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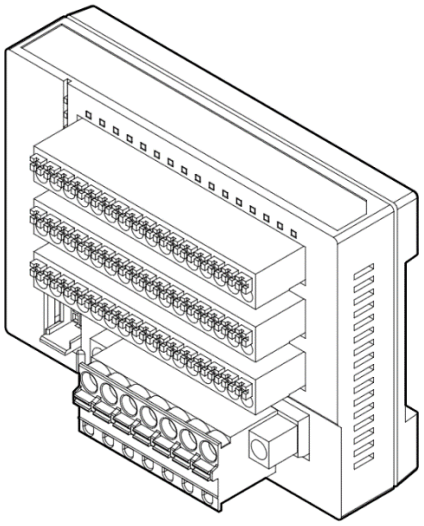
IO-Link Hub

UR-DS16D

UR-DS16T

UR-DS8D8T

User's Manual



OPTEX FA CO., LTD.

Introduction

Thank you for purchasing the UR-DS16D, -DS16T, -DS8D8T IO-Link Hub.
This manual includes the information required to use the UR-DS16D, -DS16T, -DS8D8T. read this manual carefully before use, and fully understand the functions and performance before using this product correctly. Also, keep this manual in a safe place after reading it, and always keep it handy.

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Revision History

First edition: 2023.4.4

Second edition: 2024.2.22 (Added description of how to wire to the power terminal and the device terminal.)

Third edition: 2024.8.23 (Added communication speed selection, Changed description of IEC61131-2)

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Safety Precautions

Safety precautions for ensuring safe operation of this product are displayed as follows with the following symbols.

Precautions listed here describe important information about safety. Make sure to follow them accordingly.

Safety Symbols

⚠WARNING	Indicates that any improper operation or handling may result in moderate or minor injury, and in rare cases, serious injury or death. Also indicates a risk of serious property damage.
⚠CAUTION	Indicates that any improper operation or handling may result in minor injury or property damage.

⚠WARNING	
	Do not disassemble, repair, modify, deform under pressure or attempt to incinerate this product. Doing so may cause injury or fire.
	Do not use this product in water or in a location where it may be exposed to water. Do not use this product if wet. Doing so may cause a fire or damage the product.
	This product is not explosion-proof and should not be used around flammable or explosive gases or liquids. Doing so may cause ignition resulting in an explosion or fire.
	Do not use air dusters or any spray that uses flammable gas around the product or on the inside of the product. Doing so may cause ignition resulting in an explosion or fire.
	Do not use this product in environments other than industrial environments. If used in other environments, it may cause induction and radiation interference.
	Do not install this product or its cables in any of the following locations. Doing so may cause a fire, damage or a malfunction. 1. Locations where dust, salt, iron powders or vapor (steam) is present. 2. Locations subjected to corrosive gases or flammable gases. 3. Locations where water, oil or chemical splashes may occur. 4. Locations where heavy vibrations or impacts may occur. 5. Locations where the ambient temperature exceeds the rated range. 6. Locations subject to rapid temperature changes (or where condensation occurs). 7. Locations with strong electric or magnetic fields. 8. Outdoor locations or locations subject to direct light.
	Do not use the product at voltages or with AC power supplies that exceed the rated voltage. Doing so may cause a fire or damage the product.
	What to do in the event of a malfunction such as smoke being emitted from the product: If you detect any malfunction including emission of smoke, abnormal smells or sounds or the body becoming very hot, immediately stop operating the product and turn off the power. Failure to do so can cause fire. Repairing the product is dangerous and should in no way be performed by the customer. Contact an OPTEX FA sales representative for repairs.
	What to do if water enters the product: If water or any other liquid enters the product or the cable, immediately stop operating the product and turn off the power. Using the product in this condition may cause a fire.

⚠CAUTION	
	Do not touch this product or the cable with wet hands. Incorrect wiring can cause product failure or malfunction.
	When wiring this product, do so properly according to this manual and specified instruction manuals. Incorrect wiring can cause product failure or malfunction.
	Connect only specified cables to this product. Use of cables other than those specified can cause malfunction.
	Keep wiring separate from high voltage and motor circuits. Using the same wiring can cause malfunction or failure. If this is unavoidable, shield with a conductor such as an earthed conduit.
	Install this product as far away as possible from high-voltage equipment, equipment that generates large switching surges and equipment that generates noise, such as welding machines or inverter motors.
	Use this product with the end plate (sold separately) mounted to the DIN rail. Make sure locking mechanisms are locked before use.
	Tighten the mounting screws that attach the power terminal block to the main unit with a torque value of 0.25 N·m or less.
	Do not apply torsional stress to cables. Doing so can cause cables and connectors to malfunction. Secure the communications cable drawn out of this product within lengths of 30 cm to ensure no load is applied to the product.
	Do not drop this product or subject it to strong impact or vibrations. Doing so can cause malfunction.
	This product generates heat during operation, so do not maintain physical contact for long periods of time. Doing so can cause low-temperature burns, etc.
	Use this product within the rated range.
	Do not cut power during communication.
	Make sure to turn OFF the power before connecting or disconnecting cables and connectors. Connection or disconnection while running can cause malfunction.
	Always hold the connector when connecting or disconnecting cables and do not apply excessive force to cables.
	When removing a connector, do not touch the terminals inside the connector or allow foreign objects to get inside.
	When using power cables or commercially available switching regulators, make sure the frame ground (FG) is grounded.
	Wait until after transient state (approx. 2 sec.) when power is turned ON before use.
	Make sure to use an isolation transformer for DC power supply.
	If a surge occurs in the power supply used, use a surge absorber for the source of generation.
	If this product used in a manner not specified by the manufacturer, the protection provided by this product may be impaired.

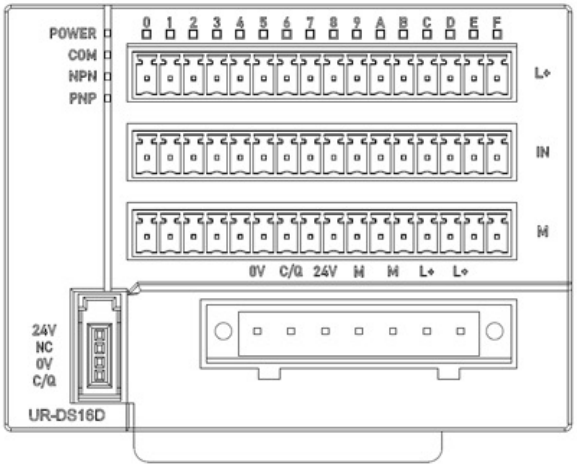
1. Overview

The UR-DS16D IO-Link Digital I/O Module is a IO-Link digital input unit that transfers 16 points of digital input ON/OFF signals (from a device such as a sensor or switch) to the process input data of an IO-Link master.

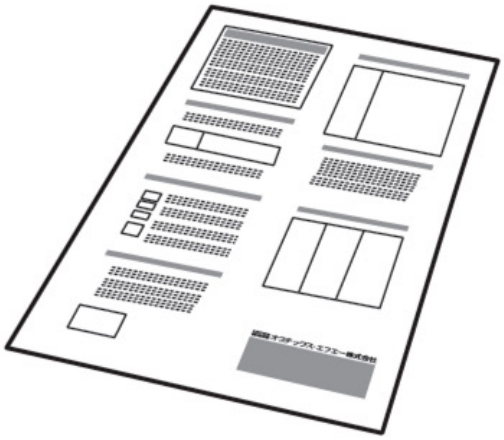
The UR-DS16T IO-Link Digital I/O Module is a IO-Link digital output unit that outputs process output data transferred from the IO-Link master as 16 points of digital output ON/OFF signals to a device such as an actuator.

The UR-DS8D8T IO-Link Digital I/O Module is a IO-Link digital input/output unit that transfers eight points of digital input ON/OFF signals (from a device such as a sensor or switch) to the process input data of an IO-Link master, while at the same time outputting process output data transferred from the IO-Link master as eight points of digital output ON/OFF signals to a device such as an actuator.
It can be used for applications such as connecting to an IO-Link master to expand the number of input points and output points.

2. Included items



(This illustration is for UR-DS16D)

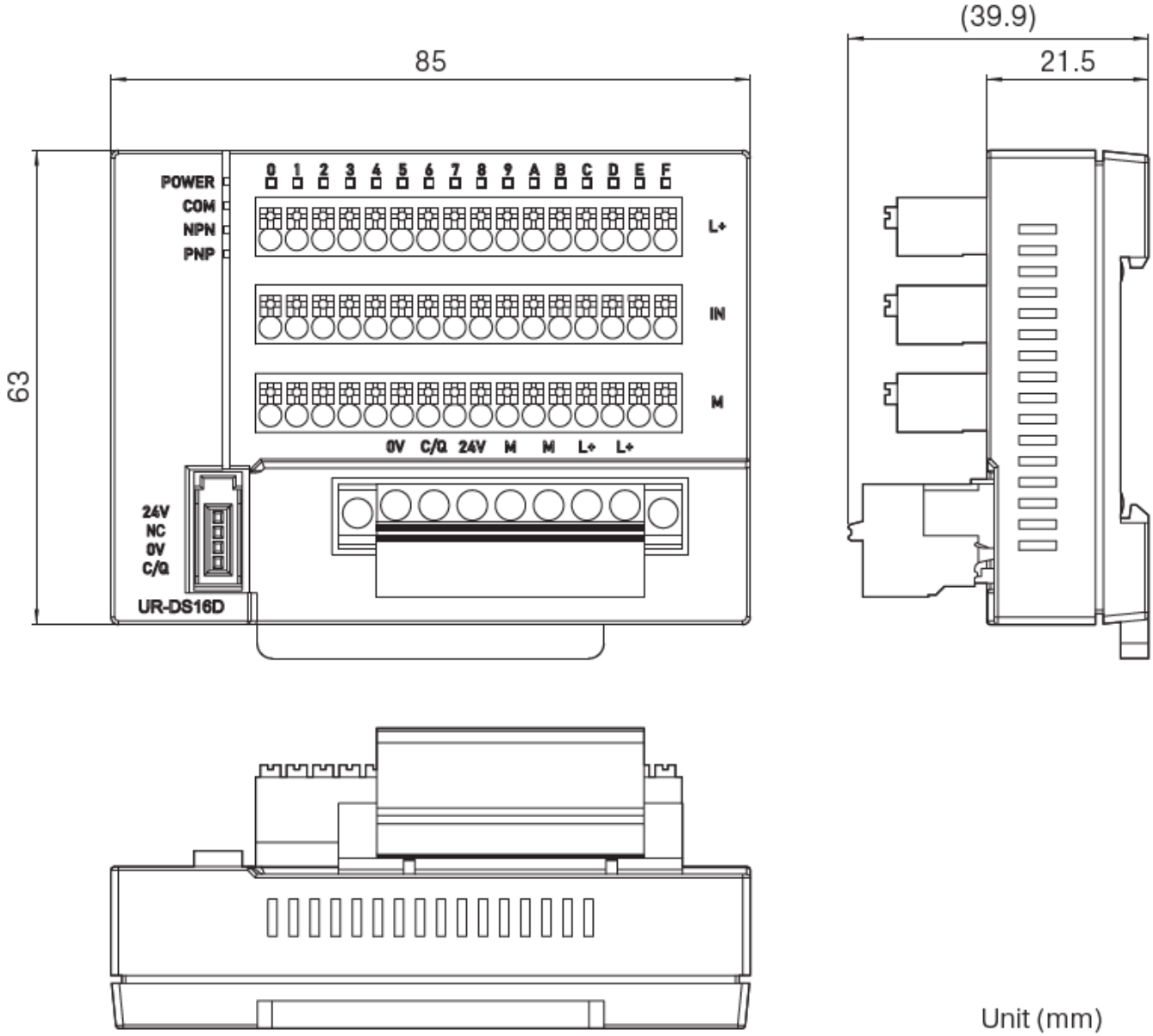


Instruction manual

- Product body (UR-DS16D / UR-DS16T / UR-DS8D8T) unit
- Device terminal block x 3
- Power terminal block

If terminal blocks are lost or damaged, order the following model.
Device terminal block : UR-FD16D (contains 1)
Power terminal block : UR-FP7T

3. Dimensions



Unit (mm)

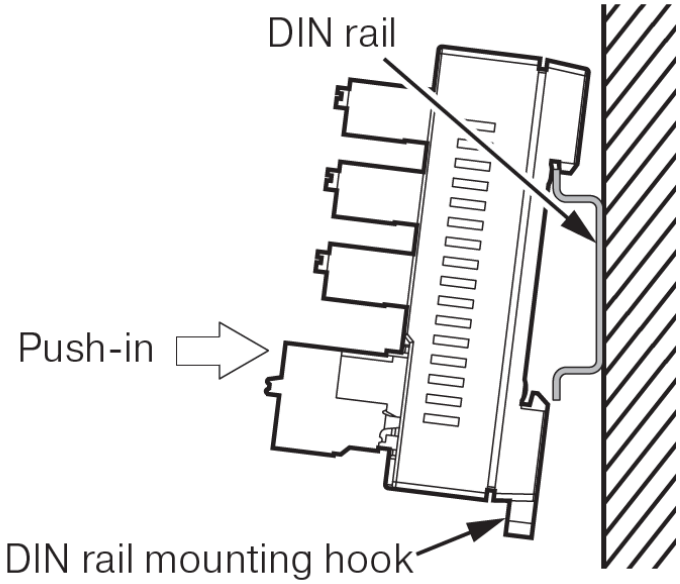
4. Installation

Follow the steps below to install this product.

1. Hook the upper hook on the back of the product to the DIN rail.

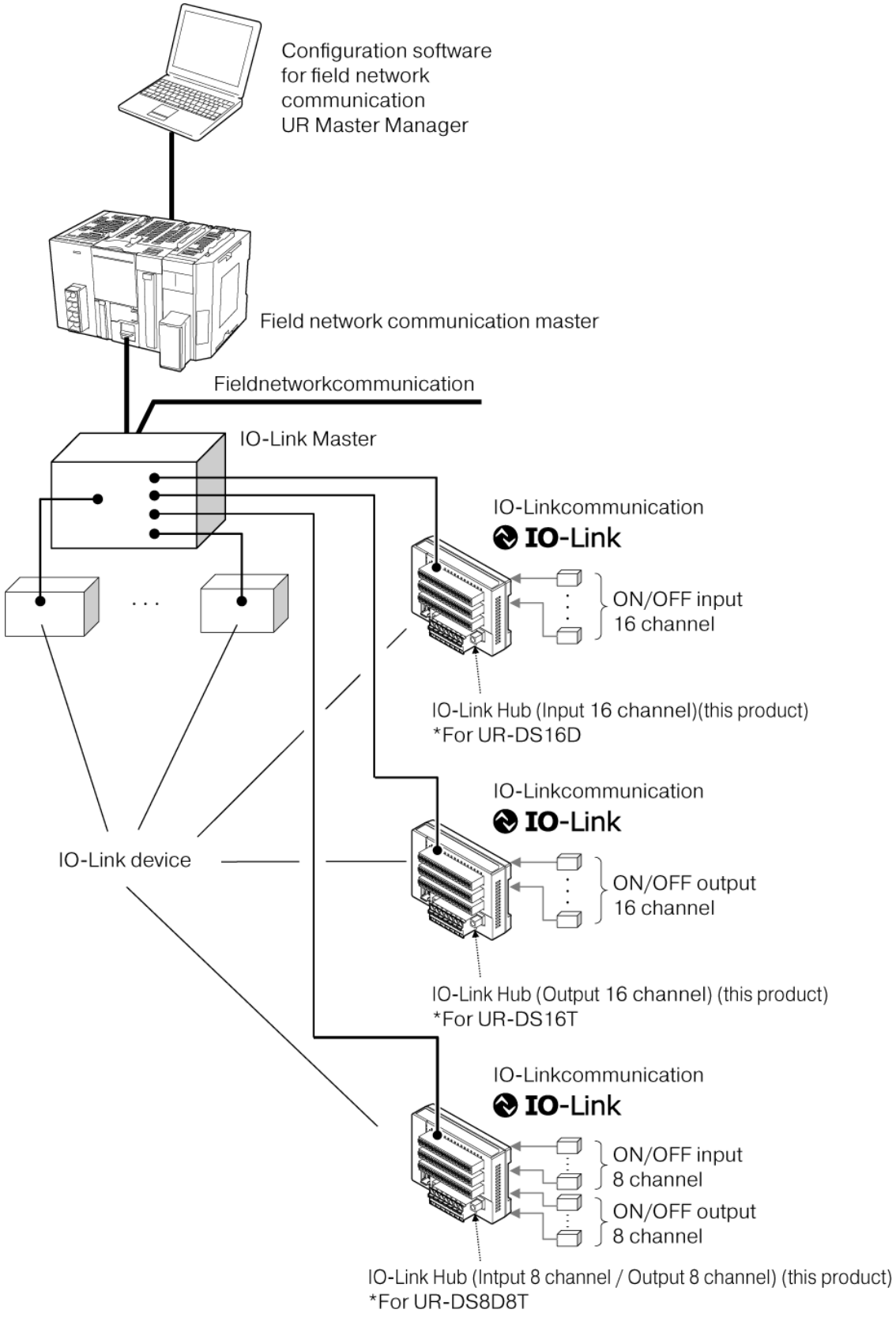
2. Push the lower side from the front.

3. Push the DIN rail mounting hook up to lock the production in place.



Install this product at least 10 mm away from an adjacent device and structure.

5. System Configuration

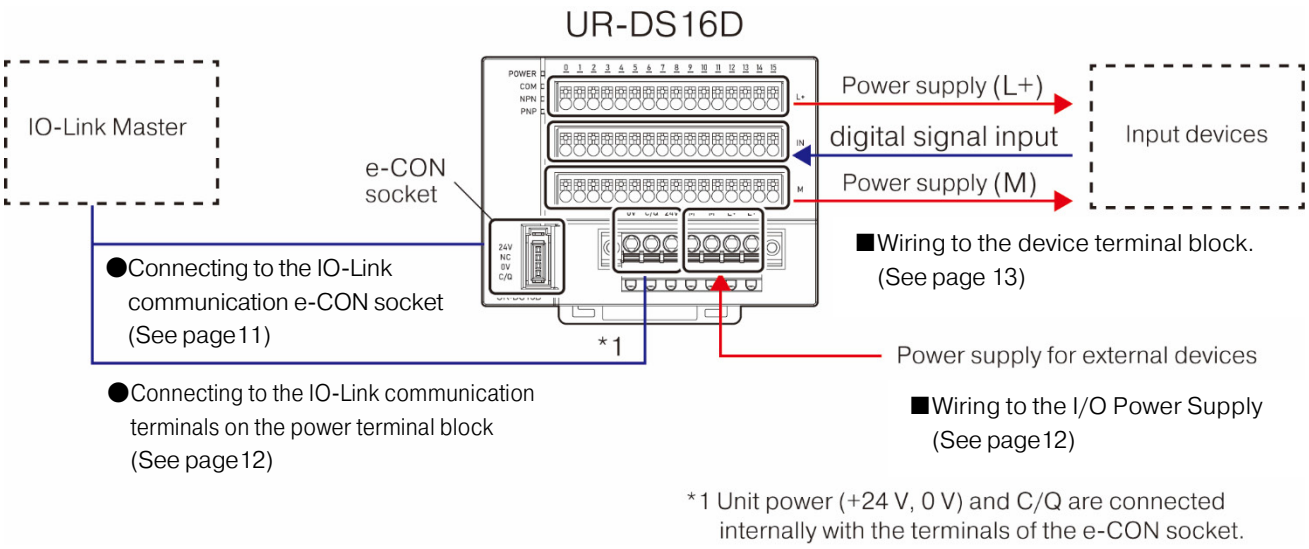


6. Connection

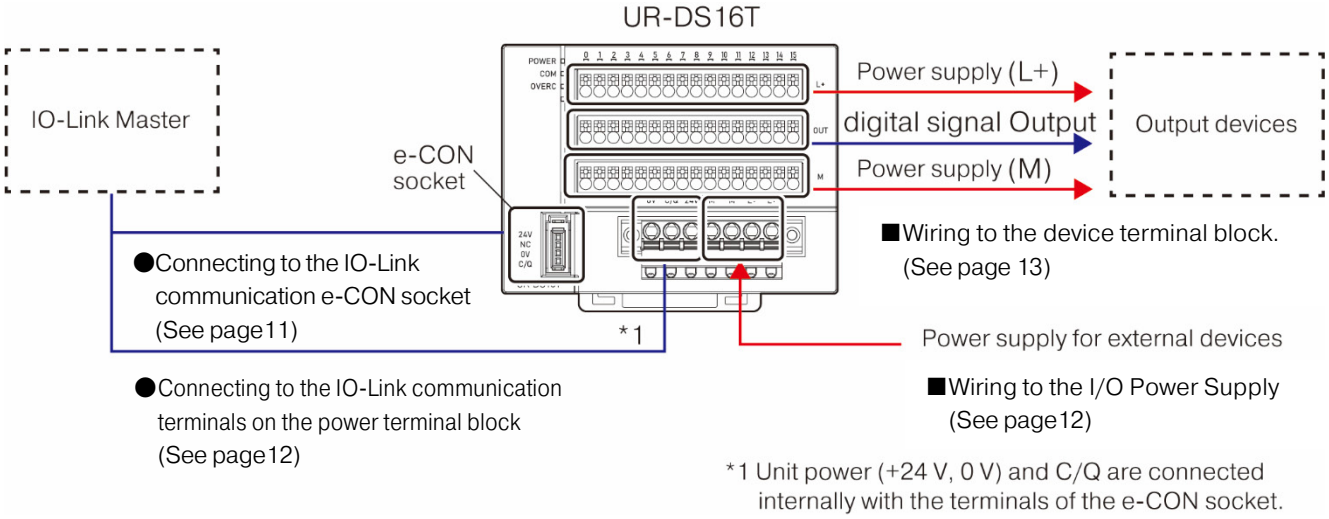
Connect the IO-Link master and external devices via IO-Link to the connectors and terminal blocks of UR-DS16D / UR-DS16T / UR-DS8D8T as shown below.

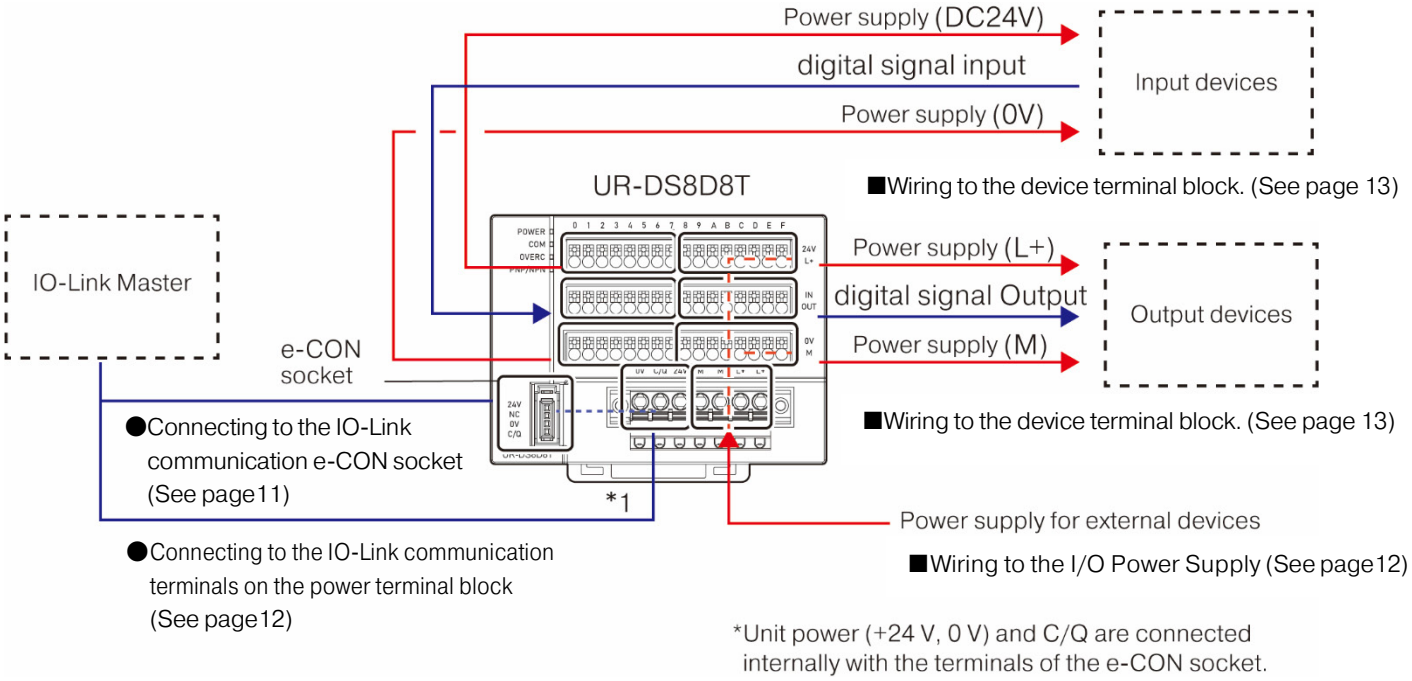
■ Connection overview

UR-DS16D



UR-DS16T

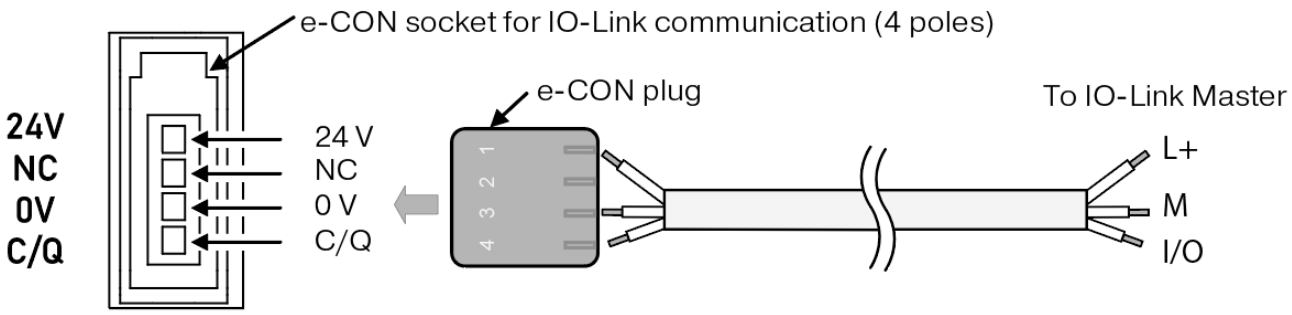




■ Wiring to the IO-Link Master

Connect the IO-Link master to either the e-CON socket on this product or the push-in terminal block (power/IO-Link terminal block).

Connecting to the IO-Link communication e-CON socket

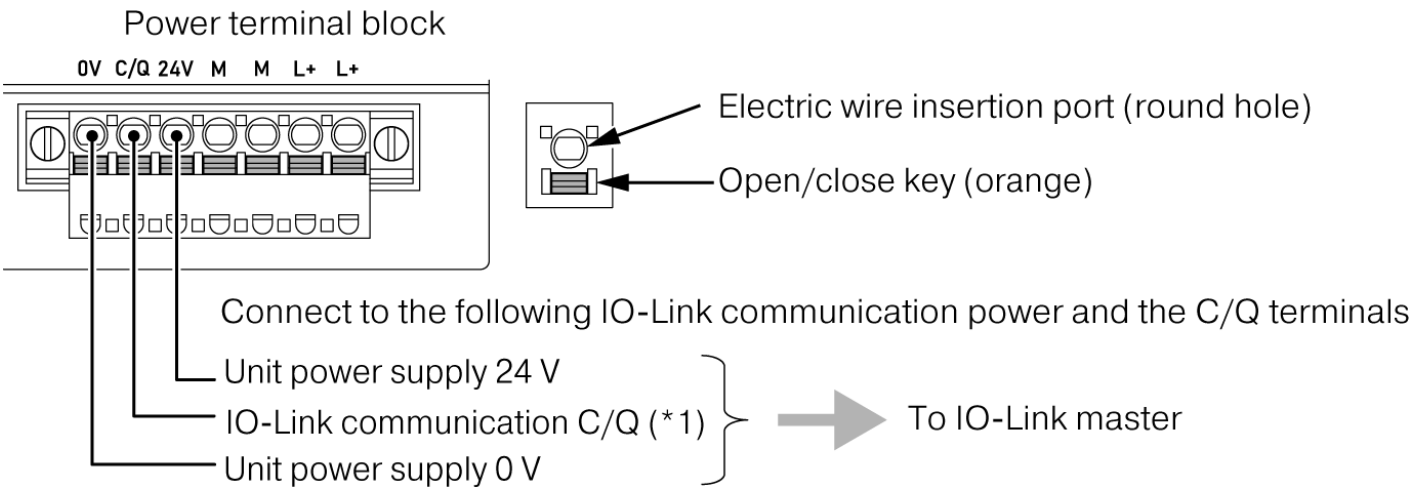


Applicable wires should be between AWG 28 to 20 stranded wires with a rated temperature of 75°C or higher.

Connecting to the IO-Link communication terminals on the power terminal block

Connect the 0V, C/Q, 24 V terminals on the power terminal block to the IO-Link master.

For the wires to be used and recommended ferrule, refer to "Wire Installation" on page 13.



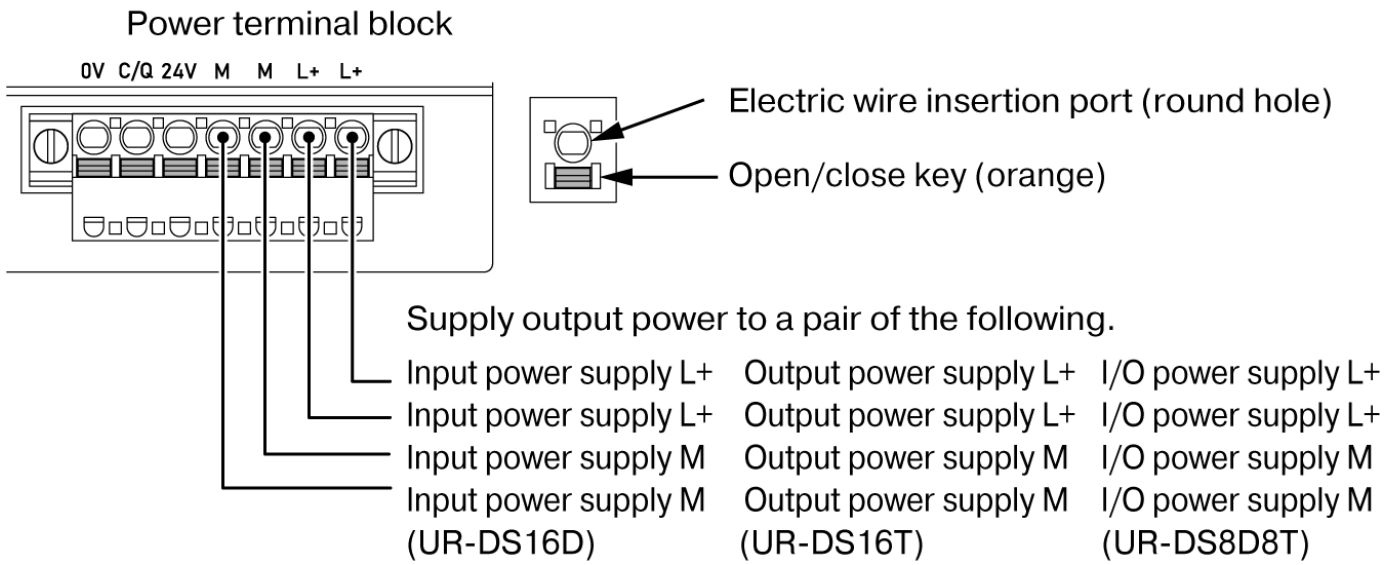
Note 1: C/Q is connected internally with the IO-Link communication e-CON socket.

Note 2: With UR-DS8D8T, these 24 V and 0 V are the input power supply.

■ Wiring to the I/O Power Supply

Supply power to input and output devices to the power terminal block.

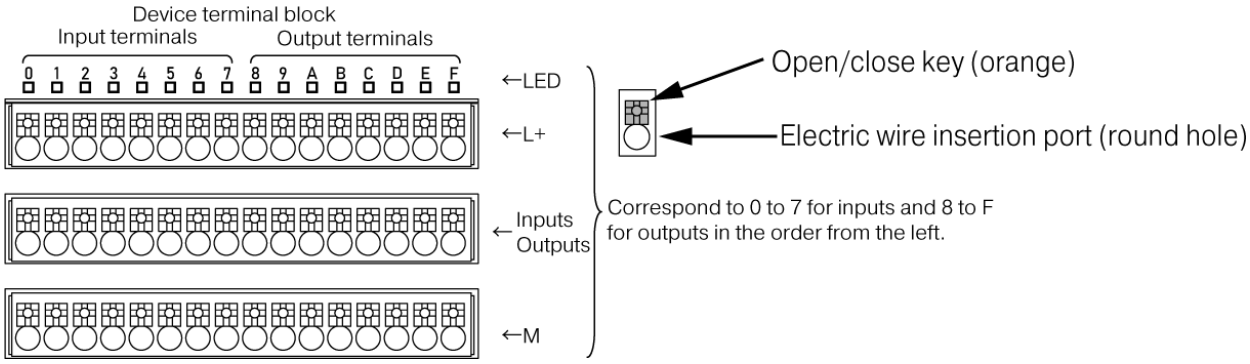
For the wires to be used and recommended ferrule, refer to "Wire Installation" on page 13.



■ Wiring to the device terminal block.

Connect the wires for power supply and I/O signal of input and output devices to the three 16-channel device terminal blocks.

For the wires to be used and recommended ferrule, refer to "Wire Installation" on page 13.



■ Wire Installation

A single or stranded wire can be used, and a ferrule can be attached to the tip of the wire.

The stripped length of single or stranded wire should be 10 mm.

Wire to be used

Use wires with a diameter compatible with the terminal blocks.

- Power terminal block: +24V, 0V, L+, M, C/Q
  AWG24 to 12
  Use wires with a temperature rating of 75 °C or higher.
- Device terminal block: L+, M, I/O
  AWG28 to 16
  Use wires with a temperature rating of 75 °C or higher.
- Cable length
  Maximum 20 m (between IO-Link Master and IO-Link Hub)

Recommended ferrule and crimping tool

・Ferrule for the power terminal block

The recommended ferrule is AI 0.5-10 WH (AWG20) from PHOENIX CONTACT.

For dimensions and ferrules other than AWG20, refer to the table below.

・ Ferrule for the Device terminal block

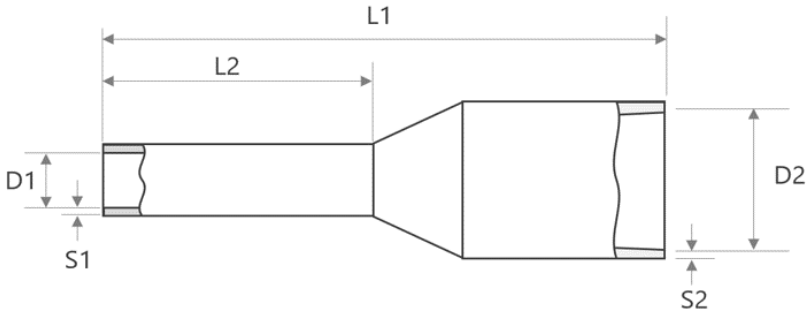
The recommended ferrule is AI 0.25-10 YE (AWG24) from PHOENIX CONTACT.

For dimensions and ferrules other than AWG24, refer to the table below.

・ Crimping tool

The recommended crimping tool is CRIMPFOX 6 from PHOENIX CONTACT.

When using a crimping tool other than the recommended one, use a type that crimps from the top and bottom (2 directions). If other tools are used to crimp and insert the terminal block, the terminal block may be damaged when pulling it out.



Unit: mm

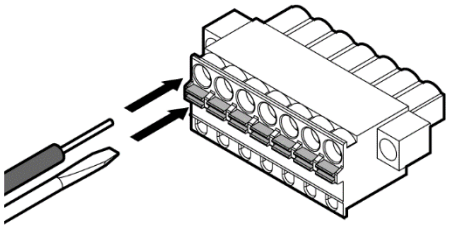
Terminal block	AWG	Ferrules from PHOENIX CONTACT							
		Model	Dimensions						Insulation sleeve color
			L1	L2	D1	S1	D2	S2	
Device terminal block	24	AI 0.25-8 YE	12.50	8.00	0.80	0.15	2.00	0.25	Yellow
	22	AI 0.34-10 TQ	14.50	10.00	0.80	0.15	2.00	0.25	Turquoise
	20	AI 0.5-10 WH	16.00	10.00	1.10	0.15	2.50	0.25	White
	18	AI 1-10 RD	16.00	10.00	1.50	0.15	3.00	0.30	Red
	16	AI 1.5-10 BK	16.50	10.00	1.80	0.15	3.40	0.30	Black
Power terminal block	24	AI 0.25-8 YE	12.50	8.00	0.80	0.15	2.00	0.25	Yellow
	22	AI 0.34-10 TQ	14.50	10.00	0.80	0.15	2.00	0.25	Turquoise
	20	AI 0.5-10 WH	16.00	10.00	1.10	0.15	2.50	0.25	White
	18	AI 1-10 RD	16.00	10.00	1.50	0.15	3.00	0.30	Red
	16	AI 1.5-10 BK	16.50	10.00	1.80	0.15	3.40	0.30	Black
	14	AI 2.5-10 BU	17.00	10.00	2.30	0.15	4.20	0.30	Blue

* The contents of ferrules are as of November 2023.

Wire installation method

1. Press the open/close key (orange) of the wire insertion port for installation with a precision flathead screwdriver.
2. Insert the wire from the wire insertion port while pressing the open/close key. Insert the wire until the tip reaches the bottom.
3. Release the open/close key to complete wiring. Pull gently to make sure it does not come loose.

Power terminal block

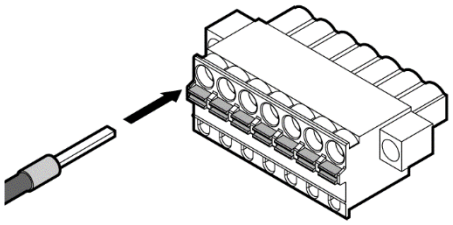


* For device terminal blocks, insert in the same way.

Wire with ferrule installation method

1. Insert the wire with the ferrule attached through the wire insertion port. Insert the ferrule until the tip of the ferrule reaches the bottom.
   (In the case of ferrule, it can be inserted without pressing the open/close key.)
2. Insert it until it reaches the bottom and the wiring is complete. Pull gently to make sure it does not come loose.

Power terminal block

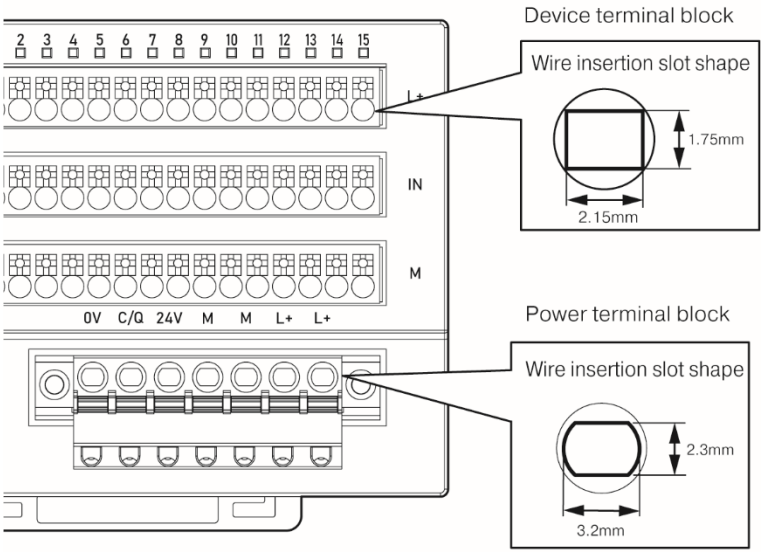


* For device terminal blocks, insert in the same way.

Wire insertion slot shape

Before inserting a wire or ferrule, check the shape of the wire insertion port below and the diameter and orientation of the wire or ferrule.

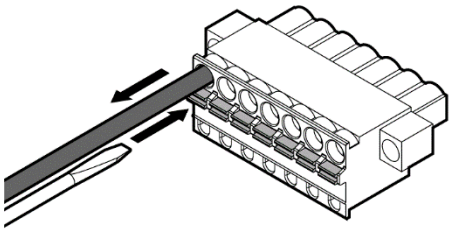
Inserting a wire or ferrule larger than the wire insertion port shown below may damage the terminal block.



Wire Removal

1. Press the open/close key (orange) of the wire insertion port to be removed with a precision flathead screwdriver.
2. Pull out the wire while holding down the open/close key.
   * If the ferrule is stuck inside the terminal block and cannot be removed, the terminal block may be damaged by forceful removal. If the ferrule is stuck, move the ferrule up, down, left, or right while pressing in the open/close key to remove the stuck part, and then pull it out.

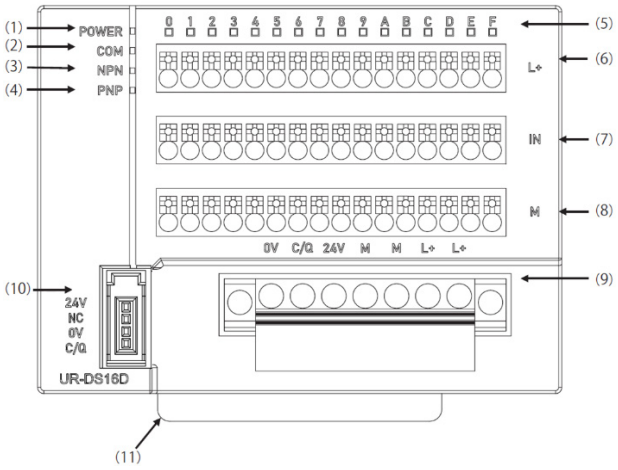
Power terminal block



* For device terminal blocks, pull out in the same way.

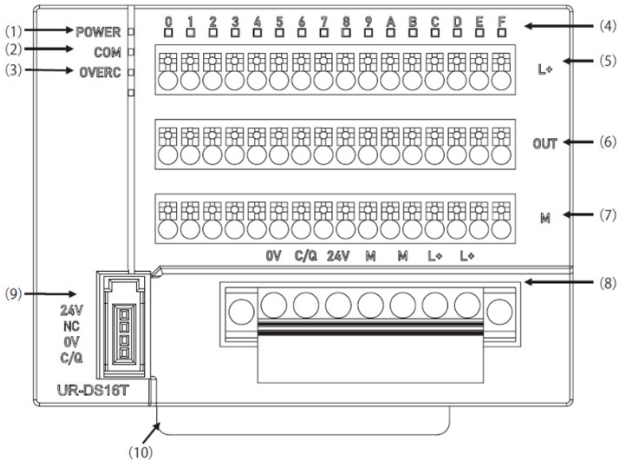
7. Part Names

■ UR-DS16D



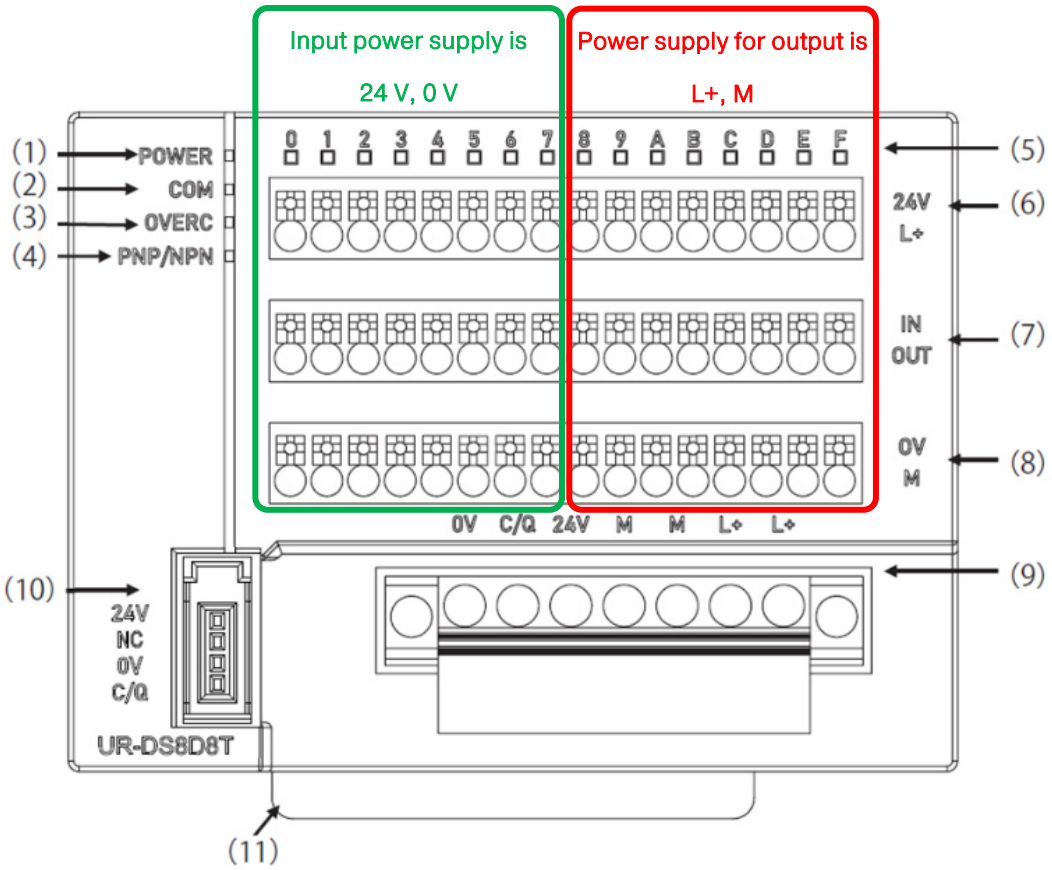
No.	Name	Function
(1)	POWER LED(green)	Turns on when the unit power is turned on.
(2)	COM LED(green)	Illuminated: After startup, before IO-Link communication is established 1 second on 0.1 second off: IO-Link communication established 0.55 second on 0.55 second off: Find me 0.1 second on 0.1 second off: IO-Link communication cutoff
(3)	NPN LED (green)	Turns on green when the inputs are set NPN.
(4)	PNP LED (orange)	Turns on orange when the inputs are set PNP
(5)	0 to F LEDs (orange)	Displays the ON/OFF status of inputs.
(6)	Device terminal block (L+)	Supplies 24 VDC to input devices.
(7)	Device terminal block (IN)	Takes signals from input devices.
(8)	Device terminal block (M)	Supplies 0 V to input devices.
(9)	Power terminal block (0 V, +24 V)	Supplies unit power (+24 V, 0 V) and I/O power (L+, M). This seven-pole removable connector has a pitch of 5.08 mm and a rating of 12 A. It uses AWG 24 to 12 wires. It is wired in parallel with the input power supply. Unit power (+24 V, 0 V) and C/Q are wired to the IO-Link master, and unit power is supplied by the IO-Link master. Unit power (+24 V, 0 V) and C/Q are connected internally with the terminals of the e-CON socket, and either the power terminal block or e-CON socket can be connected to the IO-Link master.
(10)	e-CON socket (four poles)	Unit power (+24 V, 0 V) and C/Q can be wired to the IO-Link master via the e-CON socket.
(11)	DIN rail mounting hook	Slides for attaching/removing the product to/from the DIN rail.

■ UR-DS16T



No.	Name	Function
(1)	POWER LED(green)	Turns on when the unit power is turned on.
(2)	COM LED(green)	Illuminated: After startup, before IO-Link communication is established 1 secon−−d on 0.1 second off: IO-Link communication established 0.55 second on 0.55 second off: Find me 0.1 second on 0.1 second off: IO-Link communication cutoff
(3)	OVERC LED (red)	Turns on (red), while the output overcurrent protection is activated.
(4)	0 to F LEDs (PNP: orange, NPN: green)	Displays the ON/OFF status of outputs 0 to F. The LED color indicates PNP/NPN as described above.
(5)	Device terminal block (L+)	Supplies 24 VDC to output devices.
(6)	Device terminal block (OUT)	Sends signals to output devices.
(7)	Device terminal block (M)	Supplies 0 V to output devices.
(8)	Power terminal block (0V, +24V)	Supplies unit power (+24 V, 0 V) and output power (L+, M). This seven-pole removable connector has a pitch of 5.08 mm and a rating of 12 A. It uses AWG 24 to 12 wires. It is wired in parallel with the output power supply. Unit power (+24 V, 0 V) and C/Q are wired to the IO-Link master, and unit power is supplied by the IO-Link master. Unit power (+24 V, 0 V) and C/Q are connected internally with the terminals of the e-CON socket, and either the power terminal block or e-CON socket can be connected to the IO-Link master.
(9)	e-CON socket (four poles)	Unit power (+24 V, 0 V) and C/Q can be wired to the IO-Link master via the e-CON socket.
(10)	DIN rail mounting hook	Slides for attaching/removing the product to/from the DIN rail.

■ UR-DS8D8T



No.	Name	Function
(1)	POWER LED(green)	Turns on when the unit power is turned on.
(2)	COM LED(green)	Illuminated: After startup, before IO-Link communication is established 1 second on 0.1 second off: IO-Link communication established 0.55 second on 0.55 second off: Find me 0.1 second on 0.1 second off: IO-Link communication cutoff
(3)	OVERC LED (red)	Turns on (red), while the output overcurrent protection is activated.
(4)	PNP/NPN LED (orange/green)	Turns on green when the inputs are set NPN or turns on orange when the inputs are set PNP.
(5)	0 to 7 LEDs (orange)	Displays the ON/OFF status of inputs 0 to 7.
	8 to F LEDs (PNP: orange, NPN: green)	Displays the ON/OFF status of outputs 8 to F. The LED color indicates PNP/NPN asdescribed above.
(6)	Device terminal block (Left eight terminals: 0V, Right eight terminals: M)	Supplies 24 VDC to input and output devices. Left 8 terminals: for input devices (24V) Right 8 terminals: for output devices (L+)
(7)	Device terminal block (IN OUT)	Left eight terminals: Connected to input devices. Right eight terminals: Connected to output devices.
(8)	Device terminal block (Left eight terminals: 0V, Right eight terminals: M)	Supplies 0 V to input and output devices. Left 8 terminals: for input devices (0V) Right 8 terminals: for output devices (M)

No.	Name	Function
(9)	Power terminal block (0V, +24V)	Supplies unit power, input power (+24 V, 0V) and output power (L+, M). This seven-pole removable connector has a pitch of 5.08 mm and a rating of 12 A. It uses AWG 24 to 12 wires. The input power supply (8 terminals on the left) and 24V, 0V are wired in parallel. The output power supply (8 terminals on the right) and L+, M are wired in parallel. Unit power (+24 V, 0 V) and C/Q are wired to the IO-Link master, and unit power is supplied by the IO-Link master. Unit power (+24 V, 0 V) and C/Q are connected internally with the terminals of the e-CON socket. Either the power terminal block or e-CON socket can be connected to the IO-Link master.
(10)	e-CON socket (four poles)	Unit power (+24 V, 0 V) and C/Q can be wired to the IO-Link master via the e-CON socket.
(11)	DIN rail mounting hook	Slides for attaching/removing the product to/from the DIN rail.

8. Specifications

■ General specifications (common)

Item		Specifications
Power supply voltage		24 VDC +/-15% (*1)
Current consumption		50 mA max. (for 24 VDC)
Operating temperature		0 to +55°C (no freezing)
Operating humidity		5 to 95% RH (no condensation)
Storage temperature		-25 to +75°C (no freezing)
Storage humidity		5 to 95% RH (no condensation)
Vibration resistance		IEC 61131-2 compliant Vibration frequency: 5 to 8.4 Hz, Single amplitude: 3.5 mm Vibration frequency: 8.4 to 150 Hz Acceleration: 10 m/s^2 (1.0 G) Number of sweeps: X,Y,Z : 10 times in each direction
Shock resistance		IEC 61131-2 compliant Peak Acceleration: 150 m/s^2 (15 G), 3 directions in each of the X,Y and Z directions, 3 times each (total 18 times)
Atmosphere		No corrosive gas
Operating altitude		0 to 2000 m
Installation location		In door use
Degree of protection		IP 20
Measurement category		Ⅱ or lower
Pollution degree		2 or lower
Applicable regulation	EMC	EMC Directive (2014/30/EU)
	Environment	RoHS Directive (2011/65/EU), China RoHS (Regulation 32)
Applicable standard		EN 61131-2
Company standards		Noise resistance: Feilen Level 3 cleared
Compatible DIN rall		TH35-7.5Fe, TH35-7.5Al
Cable length		Maximum 20m (between IO-Link Master and Remote I/O Unit
Compatible wire		Power terminal block: AWG 24 to 12 Device terminal block: AWG 28 to 16
Material		Unit: PC; DIN rail mounting hook: POM; Terminal block: PA
Weight		Approx. 115 g (including terminal blocks, when not wired)
Included items		Instruction manual, Device terminal block: three pieces, power terminal block

*1 Use a Class 2 power supply or a power supply compliant with SELV (Safety Extra-Low Voltage) circuit and LIM (Limited Energy Circuit) circuit standards.

■ IO-Link specifications

Item		Specifications	
		COM3	COM2
Host communication interface		IO-Link (operates as device)	
Process input data byte count	UR-DS16D	2 bytes	
	UR-DS16T	2 bytes	
	UR-DS8D8T	2 bytes	
Process output data byte count	UR-DS16D	1 byte	
	UR-DS16T	4 bytes	
	UR-DS8D8T	3 bytes	
Minimum cycle time	UR-DS16D	0.4 ms	2.4 ms
	UR-DS16T	0.6 ms	3.6 ms
	UR-DS8D8T	0.5 ms	3.0 ms
IO-Link revision		1.1	
Communication speed		COM3 (230.4 kbps)/ COM2 (38.4 kbps) Switching by service data. (default value: COM3)	
Communication function operation power supply	UR-DS16D	IO-Link power supply	
	UR-DS16T	Output power	
	UR-DS8D8T	IO-Link power supply	

MEMO

- Instead of ”Application Reset”, the device offers "Restore factory settings".
- AccessLocks/@dataStorage is implemented.
- Common Profile is not supported due to insufficient memory capacity.

■ Input specifications

Item		Specifications
Input points	UR-DS16D	16
	UR-DS8D8T	8
Type of input		Source, PNP, or Sink, NPN, switchable for all channels (Default value: Switched by process output data)
Dielectric withstanding voltage		500 volts AC for one minute between I/O terminal batch and IO-Link batch
Insulation resistance		10 MΩ or greater isolation between all I/O terminals and all IO-Link terminals at 500 VDC
Common		Shared with 16 channels
Rated input voltage		24 VDC including ripple (P-P) 5%
Rated input current (typical values)		4.9 mA
Insulation method		Photocoupler insulation

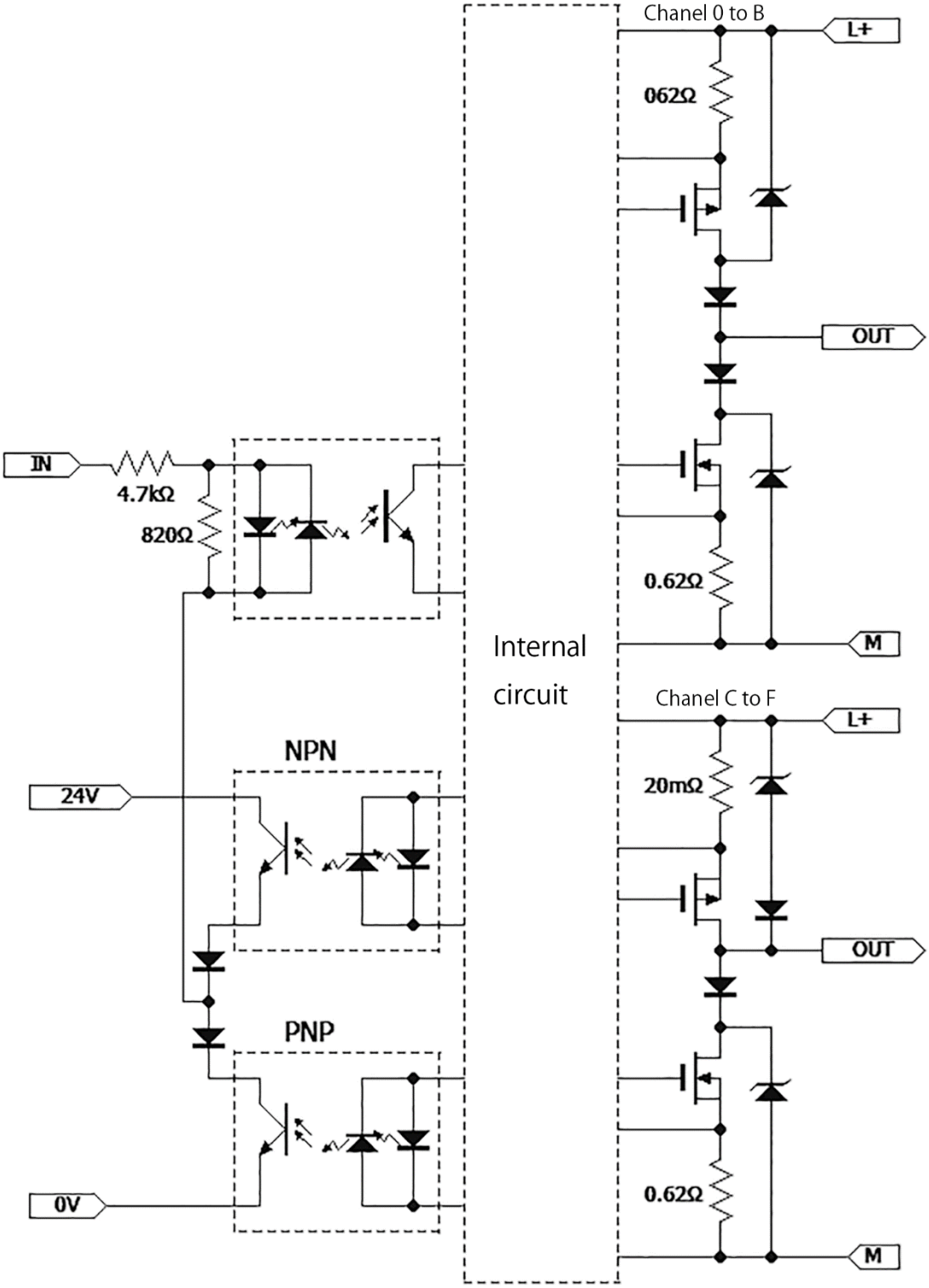
Item	Specifications
Maximum number of simultaneous input point	100 % simultaneous ON
Voltage and current at ON	15 V or higher, 3 mA or higher
Voltage and current at OFF	8 V or less, 1.5 mA or less
Input resistance	4.7 kohm
Input response time	0 to 200 ms (1 ms unit, default value of 10 ms)

■ Output Specifications

Item		Standard output	High current output
Output points	UR-DS16T	16	
	UR-DS8D8T	8	
High current output function		-	Channel C to F for Source, PNP, output
Dielectric withstanding voltage		500 volts AC for one minute between I/O terminal batch and IO-Link batch	
Insulation resistance		10 MΩ or greater isolation between all I/O terminals and all IO-Link terminals at 500 VDC	
Common		Switchable per channel	
Rated load voltage		12/24 VDC (allowable voltage from 10.2 to 28.8 VDC)	
Maximum load current		0.5 A per point	4 A per point
Maximum total load current		12 A	
Short circuit protection		Yes (firmware version 1.10 or later)	
Maximum inrush current (*1)		Current limit of 0.6 A due to the overcurrent protection circuit	6 A
Insulation method		Photocoupler insulation	
Output residual voltage when ON		1.2 V or less	0.4 V or less
Leak current when OFF		0.1mA or less	
Output response time		0.2 ms or less (OFF to ON) 1.5 ms or less (ON to OFF)	
Surge suppressor		Zener diode	
I/O power supply voltage		12/24 VDC (allowable voltage from 10.2 to 28.8 VDC)	
I/O power current consumption		55 mA max. (for 24 VDC)	
Type of output		Source, PNP, or Sink, NPN, selectable per channel	
Output reverse voltage protection		Yes	No

*1 Products with firmware version 1.09 or earlier cannot prevent damage in the event of an output short circuit, so wire correctly to avoid short circuits.

9. Circuit diagram



10. Process Data

The process data exchanged by the product with the IO-Link master using IO-Link cyclic communication is as follows.IO-Link process data is transferred in big endian format. The table below is also in big endian format. The IO-Link master UR series from OPTEX FA transfers IO-Link process data converted into little endian format to the host network by default, so refer to "Word assignment" in the table below for each unit.

■ UR-DS16D

Process data	Byte No.	Bit								Details
		7	6	5	4	3	2	1	0	
Input 2 bytes	n+0	Input F	Input E	Input D	Input C	Input B	Input A	Input 9	Input 8	Input status (0: OFF, 1: ON)
	n+1	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1	Input 0	
Output 1 byte	n+0	Reserved							Input 0 to F PNP/NPN setting*1	

Word assignment

Example: When using the IO-Link master UR series of OPTEX FA (default setting: little endian)

<Overview>

Process data	Byte No.	Byte		Details
		Higher order byte	Lower order byte	
Input 1 word	N+0	Process input data n+0	Process input data n+1	Input status (0: OFF, 1: ON)
Output 1 word	N+0	N/A	Process output data n+0	

<Details>

Process data	Byte No.	Bit																Details
		F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0	
Input 1 word	N+0	Input F	Input E	Input D	Input C	Input B	Input A	Input 9	Input 8	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1	Input 0	Input status (0: OFF, 1: ON)
Output 1 word	N+0	N/A								Reserved							Input 0 to F PNP/NPN setting*1	

*1: Only when the value of index number 96 (type of input) in the service data is “0”, the specification (0: PNP, 1: NPN) in the process output data is valid. When the service data other than “0”, the type of input is fixed by the service data specification (1: PNP input, 2: NPN input).

■ UR-DS16T

Process data	Byte No.	Bit								Details
		7	6	5	4	3	2	1	0	
Input 2 bytes	n+0	Output F	Output E	Output D	Output C	Output B	Output A	Output 9	Output 8	Overcurrent status (0: normal, 1: overcurrent) *1
	n+1	Output 7	Output 6	Output 5	Output 4	Output 3	Output 2	Output 1	Output 0	
Output 4 bytes	n+0	Output F	Output E	Output D	Output C	Output B	Output A	Output 9	Output 8	Output PNP/NPN setting (0: PNP, 1: NPN) *2
	n+1	Output 7	Output 6	Output 5	Output 4	Output 3	Output 2	Output 1	Output 0	
	n+2	Output F	Output E	Output D	Output C	Output B	Output A	Output 9	Output 8	Output control (0: OFF, 1: ON)
	n+3	Output 7	Output 6	Output 5	Output 4	Output 3	Output 2	Output 1	Output 0	

Word assignment

Example: When using the IO-Link master UR series of OPTEX FA (default setting: little endian)

<Overview>

Process data	Byte No.	Byte		Details
		Higher order byte	Lower order byte	
Input 1 word	N+0	Process input data n+0	Process input data n+1	Overcurrent status (0: normal, 1: overcurrent) *1
Output 2 words	N+0	Process output data n+2	Process output data n+3	Output control (0: OFF, 1: ON)
	N+1	Process output data n+0	Process output data n+1	Output PNP/NPN setting (0: PNP, 1: NPN) *2

<Details>

Process data	Byte No.	Bit																Details
		F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0	
Input 1 word	N+0	Output F	Output E	Output D	Output C	Output B	Output A	Output 9	Output 8	Output 7	Output 6	Output 5	Output 4	Output 3	Output 2	Output 1	Output 0	Overcurrent status (0: normal, 1: overcurrent) *1
Output 2 words	N+0	Output F	Output E	Output D	Output C	Output B	Output A	Output 9	Output 8	Output 7	Output 6	Output 5	Output 4	Output 3	Output 2	Output 1	Output 0	Output control (0: OFF, 1: ON)
	N+1	Output F	Output E	Output D	Output C	Output B	Output A	Output 9	Output 8	Output 7	Output 6	Output 5	Output 4	Output 3	Output 2	Output 1	Output 0	Output PNP/NPN setting (0: PNP, 1: NPN) *2

*1: If I/O power is not being supplied, all output overcurrent (0: normal, 1: overcurrent) status bits will turn on.

*2: Only when the value of index number 128 (type of output specification method) in the service data is "0", the specification (0: PNP, 1: NPN) in the process output data is valid. When the value is "1" the type of output is fixed at the designation (0: PNP output, 1: NPN output) in index number 129 (type of output).

■ UR-DS8D8T

Process data	Byte No.	Bit								Details
		7	6	5	4	3	2	1	0	
Input 2 bytes	n+0	Output F	Output E	Output D	Output C	Output B	Output A	Output 9	Output 8	Overcurrent status (0: normal, 1: overcurrent) *1
	n+1	input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1	Input 0	Input status (0: OFF, 1: ON)
Output 3 bytes	n+0	Reserved							Input 0 to 7 PNP/NPN setting *2	
	n+1	Output F	Output E	Output D	Output C	Output B	Output A	Output 9	Output 8	Output PNP/NPN setting (0: PNP, 1: NPN) *3
	n+2	Output F	Output E	Output D	Output C	Output B	Output A	Output 9	Output 8	Output control (0: OFF, 1: ON)

Word assignment

Example: When using the IO-Link master UR series of OPTEX FA (default setting: little endian)

<Overview>

Process data	Byte No.	Byte		Details
		Higher order byte	Lower order byte	
Input 1 word	N+0	Process input data n+0	Process input data n+1	Lower order byte Input status (0: OFF, 1: ON) Higher order byte Overcurrent status (0: normal, 1: overcurrent) *1
Output 2 words	N+0	Process output data n+2	Process output data n+3	Lower order byte Output control (0: OFF, 1: ON) Higher order byte Output PNP/NPN setting (0: PNP, 1: NPN) *3
	N+1	N/A	Process output data n+0	

<Details>

Process data	Byte No.	Bit F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0	Details
Input 1 word	N+0	Output F	Output E	Output D	Output C	Output B	Output A	Output 9	Output 8	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1	Input 0	Lower order byte Input status (0: OFF, 1: ON) Higher order byte Overcurrent status (0: normal, 1: overcurrent) *1
Output 2 words	N+0	Output F	Output E	Output D	Output C	Output B	Output A	Output 9	Output 8	Output F	Output E	Output D	Output C	Output B	Output A	Output 9	Output 8	Lower order byte Output control (0: OFF, 1: ON) Higher order byte Output PNP/NPN setting (0: PNP, 1: NPN) *3
	N+1	N/A								Reserved							Input 0 to 7 PNP/NPN setting *2	

*1: If I/O power is not being supplied, all output overcurrent (0: normal, 1: overcurrent) status bits will turn on.

*2: Only when the value of index number 96 (type of input) in the service data is “0”, the specification (0: PNP, 1: NPN) in the process output data is valid. When the service data other than “0”, the type of input is fixed by the service data specification (1: PNP input, 2: NPN input).

*3: Only when the value of index number 128 (type of output specification method) in the service data is "0", the specification (0: PNP, 1: NPN) in the process output data is valid. When the value is "1" the type of output is fixed at the designation (0: PNP output, 1: NPN output) in index number 129 (type of output).

11. Service Data

The service data for this product that can be read and written via IO-Link ISDU handling is as follows.

■ UR-DS16D

Name	Index number	Sub index number	Read/Write*1	Backup Subject	Data byte count	Default value	Setting details
System command	2	0	W		1	-	130: Initialization of setting value
							131: Stops IO-Link communication after reverting setting values to default values (Back-to-Box)
Device lock	12	0	R/W	✓	2	0	0: Unlocks the storage function.
							2: Storage function lock.
Tag name	24	0	R/W	✓	32	*2	Can be used to set a name for this unit, such as the device function or installation location.
Type of input	96	0	R/W	✓	1	0	0: Type of input (PNP/NPN) of CH0 to F is switched using the specified bit of the process output data.
							1: CH0 to F Used as PNP
							2: CH0 to F Used as NPN
Input filter	97	1to 16	R/W	✓	1	10	0 to 200: ON/OFF delay timer for CH0 input chattering prevention (unit: ms) It can be specified for each channel. Specify the value obtained by adding 1 to the channel number with the subindex number.
Internal temperature	161	0	R		2	-	Temperature of internal board, singed integer value (unit: 0.1°C)
Operating time	162	0	R		4		Operating timer (unit: 7.5 minutes)
Device identification request (Find me)	204	0	R/W		1	0	0: Normal status
							1: Flash the COM LED at 0.55 second intervals
Communication speed switching	255	0	R/W	✔	1	0	0: COM3 1: COM2

*1 R: Read only, W: Write only, R/W: Read/Write

*2 The default value is 32 "＊" (asterisk) characters.

■ UR-DS16T

Name	Index number	Sub index number	Read/Write*1	Backup Subject	Data byte count	Default value	Setting details
System command	2	0	W		1	-	130: Initialization of setting value
							131: Stops IO-Link communication after reverting setting values to default values (Back-to-Box)
Device lock	12	0	R/W	✔	2	0	0: Unlocks the storage function.
							2: Storage function lock.
Tag name	24	0	R/W	✔	32	*2	Can be used to set a name for this unit, such as the device function or installation location.
Type of output specification method	128	0	R/W	✔	1	0	0: CH0 to F type of output (PNP/NPN) switching is performed with the specified bit of process output data.
							1: Use Index 129 to switch the polarity (PNP/NPN) of the outputs of CH0 to F.
Type of output	129	0	R/W	✔	2	0	Sets the type of output (PNP/NPN) of CH0 to F all at once. Bit 00 to 15 (CH0 to F): Each bit value 0: PNP, 1: NPN
		1 to 16	R/W	✔	1	0	0: Individually sets PNP to the CH0 output
							1: Individually sets NPN to the CH0 output
Output current	130	0	R		32	-	Batch read of load current from CH0 to F, 2 bytes per channel Unit: (CH0 to B): 10 mA, (CHC to F): 100 mA
		1 to 16			2	-	Individual read of output load current, Unit: (CH0 to B): 10 mA, (CHC to F): 100 mA
Internal temperature	161	0	R		2	-	Temperature of internal board, singed integer value (unit: 0.1° C)
Operating time	162	0	R		4	-	Operating timer (unit: 7.5 minutes)
Device identification request (Find me)	204	0	R/W		1	0	0: Normal status
							1: Flash the COM LED at 0.55 second intervals
Communication speed switching	255	0	R/W	✔	1	0	0: COM3 1: COM2

*1 R: Read only, W: Write only, R/W: Read/Write

*2 The default value is 32 "＊" (asterisk) characters.

■ UR-DS8D8T

Name	Index number	Sub index number	Read/Write*1	Backup Subject	Data byte count	Default value	Setting details
System command	2	0	W		1	-	130: Initialization of setting value
							131: Stops IO-Link communication after reverting setting values to default values (Back-to-Box)
Device lock	12	0	R/W	✔	2	0	0: Unlocks the storage function.
							2: Storage function lock.
Tag name	24	0	R/W	✔	32	*2	Can be used to set a name for this unit, such as the device function or installation location.
Type of input	96	0	R/W	✔	1	0	0: Type of input (PNP/NPN) of CH0 to F is switched using the specified bit of the process output data.
							1: CH0 to F Used as PNP
							2: CH0 to F Used as NPN
Input filter	97	1 to 16	R/W	✔	1	10	0 to 200: ON/OFF delay timer for CH0 input chattering prevention (unit: ms) It can be specified for each channel. Specify the value obtained by adding 1 to the channel number with the subindex number.
Type of output specification method	128	0	R/W	✔	1	0	0: CH0 to F type of output (PNP/NPN) switching is performed with the specified bit of process output data.
							1: Use Index 129 to switch the polarity (PNP/NPN) of the outputs of CH0 to F.
Type of output	129	0	R/W	✔	2	0	Sets the type of output (PNP/NPN) of CH0 to F all at once. Bit 00 to 15 (CH0 to F): Each bit value 0: PNP, 1: NPN
		1 to 16	R/W	✔	1	0	0: Individually sets PNP to the CH0 output
							1: Individually sets NPN to the CH0 output
Output current	130	0	R		32	-	Batch read of load current from CH0 to F, 2 bytes per channel Unit: (CH0 to B): 10 mA, (CHC to F): 100 mA
		9 to 16	R		2	-	Individual read of output load current, Unit: (CH0 to B): 10 mA, (CHC to F): 100 mA
Internal temperature	161	0	R		2	-	Temperature of internal board, singed integer value (unit: 0.1°C)

Name	Index number	Sub index number	Read/Write*1	Backup Subject	Data byte count	Default value	Setting details
Operating time	162	0	R		4	-	Operating timer (unit: 7.5 minutes)
Device identification request (Find me)	204	0	R/W		1	0	0: Normal status 1: Flash the COM LED at 0.55 second intervals
Communication speed switching	255	0	R/W	✔	1	0	0: COM3 1: COM2

*1 R: Read only, W: Write only, R/W: Read/Write

*2 The default value is 32 "＊" (asterisk) characters.

12. Event

Events occurring in this product.

Event code	Message	Details
0x4210	Temperature range has been exceeded	This occurs when the temperature on the circuit board exceeds 85°C. Generated every 10 minutes. Immediately lower the ambient temperature.
0x1800	Internal interlock protection has been detected	There is an abnormality in the PNP/NPN switching circuit, and protection has been activated upon detecting a short-circuit. If this error recurs upon turning the power ON again, there may be a product failure.
0x1801	The setting value memory write count has been exceeded	The write count of the flash memory saving the setting values has exceeded 500,000 times. While the service life will not immediately end, the operating time will no longer be updated. Replace this product promptly.

13. Troubleshooting

How to handle this product when it does not work properly or when problems occur.

Symptom	Checkpoints and countermeasures
POWER LED does not light up	Check that voltage is applied to the Unit power's 24 V and 0 V and the I/O power's L+ and M.
	Check that the power terminal block is fully inserted, and the wiring is correct.
IO-Link communication is not working COM LED remains lit	Check that voltage is applied to the Unit power's 24 V and 0 V and the I/O power's L+ and M.
	Check that the IO-Link Master communication signal (C/Q) and this product's C/Q terminal are connected and that the power terminal block is fully inserted.
	Check that the IO-Link Master setting is in IO-Link communication mode. (For IO-Link Master UR series, check the master parameter "M10. I/O function setting")
COM LED is flashing at 0.1-second intervals	IO-Link communication has broken off. Check the wiring between the IO-Link Master and C/Q.
	Check that the other IO-Link communication line (C/Q) and this product's C/Q line are not wired closely for several meters or more.
	Check that the power line (inverter or servo motor drive output line) is not wired closely for several meters or more.
	Check that the IO-Link Master's power (24 V, 0 V) wiring is not separate from this product's 24 V and 0 V. Be sure to connect at least the 0 V for both securely.
	Check that the IO-Link communication line (C/Q) length has not exceeded 20 m.
PNP/NPN LEDs do not light up	Check that IO-Link communication is started in connection with the IO-Link Master.
	Check that the IO-Link Master is connected to the field network and that process output data from the IO-Link Master is enabled.
Cannot switch between PNP and NPN with process output data	Set the setting value (type of input or output specification method) and specify the type with the setting value.
Input does not turn on (Input LED does not light up)	Check that PNP/NPN switching is correct with the PNP/NPN LEDs. (orange = PNP, green = NPN)
	For PNP, check that 24 V is applied between the IN terminal and the M terminal.
	For NPN, check that 24 V is applied between the L+ terminal and the IN terminal.

Symptom	Checkpoints and countermeasures
Input status cannot be read by the host	Check that IO-Link communication is established (COM LED lights up for 1 second and turns off for 0.1 second).
	Check that communication is established between the connected IO-Link Master and the field network.
	If the IO-Link Master is the UR series, check that sufficient allocation has been made with the master parameter "M40. Process input data words allocation".
	Check the wiring to make sure the channel number connected to the IO-Link Master is correct.
	Check that the process input data refresh allocation setting between the field network and the CPU Unit is correct.
Output does not turn on	Check that PNP/NPN switching is correct with the color of the lit output LED. (orange = PNP, green = NPN)
	For PNP, 24 V will be output between the OUT terminal and the M terminal, so check that the load is correctly wired.
	For NPN, 24 V will be output between the L+ terminal and the OUT terminal, so check that the load is correctly wired.
	When the output LED is blinking, overcurrent protection is in effect, so check the wiring and the load.
Output LED does not light up	Check that the IO-Link Master connected to this product is connected to the field network.
	Check that the bit assigned to output ON/OFF in the process output data of this product is ON. If the IO-Link Master is the UR series, check with the process data monitor.
	If the IO-Link Master is the UR series, check that sufficient allocation has been made with the master parameter "M41. Process output data words allocation".
	Check the wiring to make sure the channel number connected to the IO-Link Master is correct.
	Check that the CPU Unit connected to the field network is RUN and that the program controlling process output data is operating correctly.
	Check that the process output data refresh allocation setting between the field network and the CPU Unit is correct.
	Check that IO-Link communication is operating with the IO-Link Master. (COM LED is flashing ON for 1 second and OFF for 0.1 second)

Symptom	Checkpoints and countermeasures
OVERC LED is blinking	Overcurrent protection is occurring due to output load. For capacitive loads or inductive loads such as electromagnetic switches, the blinking may be caused by inrush current. In this case, try switching to channels C to F large-capacity output (PNP side only).
	Strong noise is affecting the output line, leading to the malfunction of overcurrent protection. Check that it is not wired closely for several meters or more with a power line.
OVERC LED is lit	Overcurrent detection resistance is disconnected due to a short-circuit. Replace this product, as this is a failure.
Input/output LEDs light up for a moment when power is turned on	This is a reaction generated while the internal microcomputer is resetting; the input/output itself is not on.
All overcurrent detection bits in the process input data are ON	With UR-DS8D8T, output power (L+, M) is not being supplied.



Attention: Not to be Used for Personnel Protection.

Never use these products as sensing devices for personnel protection. Doing so could lead to serious or death.
These sensors do not include the self-checking redundant circuitry necessary to allow their use in personnel safety applications.
A sensor failure or malfunction can cause either an energized or de-energized sensor output condition.
Please consult our distributors about safety products which meet OSHA, ANSI and IEC standards for personnel protection.

- Specifications are subject to change without prior notice.
- Specifications and technical information not mentioned here are written in Instruction Manual. Or visit our website for details.
- All the warnings and cautions to know prior to use are given in Instruction Manual.

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The information in this user's manual is correct as of August 2024

UR-DS-16D_UM-E-003-2408