EJS-04/08 Series
Quick Installation Guide

Moxa EtherCAT Junction

Version 1.0, December 2024

Trademarks

EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

Overview

The EJS Series EtherCAT junction is an indispensable part of any EtherCAT network. These devices can be used to create line, star, ring, or tree topologies, enhancing the flexibility and scalability of the system. By supporting multiple topologies, the EJS enables multiple data paths to enhance network reliability and minimize downtime in the event of a failure. The EJS can act as a Hot Connect member, allowing you to use the ID selector on the device to differentiate Hot Connect groups at the field site for easier troubleshooting and maintenance. Moreover, the EJS Series can be used in redundancy topologies to provide alternative data paths in case one data path fails, ensuring that the exchange of data is not interrupted.

The EJS Series is designed for the toughest industrial environments. Protected by robust metal housing, the EJS Series is resistant to heavy interference in industrial automation environments while its small footprint makes it ideal for installation in space-constrained areas, such as in control cabinets or onboard machinery. These features make the EJS Series an excellent choice for enhancing the flexibility, reliability, and efficiency of your EtherCAT network.

NOTE Throughout this Quick Installation Guide, we use **EJS** as an abbreviation for Moxa EtherCAT Junction:
EJS = Moxa EtherCAT Junction

> ⚠️ **ATTENTION**
>
> This device complies with part 15 of FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operations.

Package Checklist

Your EJS is shipped with the following items. If any of these items are missing or damaged, please contact your customer service representative for assistance.

- Moxa EtherCAT junction
- Quick installation guide (printed)
- Warranty card

Features

- 4/8 100BaseT(X) full-duplex RJ45 ports for multiple junction connections
- Easy management with EtherCAT topology conversion
- Compact size for easy installation
- Wide power input range with redundant options
- IP30-rated metal housing with high EMC
- Two-way grounding through grounding screw or DIN rail
- Acts as a Hot Connect member with ID selector to set the device unique ID
- Can be deployed in a junction redundancy topology to enhance network reliability

Panel Layout of EJS-04
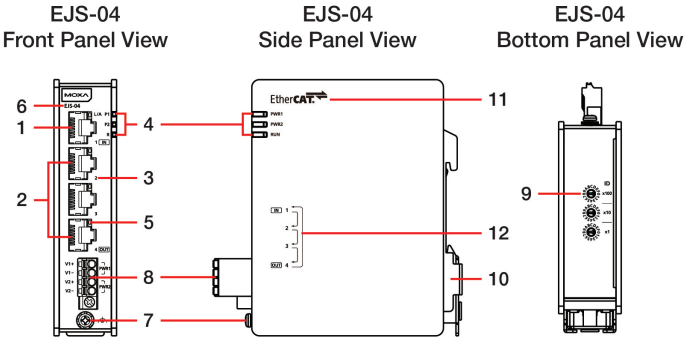
EJS-04
Front Panel View
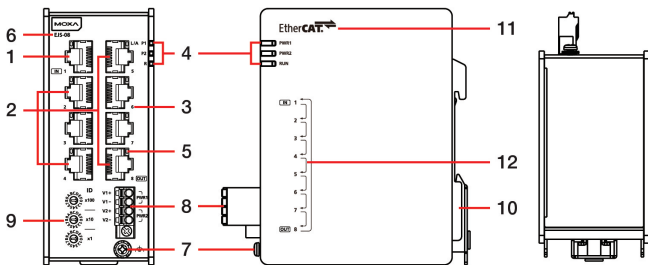
EJS-04
Side Panel View

EJS-04
Bottom Panel View

1. 100BaseT(X) port (IN)
2. 100BaseT(X) ports (OUT)
3. Port number
4. System status LEDs: PWR1, PWR2, RUN
5. 100BaseT(X) port LEDs
6. Model name
7. Chassis ground screw
8. Terminal block for power input
9. ID selector
10. DIN-rail mounting kit
11. EtherCAT logo
12. Data flow map

Panel Layout of EJS-08

EJS-08
Front Panel View
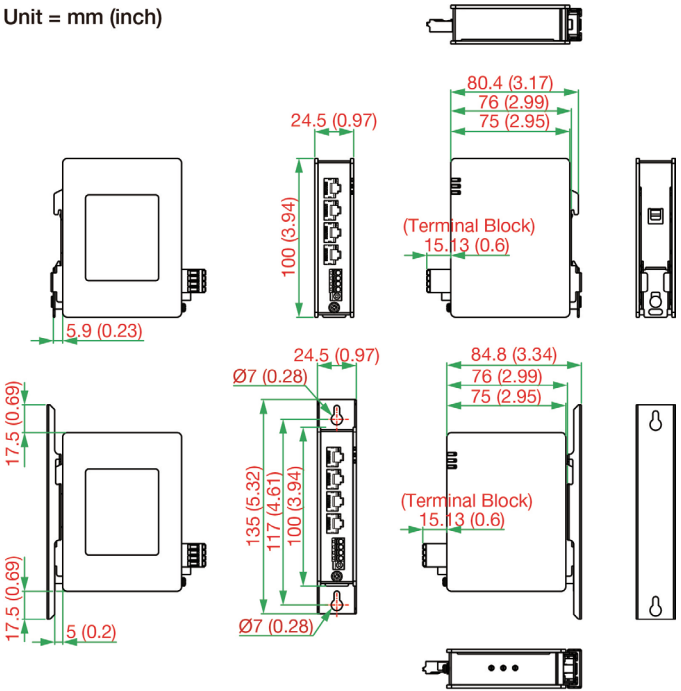
EJS-08
Side Panel View

EJS-08
Bottom Panel View

1. 100BaseT(X) port (IN)
2. 100BaseT(X) ports (OUT)
3. Port number
4. System status LEDs: PWR1, PWR2, RUN
5. 100BaseT(X) port LEDs
6. Model name
7. Chassis ground screw
8. Terminal block for power input
9. ID selector
10. DIN-rail mounting kit
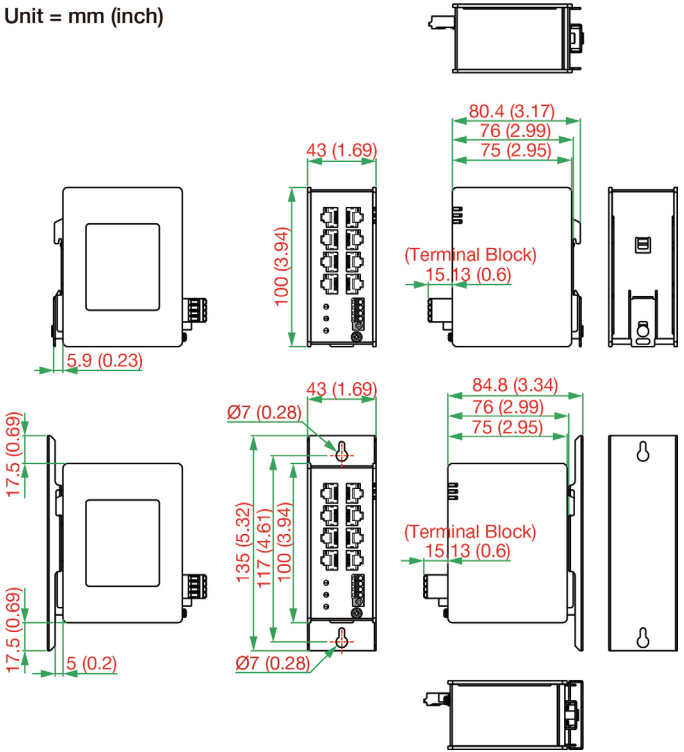11. EtherCAT logo
12. Data flow map

Mounting Dimensions

EJS-04 Series

Unit = mm (inch)

80.4 (3.17)
76 (2.99)
75 (2.95)

24.5 (0.97)

100 (3.94)

(Terminal Block)
15.13 (0.6)

5.9 (0.23)

17.5 (0.69)

17.5 (0.69)

5 (0.2)

24.5 (0.97)

Ø7 (0.28)

135 (5.32)
117 (4.61)
100 (3.94)

Ø7 (0.28)

84.8 (3.34)
76 (2.99)
75 (2.95)

(Terminal Block)
15.13 (0.6)

EJS-08 Series

Unit = mm (inch)

DIN-rail Mounting

When shipped, the DIN-rail mounting kit is fixed to the back panel of the EJS. Mount the EJS on the corrosion-free mounting rail that adheres to the EN 60715 standard.
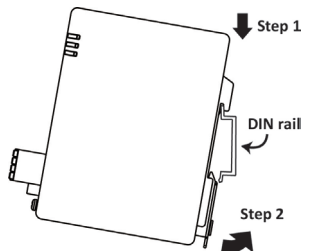
Installation Method

STEP 1:
Insert the upper lip of the DIN-rail kit into the mounting rail.

STEP 2:
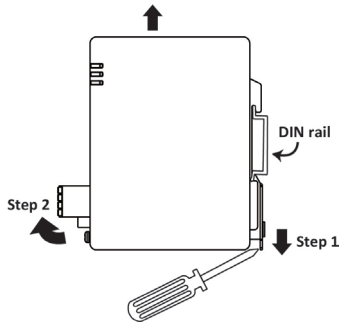Press the device towards the mounting rail until it snaps into place.

Removal Method

STEP 1:
Pull down the latch on the DIN-rail kit with a flat-head screwdriver.

STEP 2:
Slightly pull the device backwards and lift it up to remove it from the mounting rail.


ATTENTION

When installing or removing the devices, please insert a flat-head screwdriver into the latch of the holding clamp and pull the latch downward rather than pushing it towards the DIN rail side, when removing the module from the rail.

If you want to change the position of the device on the DIN rail, please follow the steps shown in the images above. First, remove the device using a flat-head screwdriver and then re-install the device in the desired position. Please DO NOT directly move the device on the DIN rail, without uninstalling it first.

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.
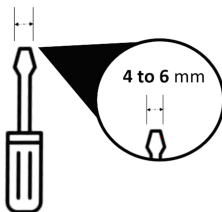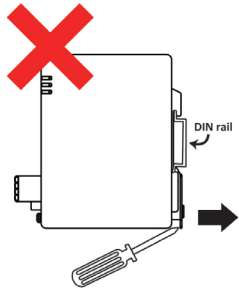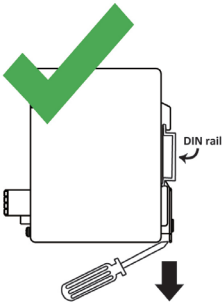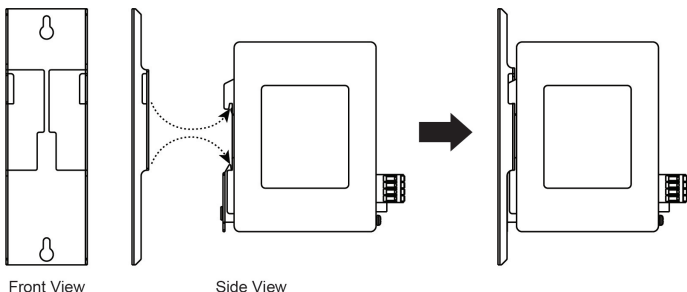

Please use a flat-head screwdriver with a head size of between 4 and 6 mm for proper installation or removal.

Wall Mounting (Optional)

For some applications, it may be necessary to mount the EJS on the wall, as illustrated below.

Front View   Side View

STEP 1:
Attach the wall mounting kit to the device and use it to mark the location where to drill the screws.

NOTE Before drilling the screws into the wall, make sure the screw head and shank size are suitable by inserting the screw into one of the keyhole-shaped apertures of the wall mounting plates.

The head of the screws should be 4.5 to 6.0 mm in diameter, and the shaft should be 2.5 to 3.5 mm in diameter, as shown in the figure at the right. The length of the screws should be at least 10 mm.

4.5 ~ 6.0

2.5 ~ 3.5
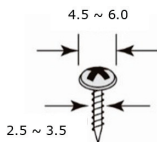
STEP 2:
Drill the screws into the wall.

Do not drive the screws in all the way—leave about 2 mm to allow room for sliding the wall mount panel between the wall and the screws.

STEP 3:

Once the screws are fixed in the wall, insert the two screw heads through the large parts of the keyhole-shaped apertures, and then slide EJS downwards, as indicated on the right. Tighten the two screws for added stability.

WARNING

External metal parts are hot. Take necessary precautions if it is necessary to touch.

Wiring Requirements

WARNING

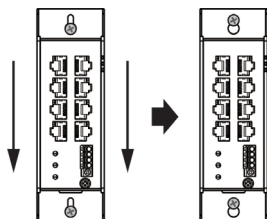Do not disconnect modules or wires unless the power supply has been switched off, or the area is known to be non-hazardous. The devices may only be connected to the supply voltage shown on the type plate.

The devices are designed for operation with a Safety Extra-Low Voltage. Thus, they may only be connected to the supply voltage connections and to the signal contact with the Safety Extra-Low Voltages (SELV) in compliance with IEC950/ EN60950/ VDE0805.

WARNING

Safety First!

Be sure to disconnect the power cord before installing and/or wiring your Moxa EtherCAT Junction.

Calculate the maximum possible current in each power wire and common wire. Observe all electrical codes dictating the maximum current allowable for each wire size.

If the current goes above the maximum ratings, the wiring could overheat, causing serious damage to your equipment.

You should also pay attention to the following items:

- Use separate paths to route wiring for power and devices. If power wiring and device wiring paths must cross, make sure the wires are perpendicular at the intersection point.
  NOTE: Do not run signal or communications wiring and power wiring in the same wire conduit. To avoid interference, wires with different signal characteristics should be routed separately.
- You can use the type of signal transmitted through a wire to determine which wires should be kept separate. The rule of thumb is that wiring that shares similar electrical characteristics can be bundled together.
- Keep input wiring and output wiring separated.
- It is strongly advised that you label wiring to all devices in the system when necessary.

Grounding the Moxa EtherCAT Junction

Grounding and wire routing help limit the effects of noise due to electromagnetic interference (EMI).

Run the ground connection either from the ground screw or the DIN rail to the grounding surface prior to connecting devices.

> ⚠️ **ATTENTION**
>
> This product is intended to be mounted to a well-grounded mounting surface, such as a metal panel.

> **NOTE** When using shielded cables to connect two Ethernet devices, a ground loop may occur if the shielding on the cables generates an additional grounding connection path. This can cause ground current to flow through to the Ethernet ports and damage the devices. Therefore, STP cables must only be connected to the ground at one end.

Wiring the Redundant Power Input

The EJS-04/08 has two sets of 12/24/48 VDC power inputs–power input 1 (PWR1/P1) and power input 2 (PWR2/P2). The top view of the terminal block connector and the location of the power inputs are shown below.
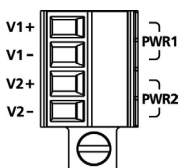
Front View

STEP 1:
Insert the positive/negative DC wires into the V1+/V1- terminals for PWR 1 and/or V2+/V2- terminal for PWR 2.

STEP 2:
To prevent the DC wires from coming loose, use a small flathead screwdriver to press the button beside each terminal of the plastic terminal block connector to secure the wire tightly. Release the screwdriver when the wire is properly inserted.

STEP 3:
Insert the plastic terminal block connector prongs into the terminal block receptor, which is located on the top panel of the EJS-04/08.

> **NOTE** The power source comes from secondary circuits. These circuits are separated from mains circuits by a transformer in which the primary windings are separated from the secondary windings by reinforced installation, double installation, or a screen connected to the protective conductor terminal.

> ⚠️ **ATTENTION**
>
> Before connecting the EJS to the DC power inputs, make sure the DC power source voltage is stable.

⚠️ **ATTENTION**

One individual conductor in a clamping point with 28-14 AWG wire size, and a torque value of 1.7 lb-in should be used.

⚠️ **ATTENTION**

The cable that is connected to the field wiring terminals must be capable of withstanding at least 105°C.

Communication Connections

The EJS-04/08 models have 4/8 100BaseT(X) Ethernet ports.

100BaseT(X) Ethernet Port Connection

The 100BaseT(X) ports located on the EJS's front panel are used to connect to Ethernet-enabled devices.

Below we show pinouts for both MDI (NIC-type) ports and MDI-X (HUB/Switch-type) ports, and show cable wiring diagrams for straight-through and cross-over Ethernet cables.

100Base T(x) RJ45 Pinouts

MDI Port Pinouts

Pin	Signal
1	Tx+
2	Tx-
3	Rx+
6	Rx-

MDI-X Port Pinouts

Pin	Signal
1	Rx+
2	Rx-
3	Tx+
6	Tx-

8-pin RJ45
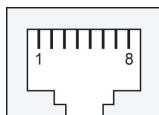
RJ45 (8-pin) to RJ45 (8-pin) Straight-through Cable Wiring

Switch Port RJ45 Connector		Straight-through Cable		NIC Port RJ45 Connector
Tx+	3	—	3	Rx+
Tx-	6	—	6	Rx-
Rx+	1	—	1	Tx+
Rx-	2	—	2	Tx-
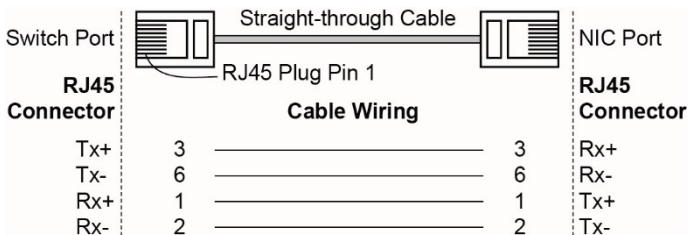
RJ45 (8-pin) to RJ45 (8-pin) Cross-over Cable Wiring

Switch Port (NIC Port)	Cross-over Cable	Switch Port (NIC Port)

RJ45 Connector — RJ45 Plug Pin 1 — **RJ45 Connector**

Cable Wiring

(Rx+) Tx+	3 ——————— 1	Rx+ (Tx+)
(Rx-) Tx-	6 ——————— 2	Rx- (Tx-)
(Tx+) Rx+	1 ——————— 3	Tx+ (Rx+)
(Tx-) Rx-	2 ——————— 6	Tx- (Rx-)
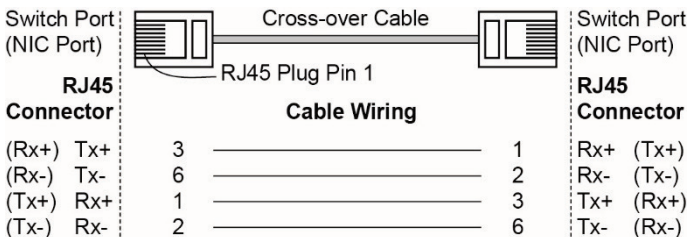
ID Selector Settings
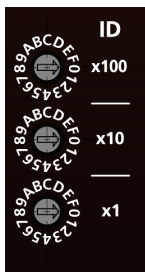
The EJS Series supports Hot Connect. Using the ID selector dials, administrators can assign a unique device ID to determine its position in an EtherCAT group. The process is as follows:

1. Use the three dials on the ID selector to set the unique device ID in hexadecimal. The valid range is 0 to 4095.

2. The EtherCAT master can identify the junction ID via process data.

3. If the EtherCAT master supports Hot Connect functionality, an I/O will dynamically be added to or removed from the EtherCAT communication without interrupting or shutting down the network. This group can be located anywhere on the EtherCAT network.

LED Indicators

The front panel of the Moxa EtherCAT Junction features several LED indicators. The function of each LED is described in the table below.

LED	Color	State	Description
PWR1	Amber	On	Power is being supplied to power input PWR 1.
		Off	Power is not being supplied to power input PWR 1.
PWR2	Amber	On	Power is being supplied to power input PWR 2.
		Off	Power is not being supplied to power input PWR 2.
RUN	Green	Off	The device is in the "Init (INIT)' state.
		Blinking	The device is in the "Pre-Operational (PREOP)" state.
		Flash (once)	The device is in the "Safe-Operational (SAFEOP)" state.

LED	Color	State	Description
		Flash (Repeatedly)	The device is in the "Bootstrap (BOOT)" state, or the device is initializing.
		On	The system is operational.
100M (per Port)	Green	On	The port is active and linked at 100 Mbps.
		Blinking	Data is being transmitted at 100 Mbps.
		Off	The port is inactive or the link is down.

Auto MDI/MDI-X Connection

The Auto MDI/MDI-X function allows users to connect the EJS's 100BaseT(X) ports to any kind of Ethernet device, without paying attention to the type of Ethernet cable being used for the connection. This means that you can use either a straight-through cable or cross-over cable to connect the EJS to Ethernet devices.

Dual Speed Functionality and Switching

The EJS's 100 Mbps RJ45 switch port auto-negotiates with the connected device for the fastest data transmission rate supported by both devices. The EJS is a plug-and-play device, so software configuration is not required at installation or during maintenance.

The half/full duplex mode for the RJ45 switched ports is user dependent and changes (by auto-negotiation) to full or half duplex, depending on which transmission speed is supported by the attached device.

Topology Conversion

The EJS Series supports conversion to the following EtherCAT topologies:

- **Line**: The simplest topology, a line topology connects multiple EtherCAT devices in a straight line, passing on data from one device to the next.
- **Star**: A star topology involves connecting multiple devices to a central junction, allowing for more flexible and modular network configurations.
- **Tree**: A combination of line and star topologies, the tree topology organizes multiple junctions in a tree structure that allows branching out at various points in the network.
- **Ring**: The ring topology forms a closed loop for redundancy where data can continue to circulate in the opposite direction if one path fails. Refer to the ring port combinations below:

Ring	EJS-04	EJS-08
Ring 1	Port 2 (OUT), Port 3 (IN)	Port 2 (OUT), Port 3 (IN)
Ring 2	N/A	Port 4 (OUT), Port 5 (IN)
Ring 3	N/A	Port 6 (OUT), Port 7 (IN)

Specifications

Interface	
RJ45 Ports	100BaseT(X), auto-negotiation speed
LED Indicators	PWR1, PWR2, RUN, 100M
ID Selector	Valid address range: 1 to 4095

Switch Properties	
Port Combinations & Extension	EJS-04 models: 4 ports (1 IN, 3 OUT)
	EJS-08 models: 8 ports (1 IN, 7 OUT)
Connection Distance	100 m (max.)
Delay	1 µs per port (approximate)
Power	
Input Voltage	12/24/48 VDC inputs
Input Current	EJS-04 models: 0.13 A (max.)
	EJS-08 models: 0.30 A (max.)
Connection	Removable 4-contact terminal block
Overload Current Protection	Present
Reverse Polarity Protection	Present
Mechanical	
Casing	IP30 protection, metal housing
Dimensions (W x H x D)	EJS-04 models: 24.5 x 100 x 75 mm (0.96 x 3.94 x 2.95 in)
	EJS-08 models: 43 x 100 x 75 mm (1.69 x 3.94 x 2.95 in)
Weight	EJS-04 models: 245 g (0.54 lb)
	EJS-08 models: 340 g (0.75 lb)
Installation	DIN-rail, wall mounting (optional kit)
Environmental Limits	
Note: For indoor use only.	
Operating Temperature	Standard models: -10 to 60°C (14 to 140°F)
	Wide temp. models: -40 to 75°C (-40 to 167°F)
Storage Temperature	-40 to 85°C (-40 to 185°F)
Ambient Relative Humidity	5 to 95% (non-condensing)
Regulatory Approvals	
Safety	UL 61010-2-201, EN 62368-1
EMC	EN 55032/35, EN 61000-6-2/-6-4
EMI	FCC Part 15B, CISPR 22, 32 (EN 55032) Class A
EMS	IEC 61000-4-2 ESD: Contact: 6 kV; Air: 8 kV
	IEC 61000-4-3 RS: 80 MHz to 1 GHz: 10 V/m
	IEC 61000-4-4 EFT: Power: 2 kV; Signal: 2 kV
	IEC 61000-4-5 Surge: Power: 2 kV; Signal: 2 kV
	IEC 61000-4-6 CS: 10 V
	IEC 61000-4-8 PFMF
Shock	IEC 60068-2-27
Free Fall	ISTA-1A (with package)
Vibration	IEC 60068-2-6, IEC 60068-2-64
Warranty	5 years

Certifications

KC Statements

⚠️ **WARNING**

이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다.

BSMI Statements

⚠️ **WARNING**

警告：為避免電磁干擾，本產品不應安裝或使用於住宅環境。