

User Manual

QEC-RXXDXXN

EtherCAT SubDevice Digital I/O Module (Sink/Source).

With 32-ch Photo-Isolated Digital Input or Output (Group COM).

(Revision 1.0)

REVISION

DATE	VERSION	DESCRIPTION
2026/10/21	Version1.0	New Release.

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- QEC: https://www.qec.tw/

This Manual is for the QEC series.

SAFETY INFORMATION

- Read these safety instructions carefully.
- Please carry the unit with both hands and handle it with caution.
- Power Input voltage +19 to +50VDC Power Input (Typ. +24VDC)
- Make sure the voltage of the power source is appropriate before connecting the equipment to the power outlet.
- To prevent the QEC device from shock or fire hazards, please keep it dry and away from water and humidity.
- Operating temperature between -20 to +70°C.
- The total current through each COM terminal must not exceed 2 A. Do not connect the AUX terminals (blue wire of the I/O cable); insulate the wire end.
- Never touch un-insulated terminals or wire unless your power adaptor is disconnected.
- Locate your QEC device as close as possible to the socket outline for easy access and avoid force caused by the entangling of your arms with surrounding cables from the QEC device.
- If your QEC device will not be used for a period of time, make sure it is disconnected from the power source to avoid transient overvoltage damage.

WARNING!



DO NOT ATTEMPT TO OPEN OR TO DISASSEMBLE THE CHASSIS (ENCASING) OF THIS PRODUCT. PLEASE CONTACT YOUR DEALER FOR SERVICING FROM QUALIFIED TECHNICIAN.

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Ch. 1

General Information

1.1 Introduction

The QEC-RXXDXXN Series from ICOP is a compact EtherCAT SubDevice for digital input/output (DI/DO) applications. It offers 32 photo-isolated digital channels arranged in four 8-channel groups with a common COM per group. Each group has its own COM terminal, which can be connected to 0 V or +24 V, so sink or source wiring (PNP or NPN devices) can be selected group by group.
The QEC-RXXDXXN uses an EtherCAT SubDevice Controller (ESC) without a microcontroller. The process data are exchanged directly by the ESC with a fixed PDO mapping, giving a simple and deterministic I/O module that integrates with standard EtherCAT MainDevices through its ESI file.

Flexible I/O Configurations with Industrial-Grade Specs
Available in three configurations: 32 DI, 16 DI + 16 DO, or 32 DO. The digital inputs use bidirectional photocouplers and accept both NPN and PNP sensors. The digital outputs use bidirectional Photo-MOS relays rated 24 VDC (max. 56 VDC), 250 mA per channel and 2 A per COM group, suitable for relays, solenoid valves, indicators and other actuators. Isolation is 2,500 Vrms for DI and 1,500 Vrms for DO (photocoupler).

Precision with Distributed Clocks
The QEC-RXXDXXN supports Distributed Clock (DC) synchronization as well as SM-synchronous operation, enabling synchronized I/O across EtherCAT nodes. The cycle time is 1 ms.

Compact, Robust, and Easy to Integrate
Housed in a DIN-rail-mountable enclosure (107.45 × 66 × 34 mm; 77.39 mm depth including the DIN-rail clip) and weighing 235 to 240 g, the module uses four 10-pin (2×5) 3.0 mm pitch headers for compact I/O wiring. It operates over a wide temperature range of -20°C to +70°C.

Scalable, Reliable I/O for EtherCAT Automation
Whether you are building a high-density I/O station or upgrading to EtherCAT-based control, the QEC-RXXDXXN offers 32 channels in a compact housing with flexible sink/source wiring per group.

1.2 Specifications



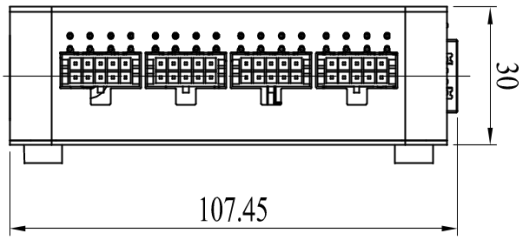


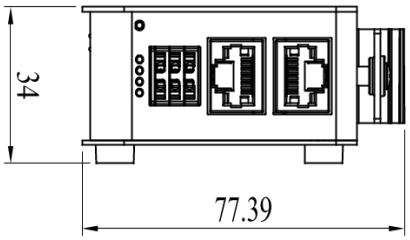


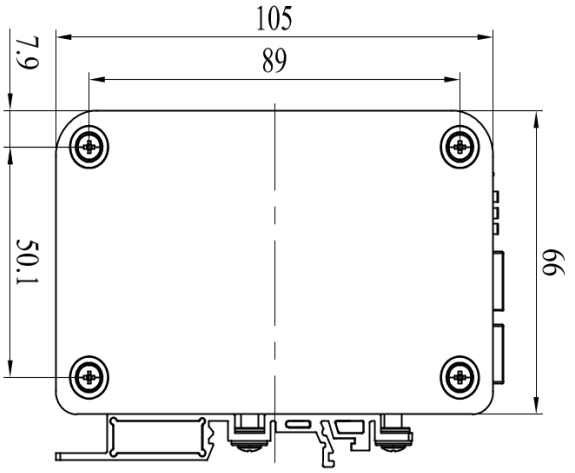
Module Name/Title	QEC-RXXDT0N	QEC-RXXDFFN	QEC-RXXD0TN
Digital I/O			
Channel	32-ch Digital Input	16-ch DI & 16-ch DO	32-ch Digital Output
Assignment	4 groups, per group: 8 x I/O, 1 x COM, 1 x AUX (Reserved, do not connect)		
DI - Type	Bidirectional (Sink/Source selectable per group via COM); supports NPN & PNP sensors		-
DI - Response Time	Rise time 6 µs, Fall time 6 µs (typ., photocoupler)		-
DI - Load Voltage	24 VDC (48 VDC version available)		-
DO - Type	-	Photo-MOS relay, bidirectional (Sink/Source selectable per group via COM)	
DO - Response Time	-	Turn-on 0.25 ms, Turn-off 20 µs (typ., Photo-MOS relay)	
DO - Load Voltage	-	Rated 24 VDC, Max. 56 VDC	
DO - Load Current	-	Max. 250 mA/ch; Peak 500 mA (100 ms, single pulse); Max. 2 A per COM group	
DO - Off-state Leakage	-	≤ 10 nA (max.)	
DO - On-resistance	-	0.8 Ω typ. / 1.5 Ω max.	
Isolation (Photocoupler)	DI: 2500 Vrms; DO: 1500 Vrms (field-to-logic; channels in a group share a common COM)		
EtherCAT			
Connector	RJ-45 (Red housing for PoE; Black housing for non-PoE)		
Cable Type	Ethernet/EtherCAT Cable (Min. CAT 5), Shielded		
Cycle Time	1 ms		
Distributed Clock (DC)	Yes		
Mailbox Protocol	Not supported (ESC only, fixed PDO mapping)		

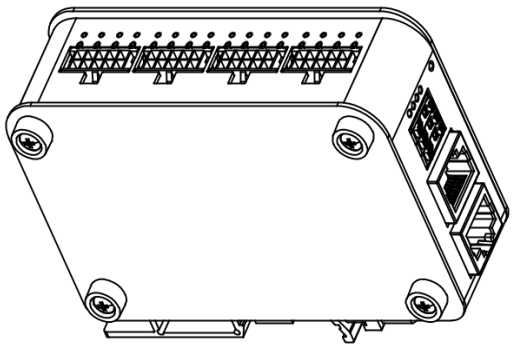
General			
I/O Connector	10-pin (2×5) header, 3.0 mm pitch, right-angle Mating cable: 4 × CABLE-ATX2X5-20CM (included)		
Power Connector	4-pin Power Input/Output (+V: Red / GND: Black) and 2-pin FGND (Green)		
Power Requirement	+19 to +50 VDC Power Input (Typ. +24 VDC)		
Power Consumption	3 W	3 W	3 W
Operating Temperature	-20 to +70°C		
Dimension	107.45 × 66 × 34 mm (W×D×H); 77.39 mm depth incl. DIN-rail clip		
Weight	235 g	237 g	240 g
LED Indicator	PWR, RUN, ERR, IN/OUT link, per-channel DI/DO status		
Certifications	CE, FCC, VCCI		
Mounting	DIN-Rail		

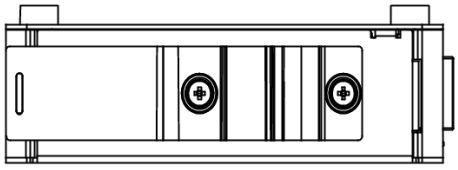
1.3 Dimension

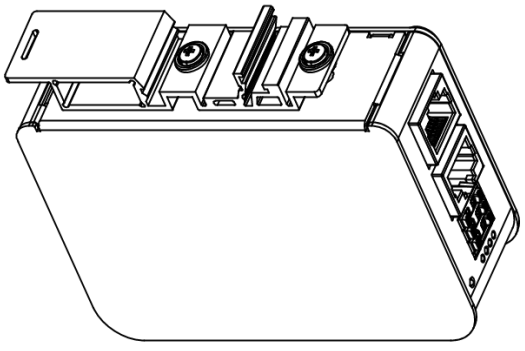










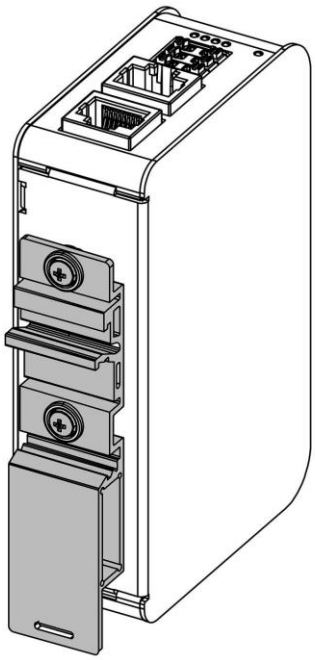


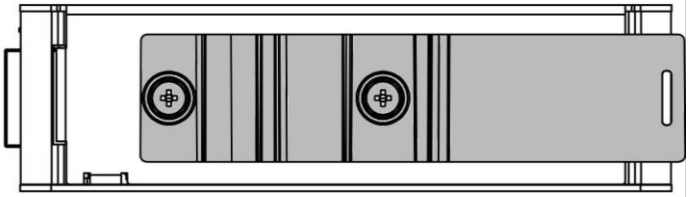
(Unit: mm)

1.4 Mounting Instruction

QEC-RXXDXXN is an easy-install design to help you set-up your modules easily. Please refer to Ch.3.1 DIN-Rail installation.

- **DIN-Rail**





1.5 Ordering Information

Type	RJ45 power source		Functions			Feature	-	Coating
	Input	Output	Digital	Input	Output	Digital Type		
QEC-R	X	X	D	X	X	N		X

1. Type: Code 1~4

R: EtherCAT SubDevice.

2. RJ45 Power source: Code 5~6

0: RJ45 In/Out w/o power

1: RJ45 PoE Device, Red Plastic Housing

3. Functions: Code 7~9

D: Digital I/O

X: 0, F (16), T (32) input channels

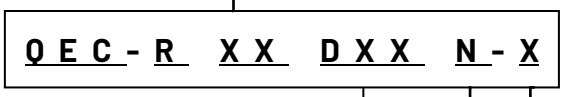
X: 0, F (16), T (32) output channels

4. Feature: Code 10

N: Digital I/O with group COM, Sink/Source selectable per 8-ch group

5. Coating: Code 11

C: Yes / N: Normal



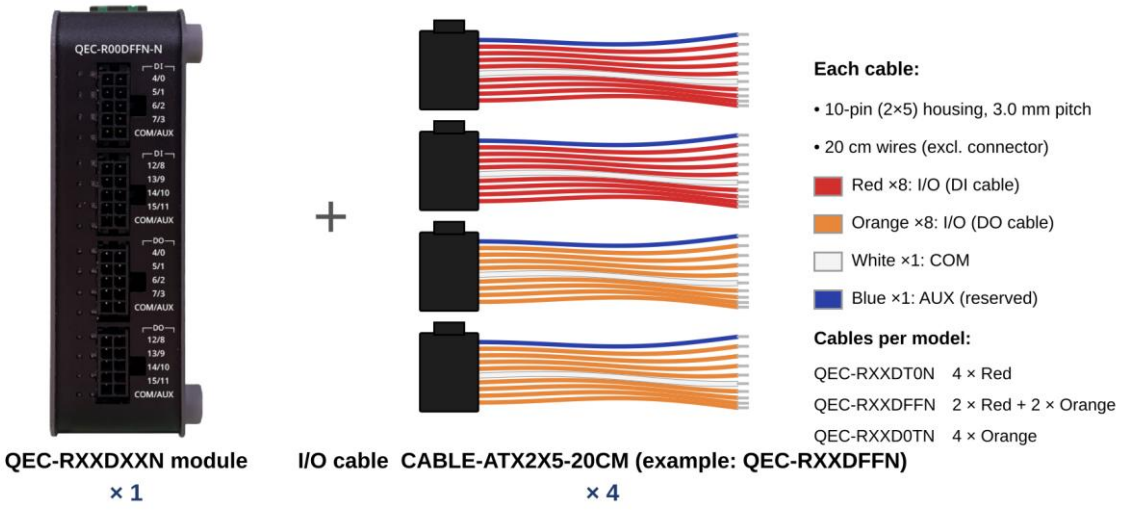
1.5.1 Reference Ordering Part Number:

Below are the standard Part Numbers:

- **QEC-R00DT0N-N**: EtherCAT SubDevice 32-ch DI Module (Sink/Source, Photo-Isolated)
- **QEC-R11DT0N-N**: EtherCAT SubDevice 32-ch DI Module (Sink/Source, Photo-Isolated)/PoE
- **QEC-R00DFFN-N**: EtherCAT SubDevice 16-ch DI + 16-ch DO Module (Sink/Source, Photo-Isolated)
- **QEC-R11DFFN-N**: EtherCAT SubDevice 16-ch DI + 16-ch DO Module (Sink/Source, Photo-Isolated)/PoE
- **QEC-R00D0TN-N**: EtherCAT SubDevice 32-ch DO Module (Sink/Source, Photo-Isolated)
- **QEC-R11D0TN-N**: EtherCAT SubDevice 32-ch DO Module (Sink/Source, Photo-Isolated)/PoE

Package Contents:

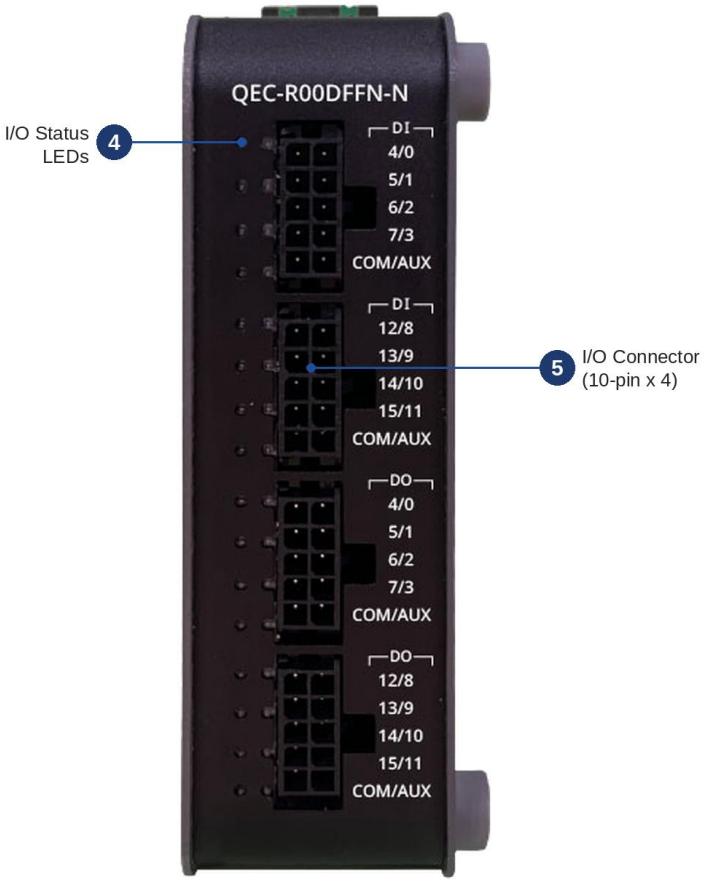
- 1 × QEC-RXXDXXN module
- 4 × I/O cable CABLE-ATX2X5-20CM (10-pin housing with 20 cm flying leads), one for each I/O connector. I/O wire color: red for DI groups, orange for DO groups.
  - QEC-RXXDT0N: 4 × red cables
  - QEC-RXXDFFN: 2 × red cables (DI) + 2 × orange cables (DO)
  - QEC-RXXD0TN: 4 × orange cables

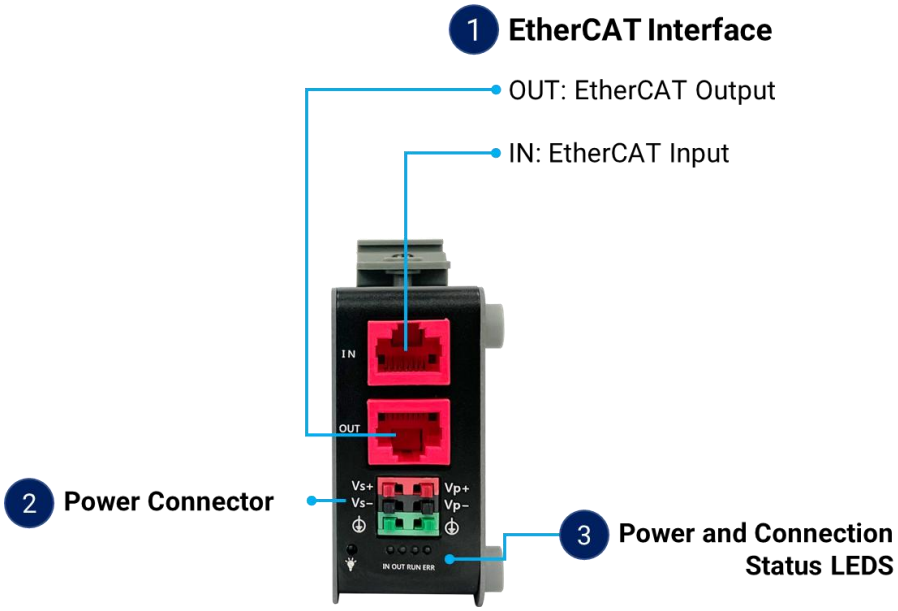


Ch. 2

Hardware System

2.1 General Technical Data



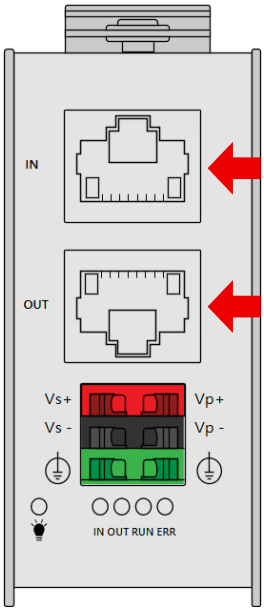


2.2 Connector Summary

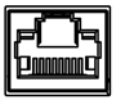
No.	Description		Type Narrative	Pin #
1	EtherCAT Interface	OUT	External RJ45 Connector (Gold finger)	8-pin
		IN		8-pin
2	Power Connector		Terminal Block Interface	6-pin
3	Power and Connection Status LEDs		External Status LEDs	-
4	I/O Status LEDs		External Status LEDs	-
5	I/O Connector		10-pin (2×5) header, 3.0 mm pitch, right-angle (one per 8-ch group)	4 × 10-pin
6	DIN-Rail installation		DIN-Rail	-

2.2.1 EtherCAT Interface

RJ45 Connectors.



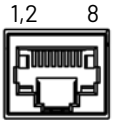
2.2.1.1 EC IN



Pin #	Signal Name	Pin #	Signal Name
1	LAN1_TX+	2	LAN1_TX-
3	LAN1_RX+	4	VS+
5	VP+	6	LAN1_RX-
7	VS- (GND)	8	VP- (GND)

* PoE LAN with the Red Housing; Regular LAN with Black Housing.
* L4, L5, L7, L8 pins are option, for RJ45 Power IN/OUT.

2.2.1.2 EC OUT

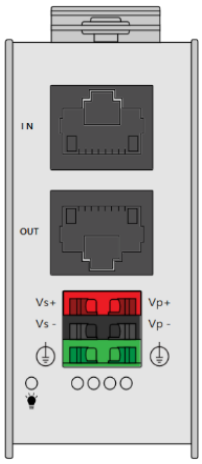
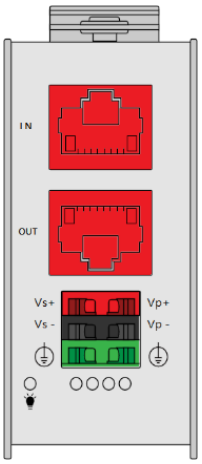


Pin #	Signal Name	Pin #	Signal Name
1	LAN2_TX+	2	LAN2_TX-
3	LAN2_RX+	4	VS+
5	VP+	6	LAN2_RX-
7	VS- (GND)	8	VP- (GND)

* PoE LAN with the Red Housing; Regular LAN with Black Housing.
* L4, L5, L7, L8 pins are option, for RJ45 Power IN/OUT.

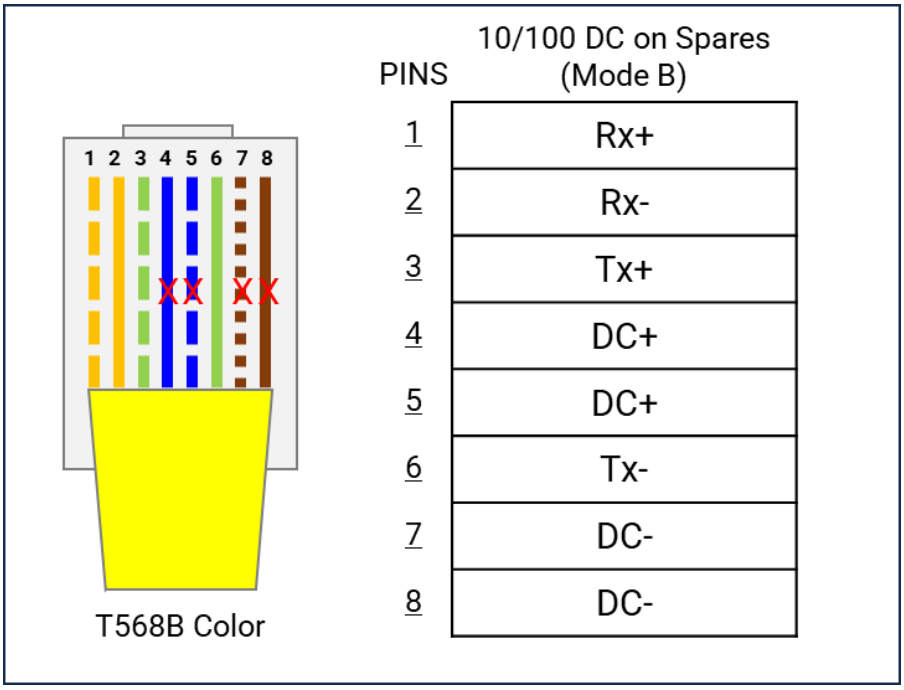
Note. QEC's PoE (Power over Ethernet)

In QEC product installations, users can easily distinguish between PoE and non-PoE: if the RJ45 house is red, it is PoE type, and if the RJ45 house is black, it is non-PoE type.

	
Non-PoE type	PoE type

PoE (Power over Ethernet) is a function that delivers power over the network. QEC can be equipped with an optional PoE function to reduce cabling. In practice, PoE is selected based on system equipment, so please pay attention to the following points while evaluating and testing:

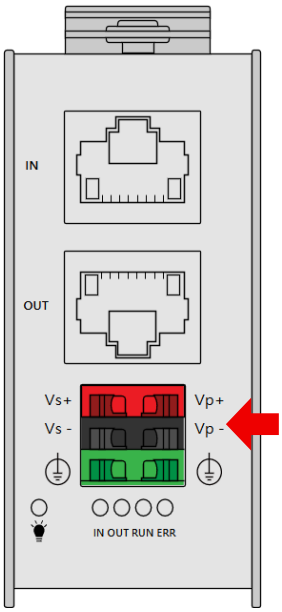
1. When connecting PoE and non-PoE devices, make sure to disconnect Ethernet cables at pins 4, 5, 7, and 8 (e.g., when a PoE-supported QEC EtherCAT MDevice connects with a third-party EtherCAT SubDevice).
2. The PoE function of QEC is different and incompatible with EtherCAT P, and the PoE function of QEC is based on PoE Type B, and the pin functions are as follows:



3. QEC's PoE power supply is up to **24V/3A**.

2.2.2 Power Connector

Euroblock Connectors.
4-pin Power Input/Output (+V: Red / GND: Black) and 2-pin FGND (Green).



Vs for system power; Vp for peripheral power and backup power.



Pin #	Signal Name	Pin #	Signal Name
1	Vs+	2	Vp+
3	Vs- (GND)	4	Vp- (GND)
5	F.G	6	F.G

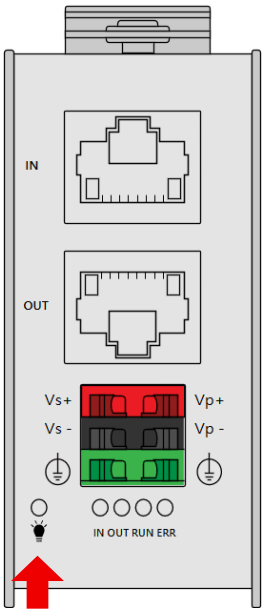
* Power Input voltage +19 to +50VDC Power Input (Typ. +24VDC)

2.2.3 Power and Connection Status LEDs

Power and connection status LEDs information.

2.2.3.1 Power Status LED

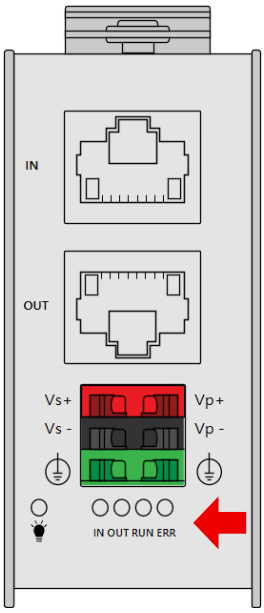
The PWR LED indicates the status of the system power (Vs). Power input is +24 VDC (typical).



Notation	States	Condition	Description
PWR 	Green LED On	Vs is applied (+19 to +50 VDC)	The system power is supplied.
	Off	Vs is not applied	No system power. Check the power wiring and the power supply.

* The QEC-RXXDXXN has no internal voltage monitoring; the PWR LED shows only whether the system power is present.

2.2.3.2 Connection Status LEDs



There are EtherCAT In, Out, Run, and Error Status LEDs.



Notation	Color	States	Description
In	Green	Off	No link
		Blinking	Link and activity
		On	Link without activity
Out	Green	Off	No link
		Blinking	Link and activity
		On	Link without activity
Run	Green	Off	The device is in state INIT
		Blinking	The device is in state Pre-Operation
		Single Flash	The device is in state Safe-Operation
		On	The device is in state Operation
Err	Red	Off	No error
		Blinking	Invalid Configuration
		Single Flash	Local Error
		Double Flash	Process Data Watchdog Timeout EtherCAT Watchdog Timeout
		On	The device is in state Error

* The IN/OUT/RUN/ERR LEDs are driven by the EtherCAT SubDevice Controller (ESC).

2.2.4 I/O Status LEDs

Each 8-ch group has eight status LEDs located next to its I/O connector. The LED lights when the corresponding channel is ON.

2.2.4.1 Digital Input (QEC-RXXDT0N)

The 32 LEDs (DI 0 to 31) individually indicate the status of the 32 digital input channels.



Notation	Color	States	Description
Digital Input	-	Off	Digital input status is “Off”
	Green	On	Digital input status is “On”

2.2.4.2 Digital Output (QEC-RXXD0TN)

The 32 LEDs (DO 0 to 31) individually indicate the status of the 32 digital output channels.



Notation	Color	States	Description
Digital Output	-	Off	Digital output status is “Off”
	Green	On	Digital output status is “On”

2.2.4.3 Digital Input/Output (QEC-RXXDFFN)

The LEDs of the upper two connector groups show the status of digital inputs DI 0 to 15, and the LEDs of the lower two groups show the status of digital outputs DO 0 to 15.

<table>
<tr><td rowspan="5">Digital Input


Digital Output</td><td>Notation</td><td>Color</td><td>States</td><td>Description</td></tr>
<tr><td rowspan="2">Digital Input</td><td>-</td><td>Off</td><td>Digital input status is “Off”</td></tr>
<tr><td>Green</td><td>On</td><td>Digital input status is “On”</td></tr>
<tr><td rowspan="2">Digital Output</td><td>-</td><td>Off</td><td>Digital output status is “Off”</td></tr>
<tr><td>Green</td><td>On</td><td>Digital output status is “On”</td></tr>
</table>

2.2.5 Digital I/O Connector

Each module provides four 10-pin (2×5) headers with 3.0 mm pitch. Each header serves one 8-ch group: 8 × I/O, 1 × COM and 1 × AUX.
For the process data mapping, refer to Ch. 5.3 Process Data.

The Digital I/O specification table:

Digital I/O	Digital Input	Digital Output
I/O Type	Bidirectional, Sink/Source selectable per group via COM (DI: photocoupler, supports NPN & PNP sensors; DO: Photo-MOS relay)	
Response Time	Rise time 6 µs, Fall time 6 µs (typ., photocoupler)	Turn-on 0.25 ms, Turn-off 20 µs (typ., Photo-MOS relay)
Load Voltage	24 VDC (48 VDC version available)	Rated 24 VDC, Max. 56 VDC
Load Current	-	Max. 250 mA/ch; Peak 500 mA (100 ms, single pulse); Max. 2 A per COM group
Isolation Protection	2500 Vrms (photocoupler)	1500 Vrms (photocoupler)
Off-state Leakage	-	≤ 10 nA (max.)
On-resistance	-	0.8 Ω typ. / 1.5 Ω max.
Channel Grouping	4 groups × 8-ch, 1 COM per group	4 groups × 8-ch, 1 COM per group

Connector Information:

- Header: 10-pin (2×5), 3.0 mm pitch, right-angle; rated 5.0 A / 250 V AC/DC per contact; applicable wire AWG #30 to #20; -25 to +85°C.
- Mating cable (included): 4 × CABLE-ATX2X5-20CM, receptacle housing C3001-H05×2 (MX3.0-2×5Y) with 20 cm wires, length excluding the connector (refer to Ch. 2.3).
- Per group: 8 × I/O (red wires on DI cables, orange wires on DO cables), 1 × COM (white wire), 1 × AUX (blue wire). The AUX pin is reserved; do not connect.
- Total current through one COM terminal: max. 2 A.

2.2.5.1 Digital Input (QEC-RXXDT0N)

The pin assignment below follows the labels printed on the front panel. For each row, the label "x/y" means: left pin = x, right pin = y (front view). Each group of five rows corresponds to one 10-pin connector, from top to bottom.

Left Pin	Signal Name		Right Pin	Signal Name
4	DI_04		0	DI_00
5	DI_05		1	DI_01
6	DI_06		2	DI_02
7	DI_07		3	DI_03
COM	COM (Group 1), white wire		AUX	Reserved (N.C.), blue wire
12	DI_12		8	DI_08
13	DI_13		9	DI_09
14	DI_14		10	DI_10
15	DI_15		11	DI_11
COM	COM (Group 2), white wire		AUX	Reserved (N.C.), blue wire
20	DI_20		16	DI_16
21	DI_21		17	DI_17
22	DI_22		18	DI_18
23	DI_23		19	DI_19
COM	COM (Group 3), white wire		AUX	Reserved (N.C.), blue wire
28	DI_28		24	DI_24
29	DI_29		25	DI_25
30	DI_30		26	DI_26
31	DI_31		27	DI_27
COM	COM (Group 4), white wire		AUX	Reserved (N.C.), blue wire

Digital Input Load Voltage:

- 24 VDC (48 VDC version available)

Channel Grouping:

- 4 groups × 8 channels; each group has its own COM

Response Time:

- Rise time 6 μs, Fall time 6 μs (typ., photocoupler)

I/O Type:

- Bidirectional (Sink/Source selectable per group via COM); supports NPN & PNP sensors

Isolation Protection:

- 2500 Vrms (photocoupler)

2.2.5.2 Digital Output (QEC-RXXD0TN)

The pin assignment below follows the labels printed on the front panel. For each row, the label "x/y" means: left pin = x, right pin = y (front view). Each group of five rows corresponds to one 10-pin connector, from top to bottom.

Left Pin	Signal Name		Right Pin	Signal Name
4	DQ_04		0	DQ_00
5	DQ_05		1	DQ_01
6	DQ_06		2	DQ_02
7	DQ_07		3	DQ_03
COM	COM (Group 1), white wire		AUX	Reserved (N.C.), blue wire
12	DQ_12		8	DQ_08
13	DQ_13		9	DQ_09
14	DQ_14		10	DQ_10
15	DQ_15		11	DQ_11
COM	COM (Group 2), white wire		AUX	Reserved (N.C.), blue wire
20	DQ_20		16	DQ_16
21	DQ_21		17	DQ_17
22	DQ_22		18	DQ_18
23	DQ_23		19	DQ_19
COM	COM (Group 3), white wire		AUX	Reserved (N.C.), blue wire
28	DQ_28		24	DQ_24
29	DQ_29		25	DQ_25
30	DQ_30		26	DQ_26
31	DQ_31		27	DQ_27
COM	COM (Group 4), white wire		AUX	Reserved (N.C.), blue wire

Digital Output Load Voltage:

- Rated 24 VDC, Max. 56 VDC

Digital Output Load Current:

- Max. 250 mA/ch; Peak 500 mA (100 ms, single pulse); Max. 2 A per COM group

Channel Grouping:

- 4 groups × 8 channels; each group has its own COM

Response Time:

- Turn-on 0.25 ms, Turn-off 20 μs (typ., Photo-MOS relay)

I/O Type:

- Photo-MOS relay, bidirectional (Sink/Source selectable per group via COM)

Isolation Protection:

- 1500 Vrms (photocoupler)

Protection:

- No built-in short-circuit protection. An external fuse (≤ 2 A) per COM is recommended.

2.2.5.3 Digital Input/Output (QEC-RXXDFFN)

The upper two connectors (groups 1–2) are digital inputs DI 0–15, and the lower two connectors (groups 3–4) are digital outputs DO 0–15. The pin assignment below follows the labels printed on the front panel. For each row, the label "x/y" means: left pin = x, right pin = y (front view). Each group of five rows corresponds to one 10-pin connector, from top to bottom.

Left Pin	Signal Name		Right Pin	Signal Name
4	DI_04		0	DI_00
5	DI_05		1	DI_01
6	DI_06		2	DI_02
7	DI_07		3	DI_03
COM	COM (Group 1, DI 0–7), white wire		AUX	Reserved (N.C.), blue wire
12	DI_12		8	DI_08
13	DI_13		9	DI_09
14	DI_14		10	DI_10
15	DI_15		11	DI_11
COM	COM (Group 2, DI 8–15), white wire		AUX	Reserved (N.C.), blue wire
4	DQ_04		0	DQ_00
5	DQ_05		1	DQ_01
6	DQ_06		2	DQ_02
7	DQ_07		3	DQ_03
COM	COM (Group 3, DO 0–7), white wire		AUX	Reserved (N.C.), blue wire
12	DQ_12		8	DQ_08
13	DQ_13		9	DQ_09
14	DQ_14		10	DQ_10
15	DQ_15		11	DQ_11
COM	COM (Group 4, DO 8–15), white wire		AUX	Reserved (N.C.), blue wire

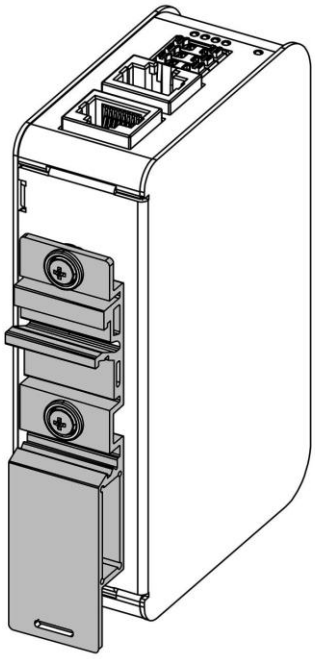
Please refer to the Digital I/O specification table.

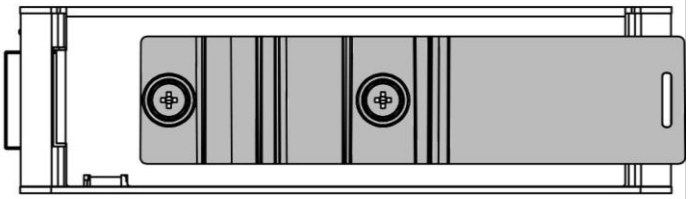
Digital I/O	Digital Input	Digital Output
I/O Type	Bidirectional (Sink/Source selectable per group via COM); supports NPN & PNP sensors	
Response Time	Rise time 6 μs, Fall time 6 μs (typ., photocoupler)	Turn-on 0.25 ms, Turn-off 20 μs (typ., Photo-MOS relay)
Load Voltage	24 VDC (48 VDC version available)	Rated 24 VDC, Max. 56 VDC
Load Current	-	Max. 250 mA/ch; Peak 500 mA (100 ms, single pulse); Max. 2 A per COM group
Isolation Protection	2500 Vrms (photocoupler)	1500 Vrms (photocoupler)
Off-state Leakage	-	≤ 10 nA (max.)
On-resistance	-	0.8 Ω typ. / 1.5 Ω max.
Channel Grouping	4 groups × 8-ch, 1 COM per group	4 groups × 8-ch, 1 COM per group

2.2.6 DIN-Rail

QEC-RXXDXXN is an easy-install design to help you set-up your modules easily. Please refer to Ch.3.1 DIN-Rail installation.

- **DIN-Rail**

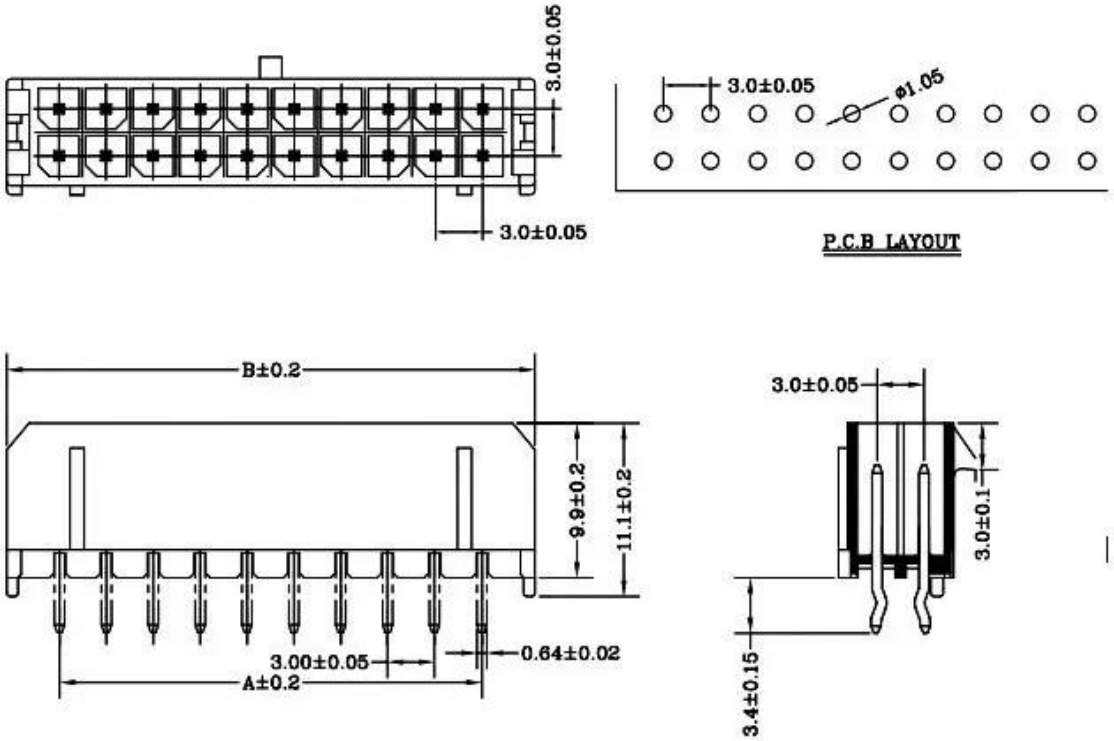




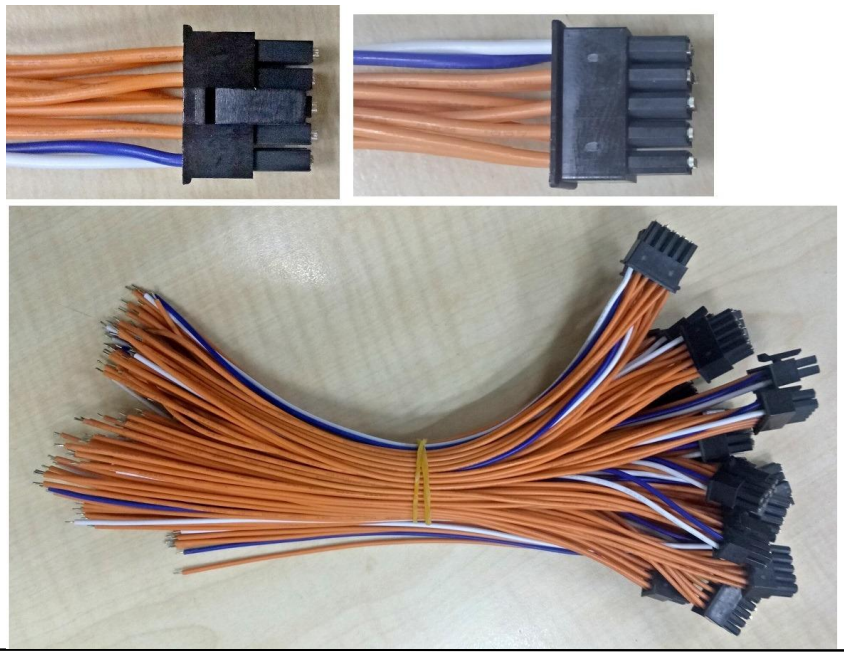
2.3 Wiring to the Connector

2.3.1 Connecting the wire to the connector

Each QEC-RXXDXXN is supplied with four I/O cables (CABLE-ATX2X5-20CM), one for each I/O connector.

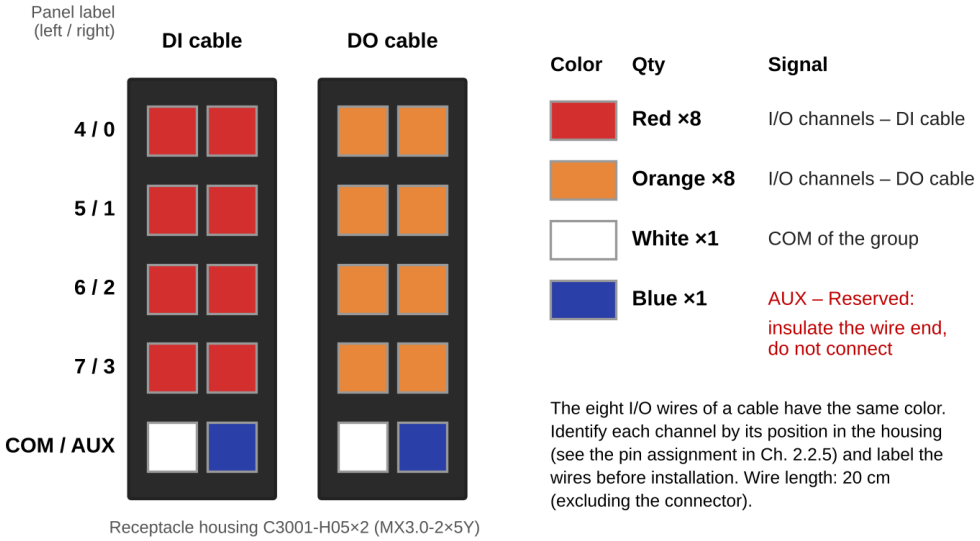


Each cable has a 10-pin (2×5) receptacle housing with 3.0 mm pitch and ten flying leads of 20 cm (length excluding the connector). The I/O wires are red on cables for DI groups and orange on cables for DO groups.

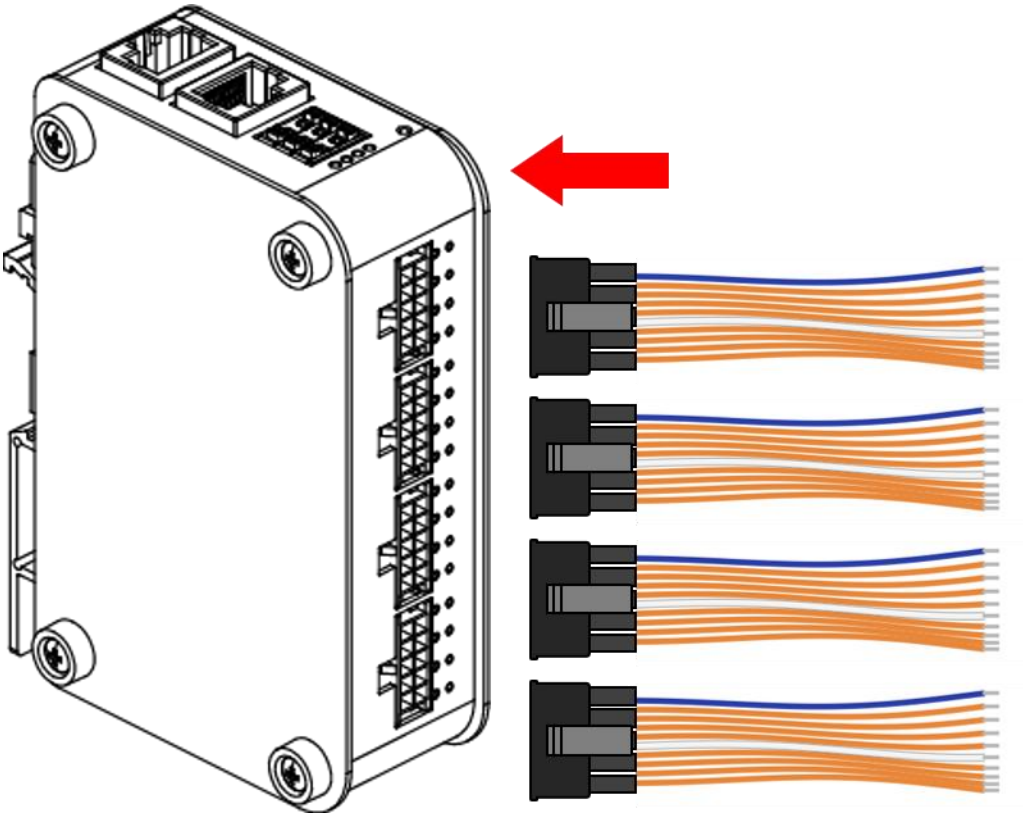


Wire colors:

I/O Cable CABLE-ATX2X5-20CM – Wire Colors (front view, Group 1 shown)

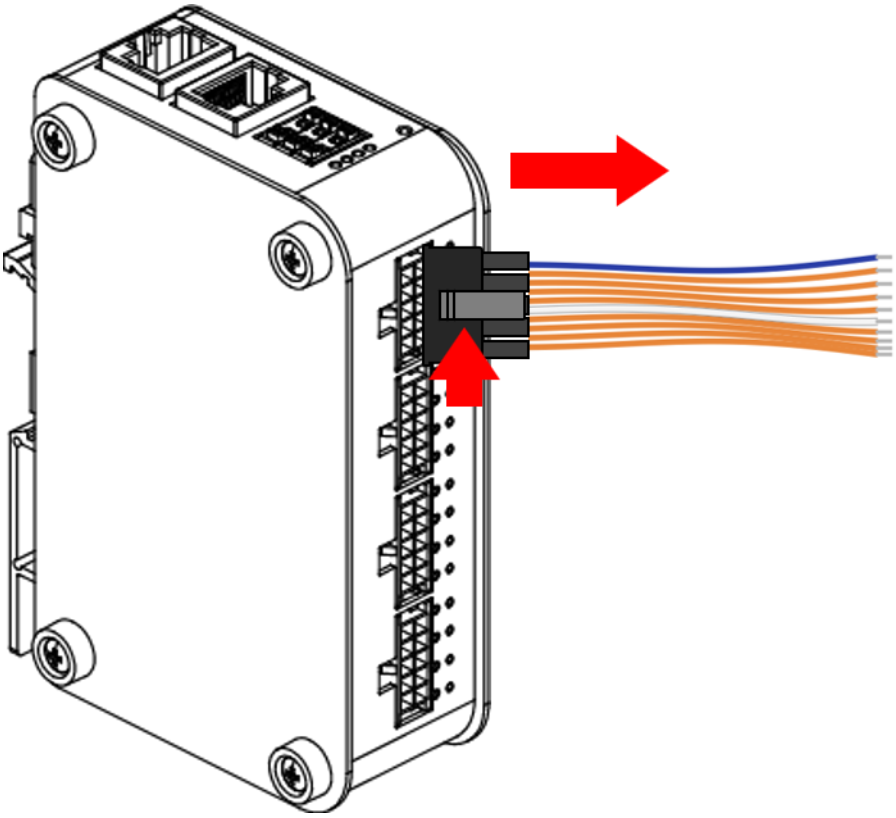


1. Plug the cable into the I/O connector of the corresponding group until the latch clicks into place.
2. Connect the I/O wires (red for DI, orange for DO) to the field devices according to the pin assignment in Ch. 2.2.5.
3. Connect the white wire (COM) to 0 V (sink wiring) or +24 V (source wiring) of the field power supply. Refer to Ch. 2.3.3.
4. Insulate the end of the blue wire (AUX). Do not connect it.



2.3.2 Removing the wire from the connector

1. Before disconnecting, turn off the field power supply of the group.
2. Press the latch on the cable housing and pull the housing straight out of the header. Do not pull on the wires.

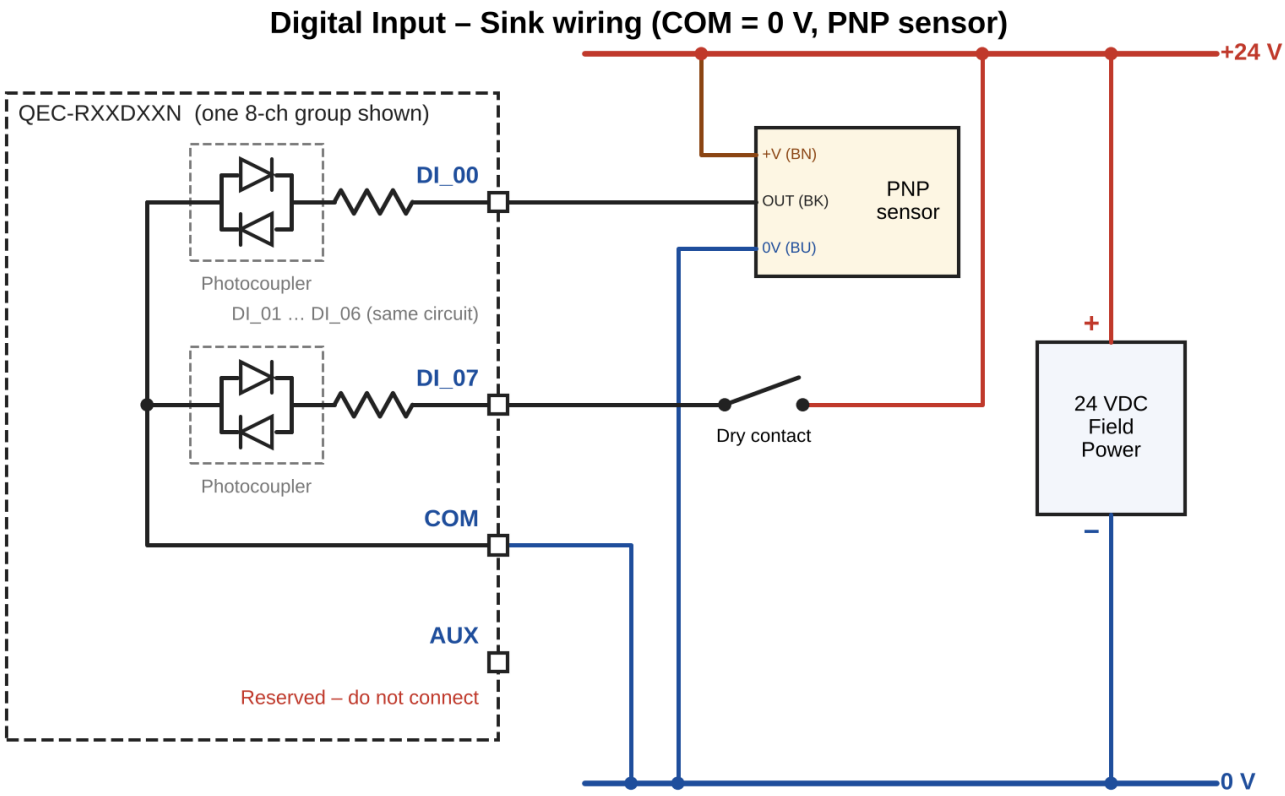


2.3.3 Application Wiring

Each 8-ch group has its own COM terminal. Sink or source wiring can be selected independently for each group by connecting COM to 0 V or to +24 V of the field power supply.

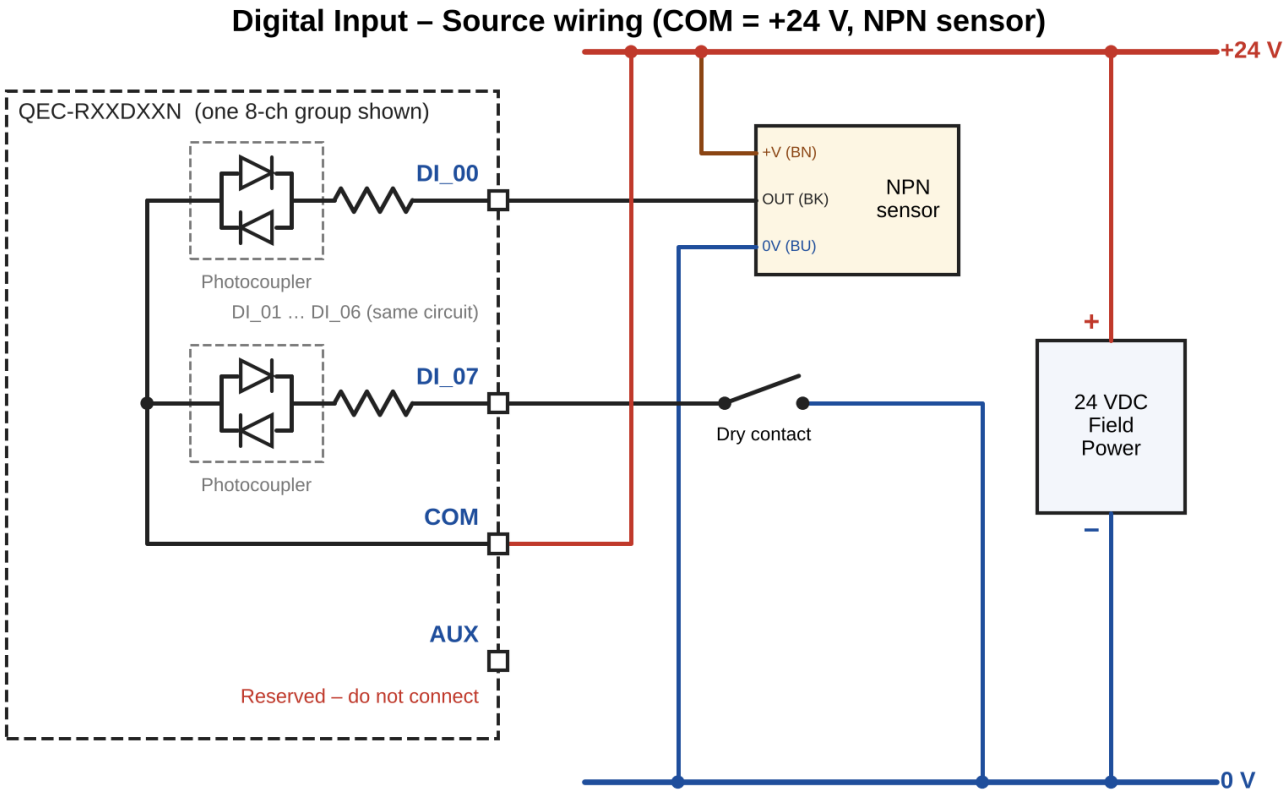
2.3.3.1 Digital Input

Sink wiring (COM = 0 V) for PNP sensors / sourcing devices:



Notes:
- COM of the group is connected to 0 V. An input turns ON when +24 V is applied to the DI terminal (PNP / sourcing sensor).
- Each 8-ch group has its own COM; sink and source wiring can be selected group by group.
- AUX is reserved. Do not connect any wire to AUX.

Source wiring (COM = +24 V) for NPN sensors / sinking devices:



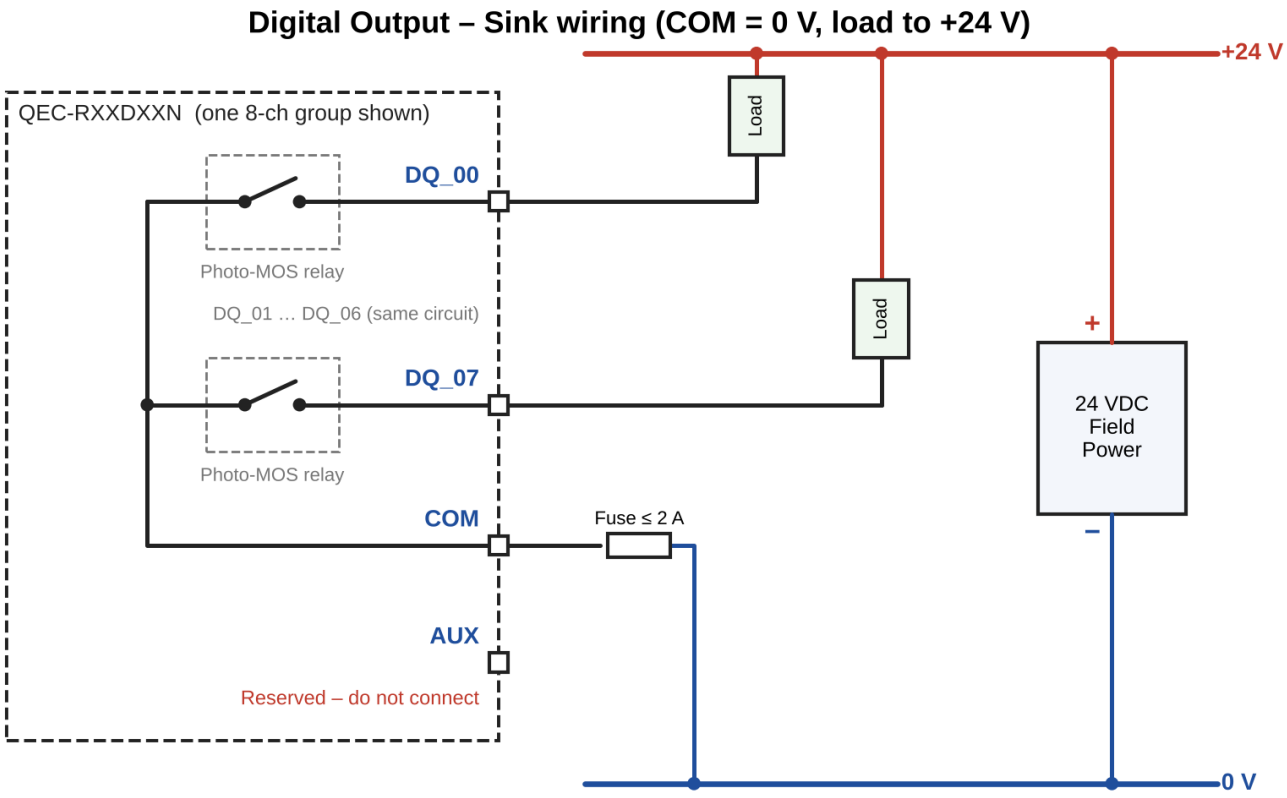
Notes:
• COM of the group is connected to +24 V. An input turns ON when the DI terminal is pulled to 0 V (NPN / sinking sensor).
• Each 8-ch group has its own COM; sink and source wiring can be selected group by group.
• AUX is reserved. Do not connect any wire to AUX.

Digital Input Specification:

- Load Voltage: 24 VDC (48 VDC version available)
- Response Time: Rise time 6 μs, Fall time 6 μs (typ., photocoupler)
- Type: Bidirectional, Sink/Source selectable per group via COM
- Isolation Protection: 2500 Vrms (photocoupler)

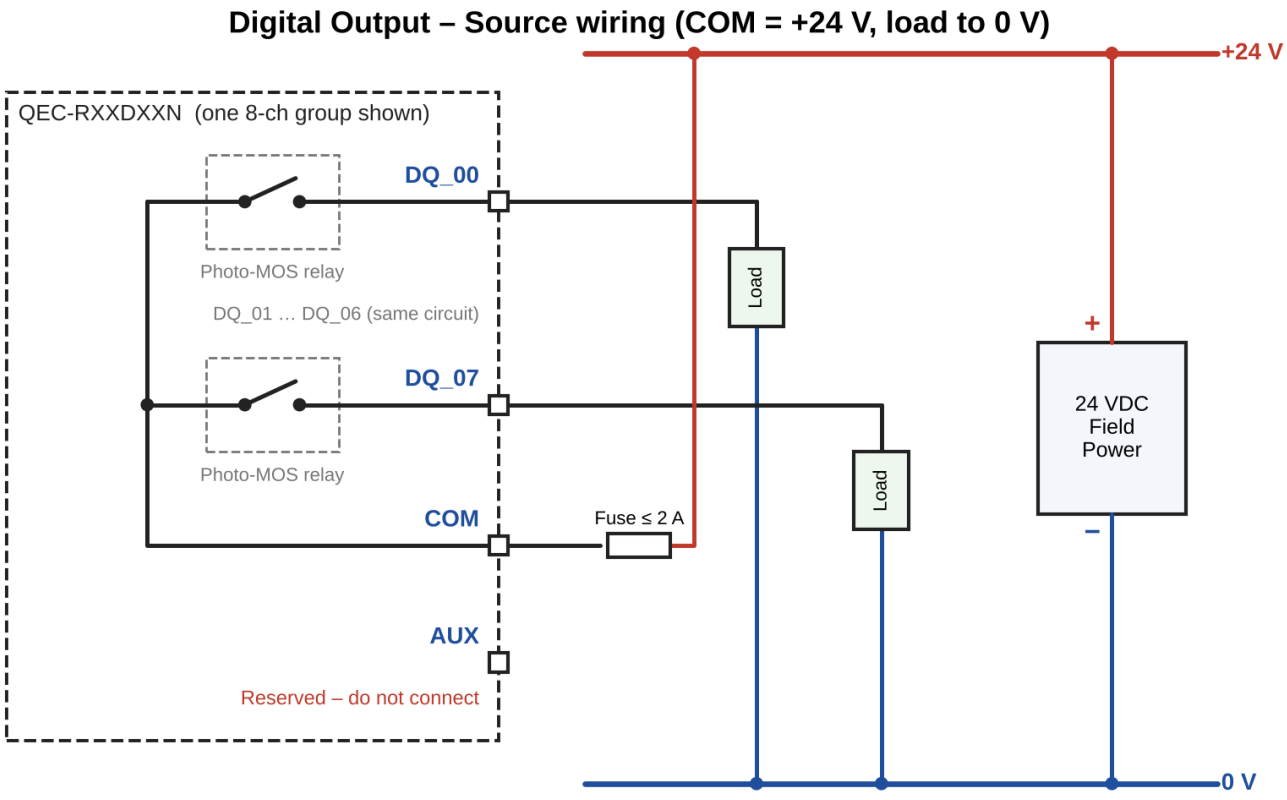
2.3.3.2 Digital Output

Sink wiring (COM = 0 V): the load is connected between +24 V and the DQ terminal.



Notes:
- COM of the group is connected to 0 V; the load is connected between +24 V and the DQ terminal.
- Max. 250 mA per channel; total current through one COM must not exceed 2 A. An external fuse (≤ 2 A) per COM is recommended.
- The outputs have no built-in short-circuit protection. For inductive loads, add a flyback diode or TVS across the load.
- AUX is reserved. Do not connect any wire to AUX.

Source wiring (COM = +24 V): the load is connected between the DQ terminal and 0 V.



Notes:
• COM of the group is connected to +24 V; the load is connected between the DQ terminal and 0 V.
• Max. 250 mA per channel; total current through one COM must not exceed 2 A. An external fuse (≤ 2 A) per COM is recommended.
• The outputs have no built-in short-circuit protection. For inductive loads, add a flyback diode or TVS across the load.
• AUX is reserved. Do not connect any wire to AUX.

Digital Output Specification:

- Load Voltage: Rated 24 VDC, Max. 56 VDC
- Load Current: Max. 250 mA/ch; Peak 500 mA (100 ms, single pulse); Max. 2 A per COM group
- Response Time: Turn-on 0.25 ms, Turn-off 20 μs (typ., Photo-MOS relay)
- Type: Photo-MOS relay, bidirectional, Sink/Source selectable per group via COM
- Isolation Protection: 1500 Vrms (photocoupler)
- Protection: No built-in short-circuit protection. Use an external fuse (≤ 2 A) per COM, and a flyback diode or TVS across inductive loads.

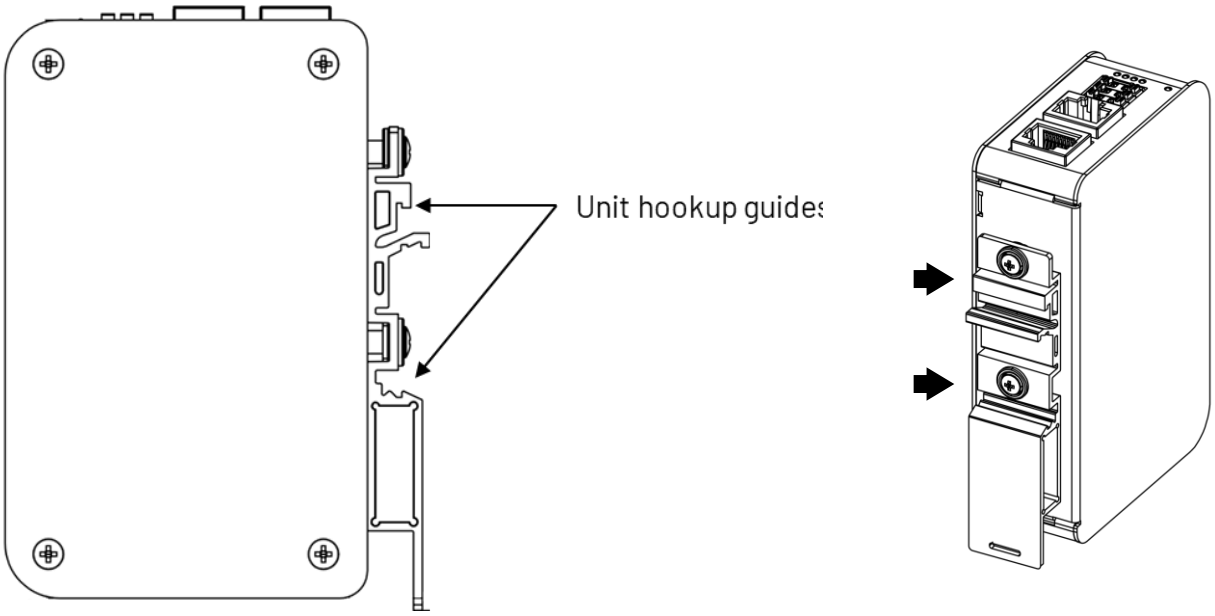
Ch. 3

Hardware Installation

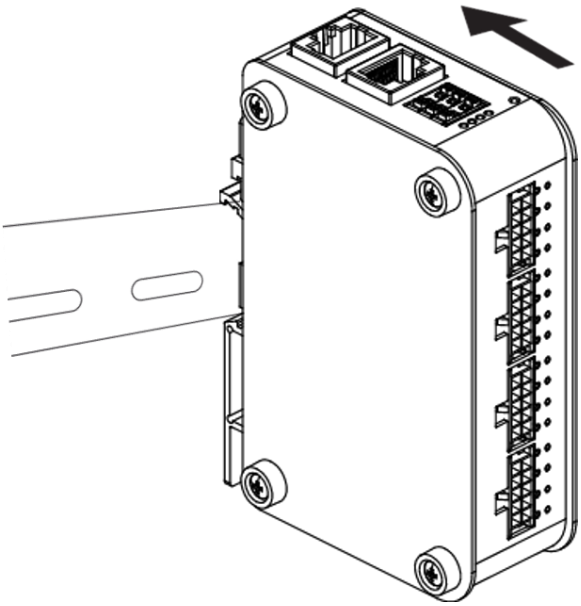
This section describes how to install QEC-RXXDXXN. Please turn OFF the power supply before you mount QEC-RXXDXXN. Always mount QEC-RXXDXXN one at a time.

3.1 DIN-Rail installation

Slide in the QEC-RXXDXXN on the hookup guides and press the QEC-RXXDXXN with a certain amount of force against the DIN track until the DIN Track mounting hook lock into place.



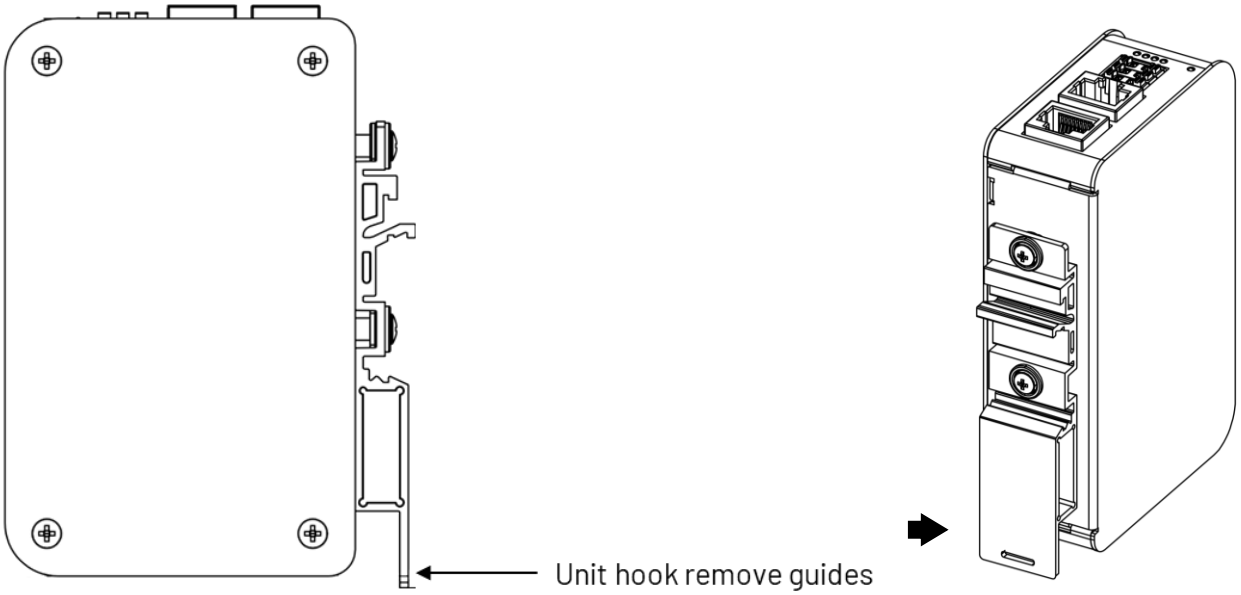
When you mount the QEC-RXXDXXN, releasing the DIN track mounting hook on the QEC-RXXDXXN is unnecessary. After you mount the QEC-RXXDXXN, make sure it is locked to the DIN Track.



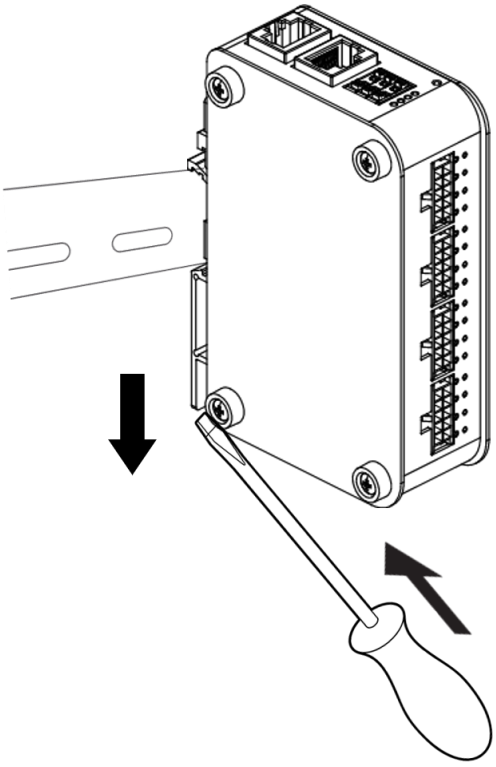
*__Note__: Always turn OFF the Unit power supply and I/O power supply before connecting and removing the QEC-RXXDXXN.

3.2 Removing QEC-RXXDXXN Unit

Use a flat-blade screwdriver to remove the DIN Track mounting hook on the unit.



Pull down and out the flat-blade screwdriver with force against the DIN track until you hear the DIN Track remove the hook.

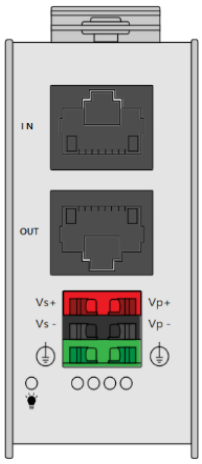
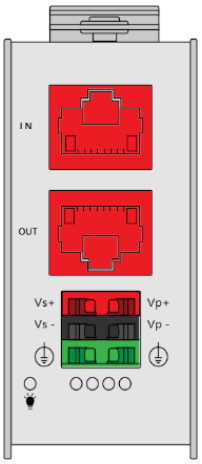


Ch. 4

Getting Started

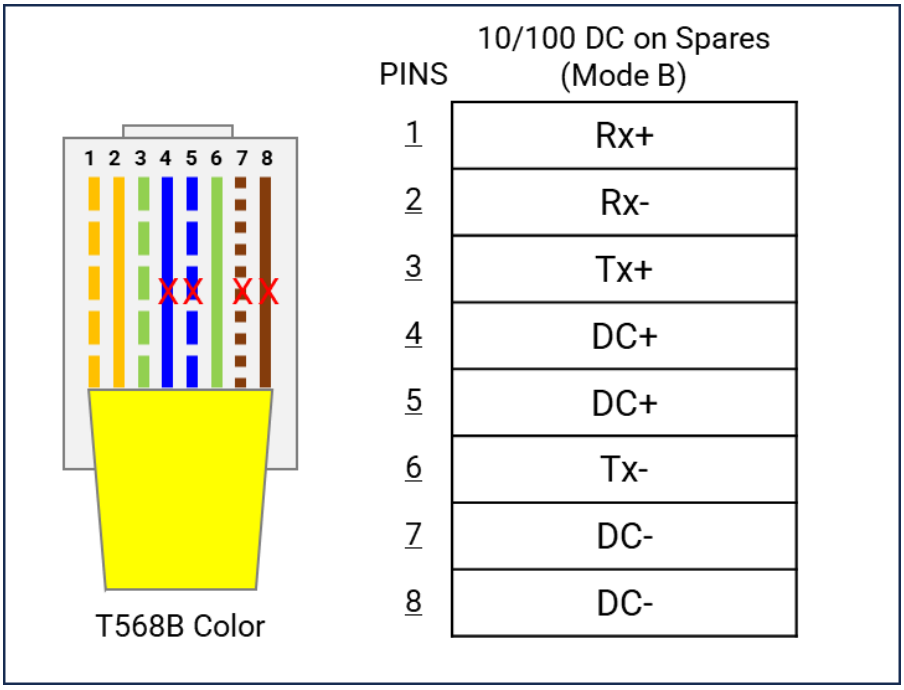
Note. QEC's PoE (Power over Ethernet)

In QEC product installations, users can easily distinguish between PoE and non-PoE: if the RJ45 house is red, it is PoE type, and if the RJ45 house is black, it is non-PoE type.

	
Non-PoE type	PoE type

PoE (Power over Ethernet) is a function that delivers power over the network. QEC can be equipped with an optional PoE function to reduce cabling. In practice, PoE is selected based on system equipment, so please pay attention to the following points while evaluating and testing:

1. When connecting PoE and non-PoE devices, make sure to disconnect Ethernet cables at pins 4, 5, 7, and 8 (e.g., when a PoE-supported QEC EtherCAT MDevice connects with a third-party EtherCAT SubDevice).
2. The PoE function of QEC is different and incompatible with EtherCAT P, and the PoE function of QEC is based on PoE Type B, and the pin functions are as follows:



3. QEC's PoE power supply is up to **24V/3A**.

4.1 Introduction

Welcome to the Getting Started Chapter for the QEC-RXXDXXN module. This section is designed to assist you in efficiently setting up and utilizing the QEC-RXXDXXN module. To facilitate this process, we will focus on TwinCAT by Beckhoff Automation, which operates on a PC.

In the following pages, we will walk you through the steps for connecting your QEC-RXXDXXN and controlling its digital inputs and outputs. The QEC-R11DFFN (16 DI + 16 DO) is used as the example.

* The QEC-RXXDXXN is an ESC-only SubDevice and does not support mailbox communication (CoE/FoE). Functions such as the “CoE - Online” tab or startup SDO parameters are not available; the process data mapping is fixed by the ESI file.

*** Note: Ensuring Up-to-date Installation of the XML Device Description File (ESI)**

To ensure smooth functioning, it is important to install the latest version of the XML device description file in the EtherCAT MDevice software. The latest version of the XML device description file can be downloaded from the QEC website.
https://www.qec.tw/

4.2 TwinCAT Operation

This section is for you if you're ready to get your QEC-RXXDXXN module up and running with TwinCAT. We'll focus on using the Digital Input and Digital Output.

4.2.1 Install the ESI file

1. Obtain the ESI file: The ESI file for the QEC-R11DFFN module is located on our website at the following link: https://www.qec.tw/.
   Simply download the ZIP file and extract it.

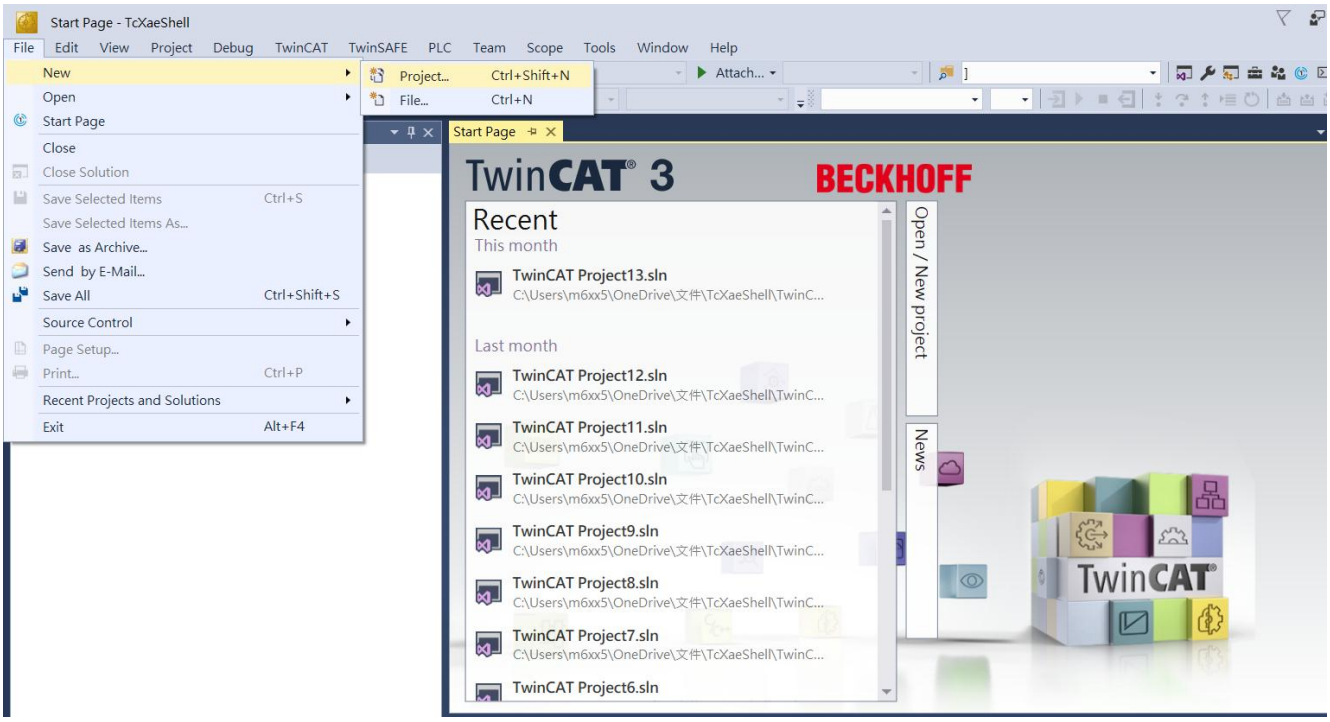
2. Install the ESI file: Once extracted, the XML file must be copied or moved to the appropriate system directory.

3. Restart the Programming System If Needed: If the TwinCAT program was running when the ESI file was copied to the appropriate system directory, you may have to restart the TwinCAT program before it will recognize the new ESI file.

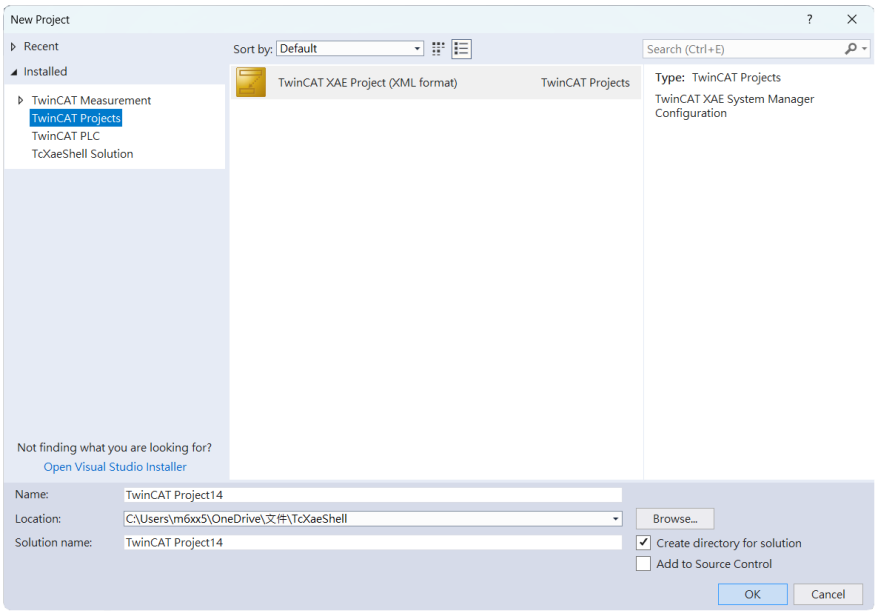
4.2.2 Add the QEC-R11DFFN to the Project

This section assumes that the TwinCAT software is in Config Mode.
For more information about TwinCAT, please refer to [TwinCAT | Automation software | Beckhoff Worldwide](), or contact Beckhoff Automation.

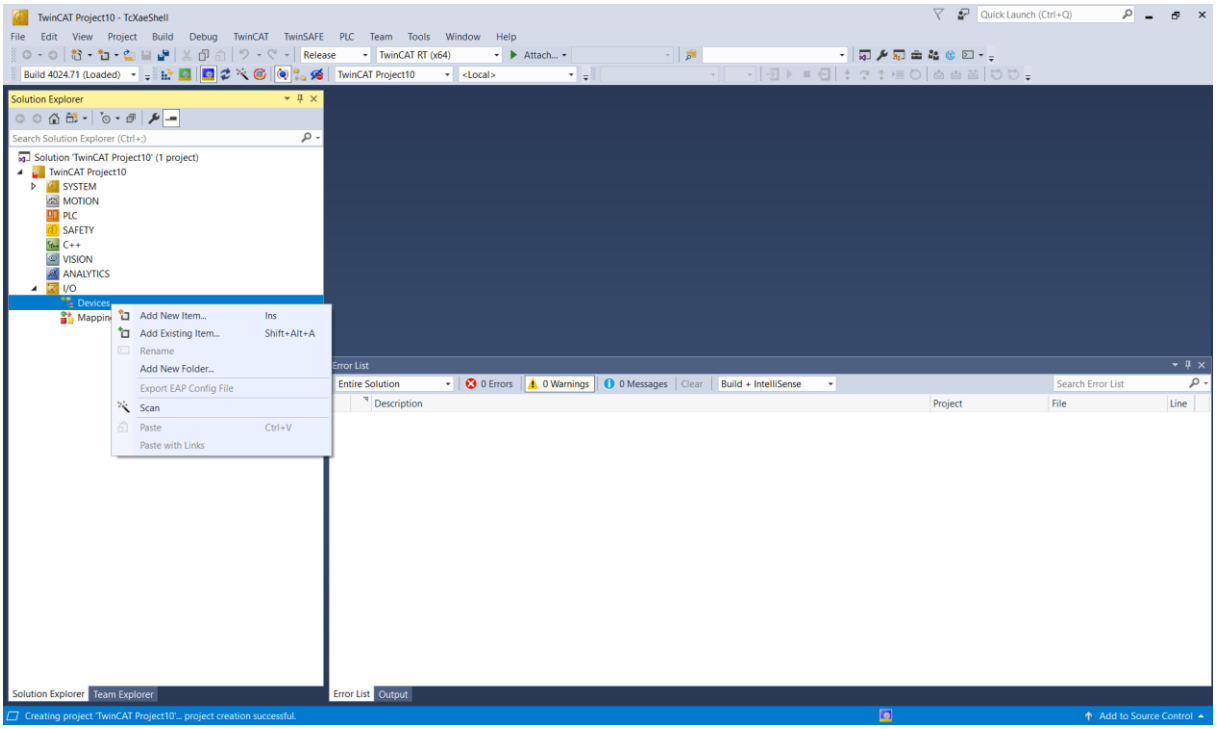
1. Click the New Project.



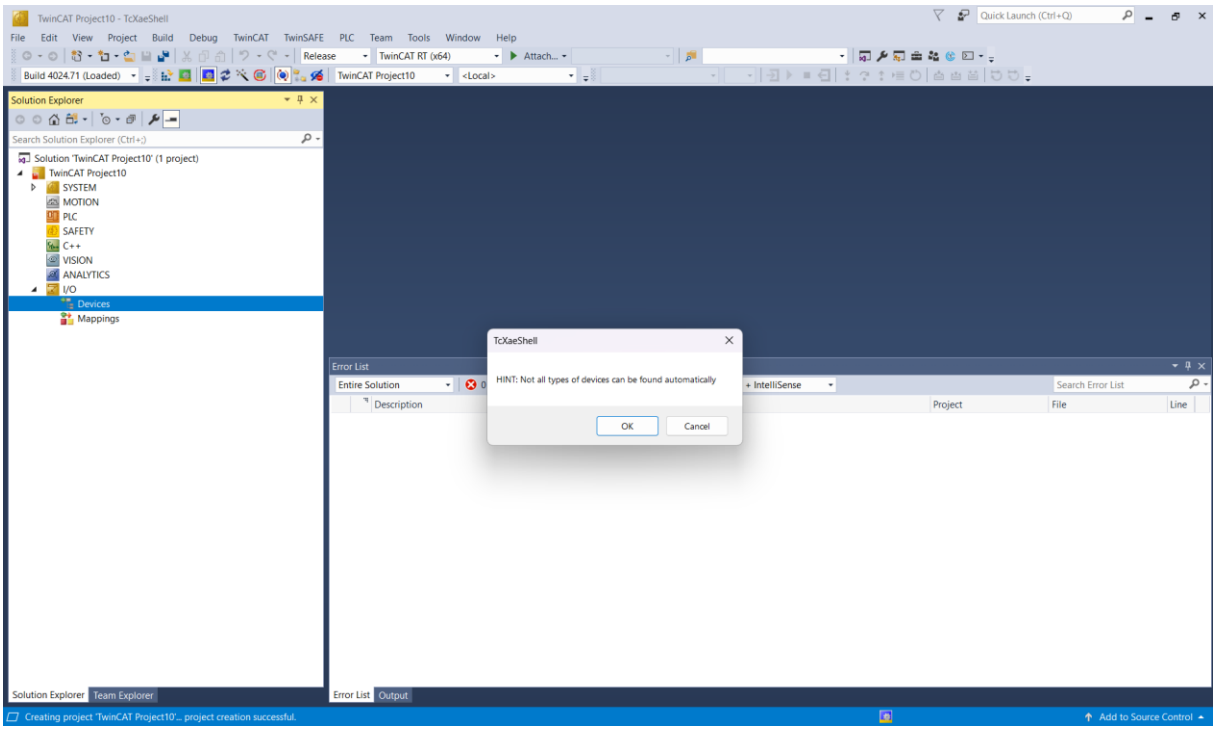
2. Select the “TwinCAT XAE Project (XML format), and change the project file name and location if you need. Then click “OK”.



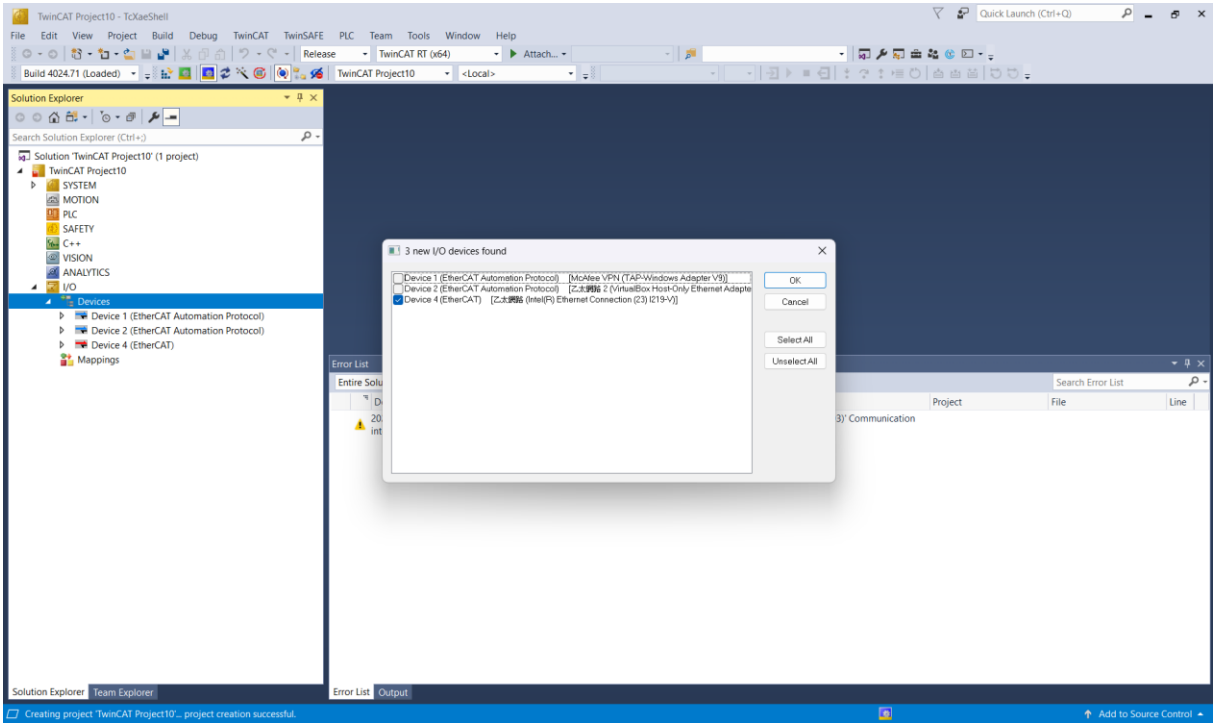
3. Right-click the “Devices” under the I/O node, and click the “Scan” button to start scanning. (If the “Scan” option is not available, the TwinCAT software is not in Config Mode.)



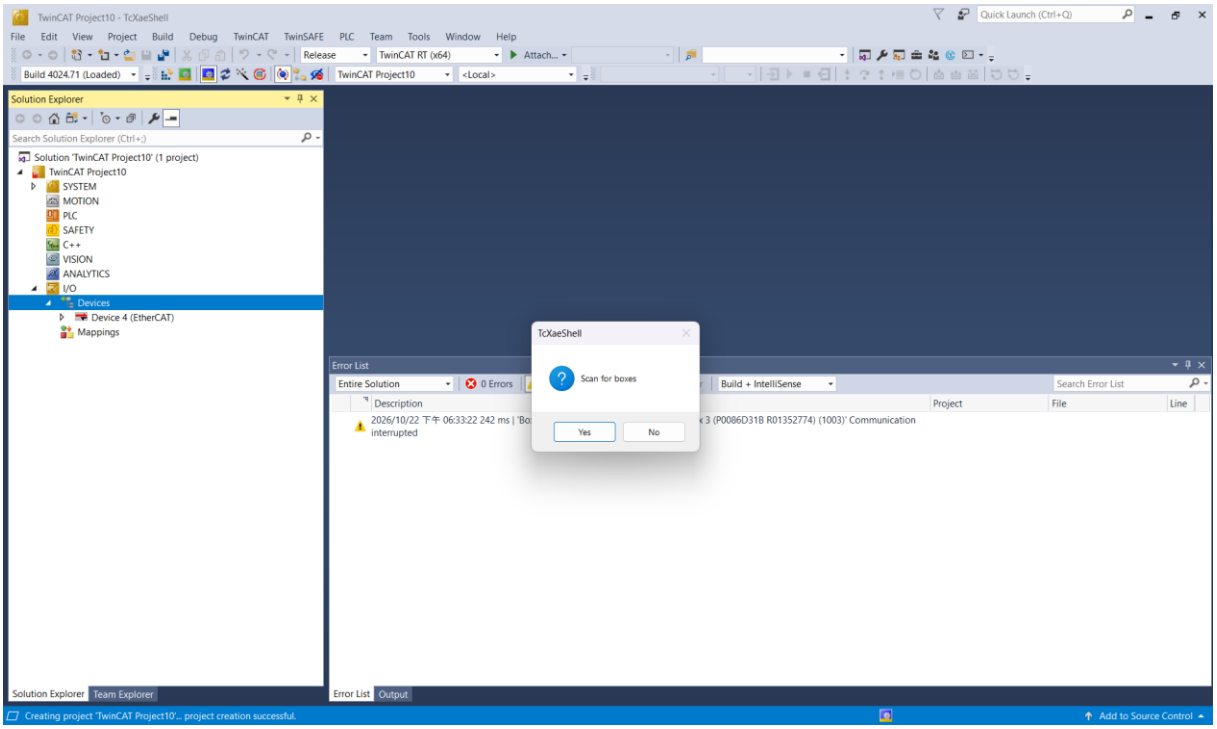
4. Click “OK” for the HINT message.



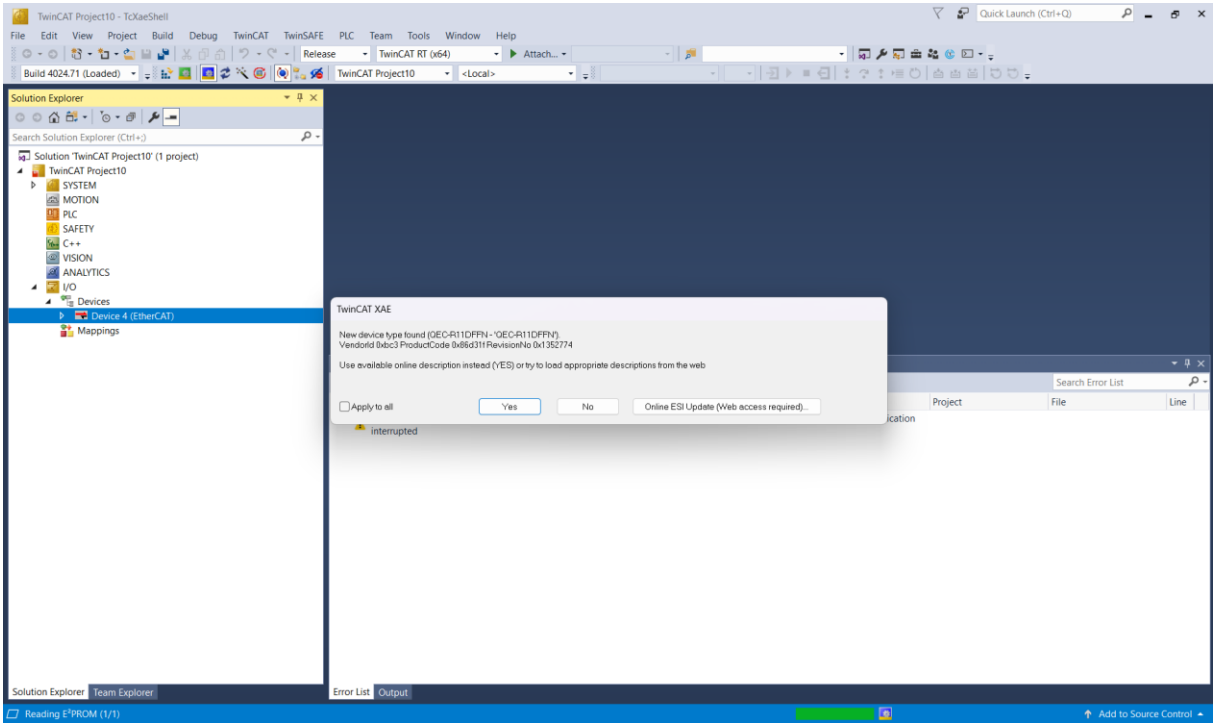
5. Choose the EtherCAT connection network.



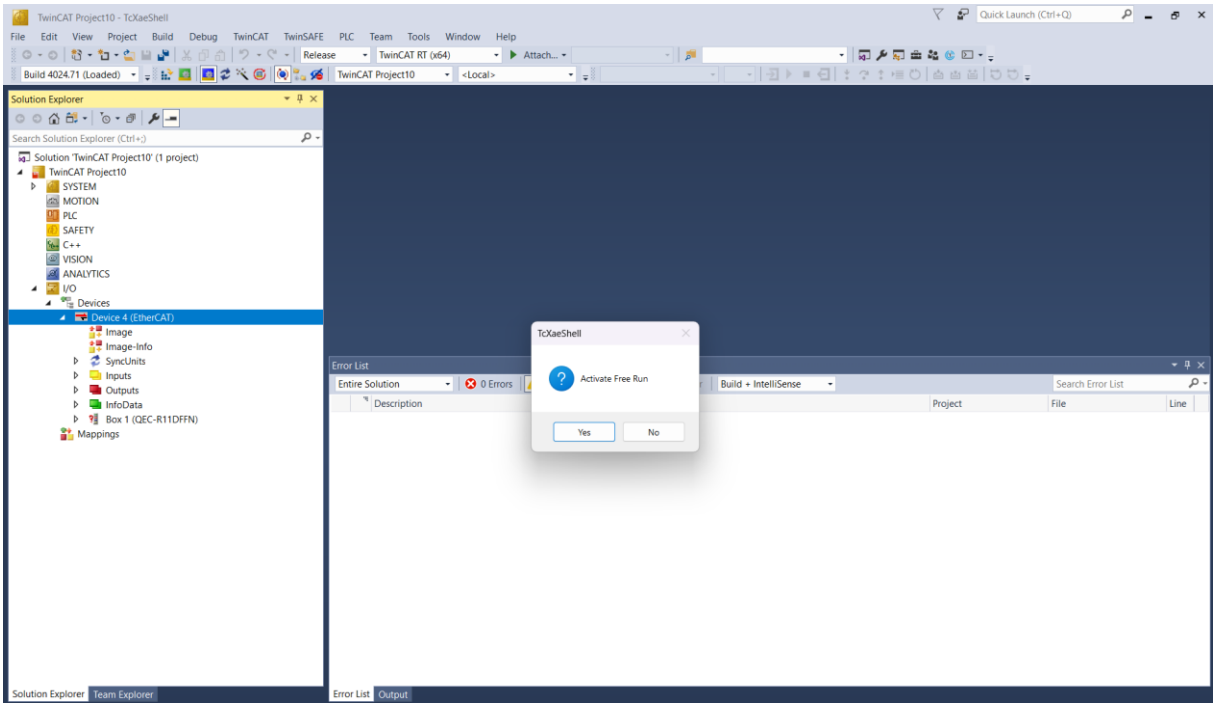
6. Confirm “Yes” to start the scan.



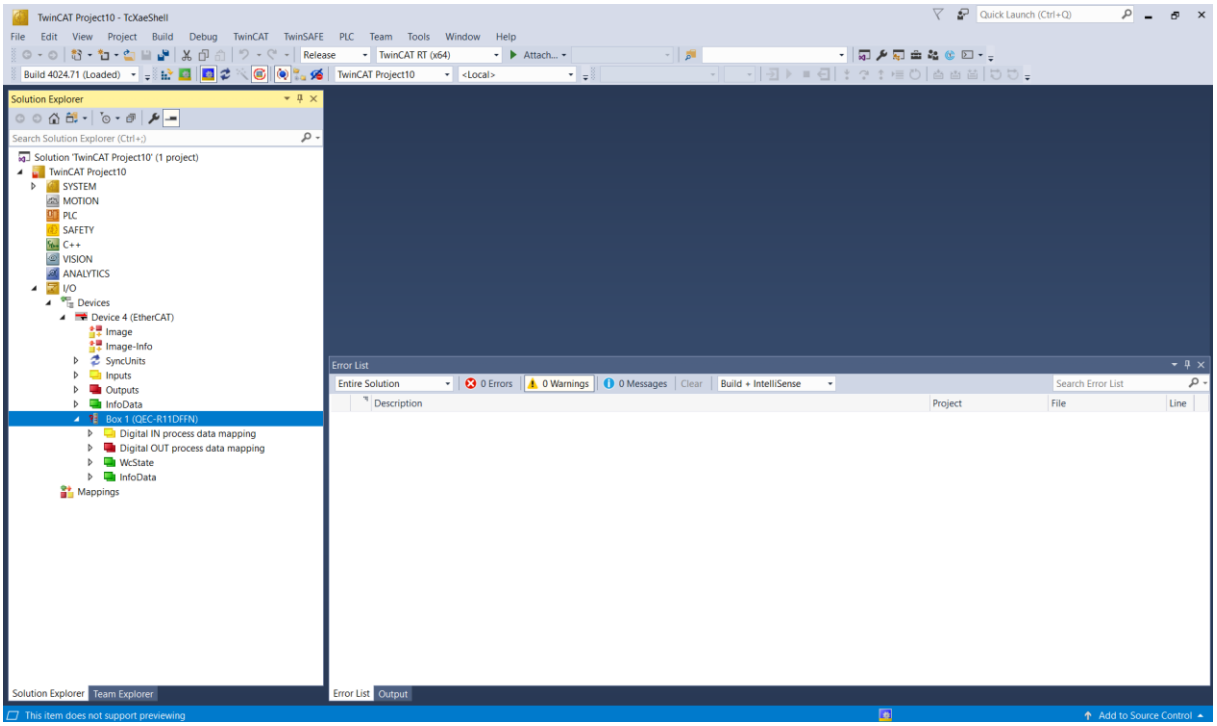
7. Choose “Yes” when TwinCAT asks you the new device type found.



8. Choose “Yes” when TwinCAT asks you to activate Free Run. Then, EtherCAT Network will translate into OP state automatically.

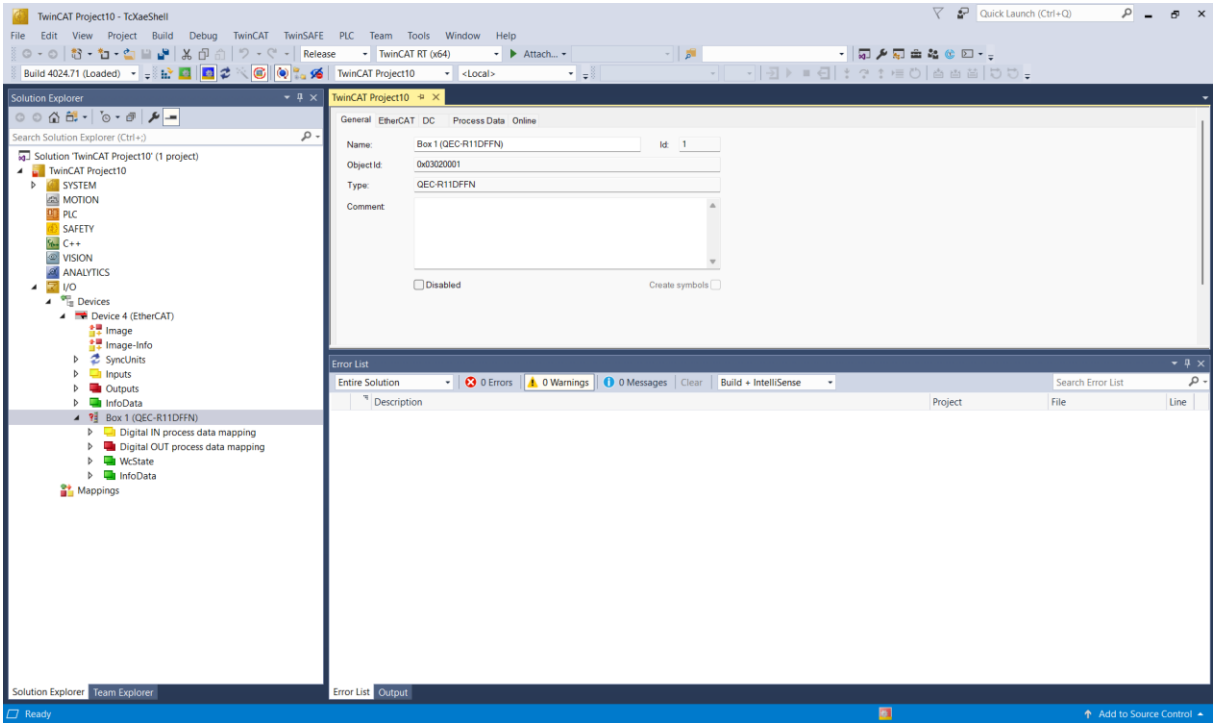


9. The QEC-R11DFFN will appear in the device tree and the name will typically begin with “Box”.

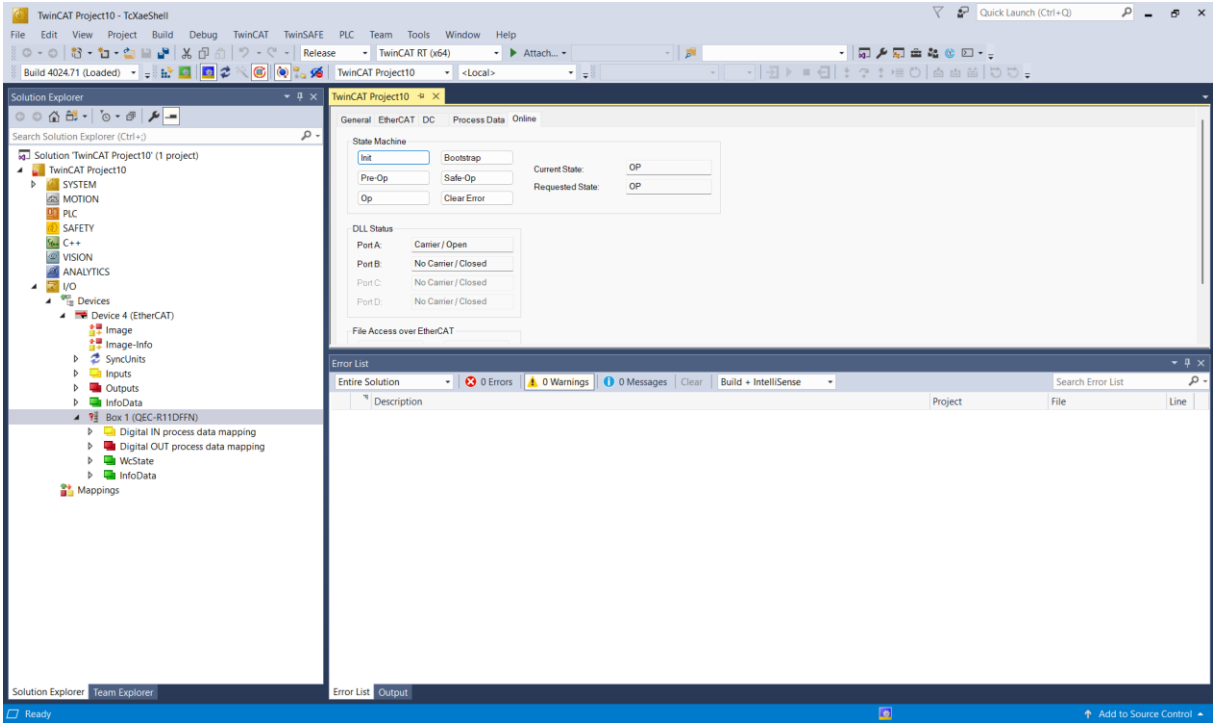


4.2.3 Start to Configure the QEC-R11DFFN

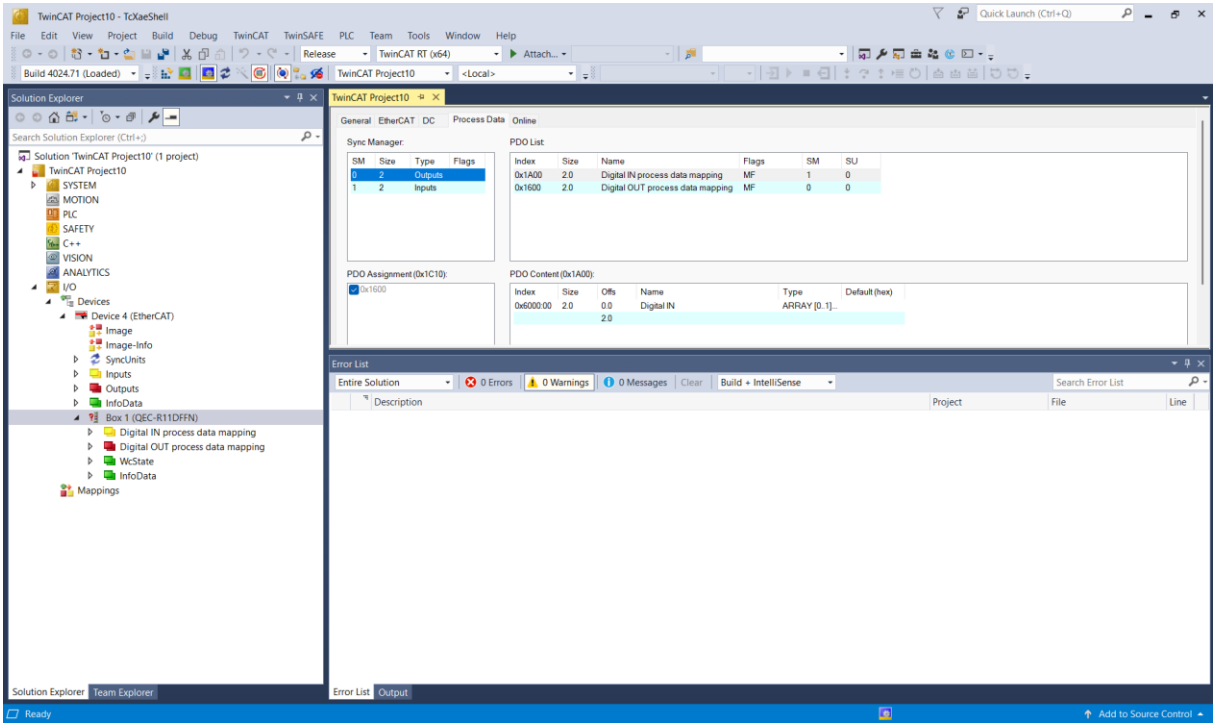
1. Click "Box 1 (QEC-R11DFFN)," and a dashboard for the EtherCAT SubDevice will appear in the right window. The default tab is “General”, and you can see the SubDevice’s Name, Object Id, Type, and Comment in this tab.



2. Click on the “Online” tab to check the EtherCAT SubDevice EtherCAT State Machine (ESM) is on OP status.



3. Click on the “Process Data” tab to check the PDO assignment. The PDO assignment is fixed: the RxPDO 0x1600 “Digital OUT process data mapping” contains the entry 0x7000 “Digital OUT” (ARRAY [0..1] OF BYTE, 16 bits), and the TxPDO 0x1A00 “Digital IN process data mapping” contains the entry 0x6000 “Digital IN” (ARRAY [0..1] OF BYTE, 16 bits).



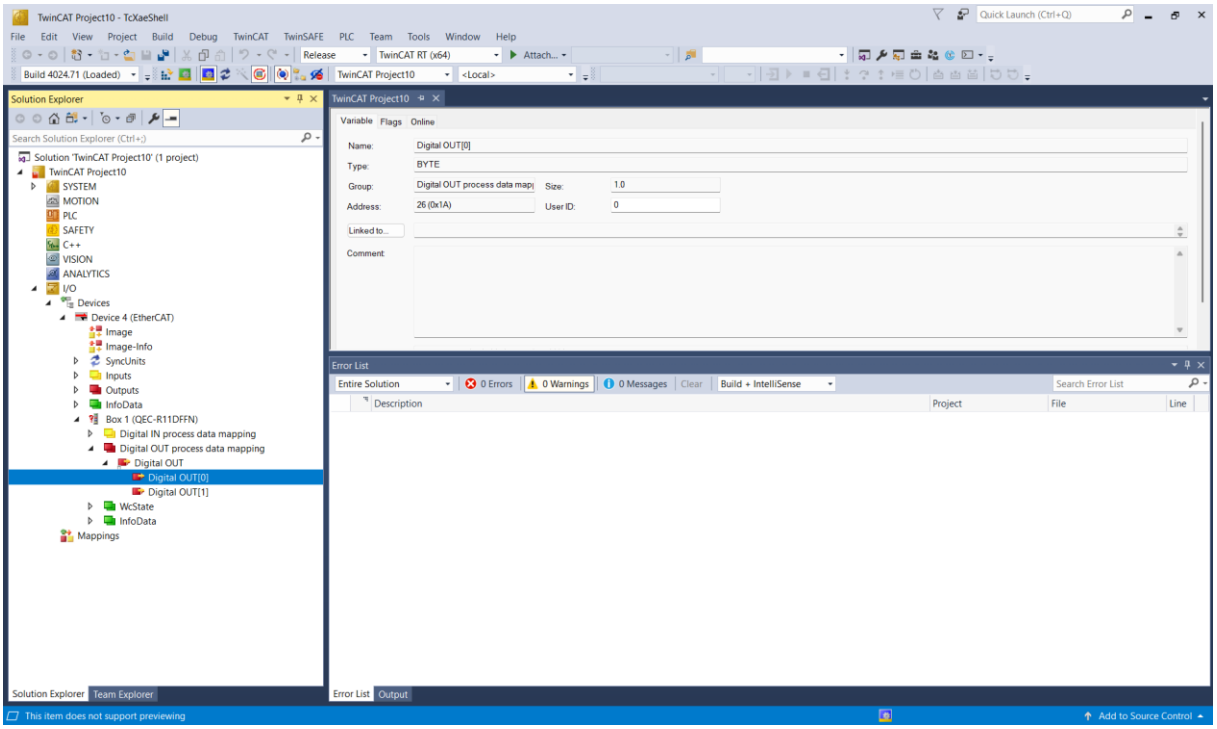
4.2.4 Control the QEC-R11DFFN

Next, we will turn ON DQ_00 to DQ_07 and read DI_00 to DI_07. On the QEC-RXXDXXN, each channel is one bit of the “Digital OUT” / “Digital IN” byte arrays (refer to Ch. 5.3).

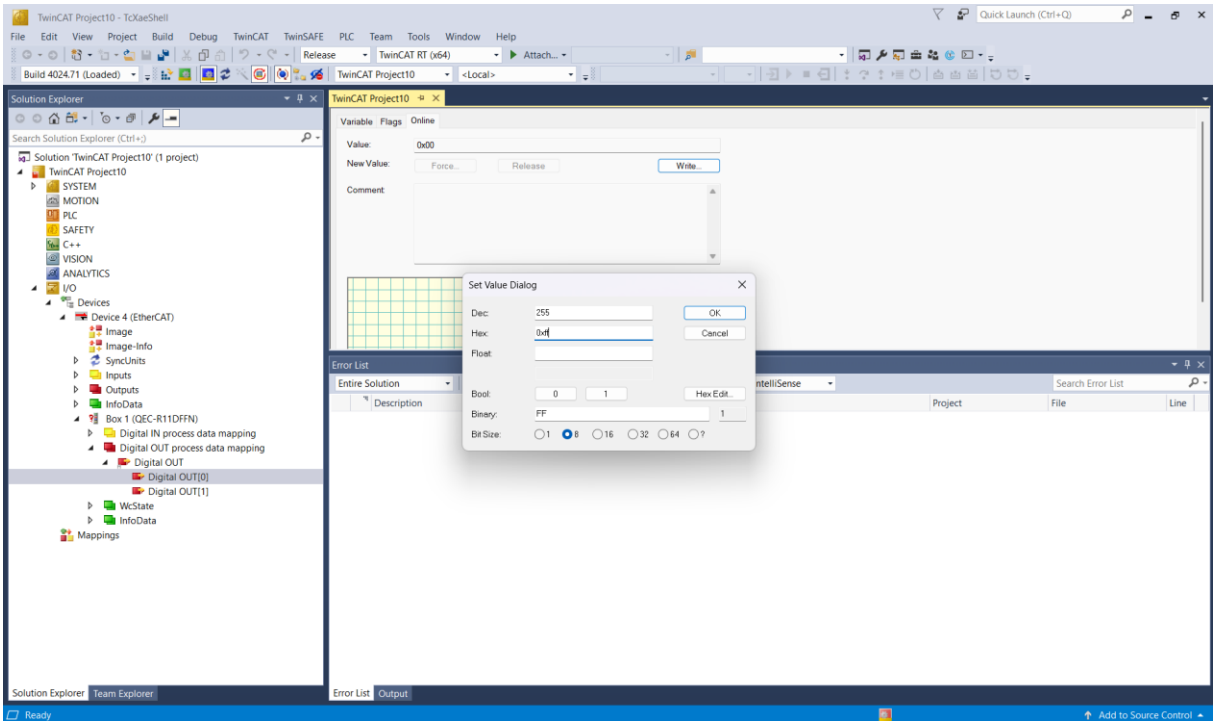
4.2.4.1 Configure the Digital Output

Configure the Digital Output.

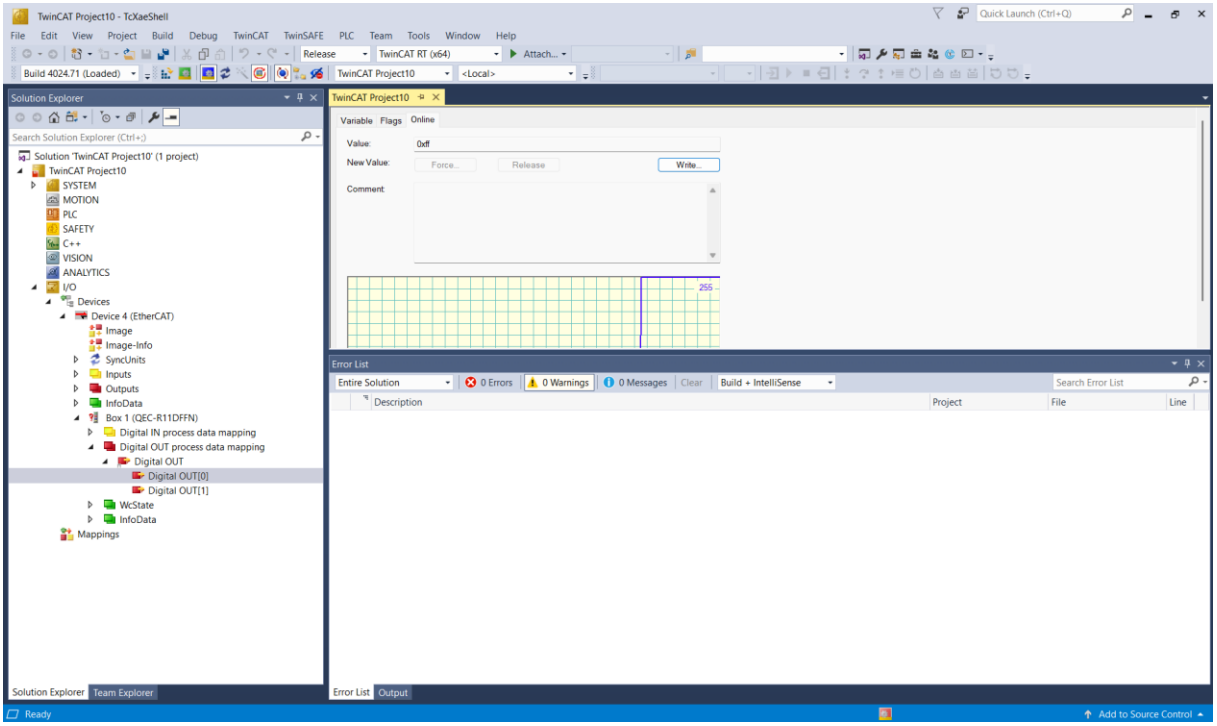
1. Expand “Digital OUT process data mapping” under the SubDevice and select “Digital OUT[0]”, which contains DQ_00 to DQ_07 (bit 0 = DQ_00).



2. Click the “Online” tab, click the "Write..." button and enter 255 (0xFF). DQ_00 to DQ_07 turn ON and their status LEDs light.



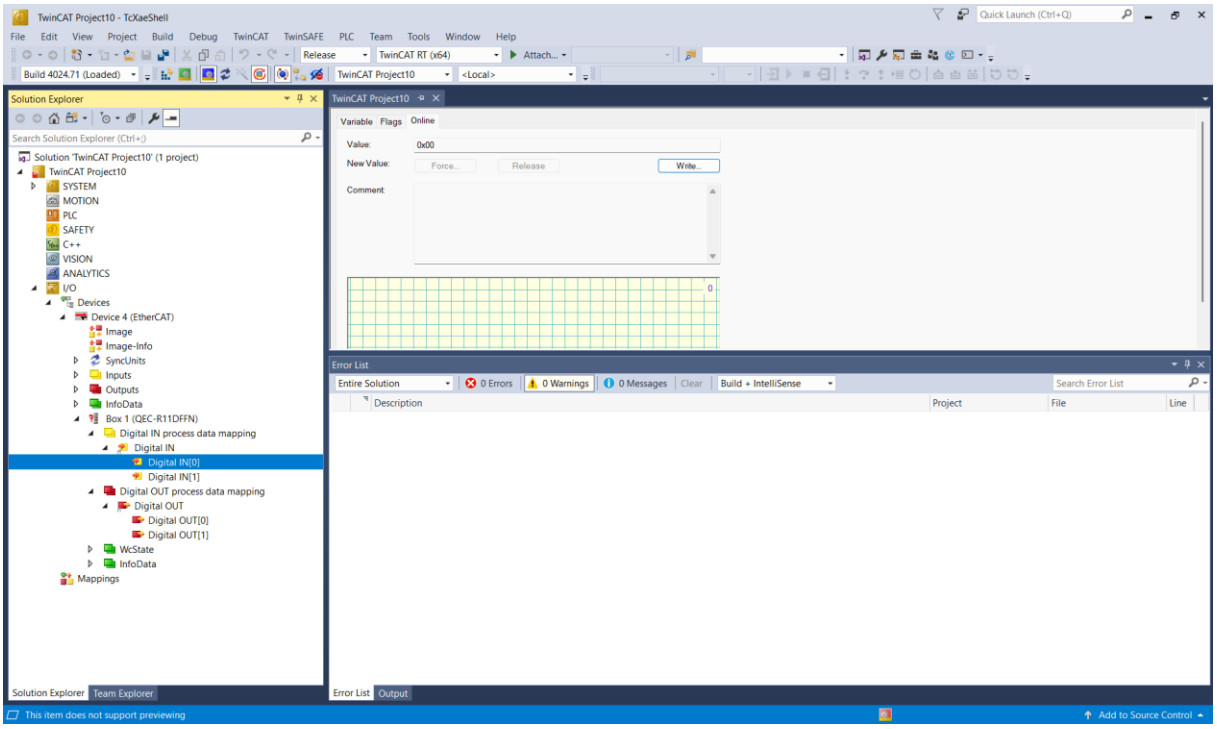
3. Write 1 (0x01) to turn ON only DQ_00. Write 0 to turn all of them OFF.



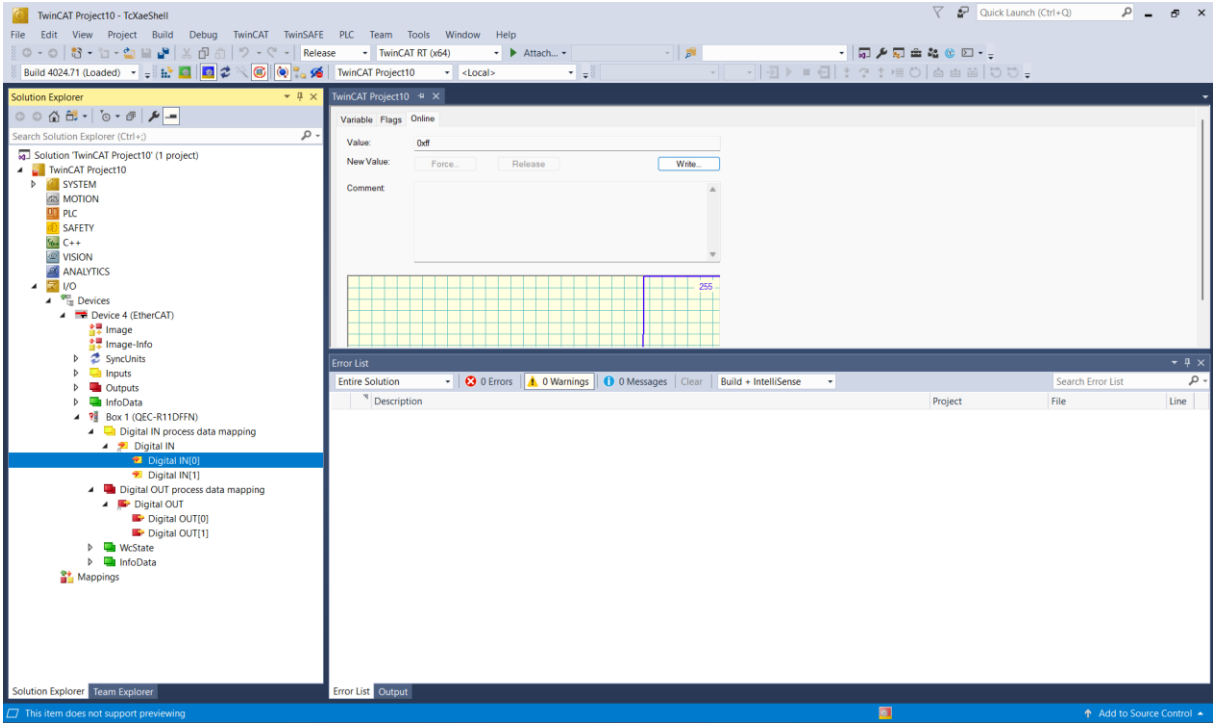
4.2.4.2 Read the Digital Input

Read the Digital Input.

1. Expand “Digital IN process data mapping” and select “Digital IN[0]”, which contains DI_00 to DI_07 (bit 0 = DI_00). Then click the “Online” tab.



2. When DI_00 to DI_07 are ON, the value is 0xFF (bit 0 = DI_00 … bit 7 = DI_07).



Ch. 5

SubDevice Information

5.1 ESI (EtherCAT SubDevice Information) file

The ESI files contain information unique to the EtherCAT SubDevice Terminals in XML format. You can load an ESI file into the Support Software to easily allocate SubDevice Terminal process data and other settings. The ESI files for QEC EtherCAT SubDevices are already installed in the Support Software.

*** Note: Ensuring Up-to-date Installation of the XML Device Description File (ESI)**

To ensure smooth functioning, it is important to install the latest version of the XML device description file in the EtherCAT MDevice software. The latest version of the XML device description file can be downloaded from the QEC website.
https://www.qec.tw/

5.2 Device Identification

The QEC-RXXDXXN has no CoE object dictionary because it does not support mailbox communication. The device identification is stored in the SII EEPROM and is described by the ESI file:

- Vendor ID: 0x00000BC3 (DMP Electronics)
- Device Profile: 5001 (Modular Device Profile)
- Group Type: DIQ32

Table 5-1: Product Code & Revision Number

Model Name	Product Code	Revision Number
QEC-R00DT0N	0x0086D31A	0x01352774
QEC-R11DT0N	0x0086D31B	0x01352774
QEC-R00D0TN	0x0086D31C	0x01352774
QEC-R11D0TN	0x0086D31D	0x01352774
QEC-R00DFFN	0x0086D31E	0x01352774
QEC-R11DFFN	0x0086D31F	0x01352774

5.3 Process Data

The process data mapping of the QEC-RXXDXXN is fixed and cannot be changed. Each digital channel is represented by one bit. A bit value of 1 means the channel is ON.

Table 5-2: PDO Assignment

Model	SyncManager	PDO	Entry	Data Type / Size
QEC-RXXDT0N	SM1 (Inputs)	TxPDO 0x1A00 Digital IN process data mapping	0x6000 Digital IN	ARRAY [0..3] OF BYTE (32 bit)
QEC-RXXDFFN	SM0 (Outputs)	RxPDO 0x1600 Digital OUT process data mapping	0x7000 Digital OUT	ARRAY [0..1] OF BYTE (16 bit)
	SM1 (Inputs)	TxPDO 0x1A00 Digital IN process data mapping	0x6000 Digital IN	ARRAY [0..1] OF BYTE (16 bit)
QEC-RXXD0TN	SM0 (Outputs)	RxPDO 0x1600 Digital OUT process data mapping	0x7000 Digital OUT	ARRAY [0..3] OF BYTE (32 bit)

Table 5-3: Bit Mapping of “Digital IN” (0x6000) / “Digital OUT” (0x7000)

Array Element	Bit 0 … Bit 7	QEC-RXXDT0N	QEC-RXXDFFN	QEC-RXXD0TN
[0]	Channel 0 … 7	DI_00 … DI_07 (Group 1)	DI_00 … DI_07 / DQ_00 … DQ_07	DQ_00 … DQ_07 (Group 1)
[1]	Channel 8 … 15	DI_08 … DI_15 (Group 2)	DI_08 … DI_15 / DQ_08 … DQ_15	DQ_08 … DQ_15 (Group 2)
[2]	Channel 16 … 23	DI_16 … DI_23 (Group 3)	-	DQ_16 … DQ_23 (Group 3)
[3]	Channel 24 … 31	DI_24 … DI_31 (Group 4)	-	DQ_24 … DQ_31 (Group 4)

For the QEC-RXXDFFN, “Digital IN[0..1]” contains DI_00 to DI_15 (groups 1–2) and “Digital OUT[0..1]” contains DQ_00 to DQ_15 (groups 3–4).

5.4 Synchronization Modes

The following operation modes are defined in the ESI file:

- SM-Synchron: the process data are updated on the SyncManager event.
- DC-Synchron: the process data are updated on the SYNC0 event of the Distributed Clock (AssignActivate 0x0300).

The cycle time is 1 ms.

Warranty

This product is warranted to be in good working order for a period of one year from the date of purchase. Should this product fail to be in good working order at any time during this period, we will, at our option, replace or repair it at no additional charge except as set forth in the following terms. This warranty does not apply to products damaged by misuse, modifications, accident or disaster. Vendor assumes no liability for any damages, lost profits, lost savings or any other incidental or consequential damage resulting from the use, misuse of, originality to use this product. Vendor will not be liable for any claim made by any other related party. Return authorization must be obtained from the vendor before returned merchandise will be accepted. Authorization can be obtained by calling or faxing the vendor and requesting a Return Merchandise Authorization (RMA) number. Returned goods should always be accompanied by a clear problem description.

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