

MotionSuite™ Network I/O Modules Hardware Manual

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Chapter 1: Overview

- This manual describes the functions and specifications of the network I/O modules.
- Read this manual carefully in order to use the network I/O modules. Also, keep this manual in a safe place so that it can be used whenever necessary.
- Refer to the following related manuals as required.

Product	Manual Name	Manual Number	Contents
Controls	MP930 Machine Controller Hardware Manual	YEA-SIA-C887-1.1	Describes the system configuration, system components, functions, specifications, installation, wiring, and external appearance of the MP930.
	MotionSuite™ MP940 Machine Controller Hardware Manual	YEA-SIA-C887-4.1	Describes the system configuration, system components, functions, specifications, installation, wiring, and external appearance of the MP940.
Software	MotionSuite™ MP930 Software Manual	YEA-SIA-C887-1.4	Describes the MotionWorks™ software that corresponds to the MP930 machine controller.
	MotionWorks+ Windows Software and Icon-Based Programming Manual	YEA-SIA-C887-1.5	Describes the MotionWorks+™ software that corresponds to the MP940 machine controller.

1.2 Precautions

This section outlines general precautions that apply to using this manual and the product. Read this section before reading the remainder of the manual.

1.2.1 Safety Precautions

- The network I/O modules were not designed or manufactured for use in devices or systems directly related to human life. Users who intend to use the product described in this manual for special purposes such as devices or systems relating to transportation, medical, space aviation, atomic power control, or underwater use must contact Yaskawa Electric Corporation beforehand.
- This product has been manufactured under strict quality control guidelines. However, if this product is to be installed in any location in which a failure of a network I/O module involves a life and death situation or in a facility where failure may cause a serious accident, safety devices **MUST** be installed to minimize the likelihood of any accident.
- Any illustrations, photographs, or examples used in this manual are provided as examples only and may not apply to all products to which this manual is applicable.
- The products and specifications described in this manual or the content and presentation of the manual may be changed without notice to improve the product and/or the manual. A new version of the manual will be released under a revised manual number when any changes are made.
- Contact a Yaskawa customer service representative or a Yaskawa office listed on the back of this manual to order a new manual whenever this manual is damaged or lost. Please provide the document number listed on the back cover of this manual when ordering.
- Contact a Yaskawa customer service representative or a Yaskawa office listed on the back of this manual to order new nameplates whenever a nameplate becomes worn or damaged.
- Yaskawa cannot guarantee the quality of any products which have been modified. Yaskawa assumes no responsibility for any injury or damage caused by a modified product.

1.2.2 Installation Precautions

Abide by the following precautions when installing network I/O modules.

Caution Using network I/O modules in environments subject to high temperatures, high humidity, excessive dust, corrosive gases, vibration, or shock may lead to electrical shock, fire, or faulty operation. Do not use network I/O modules in the following locations.

- Locations subject to direct sunlight or ambient temperatures not between 0 and 60°C.
- Locations subject to relative humidity in excess of 95%, rapid changes in humidity, or condensation.
- Locations subject to corrosive or flammable gas.
- Locations that would subject network I/O modules to direct vibration or shock.
- Locations subject to contact with water, oil, chemicals, etc.

Caution Do not allow wire clippings or other foreign matter to enter network I/O modules.

Foreign matter may cause fires, product failure, or malfunctions.

Caution Securely tighten the module mounting screws to prevent them from loosening.

Loose screws may cause a module to malfunction.

Caution Securely tighten the terminal block mounting screws to prevent them from loosening.

Loose screws may cause a module to malfunction.

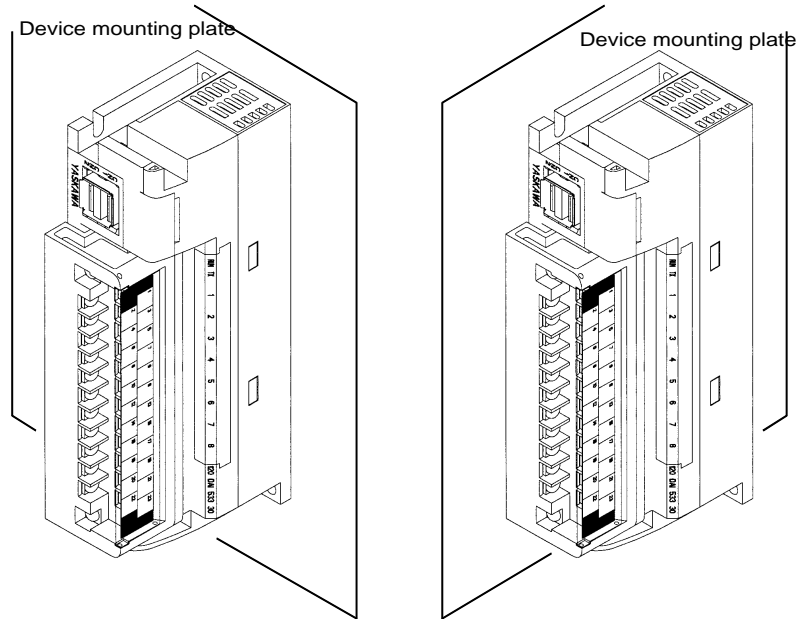
Caution Install the modules in the correct orientation.

Failure to do so may cause a module to fall off, fail, or malfunction.

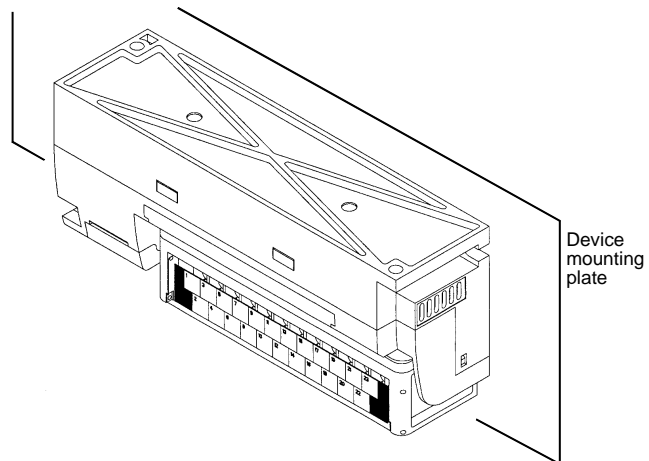
Caution The allowable ambient operating temperature range depends on the module mounting orientation. Use modules within the allowable temperature range.

Failure to do so may cause a module to fail or malfunction.

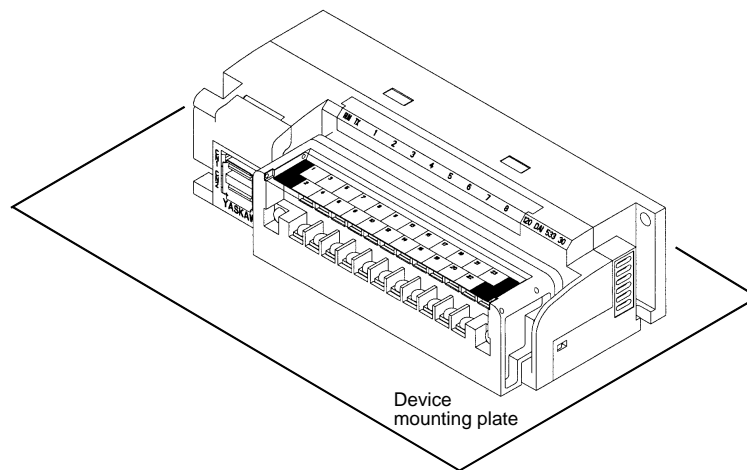
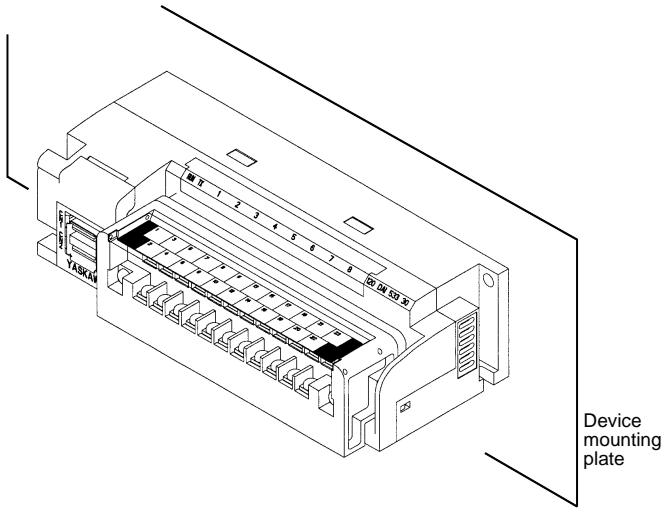
Ambient Operating Temperature: 0 to 60°C



Ambient Operating Temperature: 0 to 55° C

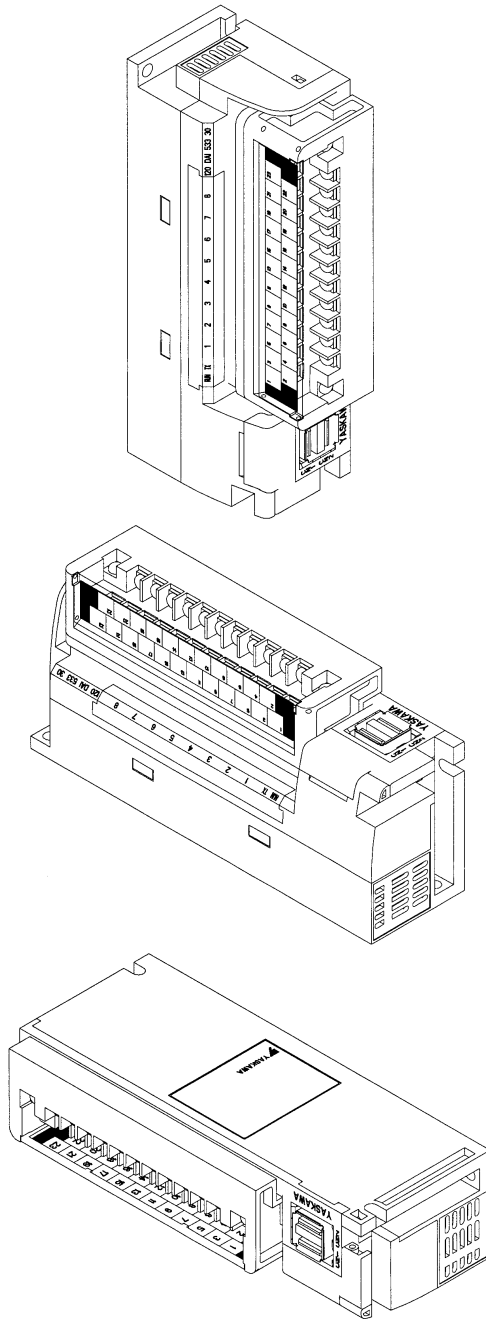


Ambient Operating Temperature: 0 to 55° C



Caution The modules cannot be oriented as shown below. Be sure to install the modules in the correct orientation.

Failure to do so may cause a module to fall off, fail, or malfunction.



1.2.3 Wiring Precautions

Caution Wiring must be performed by qualified personnel.

Wrong or inappropriate wiring may result in fire, failure, or electric shock.

Caution Connect the correct power supply for the required ratings.

Connecting unsuitable power supplies may cause fire.

Caution When using the following output modules, use an external fuses that match the specifications of the loads and connect the fuse in series with the load.

- 100/200VAC 8-point output module (JAMSC-120DA083330)
- 24VDC 16-point output module (JAMSC-120DD034340)
- Relay Contact 8-point output module (JAMSC-120DRA83030)

The built-in fuses do not provide protection for the output elements. Failure to connect external fuses may cause fire, destroy the load, or damage the output elements when a load short-circuit or an overload occurs.

Caution The 100/200VAC 8-point output module can connect a load of 0.6 A per output point, but the total load per module must be 2.4 A or less. Consider the load distribution, and restrict the total amperage to no more than 2.4A.

Failure to meet this condition may damage the output circuits.

Power Supply Noise Reduction

Caution Prevent noise from entering the product by installing an isolating transformer or a noise filter for the external power supply.

Noise from power supply may result in malfunctions.

Insert the interface cables properly.

Caution Insert the interface cable connectors into the modules and secure them correctly.

Failure to do so may result in malfunctions.

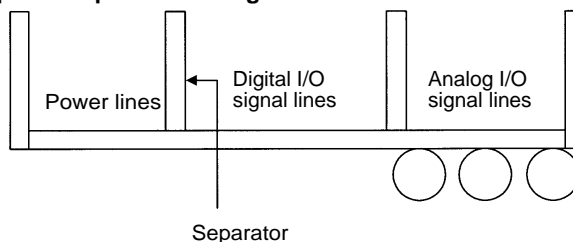
Separate Wiring Properly

Caution I/O lines connecting the I/O modules to external devices must be selected based on the following considerations: Mechanical strength, resistance to noise, wiring distance, signal voltage, etc.

Caution I/O lines must be separated from power lines both within and outside of the control panel to minimize the affect of noise.

Faulty operation may result if I/O lines are not sufficiently separated from power lines.

Example of Separated Wiring



1.2.4 Applications Precautions

WARNING Do not touch module terminals while the power is turned ON.

Touching module terminals may cause electric shock.

Caution When using the following output modules, use external fuses that match the specifications of the loads and connect the fuse in series with the load.

- 100/200VAC 8-point output module (JAMSC-120DA083330)
- 24VDC 16-point output module (JAMSC-120DD034340)
- Relay Contact 8-point output module (JAMSC-120DRA83030)

The built-in fuses do not provide protection for the output elements. Failure to connect external fuses may cause fire, destroy the load, or damage the output elements when a load short-circuit or an overload occurs.

Caution Operations such as RUN, STOP, forced outputs, and program changes during operation must be carried out with care.

Operational errors may damage the machine or cause accidents.

1.2.5 Maintenance

Caution Do not attempt to disassemble or modify the modules in any way.

Doing so may cause fires, product failure, or malfunctions.

Caution Do not disconnect the terminal blocks while the external power supply is ON. Turn OFF the external power supply before disconnecting the terminal blocks.

Disconnecting terminal block while power is ON may cause electrical shock, product failure, or malfunction.

Caution Do not replace built-in fuses without qualified technical assistance.

Replacing a built-in fuse may cause an output module to fail or malfunction. Such problems are covered by Yaskawa product warranty. Always have built-in fuses replaced by qualified Yaskawa personnel.

1.3 Using This Manual

This manual is compiled for the following readers.

- Those estimating purchase prices of network I/O modules
- Those considering application of network I/O modules
- Those designing control panels for the installation of network I/O modules
- Those creating control panels to include network I/O modules
- Those inspecting control panels on which network I/O modules have been installed
- Those testing or adjusting control panels on which network I/O modules has been installed
- Those maintaining control panels on which network I/O modules have been installed

Basic Information

In this manual, the following terms are described as follows, unless otherwise specified:

WARNING Indicates precautions that, if not heeded, could possibly result in loss of life or serious injury.

Caution Indicates precautions that, if not heeded, could result in relatively serious or minor injury, damage to the product, or faulty operation.

Chapter 2: General Specifications

2.1 System Configuration

This section describes the network I/O system configuration.

2.1.1 MP940 System Configuration Example

The following diagram shows an example of a system configuration using network I/O modules with an MP940.

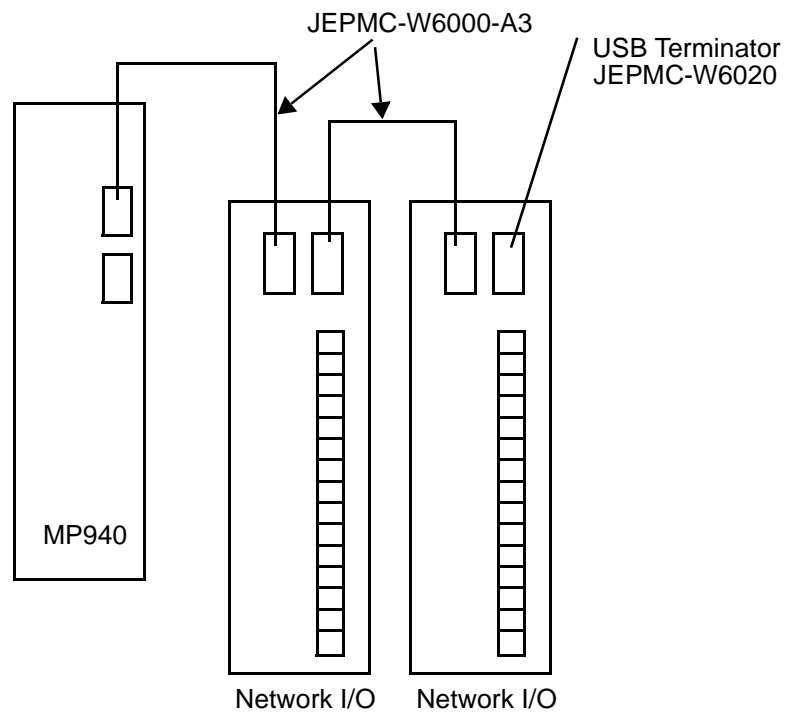


Figure 2.1: MP940 System Configuration Example

2.1.2 MP930 System Configuration Example

The following diagram shows an example of the system configuration using network I/O modules with an MP930.

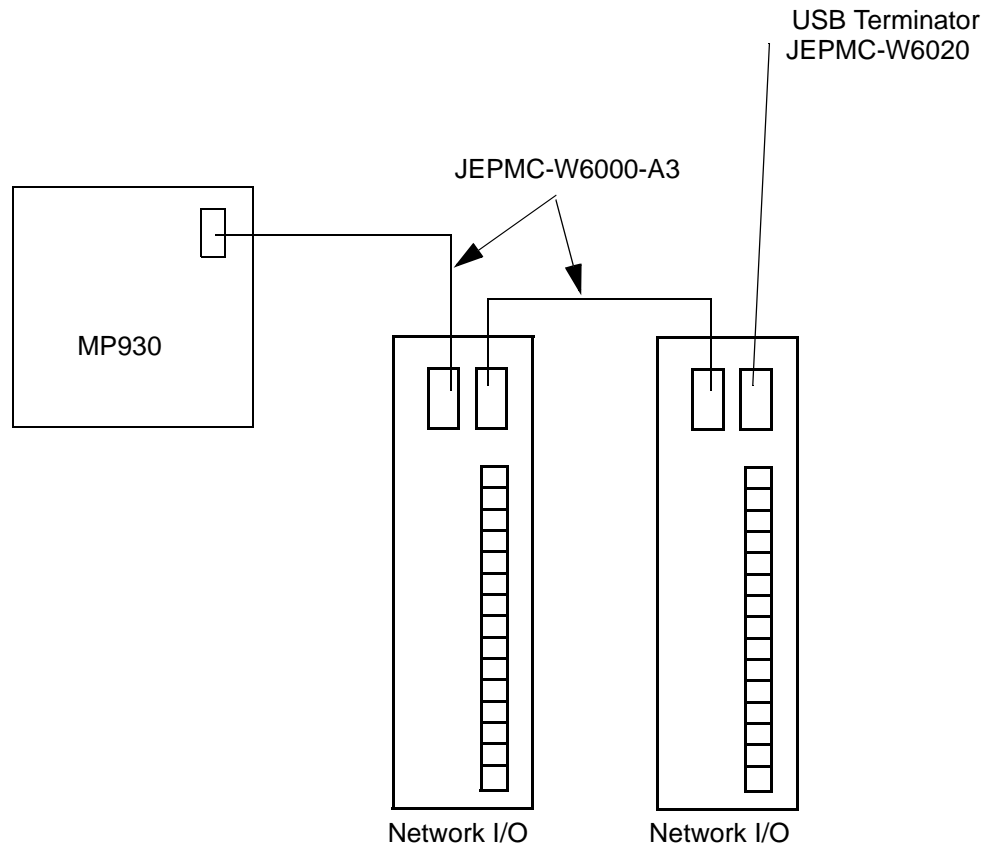


Figure 2.2: MP930 System Configuration Example

2.2 General Specifications

This section describes the general specifications of the network I/O modules.

2.2.1 General Specifications

General Specifications

Item		Specifications
Main External Power Supply	Rated Voltage	24VDC (insulating DC/DC converter)
	Allowable Voltage Range	20.4 to 26.4VDC
	Allowable Ripple	Must not exceed +10% or -15%
	Current Consumption	Included in the performance specifications for each network I/O module
Environmental Conditions	Ambient Operating Temperature	0 to 60°C (temperature restrictions depending on mounting orientation)
	Ambient Storage Temperature	-25 to +85°C
	Ambient Operating Humidity	30% to 95% RH (with no condensation)
	Ambient Storage Humidity	5% to 95% RH (with no condensation)
	Pollution Level	Pollution level 1 according to JIS B 3501
	Corrosive Gas	No corrosive gas
	Operating Altitude	Less than 2,000m above sea level
Mechanical Operating Conditions	Vibration Resistance	10 to 57Hz with half-amplitude of 0.075 mm 57 to 150Hz with fixed acceleration of 9.8 m/s^2 (1G) 10 sweep times each in X, Y, and Z directions (according to JIS B 3502)/(sweep time: 1 octave/min)
	Shock Resistance	Peak acceleration of 147 m/s^2 (15G) twice for 11 ms in X, Y, and Z directions (according to JIS B 3502)
Electrical Operating Conditions	Noise Resistance	Impulse noise: $\pm 1,000 \text{ V}$ Fast transient burst noise: Level 3 (1,000 V)
I/O Circuit Isolation	Isolation Method	Included in the performance specifications for each network I/O module
	Dielectric Strength	Between I/O terminals and internal circuit: 1,500VAC (1minute)
	Insulation Resistance	Between I/O terminals and internal circuit: 100M Ω or more (at room temperature and humidity) with a 500VDC insulation resistance tester.

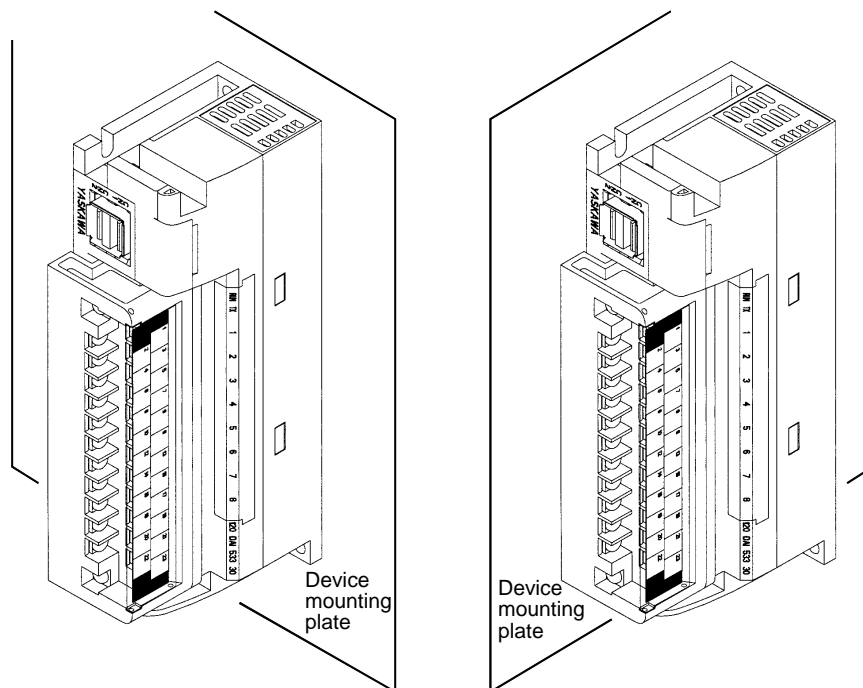
General Specifications (Continued)

Item		Specifications
Installation Requirements	Ground	Ground the FG terminal on the AC input side of the DC power supply for the main external power supply (24VDC) to 0.1Ω or less.
	Configuration	Units installed individually in one of 3 orientations (temperature restrictions depending on orientation)
	Cooling Method	Natural cooling
	Mass	Included in the performance specifications for each network I/O module.
	Dimensions	Included in the performance specifications for each network I/O module.

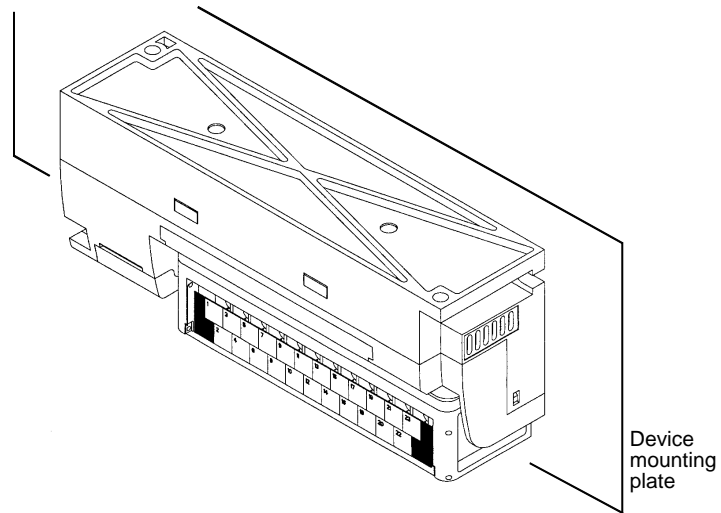
2.2.2 Mounting Orientation

Network I/O modules can be mounted in three orientations. There are restrictions on the ambient operating temperature depending on the mounting orientation. The following diagrams illustrate the possible mounting orientations, and the ambient operating temperature according to each mounting orientation.

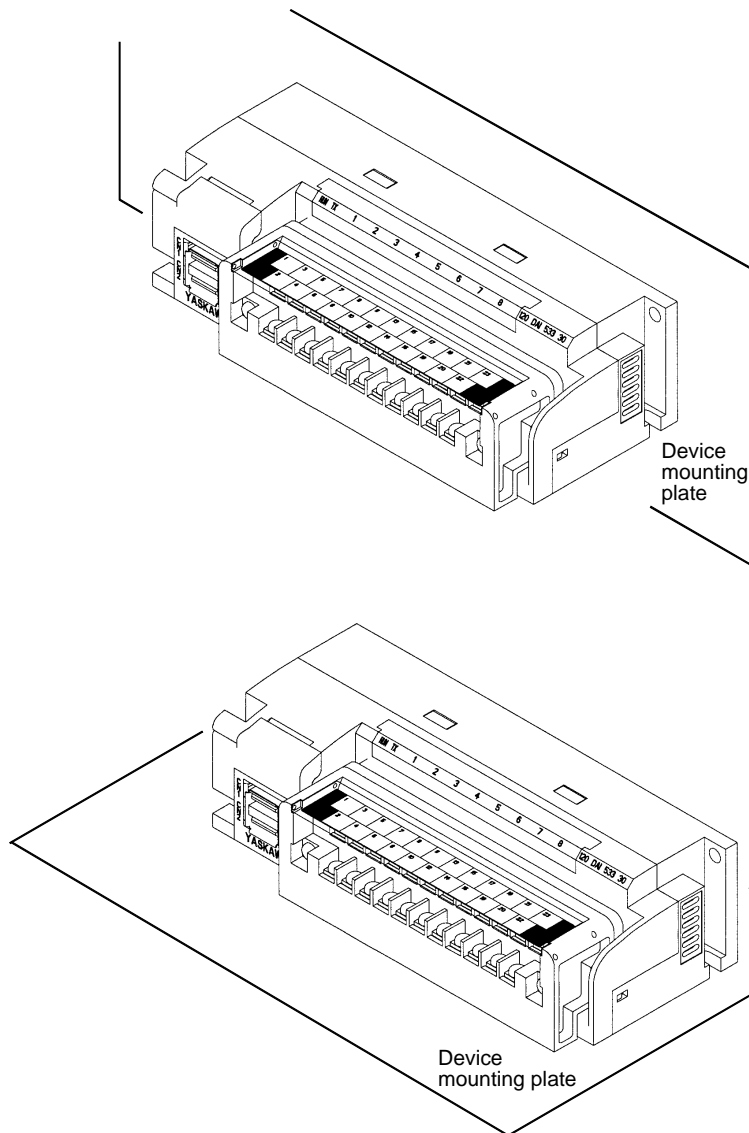
Mounting Orientation 1: Ambient Operating Temperature of 0 to 60°C



Mounting Orientation 2: Ambient Operating Temperature of 0 to 55°C



Mounting Orientation 3: Ambient Operating Temperature of 0 to 55°C



Caution Install the modules in the correct orientation.

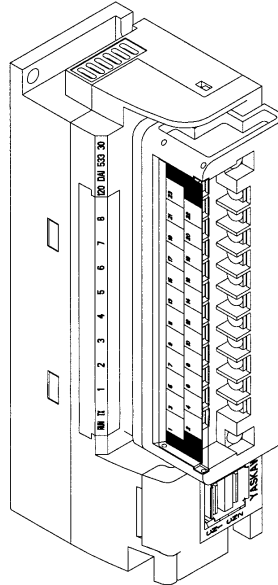
Failure to do so may cause a module to fall off, fail, or malfunction.

Caution The allowable ambient operating temperature range depends on the module mounting orientation. Use the modules within the allowable temperature range.

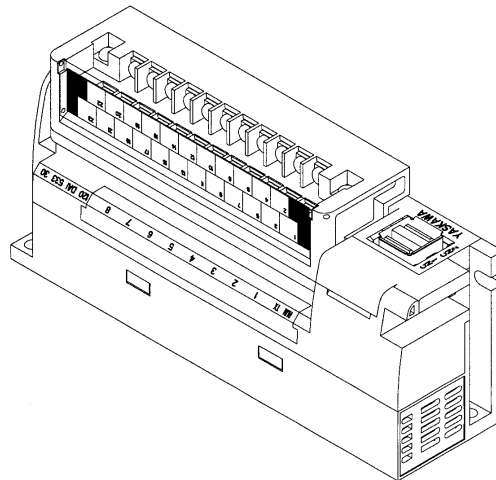
Failure to do so can cause a module to fail or malfunction.

Caution The modules cannot be oriented as shown below. Be sure to install the modules in the correct orientation.

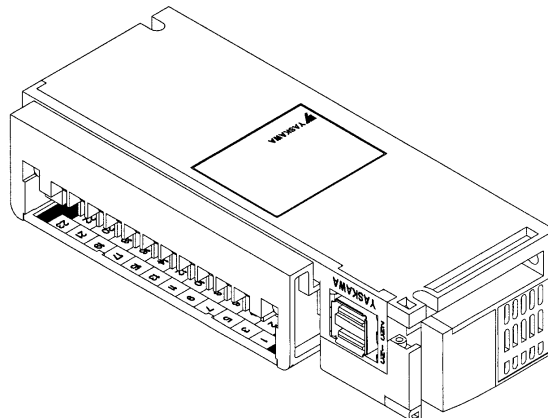
Failure to do so can cause a module to fall off, fail, or malfunction.



No



No



No

2.3 List of Input Modules

This section describes the functions, models, and specifications of the network input modules.

2.3.1 Digital Input Modules

Model Number	Rated Voltage	Rated Current	Input Impedance	Input Delay Time	Input Points	Main External Power Supply Current Consumption
JAMSC-120DAI53330	100VAC	7mA (50Hz)	14.3k Ω at 50Hz 12.5k Ω at 60Hz	OFF \rightarrow ON 20ms max. ON \rightarrow OFF 35ms max.	8	24VDC, 80mA When all points are ON
JAMSC-120DAI73330	200VAC	7mA (50Hz)	28.6k Ω at 50Hz 23.1k Ω at 60Hz	OFF \rightarrow ON 20ms max. ON \rightarrow OFF 35ms max.	8	24VDC, 80 mA When all points are ON
JAMSC-120DDI34330	12/24VDC	2.5mA at 12VDC 5.0mA at 24VDC	4.8k Ω	OFF \rightarrow ON 5ms max. ON \rightarrow OFF 5ms max.	16	24VDC, 90mA When all points are ON

2.3.2 Analog Input Modules

Model Number	Input Signal Range	Overall Accuracy	Resolution and Data Format	Input Impedance	Number of Channels	Main External Power Supply Current Consumption
JAMSC-120AVI02030	-10V to +10V	$\pm 0.5\%$ F.S. at 25°C $\pm 1.0\%$ F.S. at 0 to 60°C	16 bits, binary, 2's complement, -32,000 to +32,000	1M Ω minimum	4	24VDC, 120mA

2.4 List of Output Modules

This section describes the functions, models, and specifications of the network output modules.

2.4.1 Digital Output Modules

Model Number	Rated Voltage	Load Current	Special Remarks	Output Delay Time	Output Points	Main External Power Supply Current Consumption
JAMSC–120DAO83330	100/200VAC	0.6A/point 2.4A/common	Unprotected output according to JIS B3501	OFF → ON 10ms max. ON → OFF 1/2 cycle + 5ms max.	8	24VDC 100mA When all points are ON
JAMSC–120DDO34340	12/24 VDC	0.3A/point	Unprotected output according to JIS B3501	OFF → ON 1ms max. ON → OFF 1ms max.	16	24VDC 110mA When all points are ON
JAMSC–120DRA83030	Relay contacts 24VDC 100/200VAC	1.0A/point	Unprotected output according to JIS B3501	OFF → ON 10ms max. ON → OFF 15ms max.	8	24VDC 110mA When all points are ON

Caution To protect the output elements in an output module with unprotected outputs, insert a fuse in series with the load outside the output module.

2.4.2 Analog Output Modules

Model Number	Output Signal Range	Overall Accuracy	Resolution and Data Format	Maximum Allowable Load Current	Number of Channels	Main External Power Supply Current Consumption
JAMSC–120AVO01030	-10V to +10V	±0.2% F.S. at 25°C ±0.5% F.S. at 0 to 60°C	16 bits, binary, 2's complement, -32,000 to +32,000	±5mA 2kΩ minimum	2	24VDC 120mA

Chapter 3: Digital I/O Specifications

3.1 Digital Input Specifications

This section provides the performance specifications, circuit configuration, field connections, and appearance of the digital input modules.

3.1.1 100VAC 8-point Input Module

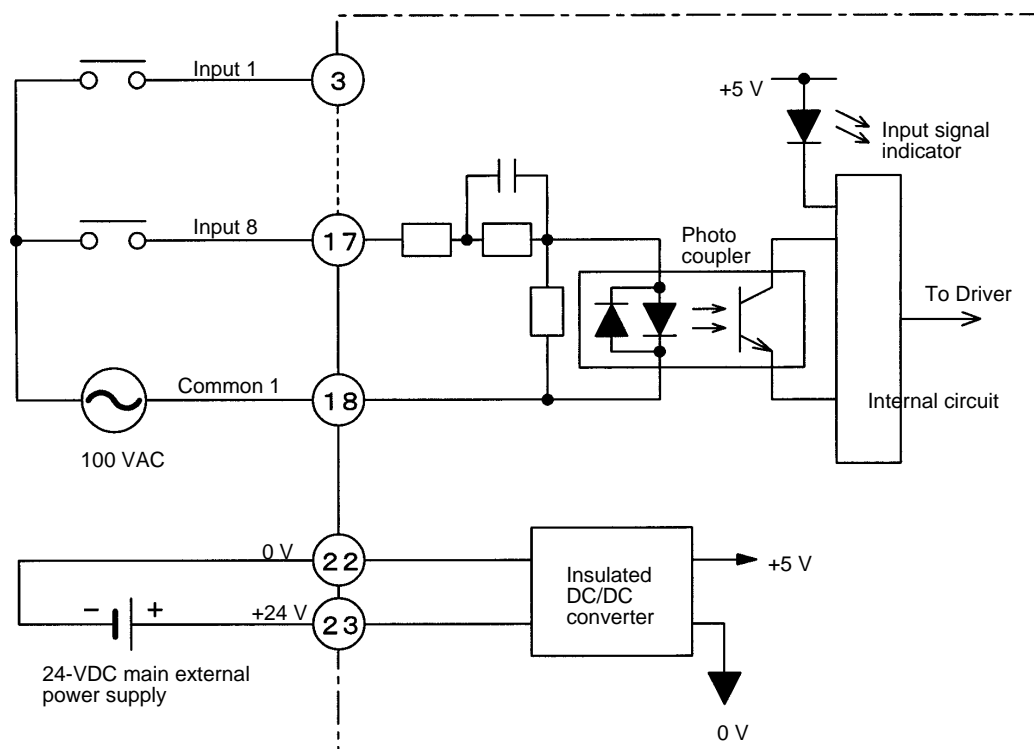
Performance Specifications

Item		Specifications
Name		100VAC 8-point Input module
Model Number		JAMSC120DAI53330
Rated Voltage		100VAC
Maximum Allowable Voltage		132VAC
Rated Frequency		50/60Hz
Allowable Frequency Range		47 to 63Hz
Inrush Current		160mA
Rated Current		7mA (100VAC, 50Hz)
Input Impedance		14.3k Ω at 50Hz 12.5k Ω at 60Hz
Standard Operating Ranges		ON voltage range: 74 to 132VAC OFF voltage range: 30VAC maximum
Input Type		AC type 2 according to JIS B 3501.
Input Delay Times		OFF \rightarrow ON: 20ms maximum ON \rightarrow OFF: 35ms maximum
Number of Commons		1
Number of Input Points/Common		8 points/common
Field Connections		Removable terminal block: M3 screws, 23 terminals
Number of Input Points		8 points
Input Signal Indicators		One indicator lights for each point when input is ON. Internal logic side.
Status Indicators		RUN lit: Main external power supply is normal. TX lit: Data is being transmitted.
Input Circuit Isolation	Isolation Method	Photocoupler isolation
	Dielectric Strength	Between input terminals and internal circuits: 1,500VAC (for 1 min)
	Insulation Resistance	Between input terminals and internal circuits: 100M Ω minimum (at room temperature and humidity) with a 500VDC insulation resistance tester
External Power Supply		For input signals: 100VAC For main external power supply: 24VDC (20.4 to 26.4VDC) 80mA maximum (when all points are ON)

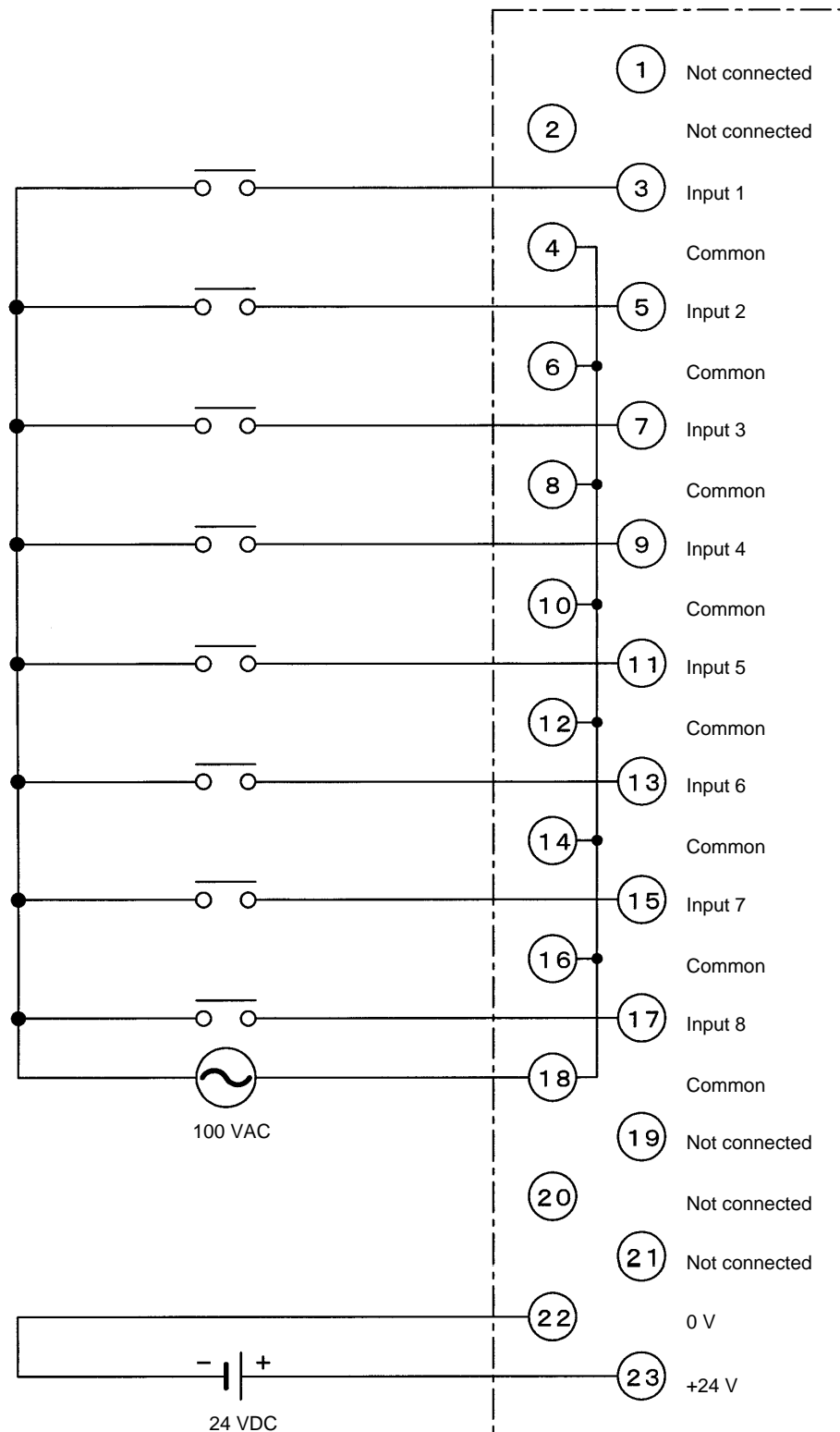
Performance Specifications (Continued)

Item	Specifications
Derating Conditions	Temperature restrictions depending on the mounting orientation (For details, refer to <i>Chapter 2 General Specifications</i> .)
Maximum Heating Value	1.92W
Hot Swapping (Removal/Insertion Under Power)	Terminal block: Not permitted Communications connector: Permitted
Approximate Mass	300g
External Dimensions	152 x 44 x 71.8mm (W x H x D)

The following diagram illustrates the circuit configuration.

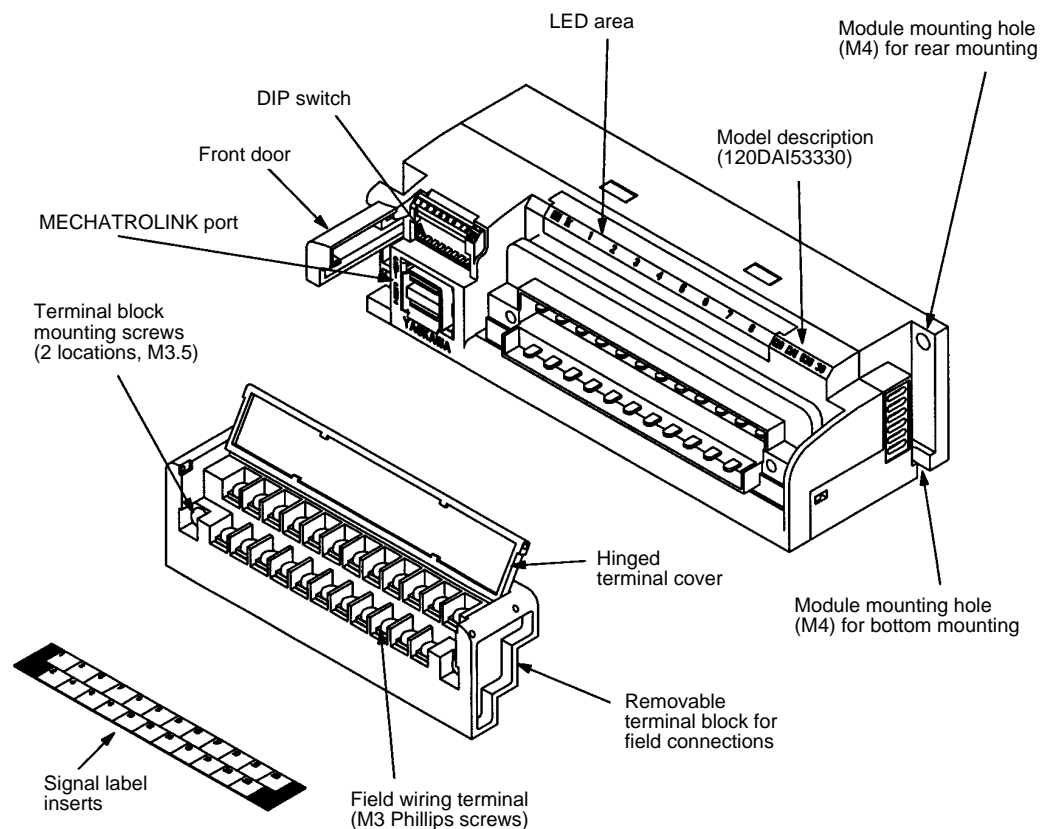


The following diagram shows an example of the terminal connections.



- Note** (1) Terminals 4, 6, 8, 10, 12, 14, 16, and 18 are connected internally.
- (2) Crimp Terminals
Use M3 crimp terminals in the terminal blocks.
- (3) Recommended Wires
Use the following wires for connection to the terminal blocks:
 1.3mm^2 (AWG16) to 0.5mm^2 (AWG20)
- (4) Terminals 1, 2, 19, 20, and 21 are not connected.
Do not use terminal 1 as a relay terminal.

Appearance and Configuration



LED Area

LED	Color	Indication when ON
RUN	Green	Main external power supply is normal.
TX	Green	Data is being transmitted.
1 to 8	Green	Input signals are ON.

Setting I/O Reference Numbers

- The leading I/O reference number used by an input module is allocated through the I/O allocation procedure for the network I/O driver module.
- The input relays are allocated for the I/O reference numbers in ascending order of slave addresses.
- The input reference numbers (input relays) are allocated for the input signals in ascending order of input module input numbers.
- An example of input relay allocation is shown below.

8 Points from 100001 Allocated for Input Relays

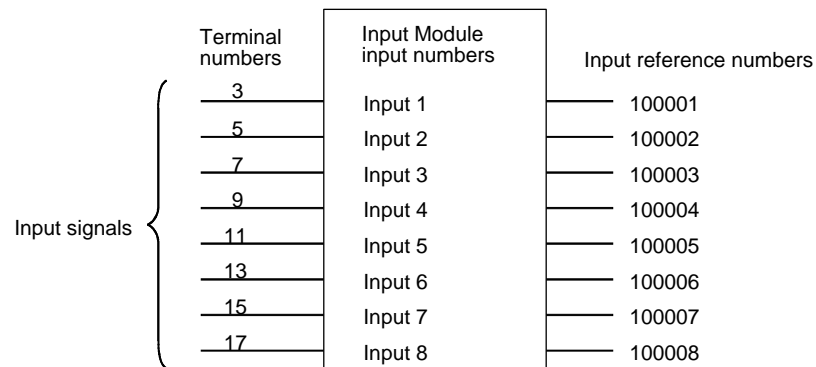
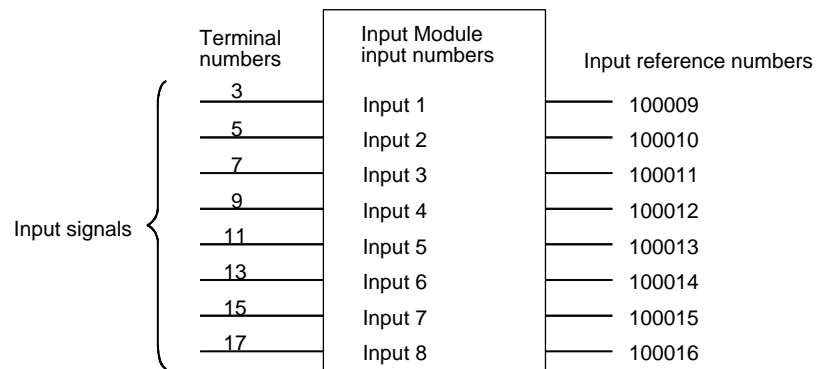


Figure 3.1 Input Relay Allocations

8 Points from 100009 Allocated for Input Relays

*Figure 3.2: Input Relay Allocations***DIP Switch Settings**

The following settings are required to use a digital input module. These settings are made using the DIP switch on the front panel of the module.

- Slave address setting
- Baud rate setting

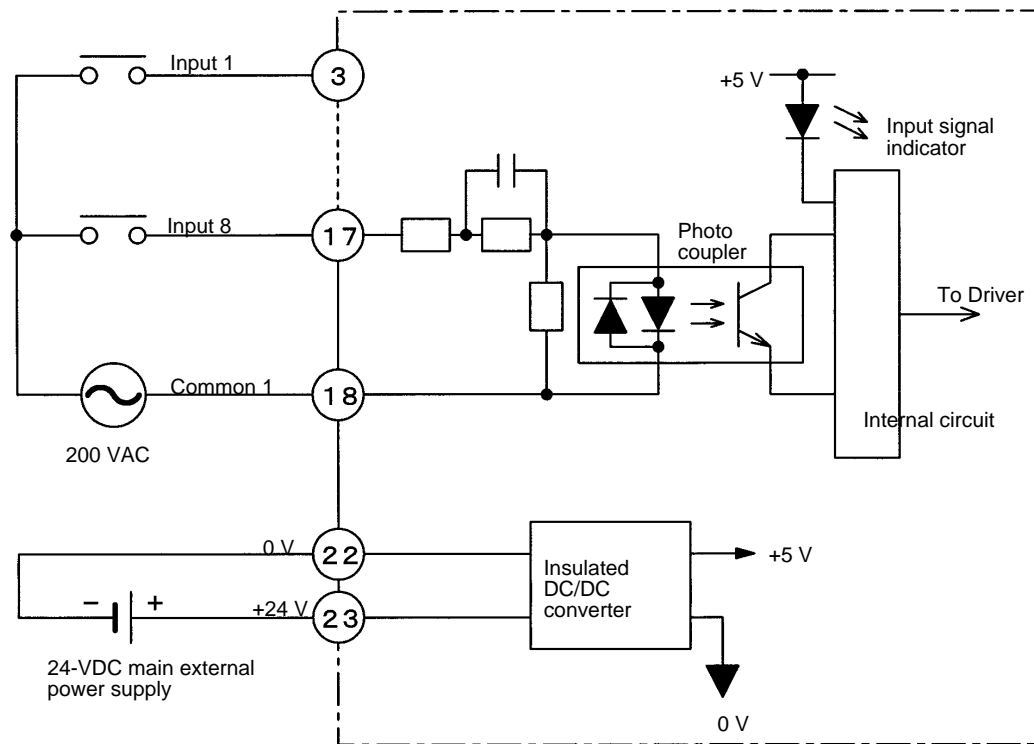
3.1.2 200VAC 8-point Input Module**Performance Specifications**

Item	Specifications
Name	200VAC 8-point input module
Model Number	JAMSC120DAI73330
Rated Voltage	200VAC
Maximum Allowable Voltage	264VAC
Rated Frequency	50/60Hz
Allowable Frequency Range	47 to 63Hz
Inrush Current	320mA
Rated Current	7mA (200 VAC, 50 Hz)
Input Impedance	28.6kΩ at 50Hz 23.1kΩ at 60Hz
Standard Operating Ranges	ON voltage range: 159 to 264VAC OFF voltage range: 40VAC maximum
Input Type	AC type 2 according to JIS B 3501
Input Delay Times	OFF → ON: 20ms maximum ON → OFF: 35ms minimum
Number of Commons	1

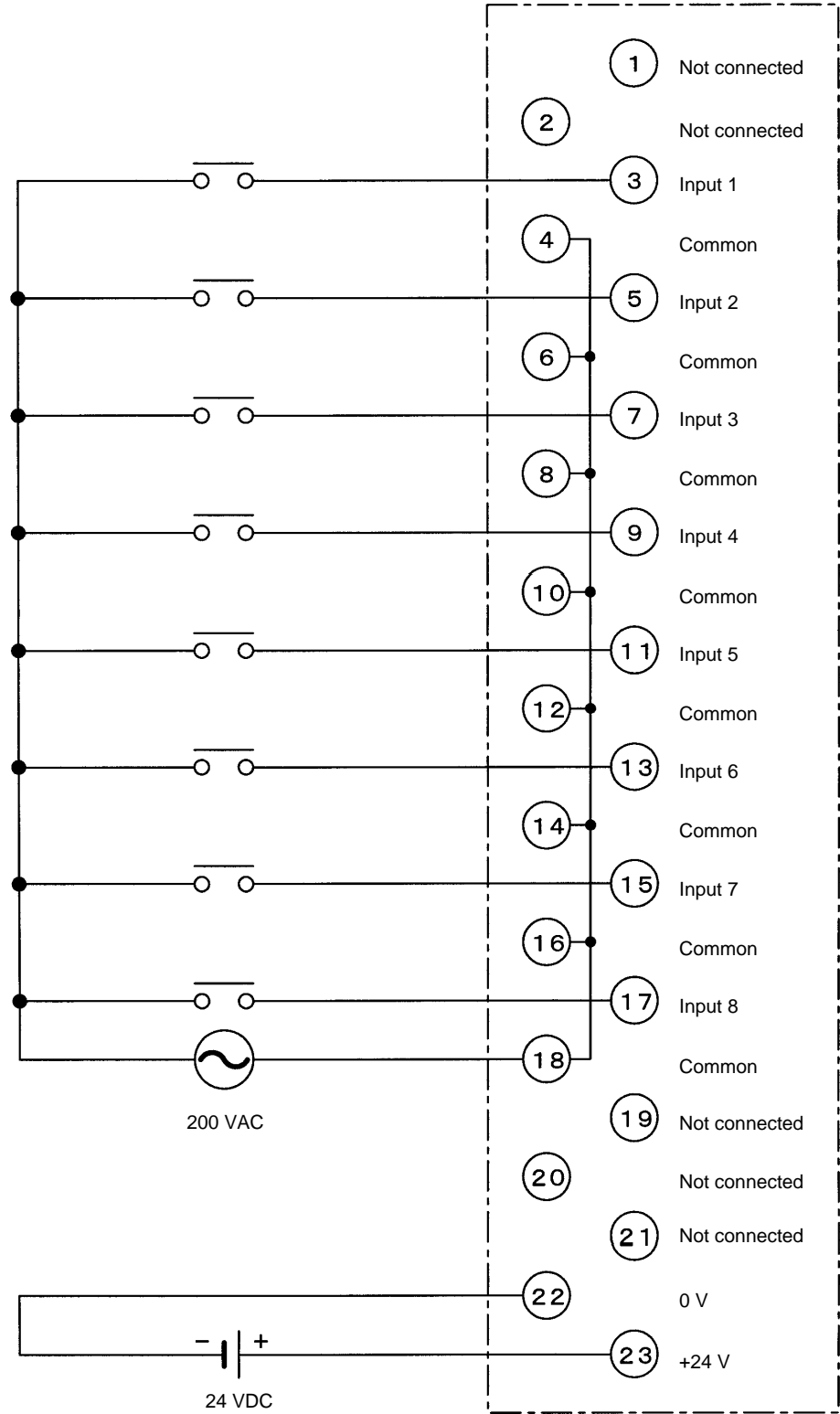
Performance Specifications (Continued)

Item		Specifications
Number of Input Points/Common		8 points/common
Field Connections		Removable terminal block: M3 screws, 23 terminals
Number of Input Points		8 points
Input Signal Indicators		One indicator lights for each point when input is ON. Internal logic side.
Status Indicators		RUN lit: Main external power supply is normal. TX lit: Data is being transmitted.
Input Circuit Insolation	Insolation Method	Photocoupler insolation
	Dielectric Strength	Between input terminals and internal circuit: 1,500VAC (for 1 min)
	Insulation Resistance	Between input terminals and internal circuit: 100MΩ or more (at room temperature and humidity) with a 500VDC insulation resistance tester
External Power Supply		For input signals: 200VAC For main external power supply: 24VDC (20.4 to 26.4VDC) 80mA maximum (when all points are ON)
Derating Conditions		Temperature restrictions depending on the mounting orientation (For details, see <i>Chapter 2 General Specifications</i> .)
Maximum Heating Value		1.92W
Hot Swapping (Removal/Insertion Under Power)		Terminal block: Not permitted Communications connector: Permitted
Approximate Mass		300g
External Dimensions		152 × 44 × 71.8mm (W × H × D)

The following diagram illustrates the circuit configuration.

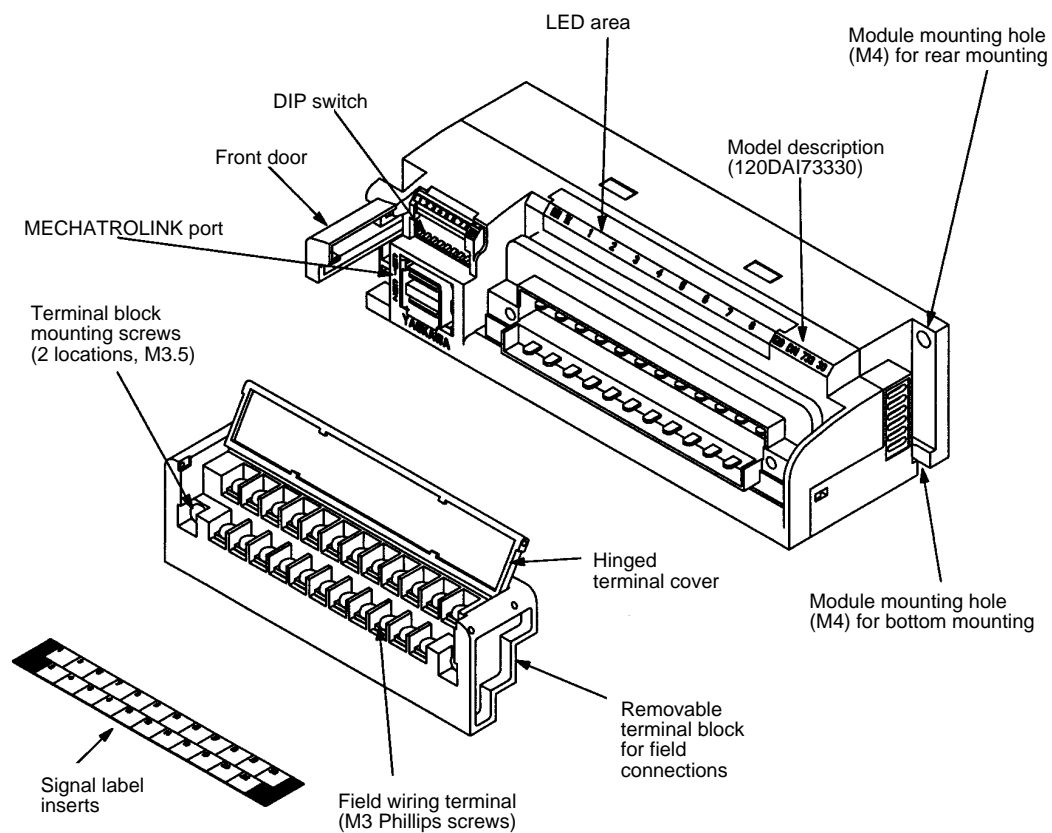


The following diagram shows an example of the terminal connections.



- Note** (1) Terminals 4, 6, 8, 10, 12, 14, 16, and 18 are connected internally.
- (2) Crimp Terminals
Use M3 crimp terminals in the terminal blocks.
- (3) Recommended Wires
Use the following wires for connection to the terminal blocks:
 1.3mm^2 (AWG16) to 0.5mm^2 (AWG20)
- (4) Terminals 1, 2, 19, 20, and 21 are not connected.
Do not use terminal 1 as a relay terminal.

Appearance and Configuration



LED Area

LED	Color	Indication when ON
RUN	Green	Main external power supply is normal.
TX	Green	Data is being transmitted.
1 to 8	Green	Input signals are ON.

Setting I/O Reference Numbers

- The leading I/O reference number used by an input module is allocated through the I/O allocation procedure for the network I/O driver module.
- The input relays are allocated for the I/O reference numbers in ascending order of slave addresses.
- The input reference numbers (input relays) are allocated for the input signals in ascending order of input module input numbers.
- An example of input relay allocation is shown below.

8 Points from 100001 Allocated for Input Relays

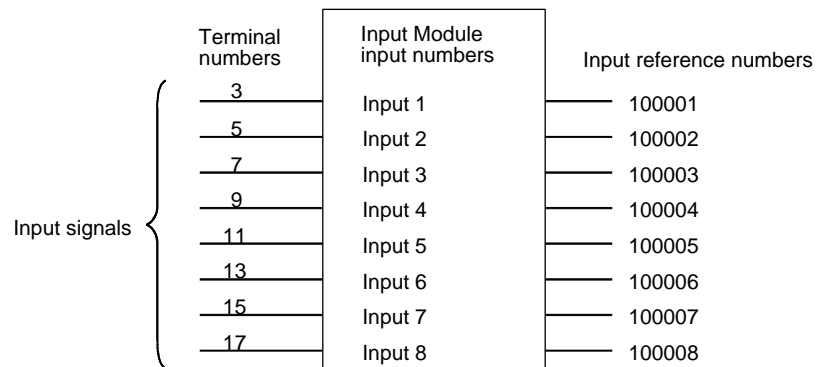
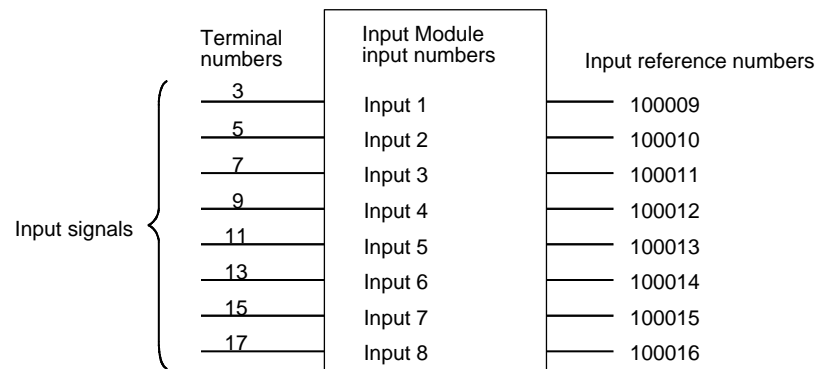


Figure 3.3: Input Relay Allocations

8 Points from 100009 Allocated for Input Relays

*Figure 3.4: Input Relay Allocations***DIP Switch Settings**

The following settings are required to use a digital input module. These settings are made using the DIP switch on the front panel of the module.

- Slave address setting
- Baud rate setting

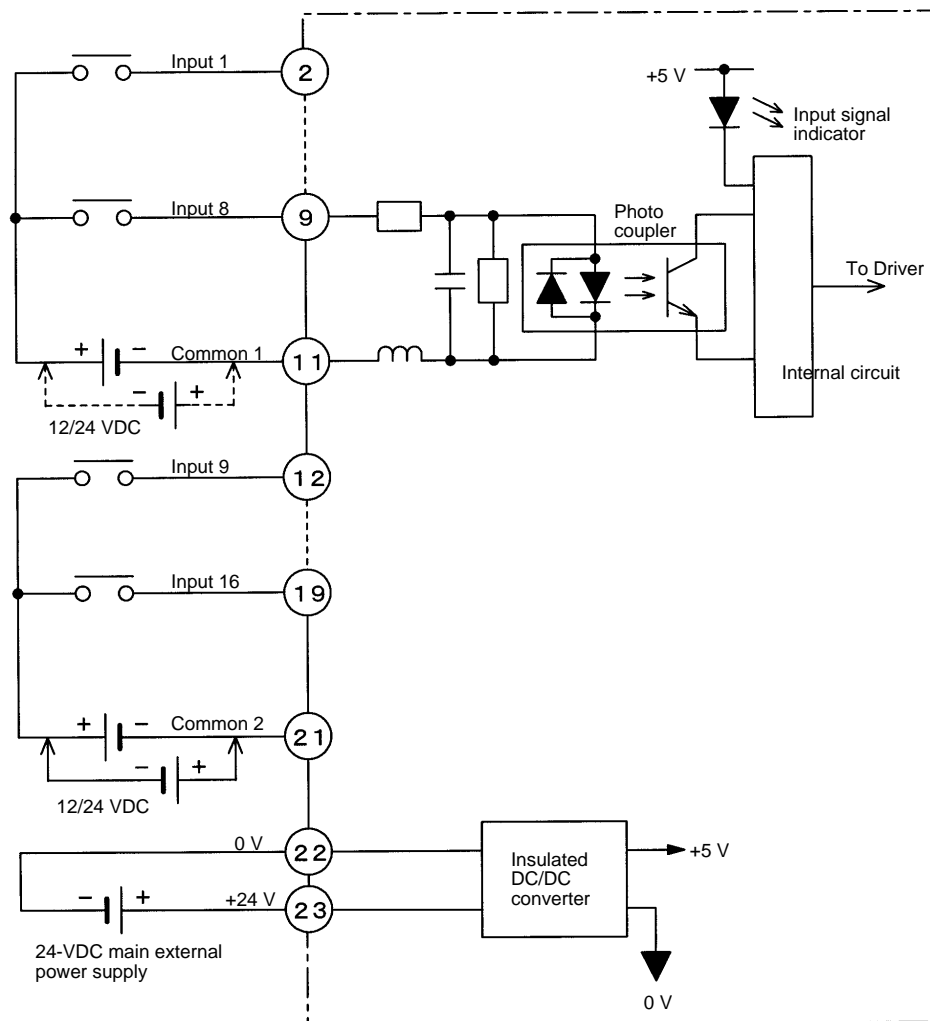
3.1.3 24VDC 16-point Input Module**Performance Specifications**

Item	Specifications	
Usage Conditions	12VDC	24VDC
Name	24VDC 16-point input module	
Model Number	JAMSC120DDI34330	
Rated Voltage	12/24VDC	
Maximum Allowable Voltage	30VDC	
Input Format	Sourcing/sinking inputs	
Rated Current	2.5mA	5mA
Input Impedance	3.0kΩ	
Standard Operating Ranges	Minimum ON voltage: 9VDC Maximum OFF voltage: 5VDC	
Input Type	Does not conform to JIS B 3501.	DC type 2 according to JIS B 3501
Input Delay Times	OFF → ON: 5ms maximum ON → OFF: 5ms maximum	
Number of Commons	2	
Number of Input Points/Common	8 points/common	

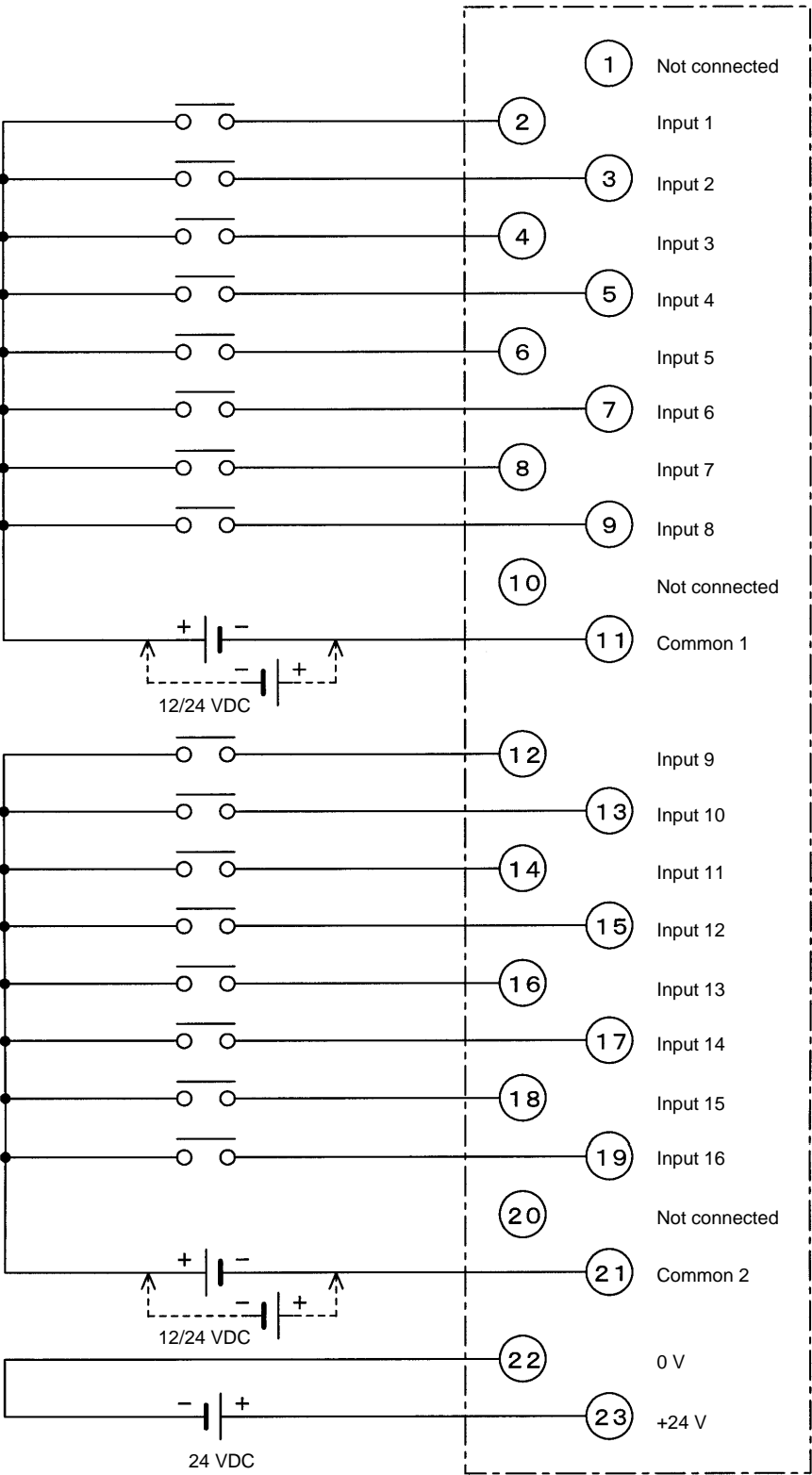
Performance Specifications (Continued)

Item		Specifications
Field Connections		Removable terminal block: M3 screws, 23 terminals
Number of Input Points		16 points
Input Signal Indicator		One indicator lights for each point when input is ON. Internal logic side.
Status Indicators		RUN lit: Main external power supply is normal. TX lit: Data is being transmitted.
Input Circuit Isolation	Insolation Method	Photocoupler insolation
	Dielectric Strength	Between input terminals and internal circuits: 1,500VAC (for 1 min)
	Insulation Resistance	Between input terminals and internal circuits: 100M Ω or more (at room temperature and humidity) with a 500VDC insulation resistance tester
External Power Supply		For input signals: 12VDC
		For input signals: 24VDC
		For main external power supply: 24VDC (20.4 to 26.4VDC) 90 mA maximum (when all points are ON)
Derating Conditions		Temperature restrictions depending on the mounting orientation (For details, refer to <i>Chapter 2 General Specifications</i> .)
Maximum Heating Value		2.16W
Hot Swapping (Removal/Insertion Under Power)		Terminal block: Not permitted Communications connector: Permitted
Approximate Mass		300g
External Dimensions		152 x 44 x 71.8mm (W x H x D)

The following diagram illustrates the circuit configuration.



The following diagram shows an example of the terminal connections.



Note (1) Crimp Terminals

Use M3 crimp terminals in the terminal blocks.

(2) Recommended Wires

Use the following wires for connection to the terminal blocks:

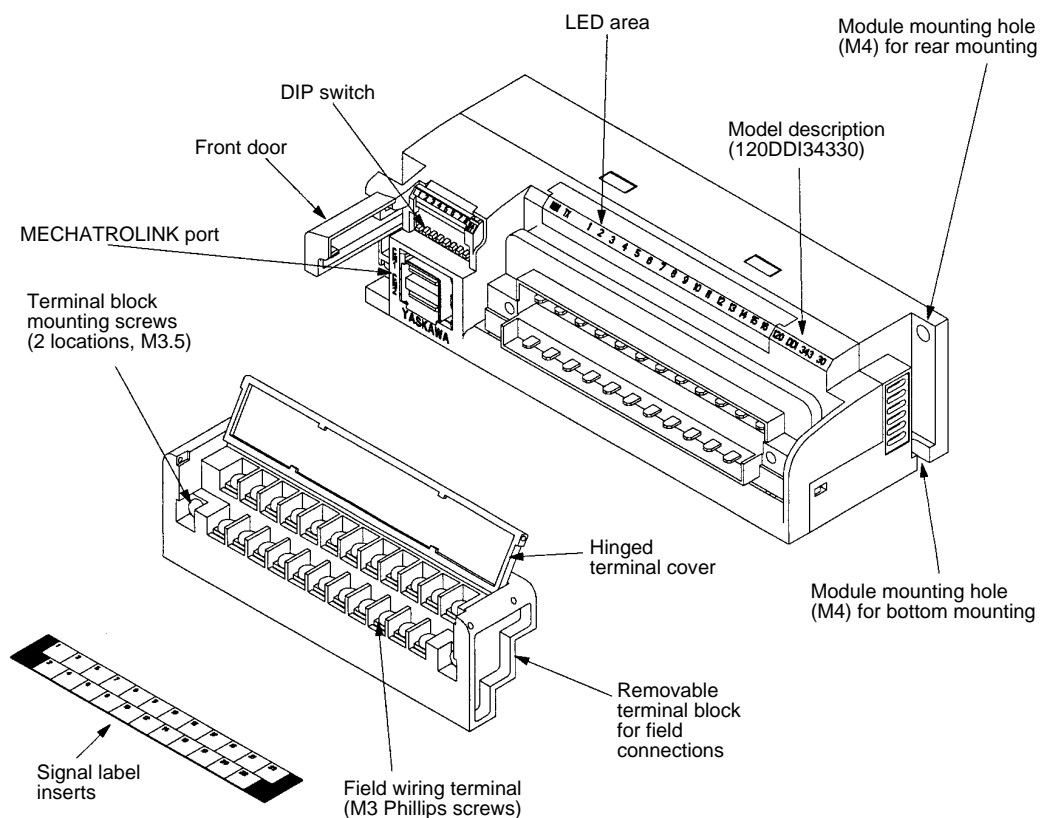
0.8mm^2 (AWG18) to 0.2mm^2 (AWG24)

(3) The signal polarity of the external power supply can be connected in either direction.

(4) Terminals 1, 10, and 20 are not connected.

Do not use terminal 1 as a relay terminal.

Appearance and Configuration



LED Area

LED	Color	Indication when ON
RUN	Green	Main external power supply is normal.
TX	Green	Data is being transmitted.
1 to 16	Green	Input signals are ON.

Setting I/O Reference Numbers

- The leading I/O reference number used by an input module is allocated through the I/O allocation procedure for the network I/O driver module.
- The input relays are allocated for the I/O reference numbers in ascending order of slave addresses.
- The input reference numbers (input relays) are allocated for the input signals in ascending order of input module input numbers.
- An example of input relay allocation is shown below.

16 Points from 100001 Allocated for Input Relays

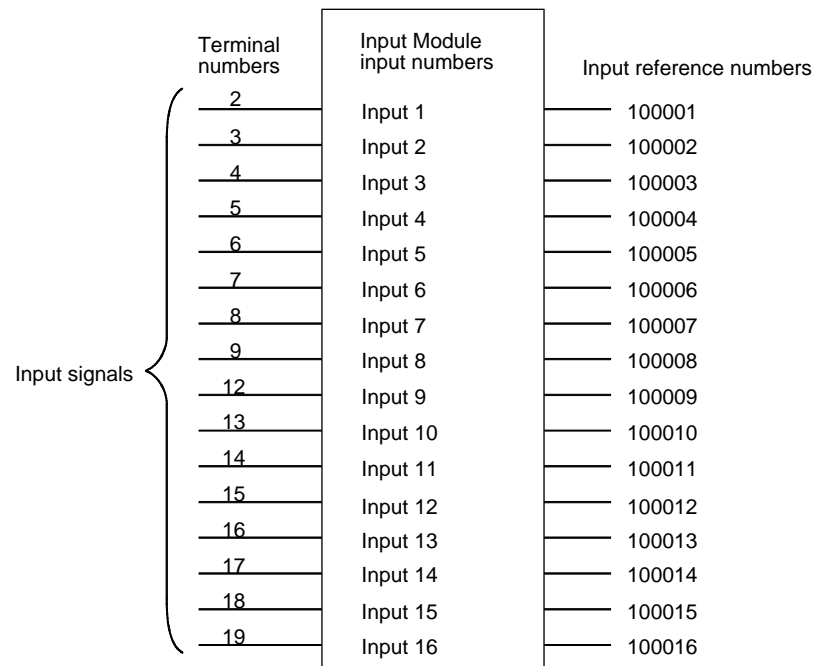


Figure 3.5: Input Relay Allocations

DIP Switch Settings

The following settings are required to use a digital input module. These settings are made using the DIP switch on the front panel of the module.

- Slave address setting
- Baud rate setting

3.2 Digital Output Specifications

This section describes the performance specifications, circuit configuration, field connections, and appearance of digital output modules.

3.2.1 100/200VAC 8-point Output Module

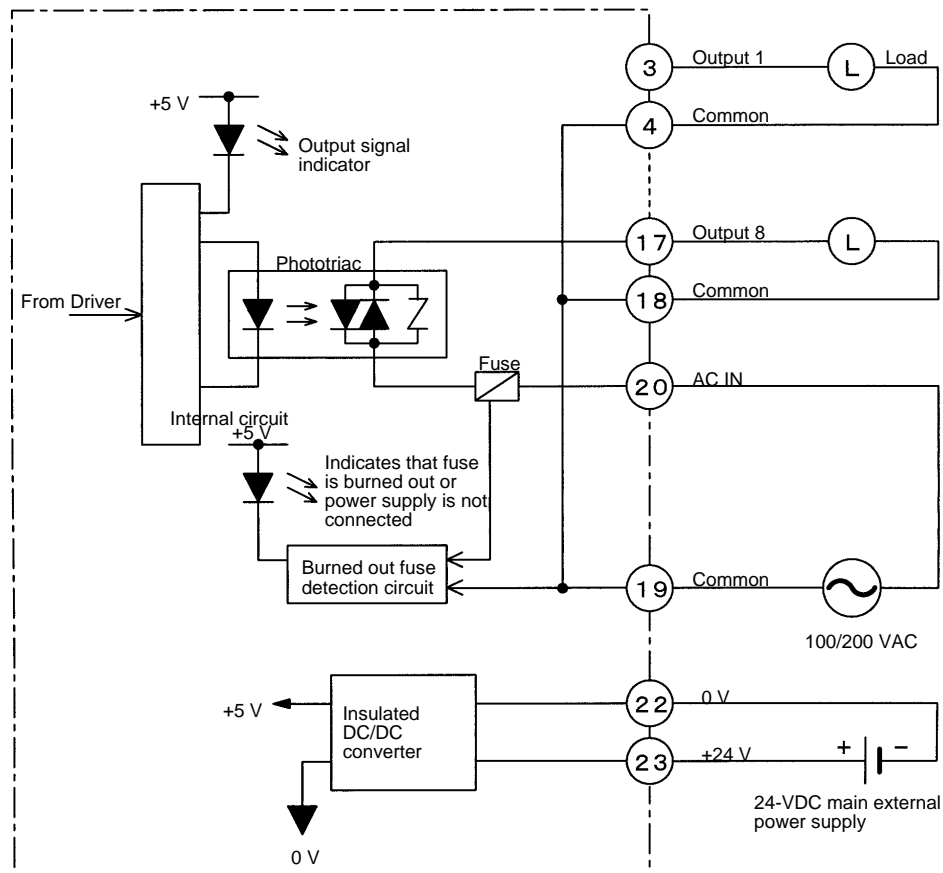
Performance Specifications

Item		Specifications
Name		100/200VAC 8-point output module
Model Number		JAMSC120DAO83330
Rated Voltage		100/200VAC
Allowable Voltage Range		80 to 264VAC
Rated Frequency		50/60Hz
Allowable Frequency Range		47 to 63Hz
Maximum Load Current		0.6 Arms/point, 2.4A/common
Output Voltage Drop		1.0Vrms
Output Delay Times		OFF → ON: 10ms maximum ON → OFF: 1/2 cycle + 5ms maximum
OFF Leakage Current		2mA maximum (240VAC, 50Hz)
Minimum Load Voltage/Current		10mArms
Output Type		Triac Output
Number of Commons		1
Field Connections		Removable terminal block: M3 screws
Output Protection Type		Unprotected outputs according to JIS B 3501
Built-in Fuse		One 3A (one per common) (Burnout time: Less than 1s at 200% of rated current)
Surge Suppressing Circuit		Varistor
Other Output Protection		None
Number of Output Points		8 points
Output Signal Indicator		One indicator lights for each point when output is ON. Internal logic side.
Status Indicators		RUN lit: Main external power supply is normal. TX lit: Data is being transmitted. ERR lit: Fuse is burned out or load drive power supply is not connected.
Output Circuit Isolation	Isolation Method	Phototriac isolation
	Dielectric Strength	Between output terminals and internal circuits: 1,500VAC (for 1 min)
	Insulation Resistance	Between output terminals and internal circuits: 100MΩ or more (at room temperature and humidity) with a 500VDC insulation resistance tester

Performance Specifications (Continued)

Item	Specifications
External Power Supply	For load drive: 100/200VAC For main external power supply: 24VDC (20.4 to 26.4VDC) 100mA (when all points are ON)
Derating Conditions	Temperature restrictions depend on the mounting orientation (For details, refer to <i>Chapter 2 General Specifications</i> .)
Maximum Heating Value	2.4W
Hot Swapping (Removal/Insertion Under Power)	Terminal block: Not permitted Communications connector: Permitted
Approximate Mass	300g
External Dimensions	152 × 44 × 71.8mm (W × H × D)

The following diagram illustrates the circuit configuration.



Caution Do not replace built-in fuses without the assistance of qualified personnel.

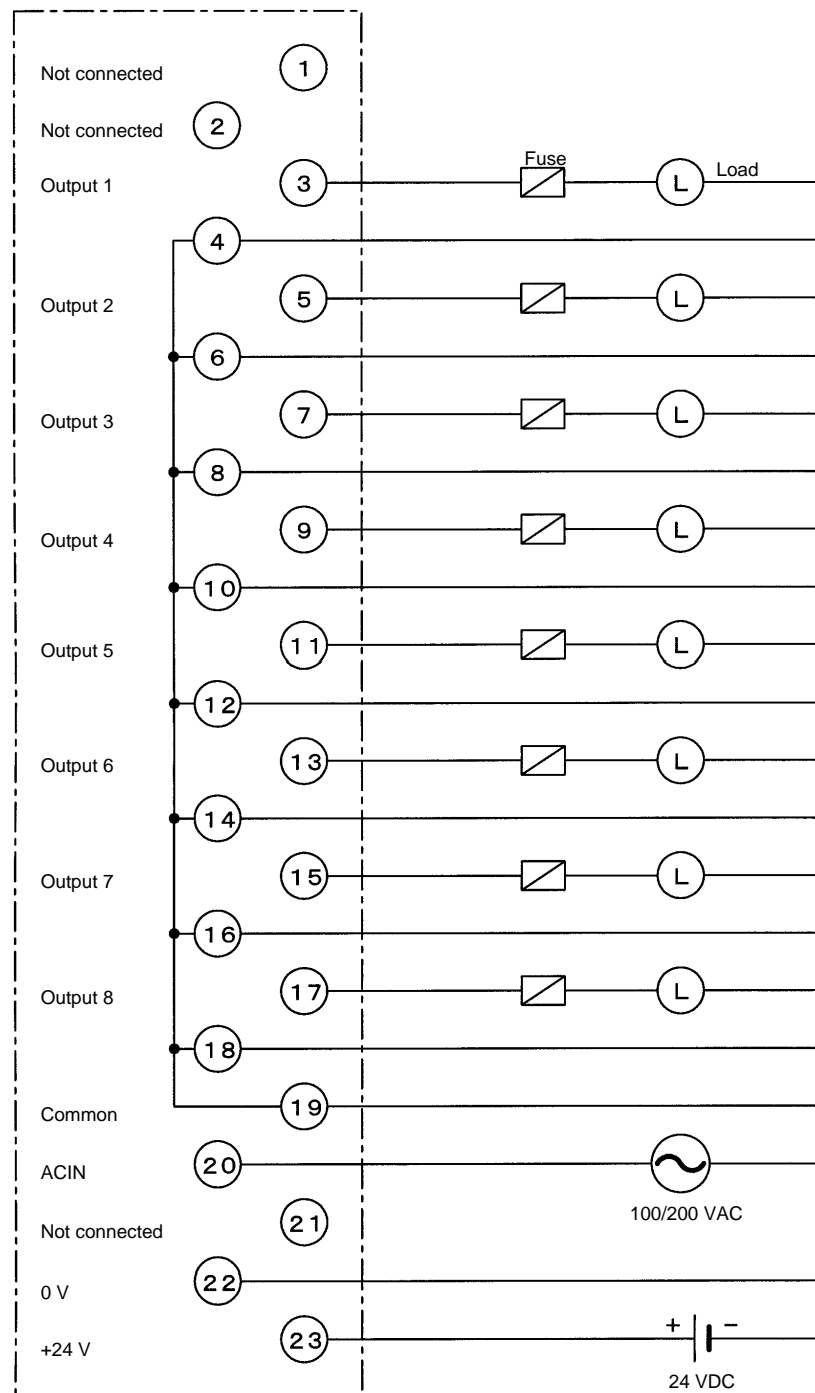
Replacing a built-in fuse may cause the output module to fail or malfunction. Such problems are covered by Yaskawa product warranty. Always have built-in fuses replaced by qualified Yaskawa personnel.

Caution Use an external fuse that matches the specifications of each load and connect it in series with the load.

The built-in fuses do not provide protection for the output elements. Failure to connect external fuses may cause fire, destroy the load, or damage the output elements when a load short-circuit or an overload occurs.

Note When the load drive power supply is OFF, or when a fuse has burned out, communications with the driver module stop.

The following diagram shows an example of the terminal connections.



Caution The 100/200VAC 8-point output module can connect a load of 0.6A per output point, but the total amperage per module must be 2.4A or less. Consider the load distribution, and restrict the total amperage to no more than 2.4A.

Failure to meet this condition may damage the output circuit.

Caution Use an external fuse that matches the specifications of each load and connect it in series with the load.

The built-in fuses do not provide protection for the output elements. Failure to connect external fuses may cause fire, destroy the load, or damage the output elements when a load short circuit or an overload occurs.

Note (1) Terminals 4, 6, 8, 10, 12, 14, 16, 18, and 19 are connected internally.

(2) Crimp Terminals

Use M3 crimp terminals in the terminal blocks.

(3) Recommended Wires

Use the following wires for connection to the terminal blocks:

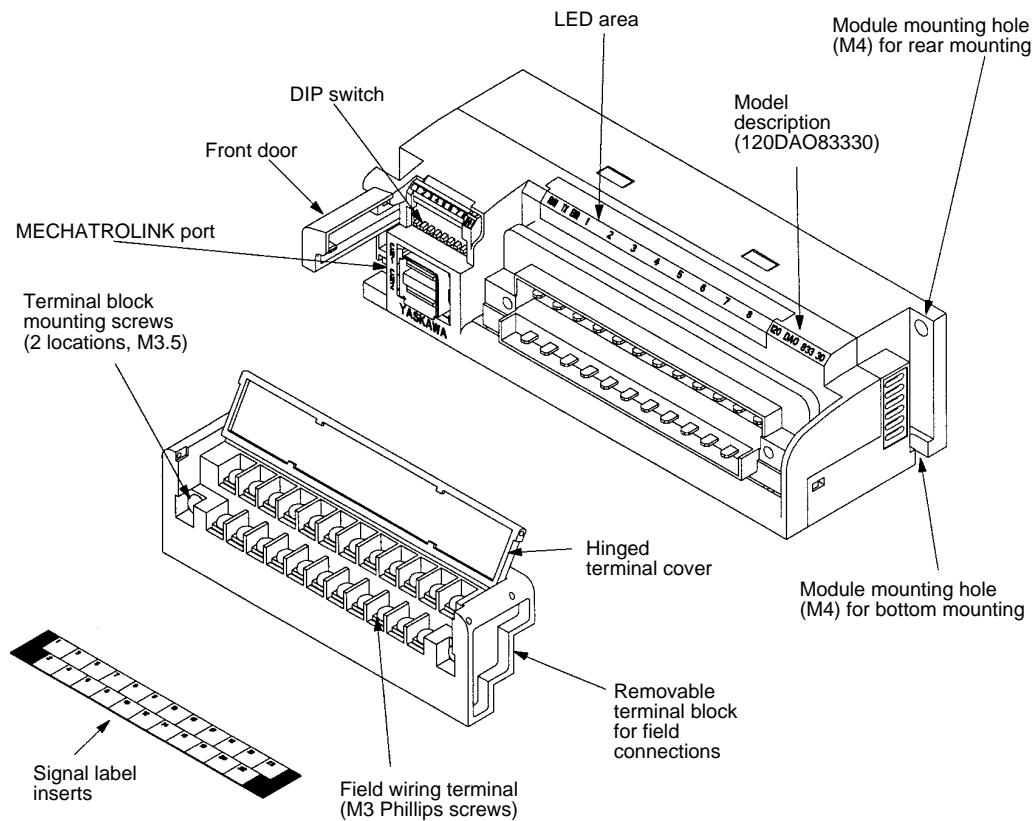
1.3mm² (AWG16) to 0.5mm² (AWG20)

Use a thickness of at least 1.3mm² (AWG16) for the common lines.

(4) Terminals 1, 2, and 21 are not connected.

Do not use terminal 1 as a relay terminal.

Appearance and Configuration



LED Area

LED	Color	Indication when ON
RUN	Green	Main external power supply is normal.
TX	Green	Data is being transmitted.
ERR	Red	Fuse is burned out or load drive power supply is not connected.
1 to 8	Green	Output signals are ON.

Setting I/O Reference Numbers

- The leading I/O reference number used by an output module is allocated through the I/O allocation procedure for the network I/O driver module.
- The output coils are allocated for the I/O reference numbers in ascending order of slave addresses.

- The output reference numbers (output coils) are allocated for the output signals in ascending order of output module output numbers.
- An example of output coil allocation is shown below.

8 Points from 000001 Allocated for Output Coils

Output reference numbers	Output Module output numbers	Terminal numbers	
000001	Output 1	3, 4	} Output signals
000002	Output 2	5, 6	
000003	Output 3	7, 8	
000004	Output 4	9, 10	
000005	Output 5	11, 12	
000006	Output 6	13, 14	
000007	Output 7	15, 16	
000008	Output 8	17, 18	

Figure 3.6: Output Coil Allocations

8 Points from 000009 Allocated for Output Coils

Output reference numbers	Output Module output numbers	Terminal numbers	
000009	Output 1	3, 4	} Output signals
000010	Output 2	5, 6	
000011	Output 3	7, 8	
000012	Output 4	9, 10	
000013	Output 5	11, 12	
000014	Output 6	13, 14	
000015	Output 7	15, 16	
000016	Output 8	17, 18	

Figure 3.7: Output Coil Allocations

DIP Switch Settings

The following settings are required to use digital I/O modules. These settings are made using the DIP switch on the front panel of the module.

- Slave address setting
- Baud rate setting
- Timeout output setting

3.2.2 24VDC 16-point Output Module

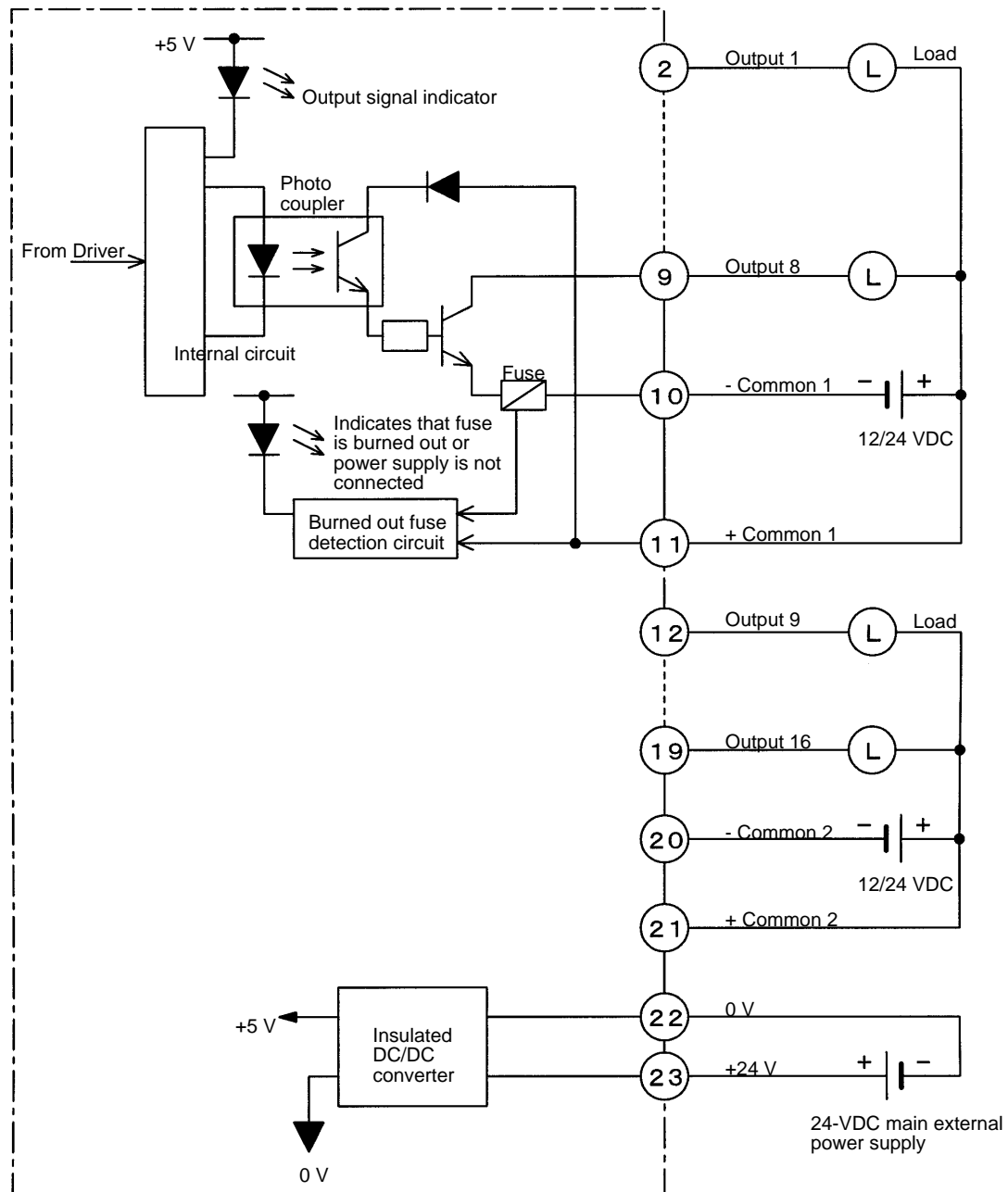
Performance Specifications

Item	Specifications
Name	24VDC 16-point output modules
Model Number	JAMSC120DDO34340
Rated Voltage	12/24VDC
Allowable Voltage Range	10.2 to 30.0VDC
Output Format	Sinking outputs
Maximum Load Current	0.3A/point
Output Voltage Drop	1.5V (0.3A) maximum
Output Delay Times	OFF → ON: 1ms maximum ON → OFF: 1ms maximum
OFF Leakage Current	1mA (24VDC) maximum
Output Type	Transistor output
Number of Commons	2
Number of Output Points/Common	8 points/common
Field Connections	Removable terminal block: M3 screws, 23 terminals
Output Protection Type	Unprotected outputs according to JIS B 3501
Built-in Fuse	Two 3.5A (one per common) (Burnout time: Less than 5s at 200% of rated current)
Surge Suppressing Circuit	None
Other Output Protection	None
Number of Output Points	16 points
Output Signal Indicator	One indicator lights for each point when output is ON. Internal logic side.
Status Indicators	RUN lit: Main external power supply is normal. TX lit: Data is being transmitted. ERR lit: Fuse is burned out or load drive power supply is not connected.

Performance Specifications (Continued)

Item		Specifications
Output Circuit Isolation	Isolation Method	Photocoupler isolation
	Dielectric Strength	Between output terminals and internal circuits: 1,500VAC (for 1 min)
	Insulation Resistance	Between output terminals and internal circuits: 100M Ω or more (at room temperature and humidity) with a 500VDC insulation resistance tester
External Power Supply		For load drive: 12/24VDC For main external power supply: 24VDC (20.4 to 26.4V) 110mA (when all points are ON)
Derating Conditions		Temperature restrictions depend on the mounting orientation (For details, refer to <i>Chapter 2 General Specifications</i> .)
Maximum Heating Value		2.64W
Hot Swapping (Removal/Insertion Under Power)		Terminal block: Not permitted Communications connector: Permitted
Approximate Mass		300g
External Dimensions		152 × 44 × 71.8mm (W × H × D)

The following diagram illustrates the circuit configuration.

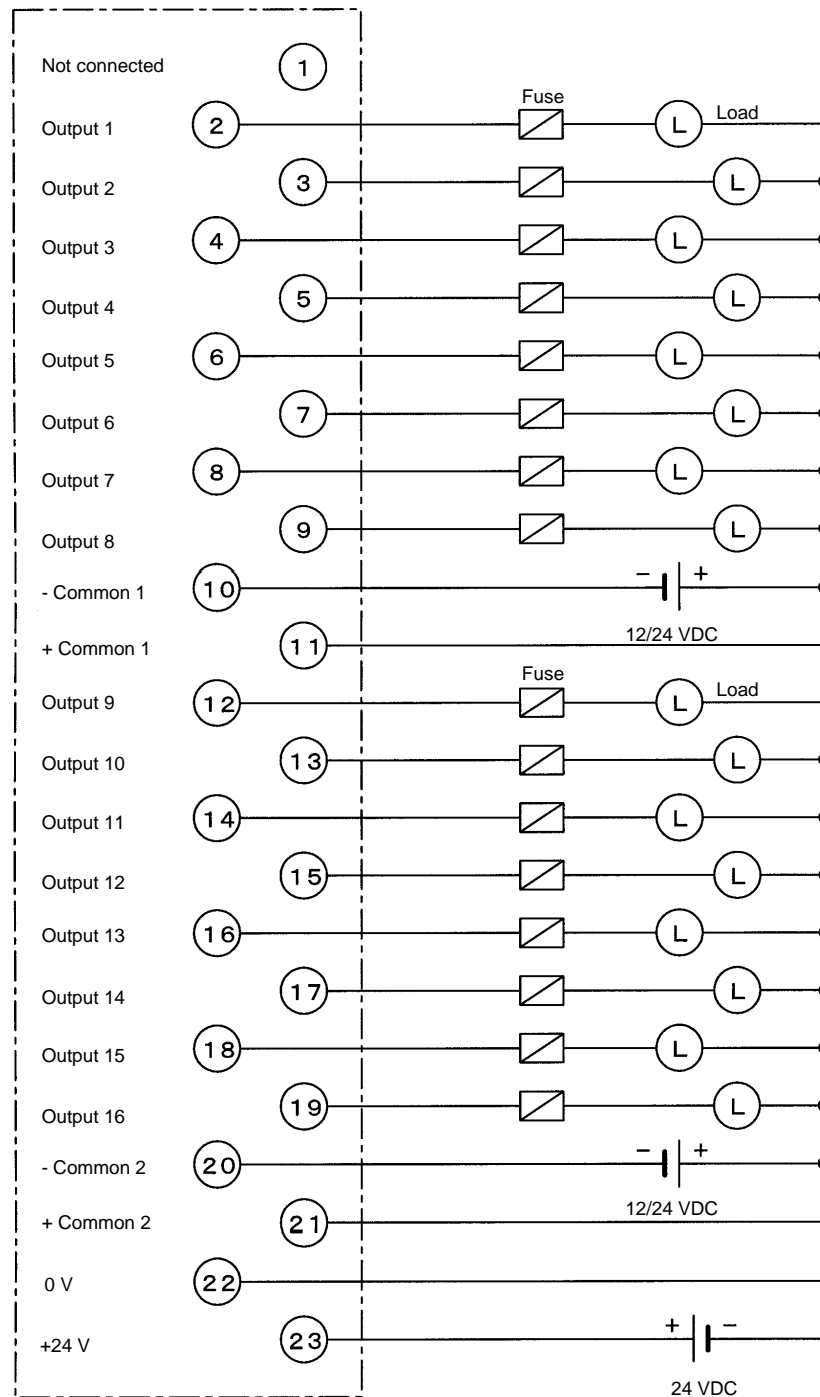


Caution Use an external fuse that matches the specifications of each load and connect it in series with the load.

The built-in fuses do not provide protection for the output elements. Failure to connect external fuses may cause fire, destroy the load, or damage the output elements when a load short-circuit or an overload occurs.

Note When the load drive power supply is OFF, or when a fuse has burned out, communications with the driver module stop.

The following diagram shows an example of the terminal connections.



Caution Use an external fuse that matches the specifications of each load and connect it in series with the load.

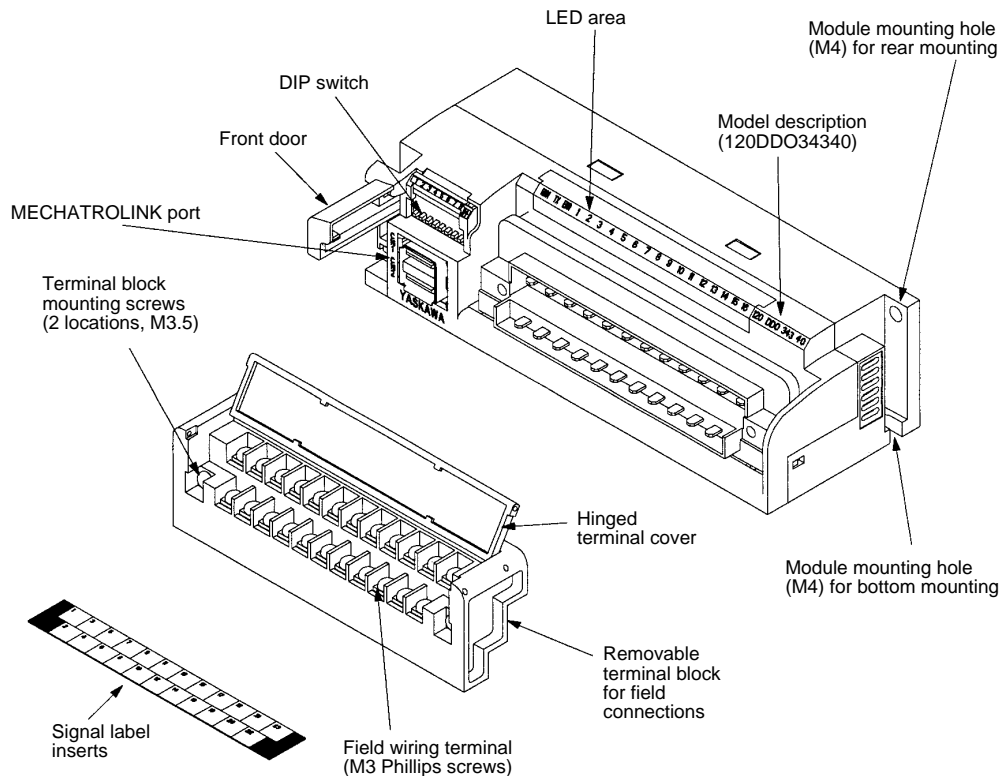
The built-in fuses do not provide protection for the output elements. Failure to connect external fuses may cause fire, destroy the load, or damage the output elements when a load short-circuit or an overload occurs.

Note (1) Crimp Terminals
Use M3 crimp terminals in the terminal blocks.

(2) Recommended Wires
Use the following wires for connection to the terminal blocks:
 0.8mm^2 (AWG18) to 0.2mm^2 (AWG24)

(3) Terminal 1 is not connected.
Do not use terminal 1 as a relay terminal.

Appearance and Configuration



LED Area

LED	Color	Indication when ON
RUN	Green	Main external power supply is normal.
TX	Green	Data is being transmitted.
ERR	Red	Fuse is burned out or load drive power supply is not connected.
1 to 16	Green	Output signals are ON.

Setting I/O Reference Numbers

- The leading I/O reference number used by an output module is allocated through the I/O allocation procedure for the network I/O driver module.
- The output coils are allocated for the I/O reference numbers in ascending order of slave addresses.
- The output reference numbers (output coils) are allocated for the output signals in ascending order of output module output numbers.
- An example of output coil allocation is shown below.

16 Points from 000001 Allocated for Output Coils

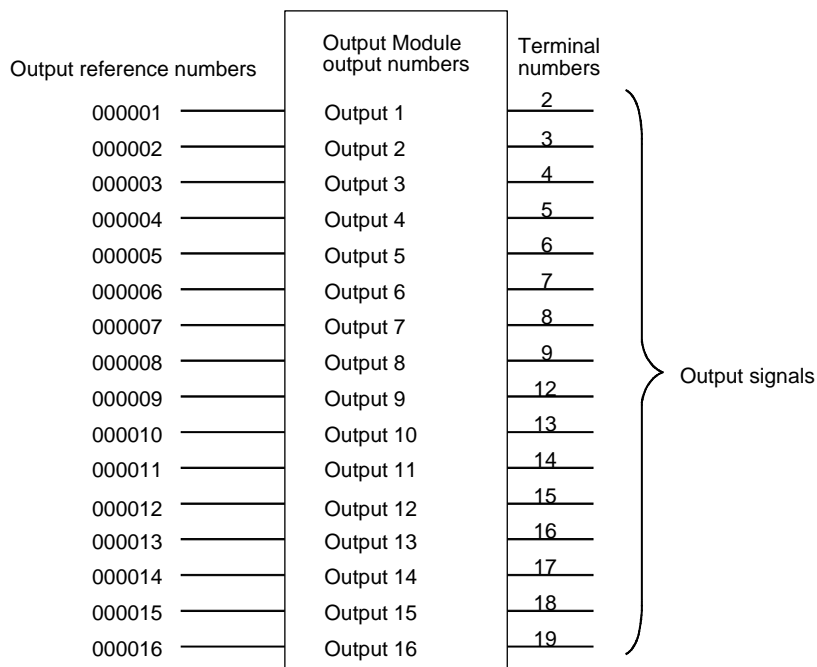


Figure 3.8: Output Coil Allocations

DIP Switch Setting

The following settings are required to use digital I/O modules. These settings are made using the DIP switch on the front panel of the module.

- Slave address setting
- Baud rate setting
- Timeout output setting

3.2.3 Relay Contact 8-point Output Module

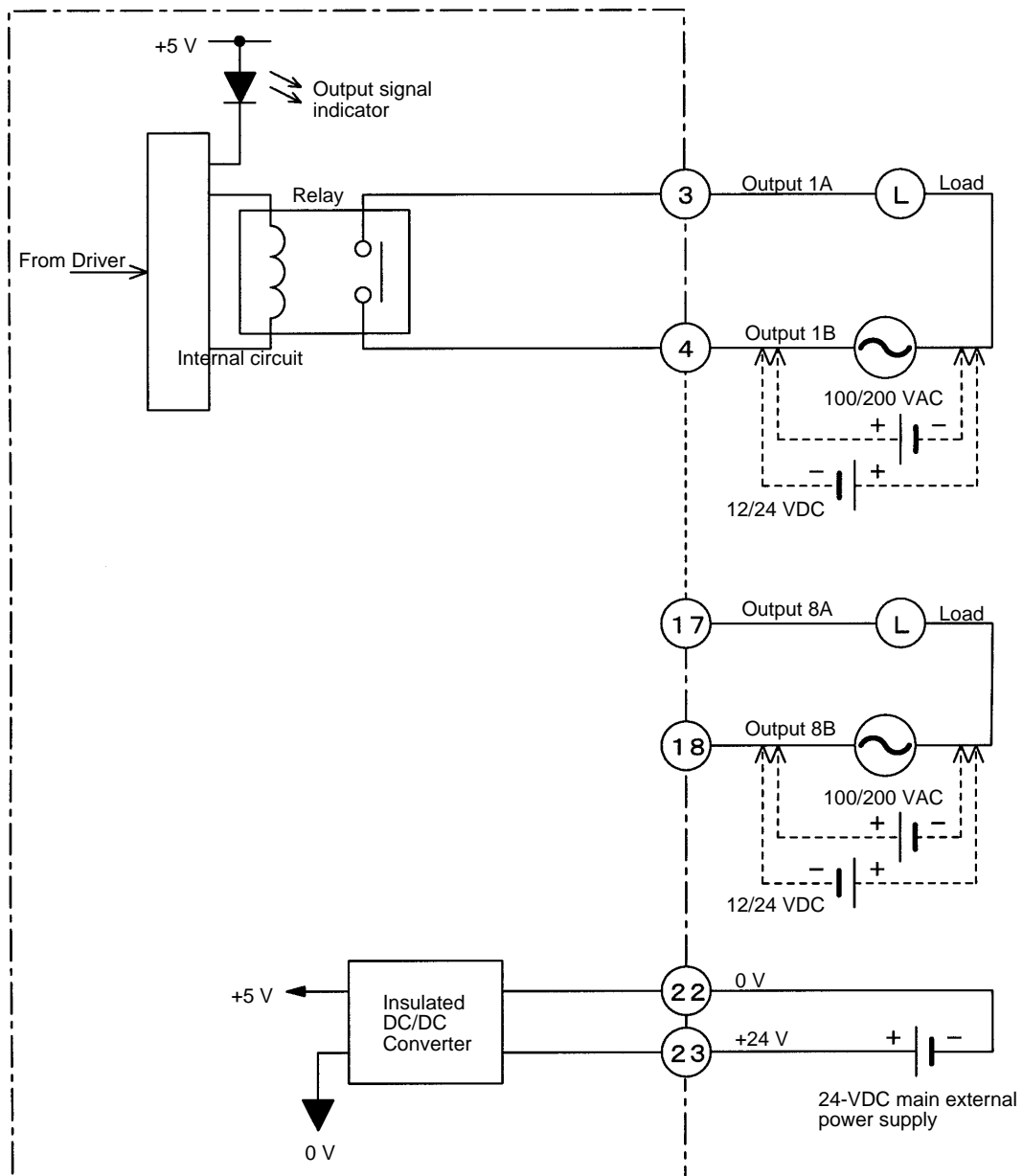
Performance Specifications

Item			Specifications	
Name			Relay Contact 8–point output module	
Model Number			JAMSC120DRA83030	
Contact Specifications	Rated Voltage and Current		200VAC 1–A resistive load 24VDC 1–A resistive load	
	Maximum Load Power		750VA (AC load) 90W (DC load)	
	Maximum Load Voltage		264VAC, 125VDC	
	Minimum Load Voltage and Current		100mVDC, 0.1mA	
	Contact Resistance		100mΩ maximum	
	Contact Life	Electrical Life	30VDC 5–A resistive load: 100,000 times or more 250VAC 3–A resistive load: 150,000 times or more	
		Mechanical Life	20,000,000 times or more	
Output Delay Times			OFF → ON: 10ms maximum ON → OFF: 15ms maximum	
Output Type			Relay contact outputs	
Field Connections			Removable terminal block: M3 screws	
Output Protection Type			Unprotected outputs according to JIS B 3501	
Built–in Fuse			None	
Surge Suppressing Circuit			None	
Other Output Protection			None	
Number of Output Points			8 points	
Output Signal Indicator			One indicator lights for each point when output is ON. Internal logic side.	
Status Indicators			RUN lit: Main external power supply is normal. TX lit: Data is being transmitted.	
Output Circuit Isolation	Isolation Method		Relay isolation	
	Dielectric Strength		Between output terminals and internal circuits: 1,500VAC (for 1 min)	
	Insulation Resistance		Between output terminals and internal circuits: 100MΩ or more (at room temperature and humidity) with a 500VDC insulation resistor	
External Power Supply			For load drive: 100/200VAC, 24VDC For main external power supply: 24VDC (20.4 to 26.4VDC) 110mA (when all points are ON)	

Performance Specifications (Continued)

Item	Specifications
Derating Conditions	Temperature restrictions depend on the mounting orientation (For details, refer to <i>Chapter 2 General Specifications</i> .)
Maximum Heating Value	2.64W
Hot Swapping (Removal/Insertion Under Power)	Terminal block: Not permitted Communications connector: Permitted
Approximate Mass	300g
External Dimensions	152 × 44 × 71.8mm (W × H × D)

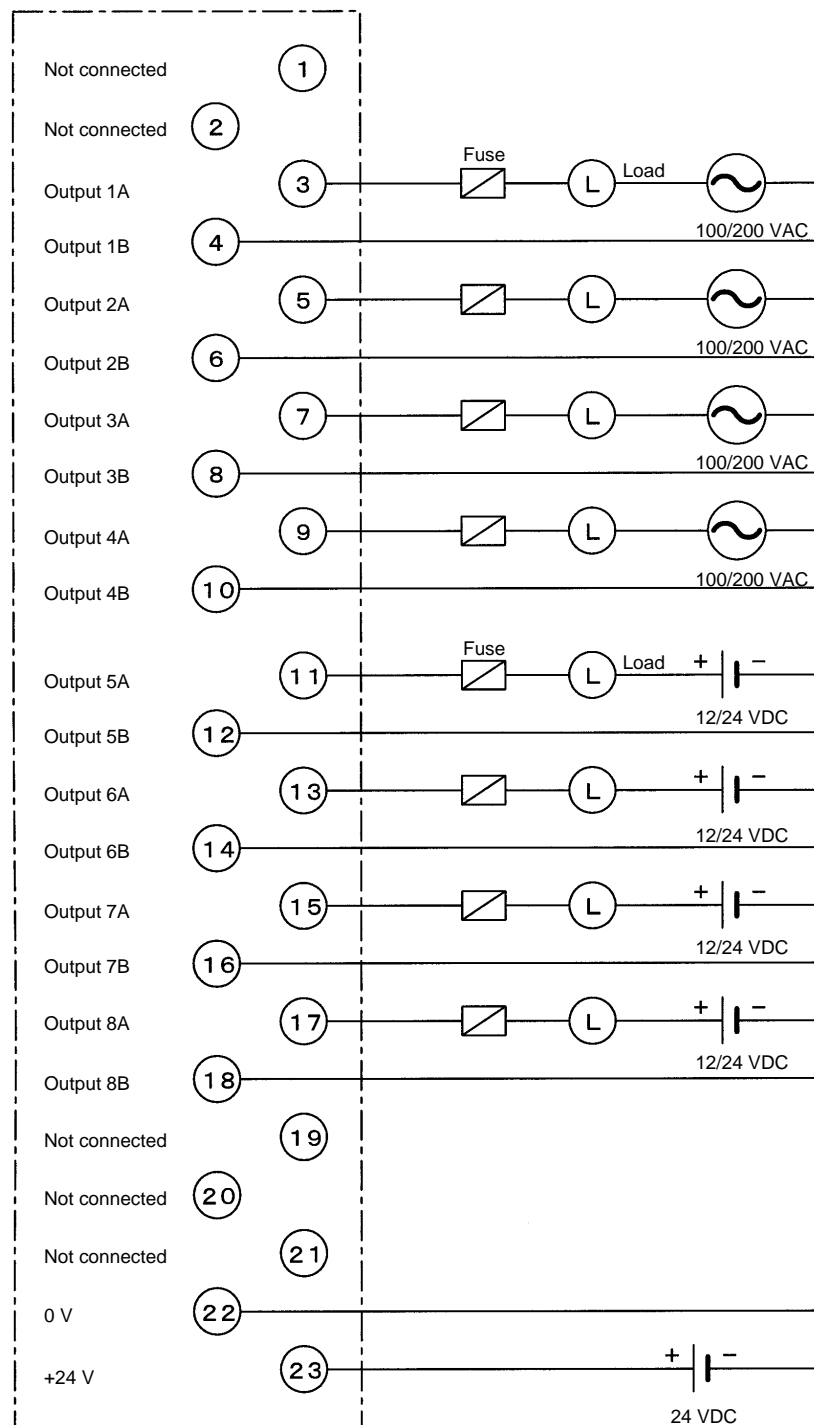
The following diagram illustrates the circuit configuration.



Caution Use an external fuse that matches the specifications of each load and connect it in series with the load. Protective fuses are not built into the relay contact 8-point output module.

Failure to connect external fuses may cause fire, destroy the load, or damage the output elements when a load short-circuit or an overload occurs.

The following diagram shows an example of the terminal connections



Caution Use an external fuse that matches the specifications of each load and connect it in series with the load. Protective fuses are not built into the relay contact 8-point output module.

Failure to connect external fuses may cause fire, destroy the load, or damage the output elements when a load short-circuit or an overload occurs.

Note (1) Crimp Terminals

Use M3 crimp terminals in the terminal blocks.

(2) Recommended Wires

Use the following wires for connection to the terminal blocks:

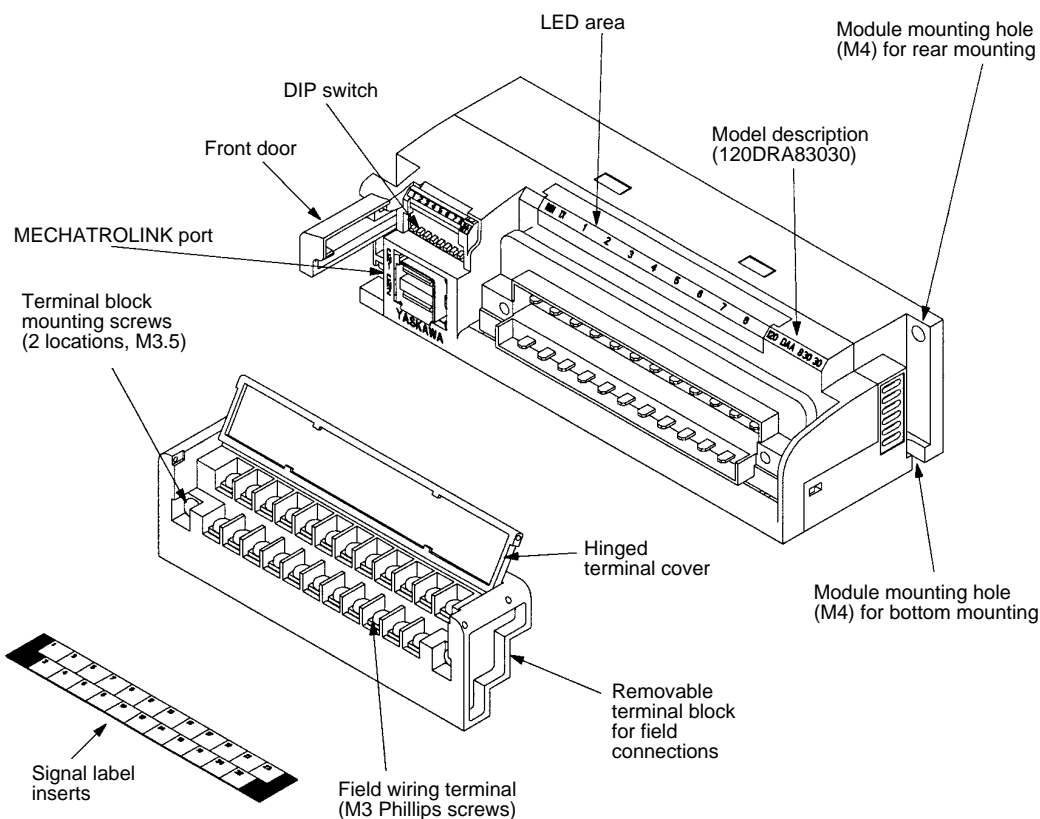
1.3mm² (AWG16) to 0.5mm² (AWG20)

Use a thickness of at least 1.3mm² (AWG16) for the common lines.

(3) Terminals 1, 2, 19, 20, and 21 are not connected.

Do not use terminal 1 as a relay terminal.

Appearance and Configuration



LED Area

LED	Color	Indication when ON
RUN	Green	Main external power supply is normal.
TX	Green	Data is being transmitted.
1 to 8	Green	Output signals are ON.

Setting I/O Reference Numbers

- The leading I/O reference number used by an output module is allocated through the I/O allocation procedure for the network I/O driver module.
- The output coils are allocated for the I/O reference numbers in ascending order of slave addresses.
- The output reference numbers (output coils) are allocated for the output signals in ascending order of output module output numbers.
- An example of output coil allocation is shown below.

8 Points from 000001 Allocated for Output Coils

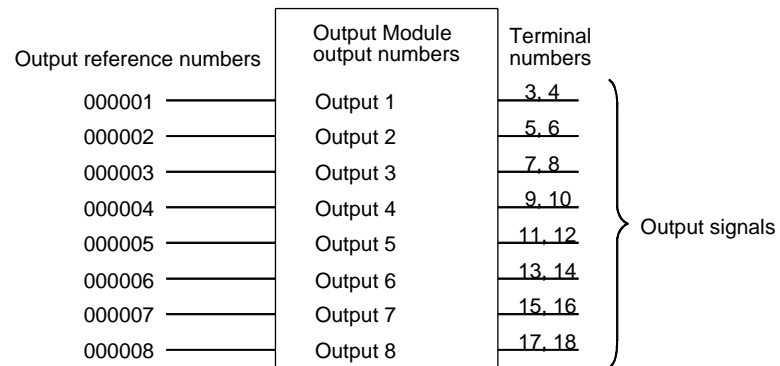


Figure 3.9: Output Coil Allocations

8 Points from 000009 Allocated for Output Coils

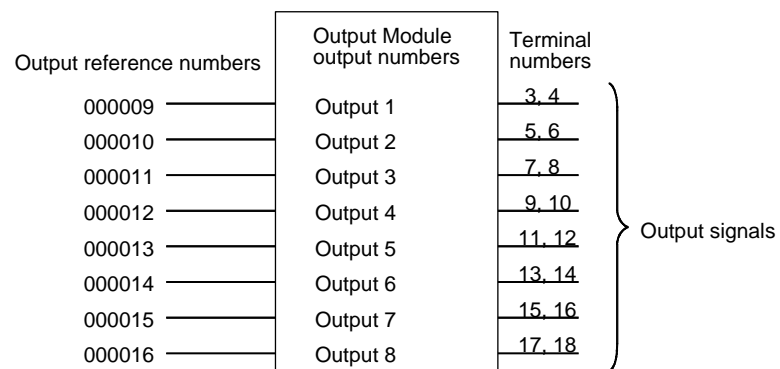


Figure 3.10: Output Coil Allocations

DIP Switch Settings

The following settings are required to use digital I/O modules. These settings are made using the DIP switch on the front panel of the module.

- Slave address setting
- Baud rate setting
- Timeout output setting

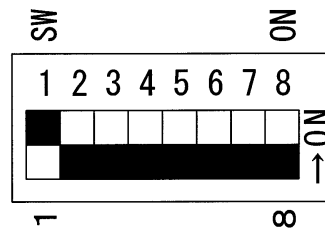
3.3 Digital Module Settings

This section describes the settings for digital I/O modules.

3.3.1 DIP Switch Functions

Various settings are required to use digital I/O modules. These settings are made using the DIP switch on the front panel of the module. The DIP switch settings are described below.

- The DIP switch consists of 8 pins, which are numbered from 1 to 8 as shown on the right.
- Each pin turns ON when shifted to the upper position.



- Each pin setting becomes effective when the pin is set.
- The function of each pin is shown in the following table.

Pin	Setting	Function
1 to 5	ON	Set the slave address of the digital I/O module.
	OFF	
6	ON	Sets the baud rate of the digital I/O module to 1Mbps.
	OFF	Sets the baud rate of the digital I/O module to 4Mbps.
7	ON	1) The data to be output when communications are stopped can be set for a digital output module. Turning this pin ON sets the output when communications are stopped to the data immediately before stoppage. 2) The digital input modules do not use this pin. Turn it OFF.
	OFF	1) The data to be output when communications are stopped can be set for a digital output module. Turning this pin OFF turns OFF the output when communications are stopped. 2) The digital input modules do not use this pin. Turn it OFF.
8	ON	For future use. Turn this pin OFF.
	OFF	

Caution The DIP switch settings for the digital I/O modules become effective when each pin is set. Operate the DIP switch while the main external power supply for the module (24VDC) is OFF.

If the DIP switch is operated while the module is operating, the settings will be changed, possibly causing the module to malfunction.

3.3.2 DIP Switch Settings

Slave Address Settings

- A maximum of 29 slaves can be connected to one network I/O driver module. Each slave must have a unique slave address.
- The slave addresses are set using DIP switch pins 1 to 5 on the front panel of the digital I/O module. Refer to the following table and set appropriately.

Slave Address Settings

Pin					Slave Address
1	2	3	4	5	
0	0	0	0	0	Not used
1	0	0	0	0	1
0	1	0	0	0	2
1	1	0	0	0	3
0	0	1	0	0	4
1	0	1	0	0	5
0	1	1	0	0	6
1	1	1	0	0	7
0	0	0	1	0	8
1	0	0	1	0	9
0	1	0	1	0	10
1	1	0	1	0	11
0	0	1	1	0	12
1	0	1	1	0	13
0	1	1	1	0	14
1	1	1	1	0	15
0	0	0	0	1	16
1	0	0	0	1	17
0	1	0	0	1	18
1	1	0	0	1	19

Slave Address Settings (Continued)

Pin					Slave Address
1	2	3	4	5	
0	0	1	0	1	20
1	0	1	0	1	21
0	1	1	0	1	22
1	1	1	0	1	23
0	0	0	1	1	24
1	0	0	1	1	25
0	1	0	1	1	26
1	1	0	1	1	27
0	0	1	1	1	28
1	0	1	1	1	29
0	1	1	1	1	Not used
1	1	1	1	1	Not used
0: OFF 1: ON					

- Note** (1) Set the slave addresses to between 1 and 29. A digital I/O module with addresses set outside this range will not communicate normally.
- (2) Do not set the same slave address more than once on the same communications line. A digital I/O module with duplicated slave addresses will not communicate normally.
- (3) The slave address settings become effective when pins 1 to 5 are set.

Baud Rate Setting

- Set the baud rate for the digital I/O modules.
- The baud rate is set using DIP switch pin 6 on the front panel of each digital I/O module. Refer to the following table and set appropriately.

Baud Rate Setting

Pin	Setting	Function
6	ON	Sets the baud rate of the digital I/O module to 1Mbps.
	OFF	Sets the baud rate of the digital I/O module to 4Mbps.

Note The pin 6 setting becomes effective when the pin is set.

Timeout Output Setting

- The data to be output when communications are stopped can be set for a digital output module.
- The time-out output when digital output module communications are stopped is set using DIP switch pin 7. Refer to the following table and set appropriately.

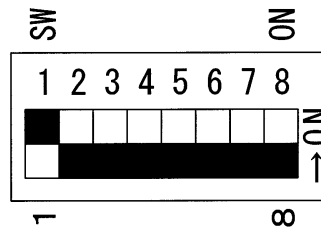
Timeout Output Setting

Pin	Setting	Function
7	ON	1) Sets the output when communications are stopped to the data immediately before stoppage. 2) The digital input modules do not use this pin. Turn it OFF.
	OFF	1) Sets the output when digital output module communications are stopped to OFF. 2) The digital input modules do not use this pin. Turn it OFF.

Note The pin 7 setting becomes effective when the pin is set.

Default Settings

- Digital Input Modules
DIP switch pins 1 to 8 on the digital input modules are factory set as shown below. Make the appropriate settings before using the modules.

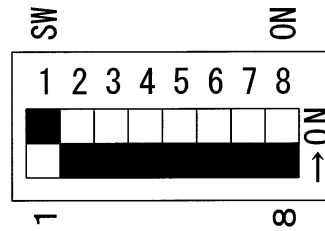


Default Settings

Pin	Setting	Function
1	ON	Sets the slave address to 1.
2 to 5	OFF	—
6	OFF	Sets the baud rate to 4Mbps.
7	OFF	Not used. Keep this pin OFF.
8	OFF	For future use. Keep this pin OFF.

- Digital Output Modules

DIP switch pins 1 to 8 on the digital output modules are factory set as shown below. Make the appropriate settings before using the module.



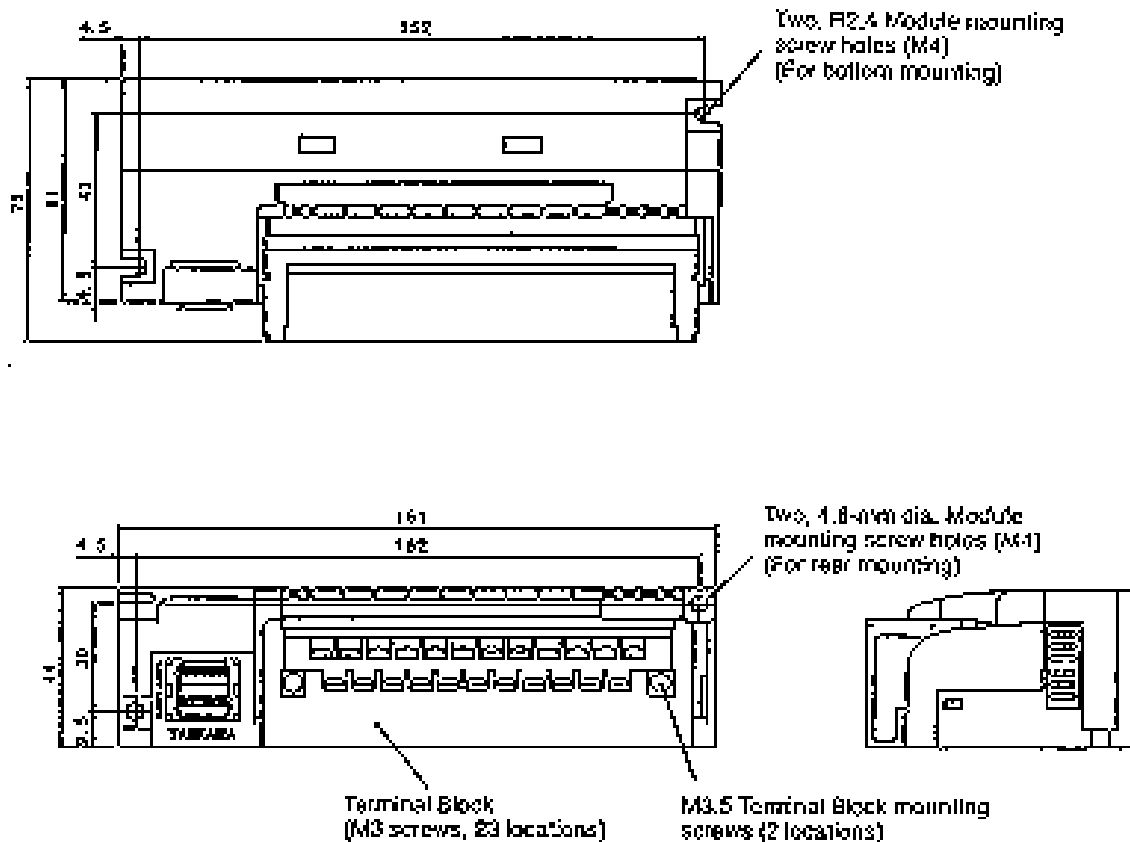
Default Settings

Pin Number	Setting	Function
1	ON	Sets the slave address to 1.
2 to 5	OFF	—
6	OFF	Sets the baud rate to 4Mbps.
7	OFF	Sets the output when communications are stopped to OFF.
8	OFF	For future use. Keep this pin OFF.

3.4 Digital I/O Modules Dimensions

The following diagram shows the dimensions of digital I/O modules. The dimensions are in millimeters; they are the same for all the following modules:

- JAMSC120DAO83330
- JAMSC120DDO34340
- JAMSC120DRA83030
- JAMSC120DAI53330
- JAMSC120DAI73330
- JAMSC120DDI34330



Chapter 4: Analog I/O Specifications

4.1 Analog Input Specifications

This section provides the performance specifications, circuit configuration field connections, and appearance of analog input modules.

Analog Input Module ($\pm 10V$, 4 channels)

Performance Specifications

Item	Specifications
Name	Analog input module ($\pm 10 V$, 4 Channels)
Model Number	JAMSC120AVI02030
Input Signal Range	-10 to 10V
Special Inputs	None
Number of Input Channels	4 channels, batch insulation
Input Impedance	1M Ω minimum
Maximum Allowable Overload	-20 to 20V
Digital Resolution	16 bits
Data Format	Binary (2's complement), -32,000 to 32,000
Error	$\pm 0.5\%$ F.S. at 25°C $\pm 1.0\%$ F.S. at 0 to 60°C
Input Delay Time	4ms or less
Sampling Interval	Inputs refreshed each communications cycle
Input Filter Characteristics	Software filter
Number of Allocated Words	5 words/module
Maintenance and Diagnostic Functions	Watchdog timer
Field Connections	Removable terminal block: M3 screws, 23 terminals
Status Indication	RDY lit: Module is normal. RDY flashing: Transmission cable is not connected. Communications with master is on standby. TX lit: Data is being transmitted. RX lit: Data is being received. ERR lit: Communications error. FLT lit: Offset/gain setting error. FLT flashing: Self-diagnostic error. CH1 to CH4 lit: An out-of-range error has been detected for each channel. Over-range: The input signal for each channel is less than -10.02V or greater than 10.02V.

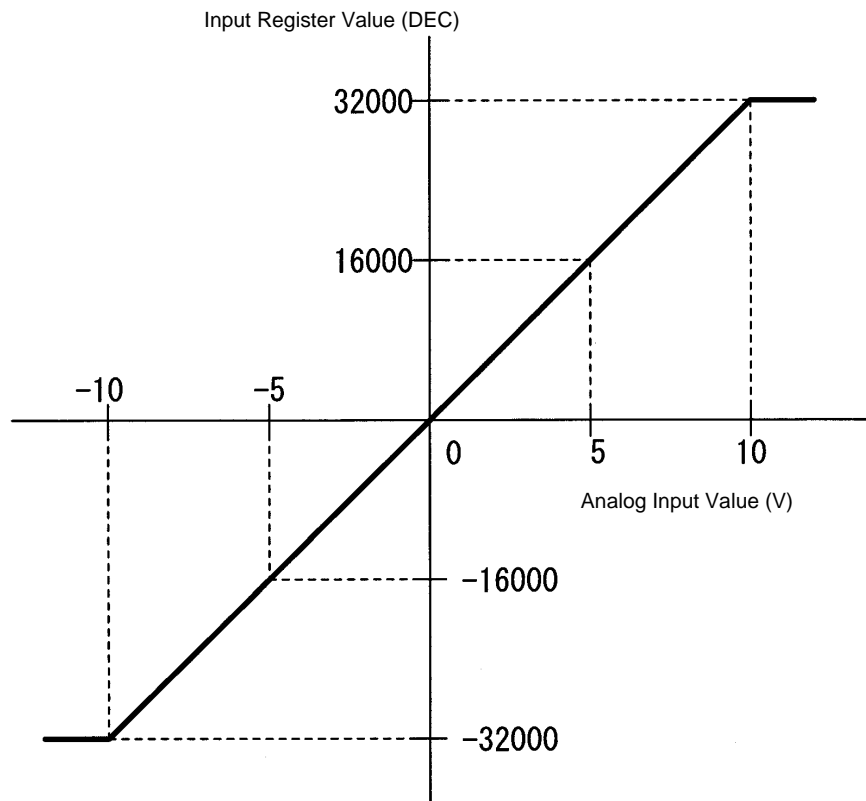
Performance Specifications (Continued)

Item		Specifications
Input Circuit Isolation	Isolation Method	Photocoupler isolation (Note: Input channels are not isolated from each other.)
	Dielectric Strength	Between input terminals and internal circuits: 1,500VAC (for 1 minute)
	Insulation Resistance	Between input terminals and internal circuits: 100MΩ or more (at room temperature and humidity) with a 500VDC insulation resistance tester
External Power Supply		Main external power supply: 24VDC (20.4 to 26.4V) 120mA maximum
Derating Conditions		Temperature restrictions depending on mounting orientation (for details, refer to <i>Chapter 2 General Specifications</i>)
Maximum Heating Value		2.88W
Hot Swapping (Removal/Insertion Under Power)		Terminal block: Not possible Communications connector: Possible
Approximate Mass		300g
External Dimensions		161 × 44 × 79mm (W × H × D)

Input Characteristics

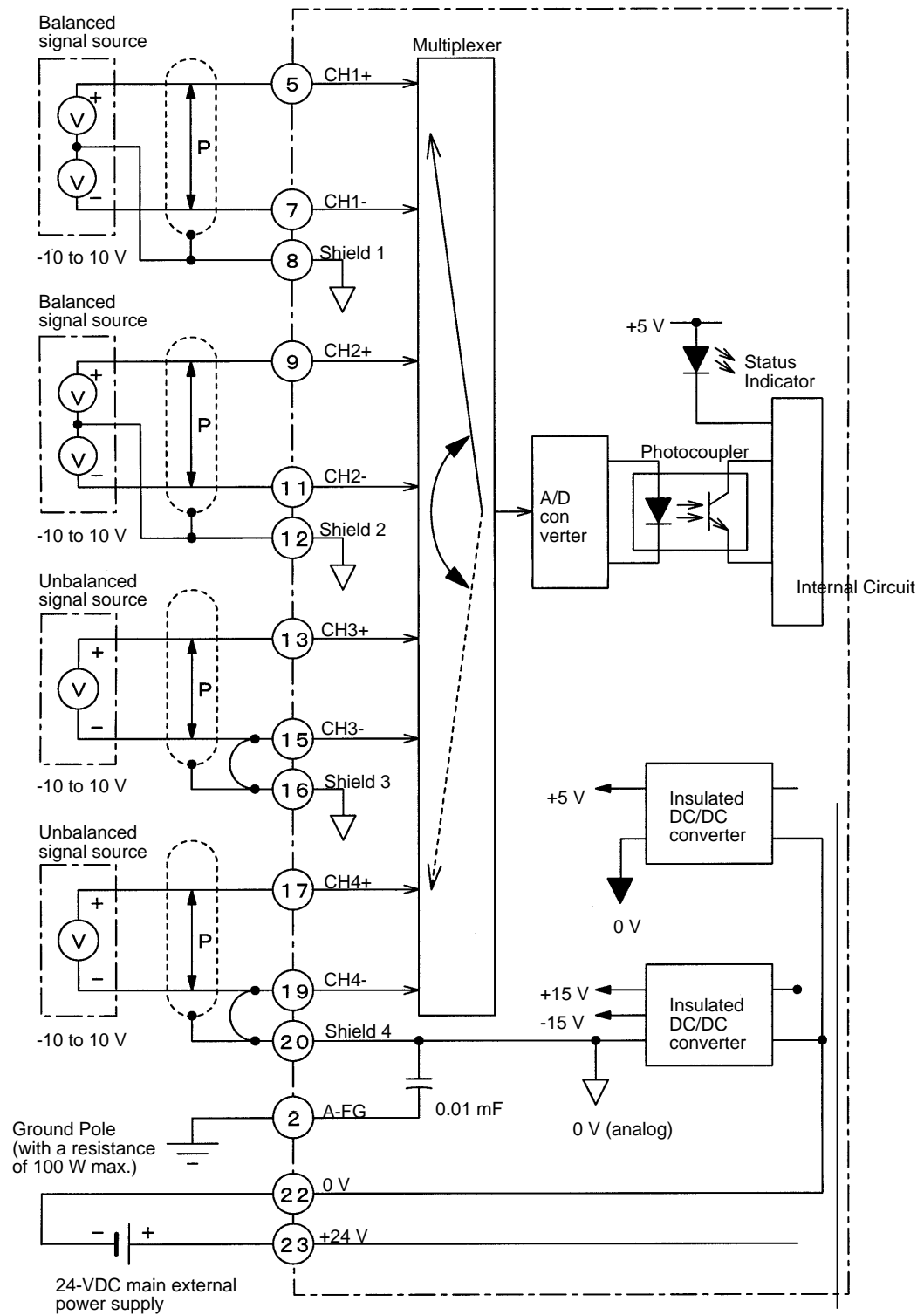
The following diagrams show the input characteristics.

Analog Input Value	Input Register Value
x -10.00V	-32,000
-10.0 V	-32,000
-5.00V	-16,000
0.00V	0
+5.00V	+16,000
+10.00V	+32,000
y +10.00V	+32,000

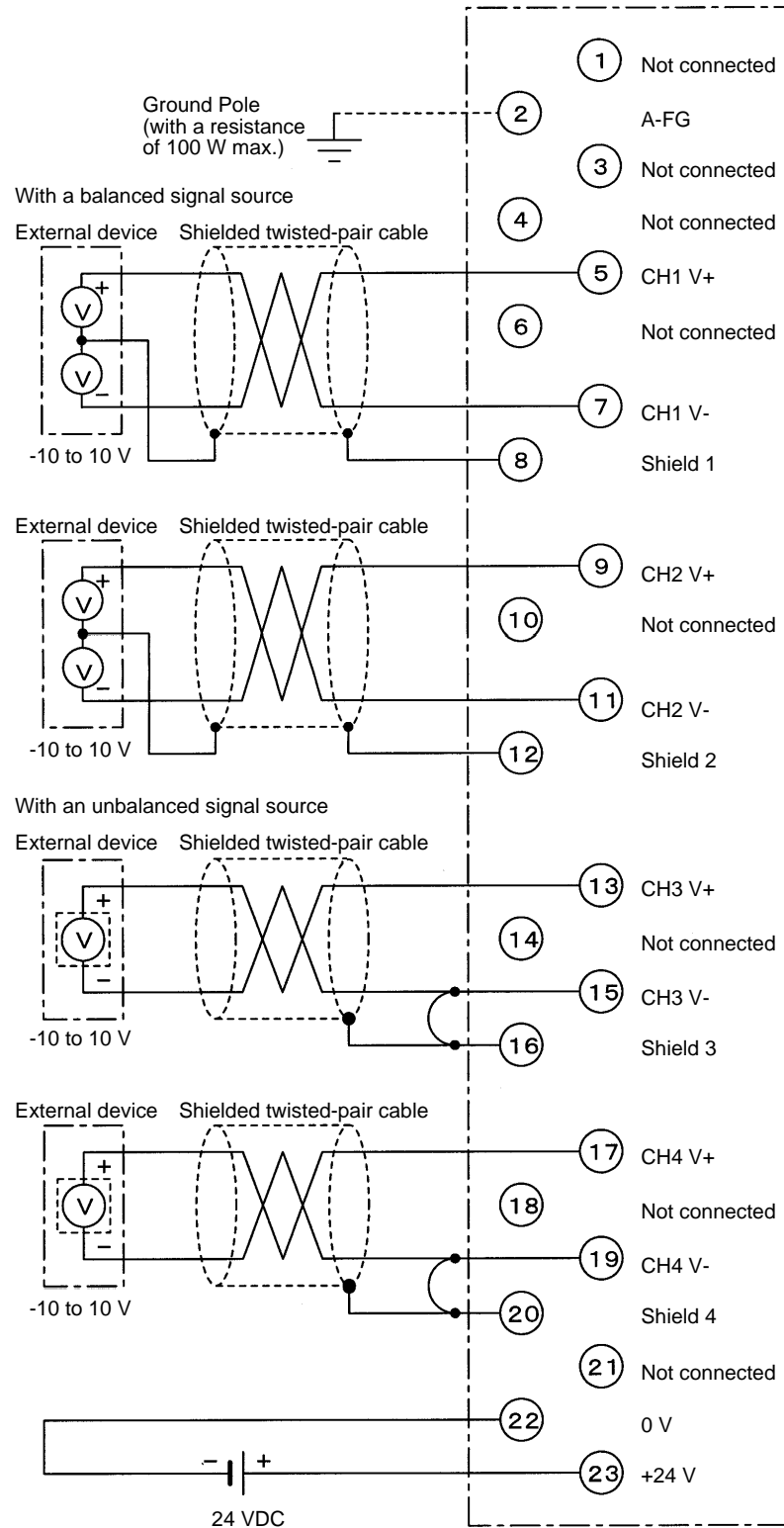


Note Input values exceeding the range -10.00V to 10.00V are clamped at -32,000 and 32,000, respectively.

The following diagram illustrates the circuit configuration.



The following diagram shows an example of the terminal connections.



Note (1) The input circuits for the channels are not isolated from each other. If isolation is required between channels, use a commercial isolating amplifier.

(2) Recommended Cables

Use the following cables for connection to the terminal block:

Shielded twisted-pair cables with the following wire sizes:

1.3mm² (AWG16) to 0.5mm² (AWG20)

(3) Connecting a Balanced Signal Source

- Connect the positive balanced signal terminal to the positive terminal of the module.
- Connect the negative balanced signal terminal to the negative terminal of the module.
- Connect the shield of the shielded cable to the shield terminal of the module.
- Connect the signal source end of the shield of the shielded cable to the 0V terminal of the balanced signal source. If an incorrect connection is made, the input signal becomes unstable, resulting in malfunctions.

(4) Connecting an Unbalanced Signal Source

- Connect the positive unbalanced signal terminal to the positive terminal of the module.
- Connect the negative unbalanced signal terminal to the negative terminal of the module.
- Connect the shield of the shielded cable to the shield terminal of the module, and short-circuit the shield terminal and the negative terminal. If an incorrect connection is made, the input signal becomes unstable, resulting in malfunctions.

(5) Unused Input Circuits

For input circuits that are not used, short-circuit the positive and negative terminals, and then short-circuit these terminals and the shield terminal. If an incorrect connection is made, the input signal becomes unstable, resulting in malfunctions.

(6) A-FG Terminal

Grounding the A-FG terminal may provide good characteristics depending on noise conditions. Use the A-FG terminal as required according to the noise conditions.

(7) Crimp Terminals

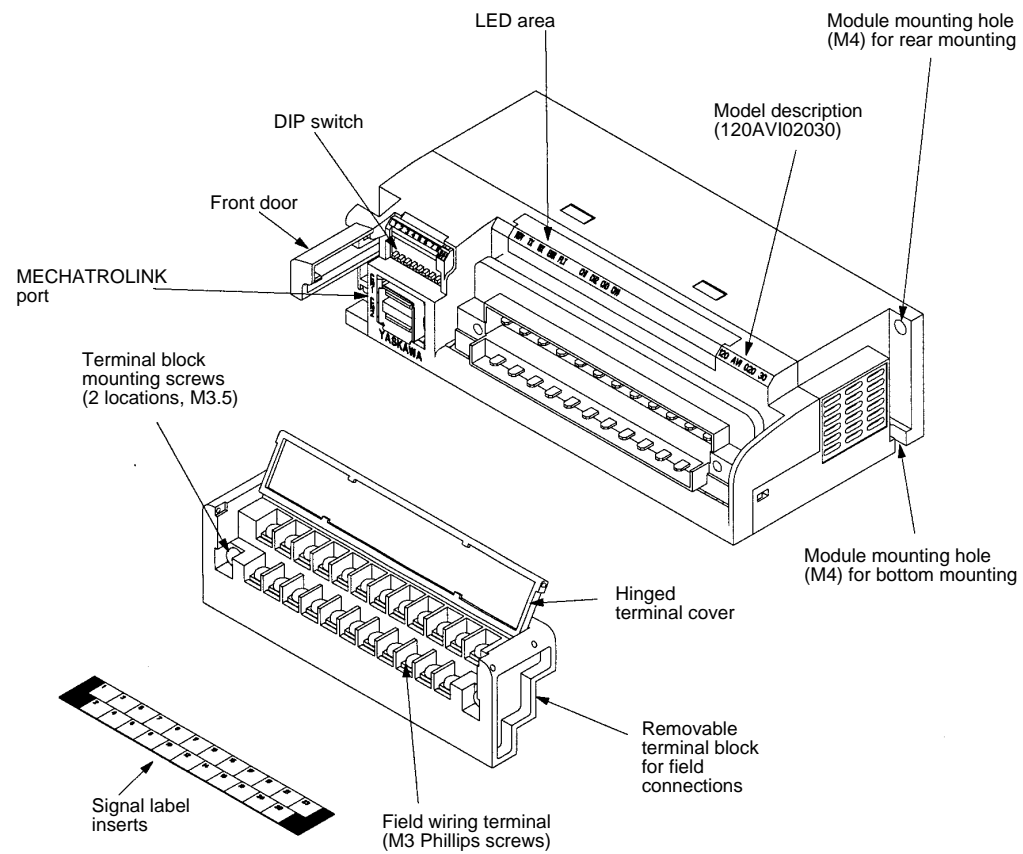
Use M3 crimp terminals in the terminal blocks.

(8) Unconnected Terminals

Terminals 1, 3, 4, 6, 10, 14, 18, and 21 are not connected.

Do not use terminal 1 as a relay terminal.

Appearance and Configuration



LED Area

LED	Color	State	Meaning
RDY	Green	Lit	Module is operating normally.
		Flashing	Transmission cable is not connected. Communications with Master is on standby.
TX	Green	Lit	Data is being transmitted.
RX	Green	Lit	Data is being received.
ERR	Red	Lit	Communications error has occurred.
FLT	Red	Lit	Offset/gain setting error.
		Flashing	Self-diagnostic error.
CH1 to CH4	Green	Lit	The following out-of-range error has been detected for a channel: The input signal for the channel is greater than 10.02V or less than -10.02V.

Setting I/O Reference Numbers

- Five consecutive input registers can be allocated as the I/O references for the analog input modules.
- The five input registers are used as shown in the following table (n: 0 to 507).

Input Register Number	Input Register Application
300001 + n	Channel 1 analog input signal
300002 + n	Channel 2 analog input signal
300003 + n	Channel 3 analog input signal
300004 + n	Channel 4 analog input signal
300005 + n	Analog input signal status of channels 1 to 4 For details, refer to <i>Input Signal Status</i> .

- The I/O reference numbers (five input registers) are allocated in ascending order of slave addresses.
- The input reference numbers (input registers) are allocated for the analog input data in ascending order of analog input module input channel numbers.
- The leading I/O reference (input register) number used by an analog input module is allocated through the I/O allocation procedure for the network I/O driver module.

Input Signal Status

- When an input signal exceeding the input signal range is input to an analog input module, an error signal is generated.

Input Register Number	Input Register Application
300005 + n	Analog input signal status of channels 1 to 4
Bits 4 to 15	Not used.
Bit 3	Set to 1 when the channel 4 input signal is less than -10.02V or greater than 10.02V.
Bit 2	Set to 1 when the channel 3 input signal is less than -10.02V or greater than 10.02V.
Bit 1	Set to 1 when the channel 2 input signal is less than -10.02V or greater than 10.02V.
Bit 0	Set to 1 when the channel 1 input signal is less than -10.02V or greater than 10.02V.

DIP Switch Settings

The following settings are required to use an analog input module. These settings are made using the DIP switch on the front panel of the module. Refer to the section on analog module settings for the method of setting the DIP switch.

- Slave address setting
- Baud rate setting
- Software filter setting

4.2 Analog Output Specifications

This section provides the performance specifications, circuit configuration, field connections, and appearance of analog output modules.

Analog Output Module ($\pm 10\text{V}$, 2 channels)

Performance Specifications

Item		Specifications
Name		Analog output module ($\pm 10\text{V}$, 2 Channels)
Model Number		JAMSC120AVO01030
Output Signal Range		-10 to 10V
Number of Output Channels		2 channels
Maximum Allowable Load Current		$\pm 5\text{mA}$ (2k Ω)
Digital Resolution		16 bits
Data Format		Binary (2's complement), -32,000 to 32,000
Error		$\pm 0.2\%$ F.S. at 25°C $\pm 0.5\%$ F.S. at 0 to 60°C
Output Delay Time		1ms maximum
Number of Allocated Words		2 words/module
Maintenance and Diagnostic Functions		Watchdog timer
Output When Master Stops		Select either of the following settings using the DIP switch. 1) Clear the output (output 0V). 2) Hold the output immediately before the master stopped.
Field Connections		Removable terminal block: M3 screws
Status Indicators		RDY lit: Module is normal. RDY flashing: Transmission cable is not connected. Communications with Master are on standby. TX lit: Data is being transmitted. RX lit: Data is being received. ERR lit: Communications error. FLT lit: Offset/gain setting error. FLT flashing: Self-diagnostic error.
Output Circuit Isolation	Isolation Method	Photocoupler isolation (Note: Output channels are not isolated from each other.)
	Dielectric Strength	Between output terminals and internal circuits: 1,500VAC (for 1 minute)
	Insulation Resistance	Between output terminals and internal circuits: 100M Ω or more (at room temperature and humidity) with a 500VDC insulation resistance tester
External Power Supply		Main external power supply: 24VDC (20.4 to 26.4VDC) 120mA maximum.

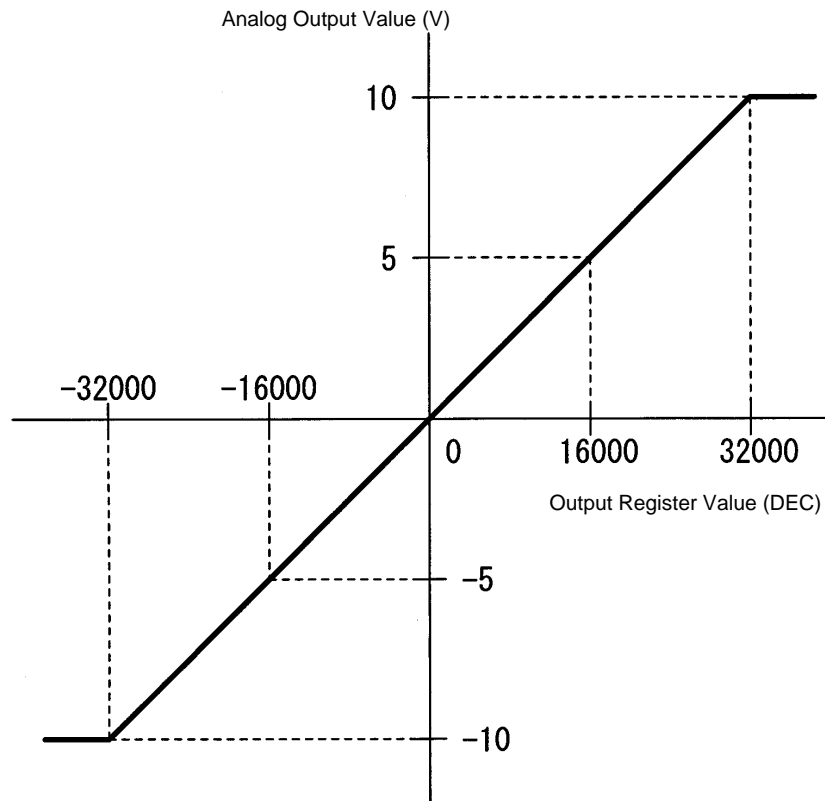
Performance Specifications (Continued)

Item	Specifications
Derating Conditions	Temperature restrictions depending on mounting orientation (For details, refer to <i>Chapter 2 General Specifications</i> .)
Maximum Heating Value	2.88W
Hot Swapping (Removal/Insertion Under Power)	Terminal block: Not permitted Communications connector: Permitted
Approximate Mass	300g
External Dimensions	161 × 44 × 79mm (W × H × D)

Output Characteristics

The following diagrams show the output characteristics.

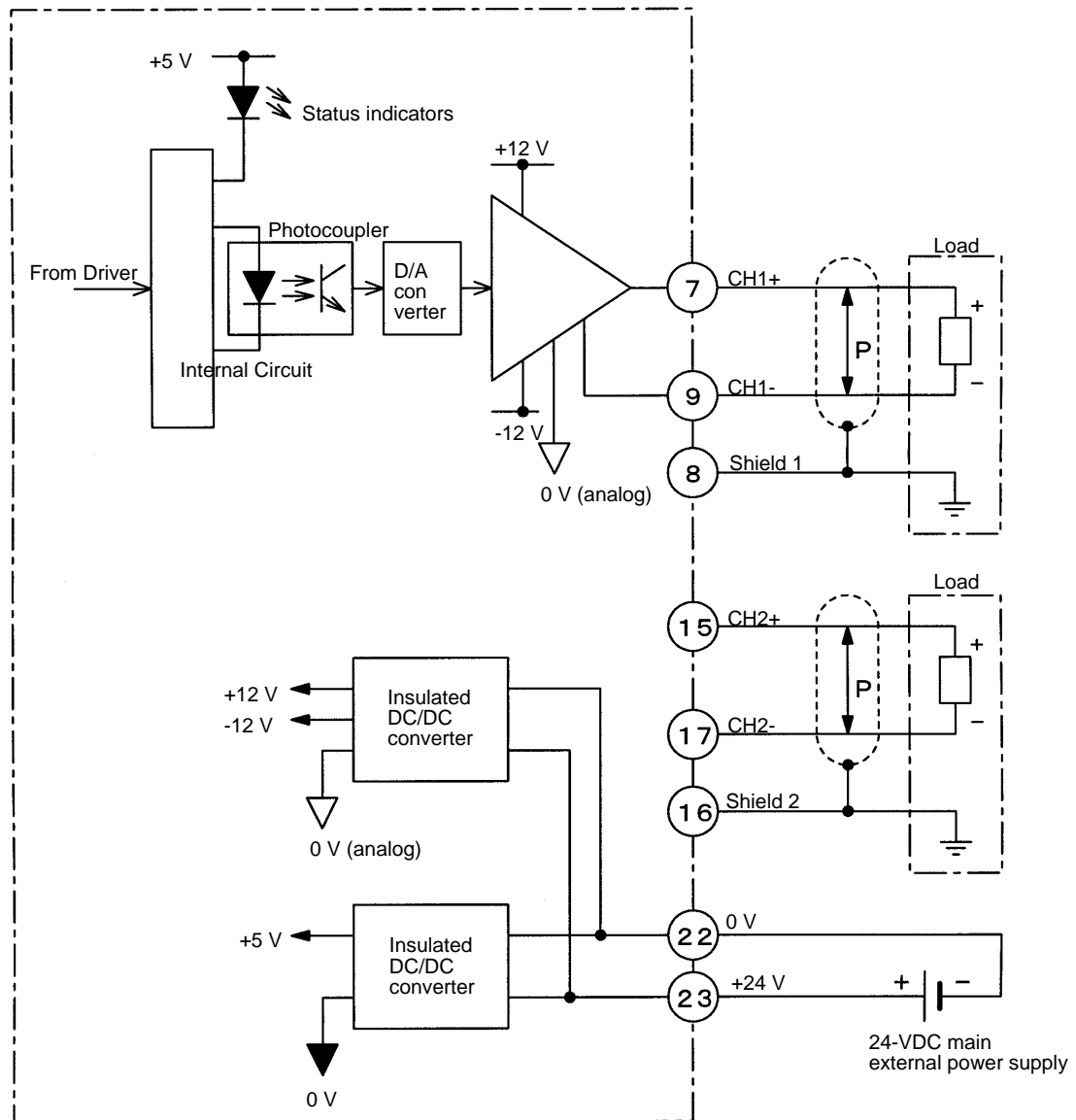
Output Register Value	Analog Output Value
x -32,000	-10.00V
-32,000	-10.00V
-16,000	-5.00V
0	0.00V
+16,000	+5.00V
+32,000	+10.00V
y +32,000	+10.00V



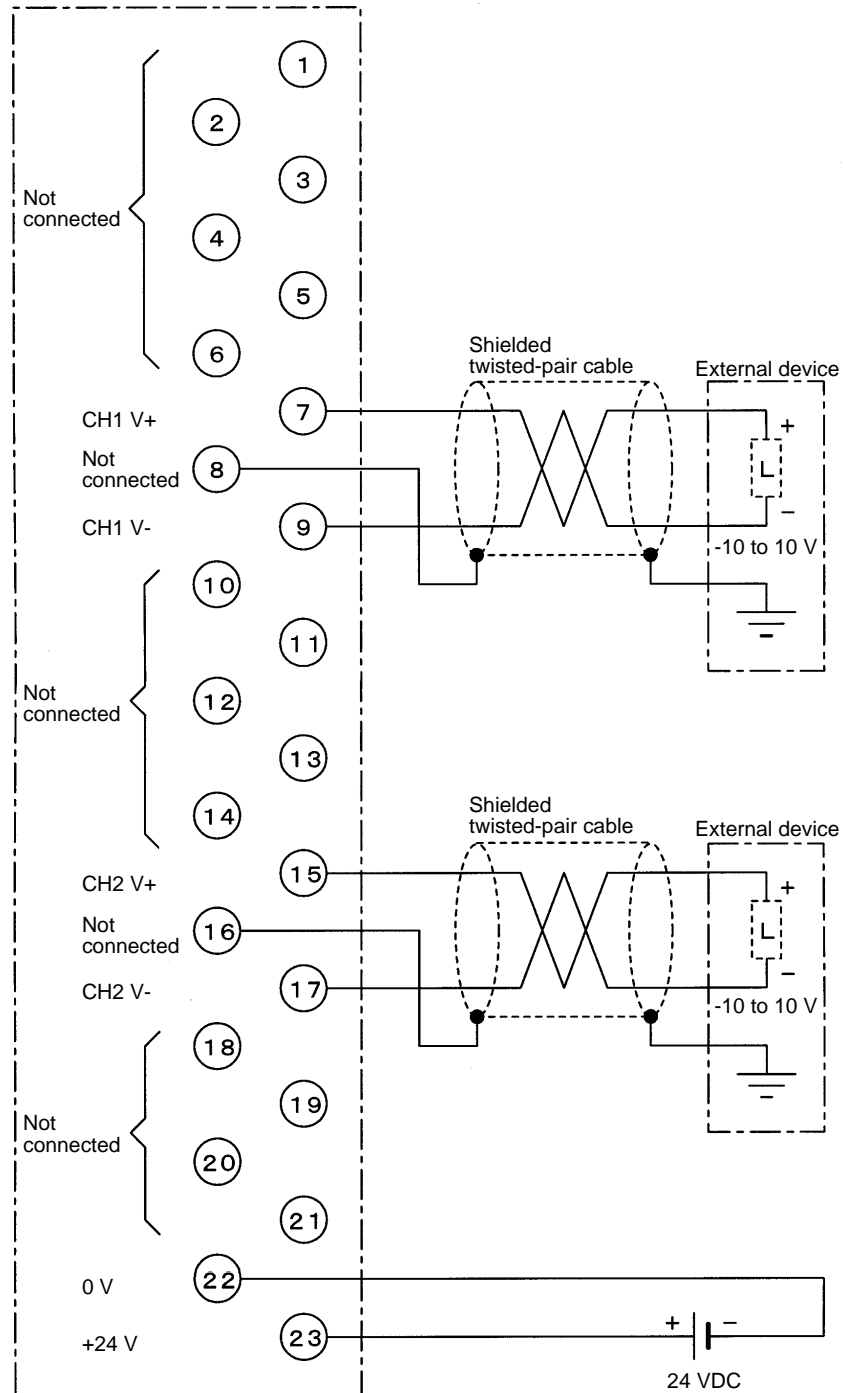
Note Output values exceeding the range -32,000 to 32,000 are clamped at -10V and 10V, respectively.

Circuit Configuration

The following diagram illustrates the circuit configuration.



Terminal Connections



Note (1) The output circuits for the channels are not isolated from each other. If isolation is required between channels, use a commercial isolating amplifier.

(2) Recommended Cables

Use the following cables for connection to the terminal block:

Shielded twisted-pair cables with the following wire sizes:

1.3mm² (AWG16) to 0.5mm² (AWG20)

(3) Ground the shield of the shielded cable at one point.

The shield should generally be grounded at one point on the load side. However, better characteristics may be obtainable by grounding the shield at one point on the module end. Determine the shield end to be grounded according to the conditions.

If an incorrect connection is made, the output signal will become unstable, resulting in malfunctions.

(4) Grounding on the Module End

Unconnected module terminals are not connected inside the module. They can therefore be used as relay terminals.

However, do not use terminal 1 as a relay terminal.

(5) Crimp Terminals

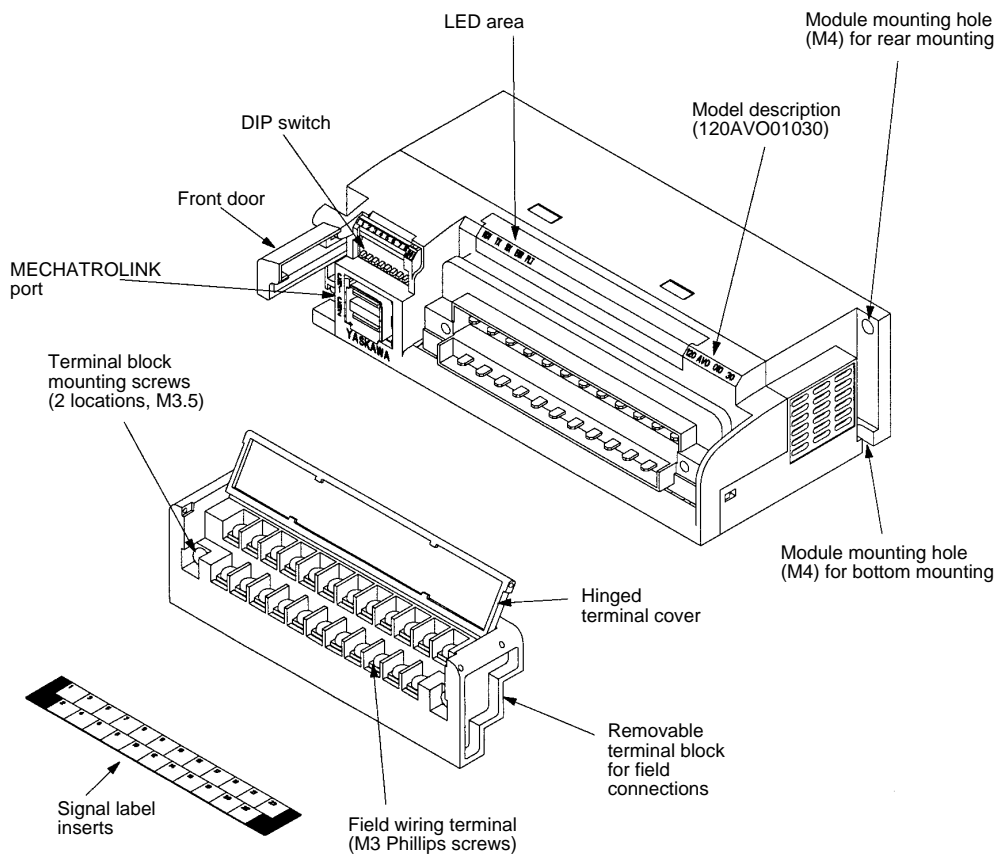
Use M3 crimp terminals in the terminal blocks.

(6) Unconnected Terminals

Terminals 1, 2 to 6, 10 to 14, and 18 to 21 are not connected.

Do not use terminal 1 as a relay terminal.

Appearance and Configuration



LED Area

LED	Color	State	Meaning
RDY	Green	Lit	Module is operating normally.
		Flashing	Transmission cable is not connected. Communications with master is on standby.
TX	Green	Lit	Data is being transmitted.
RX	Green	Lit	Data is being received.
ERR	Red	Lit	Communications error has occurred.
FLT	Red	Lit	Offset/gain setting error.
		Flashing	Self-diagnostic error.

Setting I/O Reference Numbers

- Two consecutive output registers can be allocated as the I/O references for the analog output modules.
- The two output registers are used as shown in the following table (n: 0 to 510).

Output Register Number	Output Register Application
400001 + n	Channel 1 analog output signal
400002 + n	Channel 2 analog output signal

- The I/O reference numbers (two output registers) are allocated in ascending order of slave addresses.
- The output reference numbers (output registers) are allocated for the analog output data in ascending order of analog output module output channel numbers.
- The leading I/O reference (output register) number used by the analog output modules is allocated through the I/O allocation procedure for the network I/O driver module.

DIP Switch Settings

The following settings are required to use an analog output module. These settings are made using the DIP switch on the front panel of the module. Refer to the section on analog module settings for the method of setting the DIP switch.

- Slave address setting
- Baud rate setting
- Timeout output setting

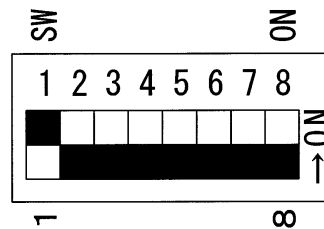
4.3 Analog Module Settings

This section describes the settings for analog I/O modules.

4.3.1 DIP Switch Functions

Various settings are required to use analog I/O modules. These settings are made using the DIP switch on the front panel of the module. The DIP switch settings are as shown in the diagram.

- The DIP switch consists of 8 pins, which are numbered from 1 to 8 as shown below.



- Each pin turns ON when shifted to the upper position.
- Each pin setting becomes effective when the main external power supply (24VDC) for the module is turned ON.
- The function of each pin is shown in the following table.

DIP Switch Functions

Pin	Setting	Function
1 to 5	ON	Set the slave address of the analog I/O module.
	OFF	
6	ON	Sets the baud rate of the analog I/O module to 1Mbps.
	OFF	Sets the baud rate of the analog I/O module to 4Mbps.
7	ON	1) The data to be output when communications are stopped can be set for an analog output module. Turning this pin ON sets the output when communications are stopped to the data immediately before stoppage. 2) The software filter can be set for an analog input module. Turning this pin ON sets the software filter to average five times.
	OFF	1) The data to be output when communications are stopped can be set for an analog output module. Turning this pin OFF sets the output when communications are stopped to 0 (zero). 2) The software filter can be set for an analog input module. Turning this pin OFF disables the software filter.
8	ON	For future use. Turn this pin OFF.
	OFF	

4.3.2 DIP Switch Settings

Slave Address Settings

- A maximum of 29 slaves can be connected to one network I/O driver module. Each slave must have a unique slave address.
- The slave addresses are set using DIP switch pins 1 to 5 on the front panel of the analog I/O module. Refer to the following table and set appropriately.

Slave Address Settings

Pin					Slave Address
1	2	3	4	5	
0	0	0	0	0	Not used
1	0	0	0	0	1
0	1	0	0	0	2
1	1	0	0	0	3
0	0	1	0	0	4
1	0	1	0	0	5
0	1	1	0	0	6
1	1	1	0	0	7
0	0	0	1	0	8
1	0	0	1	0	9
0	1	0	1	0	10
1	1	0	1	0	11
0	0	1	1	0	12
1	0	1	1	0	13
0	1	1	1	0	14
1	1	1	1	0	15
0	0	0	0	1	16
1	0	0	0	1	17
0	1	0	0	1	18
1	1	0	0	1	19
0	0	1	0	1	20
1	0	1	0	1	21
0	1	1	0	1	22
1	1	1	0	1	23
0	0	0	1	1	24
1	0	0	1	1	25
0	1	0	1	1	26
1	1	0	1	1	27

Slave Address Settings (Continued)

Pin					Slave Address
1	2	3	4	5	
0	0	1	1	1	28
1	0	1	1	1	29
0	1	1	1	1	Not used
1	1	1	1	1	Not used
0: OFF 1: ON					

- Note** (1) Set the slave addresses to between 1 and 29. An analog I/O module with addresses set outside this range cannot communicate normally.
- (2) Do not set the same slave address more than once on the same communications line. An analog I/O module with duplicated slave addresses will not communicate normally.
- (3) After changing the slave addresses, turn OFF and then ON the main external power supply (24VDC) for the module.

Baud Rate Setting

- Set the baud rate for the analog I/O module.
- The baud rate is set using DIP switch pin 6 on the front panel of the analog I/O module. Refer to the following table and set appropriately.

Baud Rate Setting

Pin	Setting	Function
6	ON	Sets the baud rate of the analog I/O module to 1Mbps.
	OFF	Sets the baud rate of the analog I/O module to 4Mbps.

- Note** The pin 6 setting becomes effective when the main external power supply (24VDC) is turned ON. After changing the setting, turn the main external power supply (24VDC) OFF and then ON.

Timeout Output Setting

- The data to be output when communications are stopped can be set for an analog output module.
- The time-out output when analog output module communications are stopped is set using DIP switch pin 7. Refer to the following table and set appropriately.

Timeout Output Setting

Pin	Setting	Function
7	ON	Sets the output when analog output module communications are stopped to the data immediately before stoppage.
	OFF	Sets the output when analog output module communications are stopped to 0 (zero).

Note The pin 7 setting becomes effective when the main external power supply (24VDC) is turned ON. After changing the setting, turn OFF and then ON the main external power supply (24VDC).

Software Filter Setting

- A software filter can be set for an analog input module.
- The software filter for the analog input module is set using DIP switch pin 7. Refer to the following table and set appropriately.

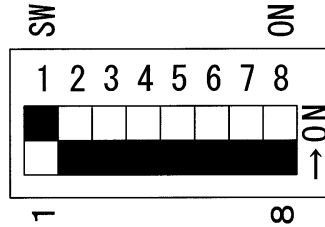
Software Filter Setting

Pin	Setting	Function
7	ON	Sets the software filter of the analog input module to average five times. With this setting, input signals are read five times by the module; the minimum value and maximum value are discarded, and the average of the other three values is sent to the master module.
	OFF	Disables the software filter of the analog input module. With this setting, the input signals read by the module are sent to the master module each communications cycle.

Note The pin 7 setting becomes effective when the main external power supply (24VDC) is turned ON. After changing the setting, turn the main external power supply (24VDC) OFF and then ON.

Default Settings

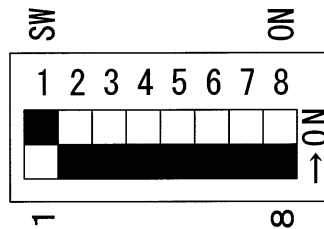
- **Analog input modules**
DIP switch pins 1 to 8 on the analog input modules are set at the factory as shown below. Make the appropriate settings before using the module.



Default Settings

Pin	Setting	Function
1	ON	Sets the slave address to 1.
2 to 5	OFF	
6	OFF	Sets the baud rate to 4Mbps.
7	OFF	Disables the software filter.
8	OFF	For future use. Keep this pin OFF.

- **Analog Output Modules**
DIP switch pins 1 to 8 on the analog output modules are set at the factory as shown below. Make the appropriate settings before using the module.



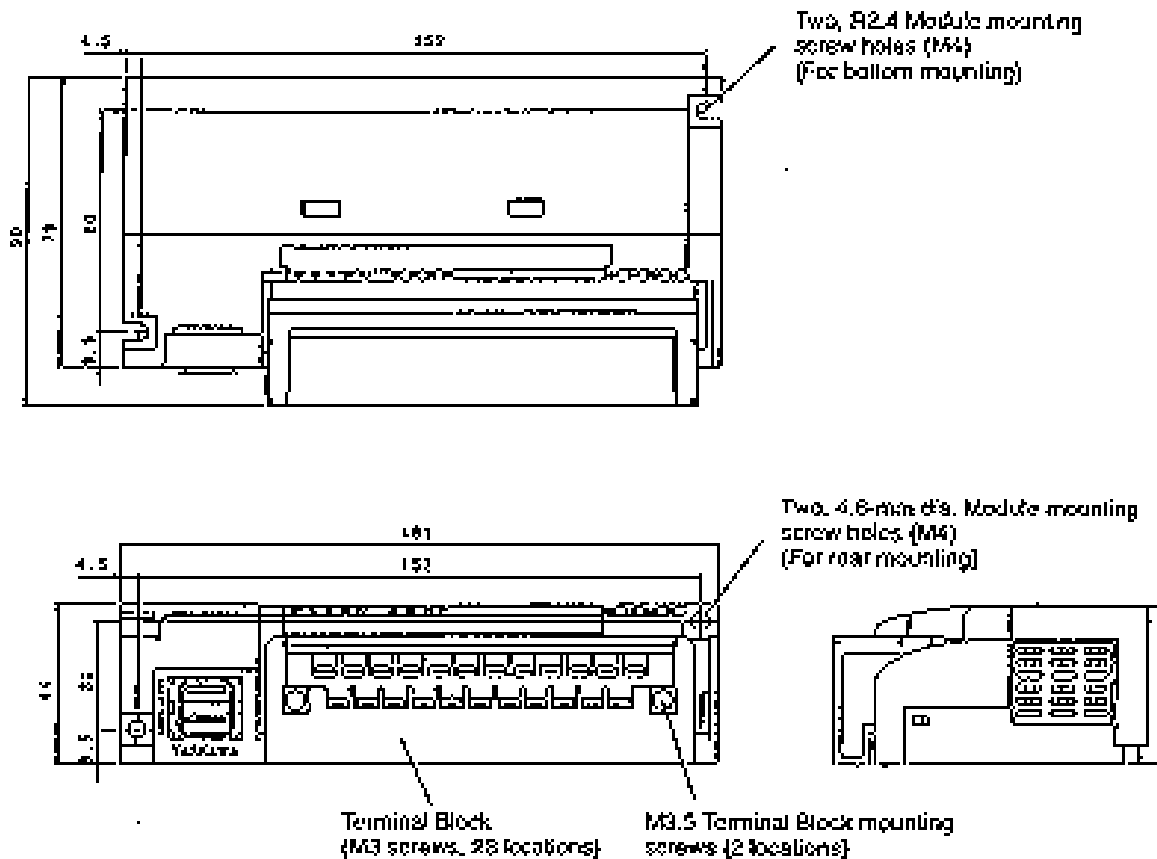
Default Settings

Pin	Setting	Function
1	ON	Sets the slave address to 1.
2 to 5	OFF	
6	OFF	Sets the baud rate to 4Mbps.
7	OFF	Sets the output when communications are stopped to 0 (zero).
8	OFF	For future use. Keep this pin OFF.

4.4 Analog I/O Modules Dimensions

The following diagram shows the dimensions of analog I/O modules. The dimensions are all in millimeters; they are the same for all the following modules:

- JAMSC120AV102030
- JAMSC120AVO01030



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YASKAWA ELECTRIC AMERICA, INC.

Chicago-Corporate Headquarters 2121 Norman Drive South, Waukegan, IL 60085, U.S.A.
Phone: (847) 887-7000 Fax: (847) 887-7310 Internet: <http://www.yaskawa.com>

MOTOMAN INC.

805 Liberty Lane, West Carrollton, OH 45449, U.S.A.
Phone: (937) 847-6200 Fax: (937) 847-6277

YASKAWA ELECTRIC CORPORATION

New Pier Takeshiba South Tower, 1-16-1, Kaigan, Minatoku, Tokyo, 105-0022, Japan
Phone: 81-3-5402-4511 Fax: 81-3-5402-4580 Internet: <http://www.yaskawa.co.jp>

YASKAWA ELETRICO DO BRASIL COMERCIO LTDA.

Avenida Fagundes Filho, 620 Bairro Saude Sao Paulo-SP, Brasil CEP: 04304-000
Phone: 55-11-5071-2552 Fax: 55-11-5581-8795 E-mail: yaskawabrasil@originet.com.br

YASKAWA ELECTRIC EUROPE GmbH

Am Kronberger Hang 2, 65824 Schwalbach, Germany
Phone: 49-6196-569-300 Fax: 49-6196-888-301

MOTOMAN ROBOTICS AB

Box 504 S38525, Torsas, Sweden
Phone: 46-486-48800 Fax: 46-486-41410

MOTOMAN ROBOTEC GmbH

Kammerfeldstraße 1, 85391 Allershausen, Germany
Phone: 49-8166-900 Fax: 49-8166-9039

YASKAWA ELECTRIC UK LTD.

1 Hunt Hill Orchardton Woods Cumbernauld, G68 9LF, Scotland, United Kingdom
Phone: 44-12-3673-5000 Fax: 44-12-3645-8182

YASKAWA ELECTRIC KOREA CORPORATION

Paik Nam Bldg. 901 188-3, 1-Ga Euljiro, Joong-Gu, Seoul, Korea
Phone: 82-2-776-7844 Fax: 82-2-753-2639

YASKAWA ELECTRIC (SINGAPORE) PTE. LTD.

Head Office: 151 Lorong Chuan, #04-01, New Tech Park Singapore 556741, SINGAPORE
Phone: 65-282-3003 Fax: 65-289-3003

TAIPEI OFFICE (AND YATEC ENGINEERING CORPORATION)

10F 146 Sung Chiang Road, Taipei, Taiwan
Phone: 886-2-2563-0010 Fax: 886-2-2567-4677

YASKAWA JASON (HK) COMPANY LIMITED

Rm. 2909-10, Hong Kong Plaza, 186-191 Connaught Road West, Hong Kong
Phone: 852-2803-2385 Fax: 852-2547-5773

BEIJING OFFICE

Room No. 301 Office Building of Beijing International Club,
21 Jianguomanwai Avenue, Beijing 100020, China
Phone: 86-10-6532-1850 Fax: 86-10-6532-1851

SHANGHAI OFFICE

27 Hui He Road Shanghai 200437 China
Phone: 86-21-6553-6600 Fax: 86-21-6531-4242

SHANGHAI YASKAWA-TONJI M & E CO., LTD.

27 Hui He Road Shanghai 200437 China
Phone: 86-21-6533-2828 Fax: 86-21-6553-6677

BEIJING YASKAWA BEIKE AUTOMATION ENGINEERING CO., LTD.

30 Xue Yuan Road, Haidian, Beijing 100083 China
Phone: 86-10-6232-9943 Fax: 86-10-6234-5002

SHOUGANG MOTOMAN ROBOT CO., LTD.

7, Yongchang-North Street, Beijing Economic & Technological Development Area,
Beijing 100076 China

Phone: 86-10-6788-0551 Fax: 86-10-6788-2878