Customer Presentation

INDUSTRIAL I/O MODULES

PRODUCT NOTICE

PRESENTER:
DATE:

creating connections for life

INDUSTRIAL I/O MODULES

Industrial I/O Modules from Molex are robust and durable IP67-rated input/output (I/O) modules designed for connecting industrial controllers and devices in harsh-duty environments to enable fast and versatile automation of industrial networks that use CANopen, EtherNet/IP or PROFINET protocols.

Key Product Information

Category: Industrial automation

Protocols: CANopen, EtherNet/IP or PROFINET

Ingress Protection: IP67 rated

Mounting: 30.00 or 60.00mm on machine

Operating Temperatures: -20 to +70°C

CANopen Module Datasheet

EtherNet/IP Module Datasheet

PROFINET Module Datasheet

View Product Landing Page

Series	
112095	**EtherNet/IP and PROFINET I/O Modules**
112098	**CANopen I/O Modules**

Vital Product Information

Industrial I/O Modules

What makes this product different from the competition?

- These products are 100% designed by Molex, including the hardware, firmware and software. This ensures all components are high quality and designed specifically for their purpose.
- The modules use Molex M12 Ultra-Lock Connectors with “push-pull” technology that provides a simple, fast and secure operator-independent M12 connection.
- Molex Industrial I/O Modules are fully functional over the entire operating temperature range.
- Molex can provide end-to-end automation solutions including cable products for connecting power, sensors/actuators and the network.

How does this product create value for our customers?

Enhanced Reliability – Molex Industrial I/O Modules are built to withstand harsh environmental conditions, including dust and water exposure. This durability ensures consistent performance and reduces downtime, which is crucial for maintaining uninterrupted operations in industrial settings. Minimizing the need for frequent replacements or repairs also translates to lower maintenance costs and a higher return on investment over the module’s lifetime.

Simple, Safe Installation – Industrial I/O Modules feature M12 Ultra-Lock push-pull connectors. This technology provides a safe, reliable connection of sensors, actuators and other control devices. The operational benefits of the Ultra-Lock technology continue to grow over time, including up to an 80% reduction in the time needed for electrical wiring installation and commissioning of industrial machinery and automation systems.

Vital Product Information

Industrial I/O Modules

How does this product create value for our customers? (cont'd)

Increased Efficiency - Industrial I/O Modules simplify the connection of sensors and actuators to control systems, streamlining the automation process. The ease of installation and maintenance allows for quicker setup and reduced labor costs, enhancing overall system efficiency.

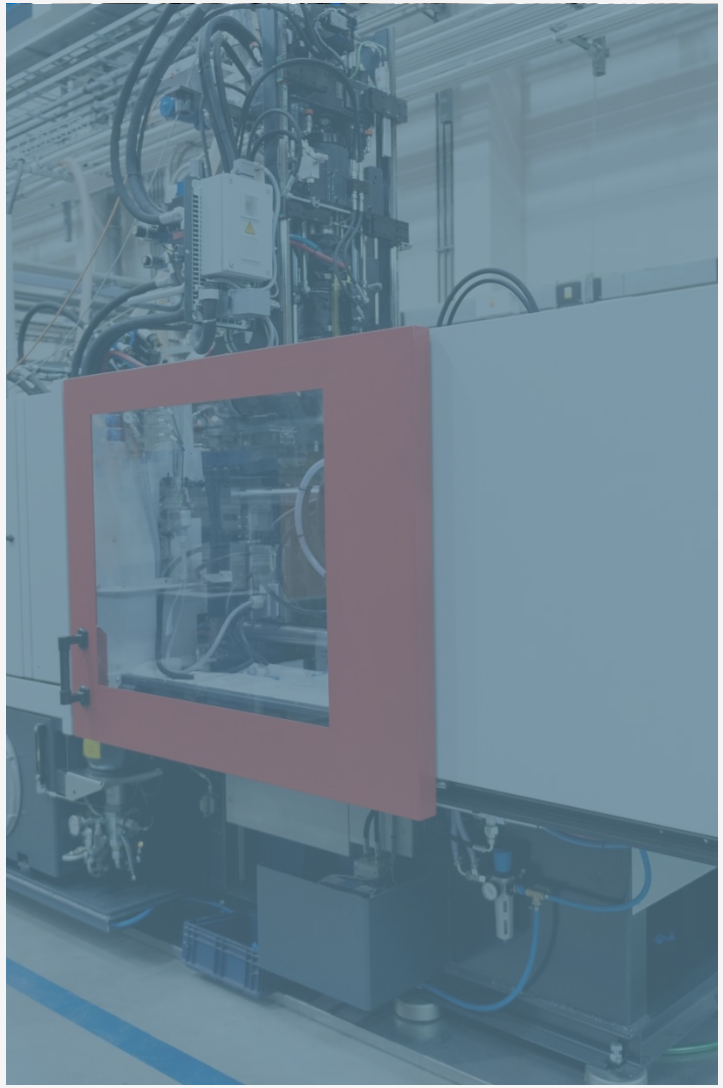
Versatility – These I/O modules support different signal types, including digital inputs, outputs and user-configurable connections. This flexibility makes them suitable for various applications, allowing customers to use a single solution across multiple projects and reducing the need for stocking different types of modules.

Scalability – Industrial I/O Modules are designed to be easily integrated into existing systems, providing a scalable solution that can grow with the customer's needs. This scalability is essential for businesses looking to expand their operations without overhauling their entire control system.

Compliance and Standards – Industrial I/O Modules comply with industry standards for safety and electromagnetic compatibility. This compliance ensures that customers can use them in regulated industries without facing legal or operational issues, thus providing peace of mind.

What is the Molex advantage?

Molex offers end-to-end industrial automation solutions, including hardware and software for a range of industrial network protocols. Molex's expertise in all aspects of industrial automation and functional safety helps customers optimize networks and improve efficiency.



Product Overview

Industrial I/O Modules

Solutions for Major Industrial Protocols

Industrial I/O Modules are available for common industrial protocols, including CANopen, CIP Safety, EtherNet/IP and PROFINET, providing advanced connectivity capability to a wide range of industrial networks.

Robust IP67-Rated Housing for Harsh Environments

Designed to be machine-mountable for harsh environments subject to dust and moisture ingress, temperature extremes, shocks and vibration, Industrial I/O Modules are IP67 rated to operate reliably in a variety of challenging conditions found on the factory floor.

Streamlined Industrial Network Design and Maintenance

Industrial I/O Modules provide various combinations of fixed and configurable I/O connections for maximum network design flexibility, while Ultra-Lock M12 push-to-lock connectors and Quick Connect capability help accelerate changeover and maintenance operations.

Markets and Applications

Industrial I/O Modules

Automotive Assembly Lines

Conveyors

INDUSTRIAL AUTOMATION

- Automotive assembly lines
- CNC machines
- Complex factory automation devices
- Conveyors
- Material handling devices
- Robotic cells
- Warehouse automation systems

Frequently Asked Questions

Industrial I/O Modules

General Questions

What does IP67 mean?
IP67 indicates the level of protection the module offers against dust and water. The “6” signifies complete protection against dust ingress, while the “7” means the module can withstand immersion in water up to 1.0m deep for 30 minutes.

What are I/O modules used for?
I/O modules are used to interface sensors, actuators and other field devices with a control system. They facilitate the input and output of signals in automation systems.

Technical Specifications

What voltages do Industrial I/O Modules typically support?
Molex Industrial I/O Modules typically support a voltage range of approximately 19V to 28V DC. It is important to check the specific product datasheet for exact voltage specifications.

What types of signals can these modules handle?
Molex Industrial I/O Modules can handle digital (both input and output) signals.

Frequently Asked Questions (cont'd)

Industrial I/O Modules

Installation and Maintenance

How do I install an I/O module?
Installation involves mounting the module in a suitable location, connecting the field devices to the module, and ensuring proper power and network connections. Always refer to the user manual for specific instructions.

What kinds of connectors are used for these modules?
Molex Industrial I/O Modules use M8 or M12 connectors for field device connections, due to their robust design and ease of use. Fast and secure Ultra-Lock connectors accelerate changeover operations, while threaded Mini-Change connectors are also available for greater flexibility.

Environmental Considerations

Can these modules be used in extreme temperatures?
Yes, Industrial I/O Modules are designed to operate at 100% capability in a wide range of temperatures ranging from -20 to +70°C.

Are I/O modules resistant to chemicals?
IP67 modules generally have some degree of chemical resistance, but this can vary. It's important to verify the module material's compatibility with the specific chemicals it will be exposed to.

Frequently Asked Questions (cont'd)

Industrial I/O Modules

Safety and Troubleshooting

Are Industrial I/O Modules compliant with industry standards?

Yes, they are designed to comply with relevant industry standards for safety, electromagnetic compatibility (EMC) and environmental protection. Check the product documentation for specific certifications.

Can I perform a firmware update on the module?

Firmware updates typically involve connecting the module to a computer via its communication interface and using the manufacturer's software tool to upload the new firmware. Molex I/O Ethernet modules support firmware updates.

Solving Industry Challenges

Industrial I/O Modules

Industry Need	Industry Challenge	Industry Solution	Anticipated Results
Streamlined connectivity for standard network protocols	Customers need easy-to-implement I/O connectivity for industrial network devices using standard fieldbus protocols.	Industrial I/O Modules use standard fieldbus protocols. EtherNet/IP and PROFINET versions use Quick Connect capability to start and operate the module in less than 500 milliseconds.	Manufacturers can quickly and easily build, modify and maintain their industrial networks by using versatile Industrial I/O Modules.
Flexibility to update or change industrial network connections	Customers need the flexibility to adapt network connections to different devices and channels.	With Industrial I/O Modules, users can choose between fixed or configurable digital I/O channels to increase machine and network design flexibility and improve ease of use.	With easier-to-use and more flexible I/O modules that are highly configurable, customers can save design time, reduce maintenance downtime and optimize costs.
Robust and reliable I/O connectivity	Industrial customers need network connections capable of withstanding the harsh environment on the factory floor.	Molex Industrial I/O Modules are IP67 rated for reliable operation in harsh environments, including on-machine use, and are vibration and dust resistant.	System performance and reliability is improved by using durable Industrial I/O Modules built to withstand tough conditions.
Simple diagnostic capability for monitoring network performance	Customers need the ability to easily monitor network performance and status.	Industrial I/O Modules feature LED indicators that instantly convey I/O, module and network status information.	Customers can more easily monitor networks and diagnose errors, speeding responses and reducing downtime.

Product Advantages and Features

Industrial I/O Modules

Is resistant to vibration and dust
Resin potting seals cables against environmental ingress for on-machine mounting.

Provides flexibility to configure module for multiple applications
Users can choose between fixed and configurable digital I/O channels, with various input and output combinations available, to improve versatility and reduce costs.

Reduces installation time with M12 Ultra-Lock push-to-lock connectors
Fast and secure Ultra-Lock connectors enable quick changeovers, with threaded Mini-Change connectors also available for greater flexibility.

Accelerates time to market with off-the-shelf options
Delivery is available in six to eight weeks.

Enables simplified networking for industrial networks
Modules are compliant with common industrial protocols. Ethernet ring redundancy (MRP feature) and Quick Connect capability to start and connect the module in less than 500 milliseconds minimize installation time and downtime.

Key Specifications	
Protocols	CANopen, EtherNet/IP, PROFINET
Ingress Protection	IP67 rated
Mounting	On machine
Form Factor	30.00 or 60.00mm
Connector Types	4- or 5-pole M12 Ultra-Lock, 5-pole Mini-Change
Operating Temperatures	-20 to +70°C

Communicates module and network status quickly through diagnostics LEDs
Maintenance personnel can easily determine I/O, module and network status by using diagnostic capabilities via an embedded web server, fieldbus messaging and diagnostic LED indicators.

Product Family Overview

Industrial I/O Modules

	CANopen I/O Modules	EtherNet/IP I/O Modules	PROFINET I/O Modules	CIP Safety I/O Modules
Series Number	112098	112095	112095	112095
IP Rating	IP67	IP67	IP67	IP67
Form Factor	Compact (30.00mm)	Classic (60.00mm)	Classic (60.00mm)	Classic (60.00mm)
Power Connector	N/A	4- or 5-pole Mini-Change	5-pole Mini-Change	4- or 5-pole Mini-Change
Network Connector	5-pole M12 Ultra-Lock, female, A-code	5-pole M12 Ultra-Lock, female, D-code	5-pole M12 Ultra-Lock, female, D-code	5-pole M12 Ultra-Lock, female, D-code
I/O Connector	3-pole M8	5-pole M12 Ultra-Lock, female, A-Code	5-pole M12 Ultra-Lock, female, A-Code	5-pole M12 Ultra-Lock, female, A-Code
I/O Versions	8 inputs 8 I/O user configurable	16 inputs 8 inputs + 8 outputs 16 I/O user configurable	16 inputs 8 inputs + 8 outputs 12 inputs + 4 outputs 16 I/O user configurable	12 safe inputs + 4 safe sourcing outputs 12 safe inputs + 2 safe bipolar outputs
Output Load Current	2.0A per output (max.), 4.0A per module (max.)	2.0A per output (max.), 8.0A per module (max.)	2.0A per output (max.), 8.0A per module (max.)	1.0A per safe sourcing output (max. 8.0A), 2.0A per safe bipolar output (max. 8.0A)
Operating Temperatures	-25 to +70°C	-20 to +70°C	-20 to +70°C	-20 to +70°C

Product Specifications

CANopen I/O Modules

Reference Information

Packing: Carton
Designed in: Millimeters
CANopen Certification: Yes
RoHS: Yes
CE: Yes
REACH: Yes
cUL: Yes
EMC: IEC 61000-6-2
I/O Configurations:
8x inputs
8x I/O user configurable using ESD file

Connectors

I/O Connectors: Female, M8, 3 pole
Bus In: Male, M12, A-code, 5 pole
Bus Out: Female, M12, A-code, 5 pole
Power Connectors: No (power supply via CAN bus)

Physical

Dimensions: 175.00 by 30.00 by 20.00mm (6.89" by 1.18" by 0.78")
Housing: IP67-rated according to IEC 60529
Housing Material: PBT VALOX 420 SEO
Operating Temperatures: -25 to +70°C
Storage Temperatures: -25 to +85°C
Relative Humidity: 10 to 95%, non-condensing

Input

Input Type: Compatible with dry contact, PNP or NPN, 2/3-wire sensors
Diagnostic LEDs: Yes
Electronic Short Circuit Protection: Yes
Input Delay: 2.5 milliseconds default or configurable through CANopen object parameter
Input Device Supply: 200mA per port at 25°C

Output

Output Load Current (max.): 2.0A per channel, 4.0A per module
Switching Frequency (max.): 300 Hz

Fieldbus

CANopen Slave, DS401 Profile
I/O Data Access Method: Synchronous acyclic, synchronous (sync) and asynchronous

Communication

Communication Rate: Auto baud, all CAN baud rates up to 1M baud
Address Settings: 1 to 99 by 2 rotary switches

Shock and Vibration

Mechanical Shock: 10G, 11 milliseconds, 3 axes
Vibration: EN 60068-2-6

Additional Resources	
Web Overview Page	https://www.molex.com/en-us/products/industrial-automation/IP67-rated-industrial-i-o-modules
Datasheet	987652-7403.pdf (molex.com)
Global Product Manager	Eric Gory, ISBU, DSS

Product Specifications

EtherNet/IP I/O Modules

Reference Information

Packing: Carton
Designed in: Millimeters
ODVA Certification: Yes
RoHS: Yes
CE: Yes
REACH: Yes
cULus/CSA: Yes (CSA 22.2)
EMC: EN 61000-6-2/EN 61000-6-4
I/O Configurations:
- 16 inputs
- 12 inputs + 4 outputs
- 8 inputs + 8 outputs
- 16 I/O user configurable

Physical

Dimensions: 220.00 by 60.00 by 37.50mm
Housing: IP67 rated
Housing Material: PBT VALOX 420 SEO
Operating Temperatures: -20 to +70°C
Storage Temperatures: -40 to +85°C
Relative Humidity: 10 to 95%, non-condensing
Firmware: Upgradeable

Input Channels

Input Type: PNP, sinking, IEC 61131-2- Type 3
Diagnostic LEDs: Yes
Sensor Power Supply: 140mA (pin 1), short circuit protection and overcurrent protection
Input Filter: 5 milliseconds
Connector: M12, 4-pin, female, A-code, Nickel Brass

Output Channels

Output Type: PNP, sourcing
Output Current: 2.0A per channel (max. 8 at 25°C)
Diagnostic LEDs: Yes
Short Circuit and Overcurrent Protection: Yes
Connector: M12, 4-pin, female, A-code, Nickel Brass
Switching Frequency: 200 Hz

Shock and Vibration

Vibration: EN 60068-2-6/EN 60068-2-29
Mechanical Shock: EN 60068-2-6/EN 60068-2-29

Product Specifications (cont'd)

EtherNet/IP I/O Modules

Fieldbus

Network Connectors: 2 x M12, 4-pole, female, D-code, Nickel Brass

Diagnostic LEDs: Yes (per port, link/speed/activity)

Rotary Switches: 3 (fixed, DHCP, stored)

Protocol: EtherNet/IP adapter spec. v2.3

I/O and Explicit Communications Support: Yes

Requested Packet Interval (RPI): 1 millisecond

Features: DLR client, ACD, Quick Connect (class A)

Ethernet Packet: Manage up to 9,000 packets per second

Description File: Yes (EDS)

EDS File Upload from Module: Uses Rockwell RSLinx

Power Connectors

Power In: Male Mini-Change, 4 pole or 5 pole

Power Out: Female Mini-Change, 4 pole or 5 pole

Protection Against Power Crossing: Yes

Power Requirements

Module Input Power: 24V DC (-15/+20%)

Module Output Power: 24V DC (-15/+20%), 8.0A max. per module

Diagnostic LEDs: Yes (logic/input and output) with detection of high- and low-voltage operation

Additional Resources	
Web Overview Page	**https://www.molex.com/en-us/products/industrial-automation/IP67-rated-industrial-i-o-modules**
Datasheet	987651-6201.pdf (molex.com)
Global Product Manager	Eric Gory, ISBU, DSS

Product Specifications

PROFINET I/O Modules

Reference Information

Packing: Carton

Designed in: Millimeters

PI PROFINET Conformance: Yes

RoHS: Yes

CE: Yes

REACH: Yes

cULus/CSA: Yes (CSA 22.2)

EMC: EN 61000-6-2/EN 61000-6-4

I/O Configurations:

- 16 inputs
- 14 inputs + 2 outputs
- 12 inputs + 4 outputs
- 8 inputs + 8 outputs
- 16 I/O universal and user configurable

Physical

Dimensions: 220.00 by 60.00 by 37.50mm

Housing: IP67 rated

Housing Material: PBT VALOX 420 SEO

Operating Temperatures: -20 to +70°C

Storage Temperatures: -40 to +85°C

Relative Humidity: 10 to 95%, non-condensing

Firmware: Upgradeable

Input Channels

Input Type: PNP, sinking, IEC 61131-2- Type 3

Diagnostic LEDs: Yes

Sensor Power Supply: 140mA (pin 1), short circuit protection and overcurrent protection

Input Filter: 5 milliseconds

Connector: M12, 4-pin, female, A-code, Nickel Brass

Output Channels

Output Type: PNP, sourcing

Output Current: 2.0A per channel (max. 8 at 25°C)

Diagnostic LEDs: Yes

Short Circuit and Overcurrent Protection: Yes

Connector: M12, 4-pin, female, A-code, Nickel Brass

Switching Frequency: 200 Hz

Shock and Vibration

Mechanical Shock: EN 60068-2-6/EN 60068-2-29

Vibration: EN 60068-2-6/EN 60068-2-29

Product Specifications (cont'd)

PROFINET I/O Modules

Fieldbus

PROFINET: Yes, 10 devices (according to specification v2.2)

Conformance: Class B (CC-B)

I/O Update Rate: Up to 1 millisecond

Data Access:
Cyclic (for I/O data)
Acyclic (for read/write alarms, module configuration and diagnostic)

PROFIenergy: Yes

SNMP V1/V2/V3: Yes

LLDP: Yes (sender/receiver)

MRP: Yes (client)

Fast Start-Up: Yes

I&M: Yes

Upload GDS File: Yes (via integrated web)

IP Address Capabilities: DCP (default) or static

Easy Replacement: Based on DCP/LLDP

Fallback Process Output Value: Via GSD

Power Connectors

Power In: Male Mini-Change, 5 pole

Power Out: Female Mini-Change, 5 pole

Protection Against Power Crossing: Yes

Power Requirements

Module Input Power: 24V DC (-15/+20%)

Module Output Power: 24V DC (-15/+20%), 8.0A max. per module

Diagnostic LEDs: Yes (logic/input and output) with detection of high- and low-voltage operation

Ethernet Switch

Network Connectors: 2 x M12, 4-pole, female, D-code, Nickel Brass

Diagnostic LEDs: Yes (per port, link/speed/activity)

Data Speed: 2 port, 10/100 Mbps (auto-negotiation)

Additional Resources	
Web Overview Page	**https://www.molex.com/en-us/products/industrial-automation/IP67-rated-industrial-i-o-modules**
Datasheet	987652-7411.pdf (molex.com)
Global Product Manager	Eric Gory, ISBU, DSS

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