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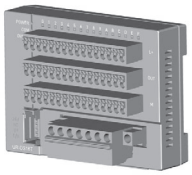
INSTRUCTION MANUAL

IO-Link Digital I/O Module

UR-DS16T

(16-point output module)



OPTEX FA CO., LTD.

Thank you for purchasing the UR-DS16T IO-Link Hub.
This manual includes the information required to use the UR-DS16T. Please 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.

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.

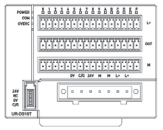
⚠CAUTION	
	Do not touch this product or the cable with wet hands. Incorrect wiring can cause product failure or malfunction.
	When wiring this product, do so properly according to this manual and specified instruction manuals. Incorrect wiring can cause product failure or malfunction.
	Connect only specified 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-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.

It can be used for applications such as connecting to an IO-Link master to expand the number of output points.

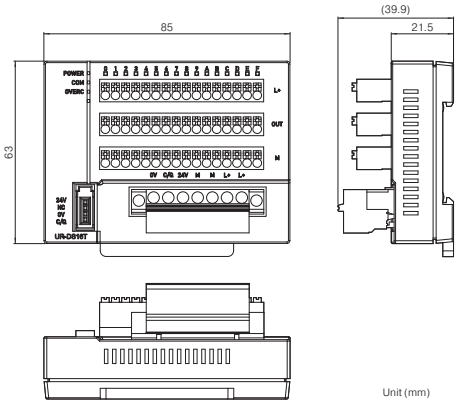
2. Included Items



- UR-DS16T unit
- Output terminal block: three pieces
- Power terminal block: one piece

- This instruction manual

3. Dimensions

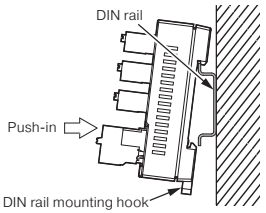


Unit (mm)

4. Installation

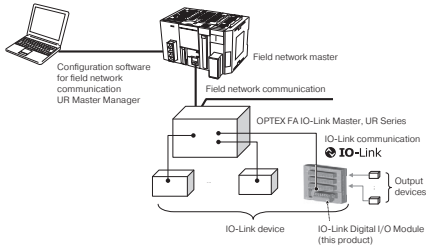
Follow the steps below to install this product.

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 product in place.



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

5. System Configuration

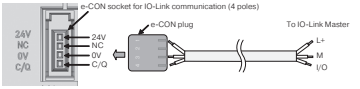


6. Connection

Wiring to the IO-Link Master

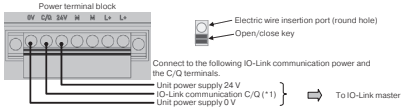
Connect the IO-Link master to either the e-CON socket on this product or the push-in terminal block (power/IO-Link terminal block).

・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.

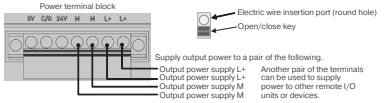
・Connecting to the IO-Link communication terminals on the power terminal block



Note 1: C/Q is connected internally with the IO-Link communication e-CON socket.
Applicable wires should be between AWG 24 to 12 stranded wires with a rated temperature of 75°C or higher.
The length of stripped insulation from the wire for rod type crimp terminal, solid or stranded wires is from 9 to 10 mm.

Wiring to Output Power

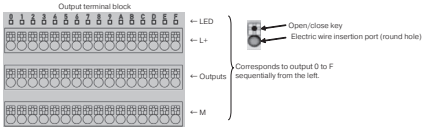
Supply power to output devices to the push-in terminal block.



Applicable wires should be between AWG 24 to 12 stranded wires with a rated temperature of 75°C or higher.
The length of stripped insulation from the wire for rod type crimp terminal, solid or stranded wires is from 9 to 10 mm.

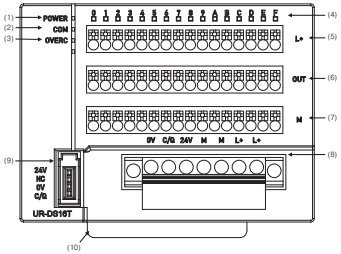
Wiring to the Output Terminal Block

Connect the wires for power supply and output signal of output devices to the three 16-channel push-in terminal blocks.



Applicable wires should be between AWG 28 to 16 stranded wires with a rated temperature of 75°C or higher.
The length of stripped insulation from the wire for rod type crimp terminal, solid or stranded wires is 10 mm.

7. Part Names



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)	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)	Output power supply terminal block (L+)	Supplies 24 VDC to output devices.
(6)	Output signal terminal block (OUT)	Sends signals to output devices.
(7)	Output power supply 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.

8. Specifications

General Specifications

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
Shock resistance		IEC 61131-2 compliant
Atmosphere		No corrosive gas
Operating altitude		0 to 2000 m
Installation location		In door use
Degree of protection		IP20
Measurement category		II or lower
Pollution degree		2 or lower
Applicable regulations	EMC	EMC Directive (2014/30/EU)
	Environment	RoHS Directive (2011/65/EU), China RoHS (Regulation 32)
Applicable standard		EN 61131-2
NRTL certification		Under application
Company standards		Noise resistance: Feilen Level 3 cleared
Compatible DIN rail		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 Output 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 accessories		Instruction manual (this document), output terminal block: three pieces, power terminal block: one piece

*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
Host communication interface	IO-Link (operates as device)
Process input data byte count	2 bytes
Process output data byte count	4 bytes
Minimum cycle time	0.6 ms
IO-Link revision	1.1
Communication speed	COM3 (230.4 kbps)
Communication function operation power supply	Output power

Output Specifications

Item	Specifications	
	Standard output	High current output
Output points	16	
High current output function	-	Channel C to F for Source, PNP, output
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	
Maximum inrush current(*1)	Current limit of 0.6 A due to the overcurrent protection circuit	6 A
Output residual voltage when ON	1.2 V or less	0.4 V or less
Leak current when OFF	0.1 mA 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
Common	Switchable per channel	

*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. Process Data

The process data exchanged by the product with the IO-Link master using IO-Link cyclic communication is as follows.

Process data	Byte	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Process input data	+0*1	Output F Overcurrent status	Output E Overcurrent status	Output D Overcurrent status	Output C Overcurrent status	Output B Overcurrent status	Output A Overcurrent status	Output 9 Overcurrent status	Output 8 Overcurrent status
	+1*1	Output 7 Overcurrent status	Output 6 Overcurrent status	Output 5 Overcurrent status	Output 4 Overcurrent status	Output 3 Overcurrent status	Output 2 Overcurrent status	Output 1 Overcurrent status	Output 0 Overcurrent status
Process output data	+0*2	Output F PNP/NPN setting	Output E PNP/NPN setting	Output D PNP/NPN setting	Output C PNP/NPN setting	Output B PNP/NPN setting	Output A PNP/NPN setting	Output 9 PNP/NPN setting	Output 8 PNP/NPN setting
	+1*2	Output 7 PNP/NPN setting	Output 6 PNP/NPN setting	Output 5 PNP/NPN setting	Output 4 PNP/NPN setting	Output 3 PNP/NPN setting	Output 2 PNP/NPN setting	Output 1 PNP/NPN setting	Output 0 PNP/NPN setting
	+2	Output F control	Output E control	Output D control	Output C control	Output B control	Output A control	Output 9 control	Output 8 control
	+3	Output 7 control	Output 6 control	Output 5 control	Output 4 control	Output 3 control	Output 2 control	Output 1 control	Output 0 control

*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 nember 129 (type of output).

IO-Link process data is transferred in big endian format. The table above 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 the byte order will be the reverse of that in the table above.

10. Service Data

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

Name	Index number	Subindex 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: Storage function unlocked. 2: Storage function locked.
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. Bit00 to 15 (CH0 to F): Each bit value 0: PNP, 1: NPN
		1	R/W	✓	1	0	0: Individually sets PNP to the CH0 output 1: Individually sets NPN to the CH0 output
		2 … 16	R/W … R/W	✓ … ✓	1 … 1		Same as above, CH1 … Same as above, CHF
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	R		2		Individual read of output load current, CH0
		2 … 16	R … R		2 … 2		Same as above, CH1 … Same as above, CHF
Internal temperature	161	0	R		2		Temperature of internal board, signed integer value (unit: 0.1 °C)
Operating time	162	0	R		4		Operating time (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

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

2 The default value is 32 "" (asterrisk) characters

- Support for the China RoHS directive

For details on the support for the China RoHS (the Administrative Measure on the Control of Pollution Caused by Electronic Information Products), see the following website.
https://www.optex-fa.com/rohs_cn/

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