signal number)	1(-) to 256 (2000 – 4047)
ation	[Output]	8 (2000 - 2063)	Number of send bytes (signal number)	1(-) to 256 (2000 - 4047)
Card information	[Status]	0003	Network status	bit 0: Linked bit 1: IP address established
pro	[MAC Address]	**_**_**_**_**	MAC address	
ö	[IP]	*** *** ***	IP address	Parameter [EPIP]
	[Subnet]	*** *** ***	Subnet Mask	Parameter [EPMSK]
	[Gateway]	*** *** ***	Gateway	Parameter [EPGW]
	[H/W Ver]	0	Card group number	0: G51 to 6: G57 7: Use prohibited

PROFINET IO

11.1.2. For the PROFINET IO 2-Port module

	Display item	Display example	Meaning	Remarks			
	Card name	Network Base (TZ535)	Card name				
	[Kind]	PROFINET IO 2-Port	Name of Anybus-CC module on network base card				
	[LED_1]	Green	Module Status LED status				
	[LED_2]	Green	Network Status LED status				
	[Input]	16 (2000 - 2127)	Number of received bytes (signal number)	8 / 16 / 32 / 64 / 128 / 255			
и	[Output]	16 (2000 - 2127)	Number of send bytes (signal number)	8 / 16 / 32 / 64 / 128 / 255			
Card information	[Status]	0003	Network status	bit 0: Linked bit 1: IP address established bit 3: Link port1 bit 4: Link port2			
Cal	[MAC Address]	**_**_**_**_**	MAC address				
	[IP]	*** *** ***	IP address	Set address from PLC			
	[Subnet]	*** *** ***	Subnet Mask	Set address from PLC			
	[Gateway]	*** *** ***	Gateway	Set address from PLC			
	[H/W Ver]	0	Card group number	0: G51 to 6: G57 7: Use prohibited			

11.2. Pseudo-input Function

The pseudo-input function for the EtherNet/IP network base card allows the pseudo input signals from RT ToolBox2.

Usable cases and usage methods are explained below.

No.	Network base card (TZ535) status	Condition	Usability
1	Not mounted		×
2		Network cable not connected	•
3	Mounted	Network cable connected, but a communication error occurring	•
4		In normal communication	•
		 indicates usable, 	and × indicates not

* A pseudo-input is not possible while an error is occurring.

<Usage method>

(1) Start RT ToolBox2.

(2) Click [Online] - [Monitor] - [Signal Monitor] - [General Signals] in the work space tree, and start the general-purpose signal monitor.

3	General P	urp	930	sier	al 1	RC	1											
Р	Input signal:																	
	Signal #	F	E	D	¢	В	Α	9	8	7	6	5	4	3	2	1	0	Eseudo
	15-0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Input
	31- 16	0	0	0	0	0	Û	0	0	0	0	0	0	0	0	Û	0	
k	Output signal:																	Monitor setting
	Signal#	F	E	D	C	8	٨	9	8	7	6	5	4	3	2	1	Û	
	15-0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
	31-16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
																		Eorced Output

(3) Click the [Pseudo-input] button.

General-purpose INPUT signal << Pseudo-INPUT >	»>	X
Head signal #: 0	Refresh	
15 15-000000000000000000000000000000000000		000 (Hex) Se <u>t</u> 000 (Hex)
	Bit Pseudo-INPUT	Port eudo-INPUT

(4) Input the signal number (2000 or higher) in the "Head signal #" field and click the [Set] button.(5) Select the check box for the signal to be input, and click the [Bit pseudo INPUT] button.

	5		,
General-purpose INPUT signal << Pseudo-IN	NPUT >>		
Head signal #: 6000	Refresh		
6015 6015 - 6000 0 0 0 0 0 0 0 0 Click on -> 0 0 0 0 0 0 0 check box. 6031		=	0001 (Hex)
6031 - 6016 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		=	0000 (Hex)
check box.	Bit Pseudo-INPUT		Port Pseudo-INPUT

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