

# **Instruction Manual**

Block Manifold MW4G Series

Serial Transmission Type NW4G\*-T7EP\*\*\* (W4G-OPP8-\*EP-\*\*)

[PROFINET Compatible]

- Please read this instruction manual thoroughly before using the product.
- In particular, carefully read the contents related to safety.
- Retain this instruction manual with the product for further consultation whenever necessary.

## Safety precautions

When designing and manufacturing devices using CKD products, the manufacturer is obligated to ensure that the safety of the mechanism, pneumatic control circuit and/or fluid control circuit and the system that runs the electrical controls are secured.

It is important to select, use, handle and maintain CKD products appropriately to ensure their safe usage.

Observe warnings and precautions to ensure device safety.

Check that device safety is ensured, and manufacture a safe device.



## **WARNING**

- 1. This product is designed and manufactured as a general industrial machine part. It must be handled by an operator having sufficient knowledge and experience.
- 2. Use this product in accordance with specifications.

This product must be used within its stated specifications.

In addition, never attempt to modify or additionally machine this product.

This product is intended for use in general industrial machinery, equipment or parts. It is not intended for use outdoors (except for products with outdoor specifications) or for use under the following conditions or environments.

(Note that this product can be used when CKD is consulted prior to its usage and the customer consents to CKD product specifications. The customer should provide safety measures to avoid dangers in the event of problems.)

- (1) Use for applications requiring safety, including nuclear energy, railways, aircraft, marine vessels, vehicles, medical devices, devices or applications in contact with beverages or foodstuffs, amusement devices, emergency cutoff circuits, press machines, brake circuits, or safety devices or applications.
- (2) Use for applications where life or assets could be significantly affected, and special safety measures are required.
- 3. Observe organization standards and regulations, etc., related to the safety of the device design and control, and such.

ISO4414, JIS B 8370 (General rules for pneumatic systems)

JFPS2008 (Principles for pneumatic cylinder selection and use)

Including the High Pressure Gas Safety Act, Industrial Safety and Health Act, other safety rules, organization standards and regulations, etc.

- 4. Do not handle, pipe, or remove devices before confirming safety.
  - (1) Inspect and service the machine and devices after confirming safety of the entire system related to this product.
  - (2) Note that there may be hot or charged sections even after operation is stopped.
  - (3) Turn off the energy source (air supply or fluid supply), and turn off power to the facility when inspecting or servicing the device. Discharge any compressed air from the system, and pay enough attention to possible water leakage and leakage of electricity.
  - (4) Make sure to secure system safety, such as pop-out prevention measures when starting or restarting a machine or device that incorporates pneumatic components.
- 5. Observe the warnings and cautions on the following pages to prevent accidents.

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Precautions are ranked as "DANGER", "WARNING", and "CAUTION" in this section.



**DANGER:** In the case where the product operation is mishandled and/or when the urgency of a dangerous situation is high, it may lead to fatalities or serious injuries.



**WARNING** A dangerous situation may occur if handling is mistaken, leading to fatal or serious injuries.



CAUTION: A dangerous situation may occur if handling is mistaken, leading to minor injuries or property damage.

Note that some items indicated with "CAUTION" may lead to serious results depending on the conditions.

All items contain important information and must be observed.

## Limited warranty and disclaimer

Warranty period

This warranty is valid for one (1) year after delivery to the customer's designated site.

Scope of warranty

In case any defect clearly attributable to CKD is found during the warranty period, CKD shall, at its own discretion, repair the defect or replace the relevant product in whole or in part and at no cost, according to its own judgment.

Note that the following failures are excluded from the warranty scope:

- (1) Failures due to use outside the conditions and environments set forth in the catalog or these specifications.
- (2) Failures resulting from factors other than this product
- (3) Failures caused by improper use of the product.
- (4) Failures resulting from modifications or repairs made without CKD consent.
- (5) Failures caused by matters that could not be predicted with the technologies in practice when the product was delivered.
- (6) Failures resulting from natural disasters or accidents for which CKD is not liable.

The warranty covers the actual delivered product, as a single unit, and does not cover any damages resulting from losses induced by malfunctions in the delivered product.

#### Compatibility check

The customer is responsible for confirming the compatibility of CKD products with the customer's systems, machines and equipment.

# **MARNING**

- If the product must be used under conditions that are different from the specified conditions or if the product is to be used for a special application, consult CKD before utilizing the product.
- Before performing maintenance, turn off the power, cut off the compressed air supply, and make sure there is no residual pressure.
- Before increasing or decreasing the number of stations (valves) on the manifold, turn off the power and release pressure.
- Before disassembling or assembling the manifold, read this instruction manual carefully with full understanding of its content.
- Before performing electrical wiring, read this manual carefully and with full understanding of its contents.

# CAUTION:

- Regularly perform daily and periodic inspections to correctly maintain product performance.
- Confirm working voltage and polarity before wiring and turning on the power.
- Do not touch the electrical wiring connections (exposed live parts); as there is a risk of electric shock. During wiring, keep the power off. Also, do not touch these live parts with wet hands.
- Before using the serial transmission slave unit, read the manual for the applicable communication system carefully with full understanding of its content.
- System components such as valves and cylinders could malfunction if the serial transmission slave unit address setting is incorrect. Always check the address setting before starting use.
- This product does not meet the surge immunity requirements specified in EN61000-4-5 for CE marking. Please provide appropriate protective measures on the device side.
- The valve status light may flicker momentarily when the valve power of the slave unit turns on (i.e., when the power voltage starts to rise). This will not cause the valve itself to turn ON or OFF.

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## NW4G\*-T7EP\*\*\*

## Serial Transmission Type

## Instruction Manual

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#### 1. PRODUCT

#### 1.1 General outline of the system

#### 1.1.1 NW4G\*-T7EP\*\*\*

This is a PROFINET device for NW4G connecting to PROFINET which is one of the industrial Ethernet standards. The NW4G\*-T7EP\*\*\* slave unit has the following features:

- (1) It is connected to the PLC with only an Ethernet cable, allowing a significant reduction of man-hours in wiring.
- (2) The built-in 2-port switch makes it easy to configure line topology.
- (3) Unit power and Valve power of the slave unit are separated, ensuring easy maintenance work.
- (4) The slave unit is available in +COM or -COM output types and selectable in 16 or 32 output points or 16 input-output points, allowing for use in a wide variety of applications.
- (5) The slave unit can connect to both W4G2 and W4G4 solenoid valves.

#### 1.1.2 PROFINET

PROFINET is an open industrial Ethernet standard for industrial automation advocated by PROFIBUS & PROFINET International (PI). PROFINET is based on industrial Ethernet and uses TCP / IP and IT related standards.

PROFINET enables engineering over different vendors and integrates seamlessly with existing fieldbus applications.

For more information on PROFINET, please refer the website run by PI (www.profinet.com).

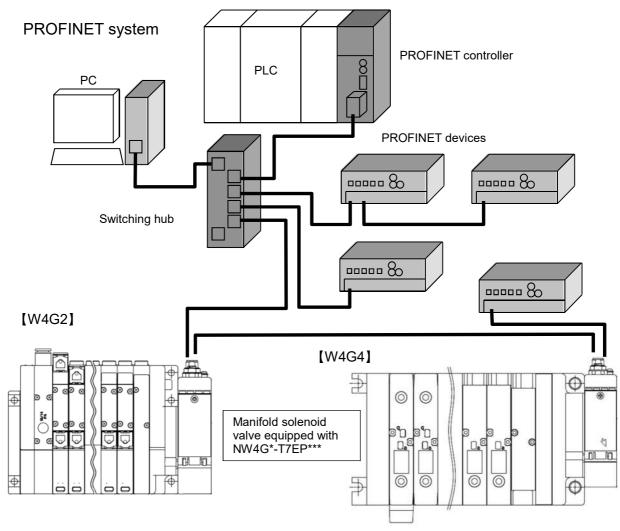
## 1.2 Network structure

This system mainly consists of PLC (PROFINET controller), NW4G\*-T7EP \*\*\* solenoid valve and peripheral devices.

1.2.1 Example of PLC

Manufacturer	Product series
Siamana AC	S7-1200
Siemens AG	S7-1500

## 1.2.2 Example of the basic network structure



## 1.3 Specifications

## 1.3.1 Transmission specifications

Item	Specifications
Communication protocol	PROFINET IO
Baud rate	100 Mbps
Communication method	Full duplex
Transmission media (Network cable)	Ethernet cable (Category 5 or higher)



 Upon selecting the network cable, consider the ambient conditions such as noise and temperature. Also, note that the maximum length of the cable between devices varies depending on the cable used.

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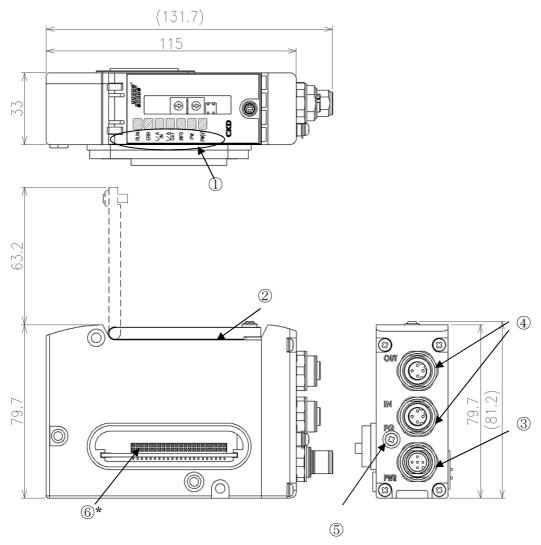
## 1.3.2 Specifications

Always operate this slave unit within its product specifications.

Item				Speci	fications		
Manifold Model No.		-T7EP1	-T7EP2	-T7EPB7	-T7EPP1	-T7EPP2	-T7EPPB7
Sla	ve unit	W4G-OPP8 -1EP	W4G-OPP8 -2EP	W4G-OPP8 -7EP-B	W4G-OPP8 -1EP-P	W4G-OPP8 -2EP-P	W4G-OPP8 -7EP-PB
VC	wer supply oltage		21.6	S VDC to 26.4	VDC (24 VDC:	±10%)	
cons	wer current sumption		130 mA	or less (at 24.0	VDC with all	points ON)	
	ower supply oltage		22.8 V	DC to 26.4 VD	C (24 VDC+10	)%, -5%)	
	ower current sumption				vith all points C oints ON and v		
Outp	put type		+COM(NPN)			-COM(PNP)	
	of input/output points	(0/16)	(0/32)	(16/16)	(0/16)	(0/32)	(16/16)
Insulatio	n resistance	30 N	/IΩ or more wit	th 500 VDC be	tween externa	l terminals and	case
Withsta	and voltage		500 VAC for 1	minute betwee	en external ter	minals and cas	е
Shock	resistance		294.	0 m/s² in 3 dire	ections, 3 time	s each	
Storage	temperature	-20°C to 70°C					
Storag	e humidity	30% to 85%RH (no dew condensation)					
Ambient temperature		-5°C to 55°C					
Ambient humidity			30%	to 85%RH(n	o dew conden	sation)	
Ambient	Ambient atmosphere		No corrosive gas				
_	nunication otocol	PROFINET					
Baı	ud rate	100 Mbps					
Communic	cation method	Full duplex					
PROFINE	ET connector	M12 4-pin D code					
Output is	solation type	Photocoupler isolation					
Max. lo	ad current	40 mA per output point					
Leaka	ge current	0.1mA or less					
Residu	Residual voltage		0.5 V or less				
Fuse rating		Valve power: 24 V, 3 A / Unit power 24 V, 2 A (both fuses are not replaceable)					
Status	Status indicator		LED(communication status, unit power and valve power statuses*1)				
Degree of protection		IP65					
Vibration	Durability		10 Hz to 150 Hz to 10 Hz, 1 octave/min, 15 sweeps each in X, Y, Z directions a half-amplitude of 0.75 mm or acceleration of 98.0 m/s², whichever is smaller				
proof	Malfunction					ach in X, Y, Z di /s², whichever i	

<sup>\*1.</sup> Status can be monitored when Unit power is supplied with specified voltage.

#### 1.4 Parts of the Slave Unit



- ① Status monitoring lights
  Indicate slave unit status and network status by LEDs.
- 2 Cover

Protects the status monitoring lights(LEDs) and the switches.

- ③ Power plug of the unit/valve (M12×1 port 【PWR】 A-cord)
  Connects socket for powering the Unit/Valve.
- 4 Network connector socket (M12×2 ports [IN, OUT] 4-pin, D-cord) IN: I/O port for PROFINET communication OUT: I/O port for PROFINET communication (There is no functional difference between IN and OUT ports.)
- ⑤ FG terminal Connects to FG.
- ⑥ Input/output block connector Connects to the input/output block. (\* Only available with W4G-OPP8-7EP-\*B)

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## 1.5 LED Indicators



• Discharge static electricity that has built up on your body before touching the slave unit. Otherwise, static electricity may damage this product.

These LEDs indicate slave unit status and network status.

See table below for their descriptions.

Switch	Function	Status	
PW	Indicates slave unit power status	OFF	Unit power OFF
PVV		Green on	Unit power ON
PW(V)	Indicates valve power	OFF	Valve power OFF
	status	Green on	Valve power ON
		OFF	Not communicating
	Indicates slave unit	Green on	In communication
RUN	operating status	Green flashing	Preparing for communication
	operating status	Green flashing	Forced output setting in progress
		special 2	, , , ,
	Indicates slave unit communication status	OFF	Normal
ERR		Red flashing	Cyclic data receive timeout
		Red flashing	Received data disable
		special 1	
	Indicates slave unit status	OFF	Normal
INFO		Red ON	EEPROM error
""		Red flashing	Receives participation test signal
		The other	Internal circuit board error
	Indicates Ethernet port	OFF	No link, no data transfer
L/A IN	Indicates Ethernet port status IN side	Green on	Link established, no data transfer
		Green flashing	Link established, in transferring data
	Indicates Ethernet port	OFF	No link, no data transfer
L/A OUT	status OUT side	Green on	Link established, no data transfer
	Status OUT SINE	Green flashing	Link established, in transferring data

## Special flashing pattern (repeats the pattern described)

special haching patient (repeate the patient accombat)				
Item	Flashing pattern (ON: <mark>⊯</mark> OFF:□ )			
Special 1	Repeat flashing 2 times  Approx. 1 second  Approx. 1 second			
Special 2	Repeat flashing 3 times  Approx. 1 second  Approx. 1 second			



#### 2. PRECAUTIONS

- To correspond with the requirements of the relevant EC Directive, use AC/DC adapter (e.g., switching power supplies) complying with EMC standards for the valve and slave unit power supplies.
- Before turning the power ON or OFF, ensure the safety of the surroundings as the components in the system, including the valve (cylinder), may move unexpectedly.
- Refer to the user's manual provided for the PROFINET controller concerning the communication delay time. The transmission delay within the entire system depends on the scan time achieved by the PLC and on other devices included in the system.
- Refer to the valve specification for the response time as it varies by the model of solenoid valve.
- The time it takes for the solenoid valve to turn OFF is delayed by approximately 20 msecs since there is a surge absorbing circuit incorporated in the slave unit.
- Make sure the power cables and network cables are connected according to the specifications to avoid any incorrect wiring.
- Do not subject the power cables and network cables to tension and impact.
- Before turning on the power, make sure that all cables and connectors are connected firmly.
- Never attempt to disassemble, modify, and/or repair the slave unit. Doing so may result in failure or malfunction of the slave unit.
- Many precision devices are mounted inside the slave unit. Do not drop the slave unit nor apply vibration or impact to the unit.
- Do not connect or disconnect any connectors while the power is being supplied. Doing so may result in failure or malfunction.
- Mold and rust can develop on the product if it is exposed to high humidity during transportation. Include
  moisture absorbers and tightly seal the package.
- Install the Slave Unit at least 200mm away from high-voltage cables and power lines, or lay the high-voltage cables and power lines in metal tubing and ground it.

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#### 3. OPERATION

## 3.1 Configuration

The functions of PROFINET devices are described in the GSD file. The configuration tool understands the device functions and provides the necessary settings by installing GSD file.

This section describes the configuration using STEP7 V13 manufactured by Siemens AG as a configuration tool.

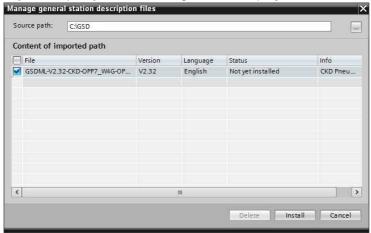
#### 3.1.1 GSD file

For information on obtaining GSD files, please contact us.

#### 3.1.2 GSD file installation

Install the GSD file in the configuration tool.

- a) Select Options-Manage general station description files (GSD).
- b) Check the check box and execute [Install] after specifying the folder where the GSD file is stored in [Source path] and confirming that the displayed GSD file is correct.



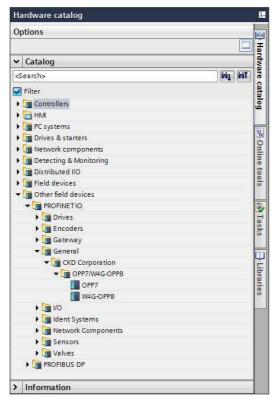
### 3.1.3 Device registration

Register the slave unit in the project. On registering, please prepare what describes model number of the slave unit. The label on the side of the unit also describes the model number.

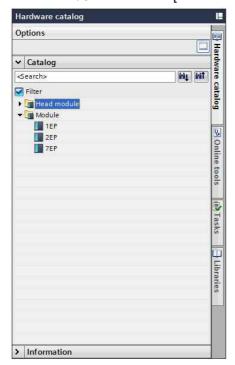


a) Double-click W4G-OPP8 in the [Hardware catalog].

Other field devices - PROFINET IO - General - CKD Corporation - OPP7/W4G-OPP8



- b) Double-click W4G-OPP8 displayed on [Network view] to display the [Device view].
- c) Select the I/O module from [Hardware catalog] again.



Select the same I/O module as the actual slave unit.

Selecting different I/O module from the actual slave unit will prevent the unit from communicating with other devices properly.

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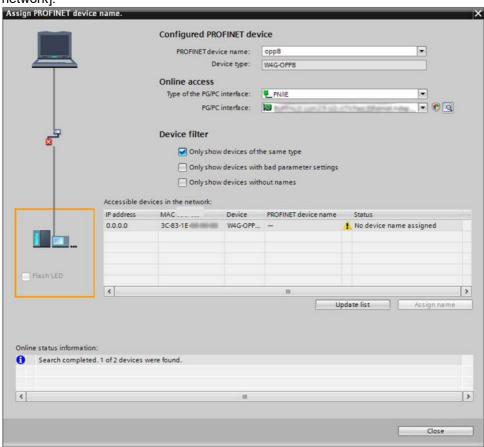
#### 3.1.4 Device name setting

Each device needs to be configured with a unique name for PROFINET connection.

Example shows S7-1214C manufactured by Siemens AG being registered in the project and connected with the slave unit as a PROFINET controller.

Note that the set device name uses the default value automatically assigned by the configuration tool. Check the configuration tool manual for setting the device name by yourself.

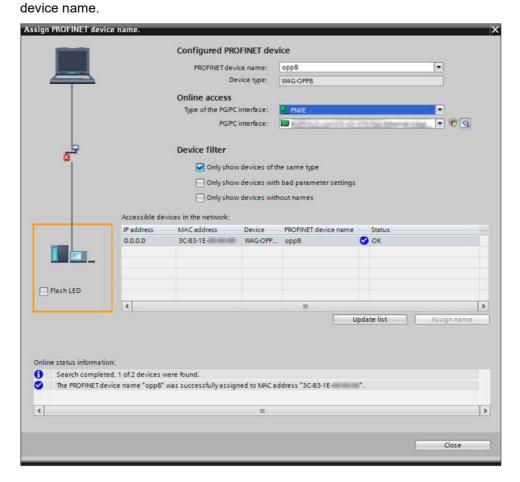
- Select W4G-OPP8 displayed in [Network view], right click and select [Assign device name].
- b) Find the target product from [MAC address], [Device], etc. displayed in [Accessible devices in the network].



Note: In case the target unit was not found, check that the network is configured correctly.



Select the target slave unit and execute [Assign name].
 The setting is complete when [Status] becomes OK. [PROFINET device name] displays the set



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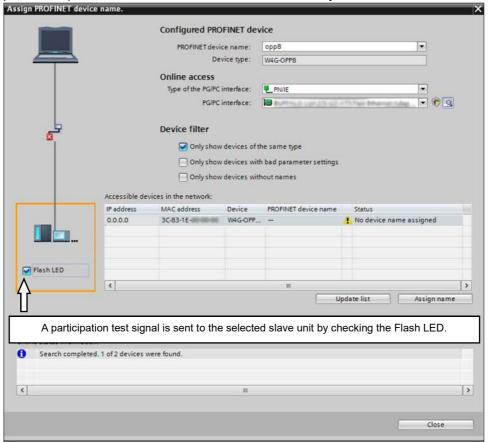


#### ·Flash LED

The INFO LED flashes several times when a participation test signal is received from the configuration tool and such. This function enables to find the desired slave unit.

Refer to the configuration tool manual for the transmission method of participation test signal.

(Reference) Use case with STEP7 V13 manufactured by Siemens AG

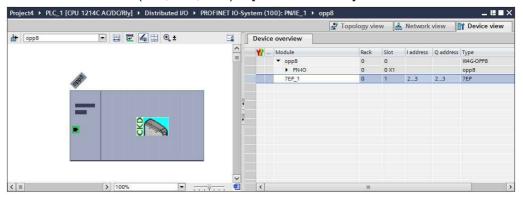




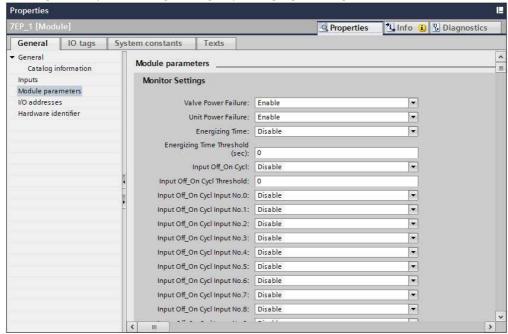
#### 3.1.5 I/O module parameter setting

Sets Enable / Disable the monitoring function and the output value processing at communication error.

- a) Double-click W4G-OPP8 displayed on [Network view] to display the [Device view].
- b) Select the I/O module (1EP, 2EP, 7EP) in [Device overview].



c) Select [Module parameters] in the [Properties] – [General] tab.



d) Set the necessary parameters.

The parameters are stored in the PROFINET controller.

Refer to the configuration tool manual for how to save parameters download to the PROFINET controller.

Note: Refer to the chapter 3.2 for parameter details.

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## 3.2 Parameters

Several parameters are available for monitoring and setting this slave unit. Set according to the intended use.

## 3.2.1 Monitor (Monitor settings)

Monitors the slave unit status and notifies an alarm to the PROFINET controller when an error occurs.

#### a) Valve Power (Valve Power Failure)

valve i ever (valve i ever i anale)				
Function	Monitors the valve power.  Notifies an alarm to the PROFINET controller when the valve voltage drops.			
Settings	Selects Enable/ Disal	ble		
	Value	Contents		
	Enable	Execute monitor. (initial value)		
	Disable	Does not monitor.		
		_		
Subject of notice	Undervoltage			

## b) Unit Power (Unit Power Failure)

Note: Setting is available with NW4G\*-T7EPB7 and NW4G\*-T7EPPB7.

gg				
Function	Monitors the unit power.  Notifies an alarm to the PROFINET controller when the valve voltage drops.			
Settings	Selects Enable/ Disa	able		
J	Value	Contents		
	Enable	Executes monitor. (initial value)		
	Disable	Does not monitor.		
Subject of undervoltage				

#### c) Energizing time

Lifergizing time	energizing time		
Function	Monitors the slave unit energizing time.  Notifies an alarm to the PROFINET controller when the energizing time exceeds the threshold.		
Settings	Selects Enable/ Disab	ble	
Ŭ	Value	Contents	
	Enable	Executes monitor.	
	Disable	Does not monitor. (initial value)	
	Threshold (Energizing	g Time Threshold)	
	Setting range	unit	
	0-4,294,967,295	Second	
Subject of notice	Threshold-Exceeding of Energizing Time (Over Threshold Energizing Time)		
Remarks	The energization time stops counting at the maximum count (4,294,967,295 seconds).		



## d) Input count (Input Off\_On Cycl)

Function	Monitors the input count for each input number.  Notifies an alarm to the PROFINET controller when input count exceeds the threshold with any input number.  Note: Setting is available with NW4G*-T7EPB7 and NW4G*-T7EPPB7.		
Settings	Selects individual setting	/ Disable	
	Value	Contents	
	Individual settings	According to the settings.	
	Disable	Does not monitor the all input points. (Initial value)	
Value C		Off_On Cycl Input No.0 to No.15)  Contents	
	Enable	Executes monitor.	
	Disable	Does not monitor. (Initial value)	
Threshold (Input Off_		Cycl Threshold)	
	Setting range	unit	
	0-4,294,967,295	Counts	
Subject of notice	Threshold-Exceeding of input count (Over threshold input Off_On Cycles)		
Remarks	The input count stops co	unting at the maximum count (4,294,967,295 seconds).	

Note: The input count can be rewritten to any value. Refer to chapter 3.6.

## e) Output count (Output Off\_On Cycl)

Function	Monitors the output count for each output number.  Notifies an alarm to the PROFINET controller when output count exceeds the threshold with any output number.		
Settings	Selects individual setting	/ Disable	
	Value	Contents	
	Individual settings	According to the settings.	
	Disable	Does not monitor the all output points. (Initial value)	
	Individual setting (Output Output 32 points: x = 31)  Value	t Off_On Cycl Output No.0 to No.x) (Output 16 points: x = 15,  Contents	
	Enable	Executes monitor.	
	Disable	Does not monitor. (Initial value)	
	Threshold (Output Off_O Setting range 0-4,294,967,295	unit Counts	
Subject of notice	Threshold-Exceeding of output count (Over threshold output Off_On Cycles)		
Remarks	The output count stops counting at the maximum count (4,294,967,295 seconds).		

Note: The output count can be rewritten to any value. Refer to chapter 3.6.

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#### 3.2.2 Output

Sets output in the event of communication error.

Note that a communication error describes the physical disconnection, such as a LAN cable disconnection, or when the PROFINET controller is not in a normal state, such as STOP.

a) Output setting in the event of communication error (Communication Error Output No.0 to No.x) (Output 16 points: x = 15, Output 32 points: x = 31)

Function	Sets output in the event of communication error.		
Settings	Selects output value		
	Value	Contents	
	Forced Off	Turn off the output. (Initial value)	
	Forced On	Turn on the output.	
	Hold output value (Last Valid Value)	Holds the previous output value before the error.	

#### 3.2.3 Input

Note: Setting is available with NW4G\*-T7EPB7 and NW4G\*-T7EPPB7.

Notifies the input to the PROFINET controller after the state is maintained for the set time when the state of the input signal changes. Does not notify the input to the controller if the status change is within the set time.

Note that it takes up to the following time for the hardware to detect a status change of the input signal.

Sig	ınal chan	ge	Maximum detection time
OFF	$\rightarrow$	ON	15 ms
ON	$\rightarrow$	OFF	18 ms

a) Input ON-response (On-Delay)

input Oiv-respo	rise (On-Delay)	
Function	Sets the response delay fund Also, sets the delay time. (Co	ction when the input signal changes to ON. ommon to all inputs)
Settings	Selects input ON-response of	delay enable / disable (On-Delay Input No.0 to No.15)
	Value	Contents
	Enable	Enables response delay. (Initial value)
	Disable	Disables response delay.
	Input On-response delay tim	e (On-Delay Time)
	Value	
	1 ms (initial value)	
	2 ms	
	10 ms	
	20 ms	
	100 ms	
	200 ms	

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b) Input OFF-response (Off-Delay)

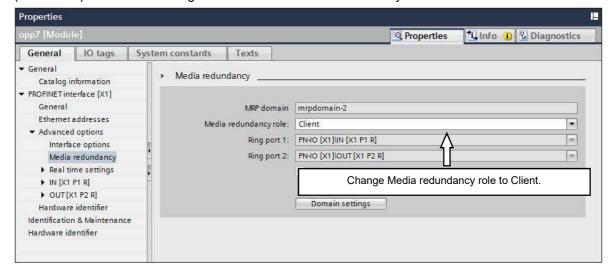
Function	Sets the response delay function when Also, sets the delay time. (Common to	
Settings	Selects input OFF-response delay ena	ble / disable (Off-Delay Input No.0 to No.15)
	Value	Contents
	Enable	Enables response delay. (Initial value)
	Disable	Disables response delay.
	Input Off-response delay time (Off-Dela	ay Time)
	Value	
	1 ms (initial value)	
	2 ms	
	10 ms	
	20 ms	
	100 ms	
	200 ms	

## 3.3 MRP (Media Redundancy Protocol) function

This slave unit supports the MRP function (client).

A device with MRP manager function and an appropriate network construction are necessary to use the MRP function. Refer the manual of such device for detail.

(Reference) MRP client setting of this unit in STEP7 V13 made by Siemens AG



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## 3.4 Correspondence between the slave unit output No. and PLC address No.

#### 3.4.1 PLC address correspondence tables

Tables below describe the correspondence using PLC Manufactured by Siemens AG as a representative example.

#### ◆ NW4G\*-T7EP\*1 (16 output points)

PLC address No.						0	utp	ut E	3it (	)0-´	15					
	00	01	02	03	04	05	06	07	80	09	10	11	12	13	14	15
Slave unit output No.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Solenoid output No.	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16

## ♦ NW4G\*-T7EP\*2 (32 output points)

PLC address No.						0	utp	ut E	3it (	)0-	15											0	utp	ut E	3it 1	16-3	31					
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Slave unit output No.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Solenoid output No.	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16	s17	s18	s19	s20	s21	s22	s23	s24	s25	s26	s27	s28	s29	s30	s31	s32

### NW4G\*-T7EP\*B7 (16 output points), with 8 points solenoids, 4 input blocks, and 2 output blocks

PLC address No.						0	utp	ut l	3it (	00-	15											lı	npu	ıt B	it 0	0-1	5					
	00	01	02	03	04	05	06	07	80	09	10	11	12	13	14	15	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
Slave unit output No.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Solenoid output No.	s1	s2	s3	s4	s5	s6	s7	s8																								
Input block No.																	1-0	1-1	1-2	1-3	2-0	2-1	2-2	2-3	3-0	3-1	3-2	3-3	4-0	4-1	4-2	4-3
Output block No.									1-0	1-1	1-2	1-3	2-0	2-1	2-2	2-3																

<sup>\*</sup> Connect the input block first then output block to the slave unit.

## ♦ NW4G\*-T7EP\*B7 (16 output points), with 12 points solenoids, 4 input blocks, and 1 output block

PLC address No.						0	utp	ut E	3it (	)0- <sup>-</sup>	15											lı	npu	ıt B	it 00	0-1	5					
	00	01	02	03	04	05	06	07	80	09	10	11	12	13	14	15	00	01	02	03	04	05	06	07	80	09	10	11	12	13	14	15
Slave unit output No.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Solenoid output No.	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12																				
Input block No.																	1-0	1-1	1-2	1-3	2-0	2-1	2-2	2-3	3-0	3-1	3-2	3-3	4-0	4-1	4-2	4-3
Output block No.													2-0	2-1	2-2	2-3																

<sup>\*</sup> Connect the input block first then output block to the slave unit. \* Set 2 with rotary switch of output block.

<sup>\*</sup> Set 1 and 2 with rotary switches of output block from the side of slave unit.

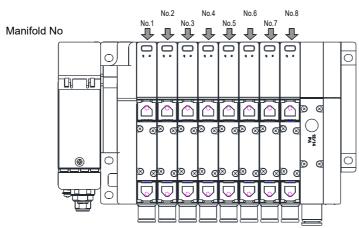


3.4.2 Examples of Valve No. assignments corresponding to the slave unit T7EP\* solenoid output No.

The valve No. 1a, 1b, 2a, 2b, ... indicate the station numbers such as station No.1, station No.2, and so on; while the alphabets 'a' and 'b' mean, respectively, the solenoid on the a-side and the solenoid on the b-side of the "double-solenoid type" valve. Also, "V" stands for "vacant".

Appearance and maximum station number depends on solenoid model.

#### NW4G\*-T7EP\*1 (16 output points)



The figure is an example of double-solenoid type valves mounting 8 stations on the manifold.

There is no solenoid on the b-side for single-solenoid type.

#### [Standard wiring]

· When all valves mounted on the manifold are single solenoids:

solenoid Output No.	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16
Valve No.	1a	2a	3a	4a	5a	6a	7a	8a	9a	10a	11a	12a	13a	14a	15a	16a

·When all valves mounted on the manifold are double solenoids:

solenoid Output No.	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16
Valve No.	1a	1b	2a	2b	За	3b	4a	4b	5а	5b	6a	6b	7a	7b	8a	8b

·When both single and double solenoids valves are mounted on the manifold (an example is shown above)

solenoid Output No.	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16
Valve No.	1a	2a	3a	3b	4a	4b	5a	6a	7a	7b	8a	9a	10a	10b	11a	11b

## [Double wiring]

· When all valves mounted on the manifold are single solenoids:

solenoid Output No.	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16
Valve No.	1a	(V)	2a	(V)	За	(V)	4a	(V)	5a	(V)	6a	(V)	7a	(V)	8a	(V)

·When all valves mounted on the manifold are double solenoids:

solenoid Output No.	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16
Valve No.	1a	1b	2a	2b	3а	3b	4a	4b	5а	5b	6a	6b	7a	7b	8a	8b

·When both single and double solenoids valves are mounted on the manifold (an example is shown above)

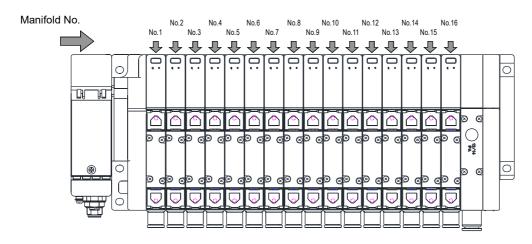
solenoid Output No.	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16
Valve No.	1a	(V)	2a	(V)	3a	3b	4a	4b	5a	(V)	6a	(V)	7a	7b	8a	(V)

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#### ◆ NW4G\*-T7EP\*2 (32 output points)

The figure is an example of double-solenoid type valves mounting 16 stations on the manifold. There is no solenoid on the b-side for single-solenoid type.



#### [Standard wiring]

· When all valves mounted on the manifold are single solenoids:

Solenoid Output No.	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16	s17	s18	s19	s20	s21	s22	s23	s24	s25	s26	s27	s28	s29	s30	s31	s32
Valve No.	1a	2a	3a	4a	5а	6a	7a	8a	9a	10a	11a	12a	13a	14a	15a	16a	17a	18a	19a	20a	21a	22a	23a	24a	25a	26a	27a	28a	29a	30a	31a	32a

·When all valves mounted on the manifold are double solenoids:

ĺ	Solenoid Output No.	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16	s17	s18	s19	s20	s21	s22	s23	s24	s25	s26	s27	s28	s29	s30	s31	s32
Ī	Valve No.	1a	1b	2a	2b	3a	3b	4a	4b	5a	5b	6a	6b	7a	7b	8a	8b	9a	9b	10a	10b	11a	11b	12a	12b	13a	13b	14a	14b	15a	15b	16a	16b

·When both single and double solenoid valves are mounted on the manifold (an example is shown above)

٧	Hell bottl sit	gic	an	u u	our	JIC (	SOIC	7110	iu v	aiv	CO (	aic	HIC	un	leu	UH	uic	1110	יווו וג	ulu	(ai	1 67	alli	hie	10 (	3110	VVII	abt	700				
	Solenoid Output No.	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16	s17	s18	s19	s20	s21	s22	s23	s24	s25	s26	s27	s28	s29	s30	s31	s32
	Valve No.	1a	2a	3a	3b	4a	4b	5a	6a	7a	7b	8a	9a	10a	10b	11a	11b	12a	13a	14a	14b	15a	15b	16a									

## [Double wiring]

· When all valves mounted on the manifold are single solenoids:

Solenoid Output No.	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16	s17	s18	s19	s20	s21	s22	s23	s24	s25	s26	s27	s28	s29	s30	s31	s32
Valve No.	1a	(V)	2a	(V)	3a	(V)	4a	(V)	5a	(V)	6a	(V)	7a	(V)	8a	(V)	9a	(V)	10a	(V)	11a	(V)	12a	(V)	13a	(V)	14a	(V)	15a	(V)	16a	(V)

·When all valves mounted on the manifold are double solenoids:

Solenoid Output No.	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16	s17	s18	s19	s20	s21	s22	s23	s24	s25	s26	s27	s28	s29	s30	s31	s32
Valve No.	1a	1b	2a	2b	3a	3b	4a	4b	5a	5b	6a	6b	7a	7b	8a	8b	9a	9b	10a	10b	11a	11b	12a	12b	13a	13b	14a	14b	15a	15b	16a	16b

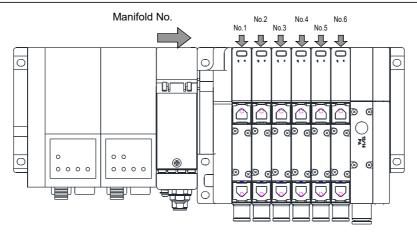
·When both single and double solenoid valves are mounted on the manifold (an example is shown above)

Solenoid Output No.	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16	s17	s18	s19	s20	s21	s22	s23	s24	s25	s26	s27	s28	s29	s30	s31	s32
Valve No.	1a	(V)	2a	(V)	3a	3b	4a	4b	5a	(V)	6a	(V)	7a	7b	8a	(۷)	9a	(V)	10a	(۷)	11a	11b	12a	12b	13a	(V)	14a	(V)	15a	15b	16a	(V)



♦ NW4G\*-T7EP\*7 (16 output points, 1 input block, and 1 output block)

The figure is an example of double-solenoid type valves mounting 6 stations on the manifold and connecting each 1 of output block and input block. There is no solenoid on the b-side for single-solenoid type.



#### [Standard wiring]

· When all valves mounted on the manifold are single solenoids:

ſ	Solenoid Output No.	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16
Ī	Valve No.	1a	2a	3a	4a	5a	6a	7a	8a	9a	10a	11a	12a	2-0	2-1	2-2	2-3

<sup>\*</sup> Set 2 with the rotary switch of output block.

·When all valves mounted on the manifold are double solenoids:

Solenoid Output No.	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16
Valve No.	1a	1b	2a	2b	3a	3b	4a	4b	5a	5b	6a	6b	2-0	2-1	2-2	2-3

<sup>\*</sup> Set 2 with the rotary switch of output block.

·When both single and double solenoid valves are mounted on the manifold (an example is shown above)

Solenoid Output No.	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16
Valve No.	1a	2a	3а	3b	4a	4b	5a	6a	7a	7b	8a	9a	2-0	2-1	2-2	2-3

<sup>\*</sup> Set 2 with the rotary switch of output block.

### [Double wiring]

· When all valves mounted on the manifold are single solenoids:

Solenoid Output No.	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16
Valve No.	1a	(V)	2a	(V)	3a	(V)	4a	(V)	5a	(V)	6a	(V)	2-0	2-1	2-2	2-3

<sup>\*</sup> Set 2 with the rotary switch of output block.

·When all valves mounted on the manifold are double solenoids:

Solenoid Output No.	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16
Valve No.	1a	1b	2a	2b	3a	3b	4a	4b	5a	5b	6a	6b	2-0	2-1	2-2	2-3

<sup>\*</sup> Set 2 with the rotary switch of output block.

·When both single and double solenoid valves are mounted on the manifold (an example is shown above)

٠.	HOLL BOTH OIL	9.0	ч.,	<u> </u>	<u> </u>	,,,,,	00.0	,,,,		<b>ч</b> .,	-	<u> </u>		, GI I		<u> </u>	
	Solenoid Output No.	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16
	Valve No.	1a	(V)	2a	(V)	3a	3b	4a	4b	5a	(V)	6a	(V)	2-0	2-1	2-2	2-3

<sup>\*</sup> Set 2 with the rotary switch of output block.

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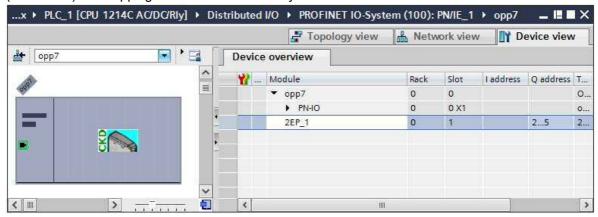


## 3.5 Programming

This slave unit is treated as a PROFINET device and receives the output signal from the PROFINET controller to operate the valve.

Refer to the PROFINET controller manual when designing a program.

#### (Reference) I/O mapping in STEP7 V13 made by Siemens AG



The mapping is as follow for the above case: (Same is true with Input.)

#### I/O mapping

		Output No.							
	31	30	29	28	27	26	25	24	
Bit	Q5.7	Q5.6	Q5.5	Q5.4	Q5.3	Q5.2	Q5.1	Q5.0	
1byte	QB5								

		Output No.							
I		23	22	21	20	19	18	17	16
Ì	Bit	Q4.7	Q4.6	Q4.5	Q4.4	Q4.3	Q4.2	Q4.1	Q4.0
	1byte	QB4							

		Output No.							
	15	14	13	12	11	10	9	8	
Bit	Q3.7	Q3.6	Q3.5	Q3.4	Q3.3	Q3.2	Q3.1	Q3.0	
1byte	QB3								

		Output No.							
	7	6	5	4	3	2	1	0	
Bit	Q2.7	Q2.6	Q2.5	Q2.4	Q2.3	Q2.2	Q2.1	Q2.0	
1byte	QB2								

		Output No.							
	7 6 5 4 3 2 1 0	15 14 13 12 11 10 9 8	23 22 21 20 19 18 17 16	31 30 29 28 27 26 25 24					
1byte	QB2	QB3	QB4 QB5						
2bytes	QV	V2	QV	V4					
4bytes	QD2								



## 3.6 Acyclic data access

Various types of data are in this slave unit. Acyclic data access from the PROFINET controller enables to refer (read) the data. Also, value setting (write) is available for some data.

Do not operate value setting (write) to the indexes with which setting is not available. The operation will not be guaranteed in case of such setting.

#### 3.6.1 Index

Each data is assigned a number called an index, and it is accessed by specifying the index.

#### a) The entire index

Index	Size (byte)	Item	Setting range*1	Function/Contents
1001	4	Vendor name	Ď	Returns 'CKD' (character string).
1002	2	Vendor ID	D	Returns 0x0357.
1003	15	Product name	D	Returns product name (character string).
1004	2	Hardware version	D	Returns hard ware version.
1005	4	Software version	D	Returns software version.
1006	4	Item Code	D	Returns item code.
1007	4	Serial No.	D	Returns the serial number.
1008	1	IP address setting status	D	Returns the current status of IP address setting. 0x00: Use the value stored in the slave unit. 0x01: Use the value notified from the PROFINET controller.
1009	4	IP address	D	
1010	4	Subnet mask	D	Returns the current IP address, subnet mask, and gateway.
1011	4	Gateway	D	
1012	4	SW IP address	D	Determent to ID address and a standard and determined in
1013	4	SW subnet mask	D	Returns the IP address, subnet mask or gateway stored in
1014	4	SW gateway	D	the slave unit.
1015	1	(For other models)	D	Returns 0x00.
1016	1	(For other models)	D	Returns 0x00.
1017	6	MAC address	D	
1018	6	MAC address IN	D	Returns the MAC address.
1019	6	MAC address OUT	D	
1020	4	Energizing time	D	Returns the energization time (seconds).
1021	1	Number of output points	D	Returns the number of output points.
1022	1	Number of input points	D	Returns the number of input points.
1023	1	Output type	D	Returns the number of output type. 0x00:+COM 0x01:-COM
1024	240	Device name	D	Returns the device name (character string).
1025	1	Maintenance monitor	D	Returns the monitoring status. (1: Notifying the PROFINET controller, 0: None) Bit0: Valve power Bit1: Unit power Bit2: (No definition) Bit3: Energizing time Bit4: (No definition) Bit5: (No definition) Bit6: Input count Bit7: Output count
1026	1	Maintenance settings	D	Returns the monitoring status. (1: Monitoring, 0: None) Bit0: Valve power Bit1: Unit power Bit2: (No definition) Bit3: Energizing time Bit4: (No definition) Bit5: (No definition) Bit5: (No definition) Bit6: Input count Bit7: Output count
1027	4	Energizing time maintenance threshold	D	Returns the threshold of energization time.
1028	4	Output count maintenance threshold	D	Returns the threshold of the output count.
1029	4	Input count maintenance threshold	D	Returns the threshold of the input count.
1030	1	Valve power	D	Returns the valve power status. 0x00: Valve power OFF 0x01: Valve power ON

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Index	Size (byte)	ltem	Setting range*1	Function/Contents
1031	1	Input On-response time setting	D	Returns the input on-response time.  0x01:1 ms  0x02:2 ms  0x0A:10 ms  0x14:20 ms  0x64:100 ms  0xC8:200 ms
1032	1	Input Off-response time setting	D	Returns the input off-response time.  0x01:1 ms  0x02:2 ms  0x0A:10 ms  0x14:20 ms  0x64:100 ms  0xC8:200 ms

Note: The energization time stops counting at the maximum count (4,294,967,295 seconds).

<sup>\*1</sup> Setting range: "E" stands for enable and "D" stands for disable.



## b) For each output number

Internal data can be referenced to for each output number. Each index is as follows.

Index	Itom				Outpo	ut No.			
offset	Item		1	to	15	16	to	30	31
1	Cyclic output data	2001	2011		2151	2161		2301	2311
2	Forced output data	2002	2012		2152	2162		2302	2312
3	Forced output setting	2003	2013		2153	2163		2303	2313
4	Output setting in the event of communication error	2004	2014		2154	2164		2304	2314
5	Value setting in the event of communication error.	2005	2015	to	2155	2165	to	2305	2315
6	(For other models)	2006	2016		2156	2166		2306	2316
7	Output count maintenance monitor	2007	2017		2157	2167		2307	2317
8	Output count maintenance setting	2008	2018		2158	2168		2308	2318
9	Output count	2009	2019		2159	2169		2309	2319
10	(For other models)	2010	2020		2160	2170		2310	2320

Note 1: Available setting is output No. 0 to No. 15 for output 16 points, and output No. 0 to No. 31 for output 32 points.

Note 2: The output count stops counting at the maximum count (4,294,967,295 seconds).

Index offset	Size (byte)	Item	Setting range*1	Function/Contents
1	1	Cyclic output data	D	Returns the output data received from the PROFINET controller. 0x00:OFF 0x01:ON
2	1	Forced output data	E	Returns the output value when the output setting is configured as forced output.  0x00: OFF (initial value)  0x01:ON
3	1	Forced output setting	E	Returns the selection status of the output value. 0x00: Cyclic output (initial value) 0x01: Forced output
4	1	Output setting in the event of communication error	D	Returns the output value selection status when a communication error occurs.  0x00: Value setting in the event of communication error.  0x01: Holds the previous output value before the error.
5	1	Value setting in the event of communication error.	D	Returns the output value when the output value selection in the event of communication error is set to forced output.  0x00:OFF 0x01:ON
6	1	(For other models)	D	* An access error will occur.
7	1	Output count maintenance monitor	D	Returns the monitoring status of output count. 0x00: No notification 0x01: Notifying the PROFINET controller
8	1	Output count maintenance setting	D	Returns the monitoring setting of output count. 0x00: Not monitored 0x01: Monitoring
9	4	Output count	Е	Returns the output count.
10	4	(For other models)	D	* An access error will occur.

<sup>\*1</sup> Setting range: "E" stands for enable and "D" stands for disable.

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## c) For each input number

Note: Setting is available with NW4G\*-T7EPB7 and NW4G\*-T7EPPB7 only. An access error will occur for the other No.

Internal data can be referenced to for each input number. Each index is as follows.

Index	Item		Inpu	t No.		
offset	item	0	1	to	15	
1	Sensor input data	3001	3011		3151	
2	Forced input data	3002	3012		3152	
3	Forced input setting	3003	3013		3153	
4	Input On-response setting	3004	3014		3154	
5	Input Off-response setting	3005	3015	to	3155	
6	Input count maintenance monitor	3006	3016	iO.	3156	
7	Input count maintenance setting	3007	3017		3157	
8	Input count	3008	3018		3158	
9	(For other models)	3009	3019		3159	
10	(For other models)	3010	3020		3160	

Note: The input count stops counting at the maximum count (4,294,967,295 seconds).

Index offset	Size (byte)	Item	Setting range*1	Function/Contents
1	1	Sensor input data	D	Returns the signal status from the input module. 0x00:OFF 0x01:ON
2	1	Forced input data	E	Returns the value to be notified as input data to the PROFINET controller when forced input is enabled. 0x00: OFF (initial value) 0x01:ON
3	1	Forced input setting	E	Returns the selection status of the input data. 0x00: Sensor input (initial value) 0x01: Forced input
4	1	Input On-response setting	D	Returns the setting status of the input on-response delay function. 0x00: Disable 0x01: Enable
5	1	Input Off-response setting	D	Returns the setting status of the input off-response delay function. 0x00: Disable 0x01: Enable
6	1	Input count maintenance monitor	D	Returns the monitoring status of input count. 0x00: No notification 0x01: Notifying the PROFINET controller
7	1	Input count maintenance setting	D	Returns the monitoring setting of input count. 0x00: Not monitored 0x01: Monitoring
8	1	Input count	D	Returns the input count.
9	4	(For other models)	D	* An access error will occur.
10	4	(For other models)	D	* An access error will occur.

<sup>\*1</sup> Setting range: "E" stands for enable and "D" stands for disable.

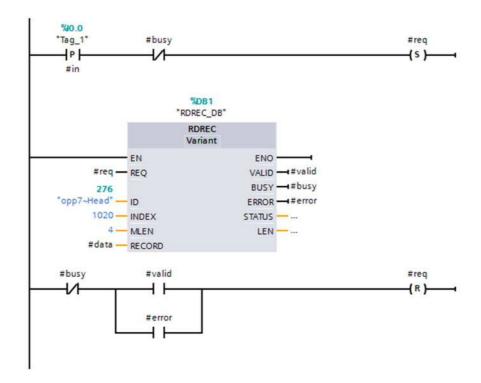


#### 3.6.2 Reference program

This program performs acyclic data access with ladder logic.

#### Refer to the following values:

Index	Size (byte)	Item
1020	4	Energizing time



#### <Circuit Detail>

- 1. Executing input 0.0 makes [req] effective.
- 2. Acquire the data [INDEX: 1020] for [ID: 276] with [RDREC].
- 3. Process is complete if either [VALID] or [ERROR] is returned.
- 4. The acquired contents are stored in [data] when [VALID] is returned.

Note 1: [ID] of [RDREC] varies depending on the project. Change the [ID] to the target device.

Note 2: As input chattering is not considered, add mask time if needed.

Note 3: Correct parameters by changing [RDREC] to [WRREC] for setting (write).

Refer to the PROFINET controller manual for details.

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### 3.7 Forced output

Forced output setting enables to change the output data without changing the main program of the PROFINET controller.

Forced output setting can be set for each output number.

The forced output setting is disabled when the connection with the PROFINET controller is erroneous. (Outputs according to the [Communication Error Output] setting in the event of communication error.)



 The forced output setting is cleared then the setting canceled when this unit is powered off or communication with the PROFINET controller is disconnected. The data is output as is from PROFINET controller when the communication restored or the unit is powered on for the next time.

Changing the setting to forced output makes the RUN LED indicate the green flashing special 2. Refer to chapter 1.5 LED Indicators.

#### 3.7.1 Settings

Writing acyclic data to the needed output No. enables to set the forced output.

Refer to the chapter 3.6 Acyclic data access for writing acyclic data and other setting details.

The value set in the forced output data becomes the output data to the valve when the output setting is set to forced output.

	Index		
No.	Forced output data (OFF/ON)	Output setting (Cyclic output / Forced output)	Remarks
Output No.0	2002	2003	
Output No.1	2012	2013	
Output No.2	2022	2023	
Output No.3	2032	2033	
Output No.4	2042	2043	
Output No.5	2052	2053	
Output No.6	2062	2063	
Output No.7	2072	2073	
Output No.8	2082	2083	
Output No.9	2092	2093	
Output No.10	2102	2103	
Output No.11	2112	2113	
Output No.12	2122	2123	
Output No.13	2132	2133	
Output No.14	2142	2143	
Output No.15	2152	2153	
Output No.16	2162	2163	
Output No.17	2172	2173	
Output No.18	2182	2183	
Output No.19	2192	2193	
Output No.20	2202	2203	
Output No.21	2212	2213	
Output No.22	2222	2223	
Output No.23	2232	2233	
Output No.24	2242	2243	
Output No.25	2252	2253	



	Inc		
No.	Forced output data (OFF/ON)	Output setting (Cyclic output / Forced output)	Remarks
Output No.26	2262	2263	
Output No.27	2272	2273	
Output No.28	2282	2283	
Output No.29	2292	2293	
Output No.30	2302	2303	
Output No.31	2312	2313	

Available access is No.0 to No.15 for 16 outputs, and No.0 to No.31 for 32 outputs. An access error will occur for the other.

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## 3.8 Forced input

Note: Setting is available with NW4G\*-T7EPB7 and NW4G\*-T7EPPB7 only. \* An access error will occur for the other number.

Configuring the forced input setting enables to change the input value without actually entering any input signal. Forced input setting can be set for each input number.

The forced input setting is disabled when the connection with the PROFINET controller is erroneous.



The forced input setting is cleared then the forced input is canceled when this
unit is powered off or communication with the PROFINET controller is
disconnected. Notifies the sensor input data to PROFINET controller when
the communication restored or the unit is powered on for the next time.

Enabling the forced input setting makes the RUN LED indicate the green flashing special 2. Refer to chapter 1.5 LED Indicators.

#### 3.8.1 Settings

Writing acyclic data to the needed input number enables to set the forced input.

Refer to the chapter 3.6 Acyclic data access for writing acyclic data and other setting details.

The input data notified to the PROFINET controller is replaced with the value set in the forced input data when the forced input is set for input setting.

	Inc		
No.	Forced input data (OFF/ON)	Imputt setting (Sensor input / Forced input)	Remarks
Input No.0	3002	3003	
Input No.1	3012	3013	
Input No.2	3022	3023	
Input No.3	3032	3033	
Input No.4	3042	3043	
Input No.5	3052	3053	
Input No.6	3062	3063	
Input No.7	3072	3073	
Input No.8	3082	3083	
Input No.9	3092	3093	
Input No.10	3102	3103	
Input No.11	3112	3113	
Input No.12	3122	3123	
Input No.13	3132	3133	
Input No.14	3142	3143	
Input No.15	3152	3153	



## 3.9 I & M data

This slave unit supports I & M 0 to 3.

Refer to the PROFINET controller manual for details on how to review and set from the PROFINET controller.

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#### 4. INSTALLATION

The network cables and power cables must be connected to the NW4G\*-T7EP\*\*\* to function.

Incorrect connection causes not only malfunctions but in some cases, critical transmission damage to this slave unit as well as other related devices.

Read this instruction manual and the user's manuals of the PLC and other devices for correct connections before use.



- Discharge static electricity that has built up on your body by touching a grounded metal object before handling the device. Otherwise, static electricity may damage this product.
- Do not touch the electrical wiring connections (exposed live parts); as there
  is a risk of electric shock. During wiring, keep the power off. Also, do not
  touch these live parts with wet hands.
- Do not subject the power cables and network cables to tension and impact.
  Long cables can exert unexpected momentum and impact due to its weight,
  and this can consequently damage the connectors and devices. Take
  preventative measures such as securing the cables part way along its length
  to reduce inertia.
- To prevent noise problems, keep the following in mind when wiring:
  - (1) If noise is likely to have an influence, make efforts to provide a separate power supply for each manifold solenoid valve and wire them independently.
  - (2) Do not make the power and FG cables needlessly long, but wire them with the shortest possible lengths.
  - (3) Do not share power with noise generating devices such as inverters and motors.
  - (4) Do not lay the power cables, network cables, and other power lines parallel to each other.
  - (5) Be sure to connect the shielding of the network cable to equipotential bonding close to the slave unit.
- Make sure the power cables and network cables are connected according to the specifications to avoid any incorrect wiring. Incorrect wiring can cause the slave unit to malfunction or to be damaged.
- Make sure that all cables and connectors are connected firmly before turning the power ON.



## 4.1 Connecting and wiring to the network connector socket

Network connector plug is not included in this unit. Purchase a network connector plug separately that meets the specifications. Network cable can be wired by connecting it to the network connector plug then the plug to the network connector socket on the slave unit.

<Recommended M12 cable with RJ45 connector [Cat.5e]>
PNET/B-RJ-12F-\*\*\*□ Industrial Ethernet cable (double shielded) Manufactured by JMACS
\*\*\*: strip length, □: unit, M = meter, C = centimeter

<Recommended assembly type connector>

21 03 281 1405 M12 assembly type connector 09 45 151 1100 RJ45 assembly type connector

Manufactured by HARTING Manufactured by HARTING

<Recommended cable [Cat.5e]>

09 45 600 01□□ industrial Ethernet cable

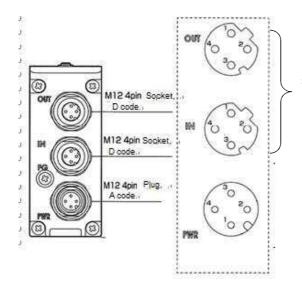
Note: □ differs depending on the cable specifications.

Manufactured by HARTING

Connecting the network cable

Connect the network cable to the network connector plug according to the following instructions.

- (1) After confirming safety, stop network communication and turn off all peripheral equipment.
- (2) Refer to the figure below and wire the cable to the M12 connector.



Network connector socket

Port	Pin No.	Signal	Function	
	1	TXD+	Transmission data, plus	
	2	TXD-	Transmission data, minus	
	3	RXD+	Received data, plus	
	4	RXD-	Received data, minus	



- Make sure that the network cable have a sufficient bending radius, and do not bend it forcibly.
- Separate the network cable from the power cable and high-voltage wire.
- When the network connector (Out) is unused, make sure to cover with water-resistant cap.

<Recommended water-resistant cap> 21 01 000 0003 (M12 Cap)

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## 4.2 Connecting and wiring to the Unit/Valve power plug

Power socket is not included in this unit. Purchase a power socket separately that meets the specifications. Power cable can be wired by connecting it to the power socket then the socket to the power plug on the slave unit.

<Unit power>

Power to operate the slave unit.

Prepare a 21.6 VDC to 26.4 VDC power with the least noise.

<Valve power>

Power to operate the solenoid valve which is a load on the system.

Prepare a 22.8 VDC to 26.4 VDC power with the least noise.

<Recommended M12 loose power cable >

XS2F-D421-□8□-□ straight type

Manufactured by Omron

Note: □ differs depending on the cable specifications.

<Recommended M12 connector and power cable>

21 03 212 2305 (M12 assembly type connector)

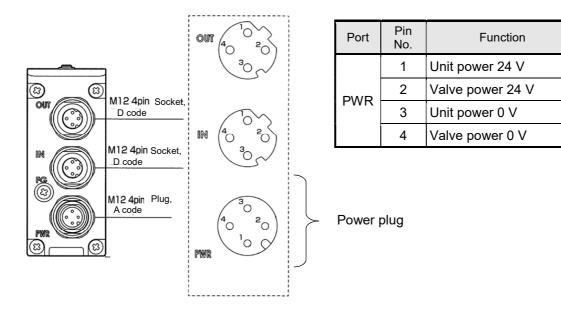
Manufactured by HARTING

Cable size: AWG22 to 18, outside diameter of compatible cable: 6 to 8 dia

#### 4.2.1 Connecting the power cable

Connect the Unit/Valve power cables to the power socket according to the following instructions.

- (1) After confirming safety, power off the power supply connected to the slave unit.
- (2) Refer to the figure below and wire the power cable's 24 V power line to the power plug's 24 V terminal and the 0 V power line to the 0 V terminal.





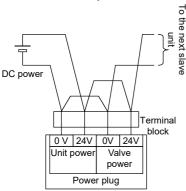


- Carefully check the polarities and rated voltage before making any connections.
- Calculate the current consumption before selecting the appropriate power cable.
- Keep in mind that a voltage drop may occur from powering multiple slave units from one power supply when selecting and wiring the cables.
- Secure the specified power supply voltage by taking countermeasures, such as wiring the power cables in multiple systems or installing other power supplies if a voltage drop cannot be avoided.
- Wire the power cables at the terminal block placed in front of the power plug, when daisy chain is used.

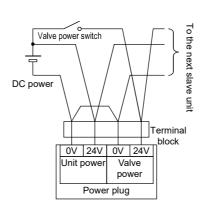
#### 4.2.2 Wiring the power cable

Followings are examples 1 to 3 for wiring to the power plug. Configure any other circuit as needed.

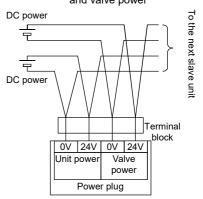
Common connection for unit power and valve power



2. Wiring to turn on/off valve power



3. Separate connection for unit power and valve power



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#### 5. MAINTENANCE

## 5.1 Removing the product (slave unit)

- (1) After confirming safety, stop network communication and turn off all the peripheral devices as needed.
- (2) After confirming safety, turn off unit power and valve power.
- (3) Remove the network connector plug and the power socket.
- (4) Remove the slave unit mounting screws.
- (5) Remove the slave unit by holding laterally.

## 5.2 Mounting the product (slave unit)

- (1) Hold the unit and insert it slowly by matching connectors of connection block and slave unit's side surface.
- (2) Make sure that the slave unit and the connection block are connected and firmly tighten together with the mounting screws.

(Proper tightening torque: 1.2 N·m)

(3) Make sure the power (for both unit and valve) is turned off, and after confirming safety, attach the network connector plugs and the power socket.

Installing the plugs/sockets while the power is turned on may cause the components in the system

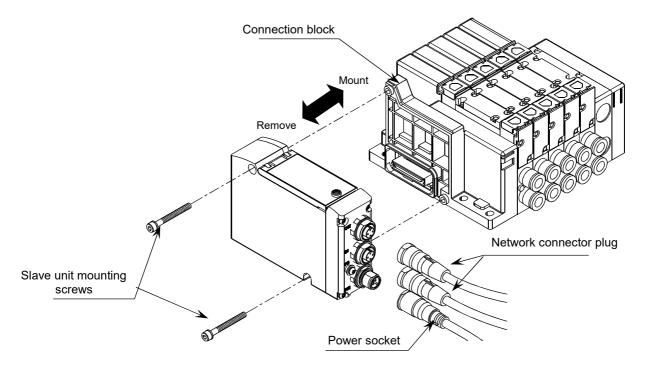
to operate unexpectedly. Ensure the safety of the surroundings before starting.

Network connector plug: Reference tightening torque 0.6 N·m

(Torque depends on the connector plug. Contact the plug manufacturer for appropriate torque.) Power socket: Reference tightening torque 0.45 N·m

(Torque depends on the connector socket. Contact the socket manufacturer for appropriate torque.)

(4) After confirming safety, turn on each power supply.







- Before turning the power ON or OFF, ensure the safety of the surroundings as the components in the system, including the valve (cylinder), may move unexpectedly. Ensure the safety of the surroundings before starting.
- Check the Communication Error Output setting, the device name of slave unit, IP address, etc., when power on the unit.
- Do not touch the electrical wiring connections (exposed live parts) as there
  is a risk of electric shock.
- Many precision devices are mounted inside the slave unit. Do not drop the slave unit nor apply vibration or impact to the unit.
- Do not connect or disconnect any connector plugs while the power is being supplied. Doing so may result in failure or malfunction.
- When the network connector (OUT) is unused, make sure to cover with water-resistant cap.

<Recommended water-resistant cap> 21 01 000 0003 M12 Cap

Manufactured by HARTING

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## 5.3 Troubleshooting

Troubleshooting needs to be conducted on the entire system and not just on a single unit. As the system may move unexpectedly depending on the communication status, be sure to exercise ample caution and ensure safety when conducting maintenance.

#### [Problem 1] PW and PW (V): does not light up

- •Unit power and valve power may not be turned on. Check the power cable status if it is disconnected, also if the powers supply voltage is within the specified range.
- ·A fuse blowout may have occurred in the unit.
- •If the system does not recover after checking the system and restarting the product, replace the unit.

#### [Problem 2] L/A IN, L/A OUT: does not light up

- •The network cable may not be connected. Check if the network cable is securely inserted all the way, the network cable is not broken, a CAT.5 or higher network cable is used, the network is configured correctly, and if there is no source device or high-voltage / high-current cable is around this unit and the network cable.
- •If the system does not recover after checking the system and restarting the product, replace the unit.

#### [Problem 3] RUN LED: does not light up

•Communication with the PROFINET controller may not be started, or it may be disconnected after starting communication. Check if this product and the PROFINET controller are on the same network, a device using the same IP address is additionally connected, a device with the same device name is additionally connected, and if the setting value is correct when the setting of PROFINET controller was changed. Power off once and power on again after checking.

#### [Problem 4] RUN LED: flashes

•Communication with the PROFINET controller may not be started. Check if this product and the PROFINET controller are on the same network, the PROFINET controller is set correctly, network is configured correctly, each devices are set correctly when using MRP. (Please refer the manual of each device for how to set MRP.)

#### [Configuration check point]

- If the device name set in this product is the same as that set in the PROFINET controller configuration.
- If the same I/O module is selected as the actual configuration of this product.
- If the correct GSD file is used.

#### [Problem 5] ERR LED: flashes

•Communication with the PROFINET controller may be disconnected after starting communication. Check if this product and the PROFINET controller are on the same network, whether a device using the same IP address is additionally connected, whether a device with the same device name is additionally connected, and if the setting value is correct when the setting of PROFINET controller was changed.



#### [Problem 6] ERR LED: flashes special 2 and RUN LED: flashes

- •The output data received from the PROFINET controller is disabled. Check the PROFINET controller status.
  - With the output data sent from the PROFINET controller, the information confirming if the output data is enable or not is sent together. If the information is disable, indication becomes as this.

## [Problem 7] INFO LED: lights up

- •The EEPROM error may have occurred.
- ·If the product does not recover after restarting, replace the unit.
  - Despite of the following restrictions, operation is possible even If an EEPROM error occurs. However, use the product only for emergency operation until replacement as an unexpected error may have occurred with it.
    - ① Setting the device name is needed each time the power is turned on.
    - ② All the integrated values such as energizing time, output count, and input count are reset to "0" each time the power is turned on.
    - ③ The I & M data is cleared each time the power is turned on.
    - ④ Communication cannot be performed normally if there are multiple devices with an EEPROM error on the same network.

#### [Problem8] INFO LED: flashes

- ·An internal circuit board error may have occurred.
- •If the product does not recover after restarting, replace the unit.

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### 5.4 Maintenance of components

This section describes the daily maintenance of devices such as methods of cleaning, inspection, and replacing the slave unit.

#### 5.4.1 Cleaning

Clean the device periodically in the following manner to ensure its optimum state.

- (1) For daily cleaning, wipe the device with a dry, soft cloth.
- (2) If dirt remains even after wiping with a dry cloth, use a damp cloth with 2% diluted detergent that has been firmly wrung out.
- (3) Rubber, vinyl, and tape products may stain the slave unit if they are left on for long periods of time. Remove such items during regular cleaning.

#### 5.4.2 Inspection

Always perform periodic inspections to ensure that everything is in an optimum state.

Periodic inspections should be carried out at least once every 6 to 12 months.

However, for a slave unit used in environments subject to high temperatures, humidity and/or excessive dust, inspections should be carried out more frequently.

#### ■ Inspection items

Periodically inspect the following items to ensure that they do not deviate from the criteria. If the items deviate from the criteria, improve the ambient environment to fall within the criteria or adjust the slave unit itself.

Inspection items	Inspection details	Criteria	Inspection method
Environment	Are the ambient and in-panel temperatures suitable?	Refer to the specifications of the slave unit.	Thermometer
	Are the ambient and in-panel humidity suitable?	Refer to the specifications of the slave unit.	Hygrometer
	Is there any accumulated dust?	There should be no dust.	Visual check
Condition of installation	Is the slave unit securely mounted?	There should be no looseness.	Hexagonal wrench
	Is the network cable connector fully inserted?	There should be no looseness.	Visual check
	Are there any damages to the connection cables?	There should be no external abnormalities.	Visual check

#### 5.4.3 Replacing the slave unit

If any unit fails, immediately perform recovery work to prevent the entire network from being affected. To restore Network function as soon as possible, it is recommended to keep spare units on hand for the replacement.

#### ■ Inspection items

When replace the unit after a periodic inspection has revealed a problem, check that the new unit does not have any errors after replacement.