2022.10.7

Handling Instructions

DeviceNet Compatible Serial Transmission Slave Unit

OPP4-1D

Thank you for purchasing our product.
To ensure correct use of this product, read the following precautions carefully before use.
Improper use of this product can impair functions and result in accidents.
Keep this document in a safe and convenient place for future reference whenever necessary.
For further details, please refer to the product catalog and instruction manual.

⚠CAUTION

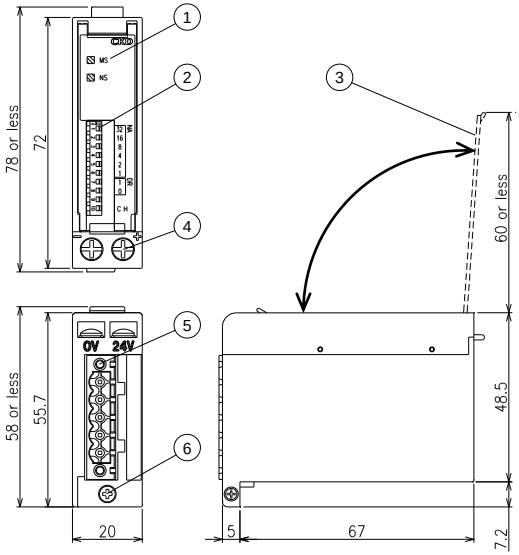
- Setting the Serial Transmission Slave Unit address to an improper value can cause a solenoid valve, a cylinder, or such to malfunction.
  Before using the Slave Unit, make sure the address is set correctly before use.
- Contact with electric wiring connections (bare live parts) involves a risk of electric shock. Always disconnect power before wiring. Never touch live parts with wet hands.
- Be sure to read the user's manual for DeviceNet thoroughly and fully understand its content before using the Serial Transmission Slave Unit.
- This product is rated for DC24V only and shall only be used at its specified power supply voltage.

1. Slave Unit Specification

The product shall be used within its specifications.

Item	Specification
Power supply voltage	DC22.8V to 26.4V (DC24V+10%, -5%)
Power current consumption	110mA or less (under no load with all points ON)
Network power supply voltage	DC11.0V to 25.0V
Network current consumption	50mA or less
Number of output points	16 points
Insulation resistance	Between external terminals and the case: 30 MΩ or more with 500 VDC
Withstanding voltage	Between external terminals and the case: 500 VAC for one minute
Noise resistance	1000Vp-p Pulse width 100nsce, 1μsec
Shock resistance	294m/s^2 for 3 times in 3 directions
Ambient temperature	0°C to 55°C
Ambient humidity	30% to 85% RH (no dew condensation)
Atmosphere	No corrosive gas
Transfer rate (Baud rate)	125kbps, 250kbps, 500kbps (Selectable by switch)
Output insulation	Photo coupler insulation
Max. load current	40 mA/1 point
Leakage current	0.1 mA or less
Residual voltage	0.5 V or less
Fuse rating	24V 1A（Not replaceable）
Action indicator	LED (Module status and Network status only)
No. of nodes occupied by slave	1 node

2. Parts of the Slave Unit



① LED indicators
Indicate the status of the Slave Unit and network with MS, NS.

② Switches
The setting switches are used to set three kinds of functions, node address, baud rate, and output mode if the communication error occurs.

③ Cover
Protects the LEDs and setting switches.

④ Electric power terminal (M3)
Here the main power supply is connected.
(Load power supply is included)

⑤ Network connector socket
This is the connector socket for connecting the network cable, which allows the Slave Unit to be connected to DeviceNet.

⑥ Mounting screw (M2.5 tapping screw)
This screw is used to secure the Slave Unit to the connecting block.

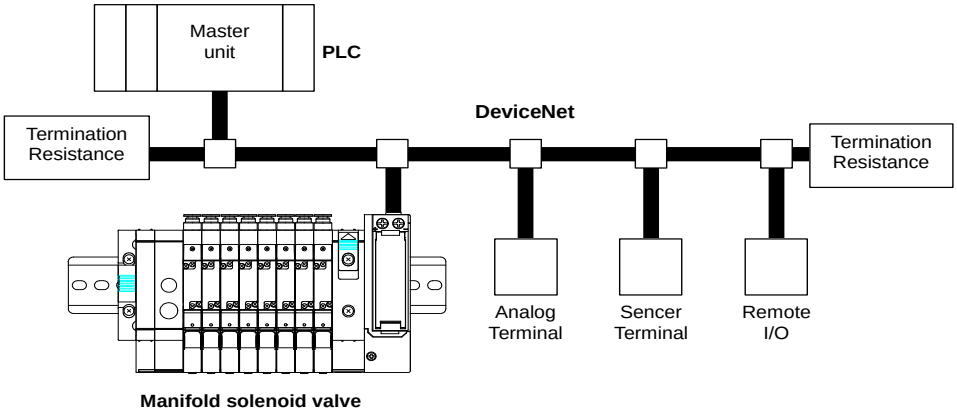
3. System structure

This system mainly consists of a PLC, master unit, OPP4-1D mounted manifold solenoid valve, and peripheral equipment (DeviceNet slaves).

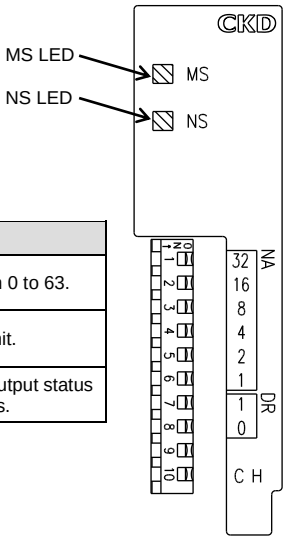
3.1 Examples of PLC and master unit combination

PLC manufacturer	Compatible PLC	Master unit model
Omron Corporation	NJ series	CJ1W-DRM21
	CJ series	
	CS1 series	CS1W-DRM21
Other equipment compatible with DeviceNet		

3.2 Example of basic structure of the system



4. Switches and LED indicators



4.1 Switches

The switches are used to set node address, baud rate, and output mode in the event of a communication error. This Slave Unit operates according to the switch settings when the power is turned on.

※Setting changes will not be recognized after the power is turned on.

Name of switch	Content of Setting
NA Switch No.1 to 6 (Node address setting)	Sets the Slave Unit node address between 0 to 63.
DR Switch No.7, 8 (Baud rate setting)	Sets the baud rate for the Master unit.
C H Switch No.10 (Output mode setting)	Selects whether to hold (H) or clear (C) the output status when a communication error occurs.

Note) Switch No. 9 be the unused.

4.2 LED indicators

These LEDs indicate the status of the product and network.
Refer to the following table for the description of LED indicators.

MS LED	NS LED	Description		Note
Green ☼	Green ☼	I/O communication in progress	I/O data is being communicated between the master and slave unit.	Operating normally.
Green ☼	●	Node address duplication checking	Waiting for node address duplication checking to be completed at the master.	In case only the certain slave unit is in this condition, restart the unit after checking if the baud rate is the same as the master.
Green ☼	Green ◐	Connection waiting	Waiting for connection establishment from the master.	
Red ☼	●	Watchdog timer error	Watchdog timer error occurred in the Slave Unit.	Replace the Slave Unit.
Red ◐	●	Improper switch setting	Switch setting is not correct.	Restart the Slave Unit after checking the switch setting.
Green ☼	Red ☼	Duplicate node address	Node address is duplicated.	After re-setting the node address to avoid duplicate, restart the Slave Unit.
Green ☼	Red ☼	Bus-off detection	Bus-off	Check the following and restart the Slave Unit: • Matching master and slave baud rates • Proper cable lengths (trunk and branch lines) • Broken or loose cables • Installation of terminators at both ends of the trunk line • Excessive noise
Green ☼	Red ◐	Communication time out		
●	●	No main power supply		After checking both node address and baud rate are set properly, supply the main power supply.

☼: ON ◐: Flashing ●: OFF

5. Switch setting

⚠ CAUTION

- Always set the switches with the main power (including the network power) turned OFF.
- The cover of the Slave Unit for the solenoid valve system can easily be opened and closed. Keep the cover closed except when you have to change switch positions or reconnect wires. If you keep the cover open unnecessarily, foreign matter may enter the circuit board causing an unexpected failure, or the cover may be broken by accidental contact. While the cover is open as you change switch positions or reconnect wires, be careful not to cause the entry of foreign matter.
- Setting switch has been precisely built. Disorderly handling may cause damage of switch. To set station number, never touch internal circuit printed board.

5.1 Node address setting

Set the Slave Unit node address.
The Slave Unit functions according to the node address setting at power-up.
Duplicate node address cannot be assigned.

Node address	Switch No.					
	1 (32)	2 (16)	3 (8)	4 (4)	5 (2)	6 (1)
0	0	0	0	0	0	0
1	0	0	0	0	0	1
2	0	0	0	0	1	0
3	0	0	0	0	1	1
≀	≀					
60	1	1	1	1	0	0
61	1	1	1	1	0	1
62	1	1	1	1	1	0
63	1	1	1	1	1	1

0 : OFF
1 : ON
Value in ( ) is indicated on the sheet.

※Example to set the node address to “50”:
50 = 32·(SW1 ON) + 16·(SW2 ON) + 8·(SW3 OFF) + 4·(SW4 OFF) + 2·(SW5 ON) + 1·(SW6 OFF)
According to the above formula, turn ON the switch Nos.1, 2, and 5, and turn OFF other switches (Nos.3, 4, and 6).

5.2 Baud rate setting

Set the baud rate for the master unit.

baud rate	Switch No.	
	7 (DR1)	8 (DR0)
125 kbps	0	0
250 kbps	0	1
500 kbps	1	0
Cannot be set	1	1

0 : OFF
1 : ON

⚠ CAUTION

- Set the same baud rate as that set for all nodes (master and slave units) on the network. If the baud rate is set incorrectly, slave units with a baud rate different from that of the master unit cannot only be communicated between nodes with the correct baud rate set.

5.3 Output mode setting

The output data status if the communication error occurs in this product is set as shown below.

	Switch No.10 (CH)	Content of Setting
CLEAR	OFF	Used to clear to “0” all the output data from the master unit in case of a communication error.
HOLD	ON	Used to hold the output data in the status immediately before the data is output from the master unit in case of a communication error.

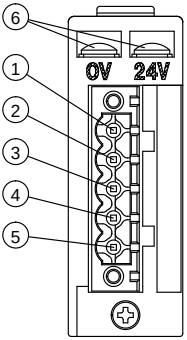
⚠ CAUTION

- If the switches are set with the power turned ON, the set contents may not be recognized correctly. Always set the switches with the main power (including the network power) turned OFF.

6. Wiring

The function explanation and the connection destinations of the terminal are shown.

Symbol	Function	Objects to be connected	Indicated Cable Color
① V-	Network power supply (-)	Use low-noise DC11 to 25V power supply	Black
② CAN_L	Communications data lines (low)	Connect CAN-L network cable of the master unit or other slave.	Blue
③ Drain	Shielded terminal	Cable shielding	(none/bare)
④ CAN_H	Communications data lines (high)	Connect CAN-H network cable of the master unit or other slave.	White
⑤ V+	Network power supply (+)	Use low-noise DC11~25V power supply	Red
⑥ Power input	Main power supply (Including load power supply)	DC24V ±10%	0V
			24V



⚠CAUTION

- Contact with electric wiring connections (bare live parts) involves a risk of electric shock. Always disconnect power before wiring. Never touch live parts with wet hands.
- Do not subject the main power cables and network cables to tension and impact. Long cables can exert unexpected power due to its weight and impact, and this can consequently damage the connectors and devices.
  Take preventative measures such as securing the cables to the equipment.

6.1 Communications distances

In DeviceNet, communication distance is as follows depending on the baud rate.

baud rate	Max network length **	Branch line length	Total branch line length
125k bps	500m or less	6m or less	156m or less
250k bps	250m or less	6m or less	78m or less
500k bps	100m or less	6m or less	39m or less

** Indicates values when a thick private cable is used.
The value is less than 100m in cases where a thin private cable is used.

⚠CAUTION

- Please confirm the operation manual of the network system, because the communication distance changes by the thickness of the cable and baud rate.

6.2 Connecting the power cables

When connecting the power cable to the Slave Unit, follow the procedure described below.

① After confirming safety, turn off the power to connect to the Slave Unit.
② Attach an M3 crimp terminal that is not more than 6mm in width to the power cable.
③ Secure the power cable to the power supply terminal by matching the polarities, that is, 24V wire to 24V terminal (+) and 0V wire to 0V terminal (-).
(Adequate tightening torque : 0.5N·m)

In this product (OPP4), the Slave Station (unit) power supply and load (valve) power supply are common, which cannot be separate from each other.

⚠CAUTION

- If a only twisted wire is connected direct to the terminal block, firing may result; it is, therefore, necessary to always use a crimp terminal.
- Before connecting the power supply, confirm the polarity of the terminal on the product and the polarity of the cable terminal.
- Calculate the current consumption before selecting an appropriate power cable.
- If power is to be supplied to more than one slave from one power supply, voltage drop due to cables should be considered when selecting and wiring the cables.
- If voltage drop cannot be avoided, take measures to secure the specified power supply voltage such as wiring the power cables in multiple systems or installing other power supplies.

6.3 Connecting the network cable

When connecting the DeviceNet cable to this product, follow the steps below.

① After confirming safety, stop network communication and turn off all peripheral equipment.

② Insert each of the DeviceNet cable wires, CAN H (white), CAN L (blue), V+(red), V-(black), and Drain(bare) into relevant hole(CAN H ,CAN L ,V+ , V- , and Drain) while carefully referring to the orientation of the attached connection connector.
(Refer to the figure below)

③ Firmly tighten each cable, using the cable fixing screw of connecting connector.
(Adequate tightening torque : 0.5N·m)

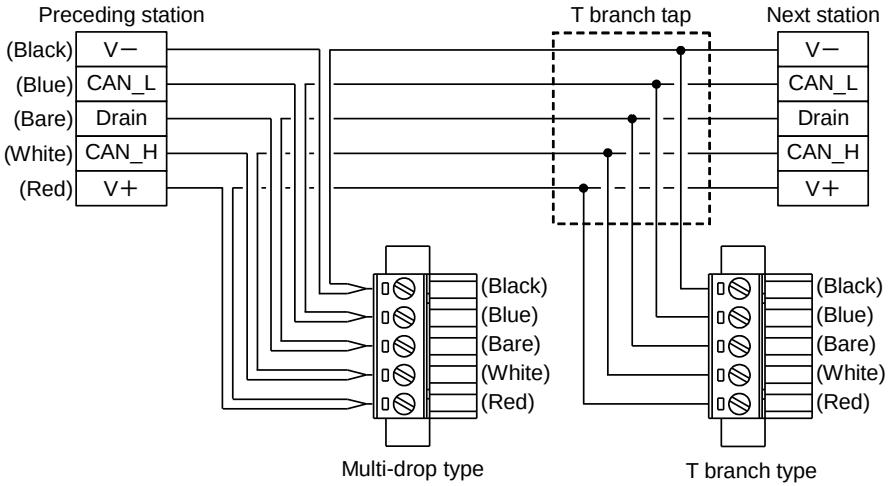
④ Make sure the color of the connector cable and supplied connector are the same color, the connector plugged into the product, please tighten the screws firmly.
(Adequate tightening torque : 0.3N·m)

<Recommended Connector>

Supplied connector : MSTB2,5/5-STF-5,08 AUM (with connector fixing screw) Phoenix contact
Similar connector : MSTB2,5/5-ST-5,08 AUM (without connector fixing screw) Phoenix contact

⚠ CAUTION

- For the network cables, use dedicated cables that comply with DeviceNet specifications.
- When inserting a cable into the connector, the cable may intrude into not the connector tightening side but the rear side; it is, therefore, necessary to keep the cable fixing screw satisfactorily loose.
- For connectors provided with connector fixing screws, be sure to firmly tighten the connector fixing screws when inserting the connector. If it is inserted and not fixed, the connector may come off, thereby causing malfunctions. For connectors not provided with fixing screws, make sure the hooks are engaged securely.
- Make sure the network cable has sufficient bending radius, and do not bend it forcibly.



⚠ CAUTION

- To prevent problems caused by noise, keep the following in mind when wiring.
  ① If noise is likely to have an influence, provide a power supply for each manifold solenoid valve when possible and wire them independently.
  ② Do not use power cables that are longer than necessary and wire them in the shortest distance possible.
  ③ Do not share power with noise generating devices such as an inverter motor.
  ④ Do not lay main power cables, network cables, and other power cables in parallel.

7. Maintenance

7.1 Mounting the product (Slave Unit)

① Set the node address of the product

② Holding the Slave Unit, insert it into the Slave Unit connecting block slowly from the front along the guide.

③ Make sure the Slave Unit and the connecting block are connected and tighten the Slave Unit mounting screw firmly. (Adequate tightening torque: 0.5 N･m)

④ Turn off the power (for main/network/) and connect the network connectors and power cable. The system may operate suddenly if the connectors are installed while the power is turned on. Be careful of the surroundings and secure safety before performing work.

⑤ After confirming safety, turn on each power.

⚠CAUTION
- Before turning the main power and network power ON, check the Slave Unit address, transfer rate and output setting during abnormal communication.

7.2 Removing the product (Slave Unit)

① After confirming safety, stop network communication as necessary and turn off all peripheral equipment.

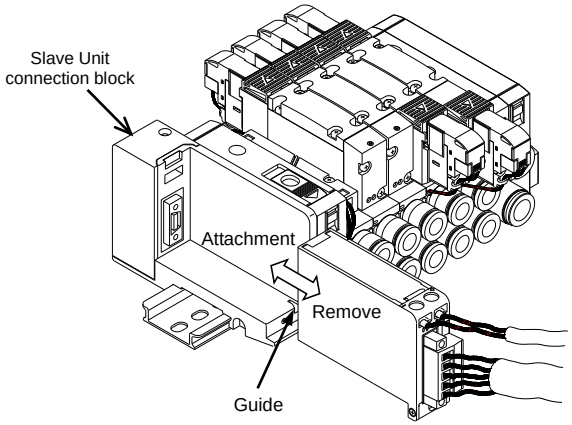
② After confirming safety, turn off the main power and network power as necessary.

③ Loosen the Slave Unit fixing screws.

④ Hold and pull out the product slowly in the direction of the arrow.

⑤ Remove the network connectors and power cable.

⚠CAUTION
- Avoid pulling out the Slave Unit while pulling the cable or connector; otherwise, broken circuit and damage may result.
- Contact with electric wiring connections (bare live parts) involves a risk of electric shock.



7.3 Screw and tightening torque

As for the screw that is used with this product, please defend the following tightening torque.

	Terminal screw	Slave Unit fixation screw	Cable fixation screw	Connector fixation screw
Use screw kind	M3x6	M2.5 (Tapping screw)		
Propriety tightening torque	0.3～0.5N･m	0.3～0.5N･m	0.5N･m	0.3N･m

8. Caution

- This product does not meet the surge immunity requirements specified in EN61000-4-5 for CE marking. Please provide appropriate protective measures against lightning surges on the device side.
- The comply with EC Directives, the power supply used as a main power supply and network power supply must be AC/DC power supply adapter (for example , switching power supply) that suits EMC standard.
- Refer to the user's manual for the network system concerning the communication delay time. The communication delay within the entire system depends on the scan time achieved by the PLC and on other devices included in the system.
- Solenoid valve responding time, of course, varies depending on model. It is advisable of referring to valve specification.
- Connect the power supply cable and signal cable correctly within the specifications so that any incorrect wiring is not performed.
- Pay special attention so that any tensile force or impact is not applied to the power supply cable and signal cable.
- Before turning ON the power, make sure that all network cables and connector plug s 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 Slave Unit.
- Do not connect or disconnect any connector plug while the power is supplied. Doing so may result in failure or malfunction.
- The time it takes for the solenoid valve to turn OFF is delayed by approximately 20ms since there is a surge absorbing circuit incorporated in the Slave Unit.
- Contact us regarding this product, please contact your local sales office or below.

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