# OMRON

## **PROFINET** Fieldbus

# **Industrial Robot Configuration**

**User's Guide** 



#### - NOTE -

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## Introduction

This manual is OMRON's original instructions describing the setup and operations of the product. Please read this manual and make sure you understand the functionality and performance of PROFI-NET fieldbus before attempting to use it.

Keep this manual in a safe place where it will be available for reference during operation.

## **Intended Audience**

This manual is intended for the following personnel, who must also have knowledge of factory automation (FA) systems, robotic control methods, and Siemens controller configuration methods.

- Personnel in charge of introducing FA systems.
- · Personnel in charge of designing FA systems.
- Personnel in charge of installing and maintaining FA systems.
- Personnel in charge of managing FA systems and facilities.

## **Applicable Models**

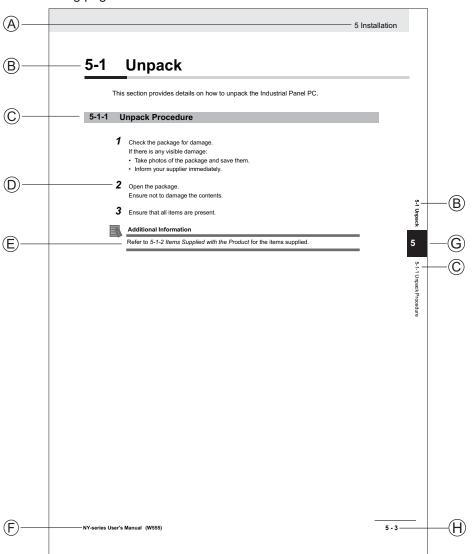
This manual provides information for industrial robots that support PROFINET fieldbus. When information varies between different robot models, details are provided.

## Units

All units are metric unless otherwise noted.

# **Manual Information**

## **Page Structure**



The following page structure is used in this manual.

Note: This illustration is provided as a sample. It will not literally appear in this manual.

Item	Explanation	ltem	Explanation
А	Level 1 heading	Е	Special Information
В	Level 2 heading	F	Manual name
С	Level 3 heading	G	Page tab with the number of the main section
D	Step in a procedure	Н	Page number

## **Special Information**

Special information in this manual is classified as follows:

#### Precautions for Safe Use

Precautions on what to do and what not to do to ensure safe usage of the product.



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#### **Precautions for Correct Use**

Precautions on what to do and what not to do to ensure proper operation and performance.

#### Additional Information

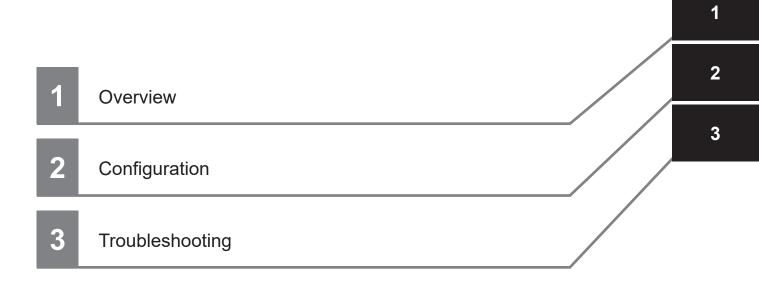
Additional information to read as required. This information is provided to increase understanding or make operation easier.



#### Version Information

Information on differences in specifications and functionality between different versions.

# **Sections in this Manual**



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## Warranty and Limitations of Liability

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Information presented by Omron Companies has been checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical or proofreading errors or omissions.

# **Safety Precautions**

## **Definition of Precautionary Information**

The following notation is used in this manual to provide precautions required to ensure safe usage of the OMRON Industrial Robots that support PROFINET communications. The safety precautions that are provided are extremely important to safety.

Always read and heed the information provided in all safety precautions.

The following notation is used.

A DANGER	Identifies an imminently hazardous situation which, if not avoid- ed, is likely to result in serious injury, and might result in fatality or severe property damage.
	Indicates a potentially hazardous situation which, if not avoid- ed, could result in death or serious injury. Additionally, there may be severe property damage.
	Indicates a potentially hazardous situation which, if not avoid- ed, may result in minor or moderate injury, or property damage.

## **Symbols**

	The circle and slash symbol indicates operations that you must not do. The specific opera- tion is shown in the circle and explained in text. This example indicates prohibiting disassembly.
	The triangle symbol indicates precautions (including warnings). The specific operation is shown in the triangle and explained in text. This example indicates a precaution for electric shock.
$\underline{\mathbb{N}}$	The triangle symbol indicates precautions (including warnings). The specific operation is shown in the triangle and explained in text. This example indicates a general precaution.
0	The filled circle symbol indicates operations that you must do. The specific operation is shown in the circle and explained in text. This example shows a general precaution for something that you must do.
	The triangle symbol indicates precautions (including warnings). The specific operation is shown in the triangle and explained in text. This example indicates a precaution for high temperatures.

## Warnings

# 

## Cybersecurity

To maintain the security and reliability of the system, a robust cybersecurity defense program should be implemented, which may include some or all of the following:

#### Anti-virus protection

- Install the latest commercial-quality anti-virus software on the computer connected to the control system and keep the software and virus definitions up-to-date.
- Scan USB drives or other external storage devices before connecting them to control systems and equipment.

#### Security measures to prevent unauthorized network access

- Install physical controls so that only authorized personnel can access control systems and equipment.
- Reduce connections to control systems and equipment via networks to prevent access from untrusted devices.
- Install firewalls to block unused communications ports and limit communication between systems. Limit access between control systems and systems from the IT network.
- Control remote access and adopt multifactor authentication to devices with remote access to control systems and equipment.
- Set strong password policies and monitor for compliance frequently.

#### Data input and output protection

- Backup data and keep the data up-to-date periodically to prepare for data loss.
- Validate backups and retention policies to cope with unintentional modification of input/ output data to control systems and equipment.
- Validate the scope of data protection regularly to accommodate changes.
- Check validity of backups by scheduling test restores to ensure successful recovery from incidents.
- Safety design, such as emergency shutdown and fail-soft operations in case of data tampering and incidents.

#### Additional recommendations

- When using an external network environment to connect to an unauthorized terminal such as a SCADA, HMI or to an unauthorized server may result in network security issues such as spoofing and tampering.
- You must take sufficient measures such as restricting access to the terminal, using a terminal equipped with a secure function, and locking the installation area by yourself.
- When constructing network infrastructure, communication failure may occur due to cable disconnection or the influence of unauthorized network equipment.
- Take adequate measures, such as restricting physical access to network devices, by means such as locking the installation area.
- When using devices equipped with an SD Memory Card, there is a security risk that a third party may acquire, alter, or replace the files and data in the removable media by removing or unmounting the media.
- Please take sufficient measures, such as restricting physical access to the Controller or taking appropriate management measures for removable media, by means of locking and controlling access to the installation area.
- Educate employees to help them identify phishing scams received via email on systems that will connect to the control network.



# **Related Manuals**

Use the following related manuals for reference.

Manual Title	Description
Automation Control Environment (ACE) Version 4 Us- er's Manual (Cat. No. I633)	Instruction for the use of the ACE Version 4 software.
V+ User's Manual (Cat. No. I671)	Provides a description of the V+ programming lan- guage and functionality.
V+ Keyword Reference Manual (Cat. No. I672)	Provides reference to V+ Keyword use and functionali- ty.
Robot User's Manual	User Manual for specific robot types.

# **Revision History**

A manual revision code appears as a suffix to the catalog number on the front and back covers of the manual.



Revision code	Date	Revised content
01	June 2023	Original production
02	March 2024	Updates and minor modifications.

# 1

# **Overview**

This section provides a general overview.

1-1	Introdu	iction	.1-2
		PROFINET Specifications	
		Robot Firmware and Software Requirements	
	1-1-3	Data Types	. 1-3
		• •	

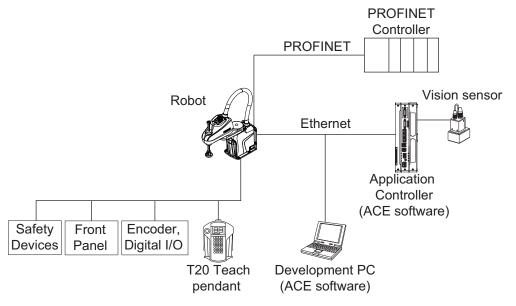
# **1-1** Introduction

This document provides information about PROFINET configuration and programming methods for OMRON Industrial Robots.

PROFINET fieldbus provides the ability for OMRON Industrial Robots to exchange data with other industrial devices. The robot can be configured as a PROFINET device for communications with a PRO-FINET controller.

V+ variables and robot status information can be shared over the PROFINET fieldbus allowing movement and control with simple programming methods.

The PROFINET implementation uses a vendor-specific device profile that is detailed in this document. The typical PROFINET system configuration is shown below.



## 1-1-1 **PROFINET Specifications**

PROFINET communication specifications are provided below.

Item	Specification
Protocol	PROFINET v2.4
Class	В
Device profile	Vendor specific I/O
IO connection cycle time <sup>*1</sup>	4, 8, 16, 32, 64, 128, 512 ms
Maximum data payload	512 bytes for Input and 512 bytes for Output
Sub-slot limit	Slot 1 with V+ variable exchange can contain only 32
	sub-slots.

\*1. IO Connection Cycle Time controls communication interval independent of the robot controller data refresh rate.

## 1-1-2 Robot Firmware and Software Requirements

The following firmware and software versions are required for PROFINET support.

- Firmware: version 6.0C6 or higher.
- Software: ACE version 4.7.3 or higher.

- i4L Robot Controller: Revision B and above.
- i4H Robot Controller: Revision C and above.



#### **Additional Information**

Contact your local OMRON representative for more information about robot controller types not listed above.

## 1-1-3 Data Types

Use the following information to understand all data types and sizes.

Data Type	Byte Size	Array Option (Byte Size)
BOOL	1	8/16/32 (1/2/4)
INT	2	16/32 (32/64)
DINT	4	16/32 (64/128)
REAL	4	6/16/32 (24/64/128)
LREAL	8	6/16/32 (48/128/256)
String	32 (1 byte for each character)	Not Available

1

1 Overview

# 2

# Configuration

2-1	Basic	c Configuration Steps	
		i4H Typical Connections	
		i4L Typical Connections	
2-2	Confi	iguration Example	
2-3	V+ Pı	rogram Example	

# 2-1 Basic Configuration Steps

Basic PROFINET configuration steps are provided below. Refer to 2-2 *Configuration Example* on page 2-5 for a specific configuration example.

The following items are required for PROFINET configuration:

- Siemens TIA Portal configuration software.
- A Siemens PLC that supports PROFINET controller functionality.
- · An OMRON Industrial Robot that supports PROFINET device functionality.
- ACE software version 4.7 or higher.
- An installed robot device and a PLC controller with proper network connections.
- · Ethernet network equipment and cabling.

Refer to the Automation Control Environment (ACE) Version 4 User's Manual (Cat. No. 1633) for more information about the Configure PROFINET Settings area.

- 1 Connect all required network equipment and cabling.
- **2** Obtain the GSDML file using ACE.
- **3** Install the GSDML file using TIA Portal.
- 4 Add the robot device and make configuration settings in TIA Portal.
- **5** Add, compile, and download the TIA Portal configuration to the PLC.
- **6** Make robot configuration settings with ACE software.
- **7** Confirm data exchange between the robot and PLC.
- 8 Scan for the new robot device.

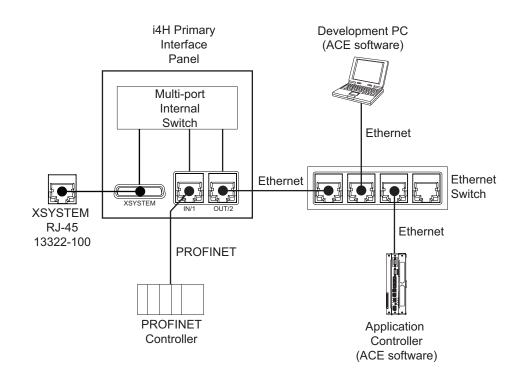
## 2-1-1 i4H Typical Connections

The following figure shows typical PROFINET connections for an i4H robot. This is a typical connection method, but due to the presence of an internal switch, other configurations are possible.



#### Additional Information

When PROFINET is enabled, Port IN/1 is reserved for PROFINET communications only.



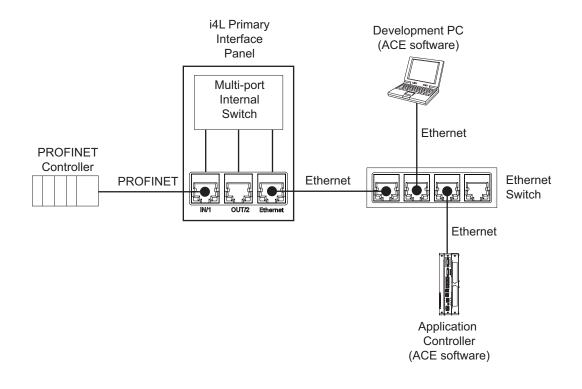
## 2-1-2 i4L Typical Connections

The following figure shows typical PROFINET connections for an i4L robot. This is a typical connection method, but due to the presence of an internal switch, other configurations are possible.



## Additional Information

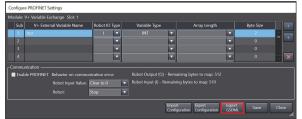
When PROFINET is enabled, Port IN/1 is reserved for PROFINET communications only.



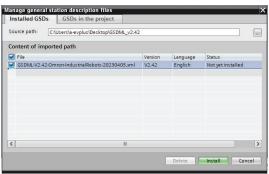
# 2-2 Configuration Example

This configuration example provides step-by-step instructions to configure the robot in a PROFINET network under the following conditions.

- A Siemens S7-1200 or 1500 PLC is used as the PROFINET controller.
- An i4L robot is used as the PROFINET device.
- TIA Portal version 15 is used with the PLC added.
- ACE software version 4.7 is used with the robot added and online.
- The robot will exchange data using i\_bool\_8[] and q\_bool\_8[] BOOL array variables (array length is 8, 1 byte).
  - 1 Obtain the GSDML xml file for the robot using ACE. The GSDML file is stored in the robot controller. Connect to the robot controller using ACE. Open the *Configure PROFINET Settings* area and then click the **Export GSDML** Button.



2 Install the GSDML file using TIA Portal.



**3** Confirm that OMRON Corporation robots are listed in the Catalog area.

Hardware	e catalog		# 11 )
Options			
✓ Catalo	g		
<search></search>			lini lini
Filter	Profile:	<all></all>	
• Cont	rollers	(h)	110
HMI			
PC s	stems		
	es & starter	s)	
	vork compo		
Dete	cting & Mo	nitoring	
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• 🖬	Gateway		
	NC/RC		
	OMRON	I Corporation	
	- Indu	istrial Robots	
		4H-Series	
		4L-Series	
		i4-350L, 180mm quill	
		i4-350L, 180mm quill, wall mount	
		i4-450L, 180mm quill	
		i4-450L, 180mm quill, wall mount	
		i4-550L, 180mm quill	
		i4-550L, 180mm quill, wall mount	
		i4-550L, 350mm quill	
		i4-550L, 350mm quill, wall mount	
	Sensors		
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4 Add the robot device to the Network view with TIA Portal.

Demo + Devices & networks		_∎≡×
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💦 Network 🔛 Connections 🛛 HM connection 💌 🕎 🖽 🛄 🍳 🛨	Network overview Connect	ctions
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378 omron-industri	PLC_378	CPU 1212C AC/DC/Rly
1212C 14-450L, 180m DP.NORM	✓ GSD device_1	GSD device
PLC_378	omron-industrial-robot	i4-450L, 180mm quill
	•	
PN/IE_1		
	~	
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**5** Assign the IP address of the robot with TIA Portal.

Project tree 🛛 🕄 🕻	Demo → Ungrouped devices →	omron-industrial-robot [i4-450L, 180mm quill]
Devices		
Devices	Original Conference on Automatical Sectors of Conference on Confere	Protected append unatification access a by size of Measure and Presson's agreentation.     Pre more enformation advocumduated accump, please visit     They Announcement cominification accump, please visit
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<ul> <li>Sign Online access</li> <li>Sign Carle Readent/St memory</li> <li>Control Readent/St memory</li> <li>Control Readent/St memory</li> <li>V Datality view</li> </ul>	General ID Lag Syste General ID Lag Syste Grant Bonario PROFECTentheck(1) General Herrolicate Subtractor Herrolicate Subtractor Management Management Participation Management Option Participation Pa	Inhumentaliti     Itenso     Name       Interface networked with     Soldners:     Interface networked with       Interface networked with     Interface networked with       IP protocol     If address soldner:
Name		PROFINET  PROFINET Converse PROFINET device nume automatically  PROFINET converter name: [ms]78  Device number: [1 •

6

Assign a unique device name to the robot in TIA Portal.

11 II I			Configured PRO	FINET devi	ice		
Demo     Mol mon whice     Mol mon whice     Mol mon whice     Mol money which are been with a second	Diagnostic status Channel diagnostics > PROFNRET/interface [tn] > Functions Assign Praddess Assign Praddess Beset to factory settings		Online access Type of the PG/PC i PG/PC i Device filter	vice type: ( interface: ( interface: ( devices of the devices with	bad parameter settings	e tersoni Connecton	
Languages & resources     Donine access		Accessible devic	es in the network:				
Card Reader/USB memory		IP address	MAC address	Device	PROFINET device name	Status	
		10.151.17.40	00-10-EA-EE-C3-CF	FIXED_RO	omron-fixed-robot	Device name is different	^
		10.151.17.51	00-10-EA-C7-7D-A2	FIXED_RO	i4-350l	Device name is different	
		10.151.22.81	00-10-EA-8F-A9-0F	FIXED_RO	5485-0004	1 Device name is different	
		10.151.22.86	00-10-EA-83-18-7F	FIXED_RO	5440-00397	L Device name is different	-
		10.151.22.189	00-10-EA-CA-42-84	FDED_RO	proto9	1 Device name is different	
		10.151.22.191	00-10-EA-AC-A6-97	FIXED_RO	5485-00080	1 Device name is different	
			00-10-EA-8C-44-E7	ENTER DO	5450-00031	Device name is different	~

7 Set the IO cycle update time with TIA Portal.

General IO tags Sys	tem constants Texts		
General Catalog information	>> ID cycle		
FROFINET interface (x1) General Ethernet addresses identification & Maintenance Advanced options Interface options Real time settings Interface Prot 10 (17)	Update time:	C Calculate update time automatically C Set update time manually a 000 Addatt apdate time when send clock changes	ms [*]
	Watchdog time Accepted update cycles without 10 date:	3	
	Watchdog time:		ms

**8** Add the V+ Variable Exchange Module to the Device Overview.

<ul> <li>Ungrouped devices &gt; omron-industrial-robot [</li> </ul>	4-350L, 180mm							Hardware catalog	
		Topol	ogy view	nh Ne	etwork view	v []Y D	evice view	Options	
omron-industrial-robot (i4-35 💌 🔛 📰 🔛 🐂 🗧		erview							
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ral									
			_		_	_			
No 'properties' available.									

**9** Configure the data to exchange with TIA Portal.

Set the input and output data to exchange between the robot and PLC in the following manner.

1	Module	Rack	Slot	I address	Q address	Туре	Article no.	Firmware	
		0	0			i4-550L, 180mm q	R\$4-2055002		^
	PN-IO	0	0 X1			omron-industrial-r			
	<ul> <li>V+ Variable Exchange_1</li> </ul>	0	1			V+ Variable Exchan			
	BOOL[8] - I	0	11	70		BOOL[8] - I			
	BOOL[8] - O	0	12		70	BOOL[8] - O			=
		0	13						
		0	14						

## **10** Assign symbolic names for each address.

General	IO tags	System con	stants Texts	General	IO tags	System con	stants Texts	(
Name	Туре	Address	Tag table	Name	Туре	Address	Tag table	
	Bool	%170.0	Bool	Q_Bool	_O Bool	%Q70.0	Bool	
	Bool	%/70.1	Bool	Q_Bool	_1 Bool	%Q70.1	Bool	
	2 Bool	%170.2	Bool	Q_Bool	_2 Bool	%Q70.2	Bool	
	B Bool	%170.3	Bool	Q_Bool	_3 Bool	%Q70.3	Bool	
	Bool	%170.4	Bool	Q_Bool	_4 Bool	%Q70.4	Bool	
	5 Bool	%170.5	Bool	Q_Bool	_5 Bool	%Q70.5	Bool	
	5 Bool	%170.6	Bool	Q_Bool	_6 Bool	%Q70.6	Bool	
I_Bool_7	7 Bool	%170.7	Bool	Q_Bool	_7 Bool	%Q70.7	Bool	

- **11** Add, compile, and download the TIA Portal configuration to the PLC.
- **12** Access the robot controller *Configure Options* area with the ACE software and then proceed with the *Configure PROFINET Settings* option.

The data was been been by the data was an analysis of the data was an	New Project - H-350L_0 - ACE 4.7	(860)	- D X
Name of the second seco	File Edit View Insert Control	fler Tools Window Help	
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Very Very Very Very Very Very Very V		🕞 profestoorem 🛛 🔯 Controller Settings 🗙	
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Conjuga Mani and Conjuga Mani Andre			·
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Control Contro		Configure Robot Position Latches	
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Contract RCHUID Serrap		Configure System Settings	
		Configure Network Settings	
		Configure PROFINET Settings	
		Software Ravisic The V+ version of	
		N. 1	1.4
		States A	
		🕴 🖬 👘 👔 👔 👔	Cancel
	fl fbrr	Output Ridd	

**13** Enter the V+ External Variable Name and then set the IO Type, Variable Type and Array Length in the *Configure PROFINET Settings* area.

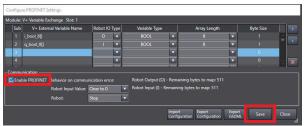
Make the following considerations when creating V+ External Variables in this area.

- Ensure the order (top to bottom) of the variables corresponds with the order established in TIA Portal.
- V+ External Variables standard types are 64 bit floating point.
- Brackets [] must follow the variable name when declaring an array variable type. Array variables must also have an array length set.
- A \$ character must proceed the variable name when declaring a string variable type. String variables must also have an array length set.
- V+ variable naming convention must be followed. Refer to the V+ User's Manual (Cat. No. *1671)* for more information.

00	ule:	V+ Variable B	exchange Slot: 1							
	Sub	V+ Exte	mal Variable Name	Robot IO	Туре	Variable Type	Array Length		Byte Size	
				0						
				1						
	3							<b>-</b>		
		nication — ole PROFINET	Behavior on commu Robot Input Value:		or:		g bytes to map: 5 sytes to map: 511			
			Robot:	Stop	-					

**14** Select the *Enable PROFINET* check-box and adjust the communication error behavior settings. Click the **Save** Button to implement the changes.

Saving triggers a robot controller reboot request.



15 Synchronize the new variables created in the robot controller after the reboot.

Select the new variables and then click **Transfer from Target** to bring the new variables into the ACE project.

Synchron	nisation		
	Computer: Data Name	Target : Data Name	Compare
1	▼ Variables	▼ Variables	
1			
2 2 2			
Legend:	Synchronized Officient		Not checked
	Transfer To Targ	et Transfer From Target	Recompare Close

**16** Scan for the new robot device.

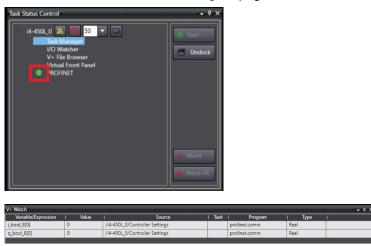
If the new robot is not detected, check network connections and repeat previous steps. Refer to *Section 3 Troubleshooting* on page 3-1 for more information.

		Type of the PGIPC interfa		12574L Gigabit Networl	Connection	
	Accessible nodes of th					
	Device	Device type	Interface type	Address	MAC address	
	omron-fixed-robot	FIXED_ROBOT	ISO	00-10-EA-EE-C3-CF		
	i4-550l	i4-550L, 180mm	PN/IE	10.151.17.35	00-10-EA-A6-A8-B3	
	hmi_1	SIMATIC-HM	PN/IE	10.151,17.41	E0-DC-A0-00-52-61	
	i4-350l	i4-350L, 180mm	PN/IE	h 10.151.17.51	00-10-EA-C7-7D-A2	
	labrat-cobra2	SIMATIC-PC	PN/IE	10.151.17.82	00-50-56-89-FD-8E	
	desktop-4nfb7pe	SIMATIC-PC	PN/IE	10.151.17.84	00-50-56-89-89-30	
	plc_1	CPU 1212C AC/D	PN/IE	10.151.17.140	8C-F3-19-78-DA-41	
Flash LED	plc_dev	CPU 1212C AC/D	PN/IE	10.151.17.141	8C-F3-19-7B-D9-FA	
	usomca2192	SIMATIC-PC	PN/IE	10.151.22.19	98-FA-98-3E-64-6F	
	desktop-2f9g86a	SIMATIC-PC	PN/IE	10.151.22.74	00-00-0A-A7-0A-90	1
inline status informa				Display only er	<u>S</u> tart sea	rch
				Display only er	ior messages	
	e device usomca0911					
Scan completed.						
? Retrieving device						1
	ation retrieval completed.					

**17** Check the *Device Overview* area in TIA Portal to ensure the connection status is valid. If the connection status is not valid, check network connections and repeat previous steps. Refer to *Section 3 Troubleshooting* on page 3-1 for more information.

		🚽 Topology view 🛛 📩 Networ	k view	De De	vice view	
🏄 🛛 OMS378 (i4-450L, 180mm qu 🖃 🔛 🌃 🖽 🛄 🔍 🛓	<b>a</b> (	Device overview				
	^	1 Module	Rack	Slot	I address	T
		OMS378	0	0		1
e 1	=	PN-IO	0	0 X1		i T
045319		V+ Variable Exchange_1	0	1		
		BOOL[8] - I	0	11	1	
		BOOL[8] - O	0	12		
			0	13		
			0	14		ilł
			0	15		
DP-NORM			0	16		
			0	17		
			0	18		
			0	19		14
	-		0	1 10		
	<u>*</u>		0	111		

**18** Confirm data exchange by checking the following areas in the ACE software. If the data exchange is not occurring, check network connections and repeat previous steps. Refer to *Section 3 Troubleshooting* on page 3-1 for more information.



## 2-3 V+ Program Example

This section shows an example V+ program.

While the robot is active and connected, the program checks for the status of the first bit in the q\_bool\_8 array, and then based on that bool value, sets the value of the first bit of the i\_bool\_8 array to match and prints the values of both bits.

If there is an error, the program will instead print information about the error.

```
.PROGRAM profinet.comm()
```

```
;Main loop
WHILE TRUE DO
;While PROFINET State is ACTIVE (enabled, connected, and communicating)
    WHILE FB.STATE == 3 DO
        ;Reflect input to output from PLC point of view
        IF q bool 8[0] THEN
            i bool 8[0] = TRUE
        END
        IF NOT q bool 8[0] THEN
            i bool 8[0] = FALSE
        END
        ;Delay of 2ms
        WAIT.EVENT , 2E-03
        ; Print values of PROFINET Input and Output Data
        TYPE "q_bool_8[0]: ", q_bool_8[0], ", i_bool_8[0]: ", i_bool_8[0]
   END
    $additional info = ""
    ;Get PROFINET Error Code and Additional Information (FB.ERROR)
    fieldbus error = FB.ERROR($additional info)
    ; If there is a PROFINET Error
    IF (fieldbus error <> 1) THEN
        ; Print Error Information
        TYPE "General Profinet error: ", fieldbus_error
        TYPE "Additional Information: ", $additional info
    END
    ;Delay of 2ms
   WAIT.EVENT , 2E-03
END
```

.END

2

# 3

# Troubleshooting

Use the information in this section to troubleshoot PROFINET communication issues.

3-1	PROFINET Status	. 3-2
3-2	PROFINET Errors	. 3-3

# 3-1 **PROFINET Status**

Use the FB.STATE keyword to return the current state of the fieldbus. This keyword returns the following information.



### **Additional Information**

Refer to the V+ Keyword Reference Manual (Cat. No. 1672) for more information about the FB.STATE keyword and usage.

Value Returned	Fieldbus State	Description
0	Disabled	Initialization fails or PROFINET is disabled.
1	Inactive	PROFINET is enabled but there is no connection
2	Idle	PROFINET is enabled and con- nected, but there is not data ex- change between the Controller and the robot.
3	Active	PROFINET is enabled, connected, and communicating. Data is being actively exchanged between the Controller and the robot.

# 3-2 **PROFINET Errors**

Use the FB.ERROR keyword to obtain detailed PROFINET error information. Fieldbus error code and error description details returned from the FB.ERROR keyword are provided below.



### Additional Information

- Refer to the V+ Keyword Reference Manual (Cat. No. 1672) for more information about the FB.ERROR keyword and usage.
- The robot behavior when communication errors occur can be configured in the ACE software. Refer to the *Automation Control Environment (ACE) Version 4 User's Manual (Cat. No. 1633)* for more information about configuring PROFINET settings.

Error Code	Error Description	Fieldbus State	Cause	Details
-1202 (field- bus system initialization fault)	Error Code 1	Disabled	Device configuration failed.	<ul> <li>I&amp;M configuration corrupted.</li> <li>Memory not initialized.</li> <li>Network interface not available.</li> </ul>
	Error Code 2		PROFINET stack initializati	on failed.
	Error Code 3		LLDP system description corrupted.	<ul> <li>LLDP system description in illegal status.</li> <li>Port description TLV (port 0).</li> <li>System name TLV.</li> <li>System description TLV.</li> </ul>
	Error Code 4	-		LLDP port description in illegal status. Port description TLV (port 1).
	Error Code 5		LLDP PHY not initialized.	
	Error Code 6		Profile version mismatch	PROFINET cannot be ini- tialized because of a ver- sion mismatch.
-1201 (con- nection lost)	Connection rejected x y z a where: • x = Error code • y = Error decode • z = Error code 1 • a = Error code 2	Inactive	Connection request re- jected.	The connection request was rejected by the PRO- FINET controller.
	Communication closed because of a comm loss		Connection timeout.	The connection has been aborted by the PROFI- NET controller.

3

Error Code	Error Description	Fieldbus State	Cause	Details
-1203 (inva- lid data)	Not able to read data be- cause the PLC has stop- ped	Idle	The controller stopped.	Communication data is in- valid because the Control- ler has stopped.
	Not able to read data be- cause supervisor is block- ing submodule		The supervisor blocked the submodule.	Communication data is in- valid because the supervi- sor is blocking the com- munication.
	Not able to read data be- cause the submodule is invalid		The submodule is invalid.	Communication data is in- valid because the sub- module is invalid.
-1200 (inva- lid configu- ration)	<ul> <li>Module Diff (Expected x, y, Actual z a) at b, c</li> <li>where:</li> <li>x, z = Module ident number</li> <li>y, a = Submodule ident number</li> <li>b = slot number</li> <li>c = subslot number</li> </ul>		A profile/robot mismatch occurred.	A mismatch between the PROFINET I/O and ACE submodule configuration exists.
	Peer Mismatch x where x = extended channel error type		A peer mismatch occur- red.	The peer port is mis- matched in the port name.
	MAU Type Mismatch: Ex- pected x, Actual y where x, y = MAU Type		A MAU type mismatch oc- curred.	The peer port mismatched in the MAU type.
	Link State Mismatched (Expected x y, Actual z a) where: • x, z = Link State • y, a = Port State	-	A link mismatch occurred.	The peer port is mis- matched in the link.
	<ul> <li>Variable Type Mismatch (Expected: 0xY, Real: 0xA) at slot b, subslot c where:</li> <li>Y, A = submodule Ident Number in hex</li> <li>b = slot number</li> <li>c = subslot number</li> </ul>	-	A variable mismatch oc- curred.	A mismatch between PROFINET I/O and the ACE submodule configu- ration occurred.
	<ul> <li>Robot Type Mismatch (Expected: 0xY, Real: 0xA) at slot b, subslot c where:</li> <li>Y, A = Module Ident Number in hex</li> <li>b = slot number</li> <li>c = subslot number</li> </ul>		A robot type mismatch oc- curred.	The actual robot is differ- ent than the one config- ured in the PROFINET controller.

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