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Date　2024-12-24
CN　　安装说明
EN　　Instruction Sheet

禾川科技官方网站

⚠ 1. 安全注意事项（Safety precautions）

本说明书涉及产品为工业产品，并且均为开放型外壳设计。要求用户使用产品时，务必将产品安装在具有防尘、防潮以及免于电击／冲击等意外的控制柜内，并且需要设置保护措施以防止非维护人员不当操作或意外导致设备故障或损坏，造成不可避免的人员危险和财产损失。

The products in this manual are industrial products and are all open-type housing designs. It is essential to install these products within a control cabinet that is safeguarded against dust, moisture, and accidents such as electric shocks or physical impacts. Additionally, protective measures must be taken to prevent malfunctions or damage caused by improper operation or accidents involving non-maintenance personnel. Failure to do so may lead to serious risks to personnel safety and potential loss of property.

更详细的信息请参考 QX 系列硬件手册。
Please refer to the QX series hardware manual for more detailed information.

2. 命名规则（Model identification）

$$\underset{1}{\underline{HC}}\ \underset{2}{\underline{QX}}\ -\ \underset{3}{\underline{EC}}\underset{4}{\underline{01}}\ -\ \underset{5}{\underline{D}}\underset{6}{\underline{4}}\ -\ \underset{7}{\underline{XXXX}}$$

1	**产品名称（Product name）**		**3**	**功能模块（Function module）**		**5**	**电源类型（Power supply type）**		**6**	**迭代版本（Iteration version）**
HC	禾川（Hechuan Technology）		EC	EtherCAT耦合器（EtherCAT coupler）		D	直流电源（DC power supply）		4	第4代（The 4th generation）

2	**产品系列（Product series）**		**4**	**功能代码（Function code）**		**7**	**软件/固件定制代码 (Customized software/ firmware Code)**
QX	Q系列通用扩展版（Q-series general-purpose expansion）		01	标准版（Standard version）		X	0~9/A~Z/空(N/A)
			02	功能代码2（Function code 2）			
			03	功能代码3（Function code 3）			

3. 适用型号（Applicable model）

名称（Name）	型号（Model）	模块简要说明	Brief description
耦合器模块 Coupler module	HCQX-EC01-D4	标准EtherCAT耦合器，扩展模块占用EtherCAT节点*	Standard EtherCAT coupler. An expansion module occupies an EtherCAT node
	HCQX-EC02-D4	标准EtherCAT耦合器，扩展模块不占用EtherCAT节点*	Standard EtherCAT coupler. An expansion module does not occupy an EtherCAT node
	HCQX-EC03-D4	NXE系列模块专用EtherCAT耦合器，扩展模块不占用EtherCAT节点	EtherCAT coupler dedicated to NXE series modules. An expansion module does not occupy an EtherCAT node

* 注：耦合器右侧最多可以挂载 16 个 IO 模块。
*Note: Up to 16 IO modules can be mounted to the right side of a Coupler module.

4. 通用电气及环境规格（General electrical and environmental specifications）

4.1　通用电气规格（General electrical specifications）

型号（Model）*1	额定电压/功率*2	Rated voltage/power*2	输出电压/功率	Output voltage/power
HCQX-EC01-D4	DC24V (DC20.4~28.8V),19W	DC24V (DC20.4~28.8V),19W	DC12V,16W	DC12V,16W
HCQX- EC02-D4				
HCQX- EC03-D4	DC24V (DC20.4~28.8V),1.2W	DC24V (DC20.4~28.8V),1.2W	-	-

* 注：1. 所有型号均为安全特低电压输入产品。
　　　2. 此处标识的额定功率为满负载运行时的最大功率。
*Note: 1. All models are featured by the SELV input type.
　　　2. The power rating indicated here is the maximum power under full-load operation.

4.2　环境规格（Environmental requirements）

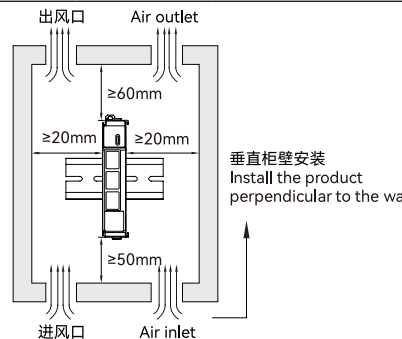| 项目	Item	规格	Specifications
海拔高度	Altitude	≤2000m	≤2000m
使用环境	Operating environment	控制柜内安装，开放式及室内使用	Installation within a control cabinet, open-type and indoor use
工作温度	Operating temperature	-10~55℃	-10~55℃
储存温度	Storage temperature	-40~75℃	-40~75℃
环境湿度	Ambient humidity	10~95%RH（无结露）	10~95%RH (non-condensation)
振动耐受	Vibration resistance	5~150Hz（X/Y/Z方向，1g/3.5mm位移）	5~150Hz (X/Y/Z direction, 1g /3.5mm displacement)
污染等级	Pollution degree	污染度2	Level 2
冷却方式	Cooling method	自然冷却	Natural air cooling
防护等级	IP rating	IP20	IP20
外壳材质	Enclosure material	阻燃材料	Self-extinguishable

* 注：若设备未依制造商指定方式使用，设备所提供的保护可能会被减弱。
*Note: If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.
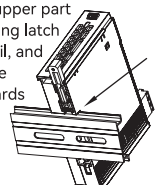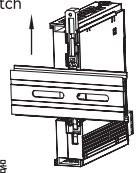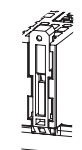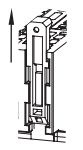
5. 安装说明（Installation instructions）

5.1　控制柜安装（Installation within a control cabinet）

CN　设备冷却方式为自然冷却或通过加装风扇进行冷却，请保证安装方向与柜壁垂直；请参考右侧示意图，在设备的周围留有足够的空间，并排安装时，建议横向两侧预留20mm 以上间距。
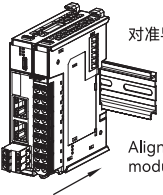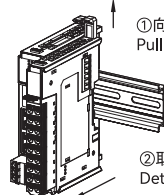
EN　Please install the product perpendicular to the wall and ensure a sufficient cooling effect via natural air or a cooling fan. Please leave enough clearance around the product as shown in the right figure. During a side-by-side installation, please leave a horizontal clearance of more than 20 mm on both sides.
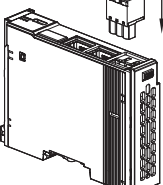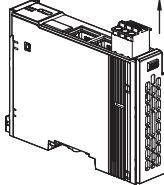

出风口　Air outlet
≥60mm
≥20mm　≥20mm
垂直柜壁安装 Install the product perpendicular to the wall
≥50mm
进风口　Air inlet

1

5.2 导轨拆装 1（DIN rail mounting and dismounting I）

CN 安装耦合器时，将双向联动卡扣上部紧扣在 DIN 导轨上，并向导轨侧按压模块，听到"咔哒"声，耦合器即成功安装于 DIN 导轨上（安装前应保证双向联动卡扣处于紧锁状态，否则可能导致安装故障）；拆卸耦合器时，将双向联动卡扣向上拉动一定距离，听到"咔哒"声后，取下耦合器即可。

EN Before installation, check that the DIN rail mounting latch is in a locked state. During mounting, position the upper part of the mounting latch of the coupler on the DIN rail, and then press module towards the DIN rail until a clear click is heard (which indicates the latch is momentarily opened and locked onto the rail). During dismounting, pull the latch upwards until a clear click is heard (which indicates the latch is unlocked), and then directly detach the coupler.

将双向联动卡扣上部紧扣在DIN导轨上，并向导轨侧按压模块
Position the upper part of the mounting latch on the DIN rail, and then press the module towards the DIN rail

①向上拉动双向联动卡扣
Pull up to unlock the DIN rail mounting latch

②取下耦合器
Detach the coupler

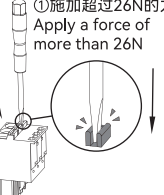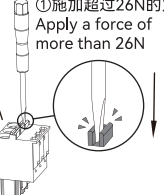| 紧锁状态 (Locked)	释放状态 (Unlocked)

5.3 导轨拆装 2（DIN rail mounting and dismounting II）

CN 安装模块时，将模块侧面导槽对准 EC 耦合器导槽后，向内按压模块，听到"咔哒"声，模块成功安装于 DIN 导轨上（安装前保证双向联动卡扣处于紧锁状态，否则可能导致安装故障）；拆卸模块时，将卡扣向上拉动一定距离，听到"咔哒"声后，取下模块即可。

EN Before installation, check that the DIN rail mounting latch is in a locked state. During mounting, align the groove of the module to that of the EC coupler to engage them together, and then press the module towards the DIN rail until a clear click is heard (which indicates the latch is momentarily opened and locked onto the rail). During dismounting, pull the latch upwards until a clear click is heard (which indicates the latch is unlocked), and then directly remove the module.

对准导槽后将模块向导轨按压
Align the groove and press the module towards the DIN rail

①向上拉动卡扣
Pull the latch upwards

②取下模块
Detach the module

5.4 可拆卸端子拆装（Removable terminal block mounting and dismounting）

CN 可拆卸端子拆装如右图所示。

EN The mounting and dismounting of the removable terminal block are shown in the figures on the right side.

沿箭头方向插入端子
Insert the terminal block along the direction indicated by the arrow

沿箭头方向拔出端子
Detach the terminal block along the direction indicated by the arrow
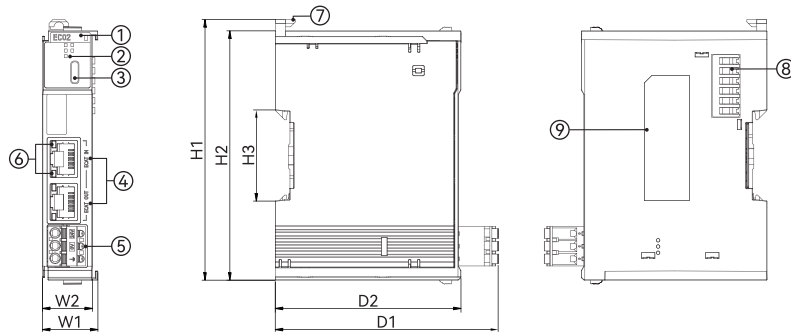
⚠ 5.5 线缆拆装（Cable connecting and disconnecting）

CN 安装线缆时，将一字螺丝刀垂直插入可拆卸端子压块内，施加超过 26N 的力，将准备好的线缆插入到圆孔中，拔出一字螺丝刀，轻拽线缆，线缆不松动即成功完成配线；反之即可取出线缆。端子规格及配线示意图如右图所示。

EN During connecting, insert the flat-blade screwdriver into the unlocking tab with a force of more than 26 N. Then insert a cable into the circular hole. Gently tug the cable after pulling out the screwdriver. If the cable is secured firmly, then the connection is finished. The reverse is the procedure for unplugging the cable. The terminal specifications and wiring diagram are shown in the right figure.

①施加超过26N的力
Apply a force of more than 26N

②将线缆插入到圆孔中
Insert the cable into the circular hole

①施加超过26N的力
Apply a force of more than 26N

②将线缆拔出
Unplug the cable

模块端子（Terminal）	线径范围：AWG (Wire width)	剥线长度：mm (Wire stripping length)	按压力：N (Pressure)
DC24V 电源端子（DC24V power supply terminal）	28~14	10	26

线径范围 Wire width
剥线长度 Wire stripping length

⚠ 警告：只能使用 75℃铜导线。
Warning: Use only a copper conductor that is 75° C.
Attention: Utilisez uniquement un conducteur en cuivre à 75° C.

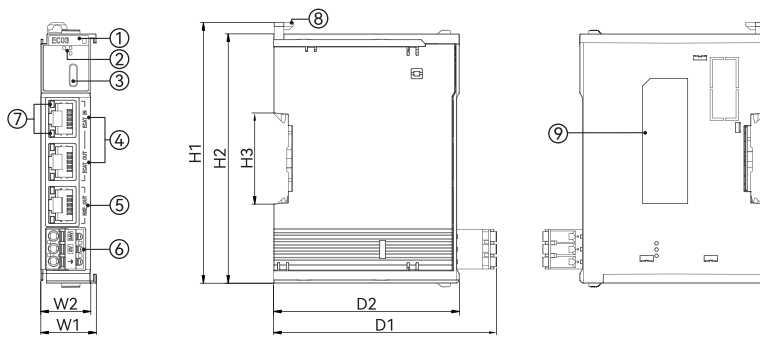# 6. 接口和尺寸说明（Interface and dimension description）

序号(No.)	名称	Name	功能	Function
1	产品型号	Product model	模块型号	Module model numbers
2	模块状态指示灯	Module status indicator	显示模块与通道状态	Display module and channel status
3	Type-C 接口*	Type-C interface*	固件升级，无电压输出	Update firmware, no voltage output.
4	RJ45通讯接口	RJ45 communication interface	EtherCAT 信号输入输出	Supports EtherCAT signal input and output
5	DC24V电源端子	DC24V power supply terminal	DC24V 供电接口	DC24V power supply interface
6	RJ45通讯指示灯	RJ45 communication indicator	显示EtherCAT连接及通讯状态	Displays the status of EtherCAT connection and communication
7	双向联动卡扣	DIN rail mounting latch	固定模块在 DIN 导轨上	Mounts the module onto a DIN rail
8	扩展模块通讯接口	Expansion module communication interface	主机和IO模块或IO模块间通讯及供电接口，不支持热插拔	The interface for the communication and power supply between the host and the IO module or between IO modules, does not support hot-swapping
9	标签	Label	显示模块型号、规格参数、内部序列号等基本信息	Displays the basic information including controller model, specification parameters, and internal serial number

* 注：仅 EC02 有此接口。
*Note: Only the EC02 is equipped with this interface.

型号（Model）	外形尺寸（Dimension）:mm							重量（Weight）:g
	W1	W2	H1	H2	H3	D1	D2	
HCQX-EC01-D4	22.25	20.05	104.50	100.00	35.40	89.40	74.50	90 approx.
HCQX-EC02-D4								95 approx.

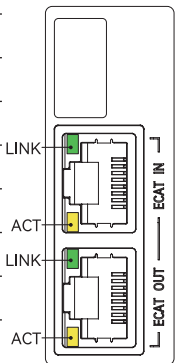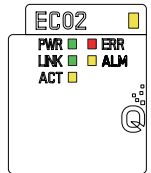| 序号(No.)	名称	Name	功能	Function
1	产品型号	Product model	模块型号	Module model numbers
2	模块状态指示灯	Module status indicator	显示模块与通道状态	Display module and channel status
3	Type-C 接口	Type-C interface	固件升级，无电压输出	Update firmware, no voltage output.
4	RJ45通讯接口	RJ45 communication interface	EtherCAT 信号输入输出	Supports EtherCAT signal input and output
5	RJ45通讯接口	RJ45 communication interface	与NXE系列模块通讯	Communicates with a NXE series module
6	DC24V电源端子	DC24V power supply terminal	DC24V 供电接口	DC24V power supply interface
7	RJ45通讯指示灯	RJ45 communication indicator	显示EtherCAT连接及通讯状态	Displays the status of EtherCAT connection and communication
8	双向联动卡扣	DIN rail mounting latch	固定模块在 DIN 导轨上	Mounts the module onto a DIN rail
9	标签	Label	显示模块型号、规格参数、内部序列号等基本信息	Display the basic information including module model, specification parameters, and internal serial number

型号（Model）	外形尺寸（Dimension）:mm							重量（Weight）:g
	W1	W2	H1	H2	H3	D1	D2	
HCQX-EC03-D4	22.25	20.05	104.50	100.00	35.40	89.40	74.50	90 approx.

7. 指示灯说明（Indicator description）

指示灯含义 (Indicator meaning)		颜色 (Color)	状态	Status	说明	Description
HCQX-EC01-D4 / HCQX-EC02-D4 / HCQX-EC03-D4						
模块状态 (Module status)		黄色 (Yellow)	熄灭	Not lit	Init（初始化状态）	Initialization
			快闪	Fast blinking	Preop（预操作状态）	Pre operational
			慢闪	Slow blinking	Safeop（安全操作状态）	Safe operational
			常亮	Lit	OP（可操作状态）	Operational
			不等时闪	unequally blinking	Boot（引导程序状态）	Bootstrap

丝印 (Screen printing)	指示灯含义 (Indicator meaning)	颜色 (Color)	状态	Status	说明	Description
HCQX-EC01-D4						
PWR	电源 (Power supply)	绿色 (Green)	熄灭 Not lit		供电电压不足或未供电	Insufficient power supply voltage or no power supply
			常亮 Lit		供电正常	Normal power supply
ACT&LINK	QBUS 连接及通讯 (QBUS connection and communication)	绿色 (Green)	熄灭 Not lit		耦合器与右侧模块无物理连接	No physical connection between the coupler and the right-side module
			闪烁 Blinking		耦合器与右侧模块检测到物理连接及数据交互	There is a physical connection and data exchange between the coupler and the right-side module
			常亮 Lit		耦合器与右侧模块检测到物理连接但无数据交互	There is a physical connection but no data exchange between the coupler and the right-side module
ECAT IN ACT	EtherCAT 连接及通讯 (EtherCAT connection and communication)	黄色 (Yellow)	熄灭 Not lit		ECAT IN 无物理连接	There is no physical connection detected in ECAT IN
			闪烁 Blinking		ECAT IN 检测到物理连接及数据通讯	There is a physical connection and data exchange detected in ECAT IN
			常亮 Lit		ECAT IN 检测到物理连接但无数据交互	There is physical connection detected in ECAT IN without data exchange
ECAT OUT LINK	EtherCAT OUT 连接 (EtherCAT OUT connection)	绿色 (Green)	熄灭 Not lit		ECAT OUT 无物理连接	There is no physical connection detected in ECAT OUT
			常亮 Lit		ECAT OUT 检测到物理连接	There is a physical connection detected in ECAT OUT
ECAT OUT ACT	EtherCAT OUT 通讯 (EtherCAT OUT communication)	黄色 (Yellow)	熄灭 Not lit		ECAT OUT 无数据交互	There is no data exchange detected in ECAT OUT
			闪烁 Blinking		ECAT OUT 检测到数据交互	There is data exchange detected in ECAT OUT

HCQX-EC02-D4

| 指示灯	名称	颜色	状态		说明（中）	说明（英）
PWR	电源 (Power supply)	绿色 (Green)	熄灭	Not lit	供电电压不足或未供电	Insufficient power supply voltage or no power supply
			常亮	Lit	供电正常	Normal power supply
LINK	EtherCAT 连接 (EtherCAT connection)	绿色 (Green)	熄灭	Not lit	耦合器与右侧模块无物理连接	No physical connection between the coupler and the right-side module
			常亮	Lit	耦合器与右侧模块检测到物理连接	There is a physical connection between the coupler and the right-side module
ACT	EtherCAT 通讯 (EtherCAT communication)	黄色 (Yellow)	熄灭	Not lit	耦合器与右侧模块无数据交互	NO data exchange between the coupler and the right-side module
			闪烁	Blinking	耦合器与右侧模块检测到数据交互	There is a data exchange between the coupler and the right-side module
ERR	模块故障 (Module error)	红色 (Red)	熄灭	Not lit	正常或无工作电源	Normal power supply or no power supply
			快闪	Fast blinking	耦合器与主站通讯异常	Abnormal communication between the coupler and the master
			慢闪	Slow blinking	耦合器与模块通讯异常	Abnormal communication between the coupler and the module
			单闪	Single blinking	耦合器与模块状态不同	Different statuses between the coupler and the module
			双闪	Double blinking	扫描周期小于 500μs	The scanning cycle is less than 500μs
			三闪	Triple blinking	FPGA 初始化失败	FPGA initialization failure
			常亮	Lit	耦合器与模块不适配	A mismatch between the coupler and the module
ALM	输入电压异常 (Abnormal input voltage)	黄色 (Yellow)	熄灭	Not lit	电压正常	Normal voltage
			快闪	Fast blinking	过压：检测到电压高于 27V 并持续 5ms 及以上时间	Over-voltage: The detected voltage is higher than 27V and lasts for 5ms or more
			慢闪	Slow blinking	欠压：检测到电压低于 21V 并持续 5ms 及以上时间	Under-voltage: The detected voltage is lower than 21V and lasts for 5ms or more
ECAT IN LINK	EtherCAT IN 连接 (EtherCAT IN connection)	绿色 (Green)	熄灭	Not lit	ECAT IN 无物理连接	There is no physical connection detected in ECAT IN
			常亮	Lit	ECAT IN 检测到物理连接	There is a physical connection detected in ECAT IN
ECAT IN ACT	EtherCAT IN 通讯 (EtherCAT IN communication)	黄色 (Yellow)	熄灭	Not lit	ECAT IN 无数据交互	There is no data exchange detected in ECAT IN
			闪烁	Blinking	ECAT IN 检测到数据交互	There is data exchange detected in ECAT IN
ECAT OUT LINK	EtherCAT OUT 连接 (EtherCAT OUT connection)	绿色 (Green)	熄灭	Not lit	ECAT OUT 无物理连接	There is no physical connection detected in ECAT OUT
			常亮	Lit	ECAT OUT 检测到物理连接	There is a physical connection detected in ECAT OUT
ECAT OUT ACT	EtherCAT OUT 通讯 (EtherCAT OUT communication)	黄色 (Yellow)	熄灭	Not lit	ECAT OUT 无数据交互	There is no data exchange detected in ECAT OUT
			闪烁	Blinking	ECAT OUT 检测到数据交互	There is data exchange detected in ECAT OUT

HCQX-EC03-D4

指示灯	名称	颜色	状态		说明（中）	说明（英）
PWR	电源 (Power supply)	绿色 (Green)	熄灭	Not lit	供电电压不足或未供电	Insufficient power supply voltage or no power supply
			常亮	Lit	供电正常	Normal power supply
ERR	模块故障 (Module error)	红色 (Red)	熄灭	Not lit	正常或无工作电源	Normal power supply or no power supply
			快闪	Fast blinking	耦合器与主站通讯异常	Abnormal communication between the coupler and the master
			慢闪	Slow blinking	耦合器与模块通讯异常	Abnormal communication between the coupler and the module
			单闪	Single blinking	耦合器与模块状态不同	Different statuses between the coupler and the module
			双闪	Double blinking	扫描周期小于 500μs	The scanning cycle is less than 500μs
			三闪	Triple blinking	FPGA 初始化失败	FPGA initialization failure
			常亮	Lit	耦合器与模块不适配	A mismatch between the coupler and the module
ALM	输入电压异常 (Abnormal input voltage)	黄色 (Yellow)	熄灭	Not lit	电压正常	Normal voltage
			快闪	Fast blinking	过压：检测到电压高于 27V 并持续 5ms 及以上时间	Over-voltage: The detected voltage is higher than 27V and lasts for 5ms or more
			慢闪	Slow blinking	欠压：检测到电压低于 21V 并持续 5ms 及以上时间	Under-voltage: The detected voltage is lower than 21V and lasts for 5ms or more

EC02

PWR ■ ERR
LINK ■ ALM
ACT

LINK
ACT
ECAT IN
LINK
ACT
ECAT OUT

EC03

PWR ■ ERR
ALM

				熄灭 Not lit	ECAT IN 无物理连接	There is no physical connection detected in ECAT IN	
ECAT IN LINK	EtherCAT IN 连接 (EtherCAT IN connection)	绿色 (Green)		常亮 Lit	ECAT IN 检测到物理连接	There is a physical connection detected in ECAT IN	
ECAT IN ACT	EtherCAT IN 通讯 (EtherCAT IN communication)	黄色 (Yellow)		熄灭 Not lit	ECAT IN 无数据交互	There is no data exchange detected in ECAT IN	
				闪烁 Blinking	ECAT IN 检测到数据交互	There is data exchange detected in ECAT IN	
ECAT OUT LINK	EtherCAT OUT 连接 (EtherCAT OUT connection)	绿色 (Green)		熄灭 Not lit	ECAT OUT 无物理连接	There is no physical connection detected in ECAT OUT	
				常亮 Lit	ECAT OUT 检测到物理连接	There is a physical connection detected in ECAT OUT	
ECAT OUT ACT	EtherCAT OUT 通讯 (EtherCAT OUT communication)	黄色 (Yellow)		熄灭 Not lit	ECAT OUT 无数据交互	There is no data exchange detected in ECAT OUT	
				闪烁 Blinking	ECAT OUT 检测到数据交互	There is data exchange detected in ECAT OUT	
NXE OUT LINK	NXE OUT 连接 (NXE OUT connection)	绿色 (Green)		熄灭 Not lit	NXE OUT 无物理连接	There is no physical connection detected in NXE OUT	
				常亮 Lit	NXE OUT 检测到物理连接	There is a physical connection detected in NXE OUT	
NXE OUT ACT	NXE OUT 通讯 (NXE OUT communication)	黄色 (Yellow)		熄灭 Not lit	NXE OUT 无数据交互	There is no data exchange detected in NXE OUT	
				闪烁 Blinking	NXE OUT 检测到数据交互	There is data exchange detected in NXE OUT	

指示灯闪烁频率如下图所示:
The indicator blinking frequency is shown below.
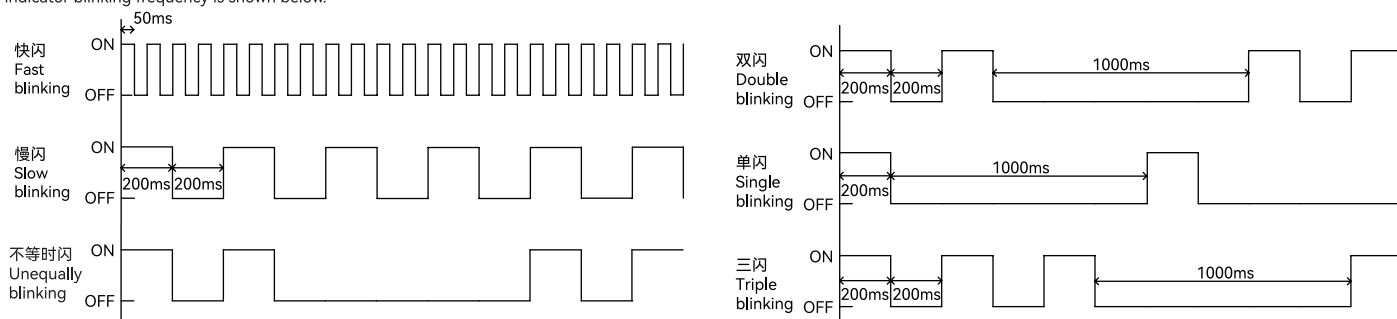
8. 端子及配线说明（Terminal and wiring description）

DC24V电源端子说明 (DC24V power supply terminal description)		接线（Wiring）
24V		
0V		
⏚		
	FE 功能性接地（Functional ground）	

EC01/EC02接口说明（EC01/EC02 interface description）		EC03接口说明（EC03 interface description）	
	–	ECAT IN	EtherCAT 输入信号 EtherCAT input signal
ECAT IN	EtherCAT 输入信号 EtherCAT input signal	ECAT OUT	EtherCAT 输出信号 EtherCAT output signal
ECAT OUT	EtherCAT 输出信号 EtherCAT output signal	NXE OUT	NXE 输出信号 NXE output signal