

IO-Link

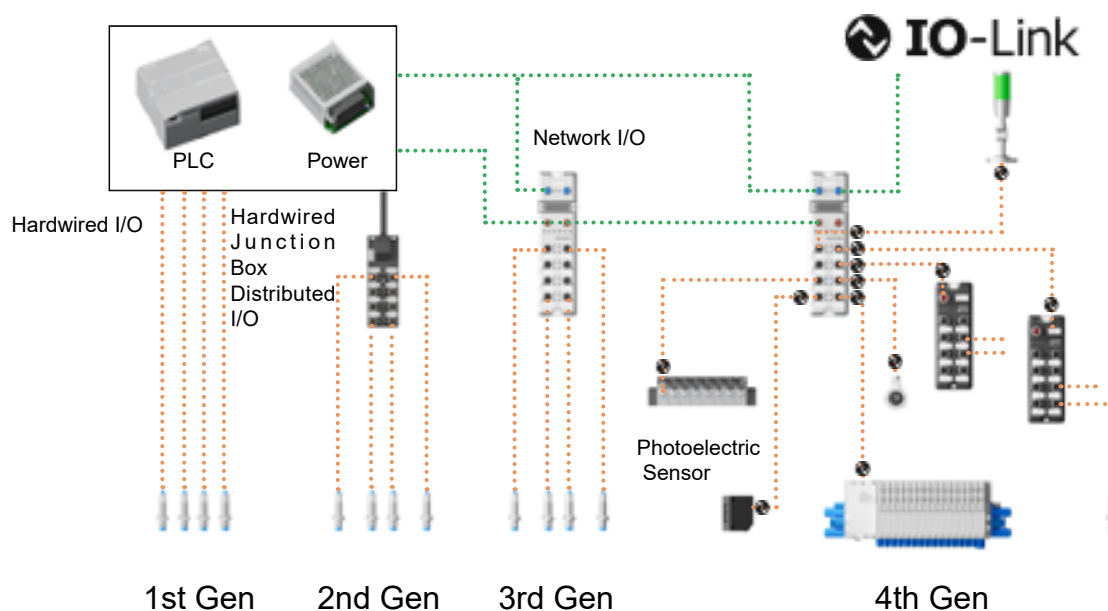


Overview of IO-Link

What is IO-Link?

IO-Link is a short-distance, bidirectional, digital, point-to-point, wired (or wireless) industrial communication network standard (IEC 61131-9) used to connect digital sensors and actuators to any type of industrial fieldbus or industrial Ethernet. Each IO-Link device is connected to a channel on an IO-Link master station, [making IO-Link a point-to-point communication protocol rather than a fieldbus.](#)

The goal of IO-Link is to provide a technical platform that enables the development and use of sensors and actuators capable of generating and utilizing rich data sets, which can be economically used to optimize industrial automation processes and operations.



Evolution of Industrial Field Wiring

Overview of IO-Link

Features of IO-Link

■ Digital Communication and Accurate Transmission:

- IO-Link uses digital communication, enabling highly intelligent data exchange between devices, ensuring accuracy and reliability in data transmission.
- Compared to traditional analog signals, IO-Link avoids interference from electromagnetic signals, eliminating the need for shielded cables and enhancing system reliability.

■ Bidirectional Communication:

- IO-Link supports bidirectional communication, allowing not only data reading from sensors and actuators but also sending instructions and configuration parameters to them.
- This bidirectional communication enables devices to respond more flexibly and intelligently to the needs of industrial automation systems.

■ Unified Interface and Standardization:

- IO-Link provides a unified interface for various sensors and actuators, reducing the complexity of device integration.
- As an internationally standardized communication protocol, IO-Link ensures interoperability between devices from different manufacturers, enhancing flexibility in device selection and integration for businesses.

■ Enhanced Data Transmission Capabilities:

- IO-Link offers comprehensive data transmission capabilities, including process data, event data, and service data, providing extensive information for industrial automation systems.
- The transmitted data includes measurements, switch signals, manufacturer information, device status, signal quality, and more, offering a rich data foundation for the Industrial Internet of Things (IIoT).

■ Flexibility and Scalability:

- IO-Link technology is highly flexible, capable of adapting to different application needs.
- Due to its scalability, it can accommodate the evolution of future industrial automation systems and the introduction of new technologies.

■ Simplified Installation and Maintenance:

- IO-Link devices can be parameterized and configured through digital communication, reducing manual intervention and errors, simplifying the installation and maintenance processes.
- Remote access for parameter settings and diagnostics can save time, prevent failure costs, and improve ease of commissioning.

■ Predictive Maintenance and Fault Prediction:

- Diagnostic information transmitted through IO-Link helps companies perform fault diagnosis, enabling timely problem detection and resolution, minimizing production interruptions and losses.
- By monitoring the status and performance data of devices, predictive maintenance can be achieved, preventing equipment failures in advance and further enhancing production efficiency.

■ Quick Replacement and Identification:

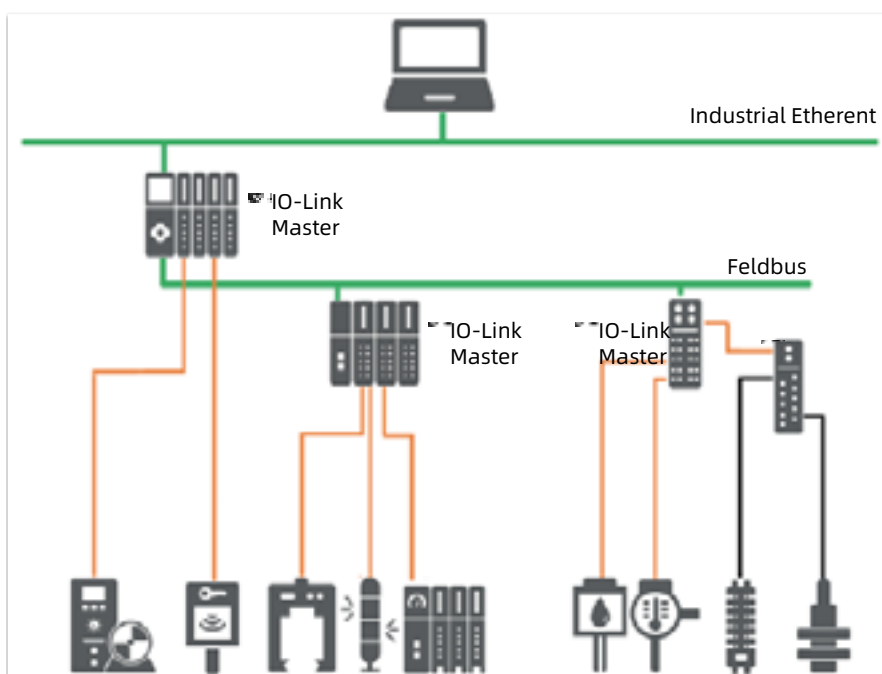
- The IO-Link master stores all parameters of the connected sensors. When a sensor fails, the previously stored parameters are automatically transferred to the new sensor upon replacement, reducing downtime and maintenance costs.
- The IO-Link master can also retrieve vendor information, such as serial numbers and model types, from connected IO-Link sensors, enabling device identification.

Overview of IO-Link

Components of IO-Link

IO-Link system consists of three main components:

- ① IO-Link Master
- ② IO-Link Devices/Hub
- ③ IO-Link Cables



Supported Bus Protocols



WAIN IO-Link Series

Master Station

Product Introduction

The WAIN IO-Link Bus IP67 Module is an IO-Link master device within the standard IO architecture. On the bus side, it supports industrial Ethernet bus interfaces such as EtherCAT, PROFINET, and EtherNet/IP, while on the user side, it supports the IO-Link protocol. It serves as a gateway device between the bus slave and IO-Link master station. Both the bus and IO-Link interfaces can connect with equipment from multiple manufacturers, offering high compatibility and providing users with various options for data collection, system configuration optimization, simplifying field wiring, and improving system reliability.

Product Features

Up to IP67 Protection Level

- Suitable for harsh industrial environments.

Standardized

- Based on IO-Link standard V1.1.3, enabling remote control of IO-Link slave devices, making operation convenient.

High Compatibility

- Supports slave devices with special process data lengths.

Compact Size

- Ideal for applications in confined spaces.

Easy Diagnosis

- Innovative channel indicator light design, close to the channel, making the channel status clear at a glance and facilitating easy detection and maintenance.

Simple Configuration

- Easy to configure, supports all major PLC systems.

Quick and Simple Wiring

- Standard cable for simple wiring.



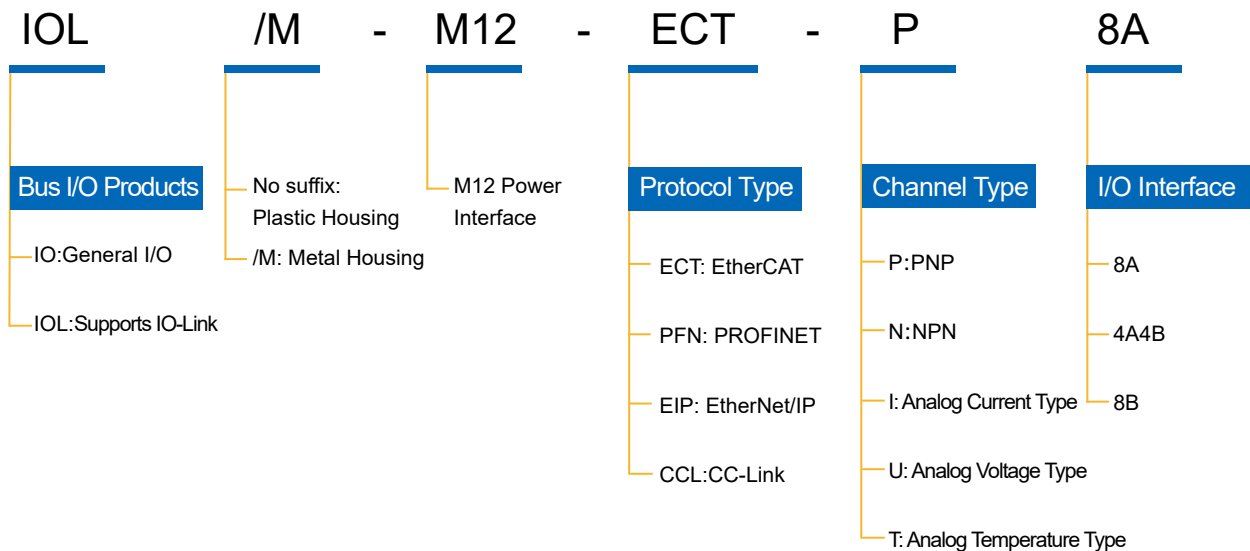
WAIN IO-Link Series

Master Station- Technical Specifications

Parameter Name	Technical Specifications
Operating Voltage (V)	24V DC(18V~30V)
US Total Current	Max 9A
UA Total Current	Max 9A
IO-Link Interface	M12, A-code, 5Pin, Female Connector
IO-Link Channels	8
IO-Link Interface Type	Class-A/Class-B
IO-Link Version	V1.1
Power Interface	M12, L-code, 5Pin, Male/Female Connector
Number of Input Channels	Max 16
Number of Output Channels	Max 16
Signal Type	PNP
Dimensions	225x62x23.5mm
Weight	425g
Mounting Method	Screw Fastening
Altitude	Below 2000m (reference altitude above sea level)
Protection Rating	IP67
Operating Temperature	-25~+70°C
Storage Temperature	-40~+85°C
Relative Humidity	95%, non-condensing

WAIN IO-Link Series

Model Naming Rules: Master Station



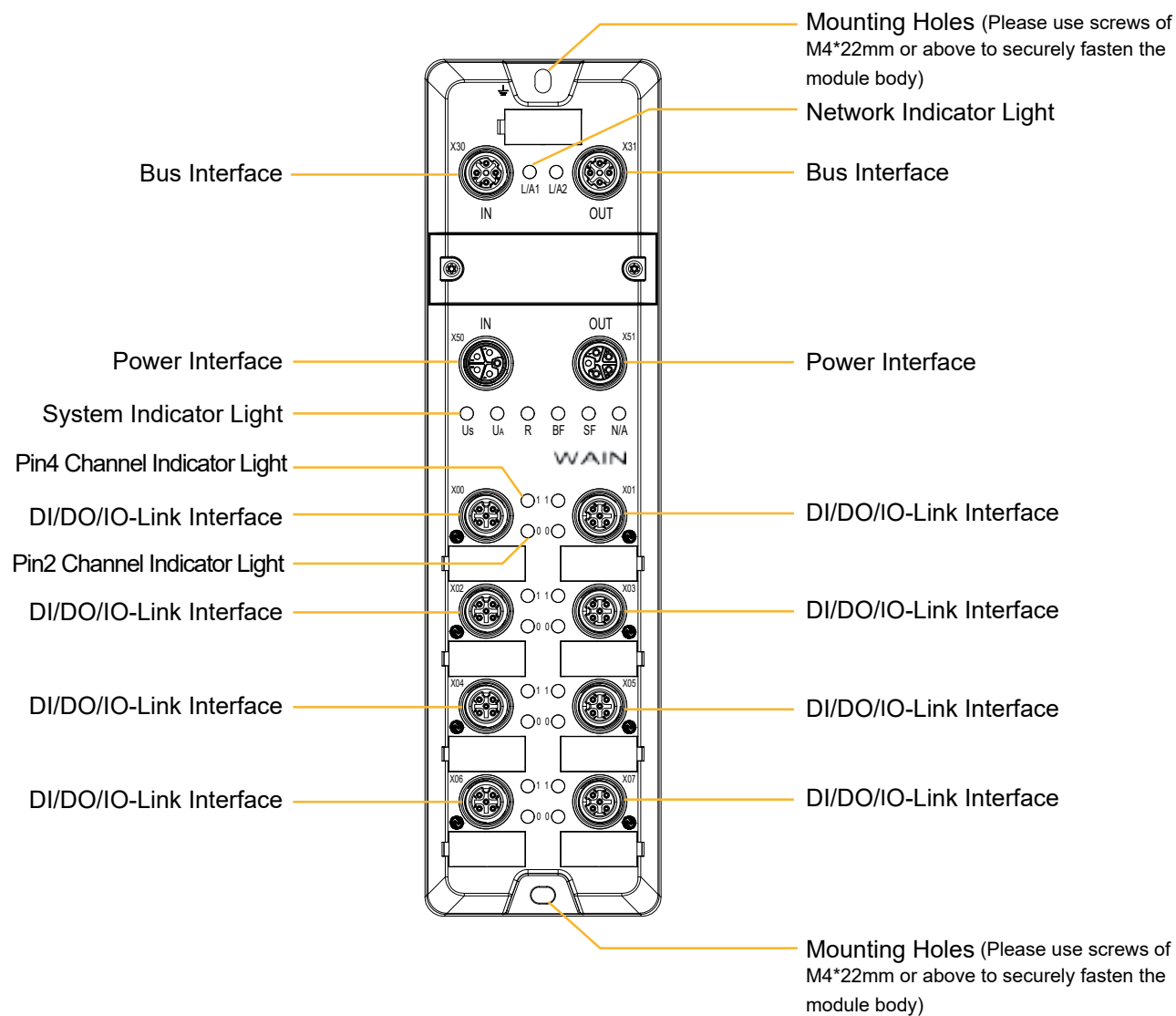
Master Station - Product Model List

Model	Product Description	Order Number
IOL-M12-ECT-P-8A	EtherCAT Bus Protocol, 8xClass-A Port IO-Link Master	171 058 000 3500
IOL-M12-ECT-P-4A4B	EtherCAT Bus Protocol, 4xClass-A, 4xClass-B Port IO-Link Master	171 058 000 3504
IOL-M12-ECT-P-8B	EtherCAT Bus Protocol, 8xClass-B Port IO-Link Master	171 058 000 3505
IOL-M12-PFN-P-8A	PROFINET Bus Protocol, 8xClass-A Port IO-Link Master	171 058 000 3501
IOL-M12-PFN-P-4A4B	PROFINET Bus Protocol, 4xClass-A, 4xClass-B Port IO-Link Master	171 058 000 3502
IOL-M12-PFN-P-8B	PROFINET Bus Protocol, 8xClass-B Port IO-Link Master	171 058 000 3503
IOL-M12-EIP-P-8A	EtherNet/IP Bus Protocol, 8xClass-A Port IO-Link Master	171 058 000 3506
IOL-M12-EIP-P-4A4B	EtherNet/IP Bus Protocol, 4xClass-A, 4xClass-B Port IO-Link Master	171 058 000 3507
IOL-M12-EIP-P-8B	EtherNet/IP Bus Protocol, 8xClass-B Port IO-Link Master	171 058 000 3508
IOL/M-M12-ECT-P-8A	EtherCAT Bus Protocol, 8xClass-A Port IO-Link Master, Metal Housing	171 058 000 1500
IOL/M-M12-ECT-P-4A4B	EtherCAT Bus Protocol, 4xClass-A, 4xClass-B Port IO-Link Master, Metal Housing	171 058 000 1504
IOL/M-M12-ECT-P-8B	EtherCAT Bus Protocol, 8xClass-B Port IO-Link Master, Metal Housing	171 058 000 1505
IOL/M-M12-PFN-P-8A	PROFINET Bus Protocol, 8xClass-A Port IO-Link Master, Metal Housing	171 058 000 1501
IOL/M-M12-PFN-P-4A4B	PROFINET Bus Protocol, 4xClass-A, 4xClass-B Port IO-Link Master, Metal Housing	171 058 000 1502
IOL/M-M12-PFN-P-8B	PROFINET Bus Protocol, 8xClass-B Port IO-Link Master, Metal Housing	171 058 000 1503
IOL/M-M12-EIP-P-8A	EtherNet/IP Bus Protocol, 8xClass-A Port IO-Link Master, Metal Housing	171 058 000 1506
IOL/M-M12-EIP-P-4A4B	EtherNet/IP Bus Protocol, 4xClass-A, 4xClass-B Port IO-Link Master, Metal Housing	171 058 000 1507
IOL/M-M12-EIP-P-8B	EtherNet/IP Bus Protocol, 8xClass-B Port IO-Link Master, Metal Housing	171 058 000 1508

WAIN IO-Link Series

Master Station - Product Structure

Part Name:



WAIN IO-Link Series

Master Station - Bus Interface Definition

Bus Interface Connection View (M12, D-code, Female)



IN

Bus



OUT

Pin	Function
1	TX+, (Transmit Data +)
2	RX+, (Receive Data +)
3	TX-, (Transmit Data -)
4	RX-, (Receive Data -)

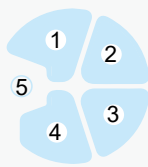
Master Station - Power Interface Definition

Power Interface Connection View (M12, L-code, Male & Female)



IN

Power



OUT

Pin	Function	Wire Color
1	+24V U _S	Brown
2	0V GND _A	White
3	0V GND _S	Blue
4	+24V U _A	Black
5	PE	Gray

WAIN IO-Link Series

Master Station - I/O Interface Definition

I/O Interface Connection View (M12, Class-A/Class-B, Female)



IO-Link

Pin	Function	Wire Color
1	+24V U_S	Brown
2	DI/DO/+24V U_A	White
3	0V GND_S	Blue
4	DI/DO/IO-Link	Black
5	PE/0V GND_A	Gray

Notes:

- For Class-A interfaces, Pin 1 and Pin 3 power comes from system power U_S , and the power for Pin 4 signal output is also provided by U_S .
- For Class-B interfaces, Pin 2 and Pin 5 power comes from auxiliary power U_A , and the power for Pin 4 signal output is provided by U_S .

WAIN IO-Link Series

Signal HUB

Product Introduction

IO-Link is the world's first standardized, cross-vendor IO technology (IEC 61131-9) and is an open standard serial communication protocol. WAIN's IO signal hub (referred to as "HUB") supports IO-Link communication and can support up to 16 digital input channels or 16 digital output channels. As an IO-Link slave, it can connect to any brand of IO-Link master station, meeting users' needs for process data acquisition, diagnostics, and configuration data transmission.

Product Features

- Up to IP67 protection level, suitable for harsh industrial environments
- Simple and quick wiring, allowing for both power supply and data transmission
- Designed according to IO-Link v1.1 specifications
- Can connect to various IO-Link standard devices and standard switching signal inputs
- LED status display, channel protection, and diagnostics



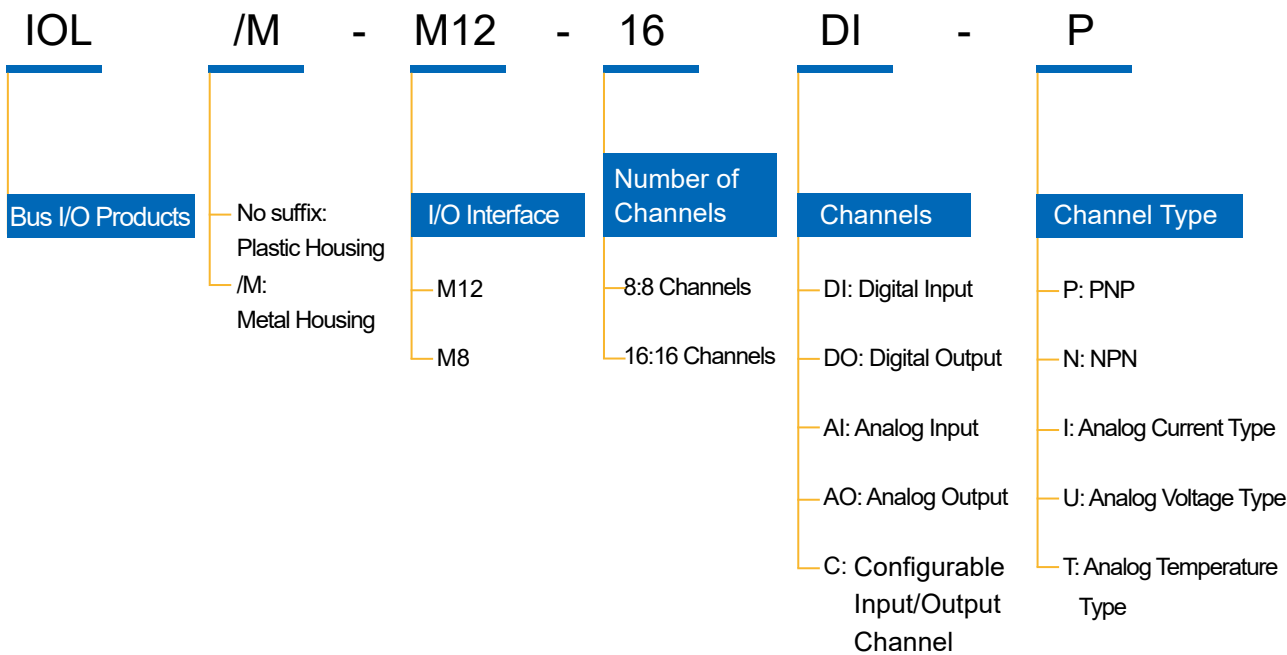
WAIN IO-Link Series

Signal HUB - Technical Specifications

Parameter	Specification	
Operating Voltage (V)	24VDC(18V~30V)	
Current Consumption (mA)	No load: 15mA	
IO-Link Interface	M12, A-code, 4Pin, Male	
IO-Link Interface Type	Class-A	
IO-Link Version	V1.1	
Communication Speed	COM2(38.4kbps)	
Minimum Cycle Time	3.2ms	
Output Interface	M12, A-code, 5Pin, Female	
Input Signal	Signal Type	PNP/NPN
	Number of Channels	Max 16
	Input Current	4mA
Output Signal Type	Signal Type	PNP/NPN
	Number of Channels	Max 16
	Max Output Current per Channel	0.5A
	Total Output Current	Max 4A
Diagnostics	Supports power monitoring, temperature monitoring, short circuit, and overload protection	
Protection Measures	Short circuit protection, overload protection	
Dimensions	164×57×32.2 mm	
Weight	270g	
Mounting Method	Screw fastening	
Altitude	Below 2000m (reference altitude above sea level)	
Protection Rating	IP67	
Operating Temperature	-25~+70°C	
Storage Temperature	-40~+85°C	
Relative Humidity	95%, non-condensing	

WAIN IO-Link Series

Model Naming Rules: Signal HUB



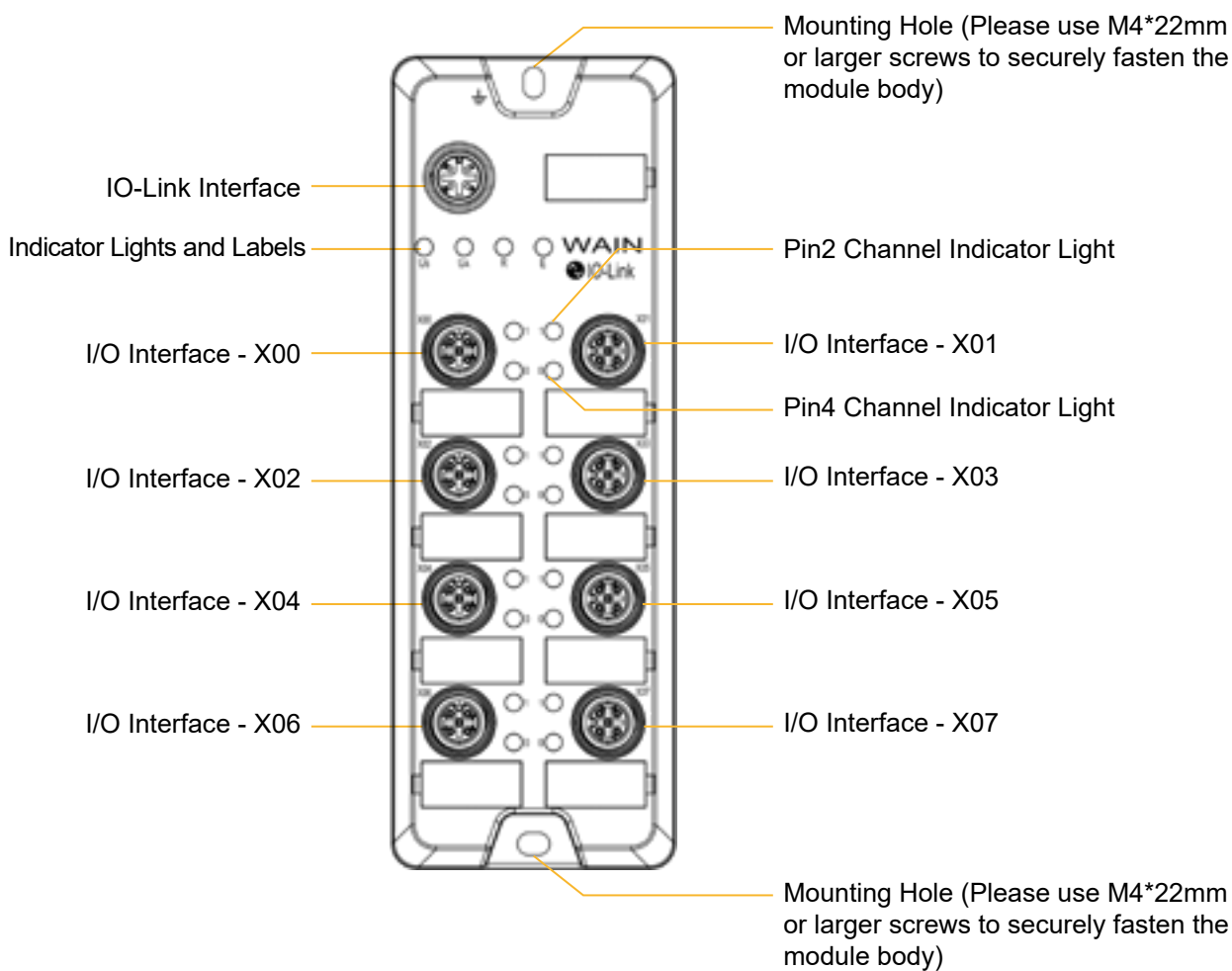
Signal HUB - Product Model List

Model	Product Description	Order Number
IOL-M12-16DI-P	16-channel digital input IO-Link HUB, PNP type, IP67	171 308 005 0301
IOL-M12-16DO-P	16-channel digital output IO-Link HUB, PNP type, IP67	171 308 005 0302
IOL-M12-16C-P	Configurable for up to 16-channel input or 16-channel output IO-Link HUB, PNP type, IP67	171 308 005 0303
IOL-M12-16C-N	Configurable for up to 16-channel input or 16-channel output IO-Link HUB, NPN type, IP67	171 308 005 0304
IOL/M-M12-16DI-P	16-channel digital input IO-Link HUB, metal housing, PNP type, IP67	171 308 005 0305
IOL/M-M12-16DO-P	16-channel digital output IO-Link HUB, metal housing, PNP type, IP67	171 308 005 0306
IOL/M-M12-16C-P	Configurable for up to 16-channel input or 16-channel output IO-Link HUB, metal housing, PNP type, IP67	171 308 005 0307
IOL/M-M12-16C-N	Configurable for up to 16-channel input or 16-channel output IO-Link HUB, metal housing, NPN type, IP67	171 308 005 0308

WAIN IO-Link Series

Signal HUB - Product Structure

Part Names:



WAIN IO-Link Series

Signal HUB - I/O Interface Definition

I/O Interface Connection View (M12, Class-A Port, Male)



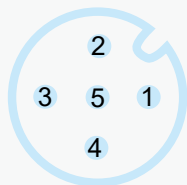
Pin	Function
1	Power Supply Voltage, +24V
2	NC/Signal Input/Signal Output
3	0V, Power Supply GND
4	C/Q, IO-Link Data Transmission Channel

Notes:

For Class-A interfaces, master stations connected to output-supported devices (IOL-M12-16DO-P and IOL-M12-16C-P) can configure Pin 2 to output a high level to provide greater driving capability, or Pin 2 can remain unconnected, with Pin 1 providing the driving power directly. The power supply for Pin 2 shares a common ground with Pin 1. It is not recommended to connect IOL-M12-16DO-P and IOL-M12-16C-P to Class-B interface master stations, or Class-A interface master stations where Pin 2 outputs a low level.

Signal HUB - I/O Interface Definition

I/O Interface Connection View (M12, Class-B Port, Male)

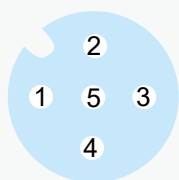


Pin	Function
1	Power Supply Voltage, +24V
2	Auxiliary Power Supply P24
3	0V, Power Supply GND
4	C/Q, IO-Link Data Transmission Channel
5	Auxiliary Power Supply N24

WAIN IO-Link Series

Signal HUB - I/O Interface Definition

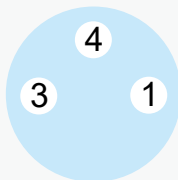
I/O Interface Connection View (M12, Female)



Pin	Function
1	Power Supply Voltage, +24V
2	DI/DO 1, Signal Input/Output 1
3	0V, Power Supply GND
4	DI/DO 0, Signal Input/Output 0
5	NC

Signal HUB - I/O Interface Definition

I/O Interface Connection View (M8, Female)



Pin	Function
1	Power Supply Voltage, +24V
2	0V, Power Supply GND
4	DI/DO, Signal Input/Output