



User Manual

QEC-RXXUN01

EtherCAT Slave LCD Module

Compatible with 2.4" and 3.5" TFT LCD

(Revision 1.0)

REVISION

DATE	VERSION	DESCRIPTION
2023/11/07	Version1.0	New Release

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For EtherCAT solution service, support or tutorials, 86Duino Coding IDE 500+ introduction, functions, languages, libraries, etc. Please visit the QEC website:

- 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 0 to +50°C.
- When using external storage as the main operating system storage, ensure the device's power is off before connecting and removing it.
- 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](#)

[1.2 Specifications](#)

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[1.4 Ordering Information](#)

1.1 Introduction

The QEC-RXXUN01 is an EtherCAT Slave module that supports both 2.4" and 3.5" TFT LCDs with touch functionality. It distinguishes itself as a comprehensive EtherCAT Slave module solution for on-machine displays in field-bus systems, providing a wide range of signal and power connections to ensure easy integration with commonly used display sizes and types.

Complying with the EtherCAT Conformance Test Tool (ET9400), the QEC-RXXUN01 has been qualified for cooperation with EtherCAT master systems, enabling quick and efficient implementation in industrial applications. The module's pin assignment includes an 8-pin Female connector for VCC3/VCC/GND signals, an 8-pin Female connector for A0-A6/GND signals, a 10-pin Female connector for I2C/PWM signals, and another 8-pin Female connector for PWM/TX/RX signals. This array of connectors ensures perfect compatibility with the popular 2.4-inch and 3.5-inch LCDs available on the market, allowing for convenient off-the-shelf display procurement to be paired with the QEC-RXXUN01.

The module measures 90 x 58 x 20 mm without the LCD and supports a standard operating temperature range from 0 to +50 °C. It offers power redundancy through two sets of isolated power inputs. If one power source encounters an issue, the module can seamlessly transition to the secondary input, maintaining uninterrupted functionality.

Further enhancing its reliability, the QEC-RXXUN01 integrates internal monitoring of hardware information, giving users the advantage of real-time diagnostics. This capability is invaluable for timely troubleshooting, providing clear insights into the module's operations and allowing maintenance teams to swiftly address and resolve potential issues.

In conclusion, the QEC-RXXUN01 EtherCAT Slave module is a well-rounded combination of advanced display compatibility, robust EtherCAT features, and thoughtful redundancy measures. Designed to facilitate on-machine displays in various industrial fields, and with a strong emphasis on real-time diagnostics, it stands as an essential tool for industries seeking seamless, uninterrupted operations.

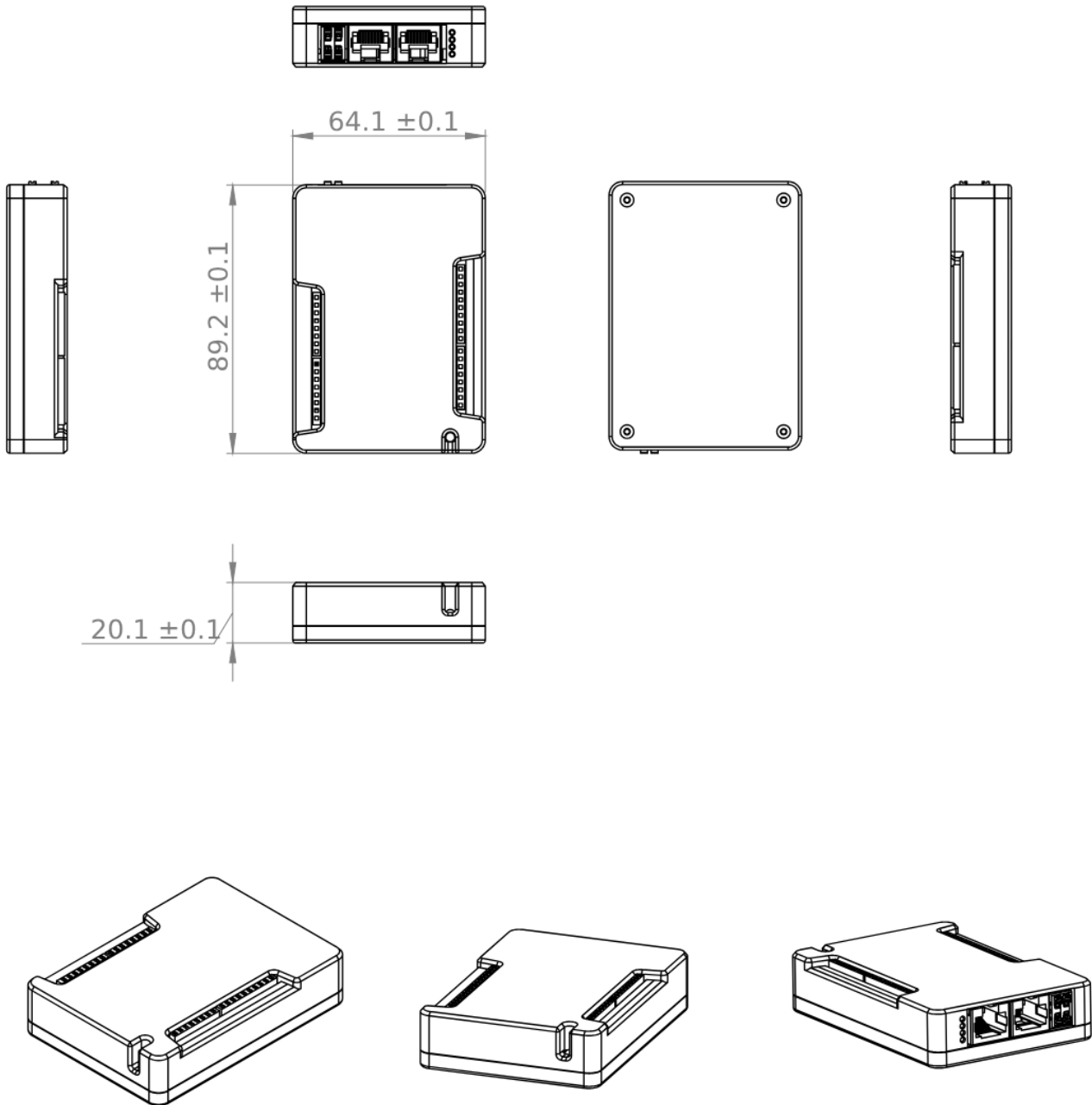
1.2 Specifications

LCD	
I/O Connector Pins	2.54mm 8-pin Female for VCC3/VCC/GND signal 2.54mm 8-pin Female for A0-A6/GND signal 2.54mm 10-pin Female for I2C/PWM signal 2.54mm 8-pin Female for PWM/TX/RX signal
General	
Connector	Push-in Terminal (Euroblock)
Protocol	EtherCAT (RJ-45 x 2)
Ethernet Standard	IEEE 802.3
Transmission Rate	100Mbps
Power Connector	4-pin Power Input/Output
Power Requirement	+19 to +50VDC Power Input (Typ. +24VDC@20mA)
Power Consumption	Min. 0.48 W
LED Indicator	PWR, RUN, LINK, ERROR
Environment	
Operating Temperature	-0 to +50 °C
Hardware	
Dimension	89.2 x 64.1 x 20.1 mm (With Case)
Weight	40 g (Without LCD)
Internal Monitoring	Temperature, Voltage, Current

Supported LCM items:

ID	LCM Driver IC ID	LCM Driver IC	Resolution
0	0x4747	HX8347-D	240 X 320
1	0x9595	HX8347-I(T)	240 X 320
2	0x9341	ILI9341	240 X 320
3	0x9486	ILI9486	320 X 480
4	0x9488	ILI9488	320 X 480

1.3 Dimension



(Unit: mm)

1.4 Ordering Information

Type	RJ45 power source		Functions		-	Coating
	Input	Output	UN	Functions		
QEC-R	X	X	UN	XX		X

1. Type: Code 1~4

R: EtherCAT Slave.

2. RJ45 Power source: Code 5~6

Q: RJ45 In/Out w/o power

1: RJ45 PoE Device, Red Plastic Housing

3. Functions: Code 7~8

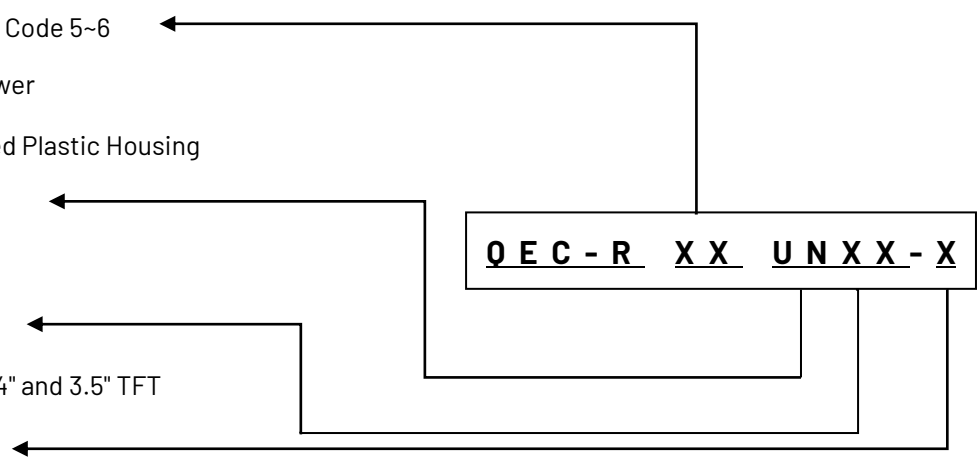
UN: M0 Duino

4. Feature: Code 9~10

Q1: Compatible with 2.4" and 3.5" TFT

5. Coating: Code 11

C: Yes / N: Normal



1.4.1 Ordering Part Number

Above is the standard Part Number, please contact our sales if you need to order other part number.

- **QEC-R00UN01-N**: EtherCAT Slave LCD Module
- **QEC-R00UN01-C**: EtherCAT Slave LCD Module (board with coating)
- **QEC-R11UN01-N**: EtherCAT Slave LCD Module /PoE

Ch. 2

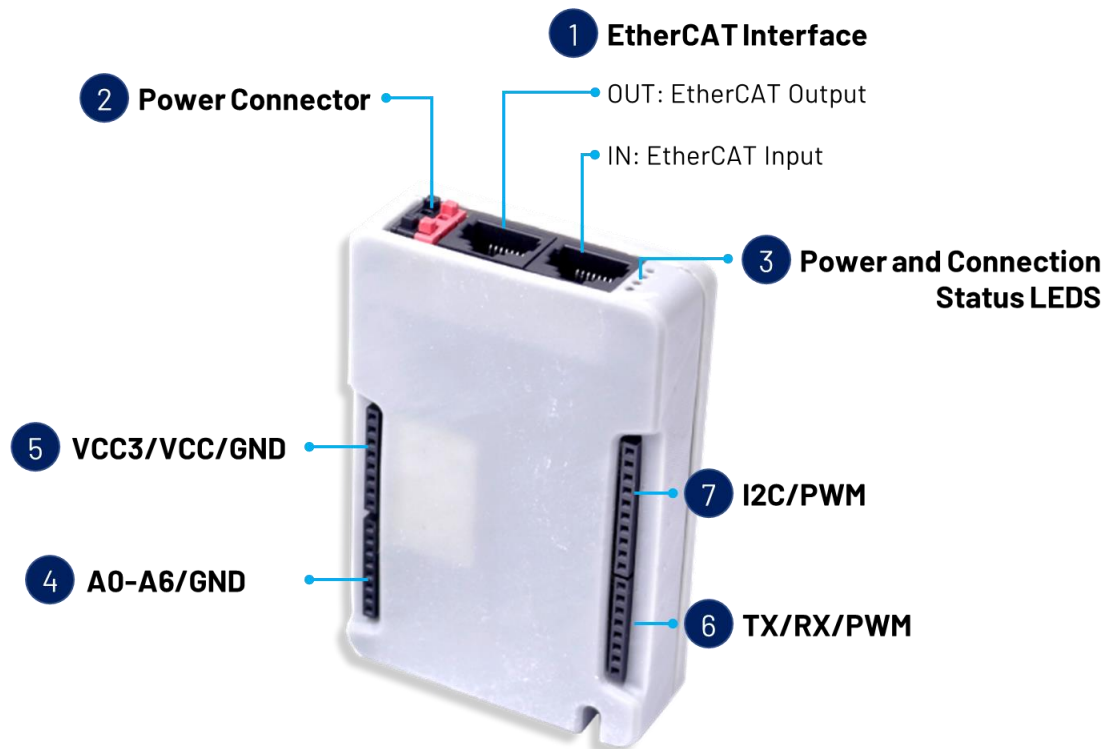
Hardware System

[2.1 General Technical Data](#)

[2.2 Connector Summary](#)

[2.3 Wiring to the Connector](#)

2.1 General Technical Data

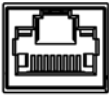


2.2 Connector Summary

No.	Description	Type Narrative	Pin #
1	EtherCAT Interface	OUT	8-pin
		IN	8-pin
2	Power Connector	Terminal Block Interface	6-pin
3	Power and Connection Status LEDs	External Status LEDs	-
4	A0 - A6/GND Signal	2.54mm 8-pin Female	8-pin
5	VCC3/VCC/GND Signal	2.54mm 8-pin Female	8-pin
6	TX/RX/PWM Signal	2.54mm 8-pin Female	8-pin
7	I2C/PWM Signal	2.54mm 10-pin Female	10-pin

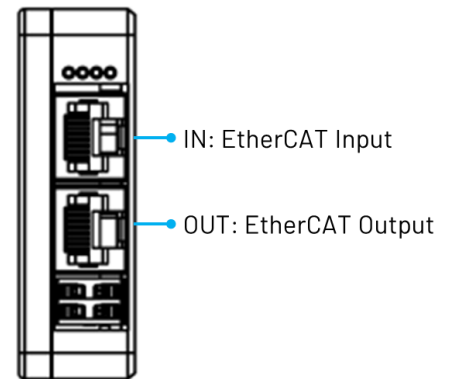
2.2.1 EtherCAT Interface

EC IN

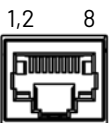
	Pin #	Signal Name	Pin #	Signal Name
	1	LAN1_TX+	2	LAN1_TX-
	3	LAN1_RX+	4	VS+
	5	VP+	6	LAN1_RX-
	7	VS-(GND)	8	VP-(GND)

* PoE LAN with the Red Housing; Regular LAN with Black Housing.

* L4, L5, L7, L8 pins are option, for RJ45 Power IN/OUT.

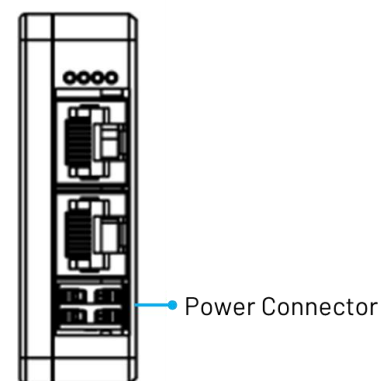


EC OUT

	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.



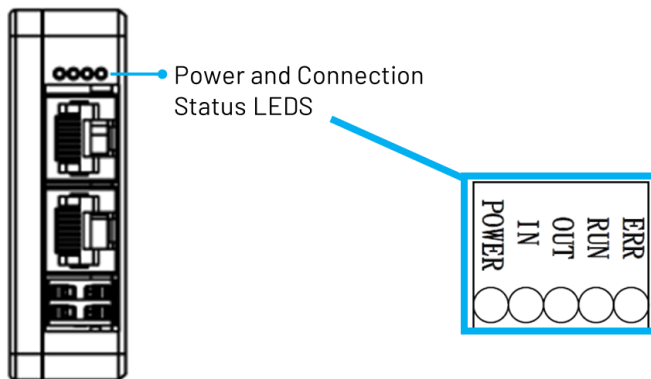
2.2.2 Power Connector

Trace width with 2mm.

	Pin #	Signal Name	Pin #	Signal Name
	1	Vs+	2	Vp+
	3	Vs-(GND)	4	Vp-(GND)

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

2.2.3 Power and Connection Status LEDs



Notation	Color	States	Description
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
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
Out	Green	Off	No link
		Blinking	Link and activity
		On	Link without activity
In	Green	Off	No link
		Blinking	Link and activity
		On	Link without activity
POWER	Green / Red	Green LED On	Voltage \leq 48V and Voltage \geq 19V
		Green LED On	Voltage $<$ 50V and Voltage $>$ 48V
		Red LED On	Voltage $<$ 19V and Voltage $<$ 17V
		Red LED On	Voltage \geq 50V and Voltage \leq 17V

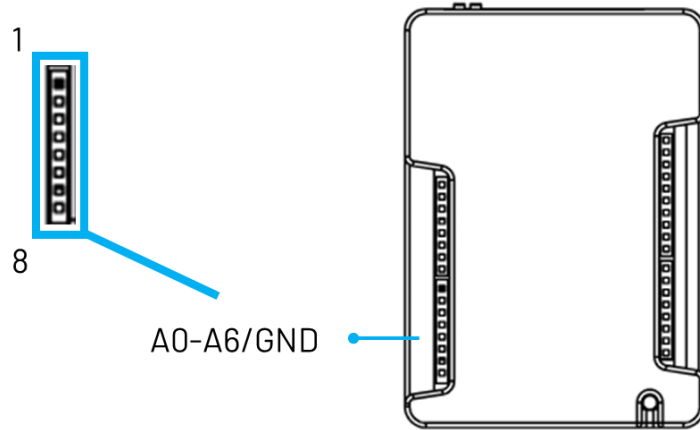
* Power input is 24V (typical). The LED status provide high/low voltage warning.

* Vs power status will be displayed first.

2.2.4 A0-A6/GND

PH1*8F (2.54) – 3.2.

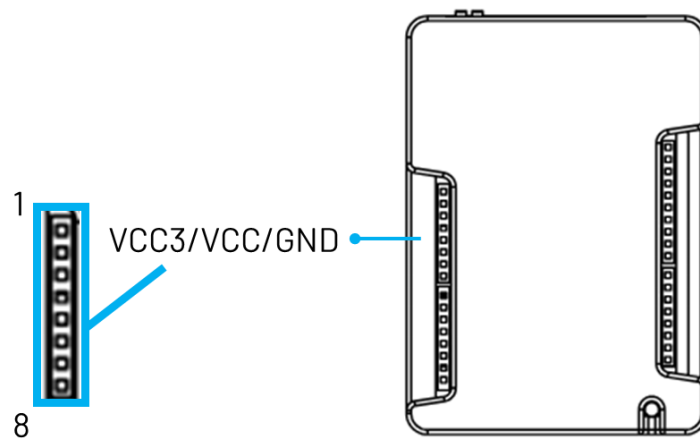
Pin #	Signal Name
1	A0
2	A1
3	A2
4	A3
5	A4
6	A5
7	A6
8	GND



2.2.5 VCC3/VCC/GND

PH1*8F (2.54) – 3.2.

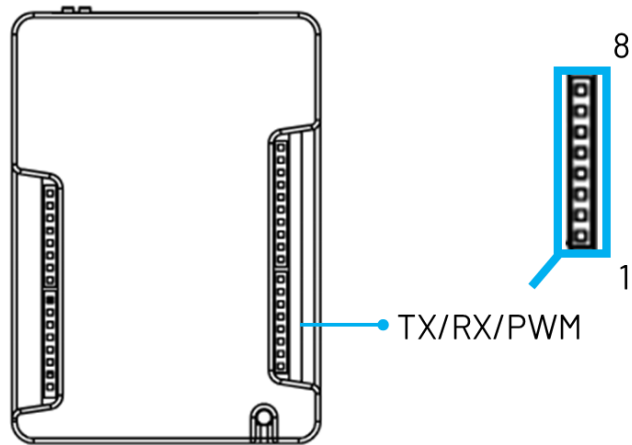
Pin #	Signal Name
1	NC
2	VCC3
3	reset-a
4	VCC3
5	VCC
6	GND
7	GND
8	NC



2.2.6 TX/RX/PWM

PH1*8F (2.54) - 3.2.

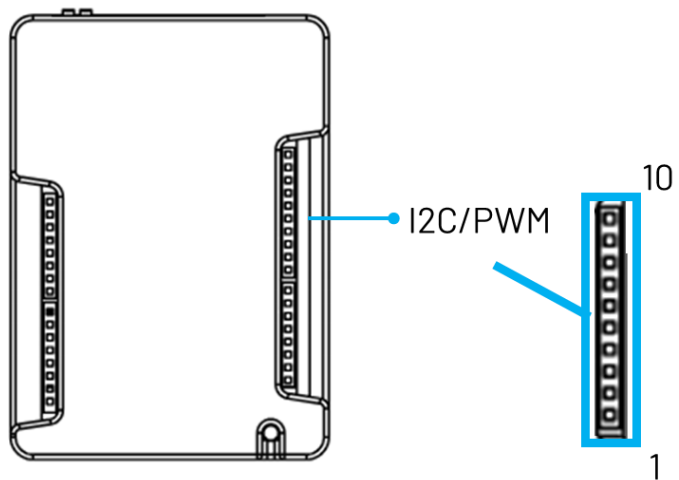
Pin #	Signal Name
1	RX
2	TX
3	-
4	PWM
5	-
6	PWM
7	PWM
8	-



2.2.7 I2C/PWM

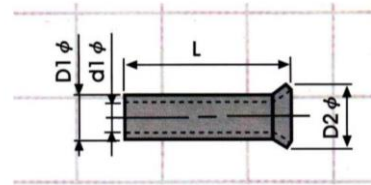
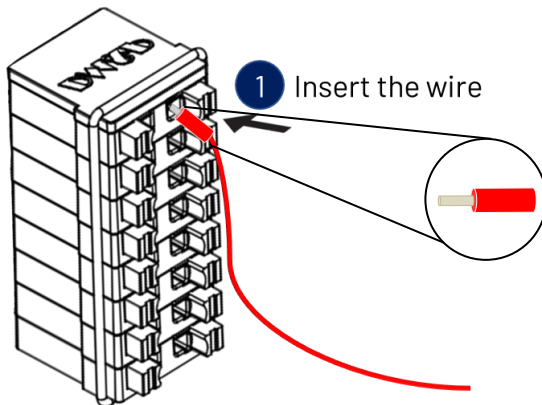
PH1*10F (2.54) - 3.2

Pin #	Signal Name
1	-
2	-
3	-
4	PWM
5	-
6	PWM
7	GND
8	NC
9	I2C1_SDA
10	I2C1_SCL



2.3 Wiring to the Connector

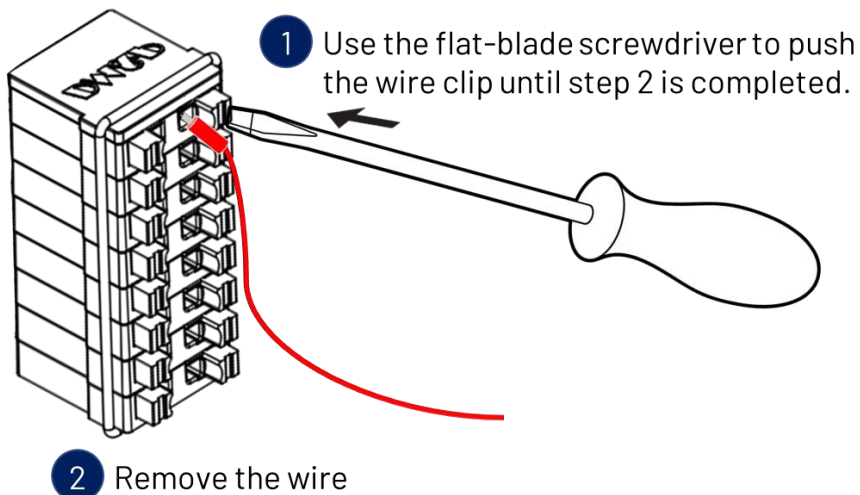
2.3.1 Connecting the wire to the connector



Insulated Terminals Dimensions (mm)

Position	L	ØD1	Ød1	ØD2
CN 0.5-6	6.0	1.3	1.0	1.9
CN 0.5-8	8.0	1.3	1.0	1.9
CN 0.5-10	10.0	1.3	1.0	1.9

2.3.2 Removing the wire from the connector



Ch. 3

Hardware Installation

[3.1 LCD Information](#)

[3.2 LCD Installation](#)

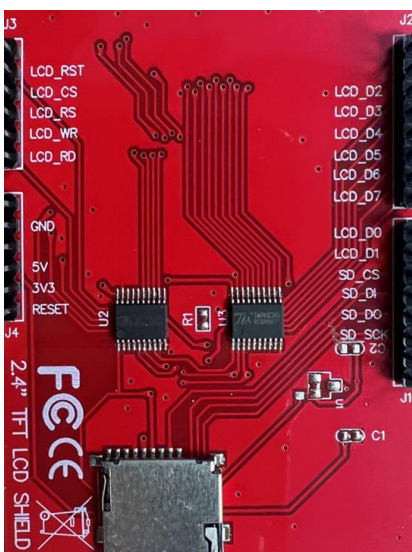
This section describes how to install 2.4" TFT LCD to QEC-RXXUN01 device. Please turn OFF the power supply before you mount LCD to QEC-RXXUN01.

3.1 LCD Information

2.4" TFT LCD Module is one of the most common RGB color display modules.

Pinout diagram TFT LCD Module

This is a pinout diagram for 2.4" TFT LCD.



TFT LCD Module Pin Configurations

The pin configuration of the module is simple like other display devices. The only problem is the developers need to understand first which method is better to operate the TFT LCD display. Therefore, the TFT touch screen uses the driver to operate each pixel and the driver uses a small no of pins as input and makes it user friendly. The pin configuration is as follows:

Power Pins

PINS	DETAILS
GND	The ground pins are here for a simple common ground
5V	The input voltage will be pass to the LCD by the 5V pin.
3V3	This pin will attach to the 3V3 volts

8-bit Data Pins

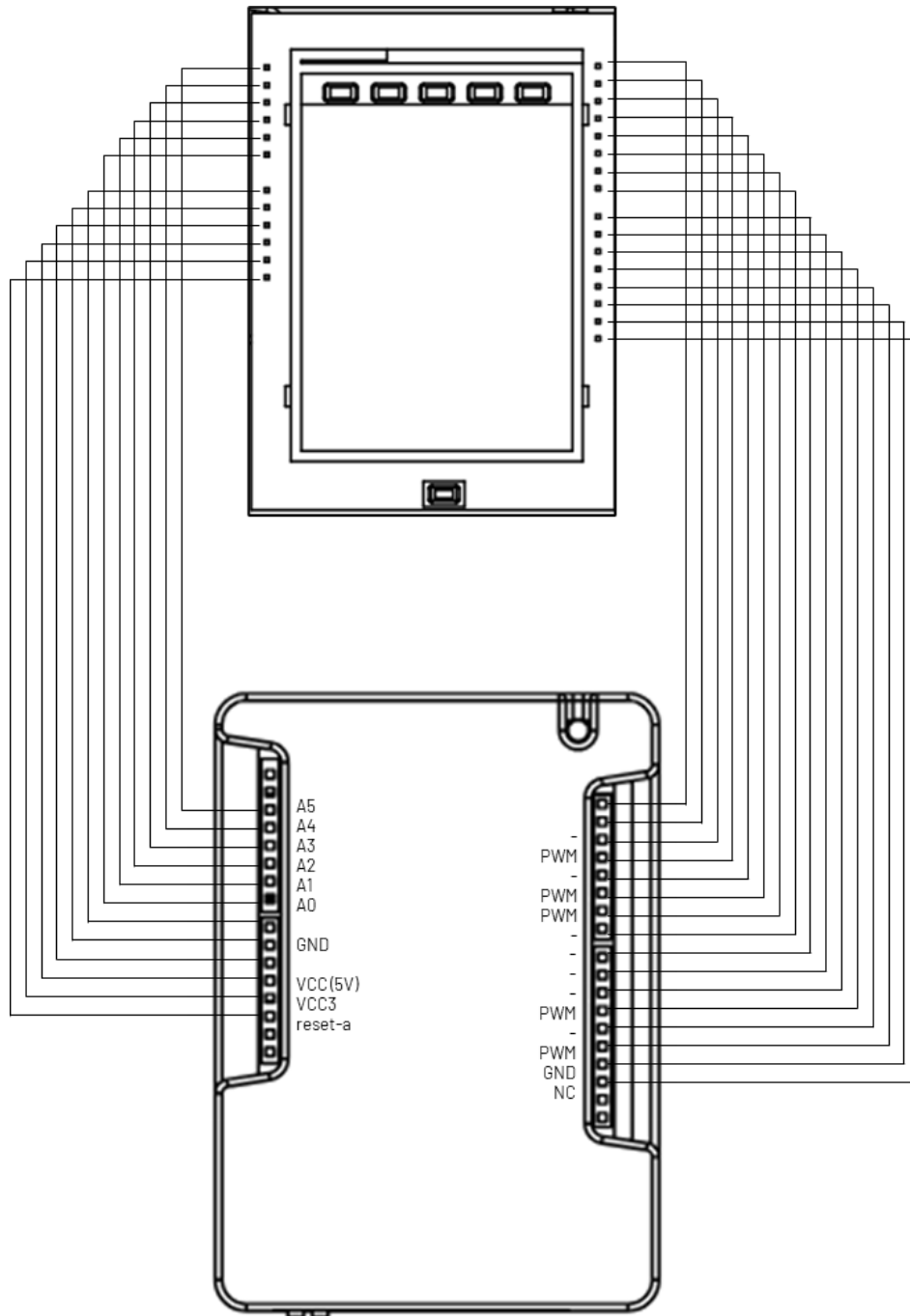
PINS	DETAILS
RST	The LCD has a reset pin which helps to clear the GRAM of the driver
CS	The CD pin helps to enable the data from registers to the LCD.
RS	The RS pin will help to toggle the data/command registers in the driver.
WR	The WR pin which only requires to activate when the device needs to write the data on the LCD.
RD	The RD pin is to enable the reading of data from the LCD.
D0	These all pins from D0~D7 are the digital data input pins. It requires only when a developer needs to work with LCD using 8-bit data or using Assemble language. The Arduino library mostly uses the SPI pins.
D1	
D2	
D3	
D4	
D5	
D6	
D7	

SPI Pins

PINS	DETAILS
SD_SCK	The SCK pin the common clock pin of the LCD with microcontroller/Arduino
SD_DO	D0 pin the data output pin of the SPI communication system.
SD_DI	The DI pin is the data input pin of the SPI communication system.
SD_SS	The SS pin will enable the SPI communication through the signal of the SS pin.

3.2 LCD Installation

The connection as below.

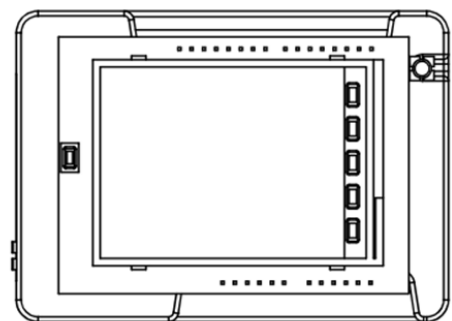
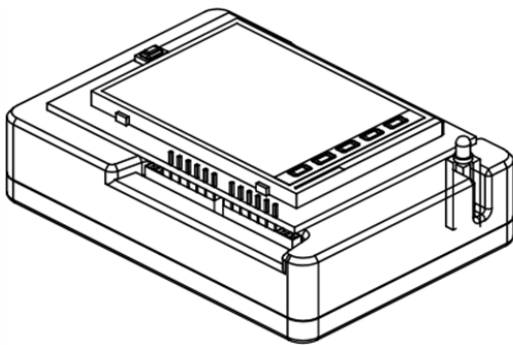


Connection Pin assignment will be like the below table.

A0-A6/GND & VCC3/VCC/GND		TX/RX/PWM & I2C/PWM	
QEC-RXXUN01 Pins	LCD Pins	QEC-RXXUN01 Pins	LCD Pins
GND	NC	RX	-
A6	NC	TX	-
A5	-	-	LCD_D2
A4	LCD_RST	PWM	LCD_D3
A3	LCD_CS	-	LCD_D4
A2	LCD_RS	PWM	LCD_D5
A1	LCD_WR	PWM	LCD_D6
A0	LCD_RD	-	LCD_D7
NC	-	-	LCD_D0
GND	GND	-	LCD_D1
GND	-	-	SD_CS
VCC	5V	PWM	SD_DI
VCC3	3V3	-	SD_D0
reset-a	RESET	PWM	SD_SCK
VCC3	NC	GND	-
NC	NC	NC	-
		I2C1_SDA	NC
		I2C1_SCL	NC

* -: connected but no signal; NC: disconnection.

After connection, your QEC-RXXUN01 with 2.4" TFT LCD will be like below picture.



Ch. 4

Slave Information

[4.1 ESI \(EtherCAT Slave Information\) file](#)

[4.2 Object Dictionary](#)

4.1 ESI (EtherCAT Slave Information) file

The ESI files contain information unique to the EtherCAT Slave Terminals in XML format. You can load an ESI file into the Support Software to easily allocate Slave Terminal process data and other settings. The ESI files for QEC EtherCAT slaves 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 Master software. The latest version of the XML device description file can be downloaded from the QEC website.

<https://www.qec.tw/>

4.2 Object Dictionary

The object dictionary defined here shall be used complementary with ETG.5001 and ETG.1000.

- Device Profile: 5001
- Modul Profile: 0
- Modular Device Profile

4.2.1 Standard Objects (0x1000-0x1FFF)

Index 1000 Device type

Index	Name	Data type	Flags	Default
1000	Device type	UINT32	RO	0x00001389 (5001)

Index 1001 Error register

Index	Name	Data type	Flags	Default
1001	Error register	UINT8	RO	0x00 (0)

Index 1008 Device name

Index	Name	Data type	Flags	Default
1008	Device name	STRING	RO	Refer to following table.

Table 4-1: Device Name

Type	Device Name
LCD Module without PoE	QEC-R00UN01
LCD Module with PoE	QEC-R11UN01

Index 1009 Hardware version

Index	Name	Data type	Flags	Default
1009	Hardware version	STRING	RO	DM449A

Index 100A

Index	Name	Data type	Flags	Default
100A	Software version	STRING	RO	1.00

Index 1018 Identity

Index	Name	Data type	Flags	Default
1018:0	Identity	UINT8	RO	> 4 <
1018:01	Vendor ID	UINT32	RO	0x00000BC3(3011)
1018:02	Product code	UINT32	RO	Refer to following table.
1018:03	Revision	UINT32	RO	Depending by model.
1018:04	Serial number	UINT32	RO	0x00000000(0)

Table 4-2: Product code & Revision Number

Model Name	Product code
QEC-R00NU01	0x0086d100
QEC-R11NU01	0x0086d103

Index 10F1 Error Settings

Index	Name	Data type	Flags	Default
10F1:0	Error Settings	UINT8	RO	> 2 <
10F1:01	Local Error Reaction	UINT32	RW	0x00000001(1)
10F1:02	Sync Error Counter Limit	UINT32	RW	0x0004(4)

Index 10F8 Timestamp Object

Index	Name	Data type	Flags	Default
10F8	Timestamp Object	UINT8	RW P	00 00 00 00 00 00 00 00

Index 1A00 TouchScreenStatus process data mapping

Index	Name	Data type	Flags	Default
1A00:0	TouchScreenStatus process data mapping	UINT8	RO	> 3 <
1A00:01	SubIndex 001	UINT32	RO	0x6000:01, 16
1A00:02	SubIndex 002	UINT32	RO	0x6000:02, 16
1A00:03	SubIndex 003	UINT32	RO	0x6000:03, 16

Index 1C00 Sync manager type

Index	Name	Data type	Flags	Default
1C00:0	Sync manager type	UINT8	RO	> 4 <
1C00:01	SubIndex 001	UINT8	RO	0x01 (1)
1C00:02	SubIndex 002	UINT8	RO	0x02 (2)
1C00:03	SubIndex 003	UINT8	RO	0x03 (3)
1C00:04	SubIndex 004	UINT8	RO	0x04 (4)

Index 1C12 SyncManager 2 assignment

Index	Name	Data type	Flags	Default
1C12:0	SyncManager 2 assignment	UINT8	RO	> 0 <

Index 1C13 SyncManager 3 assignment

Index	Name	Data type	Flags	Default
1C13:0	SyncManager 3 assignment	UINT8	RO	> 1 <
1C13:01	SubIndex 001	UINT16	RO	0x1A00 (6656)

Index 1C33 SM input parameter

Index	Name	Data type	Flags	Default
1C33:0	SM input parameter	UINT8	RO	> 32 <
1C33:01	Synchronization Type	UINT16	RW	0x0001 (1)
1C33:02	Cycle Time	UINT32	RO	0x00000000 (0)
1C33:04	Synchronization Types supported	UINT16	RO	0x4003 (16387)
1C33:05	Minimum Cycle Time	UINT32	RO	0x000186A0 (100000)
1C33:06	Calc and Copy Time	UINT32	RO	0x00000000 (0)
1C33:08	Get Cycle Time	UINT16	RW	0x0000 (0)
1C33:09	Delay Time	UINT32	RO	0x00000000 (0)
1C33:0A	Sync0 Cycle Time	UINT32	RW	0x00000000 (0)
1C33:0B	SM-Event Missed	UINT16	RO	0x0000 (0)
1C33:0C	Cycle Time Too Small	UINT16	RO	0x0032 (50)
1C33:20	Sync Error	BOOL	RO	TRUE

4.2.2 Manufacturer Objects (0x5000-0x5FFF)

Index 0x5xxn Manufacturer Objects

Index	Object Code	Data Type	Name	Default	Description
0x5000	VARIABLE	UINT16	SP_Voltage	0	Read SP Voltage
0x5001	VARIABLE	UINT16	SP_Current	0	Read SP Current
0x5002	VARIABLE	UINT16	PP_Voltage	0	Read PP Voltage
0x5003	VARIABLE	UINT16	PP_Current	0	Read PP Current
0x5004	VARIABLE	INT16	Temperature	0	Read Temperature
0x5005	VARIABLE	UINT8	BoxStatus	0	NormalOperation 0 ESC_3p3_Power_NG 3 DIQ_3p3_Power_NG 4 EXT_Xtal_Stop 5 EXT_Xtal_OverRang 6 PowerVoltageLowOrHigh 0x10 PowerVoltageTooLowOrTooOver 0x11
0x5007	VARIABLE	UINT32	MTBF		Record machine operating time. (Counter will push 1 for the Device on/off and per hour)

Index 0x5010 LCD 2p4 Function Read

Index	Name	Data type	Flags	Default
5010:0	LCD_2p4_Function_Read	UINT8	RO P	> 4 <
5010:01	ReadID	UINT16	RO	0x9341 (37697)
5010:02	Width	UINT16	RO	240
5010:03	Height	UINT16	RO	320
5010:04	GetRotation	UINT8	RO	0x00 (0)

Index 0x5011 LCD 2p4 Function Write

Index	Name	Data type	Flags	Default
5011:0	LCD_2p4_Function_Write	UINT8	RO P	> 18 <
5011:01	Reset	UINT8	WO	
5011:02	Begin	UINT16	WO	
5011:03	SetRotation	UINT8	WO	
5011:04	DrawPixel	STRING	WO	
5011:05	DrawFastHLine	UINT64	WO	
5011:06	DrawFastVLine	UINT64	WO	
5011:07	FillRect	STRING	WO	
5011:08	FillScreen	UINT16	WO	
5011:09	SetAddrWindow	UINT64	WO	
5011:0A	PushColors	STRING	WO	
5011:0B	FillCircle	UINT64	WO	
5011:0C	DrawCircle	UINT64	WO	
5011:0D	FillTriangle	STRING	WO	
5011:0E	DrawTriangle	STRING	WO	
5011:0F	FillRoundRect	STRING	WO	
5011:10	DrawRoundRect	STRING	WO	
5011:11	DrawRect	STRING	WO	
5011:12	DrawLine	STRING	WO	

Index 0x5012 LCD 2p4 Text Function

Index	Name	Data type	Flags	Default
5012:0	LCD_2p4_Text_Function	UINT8	RO P	> 5 <
5012:01	Cursor	UINT32	RW	
5012:02	Color	UINT32	RW	
5012:03	Size	UINT16	RW	
5012:04	Wrap	UINT8	RW	0x01(1)
5012:05	Println	STRING	WO	

Index 0x5013 Touch Screen

Index	Name	Data type	Flags	Default
5013	TouchScreen	STRING	WO	

Index 0x5014 Parameter

Index	Name	Data type	Flags	Default
5014	Parameter	STRING	RW	

4.2.3 Especial Objects

Index 0x6000 Touch Screen Status

Index	Name	Data type	Flags	Default
6000:0	TouchScreenStatus	UINT8	RO P	> 3 <
6000:01	Z-POINT	UINT16	RO	0x0000 (0)
6000:02	X-POINT	UINT16	RO	0x0000 (0)
6000:03	Y-POINT	UINT16	RO	0x0000 (0)

Index 0x8FF0 Output Input Setting

Index	Name	Data type	Flags	Default
8FF0	OutputInputSetting	UINT8	RW	0x00 (0)

Index 0xF000 Modular Device Profile

Index	Name	Data type	Flags	Default
F000:0	Modular Device Profile	UINT8	RO	> 2 <
F000:01	Index distance	UINT16	RO	0x0010 (16)
F000:02	Maximum number of modules	UINT16	RO	0x0000 (0)

If this is your first time running EtherCAT and using a QEC-M master, we recommend that you read [Set up the QEC-M-043T for 86Duino](#) to get your project started.

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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