

# Handling Instructions

## DeviceNet compatible Serial transmission unit block N4E0-T7D※

Thank you for purchasing CKD product.  
Please review the precautions in this handling instructions thoroughly for safe operation of this equipment.  
Dangers and malfunction can arise in the use of the product if it is used incorrectly.  
Keep this instruction in a safe location so that it is easily referenced as necessary.  
For further information, refer to the instruction manual and product catalog.



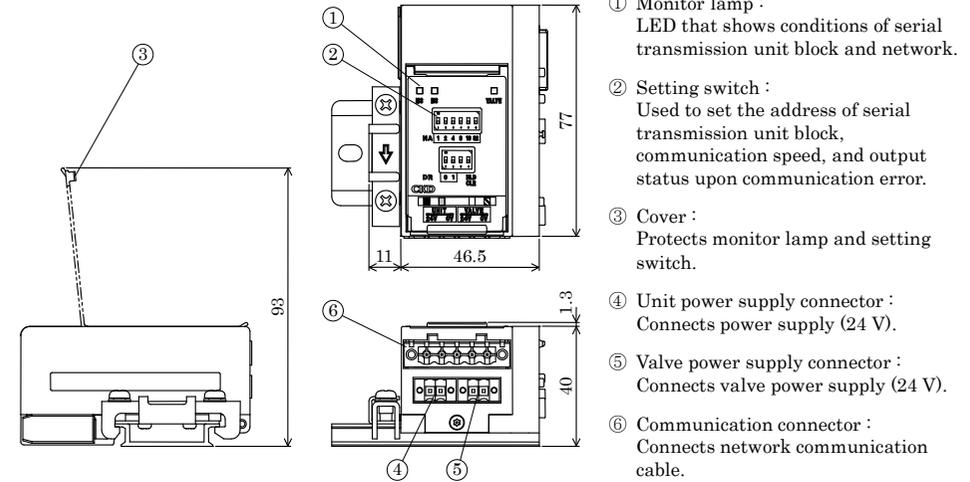
### CAUTION

- Verify that the station number of the serial transmission unit block is correctly set. Operation with incorrect station number will result in malfunction of solenoid valve and cylinder.
- Be sure to turn off power source before performing wiring work on electrical connections (bare live parts). Never touch live parts with bare hand.
- Before using the serial transmission unit block, carefully read the operation manual (user's manual) of the communication system to be used to understand the operation of the system.
- This product operates only from DC supply. Observe the voltage specification.

### 1. Operate the serial transmission unit block according to the product specification.

Item	T7D1	T7D2
Power supply voltage (unit side)	DC21.6V~26.4V (DC24V±10%)	
Current consumption (unit side)	60 mA max. (with all points ON)	85 mA max. (with all points ON)
Supply voltage (communication system)	DC11.0V~25.0V	
Current consumption (communication system)	50 mA max.	
Power supply voltage (valve side)	DC22.8V~26.4V (DC24V +10%, -5%)	
Current consumption (valve side)	15 mA max. (with all points OFF)	
No. of inputs/outputs	0/16	0/32
Insulation resistance	Across all external pins and casing 30MΩ or more w/500 VDC megger	
Withstand voltage	Across all external pins and casing 500 VAC for 1 min.	
Noise resistance	500 Vp-p pulse width 1 μs	
Vibration resistance	Durability	10 ·150·10 Hz 1 octave/min, peak amplitude 0.75 mm or 98.0 m/s <sup>2</sup> , whichever smaller, 15 scans in each X, Y and Z direction
	Malfunction	10 ·150·10 Hz 1 octave/min, peak amplitude 0.5 mm or 68.6 m/s <sup>2</sup> , whichever smaller, 4 scans in each X, Y and Z direction
Mechanical shock proof	294.0 m/s <sup>2</sup> , 3 times in each of 3 directions	
Ambient temperature	5~55°C	
Ambient humidity	30-85% RH (no dewing)	
Operating environment	No corrosive gas	
Compatible communication	DeviceNet	
Communication speed	125 k/250 k/500 k bps (selectable from DIP switch)	
Type of output insulation	Photo coupler insulation	
Max. load current	40 mA/point	
Leakage current	0.1 mA max.	
Residual voltage	0.5 V max.	
Output circuit	NPN transistor open collector	
Fuse	1 A for 24 V unit supply; 2 A for 24 V valve supply; 1 A for 24 V communication power supply (non-replaceable)	
Operating indication	LED (unit power supply/valve power supply/communication status)	

### 2. Dimensional outline drawing

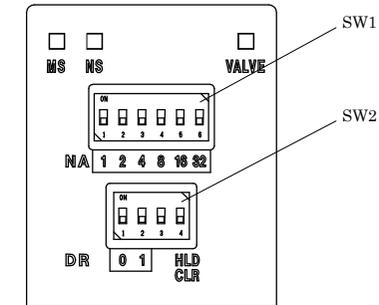


- ① Monitor lamp : LED that shows conditions of serial transmission unit block and network.
- ② Setting switch : Used to set the address of serial transmission unit block, communication speed, and output status upon communication error.
- ③ Cover : Protects monitor lamp and setting switch.
- ④ Unit power supply connector : Connects power supply (24 V).
- ⑤ Valve power supply connector : Connects valve power supply (24 V).
- ⑥ Communication connector : Connects network communication cable.

### 3. Switch and LED display

#### 3.1 Switch

Set the address of this serial transmission unit block, communication speed, and output upon occurrence of communication error.



Symbol	Switch	Settings
SW1	NAA switch Nos.1-6 (node address setting)	Set the node address of serial transmission unit block in the range of 0 to 63.
SW2	DR B switch Nos.1,2 (communication speed setting)	Set the speed of communication conducted between the master unit.
	C/H B switch No.4 (output mode setting)	Choose to hold (H) or clear (C) output status upon occurrence of communication error

Note: Switch B No.3: unused

### 3.2 MS/NS LED display

Displays the condition of the serial transmission unit block and network. Table below shows examples.

MS LED	NS LED	Description		Remarks
Green 	Green 	I/O communication	I/O data are transferred between the master and serial transmission unit block	Normal state
Green 	●	Checking node address for duplication	Waiting for completion of node address duplication check on master	If a particular serial transmission unit block is in this state, check the communication speed (same or not) and then restart the slave.
Green 	Green 	Waiting for connection	Waiting for establishment of connection from master	
Red 	●	Watchdog timer failure	Watchdog time failure occurs on the serial transmission unit block.	Replace the serial transmission unit block.
Red 	●	Invalid switch setting	Wrong setting of switch, such as DIP switch, etc.	Verify switch settings and restart the serial transmission unit block.
Green 	Red 	Duplicated node address	Duplicated node address is used for master unit	Change duplicated node address to another address and then restart the serial transmission unit block.
Green 	Red 	Detection of Busoff	Busoff (halt of communication due to many invalid data)	Check the following items and then restart the serial transmission unit block: <ul style="list-style-type: none"> <li>• Master and serial transmission unit block operate at the same communication speed.</li> <li>• Cable length of both trunk and branch is acceptable.</li> <li>• No breakage of cable or no loose connection is found.</li> <li>• Terminating resistance is installed only on both ends of trunk.</li> <li>• Noise level is low.</li> </ul>
Green 	Red 	Communication timeout		
●	●	Power supply OFF		Verify that related parameters such as address and communication speed are correctly set, and then turn on power.

### 3.3 VALVE LED display

VALVE LED	Description
Green 	Valve power supply is ON
●	Valve power supply is OFF

- ※ Lighting Blinking ● OFF  
 ※ VALVE LED can operate as a monitor only while unit power supply is ON.

### 4. Switch setting

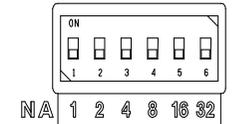
**CAUTION**

- Be sure to turn off the unit power before attempting switch setting.
- The cover on serial transmission unit block can easily be opened/closed by a single operation. Keep the cover closed if switch setting is not required, to prevent intrusion of foreign matters which will cause malfunction of internal circuit or damage to the cover. Prevention of intrusion of foreign materials should be taken into account during switch setting operation also.
- Handle the setting switch as a precision device that may be easily damaged when subjected to excessive force. Never touch the internal circuit board during setting.

### 4.1 Setting node address

Set the node address of the product in the range 0 to 63. Do not duplicate a specific node address.

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



0:OFF  
1:ON  
( ) : display in the sheet

Example: To set node address to 50

$$50 = 1 \cdot (0) + 2 \cdot (1) + 4 \cdot (0) + 8 \cdot (0) + 16 \cdot (1) + 32 \cdot (1)$$

Based on the formula above, turn ON switches Nos. 2, 5 and 6 and turn OFF switches Nos. 1, 3 and 4.

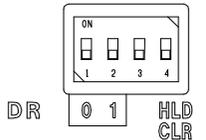
※ T7D2 is Omron PLC which solely uses addresses for 2 channels if configurator is not used.

### 4.2 Setting communication speed

Set the speed of communication conducted between the master unit.

Communication speed	Switch No.	
	1 (DR0)	2 (DR1)
125k bps	0	0
250k bps	1	0
500k bps	0	1
Do not set	1	1

0:OFF  
1:ON  
( ) : display in the sheet



### CAUTION

- The communication speed must be identical to those of all nodes (masters and slaves) over the network.  
Possible consequences: a slave whose communication speed differs from that of the master cannot participate in any network communication. Further, communication error may be introduced to communication conducted between correctly set nodes.

### 4.3 Setting output mode

Set the condition of the output data as described below in case the product encounters communication error.

	Switch No.4 (H/C)	Settings
CLEAR (CLR)	0	Clear the output data from master to "0".
HOLD (HLD)	1	Preserve the output data from the master in the condition immediately before the communication failure occurs.

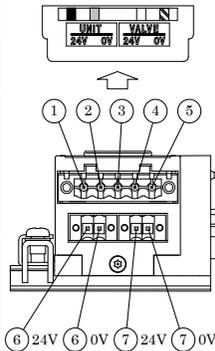
### CAUTION

- Be sure to turn off power before attempting switch setting. Otherwise, setting is not acknowledged.

## 5. Wiring

The table below describes the function of terminals and their destinations.

	Terminal	Function	Application	Cable identification color
①	V-	Power supply for communication (-)	Feed low noise 11-25 VDC supply	■ (Black)
②	CAN_L	Terminal for communication (L)	Master or other slave communication lines "CAN_L"	■ (Blue)
③	Shield	Terminal for shielding	Shield of cable	None (bare wire)
④	CAN_H	Terminal for communication (H)	Master or other slave communication lines "CAN_H"	□ (White)
⑤	V+	Power supply for communication (+)	Feed low noise 11-25 VDC supply	▨ (Red)
⑥	Power source connector	Connect to unit power source	DC24V ±10%	24V 0V
⑦	Power source connector	Connect to valve power source	DC24V +10%, -5%	24V 0V



### CAUTION

- Be sure to turn off power source before performing wiring work on electrical connections (bare live parts). Never touch live parts with bare hand.
- Provide means to protect power lines and communication lines so that they will not be exposed to excessive tension, vibration or shock. Longer line may exert force or shock generated by its own mass, on components and devices causing damage. If this is the case, mechanically support or secure the lines.

### 5.1 Transmission distance

On DeviceNet, transmission distance depends on the communication speed:

Baud rate	Network max. length <sup>*</sup>	Branch length	Total branch length
125 kbps	500m or less	6m or less	156m or less
250 kbps	250m or less		78m or less
500 kbps	100m or less		39m or less

<sup>\*</sup> The maximum lengths specified in the table above are applicable when thick cable is used. The absolute maximum length is limited to 100 m if thinner cable is used.



### CAUTION

- Communication distance depends on the communication speed and size of cable. For further information, refer to the manual of the communication system.

### 5.2 Power wire

When connecting power cable to the product, follow the procedure described below:

- Before turning off power to the unit and valve to be connected, check all safety matters.
- Insert conductors of power cable to the corresponding hole on the connector. See figure below to identify polarities.
- Secure each conductor by turning the corresponding clamping screw on the connector. (Recommended screw torque: 0.25N·m)
- When unit power supply and valve power supply are independently used, insert connector to the correct location of the product and secure it with connector clamping screws. (Recommended screw torque: 0.25N·m)

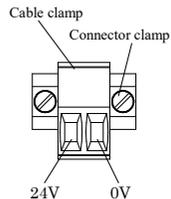
< Recommended connector >

Supplied: BL3.5/2F (Part No.: 160664) Manufactured by WEIDMULLER



### CAUTION

- Choose a cable that has enough capacity to carry amount of current to meet the calculated current consumption.
- When supplying power to I/O of two or more remote serial transmission unit blocks from a single power source, determine voltage drop on the cables before choosing cables.
- When the voltage will drop below the specified level, add cable(s) or power source.



### 5.3 Signal line

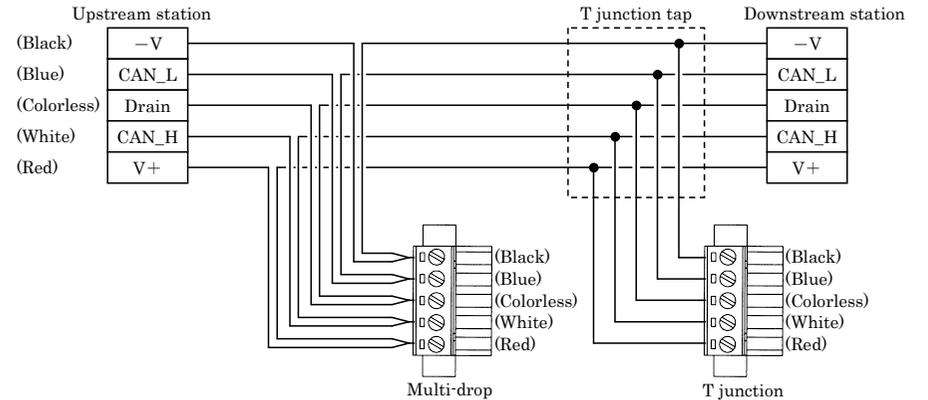
When connecting DeviceNet cable to the product, follow the procedure described below.

- Turn off the serial transmission unit block power supply and the communication power supply.
- See the figure below. Insert conductors CAN\_H (white), CAN\_L (blue), V+ (red), V- (black), Drain (bare) of DeviceNet cable into corresponding holes (CAN\_H, CAN\_L, V+, V-, Drain) on the connector (MSTB2.5/5-STF5.08AUM).
- On the connector, tighten the conductor clamping screws. (Recommended screw torque: 0.5 N·m.)
- Double check that the color of the conductor is identical to that of mated connector terminal. Insert the connector to the product and secure it with the clamping screw. (Recommended screw torque: 0.3 N·m.)

< Recommended connector >

Connector supplied : MSTB2.5/5-STF5.08AUM (w/connector clamping screw)  
Manufactured by Phoenix Contact

Compatible connector : MSTB2.5/5-ST5.08AUM (without connector clamping screw)  
Manufactured by Phoenix Contact



### CAUTION

- Be sure to use signal cable that conforms to DeviceNet specification.
- Isolate communication line from power line and high-tension line.
- Before inserting cable conductor into connector, fully loosen the cable clamping screw so that the conductor can reach the back of the connector.
- When connector clamping screw is provided, tighten it after engaging the connector. Possible consequences: loosen connector may be disconnected causing malfunction. For connector without connector clamping screw, be sure to engage the connector claws.
- The bending radius of communication cable must be large to prevent the cable from excessive bending load.
- Before making any electrical connection, check polarity and rated voltage.
- To prevent noise related problem, use the following wiring procedure.
  - When noises induce problem, prepare a power supply for each manifold solenoid valve, if possible, and prepare wiring separately.
  - Use the shortest power supply lines as far as possible.
  - Isolate the wiring power supply lines for noise generating devices such as inverter and motor.
  - Do not run supply lines and communication lines in parallel with power lines.

## 6. Maintenance

### 6.1 Removing serial transmission unit block

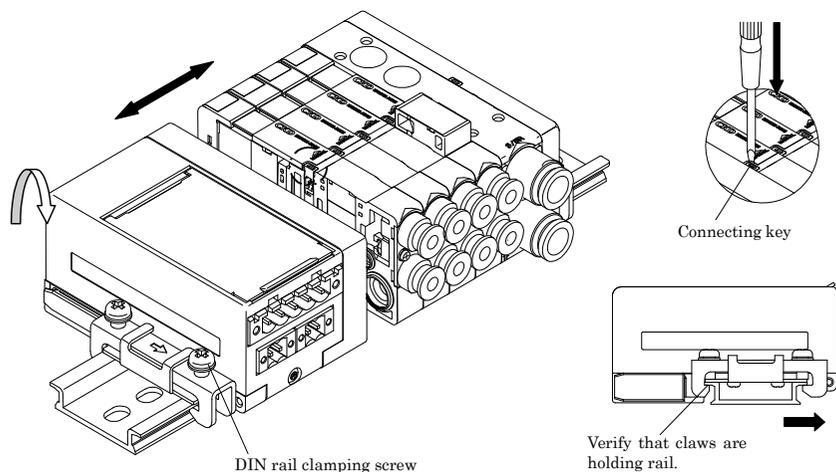
- ① Verify that loss of power will not cause danger and then turn off power to the unit and valve.
- ② Shut down the pressure supply and bleed residual pressure.
- ③ Loosen DIN rail fixing screws. Using a needle-nosed tool, press and hold the connecting key spanning the serial transmission unit block and adjacent blocks.
- ④ While pressing and holding the connecting key, slide the serial transmission unit block along the DIN rail in the direction so that block link port and connector are isolated.
- ⑤ Turn up the block toward the piping port and remove the serial transmission unit block.  
Verify that the power is turned off and then disconnect the power supply connector and communication connector.

### 6.2 Installing the product

- ① Set the address, communication speed and the status of output upon occurrence of communication error of the serial transmission unit block.
- ② Verify that power is turned off. Install the power supply connector and communication connector to the serial transmission unit block, and secure them.
- ③ Slide the serial transmission unit block along the DIN rail in the direction so that adjacent blocks are linked without leaving gap between them. Verify that the wiring connector is pinch-free. Verify that the connecting key returns back to the groove on the block upper surface.
- ④ Slide the retainer toward piping port until the claws catch the DIN rail and tighten the clamping screws. (Recommended screw torque: 1.4 N·m.)
- ⑤ Verify that application of power and pressure will not cause danger and then turn on power and pressure source.



- Before turning on unit power source, check the address of the serial transmission unit block, communication speed and output settings upon occurrence of communication error.
- Never touch electrical wiring connections (exposed live parts). Electrical shock may occur.



## 7. CAUTION

- The comply with EC Directives, the power supply used as a unit power supply and valve power supply must be AC/DC power supply adapter (for example , switching power supply ) that suits EMC standard.
- For lag time, refer to the master station user's manual. System transmission lag depends on PLC scanning time and devices connected to the network.
- Response time lag of solenoid valve varies from one to another and should be checked by referring to the particular solenoid specification.
- Solenoid valve lags behind in OFF operation, approx. 20 ms, due to the fact that the surge absorption circuit is installed on the serial transmission unit block.
- Install and connect power lines and signal lines to the applicable specification.
- Provide means to protect power lines and communication lines so that they will not be exposed to excessive tension, vibration or shock.
- Before turning on power, make sure that connection cables and connectors are installed and positively engaged.
- Do not attempt to disassemble, modify or repair the product. Unauthorized alteration will cause trouble or malfunction.
- Handle the unit as a precision device which may be easily damaged when subjected to excessive shock or vibration, e.g. due to falling.
- Do not engage/disengage connector with power applied. Possible consequences: trouble or malfunction.
- Should any questions arise regarding the product, contact below or your local business office.

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