Make Life Easy

Instruction manual

Field Network Devices

ARIO Series

Thank you for purchasing an Autonics product.
This user manual contains information about the product and its proper use, and should be kept in a place where it will be easy to access.

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Preface

Thank you for purchasing Autonics product.

Please familiarize yourself with the information contained **in the Safety Considerations section** before using this product.

This user manual contains information about the porduct and its proper use, and should be kept in a place where it will be easy to access.

Instruction Manual Guide

- Please familiarize yourself with the information in this manual before using the product.
- This manual provides detailed information on the product's features. It does not offer any guarantee concerning matters beyond the scope of this manual.
- This manual may not be edited or reproduced in either part or whole without permission.
- This manual is not provided as part of the product package.
  Please visit our website (www.autonics.com) to download a copy.
- The manual's content may vary depending on changes to the product's software and other unforeseen developments within Autonics, and is subject to change without prior notice.
  Upgrade notice is provided through our homepage.
- We contrived to describe this manual more easily and correctly. However, if there are any corrections or questions, please notify us these on our website.

Instruction Manual Symbols

Symbol	Description
 **Note**	Supplementary information for a particular feature.
 **Warning**	Failure to follow instructions can result in serious injury or death.
 **Caution**	Failure to follow instructions can lead to a minor injury or product damage.
 **Ex.**	An example of the concerned feature's use.
※1	Annotation mark.

Safety Considerations

- Please observe all safety considerations for safe and proper product operation to avoid hazards.
- Safety considerations consist of 'warning' and 'caution. The following symbols represent caution due to particular circumstances in which hazards may occur.

⚠ Warning	Warning	Failure to follow instructions can result in serious injury or death.
⚠ Caution	Caution	Failure to follow instructions can lead to a minor injury or product damage.

⚠ Warning

- Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss. (e.g. nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime/disaster prevention devices, etc.)
  Failure to follow this instruction may result in personal injury, economic loss or fire.
- Do not use the unit in the place where flammable/explosive/corrosive gas, high humidity, direct sunlight, radiant heat, vibration, impact, or salinity may be present.
  Failure to follow this instruction may result in explosion or fire.
- Do not disassemble or modify the unit.
  Failure to follow this instruction may result in fire.
- Do not connect, repair, or inspect the unit while connected to a power source.
  Failure to follow this instruction may result in fire.
- Check 'Connections' before wiring.
  Failure to follow this instruction may result in fire.

⚠ Caution

- Use the unit within the rated specifications.
  Failure to follow this instruction may result in fire or shortening the life cycle of the product.
- Use a dry cloth to clean the unit, and do not use water or organic solvent.
  Failure to follow this instruction may result in fire or electric shock.
- When connecting the power input and I/O wiring, use AWG 22~16 cable.
  After checking the connecting and removing the wire, use the crimp terminal.
  Failure to follow this instruction may result in fire or malfunction due to contact failure.
- Keep the product away from metal chip, dust, and wire residue which flow into the unit.
  Failure to follow this instruction may result in fire or product damage.
- Do not cut off power or disconnect connectors (or terminals) while operating the unit.
  Failure to follow this instruction may result in fire or product damage.

※ **The specifications and dimensions of this manual are subject to change without any notice**

Caution during Use

- Follow instructions in ‘Caution during Use’. Otherwise, it may cause unexpected accidents.
- ABUS power and I/O power should be insulated by the individually insulated power device.
- Power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.
- Use the rated standard cables and connectors. Do not apply excessive power when connecting or disconnecting the connectors of the product.
- Keep away from high voltage lines or power lines to prevent inductive noise.
  In case installing power line and input signal line closely, use line filter or varistor at power line and shielded wire at input signal line.
  For the stable operation, use shield wire and ferrite core, when wiring communication wire, power wire, or signal wire.
- Do not use near the equipment which generates strong magnetic force or high frequency noise.
- Do not touch the module communication connecter part of the base.
- Do not connect or remove the base while connected to a power source.
- For removing the terminal, body or base, do not operate units for a long time without it.
- This unit may be used in the following environments.
  ① Indoors
  ② Altitude max. 2,000m
  ③ Pollution degree 2
  ④ Installation category II

Table of Contents

1 ARIO series overview

1.1 Features

The field network device reduces the complexity of installing a system and remotely controls I/O at the factory automation line. On the purpose of controlling I/O in the vicinity of the sensor and actuator, the device receives or provides the digitalized command values transmitted from the remote PLC and industrial PC.

The field network does not directly connect I/O to the control devices such as PLC but connects by the digitalized communication. Also, the error control provided by the field network makes this device has a strong tolerance to the various on-site noises resulted from data transmission. Each field network provides the functions for making a priority of nodes(slave) and, if necessary, provides additional information of nodes to figure out the status of the device layer in the IoT system.

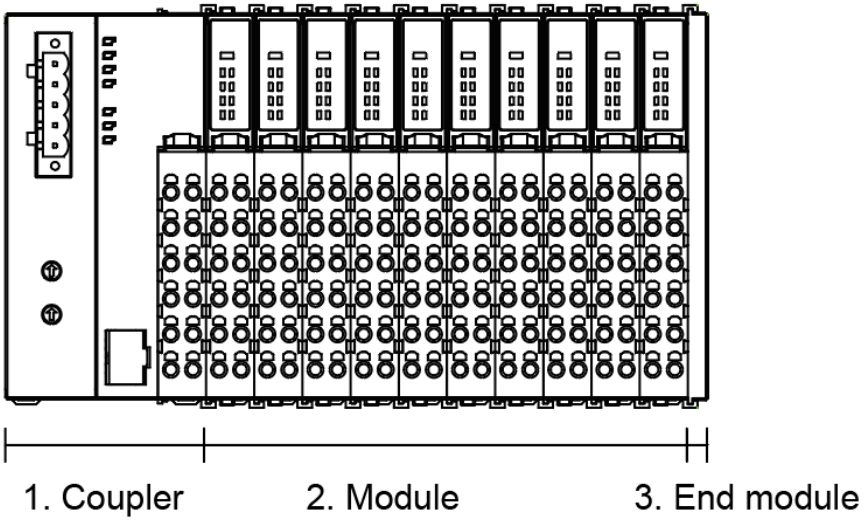
ARIO consists of two parts. One is the coupler which enables communication, and the other is the module which monitors input/output signals. Furthermore, consisting of various forms of units is available. It helps to control I/O remotely as well as efficiently, improving the concept of equipment and system design.

Installing the field network device at the nearest place for I/O reduces the costs of wiring. Providing a single node to the equipment requiring various signals, reducing configuration complexity. In other words, one coupler supporting field network communication connects with multiple modules, digital and analog I/O, and special-purpose IO, simplify a system.

The product family of the Remote I/O supporting field network is one of the products to meet the latest market paradigm represented by Smart Factory. It is available to apply to the power electronics, home, building, and medical industries.

- I/O supported based on industrial Ethernet/Fieldbus serial communication for Smart Factory
- Sequential multiple I/O distribution control via PLC, Industrial PC, etc.
- Coupler: Supports a total 8 different communications. (EtherCAT, CC-Link, ProfiNet, ProfiBus, Ethernet/IP, DeviceNet, Modbus TCP compatible, Modbus RTU compatible)
- Module: Various Input/Output Modules, Power Modules:
  Digital input/output (4/8CH), Analog input/output (2/4CH), Remote ABUS/ I/O power
- Up to 64 modules can be extended (depending on communication)
- Hot-swap function: Maintenance and setting can be restored automatically by replacing terminal and body during operation
- Push-in connection method: Easy wire connection without tools helps to reduce the workload
- Expanded user convenience with DAQMaster, a device integration management program
  - Module setting, real-time control, monitoring, and diagnosis of input/output signal.
  - Product selection and placement through virtual mode, offering recommended sorting.

1.2 Slim remote I/O system



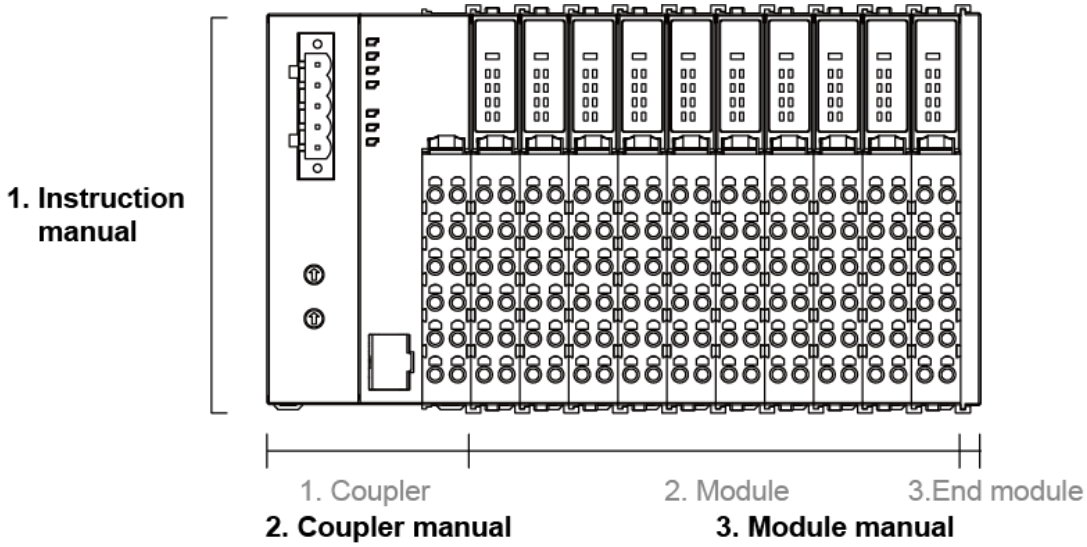
No	Name	Main features
1	Coupler	- Field network communication (Slave) as insulated - Manages memory map and sets modules - 24VDC coupler power as external non-insulated
2	I/O module	- Digital/Analog input/output module - Hot-swap available
	Power module	- Bus/Field/Terminal/Bus field power module - Hot-swap available
	Special module	- Special module for Temperature/Counter/Pulse and more - Hot-swap available
3	End module	- The last module of system - Prevents base of system exposure

1.3 Glossary

Field Network	The collective term for FieldBus and Industrial EtherNet; this communication network enables distributed control input/output of plant and process automation equipment. (※ IEC61158 doesn't define this terminology. In the standard, it is explained as FieldBus.)
FieldBus	The industrial network that is designed for the field of automation, using real-time, reliability and data flow based on serial communication. (e.g., CC-Link, ProfiBus, DeviceNet, Modbus RTU, etc.) (※ This term has shortly defined the definition from IEC61158)
Autonics BUS	The protocol is defining communication between coupler and module of ARIO series. It is a type of communication topology that enables sending and receiving information and signals sharing a single-wire communication circuit. (e.g., internet hub)
Industrial EtherNet	The industrial network that is designed for the field of automation, using real-time, reliability and data flow based on EtherNet communication. (e.g., EtherCAT, ProfiNet, EtherNet/IP, Modbus TCP, etc.)
Coupler	In ARIO series, this product that is operated as a slave exchanging data with the master of field network and manages input/output of modules.
Module	In ARIO series, this product exchanges data with the coupler and manages input/output.
Unit	In ARIO series, the coupler and modules are assembled to provide separate functions.
Channel	- One digital signal (Bit data), (e.g., 8 signals are represented by 8 Channels) - One analog signal (Word data), (e.g., 4 signals are represented by 4 Channels)
Node	The unit that master recognizes slaves (coupler) in field network. (In case of field network environment consists of one master and three slaves, there are 3 nodes.)
Hole	Multiple circle-shaped holes are where the signal cable is connected. The half-circle shaped holes are the mounting hole to connect/remove the signal cable and to grasp the status of the hole.
Connector	Sold separately to connect the main part of ARIO product and external signal cable. (EtherNet connector, ARIO terminal, D-SUB 9PIN connector, etc.)
Terminal	One of the assembled components in ARIO series provides a combination of signal and power cable to receive signals and power.
Body	One of the assembled components in ARIO series controls and manages the major functions of the module.
Base	One of the assembled components in ARIO series configures ABUS to provide ABUS power, ABIS communication line and Field power (I/O signal level)
Memory	The area is managing all information dealt with ARIO series – input/output, diagnosis, setting information, etc.

DAQMaster	The industrial software to gather and monitor the settings and data of the ARIO series.
Hot-swap	The function to support product maintenance and replacement during operation when the error or malfunction occurs to the ARIO Unit.
Bit	The data type represented by ON/OFF
Word	The data size that the system can process it at once. (※ In general, 16 bits = 1 word in the industrial system.)
Bypass power	In the Hot-swap function, this power line enables the power supply to the next module, even if the body of the module is removed.
Cut-off power	In the Hot-swap function, this power line cut-off the power supply to the next module, if the body of the module is removed.
Memory map	The data row that the coupler and module are separately managing or the master of field network configures data row fitting orders/settings of the slaves.

2 Reference manuals



2.1 Instruction manual

It describes an overview of Remote I/O, definitions of terms, installation environment, mounting/removing method, wiring and troubleshooting.

2.2 Coupler manual

It describes the overview, specification, demensions, memory map and troubleshooting of each communication.

2.3 Module manual

It describes the demensions, specification, connections and diagnosis function of each module.

2.4 DAQMaster user manual

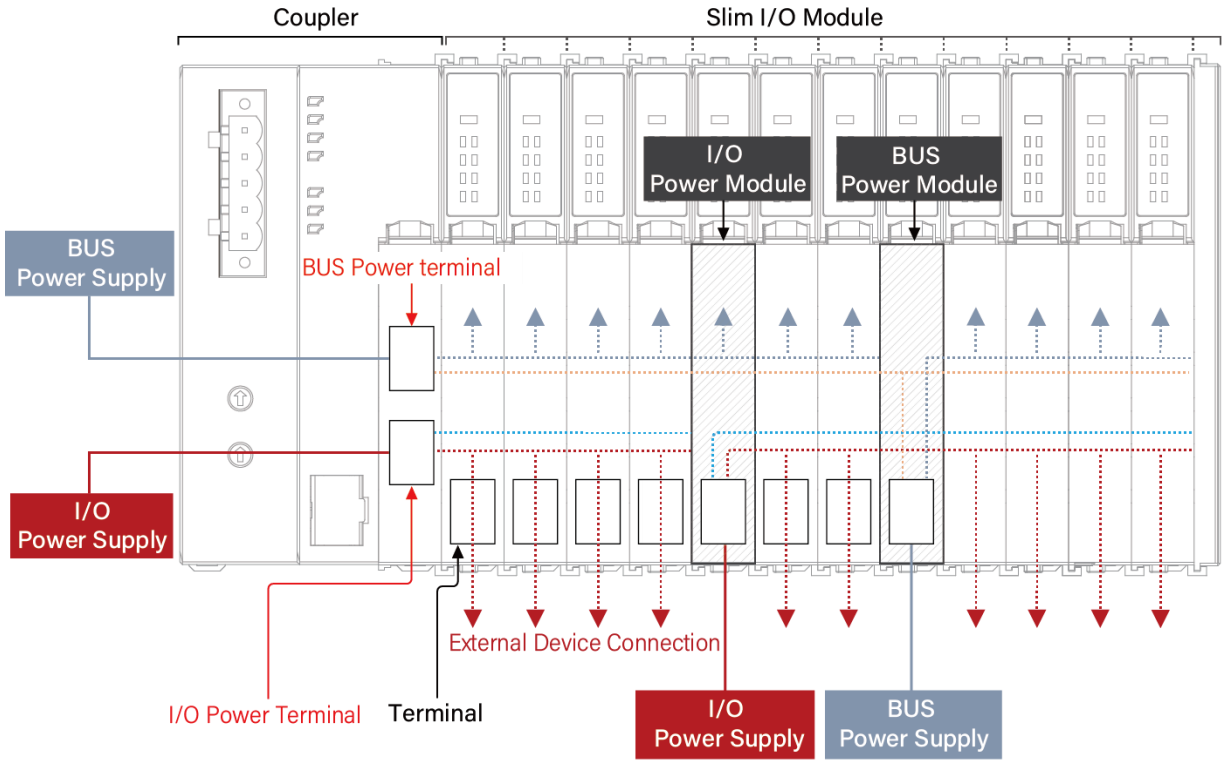
DAQMaster, a device integration management program, provides the expanded user convenience. You can use the module setting, real-time control, and monitoring/diagnosis function of input/output signal (except ARIO-C-PN and ARIO-C-PB). Also, you can arrange products through virtual mode and recommended sorting.

3 Connections

When you configure the units, considering a maximum number of modules and its length of coupler, and power supply of each module. Also, you can use the virtual mode in DAQMaster for the connection method.

Note

- The number of modules is up to 32 or 64 modules.
- Based on that, the length is up to 768mm, including the power module and except the coupler/end modules.



3.1 System power supply and distribution

Name	Terminal Input (external)	Base Distribution (internal, ABUS)		
	Supply Power	Bypass Power	Cut-Off Power	Power Type
Coupler power	ABUS Power I/O Power	do not care	do not care	VDC
ABUS Power Module	ABUS Power	I/O Power	ABUS Power	VDC
I/O Power Module	I/O Power	ABUS Power	I/O Power	VDC, VAC

3.2 Insulation of system power supply

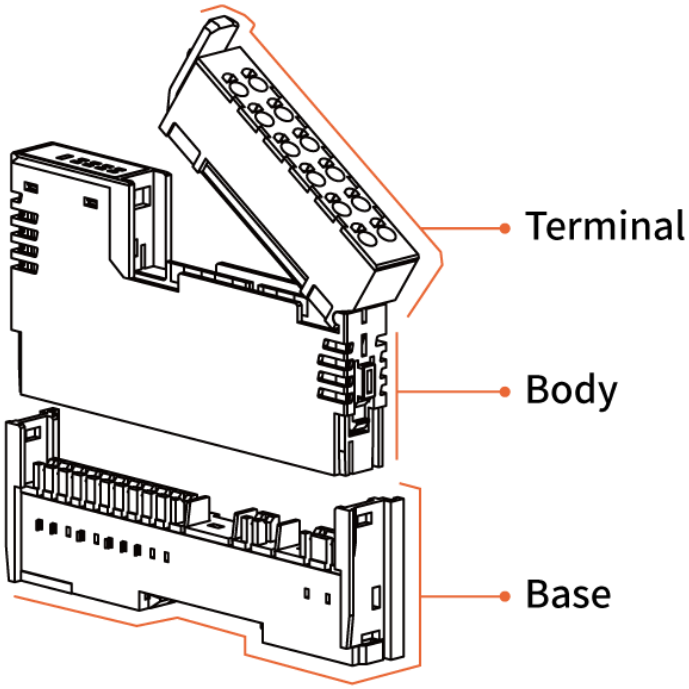
Insulation	Circuit	Description
Insulated	Inner and external communication circuits	Communication terminal for Field network – Inner control circuit
	External ABUS power circuit – External Field power circuit	Between power circuits with external input
Non-insulated	External ABUS power circuit – Inner control circuit	ABUS power supply with external input – (internal) control circuit
	External ABUS power circuit – External control circuit	I/O power supply with external input – (external) control circuit
	Inner BUS power circuit – Inner control circuit	(internal) BUS power supply – (internal) control circuit

Note

- The base of I/O and Power modules has a different shape.
- Pay attention to it when you install the product and use Hot-swap function.

4 Hardware and setup

4.1 Classification of unit



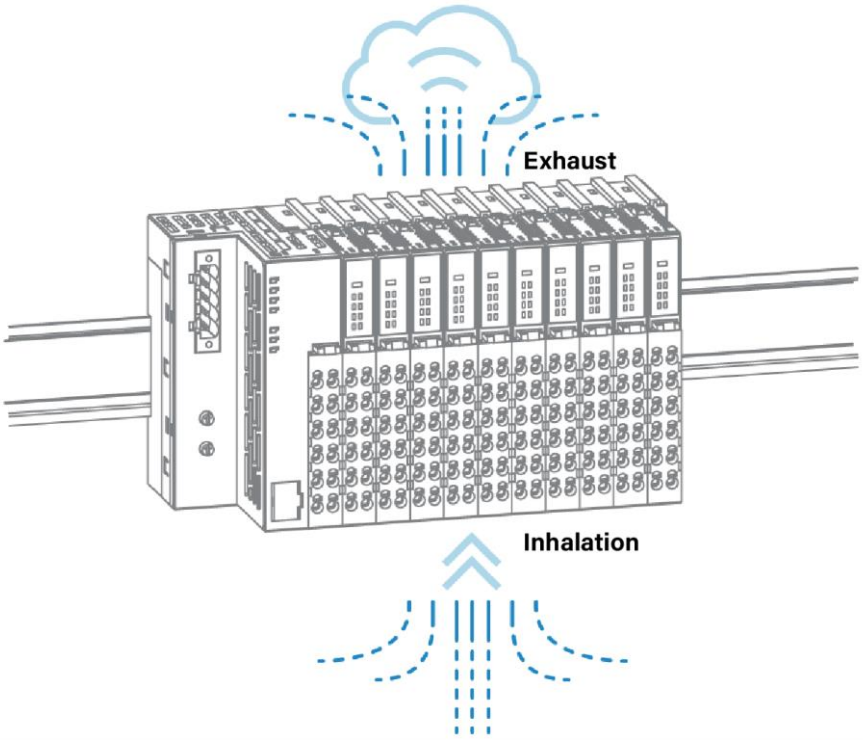
- **Terminal:** Part of the input and output signal comes out of the product
- **Body:** Part of the input and output signal controlled of the product
- **Base:** Part of the communication (ABUS) and power connection between coupler and module

Note

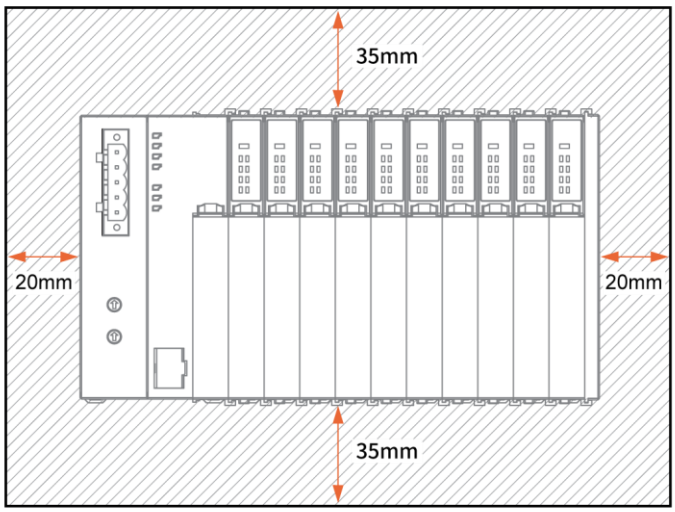
- All modules except the coupler and end module support Hot-swap function: During the operation of the system, the hardware part (terminal and body) can be replaced, and maintenance and settings can be restored automatically.
- For more information, go to the part of 'Hot-swap.'

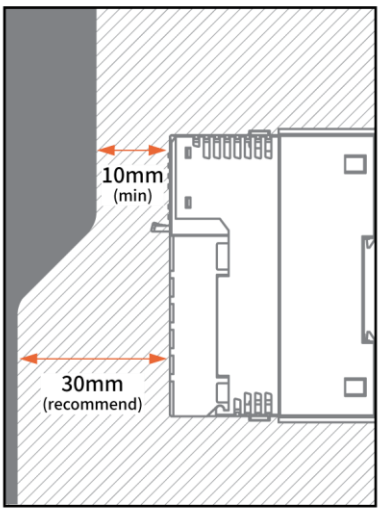
4.2 Installation environment

Consider the terminal positions of product and design for sufficient ventilation. It has to pull the heat from the lower part to the upper part of the product. Install an air exhaust fan in the top.



To minimize the interference and impact of products, wire, and peripheral devices, you must install the ARIO to meet installation distance.





Caution

- There is possible to generate heat while the product is operating. It doesn't have any impact on the operation if a particular case does not occur.
- The functions that the product provides can be limited depending on the installation environment. Please read each products' manuals carefully before you start the installation.

4.3 Installation and disassembly

4.3.1 Attention

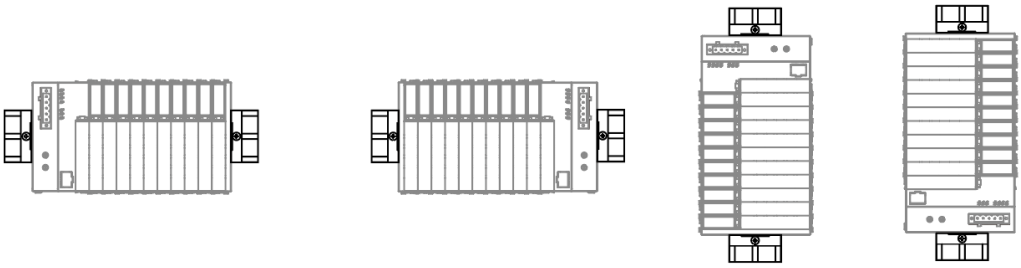
When you configure the units, considering a maximum number of modules and its length of coupler, and power supply of each module. Also, you can use the virtual mode in DAQMaster for the connection method.

Note

- The number of modules is up to 32 or 64 modules. Based on that, the length is up to 768mm, including the power module and except the coupler/end modules.
- When you have difficulty on this configuration, arrange modules like First, place I/O module (word type). And then place another module (bit and 1-byte type) next to it.
- Eight digital I/O modules can be connected to ARIO-P-B.
- Four analog and special I/O modules can be connected to ARIO-P-F1.

4.3.2 Installation order

ARIO series must be installed in this sequence regardless of forms below:
1st Coupler and 2nd Modules.



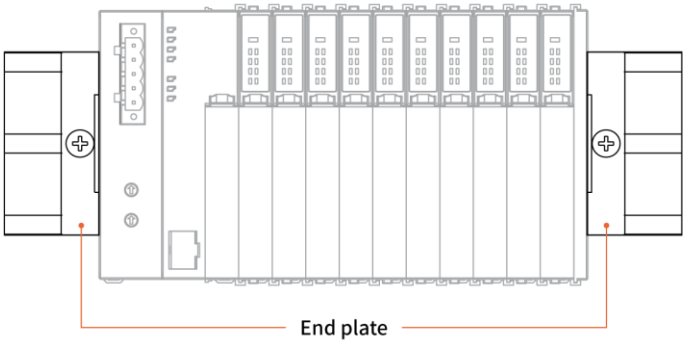
1st Release the rail lock at the back of the module and place it on the DIN Rail.

2nd Press down the module as close as possible to the DIN Rail. (Modules should be attached to the right side of the module.)

3rd Place other modules as described above.

4th Place end module as the last module in the end

5th When the installation of modules is complete, place end plate (sold separately, the recommended height is up to 15mm) at the left side of the coupler and right side of the end module. End plate helps the module is not tilted on the DIN Rail.



4.3.3 Remove the module

Use the screwdriver to unlock the module from the DIN Rail. If another module is connected to the right side of the module to be removed, the base may not be removed.
ARIO series must be removed as the reverse of installation order:
End plate → End module → Module → Coupler.

4.4 Requirements for terminal and cable

Use the UL and KC certified or each field network association certified End Sleeve (Ferrule Terminal) crimp terminals and wire.

Use the copper-conductor wire with the temperature class 60℃

4.4.1 Power and I/O terminal

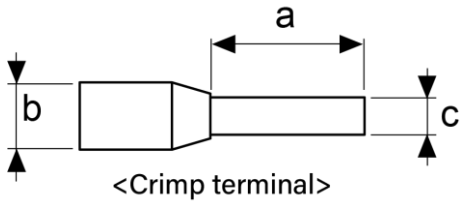
(1) Wire specifications

Wiring method	Screwless
Connection type	Pin connector, Pin terminal
Length of connection	8 to 12 mm (rated length: 10 mm)
Max. wire gauge	AWG 22 to16 (rated gauge: AWG 18)
Current	Max. 2,000mA (one terminal)
Voltage	Max. 230VAC (one terminal)

Caution

- Based on the user's environment, nonrated (e.g., solid wire) wire can be used. However, it may result in personal injury or economic loss. You must use it within the permitted range, preventing from an unexpected operation.

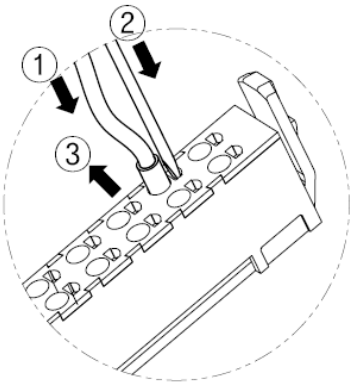
(2) Crimp terminal



<Crimp terminal>

	a	b	c	Certified spec.
Range	8 to 12mm	Max. 3mm	0.6 to 1.3mm	AWG22-16
Recommended	10mm		1mm	AWG18

(3) Connecting



Push the wire connected with the crimp terminal towards direction ① to complete the connection.

(4) Removing

1st Press and hold the catch above the terminal in direction ② with a non-conductive flat head screwdriver(width max. 3mm).

2nd Pull and remove the wire towards direction ③.

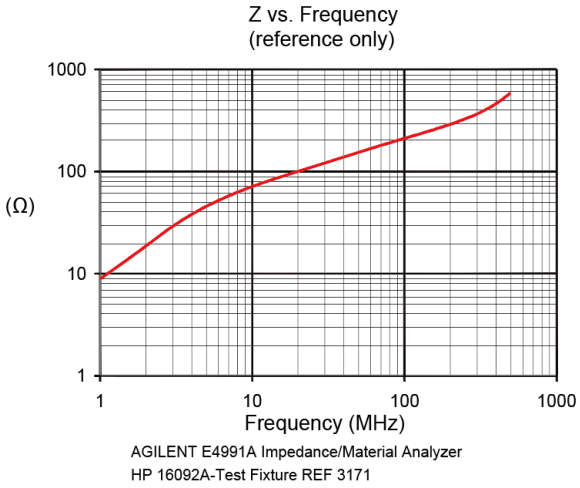
Caution

- Use non-conductive screwdriver and tools. Otherwise, it may result in personal injury or economic loss.

(5) Attention

- Install ferrite cores approx. 10cm away from the power and I / O terminals and communication connectors to protect against environmental noise. The following components are recommended.

  ① Laird's 28A5776-0A2 products or products that meet the following performance



- Impedance (Z)

Frequency	25MHz	100MHz	300MHz
Normal (REF)	115Ω	210Ω	360Ω
Minimum	-	168Ω	-

- Do not connect or disconnect wires of the terminal while the product is operating.
- Pay attention to safety accidents when hot-swap (disconnect terminal, body and base, etc.) is activated. It may result in serious personal injury and economic loss.

- When wiring, use only work made of non-conductive materials except for pinhole terminals. Depending on the product's connection and operating conditions, it may result in serious personal injury and economic loss.
- Carefully organize and arrange the cables to minimize stress.

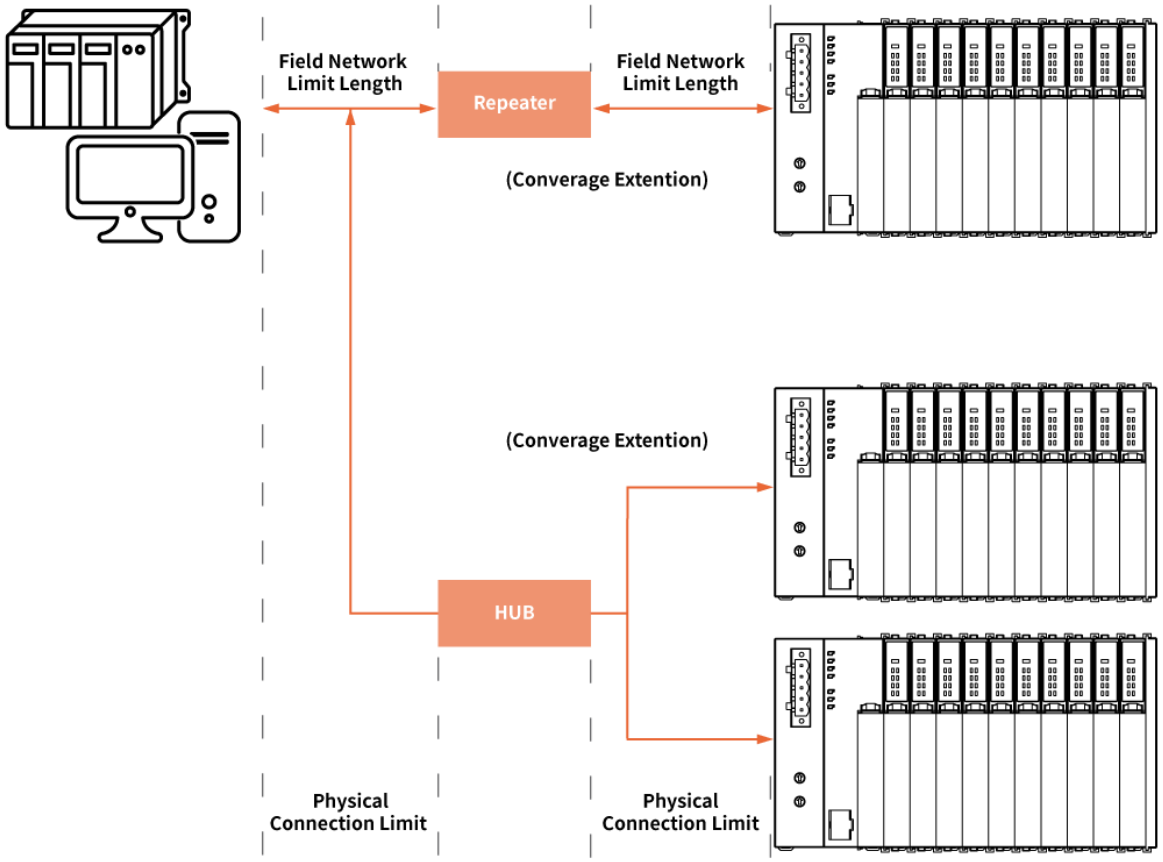
4.4.2 Communication cable

4.4.2.1 Attention

Requirements	Description
Use standardized products	Use accessories, such as connectors and cables, that are certified by the field network associations.
Comply with Node Space (Communication cable length)	Install in accordance with the minimum and maximum distances in each transfer rate allowed by the field network associations. Observe the minimum cable connection intervals clearance defined by the field network associations. (It normally maintains 1m apart.)
Do not T-shaped branch	Do not use T-shaped branch or cable extension, which may cause communication noise. In the case of a daisy chain, incorrect coupling can cause line breaks and make noise.
Do not annular arrangement	Make the cable arrangement in smooth way. (In case of 1m cable, the first 1/4 point and the last 1/4 point are in contact with each other.) Do not arrange in the form of annular, 8 type or 0 type.
Detach segment	Separate segments by function. Separate the control area of the product independently to limit the propagation when problems occur. When connecting the maximum node of a single trunk defined in the field network associations, separate the segment (16 nodes or 32 nodes units, different for each field network) by paying attention to noise such as communication lines. For serial communication, install one repeater per segment.
Use Hub	It is recommended to use a hub or switch hub (available for collision, load balancing, etc.) when extending the communication cable.
Install Ferrite Cores	Install ferrite cores approx. 10cm away from power and I / O terminals and communication connectors to protect against environmental noise. Refer to: How to Install Ferrite Cores

4.4.2.2 Field network extension

Depending on the extension equipment, communication distance, signal amplification and noise may be affected. Use equipment appropriate for your environment.



(1) Serial communication

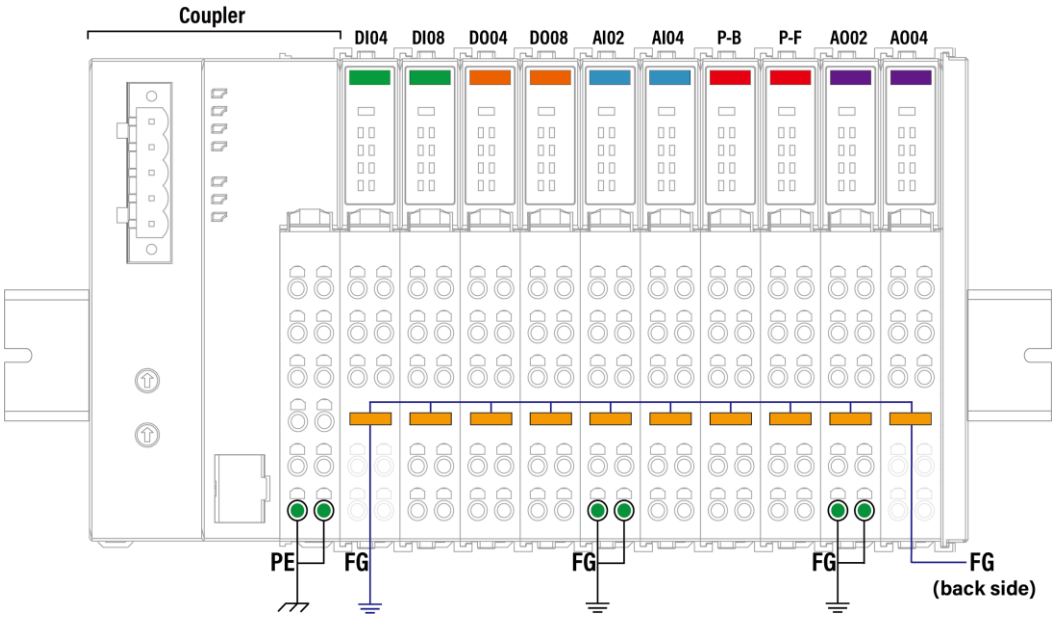
equipment	Description
Repeater	It can be extended to the maximum distance in each transfer rate defined by the field network associations. Amplify the communication signal to reduce the communication delay time. However, noise is also amplified and transmitted to the communication cable. Great care is needed because problems may occur due to the high noise.
HUB (recommended)	The maximum distance in each transfer rate defined by the field network and each transceiver (PHY chip) can be extended to the simultaneously connecting nodes that can be provided. The entire network is not affected by noise generated by the communication cable. However, if you transmit communication data to each port, communication delay may occur.

(2) Ethernet

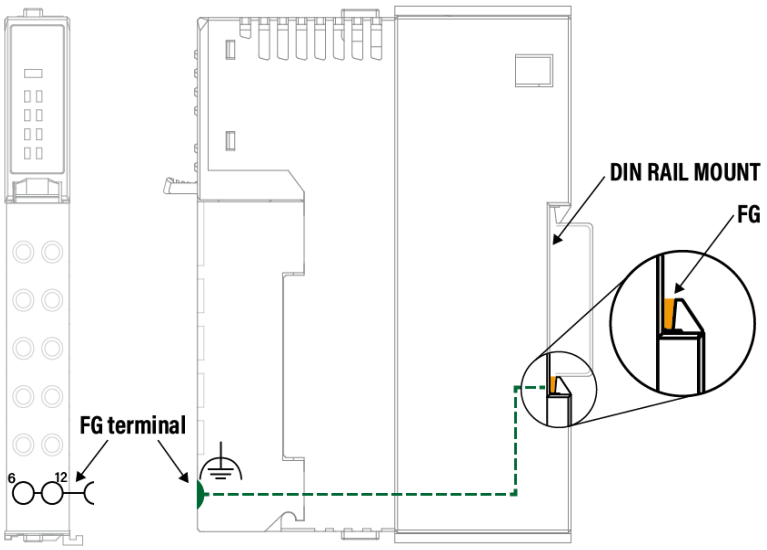
equipment	Description
Dual Port	Extend the network using the dual port of the product that functions as a dummy hub. Extend your network without other hub. However, spread of noise, line collisions, and communication delays may occur.
Repeater	It can be extended to the maximum distance in each transfer rate defined by the field network (standard distance: 100 m). Delay time is relatively small due to amplification of communication signal. However, noise is also amplified together and transmitted to the communication cable. This can be a problem when high noise occurs.
Dummy HUB	Port extension supports connections of the multiple devices. You can configure bus lines at low prices. However, noise ripple effects, line collisions, and communication delays may occur.
Switch HUB (recommended)	As the most common device, it controls flow, path, group, etc. of each port. Maintain the speed of the entire line even as the usage increases. Minimize delays and prevent collisions and noise during simultaneous communication between devices. However, it is a bit more expensive than the Dummy Hub and there is a delay in simultaneous transmission depending on the size of the buffer.

4.4.3 Earthing and shielding

When the DIN rail mounting, ground it through the housing frame (case, etc.).
The grounding structure is provided by a spring-loaded and metal elastic structure located on the DIN rail mounting structure of the base.
The grounding structure of the product is as shown in the figure.



- Side View



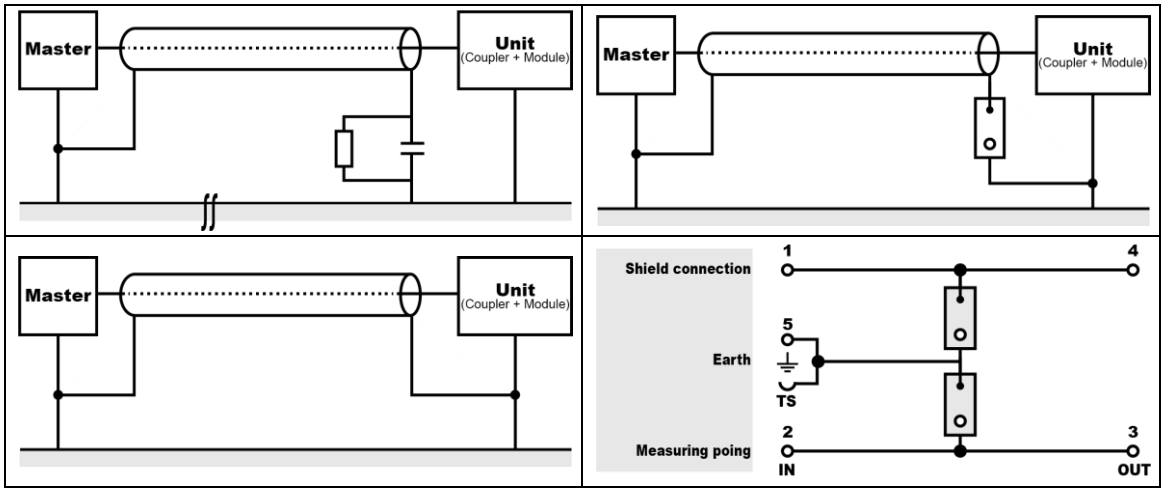
(1) Shield Connecting System

You can use a shield connecting system to reduce input noise of sensors and more.
Shield work is recommended.

Cable	Description
Communication cable	It is recommended to use shielded cables and clamps for improving the signal quality of the communication lines.
Power cable	It is recommended to use shield clamp for removing noise that may be generated when power is supplied.
I/O cable	It is recommenced to use shield clamp for the digital, analog and special modules.

(2) Possible shielding connection

Take the effective shielding as follows. Be careful not to configure closed circuit. Improper shielding may cause noise.



4.5 Maintenance

In case of failure / fault / error situation, if the module does not cause the whole system to malfunction, do not remove the product until the maintenance module comes. In addition, if the setting exists in the module, the setting of the module may be initialized when the coupler is turned off.

Do not operate it for a long time.

Be sure to replace in the same parts and components that used before disconnecting.
Incorrect combinations may cause damage to the product or system and may result in personal injuries.

(1) Terminal

	Description
Disassembly	To release the terminal, pulling the lever on top of the terminal while pressing it down.
Assembly	To assemble the terminal, support the bottom of the terminal to the bottom of the module and slide it in.

(2) Body

	Description
Disassembly	Press the buttons on the top and bottom of the body at the same time and pull the body to separate from the base.
Assembly	Assemble the base and body by sliding them in parallel.

(3) Base

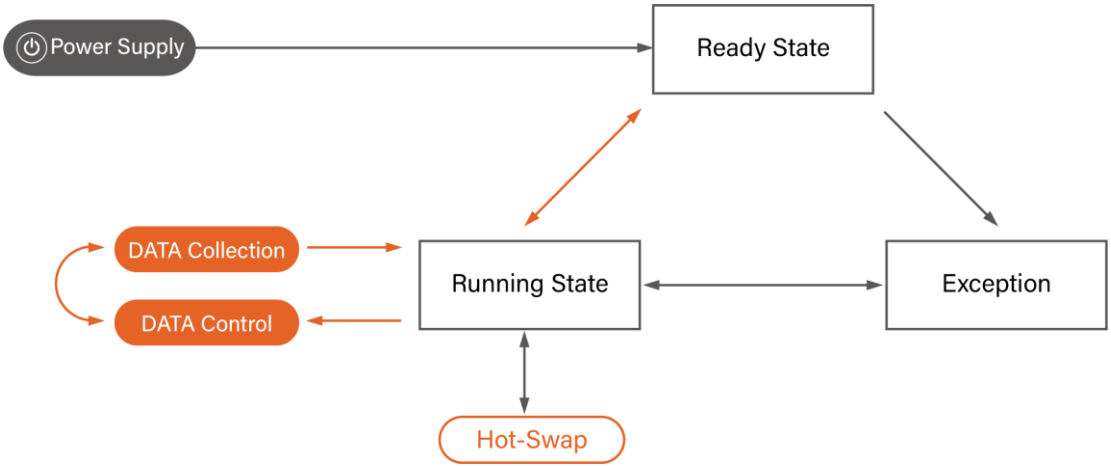
	Description
Disassembly	After removing the terminal and the body first, pulling DIN rail lever of the base while pressing it down to separate the base.
Assembly	Detach the body of the module that will follow where you want to install. Place the base directly behind the base at a certain distance (spacing of base) where you want to install, and then fit the base to the connection rails of the front and rear bases. Push it in slowly and raise the DIN rail lever of the base to install on the DIN rail
Precautions	Do not touch the connector part of the base. Do not connect or disconnect the base while power is supplied.

Warning

- With the terminal / body / base are removed, the internal circuits are vulnerable to the external environment. It may result in damage to the product and system and personal injuries.

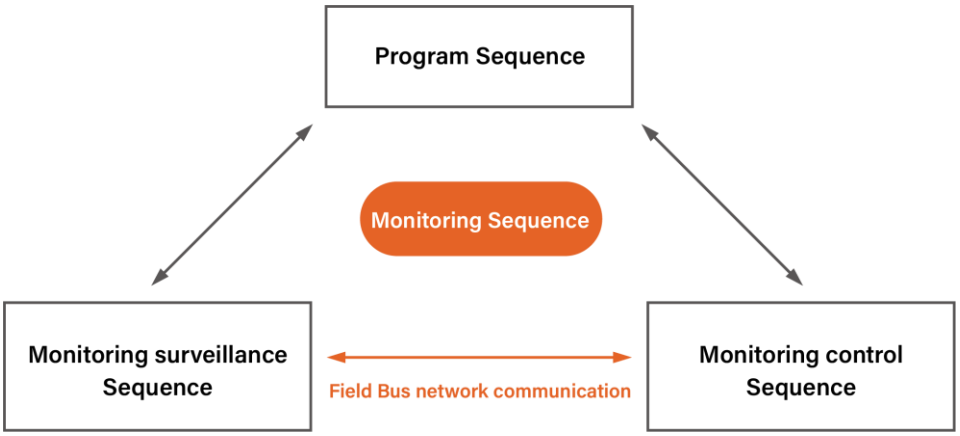
5 Operation

5.1 Workflow



<table>
<tr><th>Workflow</th><th>Description</th></tr>
<tr><td>Power supply</td><td>Power supply stage of the product</td></tr>
<tr><td>Ready State</td><td>A stage finishing the initialization for the product operation.
Error in memory map, expansion module is not recognized and entry to the corresponding stage is not available in case of the extension</td></tr>
<tr><td>Running State</td><td>The product's operation status consists of the standby mode (no field network communication, ABUS communication) and run mode (field network and ABUS communication). The main roles are data collection and control and hot-swap operation.
<table>
<tr><th>Operation</th><th>Description</th></tr>
<tr><td rowspan="4">Standby Mode</td><td>Waiting state for the Field Network</td></tr>
<tr><td>Access to internal file storage area (product configuration and settings)</td></tr>
<tr><td>Read/write memory map is available in the monitoring mode</td></tr>
<tr><td>Inadequate settings related to the product operation</td></tr>
<tr><td rowspan="3">Run Mode</td><td>Field Network Operation</td></tr>
<tr><td>Access to internal file storage area (product configuration and settings)</td></tr>
<tr><td>Read memory map is available in the monitoring mode</td></tr>
</table></td></tr>
<tr><td>Exception</td><td>Processing state because the product detects an abnormal situation.</td></tr>
</table>

5.2 Monitoring



Sequence	Description
Program Sequence	Sequence to upload and download setting information of coupler and modules
Monitoring surveillance Sequence	A state under the field network is operating, DAQMaster can arbitrarily read the information of the memory map in the coupler.
Monitoring control Sequence	A state without field network, DAQMaster can arbitrarily modify the information of the memory map in the coupler.

5.3 Parameter setting and monitoring in DAQMaster

The setting connector (USB 2.0 type Micro B) of the ARIO communication coupler module can be connected to the DAQMaster for settings and monitoring.
Refer to the DAQMaster User Manual for the detailed information.

(1) Parameter setting

Operation	Description
Setting product	Field Network Verification and Memory Map Configuration
Setting module	Settings for each module
Diagnostic function for the system configuration	Diagnose errors in system configuration based on information that the product searches the modules and passes them to monitoring
Recommendation for the system configuration	Recommendations for resolving errors based on the system error diagnosis
Virtual mode	Review a virtual simulation based on the system settings and configuration

(2) Monitoring

Provides real-time monitoring and control of memory map values without the product's interruption.

Functions	Description
Monitor the memory map	Real-time monitoring of the entire memory map area (I / O monitoring is possible during communication)
Control the memory map	All areas of memory map can be modified without field network communication
Run Time Screen Configuration	Various display with Run time screen

Screen items	Description
Setting product	Screen for detailed settings of coupler and module
Diagnostic function for the system configuration	Diagnostic screen for a combination of coupler and module configuration
System simulation	Virtual simulation screen to test the configuration of coupler and modules
Monitor the memory map	Display screen that reads the value of memory map during the coupler is operating
Control the memory map	Screen for directly writing values to the memory map without the communication with the master of the field network of the coupler
Run Time Screen Configuration	Screen selected by the user displays a corresponding value from reading the memory map of the coupler and compares it with each module type.

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* Dimensions or specifications on this manual are subject to change and some models may be discontinued without notice

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