HITACHI

S10mini

S10mini
HARDWARE MANUAL

I/O MODULES

SME-1-114 (F)

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SAFETY SUMMARY

Be sure to read this manual and all other attached documents carefully before installing, operating inspecting or conducting maintenance on this unit. Always use this unit properly. Be sure carefully read the information about the device, the safety information and precautions before using this unit. Be sure that the person(s) responsible for maintenance receives and understands this manual completely.
The hazard warnings which appear on the warning labels on the machine or in the manual have one of the following alert headings consisting of a safety alert symbol and a signal word, DANGER, WARNING, or CAUTION.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

: indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

: indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

: indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

: indicates a potentially hazardous situation which, if not avoided, may result in property damage.

Failure to observe any 

may lead to serious consequences.

All of these DANGERs and CAUTIONs provide very important precautions and should always be observed.

1. ⚠ General Safety Guidelines

Before installing, operating inspecting or conducting maintenance on this unit, read the following instructions carefully:

- Follow all the operating procedures provided in this manual.
- Pay special attention to and follow all the hazard warnings on the machine and in the manual. Failure to do so can cause injury to yourself or damage to the machine.
- Do not perform any operation or action in any way other than as provided in this manual. When in doubt, call the designated field engineer. Keep in mind that the hazard warnings in this manual or on the machine cannot cover every possible case, as it is impossible to predict and evaluate all circumstances beforehand.
  Be alert and use your common sense.
- Do not install, wire, handle, modify, or use maintenance parts in any manner not described in this manual. Such a practice may result in breakdown of this equipment or peripherals, injury or even death. Hitachi will not be responsible for any accident or failure resulting from such mishandling.

Read the following safety guidelines carefully and follow them when you conduct maintenance of the machine.

Before starting maintenance

- Maintenance of the machine must be done only by trained and qualified field engineers.
- Read and follow the safety guidelines and procedures in this manual and the related manuals.
- In this manual and on the machine, hazard warnings are provided to aid you in preventing or reducing the risk of death, personal injury, or product damage.
  Understand and follow these hazard warnings fully.
- Keep in mind that the hazard warnings in this manual or on the machine cannot cover every possible case, as it is impossible to predict and evaluate all circumstances beforehand.
  Be alert and use your common sense.

During work

- For each procedure, follow the given sequence of steps.
- Use the special tools and instruments, specified for the work in the manual or commercially available tools and instruments which fit the purpose.
- Use measurement instruments and powered tools which are properly calibrated or periodically inspected.
- Keep the maintenance area neat and tidy.
- Always put away parts, materials or tools when not in use.
- Wear an eye protector where anything may fly about.
- When using sharp objects or cutting tools, make sure that no part of your body lies in the path of the blade bit, or point.
- Before finishing your work, make sure that all parts removed during maintenance have been installed back in their original positions in the machine.
  Make sure that no tool or foreign material is left in the machine.

Prevention of electric shocks

- Before starting work, make sure that, unless otherwise specifically instructed, there is no potential electric hazard in the maintenance area such as insufficient grounding or a wet floor.
- Before starting work, note where the emergency power-off switches are located and make sure you know how to operate them.
- Unless otherwise specifically instructed, cut off all power sources to the machine before starting maintenance. Just switching off the machine power supplies is usually not enough.
  When power is fed from a wall or floor outlet, unplug the power supply cord, or turn off the switch on the power distribution panel or board. Attach a notice on the panel or board prohibiting the use of the switch.
  If the energy isolating device such as the switch on the power distribution panel or board accepts a lockout device, turn off the power, lock out the energy isolating device, and bring the key with you. When you take over the work and the key for the lockout device if applicable, do not assume that the power is off. Make sure yourself that the above-mentioned conditions such as switches are satisfied. If necessary, use a measurement tool to ensure that the power is off.
- Do not touch any uninsulated conductor or surface, where so instructed, which remains charged for a limited time after the external power supply to the machine is disconnected.
- When working on a machine which has a grounding terminal, make sure that the terminal is properly connected to the facility's ground.
- When working close to a hazardously energized part, do not work alone; work with another person who can immediately turn off the power in an emergency.
- Do not wear any metallic item such as a wrist watch with a metallic surface, or metallic accessories.
  If you wear eyeglasses with a metallic frame, take care not to let the frame touch an uninsulated surface.
- Make sure that your hands and arms are dry.
- Unless otherwise specifically instructed, use only one hand when it is necessary to work near an exposed live electric circuit.
  This prevents the completion of the circuit through your heart even if you accidentally touch the circuit.
- Do not use a dental mirror near an exposed live electric circuit.
  The mirror surface is conductive and can become hazardous even if it is made of plastic.
- Unless otherwise specifically instructed, do not supply power to any subassembly such as a power supply unit or a motor while it is removed from the machine.

Procedures in an emergency

For electric shock

- Do not panic. Do not become another victim through contact with the injured person.
- First, shut off the electric current passing through the victim.
  Use the emergency power-off switch, if there is one, or, otherwise, a normal power-off switch. If this cannot be done, push the victim away from the source of the electric current by using a nonconductive object such as a dry wooden stick.
- Then, call an ambulance.
- If the victim is unconscious, artificial respiration may be necessary.
  A proper method for performing artificial respiration or resuscitation should be learned beforehand. If the victim's heart is not beating, cardio-pulmonary resuscitation should be performed by a trained and qualified person.

For outbreak of fire

- First, shut off all the power from the machine using the emergency power-off switch, if there is one, or the normal power-off switch.
- If the fire continues burning after the power is shut off, take suitable actions including the use of a fire extinguisher or a call for the fire department.

2. ⚠ Hazard Warning Statements

The following are the hazard warning statements contained in this manual.

2.1 ⚠ WARNING Statement

(chapter 1, page 1-6)

⚠ WARNING

- Build an emergency stop circuit, interlock circuits and so forth outside this product. If these circuits were built inside the product, its failures could result in damage to hardware or in accidents.
- Limit the I/O current through an I/O module to the maximum allowable current rating or below. Overcurrent flow through an I/O module could cause damage to its internal components, resulting in accidents, fires and failures.
- Use an external power supply equipped with overvoltage and overcurrent protection features.
- If the product smokes, smells offensively or otherwise appears to be misbehaving, switch it off immediately and start problem determination.

2.2 ⚠ CAUTION Statements

(chapter 1, page 1-7)

⚠ CAUTION

- Before connecting a power supply to a module, make sure that it matches the module's rating. Connecting a power supply to a module that does not match its rating could result in fires.
- PCs and LEDs in this product use gallium arsenide (GaAs), which is designated a harmful substance by law. Exercise maximum care in disposing of this product. Have its disposal handled by an expert specialized in handling industrial waste.
- Use the same power supply for the external power supply (to the +V terminal) of the S10mini output module and for the load power supply. Use of different power supplies could result in the module malfunctioning.
- Do not use transceivers, cell phones and like devices near this system. These devices could impart noises to the system, causing it to malfunction.

(section 3.2, page 3-3) (section 3.3, page 3-4) (section 3.4, page 3-5)

⚠ CAUTION

- Use the input voltage within the voltage rating. Applying voltage past this rating could cause the module to smoke or ignite.
- Separate the power supply system of the module from equipment that is likely to generate high-frequency noises, such as an inverter.
  Applying high-frequency noise input could cause the internal parts of the module to smoke or ignite under heat even if the module is used within the rated voltage.

(subsection 4.3.5, page 4-11)

⚠ CAUTION

Install a protective circuit, such as a fuse or circuit protector, in the external power supply. The protective circuit must be one matched to the rating of the power supply.

2.3 CAUTION Statements

(chapter 1, page 1-2)

CAUTION

To prevent possible failures, use the PCs housed in a drip-proof enclosure where it may be wetted by moisture.

(chapter 1, page 1-3)

CAUTION

If the input voltage of the power supply module is within its specified range but it is closer to the upper or lower limit of the range, assume an input power supply error and request inspection from the power supply facility administrator.

(chapter 1, page 1-7)

CAUTION

Do not install, hardwire, handle, and make internal modifications to the product except to such extent as covered in this manual. We do not assume responsibility for any consequential damages to our equipment and peripheral devices and for personal injury.

(chapter 1, page 1-7)

CAUTION

- Install a protective circuit, such as a fuse or circuit protector, in the external power supply. The protective circuit must be one matched to the rating of the power supply.
- Verify correct wiring fully before switching on the equipment.
- Before shutting down (switching off or resetting) the equipment, make sure that the peripherals have stopped or remain free from adverse effects from such shutdown.
- Module failures could result in corrupted memory. Back up all sensitive data.

(subsection 2.1.8, page 2-10)

CAUTION

For the LQA050 and LQA150, the SC* side is commonly used in the module.
For the LQA055 and LQA155, the SC* side is not commonly used in the module.
Therefore, be sure to use Class D grounding on the external unit side.

(section 2.2, page 2-15)

CAUTION

Heat dissipation could cause fires or unit failures to occur. When the ambient temperature of a unit using LQV000, LQV100, or LQV020 exceeds 48°C, limit the maximum output current of the power supply module. The maximum output current falls to 5.85 A at 55°C. Allowing for the environment in which the unit is installed, either install a cooling fan on the enclosure or limit the number of modules that are mounted.

(section 3.24, page 3-35)

CAUTION

Power off the module before setting SW3 to avoid possible malfunctioning and failures.
Particularly, if an external power supply is attached to a connector, remember to switch off both the unit and the external power supply.

(section 3.24, page 3-37)

CAUTION

- Be sure to connect the input and output connectors correctly. Reverse connection of the input and output connectors could damage to the module.
- Wire an external power supply to the output section with correct polarities. Incorrect polarity setting could cause damage to the module.
- The LQZ300 and our product (Model LWX000) differ in their connector terminal assignment. To avoid damage to the module, do not attach a connector wired for the LQZ300 to the LWX000.

(section 3.25, page 3-40)

CAUTION

- Use the same power supply for an external power supply and a load power supply. Use of different power supplies could result in the module malfunctioning.
- To prevent the module from malfunctioning or failure, switch the module off before shorting or opening operating mode setup terminals.

(section 3.26, page 3-42) (section 3.27, page 3-46) (section 3.28, page 3-52)
(section 3.32, page 3-69) (section 3.33, page 3-72) (section 3.34, page 3-75)

CAUTION

Power off the module before setting the MODE and RANGE switches.

(section 3.27, page 3-47) (section 3.28, page 3-53) (section 3.30, page 3-61)
(section 3.31, page 3-66)

CAUTION
Wire the cable shield to the external terminal block and use Class D grounding collectively.

(section 3.29, page 3-56) (section 3.30, page 3-60) (section 3.31, page 3-65)
(section 3.35, page 3-78) (section 3.36, page 3-80)

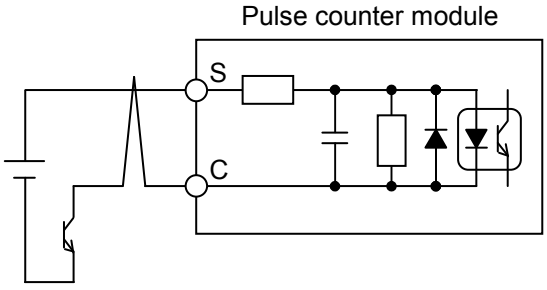
CAUTION
Power off the module before setting the MODE switch.

(subsection 4.2.3, page 4-5)

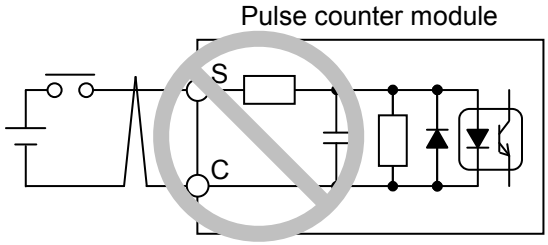
CAUTION

- When wiring a pulse counter module, be sure to wire it with a shielded twisted-pair cable and ground the cable by Class D grounding.
- The shielded twisted-pair cable must be laid at least 30 centimeters away from noise sources, such as power cables and input/output cables. Never lay it in parallel with those noise sources, and the length of the cable laid must be shortest possible.
- If a counting error occurs in the pulse counter module that has been wired according to the above rules, lay the shielded twisted-pair cable in a special duct or conduit, and then ground the duct or conduit.
- Any input terminals that need not be used must be wired as follows:
  - If the pulse counter module is used with one-phase pulse input, short the two input terminals of each of the two pairs of two-phase pulse input terminals; that is, short A1S and A1C together, then short B1S and B1C together, and then ground them all together.
  - If it is used with two-phase pulse input, short the one-phase pulse input terminals A2S and A2C together and then ground them together.
  - If the stop-signal input terminals STOPS and STOPC need not be used, short them together and then ground them together.
- A pulse generator may be connected to the pulse counter module by using either voltage-transistor connection or no-voltage-transistor connection (see below). Voltage-transistor connection should be used when grounding is made on the pulse generator side. No-voltage-transistor connection should be used when grounding is made on the pulse counter module side.
- Do not connect a contact to any pulse input terminal. Disregarding this rule may result in counting errors due to contact bouncing during closing and opening of the contact.

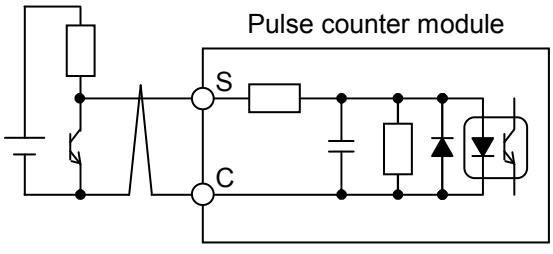
■ Voltage-transistor connection



■ Voltage-contact connection (prohibited)



■ No-voltage-transistor connection



(subsection 4.5.1, page 4-22)

CAUTION

With an I/O point setting of 128, undefined data will enter XW△▲ + 40 to XW△▲ + 70.

(subsection 4.6.2, page 4-27)

CAUTION

When using MODE2, check the model and revision of the CPU/LPU you are using, as well as the version of the programming tool.
The list below indicates the required models and revisions associated with the CPU/LPU and the versions of programming tools in order to use MODE2.

Module types and revisions:

Module type	Indicator indication	Tool window indication	Module revision
LQP000	CPMS M15 or later	–	G or later
LQP010	CPMS M15 or later	–	G or later
LQP011	CPMS M15 or later	–	H or later
LQP120	CPMS M14 or later	–	E or later
LQP510	–	Ver.2.0 Rev.1.0 or later	F or later
LQP710	–	Ver.2.0 Rev.1.0 or later	C or later

Revisions of programming tool:

Type	Version
S10V ladder chart system	Ver1.0, Rev3.0
S10mini ladder chart system	Ver7.0, Rev6.0

- Each module revision in the above table can be found on the bar code label affixed on the top of the module housing. It is the rightmost letter of the alphabet in the bar code.
- MODE2 is not usable on S10/2α Series CPUs. On these CPUs, use MODE4.
- MODE2 is not usable on any CPU or LPU revision earlier than those listed in the above table. On earlier CPU or LPU revisions, use MODE4.

(section 5.1, page 5-2)

CAUTION

When using an analog input module and an analog output module in mode 1 or mode 3, set their I/O type to DI or DO. Setting them to AI or AO would corrupt the transfer data.

(section 7.1, page 7-2)

CAUTION

The module is susceptible to electrostatic damages. Discharge electrostatic charges from your body before setting switches, attaching or detaching cables, or inserting or removing connectors.

(section 7.1, page 7-3)

CAUTION

- If the input voltage of the power supply module is within its specified range but it is closer to the upper or lower limit of the range, assume an input power supply error and request inspection from the power supply facility administrator.
- Hot-replacing a module could lead to damage to hardware or software. Be sure to switch modules off before replacing them.

(section 7.2, page 7-6)

CAUTION

The customer is cautioned not to replace any internal components of the S10mini CPU, except for the battery. We do not assume responsibility for any consequential damages to our equipment and peripheral devices and for personal injury that may result from such customer replacement. If a module appears to have failed, replace it as a whole.

WARRANTY AND SERVICING

Unless a special warranty contract has been arranged, the following warranty is applicable to this product.

1. Warranty period and scope
   Warranty period
   The warranty period for this product is for one year after the product has been delivered to the specified delivery site.

   Scope
   If a malfunction should occur during the above warranty period while using this product under normal product specification conditions as described in this manual, please deliver the malfunctioning part of the product to the dealer or Hitachi Engineering & Services Co., Ltd. The malfunctioning part will be replaced or repaired free of charge. If the malfunctioning is shipped, however, the shipment charge and packaging expenses must be paid for by the customer.

   This warranty is not applicable if any of the following are true.

   - The malfunction was caused by handling or use of the product in a manner not specified in the product specifications.
   - The malfunction was caused by a unit other than that which was delivered.
   - The malfunction was caused by modifications or repairs made by a vendor other than the vendor that delivered the unit.
   - The malfunction was caused by a relay or other consumable which has passed the end of its service life.
   - The malfunction was caused by a disaster, natural or otherwise, for which the vendor is not responsible.

   The warranty mentioned here means the warranty for the individual product that is delivered. Therefore, we cannot be held responsible for any losses or lost profits that result from the operation of this product or from malfunctions of this product. This warranty is valid only in Japan and is not transferable.

2. Range of services
   The price of the delivered product does not include on-site servicing fees by engineers. Extra fees will be charged for the following:

   - Instruction for installation and adjustments, and witnessing trial operations.
   - Inspections, maintenance and adjustments.
   - Technical instruction, technical training and training schools.
   - Examinations and repairs after the warranty period is concluded.
   - Even if the warranty is valid, examination of malfunctions that are caused by reasons outside the above warranty scope.

Revision record

Revision No.	Revision Record (contents of revision and its reason)	Month/Year	Remark
E	The safety guidelines have been reviewed and caution instructions are added for the pulse counter module (model LQC000).	August 2009	
F	Additional information is added concerning the service life of the relays contained in certain types of hardware modules.	March 2012	

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PREFACE

Thank you for purchasing the Hitachi Programmable Controller (S10mini).
This manual describes how to handle the S10mini I/O module. Read this manual thoroughly to properly use this module.

<Trademark>
Microsoft® Windows® is a registered trademark of Microsoft Corporation in the United States and/or other countries.

I/O: Input/Output

CONTENTS

FIGURES

TABLES

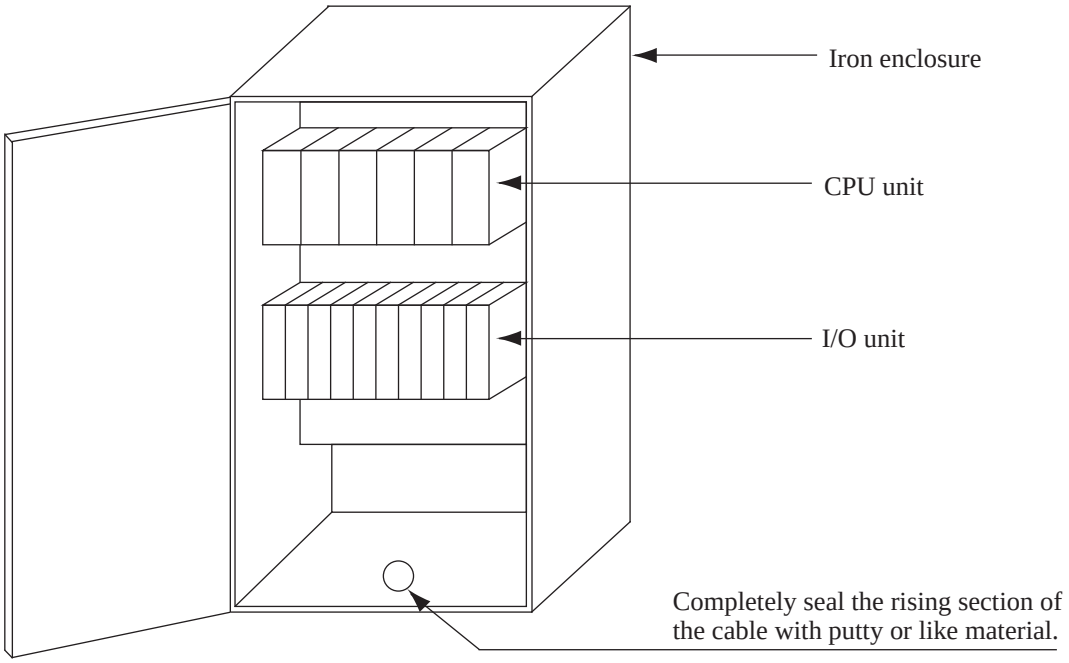
1 BEFORE USE

1 BEFORE USE

Being a processor technology-based product, the PCs should deserve special notice in the following situations:

(1) Make sure that your system implementation of the PCs is used within the warranted limits of maximum ratings, operating supply voltages, radiation characteristics, installation conditions and other requirements defined in this manual. We do not assume responsibility for failures and accidents that may incur by using your system implementation past its warranted limits.
Even if you are using your system within its warranted limits of performance, it is recommended to take fail-safe and other system precautions by allowing for the failure rate and failure mode that are anticipated for our product to defend against from personal injury, fires, and other extended damages that may result from the behavior of our product.

(2) The PCs is not of fireproof, dustproof, and waterproof construction. When installing it, house it in a dustproof, waterproof enclosure made of iron as shown below.



CAUTION
To prevent possible failures, use the PCs housed in a drip-proof enclosure where it may be wetted by moisture.

(3) Use the PCs within the limits of environmental specifications defined below. Its operation under room temperature, room humidity conditions of usage (15 to 35ºC, 45 to 85% RH) is recommended to keep it running successfully for extended periods of time. Using the product in a hot and humid environment or in a place where there are sharp temperature changes within a day will degrade its service life.

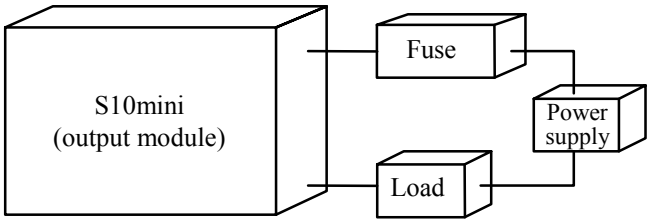
Supply voltage	LQV000: 100 to 120 VAC Single phase 50/60 Hz ± 5 Hz LQV100: 100 to 120 VAC Single phase 50/60 Hz ± 5 Hz 100 to 110 VDC LQV020: 24 VDC LQV200: 200 to 240 VDC Single phase 50/60 Hz ± 5 Hz
Supply voltage fluctuations	LQV000: 85 to 132 VAC LQV100: 85 to 132 VAC 85 to 132 VDC LQV020: 20.4 to 28.8 VDC LQV200: 170 to 264 VAC
Temperature	Operating: 0 to 55ºC, Storage: -20 to 75ºC (Temperature change rate: 10ºC /h or lower)
Relative humidity	Operating: 30 to 90% RH, Storage: 10 to 90% RH (non-condensing)
Vibration resistance	Compliant with JIS C0040 Frequency: 10 to 150 Hz, Acceleration: 10 m/s^2 8-minute sweep in each of the X-/Y-/Z-axis directions, 20 sweep cycles
Shock resistance	Compliant with JIS C0041i Peak acceleration: 147 m/s^2 Sinusoidal half-wave pulses, three cycles in each of the X-/Y-/Z-axis directions
Ambient air	Dust class: One million, no corrosive gases

CAUTION

If the input voltage of the power supply module is within its specified range but it is closer to the upper or lower limit of the range, assume an input power supply error and request inspection from the power supply facility administrator.

(4) Output module

Furnish the output module load power supply with a fuse for the protection of load short-circuits. Ensure that the employed fuse is rated to match the load. If the employed fuse rating is higher than specified, the printed circuit boards, case, and other items may burnout when the load is shorted.

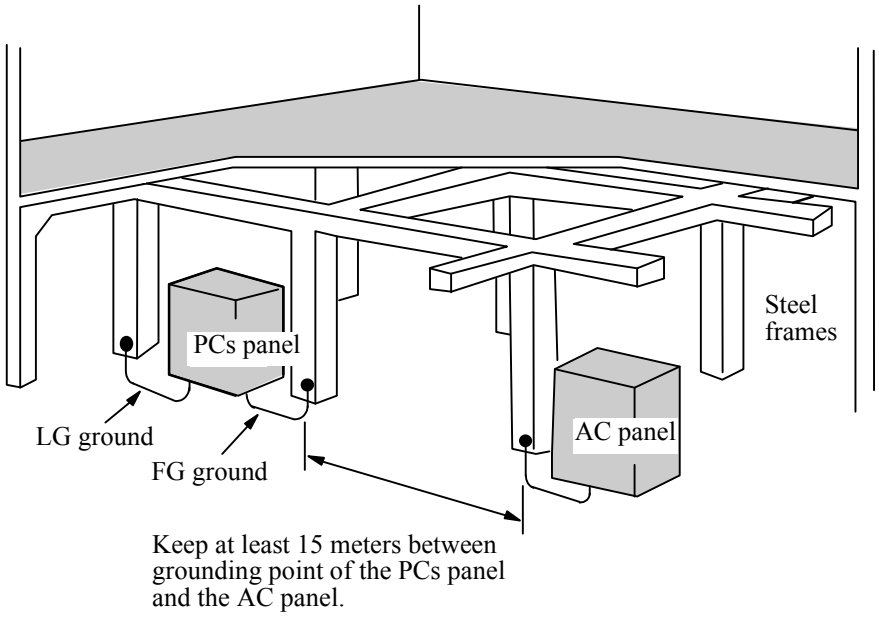


(5) Grounding point

Provide Class D* or better independent grounding. Do not use any other existing ground as a substitute. It is particularly important that the grounding point for the Programmable Controller be at least 15 m away from an AC panel grounding point.

It is the best that the grounding wire be welded to the steel frame of a building. In case when the aforesaid is impossible, bury the grounding rod in earth.

* Class D grounding is defined in the Technical Standard for Electrical Facilities of Japan. This standard states that the grounding resistance must be 100 ohms or less for equipment operating on 300 VAC or less, and 500 ohms or less for devices that shut down automatically within 0.5 seconds when shorting occurs in low tension lines.



(6) Noises

Do not install the PCs in or close to a board in which high-voltage equipment, such as an inverter, is installed.

If such location is unavoidable, install a shielding plate to shut off electromagnetic and electrostatic induction to the CPU unit or I/O unit or to cabling.

(7) Emergency stop circuit

A failure occurring in a single part could be imparted to other parts of the system. The emergency stop circuit that is assembled into the programmable controller must be built of external relay circuitry.

(8) Internal parts replacement

User must not replace internal parts of the Programmable Controller with anything other than the parts specified in the manual. Replace the entire module in which a defective part is included. For details on parts replacement, contact your Hitachi maintenance personnel.

(9) Module insertion/removal

Power must be turned off while a module is inserted or removed. Insertion or removal of a module when power is ON may cause damage to the module or electric shock.

(10) Equipment addition

If the peripheral equipment is added or altered, conduct an inspection as directed in Section 7.1, "Preventive Maintenance" to confirm whether the Programmable Controller is properly functioning.

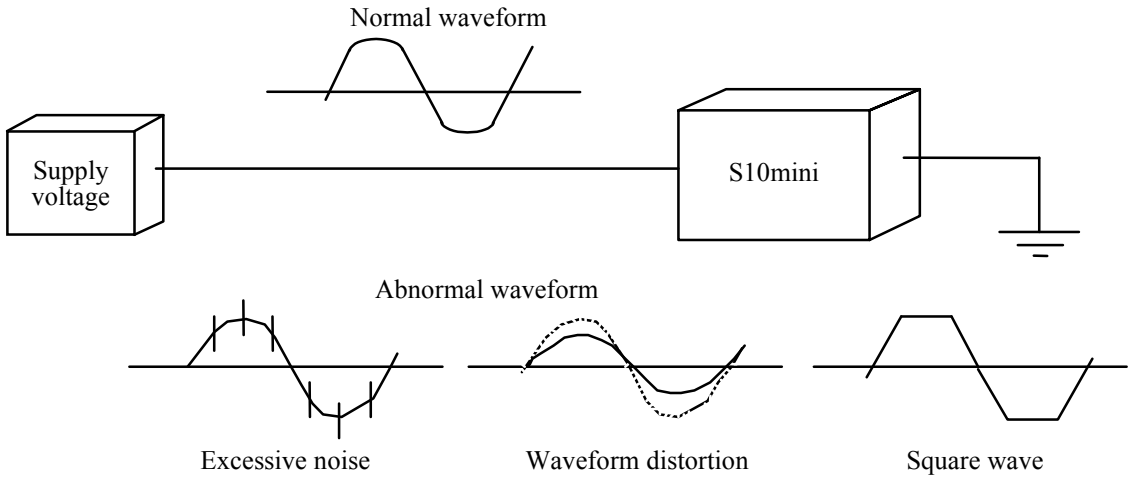
Special attention must be paid to the following regarding power supply and grounding:

- Power supply

  Inspection of the supply voltage and waveform:

  • Check for a voltage reduction.

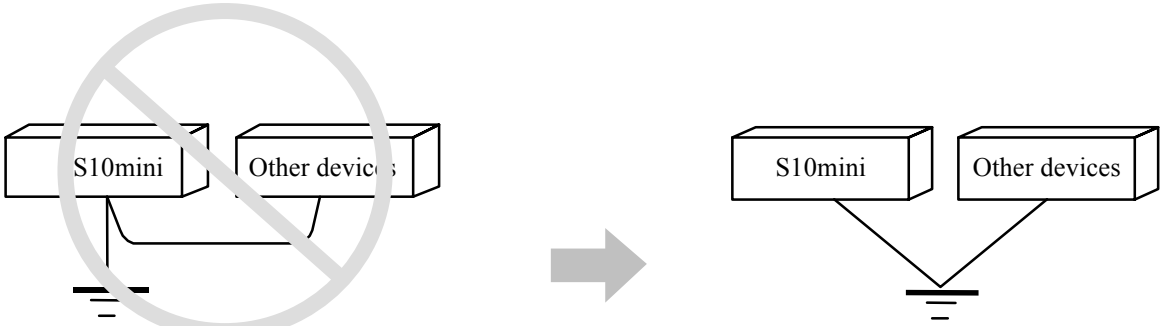
  • Check for a significance in the amount of noise in the power supply line.



(11) Grounding

Inspection of the ground wiring:

- Check if a ground wire is shared with another ground wire.
- Check if the grounding point is at least 15 m away from the grounding point of the AC panel.
- Check if any power cables or lead cables (e.g., a motor lead cable) are located adjacent to the signal cables, such as the remote I/O cable.



Share of grounding wires

Isolation of grounding wires

WARNING

- Build an emergency stop circuit, interlock circuits and so forth outside this product. If these circuits were built inside the product, its failures could result in damage to hardware or in accidents.
- Limit the I/O current through an I/O module to the maximum allowable current rating or below. Overcurrent flow through an I/O module could cause damage to its internal components, resulting in accidents, fires and failures.
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- If the product smokes, smells offensively or otherwise appears to be misbehaving, switch it off immediately and start problem determination.

CAUTION

- Before connecting a power supply to a module, make sure that it matches the module's rating. Connecting a power supply to a module that does not match its rating could result in fires.
- PCs and LEDs in this product use gallium arsenide (GaAs), which is designated a harmful substance by law. Exercise maximum care in disposing of this product. Have its disposal handled by an expert specialized in handling industrial waste.
- Use the same power supply for the external power supply (to the +V terminal) of the S10mini output module and for the load power supply. Use of different power supplies could result in the module malfunctioning.
- Do not use transceivers, cell phones and like devices near this system. These devices could impart noises to the system, causing it to malfunction.

CAUTION

Do not install, hardwire, handle, and make internal modifications to the product except to such extent as covered in this manual. We do not assume responsibility for any consequential damages to our equipment and peripheral devices and for personal injury.

CAUTION

- Install a protective circuit, such as a fuse or circuit protector, in the external power supply. The protective circuit must be one matched to the rating of the power supply.
- Verify correct wiring fully before switching on the equipment.
- Before shutting down (switching off or resetting) the equipment, make sure that the peripherals have stopped or remain free from adverse effects from such shutdown.
- Module failures could result in corrupted memory. Back up all sensitive data.

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2 KINDS AND SPECIFICATIONS OF I/O MODULES

2.1 Kinds and Specifications of I/O Modules

2.1.1 Digital input module (Terminal block-type)

Type		LQX130	LQX150
Input format		AC input	AC input
Number of inputs		16 inputs	16 inputs
Number of commons		8 common	16 comon
Insulation method		Photocoupler	Photocoupler
Rated input voltage		100 to 120 VAC (50/60 Hz)	200 to 240 VAC (50/60 Hz)
Rated input current		7.0 mA (100 VAC, 50 Hz) 8.3 mA (100 VAC, 60 Hz)	7.5 mA (240 VAC, 50 Hz) 9.0 mA (240 VAC, 60 Hz)
Operating voltage	Minimum ON voltage (current)	80 VAC (5.5 mA)	170 VAC (5.3 mA)
	Maximum OFF voltage (current)	25 VAC (1.7 mA)	50 VAC (1.5 mA)
Input impedance		Approx. 14.5 kΩ (50 Hz) Approx. 12 kΩ (60 Hz)	Approx. 31.9 kΩ (50 Hz) Approx. 26.6 kΩ (60 Hz)
Response time	OFF→ON	15 ms or less	15 ms or less
	ON→OFF	25 ms or less	25 ms or less
Internal current dissipation		70 mA or less	110 mA or less
External wiring connection method		18-point terminal block	18-point terminal block
Operation indication		LED indication (lit when ON)	LED indication (lit when ON)
Mass		210 g	240 g
Combining mount base	CPU unit mount base	Mountable	
	I/O unit mount base	Mountable	
	Scan-type analog input module mount base	Mountable	

Type		LQX200	LQX201	LQX220	LQX240
Input format		DC input (sink/source)	DC input (sink/source)	DC input (sink/source)	DC input (sink/source)
Number of inputs		16 inputs	16 inputs	16 inputs	16 inputs
Number of commons		8 common	8 common	8 common	8 common
Insulation method		Photocoupler	Photocoupler	Photocoupler	Photocoupler
Rated input voltage		12 to 24 VDC	12 to 24 VDC	48 VDC	100 VDC
Rated input current		3.4 mA (12 VDC) to 7 mA (24 VDC)	3.4 mA (12 VDC) to 7 mA (24 VDC)	Approx. 10 mA	Approx. 5 mA
Operating voltage	Minimum ON voltage (current)	10 VDC (2.7 mA)	10 VDC (2.7 mA)	40 VDC (8.3 mA)	85 VDC (3.8 mA)
	Maximum OFF voltage (current)	3 VDC (0.6 mA)	3 VDC (0.6 mA)	8 VDC (1.7 mA)	25 VDC (1.0 mA)
Input impedance		Approx. 3.3 kΩ	Approx. 3.3 kΩ	Approx. 4.7 kΩ	Approx. 22 kΩ
Response time	OFF→ON	10 ms or less	0.5 ms or less	15 ms or less	15 ms or less
	ON→OFF	10 ms or less	0.5 ms or less	25 ms or less	20 ms or less
Internal current dissipation		80 mA or less	80 mA or less	110 mA or less	110 mA or less
External wiring connection method		18-point terminal block	18-point terminal block	18-point terminal block	18-point terminal block
Operation indication		LED indication (lit when ON)	LED indication (lit when ON)	LED indication (lit when ON)	LED indication (lit when ON)
Mass		210 g	210 g	230 g	230 g
Combining mount base	CPU unit mount base	Mountable			
	I/O unit mount base	Mountable			
	Scan-type analog input module mount base	Mountable			

2.1.2 Digital input module (Connector-type)

Type		LQX300	LQX310	LQX350	LQX360
Input format		DC input (sink/source)		DC input (sink/source)	
Number of inputs		32 inputs		64 inputs	
Number of commons		32 common		32 common	
Insulation method		Photocoupler		Photocoupler	
Rated input voltage		12 to 24 VDC		12 to 24 VDC	
Rated input current		2.0 mA (12 VDC) to 4.1 mA (24 VDC)		2.0 mA (12 VDC) to 4.1 mA (24 VDC)	
Operating voltage	Minimum ON voltage (current)	9 VDC (1.4 mA)		9 VDC (1.4 mA)	
	Maximum OFF voltage (current)	3 VDC (0.3 mA)		3 VDC (0.3 mA)	
Input impedance		Approx. 5.6 kΩ		Approx. 5.6 kΩ	
Response time	OFF→ON	10 ms or less		10 ms or less	
	ON→OFF	10 ms or less		10 ms or less	
Internal current dissipation		150 mA or less		170 mA or less	
External wiring connection method		40-point connector	34-point connector	40-point connector	34-point connector
Operation indication		LED indication (lit when ON) Switch-selected		LED indication (lit when ON) Switch-selected	
Mass		150 g		170 g	
Combining mount base	CPU unit mount base	Mountable			
	I/O unit mount base	Mountable			
	Scan-type analog input module mount base	Mountable			

2.1.3 Digital input module with built-in signal latches

Type			LQX110	LQX151
Input format			AC input	AC input
Number of inputs			16 inputs	16 inputs
Number of commons			8 common	16 common
Insulation method			Photocoupler	Photocoupler
Rated input voltage			100 VAC	200 to 240 VAC (50/60 Hz)
Rated input current			Approx. 5 mA	7.5 mA (240 VAC, 50 Hz) 9.0 mA (240 VAC, 60 Hz)
Operating voltage	Minimum ON voltage (current)		85 VAC (3.8 mA)	170 VAC (5.3 mA)
	Maximum OFF voltage (current)		25 VAC (1.0 mA)	50 VAC (1.5 mA)
Input impedance			Approx. 22 kΩ	Approx. 31.9 kΩ (50 Hz) Approx. 26.6 kΩ (60 Hz)
Minimum input pulse width ton toff ON OFF		ton	15 ms	15 ms
		toff	50 ms + 3TRC(*)	50 ms + 3TRC(*)
Internal current dissipation			110 mA or less	110 mA or less
External wiring connection method			18-point terminal block	18-point terminal block
Operation indication			LED indication (lit when ON)	LED indication (lit when ON)
Mass			230 g	240 g
Combining mount base	CPU unit mount base		Mountable	
	I/O unit mount base		Mountable	
	Scan-type analog input module mount base		Mountable	

Type			LQX210	LQX211	LQX250
Input format			DC input (sink/source)	DC input (sink/source)	DC input (sink/source)
Number of inputs			16 inputs	16 inputs	16 inputs
Number of commons			8 common	8 common	8 common
Insulation method			Photocoupler	Photocoupler	Photocoupler
Rated input voltage			24 VDC	24 VDC	100 VDC
Rated input current			Approx. 10 mA	Approx. 10 mA	Approx. 5 mA
Operating voltage	Minimum ON voltage (current)		20 VDC (8.6 mA)	20 VDC (8.6 mA)	85 VAC (3.8 mA)
	Maximum OFF voltage (current)		4 VDC (1.3 mA)	4 VDC (1.3 mA)	25 VAC (1.0 mA)
Input impedance			Approx. 2.2 kΩ	Approx. 2.2 kΩ	Approx. 22 kΩ
Minimum input pulse width ton toff ON OFF		ton	15 ms	0.5 ms	15 ms
		toff	50 ms + 3TRC(*)	5 ms + 3TRC(*)	50 ms + 3TRC(*)
Internal current dissipation			110 mA or less	170 mA or less	110 mA or less
External wiring connection method			18-point terminal block	18-point terminal block	18-point terminal block
Operation indication			LED indication (lit when ON)	LED indication (lit when ON)	LED indication (lit when ON)
Mass			230 g	230 g	230 g
Combining mount base	CPU unit mount base		Mountable		
	I/O unit mount base		Mountable		
	Scan-type analog input module mount base		Mountable		

(*) TRC: Remote I/O transfer time

2.1.4 Digital output module (Terminal block-type)

Type		LQY100			LQY140		
Output format		Contact output			Contact output		
Number of outputs		16 outputs (a-contacts × 16)			8 outputs (a-contacts × 16)		
Number of commons		8 common			None (All points: Independent)		
Insulation method		Relay			Relay		
Rated output voltage		100 to 220 VAC, 12 to 24 VDC	48 VDC	100 to 110 VDC	100 to 220 VAC, 12 to 24 VDC	48 VDC	100 to 110 VDC
Rated output current		2.0 A/output 5 A/common	0.5 A/ output	0.1 A/ output	2.0 A/output 5 A/common	0.5 A/ output	0.1 A/ output
Response time	OFF→ON	15 ms or less			15 ms or less		
	ON→OFF	15 ms or less			15 ms or less		
Internal current dissipation		780 mA or less			400 mA or less		
External wiring connection method		18-point terminal block			18-point terminal block		
Operation indication		LED indication (lit when ON)			LED indication (lit when ON)		
Mass		220 g			220 g		
Combining mount base	CPU unit mount base	Mountable					
	I/O unit mount base	Mountable					
	Scan-type analog input module mount base	Mountable					

Type		LQY150			LQY160		
Output format		Contact output			Contact output		
Number of outputs		8 outputs (b-contacts × 8)			6 outputs (a-contacts × 2, c-contacts × 4)		
Number of commons		None (All points: Independent)			None (All points: Independent)		
Insulation method		Relay			Relay		
Rated output voltage		100 to 220 VAC, 12 to 24 VDC	48 VDC	100 to 110 VDC	100 to 220 VAC, 12 to 24 VDC	48 VDC	100 to 110 VDC
Rated output current		2.0 A/output	0.5 A/ output	0.1 A/ output	2.0 A/output	0.5 A/ output	0.1 A/ output
Response time	OFF→ON	15 ms or less			15 ms or less		
	ON→OFF	15 ms or less			15 ms or less		
Internal current dissipation		800 mA or less			320 mA or less		
External wiring connection method		18-point terminal block			18-point terminal block		
Operation indication		LED indication (lit when b-contact is open)			LED indication (lit when ON)		
Mass		300 g			230 g		
Combining mount base	CPU unit mount base	Mountable					
	I/O unit mount base	Mountable					
	Scan-type analog input module mount base	Mountable					

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Type		LQY170
Output format		Contact output
Number of outputs		6 outputs (a-contacts × 2, c-contacts × 4)
Number of commons		None (All points: Independent)
Insulation method		Relay
Rated output voltage		100 to 240 VAC, 12 to 24 VDC
Rated output current		2.0 A/output
Response time	OFF→ON	15 ms or less
	ON→OFF	15 ms or less
Internal current dissipation		320 mA or less
External wiring connection method		18-point terminal block
Operation indication		LED indication (lit when ON)
Mass		250 g
Combining mount base	CPU unit mount base	Mountable
	I/O unit mount base	Mountable
	Scan-type analog input module mount base	Mountable

Type		LQY200
Output format		Transistor output (sink)
Number of outputs		16 outputs
Number of commons		16 common
Insulation method		Photocoupler
Rated output voltage		12 to 24 VDC
Maximum output current		0.3 A/output
Response time	OFF→ON	0.2 ms or less
	ON→OFF	0.3 ms or less (resistive load)
Internal current dissipation		120 mA or less
External power supplies	Voltage	10.2 to 26.4 VDC
	Current (n: Number of ON points)	3.5 mA × n (12 VDC) 7.0 mA × n (24 VDC)
External wiring connection method		18-point terminal block
Operation indication		LED indication (lit when ON)
Mass		210 g
Combining mount base	CPU unit mount base	Mountable
	I/O unit mount base	Mountable
	Scan-type analog input module mount base	Mountable

2.1.5 Digital output module (Connector-type)

Type		LQY300	LQY310	LQY350	LQY360
Output format		Transistor output (sink)		Transistor output (sink)	
Number of outputs		32 outputs		64 outputs	
Number of commons		32 common		32 common	
Insulation method		Photocoupler		Photocoupler	
Rated output voltage		12 to 24 VDC		12 to 24 VDC	
Maximum output current		0.1 A/output, 1.6 A/common		0.1 A/output, 1.6 A/common	
Response time	OFF→ON	2 ms or less		2 ms or less	
	ON→OFF	2 ms or less		2 ms or less	
Internal current dissipation		260 mA or less		400 mA or less	
External power supplies	Voltage	10.2 to 26.4 VDC		10.2 to 26.4 VDC	
	Current (n: Number of ON points)	0.4 mA × n (12 VDC) 0.8 mA × n (24 VDC)		0.4 mA × n (12 VDC) 0.8 mA × n (24 VDC)	
External wiring connection method		40-point connector	34-point connector	40-point connector	34-point connector
Operation indication		LED indication (lit when ON) Switch-selected		LED indication (lit when ON) Switch-selected	
Mass		150 g		170 g	
Combining mount base	CPU unit mount base	Mountable			
	I/O unit mount base	Mountable			
	Scan-type analog input module mount base	Mountable			

2.1.6 Digital input module

Type		LQZ300		
Input section			Output section	
Input format		DC input (sink/source)	Output format	Transistor output (sink)
Number of inputs		32 inputs	Number of outputs	32 outputs
Number of commons		32 common	Number of commons	32 common
Insulation method		Photocoupler	Insulation method	Photocoupler
Rated input voltage		12 to 24 VDC	Rated output voltage	12 to 24 VDC
Rated input current		2.4 to 4.1 mA	Response time: OFF→ON	2 ms or less
Operating voltage	Minimum ON voltage (current)	9 VDC (1.4 mA)	Response time: ON→OFF	2 ms or less
	Maximum OFF voltage (current)	3 VDC (0.3 mA)	External power supplies: Voltage	10.2 to 26.4 VDC
Input impedance		Approx. 5.6 kΩ	External power supplies: Current (n: number of ON points)	0.4 mA × n (12 VDC) 0.8 mA × n (24 VDC)
Response time	OFF→ON	10 ms or less		
	ON→OFF	10 ms or less		
Internal current dissipation		300 mA or less		
External wiring connection method		40-point connector		
Operation indication		LED indication (Switch-selected)		
Mass		170 g		
Combining mount base	CPU unit mount base	Mountable		
	I/O unit mount base	Mountable		
	Scan-type analog input module mount base	Mountable		

2.1.7 Pulse counter module

Type			LQC000	
Mode (*)			Mode 1	Mode 2
Counting range			0 to 16.383 counts (unsigned 14 bits)	-8.192 to 8.191 counts (sign + 13 bits)
Number of input channels			One channel	
Insulation method			Photocoupler	
Input	Input format	Single-phase input	Up count	
		Two-phase input	Up/down count	
		Stop input	Enable type	Latch type
	Input method		No-voltage/voltage transistor type	
	Input frequency		20 kHz or less (duty ratio 50%)	
	Filter time constant		Approx. 5 μs	
	Rated input voltage		12 to 24 VDC	
	Input voltage range		10.2 to 26.4 VDC	
	Rated input current		Approx. 7 mA (12 VDC), approx. 14 mA (24 VDC)	
	ON voltage/current		10 VDC or more/5.3 mA or more	
	OFF voltage/current		3 mADC or less/0.8 mA or less	
Output	Compare result output format		Count value <, =, > compare value (coincident output is latch)	
	Rated output voltage		12 to 24 VDC	
	Output voltage range		10 to 28 VDC	
	Maximum output current		0.3 A	
	Response time (ON ↔ OFF delay)		1 ms or less	
	External power supply		10 to 28 VDC	
Internal current dissipation			150 mA or less	
External wiring connection method			18-point terminal block	
Mass			220 g	
Combining mount base	CPU unit mount base		Mountable	
	I/O unit mount base		Mountable	
	Scan-type analog input module mount base		Mountable	

(*) The modes are set by opening or shorting terminal block connectors.

2.1.8 Analog input module

Type		LQA000			LQA100
Input method		Voltage input			Current input
Input range		±5 VDC	±10 VDC	1 to 5 VDC	4 to 20 mA
RANGE switch setting		0	1	2	–
Mode		1: 4 words/4 channels (allocated to the XW area) 2: 1 word/4 channels (allocated to the EW area)			
Number of input channels		4 channels			4 channels
Insulation method		Photocouplers (common to all four channels)			
Maximum input voltage		±15 V	±15 V	±12 V	–
Maximum input current		–			±25 mA
Number of A/D conversion bits		12 bits (sign + 11 bits)			12 bits (sign + 11 bits)
Conversion rate		±2,000 digit/±5 V (0 digit: 0 V)	±2,000 digit/±10 V (0 digit: 0 V)	2,000 digit/4 V (0 digit: 1 V)	2,000 digit/16 mA (0 digit: 4 mA)
Total accuracy	Ambient temperature 25°C	±8 digits or less			±8 digits or less
	Ambient temperature 0 to 55°C	±20 digits or less			±20 digits or less
Maximum response time	MODE 1	5 ms + TRC			5 ms + TRC
	MODE 2	5 ms + 4TRC			5 ms + 4TRC
Input filter	Attenuation factor	9.1 dB/60 Hz			9.1 dB/60 Hz
	Time constant	Approx. 5 ms			Approx. 5 ms
Input impedance	Power ON	5 MΩ or more			250 Ω or more
	Power OFF	3 kΩ or more			230 Ω or more
Internal current dissipation	Module REV A	500 mA or less			500 mA or less
	Module REV B	580 mA or less			580 mA or less
External wiring connection method		18-point terminal block			18-point terminal block
Mass		230 g			230 g
Combining mount base	CPU unit mount base	Mountable			
	I/O unit mount base	Mountable			
	Scan-type analog input module mount base	Mountable			

Type		LQA200			LQA201		
Input method		Resistance temperature detector [Pt100 Ω (JPt100 Ω)]			Resistance temperature detector [Pt100 Ω (JPt100 Ω)]		
Input range		-100 to 100ºC	-200 to 350ºC	-200 to 500ºC	-50 to 150ºC	-200 to 100ºC	-100 to 350ºC
RANGE switch setting		0	1	2	0	1	2
Mode		1: 4 words/4 channels (allocated to the XW area) 2: 1 word/4 channels (allocated to the EW area)					
Number of input channels		4 channels			4 channels		
Insulation method		Photocouplers (common to all four channels)					
Number of A/D conversion bits		12 bits (sign + 11 bits)			12 bits (sign + 11 bits)		
Conversion rate		±2,000 digit /±100 mV(*)	±2,000 digit /±300 mV(*)	±2,000 digit /±400 mV(*)	±2,000 digit /±125 mV(*)	±2,000 digit /±200 mV(*)	±2,000 digit /±250 mV(*)
Total accuracy	Ambient temperature 25°C	±20 digits or less			±20 digits or less		
	Ambient temperature 0 to 55°C	±40 digits or less			±40 digits or less		
Maximum response time	MODE 1	10 ms + TRC			10 ms + TRC		
	MODE 2	10 ms + 4TRC			10 ms + 4TRC		
Input filter	Attenuation factor	40 dB/60 Hz			40 dB/60 Hz		
	Time constant	Approx. 0.3 s			Approx. 0.3 s		
Internal current dissipation	Module REV A	500 mA or less			500 mA or less		
	Module REV B	580 mA or less			580 mA or less		
External wiring connection method		18-point terminal block			18-point terminal block		
Mass		240 g			240 g		
Combining mount base	CPU unit mount base	Mountable					
	I/O unit mount base	Mountable					
	Scan-type analog input module mount base	Mountable					

(*) Bridge output voltage

Type		LQA050/LQA055			LQA150/LQA155
Input method		Voltage input			Current input
Input range		±5 VDC	±10 VDC	1 to 5 V	4 to 20 mA
Number of input channels		8 channels			8 channels
Insulation method		Photocouplers insulation (common to 8 channels)			Photocouplers insulation (common to 8 channels)
Maximum input voltage		±14 V			–
Maximum input current		–			24 mA
Number of A/D conversion bits		12 bits (sign + 11 bits) or 14 bits (sign + 13 bits)			12 bits (sign + 11 bits) or 14 bits (sign + 13 bits)
Conversion rate		±2,000 digit/±5 V (±8,000 digit/±5 V) 0 digit: 0 V	±2,000 digit/±10 V (±8,000 digit/±10 V) 0 digit: 0 V	2,000 digit/ 4 V (8,000 digit/ 4 V) 0 digit: 1 V	2,000 digit/16 mA (8,000 digit/16 mA) 0 digit: 4 mA
Total accuracy	Ambient temperature 25°C	±0.15%/Full scale (12 bit: 6 digit, 14 bit: 24 digit)			±0.15%/ Full scale (12 bit: 6 digit, 14 bit: 24 digit)
	Ambient temperature 0 to 55°C	±0.4%/Full scale (12 bit: 16 digit, 14 bit: 64 digit)			±0.4%/Full scale (12 bit: 16 digit, 14 bit: 64 digit)
Maximum response time	MODE 1	5.12 ms + TRC (remote I/O transfer) 5.12ms + RC (J.NET transfer)			5.12 ms + TRC (remote I/O transfer) 5.12ms + RC (J.NET transfer)
	MODE 2	5.12 ms + 8 TRC (remote I/O transfer) 5.12ms + RC (J.NET transfer)			5.12 ms + 8 TRC (remote I/O transfer) 5.12ms + RC (J.NET transfer)
	MODE 3	5.12 ms + TRC (remote I/O transfer) 5.12ms + RC (J.NET transfer)			5.12 ms + TRC (remote I/O transfer) 5.12ms + RC (J.NET transfer)
	MODE 4	5.12 ms +4 TRC (remote I/O transfer) 5.12ms + RC (J.NET transfer)			5.12 ms +4 TRC (remote I/O transfer) 5.12ms + RC (J.NET transfer)
Input filter	Attenuation factor	8.9 dB/60 Hz			8.9 dB/60 Hz
	Time constant	4.8 ms			4.8 ms
Input impedance	Power ON	5 MΩ or more			250 Ω or more
	Power OFF	4.8 kΩ or more			237 Ω or more
Internal current dissipation		550 mA or less			550 mA or less
External wiring connection method		18- point terminal block connector (screw: M3)			18- point terminal block connector (screw: M3)
Mass		170 g			170 g
Combining mount base	CPU unit mount base	Mountable			Mountable
	I/O unit mount base	Mountable			Mountable
	Scan-type analog input module mount base	Mountable			Mountable

CAUTION

For the LQA050 and LQA150, the SC* side is commonly used in the module.
For the LQA055 and LQA155, the SC* side is not commonly used in the module.
Therefore, be sure to use Class D grounding on the external unit side.

2.1.9 Analog output module

Type		LQA500			LQA600
Output method		Voltage output			Current output
Output range		±5 VDC	±10 VDC	1 to 5 VDC	4 to 20 mA
RANGE switch setting		0	1	2	–
Mode		1: 4 words/4 channels (allocated to the YW area) 2: 1 word/4 channels (allocated to the EW area)			1: 4 words/4 channels (allocated to the YW area) 2: 1 word/4 channels (allocated to the EW area)
Number of output channels		4 channels			4 channels
Insulation method		Photocouplers (common to all four channels)			Photocouplers (common to all four channels)
Load resistance		2 kΩ or more			600 Ω or less
Number of D/A conversion bits		12 bits (sign + 11 bits)		12 bits (unsigned)	12 bits (unsigned)
Conversion rate		±5 V/ ±2,000 digit (0 V: 0 digit)	±10 V/ ±2,000 digit (0 V: 0 digit)	4 V/4,000 digit (1 V: 0 digit)	16 mA/4,000 digit (4 mA: 0 digit)
Total accuracy	Ambient temperature 25°C	±20 mV or less	±40 mV or less	±10 mV or less	±0.04 mA or less
	Ambient temperature 0 to 55°C	±50 mV or less	±100 mV or less	±25 mV or less	±0.1 mA or less
Maximum response time	OFF→ON	4 ms + TRC			4 ms + TRC
	ON→OFF	4 ms + 4TRC			4 ms + 4TRC
Internal current dissipation	Module REV A	500 mA or less			500 mA or less
	Module REV B	530 mA or less			530 mA or less
External wiring connection method		18-point terminal block			18-point terminal block
Mass		240 g			240 g
Combining mount base	CPU unit mount base	Mountable			
	I/O unit mount base	Mountable			
	Scan-type analog input module mount base	Mountable			

Type		LQA610
Output method		Current output
Output range		0 to 20 mA
RANGE switch setting		–
Mode		1: 4 words/4 channels (allocated to the YW area) 2: 1 word/4 channels (allocated to the EW area)
Number of output channels		4 channels
Insulation method		Photocouplers (common to all four channels)
Load resistance		600 Ω or less
Number of D/A conversion bits		12 bits (unsigned)
Conversion rate		20 mA/4,000 digit (0 mA: 0 digit)
Total accuracy	Ambient temperature 25°C	±0.04 mA or less
	Ambient temperature 0 to 55°C	±0.1 mA or less
Maximum response time	OFF→ON	4 ms + TRC
	ON→OFF	4 ms + 4TRC
Internal current dissipation	Module REV A	500 mA or less
	Module REV B	530 mA or less
External wiring connection method		18-point terminal block
Mass		240 g
Combining mount base	CPU unit mount base	Mountable
	I/O unit mount base	Mountable
	Scan-type analog input module mount base	Mountable

2.1.10 Scan-type separately insulated analog input module

Type		LQA301 (A/D conversion module), LQA310 (scanner module)
Input method		Voltage input
Input range (E)		±5 VDC
Maximum input voltage (E)		±15 VDC
Maximum number of input channels		28 channels
Insulation method		Photo MOS relay, flying capacitor type
Channel-to-channel allowable voltage (ECM)		±500 VDC
Number of A/D conversion bits		12 bits (sign + 11 bits)
Conversion rate		±2,000 digit/±5 V (0 digit: 0 V)
Total accuracy	Ambient temperature 25°C	±8 digits or less
	Ambient temperature 0 to 55°C	±12 digits or less
Maximum response time		(20 ms × Number of scanner modules) + 4TRC
Input filter		Attenuation factor: 35 dB/60 Hz, time constant: approx. 150 ms
Input impedance	Power ON	1 MΩ or more
	Power OFF	1 MΩ or more
Internal current dissipation		LQA301: 500 mA or less, LQA310: 100 mA or less
Dielectric voltage		500 VDC, 1 minute (between external terminals in a batch and ground)
External wiring connection method		18-point terminal block
Mass		LQA301: 170 g, LQA310: 220 g
Combining mount base	CPU unit mount base	Not mountable
	I/O unit mount base	Not mountable
	Scan-type analog input module mount base	Mountable

2.1.11 Scan-type commonly insulated analog input module

Type		LQA800 (A/D conversion module), LQA810 (scanner module)
Input method		Voltage input
Input range (E)		±5 VDC
Maximum input voltage (E)		±15 VDC
Maximum number of input channels		28 channels
Insulation method		Photocouplers (common to all channels)
Channel-to-channel allowable voltage (ECM)		±60 VDC
Number of A/D conversion bits		12 bits (sign + 11 bits)
Conversion rate		±2,000 digit/±5 V (0 digit: 0 V)
Total accuracy	Ambient temperature 25°C	±8 digits or less
	Ambient temperature 0 to 55°C	±12 digits or less
Maximum response time		Remote I/O transfer: (20 ms × Number of scanner modules) + 4TRC
		J.NET transfer: (20 ms × Number of scanner modules) + RC
Input filter		Attenuation factor: 14 dB/60 Hz, time constant: approx. 10 ms
Input impedance	Power ON	5 MΩ or more
	Power OFF	5 MΩ or more
Internal current dissipation		LQA800: 500 mA or less, LQA810: 100 mA or less
Dielectric voltage		1500 VAC, 1 minute (between external terminals in a batch and ground)
External wiring connection method		18-point terminal block
Mass		LQA800: 170 g, LQA810: 220 g
Combining mount base	CPU unit mount base	Not mountable
	I/O unit mount base	Not mountable
	Scan-type analog input module mount base	Mountable

2.2 Mounting Design

Before installing I/O modules in the CPU or I/O mounting base, make sure that the sum total of their current dissipations does not exceed the rating for the power supply module. Table 2-1 gives the current dissipation of each type of module, and Figure 2-1 shows the maximum output current rating of the power supply module. Table 2-2 indicates the maximum number of modules that can be mounted for operation at room temperature. Depending on the combination of modules that are mounted, free slots may have to be made available. For more information, see Section 4.1, "Mounting I/O Modules."

Table 2-1 Module Current Dissipation Values

(1/2)

Description	Type	Current dissipation
CPU module	LQP***	1,500 mA or less
Station module	LQS000	150 mA or less
	LQS020	700 mA or less
Digital input module	LQX110	110 mA or less
	LQX130	70 mA or less
	LQX150	110 mA or less
	LQX151	110 mA or less
	LQX200	80 mA or less
	LQX201	80 mA or less
	LQX210	110 mA or less
	LQX211	170 mA or less
	LQX220	110 mA or less
	LQX240	110 mA or less
	LQX250	110 mA or less
	LQX300	150 mA or less
	LQX310	150 mA or less
	LQX350	170 mA or less
	LQX360	170 mA or less
Digital output module	LQY100	780 mA or less
	LQY140	400 mA or less
	LQY150	800 mA or less
	LQY160	320 mA or less
	LQY170	320 mA or less
	LQY200	120 mA or less
	LQY300	260 mA or less
	LQY310	260 mA or less
	LQY350	400 mA or less
	LQY360	400 mA or less
Digital I/O module	LQZ300	300 mA or less
Pulse counter module	LQC000	150 mA or less

(2/2)

Description		Type		Current dissipation
Analog input module		LQA000	Module REV A	500 mA or less
			Module REV B or later	580 mA or less
		LQA050		550 mA or less
		LQA055		550 mA or less
		LQA100	Module REV A	500 mA or less
			Module REV B or later	580 mA or less
		LQA150		550 mA or less
		LQA155		550 mA or less
		LQA200	Module REV A	500 mA or less
			Module REV B or later	580 mA or less
		LQA201	Module REV A	500 mA or less
			Module REV B or later	580 mA or less
Analog output module		LQA500	Module REV A	500 mA or less
			Module REV B or later	530 mA or less
		LQA600	Module REV A	500 mA or less
			Module REV B or later	530 mA or less
		LQA610	Module REV A	500 mA or less
			Module REV B or later	530 mA or less
Scan-type separately insulated analog input module	A/D conversion module	LQA301		500 mA or less
	Scanner module	LQA310		100 mA or less
Scan-type commonly insulated analog input module	A/D conversion module	LQA800		500 mA or less
	Scanner module	LQA810		100 mA or less

When using LQV000, LQV100, or LQV020, perform output current derating for the ambient temperature. For LQV200, derating is not required.

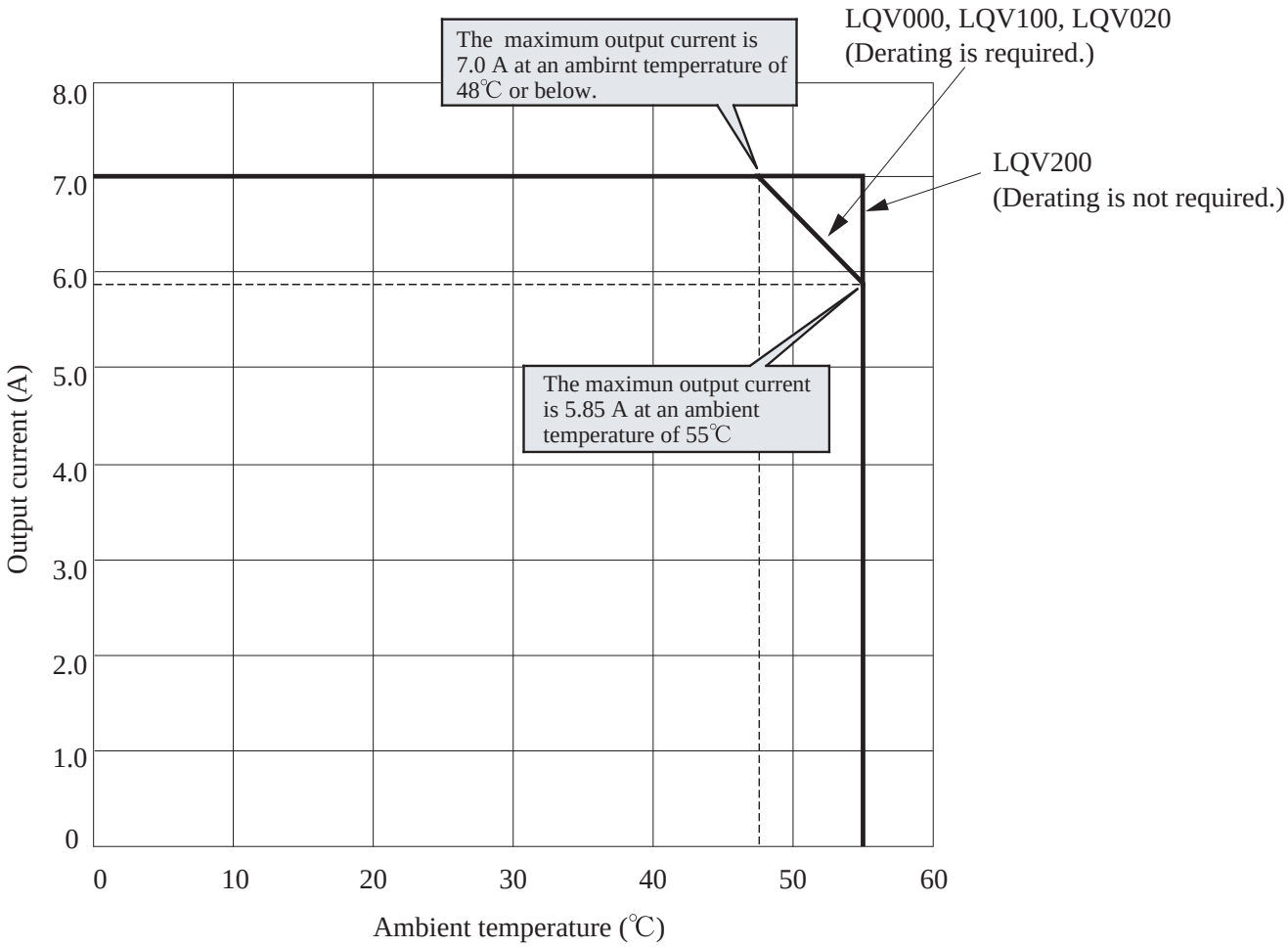

Figure 2-1 Power Supply Module Maximum Output Current Ratings

CAUTION
Heat dissipation could cause fires or unit failures to occur. When the ambient temperature of a unit using LQV000, LQV100, or LQV020 exceeds 48°C, limit the maximum output current of the power supply module. The maximum output current falls to 5.85 A at 55°C. Allowing for the environment in which the unit is installed, either install a cooling fan on the enclosure or limit the number of modules that are mounted.

Table 2-2 Maximum Number of Modules that Mountable in Mount Base

(1/2)

Description	Type	Maximum number of modules that mountable in the CPU unit mount base	Maximum number of modules that mountable in the CPU I/O unit mount base	Maximum number of modules that mountable in the scan-type analog input module mount base
Digital input module	LQX110	8	8	8
	LQX130	8	8	8
	LQX150	8	8	8
	LQX151	8	8	8
	LQX200	8	8	8
	LQX201	8	8	8
	LQX210	8	8	8
	LQX211	8	8	8
	LQX220	8	8	8
	LQX240	8	8	8
	LQX250	8	8	8
	LQX300	8	8	8
	LQX310	8	8	8
	LQX350	8	8	8
	LQX360	8	8	8
Digital output module	LQY100	7	8	8
	LQY140	8	8	8
	LQY150	6	8	8
	LQY160	8	8	8
	LQY170	8	8	8
	LQY200	8	8	8
	LQY300	8	8	8
	LQY310	8	8	8
	LQY350	8	8	8
	LQY360	8	8	8
Digital I/O module	LQZ300	8	8	8
Pulse counter module	LQC000	8	8	8

(2/2)

Description		Type	Maximum number of modules that mountable in the CPU unit mount base	Maximum number of modules that mountable in the CPU I/O unit mount base	Maximum number of modules that mountable in the scan-type analog input module mount base
Analog input module		LQA000	8	8	8
		LQA050	8	8	8
		LQA055	8	8	8
		LQA100	8	8	8
		LQA150	8	8	8
		LQA155	8	8	8
		LQA200	8	8	8
		LQA201	8	8	8
Analog output module		LQA500	8	8	8
		LQA600	8	8	8
		LQA610	8	8	8
Scan-type separately insulated analog input module	A/D conversion module	LQA301	Not mountable	Not mountable	1
	Scanner module	LQA310	Not mountable	Not mountable	7
Scan-type commonly insulated analog input module	A/D conversion module	LQA800	Not mountable	Not mountable	1
	Scanner module	LQA810	Not mountable	Not mountable	7

2.3 Mount Base

Power supply modules, CPU modules (or station modules), and I/O modules are fixed in mounting base. Mount base is broadly grouped into three types: CPU unit mount base, I/O unit mount base, and scan-type analog input module mount base.

2.3.1 CPU unit mount base

Name	Type	Required modules	Optional modules
Two-slot mount base	HSC-1020	• Power supply module • CPU module	• Option modules • I/O modules (except for the LQA3** and LQA8**)
Four-slot mount base	HSC-1040		
Eight-slot mount base	HSC-1080		

2.3.2 I/O unit mount base

Name	Type	Required modules	Optional modules
Two-slot mount base	HSC-1021	• Power supply module • Remote I/O station module, J.STATION, or D.Station module	I/O modules (except for the LQA3** and LQA8**)
Four-slot mount base	HSC-1041		
Eight-slot mount base	HSC-1081		

2.3.3 Scan-type analog input module mount base

Name	Type	Required modules	Optional modules
Eight-slot mount base	HSC-1281	• Power supply module • Remote I/O station module or J.STATION module (*)	All types of I/O modules

(*) Be sure to install a remote I/O module when using an LQA301 or LQA310. These modules won't run on a J.STATION module.

2.4 Combining I/O Modules with a CPU or Station Module

I/O modules are used in combination with a CPU or remote I/O station module, J.STATION module, or D.Station module. Table 2-3 lists the supported combinations of I/O modules with these modules.

Table 2-3 Supported Combinations of I/O Modules with CPU and Station Modules

√: Combinable nc: Not combinable

Module type	CPU module	Remote I/O station module	J.STATION module	D.Station module
LQX110	√	√	√	√
LQX130	√	√	√	√
LQX150	√	√	√	√
LQX151	√	√	√	√
LQX200	√	√	√	√
LQX201	√	√	√	√
LQX210	√	√	√	√
LQX211	√	√	√	√
LQX220	√	√	√	√
LQX240	√	√	√	√
LQX250	√	√	√	√
LQX300	√	√	√	√
LQX310	√	√	√	√
LQX350	√	√	√	√
LQX360	√	√	√	√
LQY100	√	√	√	√
LQY140	√	√	√	√
LQY150	√	√	√	√
LQY160	√	√	√	√
LQY170	√	√	√	√
LQY200	√	√	√	√
LQY300	√	√	√	√
LQY310	√	√	√	√
LQY350	√	√	√	√
LQY360	√	√	√	√
LQZ300	√	√	√	√
LQC000	√	√	√	√
LQA000	√	√	√	√
LQA050	√	√	√	√
LQA055	√	√	√	√
LQA100	√	√	√	√
LQA150	√	√	√	√
LQA155	√	√	√	√
LQA200	√	√	√	√
LQA201	√	√	√	√
LQA500	√	√	√	√
LQA600	√	√	√	√
LQA610	√	√	√	√
LQA301	nc	√	nc	nc
LQA310	nc	√	nc	nc
LQA800	nc	√	√	nc
LQA810	nc	√	√	nc

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3 INDIVIDUAL SPECIFICATIONS

3.1 LQX110 (Built-in signal latches, 100 VAC, 16 points)

Table 3-1 LQX110 Specifications

Item		Specification
Number of inputs		16 inputs
Insulation method		Photocoupler insulation
Rated input voltage		100 to 110 VAC, 50/60 Hz
Rated input current		Approx. 5 mA
Input voltage range		85 to 121 VAC
ON voltage/current		85 VAC or more/3.8 mA or more
OFF voltage/current		25 VAC or less/1.0 mA or less
Input impedance		Approx. 22 kΩ
Minimum input pulse width ton toff ON OFF	ton	15 ms or more
	toff	50 ms+3TRC (*)
Signal latch priority		Input signal preferred (See Subsection 4.3.2.)
Latch reset method		Turn on the Y coil of the address to reset.
Internal current dissipation		110 mA or less
Number of commons		8 inputs/common
Dielectric voltage		1,500 VAC, 1 minute (between external terminals in a batch and ground)
External wiring	Connection method	18-point terminal block connector (screw: M3)
	Compatible wire	0.3 to 1.25 mm^2
	Tightening torque	Approx. 6 to 8 N·m
	Allowable wiring length	200 m
Operation indication		LED indication (lit when ON); color: green
Mass		230 g

(*) TRC: Remote I/O transfer time

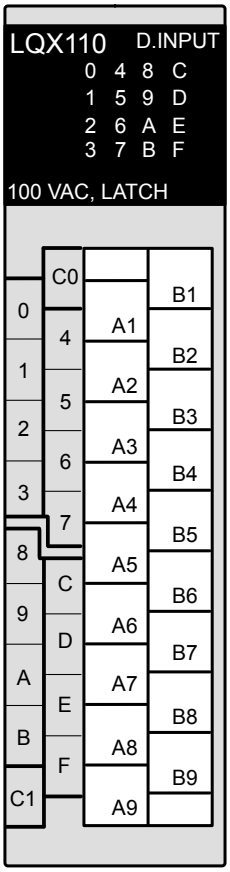


Figure 3-1 LQX110 Appearance

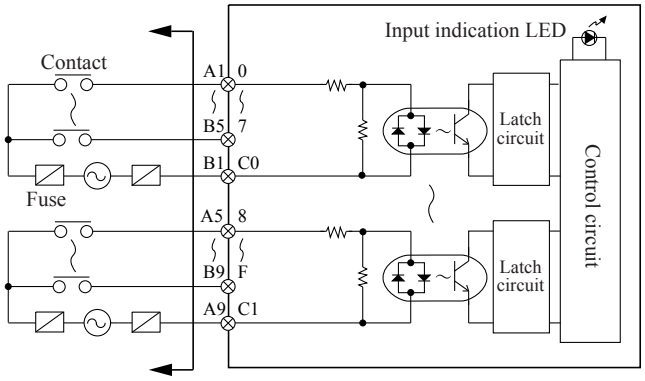


Figure 3-2 LQX110 Circuit

3.2 LQX130 (100 VAC, 16 points)

Table 3-2 LQX130 Specifications

Item		Specification
Number of inputs		16 inputs
Insulation method		Photocoupler insulation
Rated input voltage		100 to 120 VAC, 50/60 Hz
Rated input current		7.0 mA (100 VAC, 50 Hz), 8.3 mA (100 VAC, 60 Hz)
Input voltage range		85 to 132 VAC (50/60 Hz ± 5%)
Rush current		400 mA or less, 0.2 ms or less (132 VAC)(*)
ON voltage/current		80 VAC or more/5.5 mA or more
OFF voltage/current		25 VAC or less/1.7 mA or less
Input impedance		Approx. 14.5 kΩ (50 Hz), Approx. 12 kΩ (60 Hz)
Response time	OFF→ON	15 ms or less
	ON→OFF	25 ms or less
Internal current dissipation		70 mA or less
Number of commons		8 inputs/common
Dielectric voltage		1,500 VAC, 1 minute (between external terminals in a batch and ground)
External wiring	Connection method	18-point terminal block connector (screw: M3)
	Compatible wire	0.3 to 1.25 mm^2
	Tightening torque	Approx. 6 to 8 N·m
	Allowable wiring length	200 m
Operation indication		LED indication (lit when ON); color: green
Mass		210 g

(*) If a reed relay is used as an input contact, the rush current through the module could cause the contact to fuse. To avoid this, use a reed relay with an adequately large switching capacity.

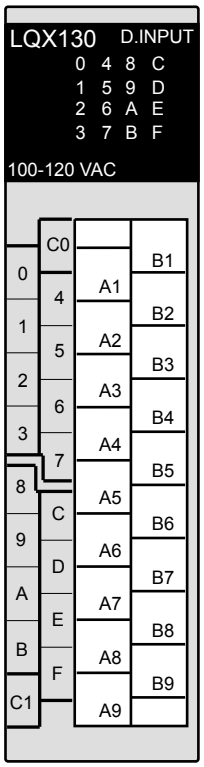


Figure 3-3 LQX130 Appearance

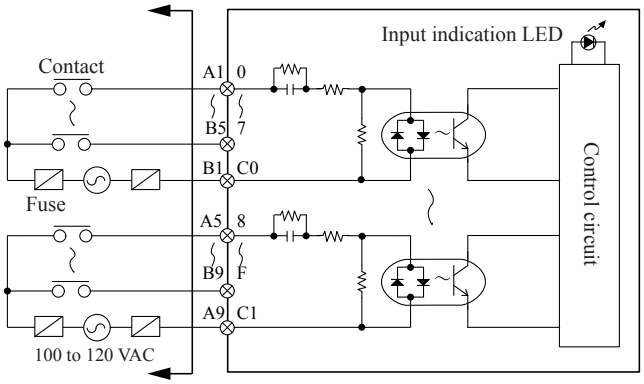


Figure 3-4 LQX130 Circuit

CAUTION

- Use the input voltage within the voltage rating. Applying voltage past this rating could cause the module to smoke or ignite.
- Separate the power supply system of the module from equipment that is likely to generate high-frequency noises, such as an inverter.
  Applying high-frequency noise input could cause the internal parts of the module to smoke or ignite under heat even if the module is used within the rated voltage.

3.3 LQX150 (200 to 240 VAC inputs, 16 points)

Table 3-3 LQX150 Specifications

Item		Specification
Number of inputs		16 inputs
Insulation method		Photocoupler insulation
Rated input voltage		200 to 240 VAC, 50/60 Hz
Rated input current		7.5 mA (240 VAC, 50 Hz), 9.0 mA (240 VAC, 60 Hz)
Input voltage range		170 to 264 VAC (50/60 Hz ± 5%)
ON voltage/current		170 VAC or more/5.3 mA or more (50 Hz)
OFF voltage/current		50 VAC or less/1.5 mA or less (50 Hz)
Input impedance		Approx. 31.9 kΩ (50 Hz), Approx. 26.6 kΩ (60 Hz)
Response time	OFF→ON	15 ms or less
	ON→OFF	25 ms or less
Internal current dissipation		110 mA or less
Number of commons		16 inputs/common
Dielectric voltage		2,000 VAC, 1 minute (between the primary and the secondary)
External wiring	Connection method	18-point terminal block connector (screw: M3)
	Compatible wire	0.5 to 2.0 mm^2
	Tightening torque	Approx. 6 to 8 N·m
	Allowable wiring length	200 m or less
Operation indication		LED indication (lit when ON); color: green
Mass		240 g

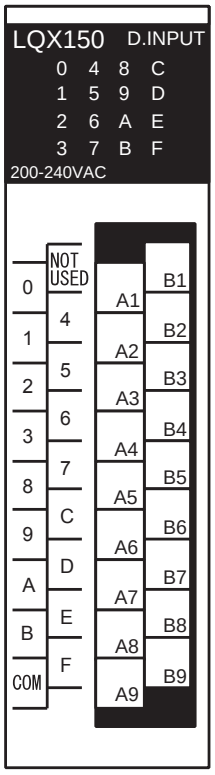


Figure 3-5 LQX150 Appearance

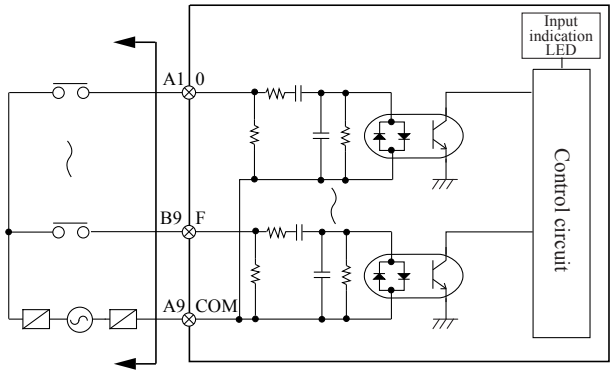


Figure 3-6 LQX150 Circuit

CAUTION

- Use the input voltage within the voltage rating. Applying voltage past this rating could cause the module to smoke or ignite.
- Separate the power supply system of the module from equipment that is likely to generate high-frequency noises, such as an inverter.
  Applying high-frequency noise input could cause the internal parts of the module to smoke or ignite under heat even if the module is used within the rated voltage.

3.4 LQX151 (Built-in signal latches, 200 to 240 VAC inputs, 16 points)

Table 3-4 LQX151 Specifications

Item		Specification
Number of inputs		16 inputs
Insulation method		Photocoupler insulation
Rated input voltage		200 to 240 VAC, 50/60 Hz
Rated input current		7.5 mA (240 VAC, 50 Hz), 9.0 mA (240 VAC, 60 Hz)
Input voltage range		170 to 264 VAC (50/60 Hz ± 5%)
ON voltage/current		170 VAC or more/5.3 mA or more (50 Hz)
OFF voltage/current		50 VAC or less/1.5 mA or less (50 Hz)
Input impedance		Approx. 31.9 kΩ (50 Hz), Approx. 26.6 kΩ (60 Hz)
Minimum input pulse width (ton, toff; ON/OFF)	ton	15 ms or more
	toff	50 ms+3TRC (*)
Internal current dissipation		110 mA or less
Number of commons		16 inputs/common
Dielectric voltage		2,000 VAC, 1 minute (between the primary and the secondary)
External wiring	Connection method	18-point terminal block connector (screw: M3)
	Compatible wire	0.5 to 2.0 mm^2
	Tightening torque	Approx. 6 to 8 N·m
	Allowable wiring length	200 m or less
Operation indication		LED indication (lit when ON); color: green
Mass		240 g

(*) TRC: Remote I/O transfer time

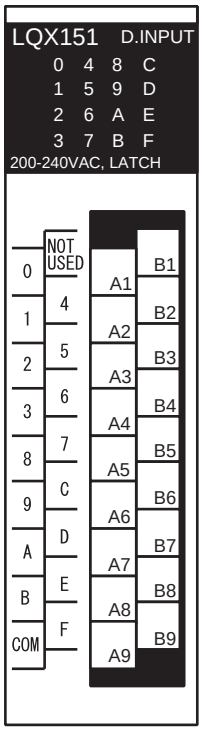


Figure 3-7 LQX151 Appearance

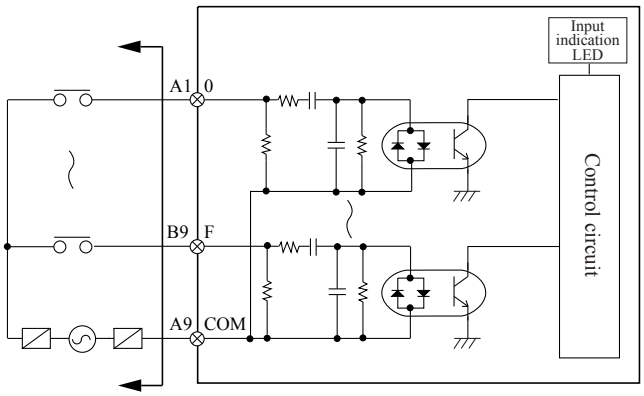


Figure 3-8 LQX151 Circuit

CAUTION

- Use the input voltage within the voltage rating. Applying voltage past this rating could cause the module to smoke or ignite.
- Separate the power supply system of the module from equipment that is likely to generate high-frequency noises, such as an inverter.
  Applying high-frequency noise input could cause the internal parts of the module to smoke or ignite under heat even if the module is used within the rated voltage.

3.5 LQX200, LQX201 (12 to 24 VDC, 16 points)

Table 3-5 LQX200 and LQX201 Specifications

Item			Specification	
Module type			LQX200	LQX201
Number of inputs			16 inputs	
Insulation method			Photocoupler insulation	
Rated input voltage			12 to 24 VDC	
Rated input current			7.0 mA (24 VDC), 3.4 mA (12 VDC)	
Input voltage range			10 to 26.4 VDC	
ON voltage/current			10 VDC or more/2.7 mA or more	
OFF voltage/current			3 VDC or less/0.6 mA or less	
Input impedance			Approx. 3.3 kΩ	
Response time		OFF→ON	10 ms or less	0.5 ms or less
		ON→OFF	10 ms or less	0.5 ms or less
Internal current dissipation			80 mA or less	
Number of commons			8 inputs/common	
Dielectric voltage			1,500 VAC, 1 minute (between external terminals in a batch and ground)	
External wiring	Connection method		18-point terminal block connector (screw: M3)	
	Compatible wire		0.3 to 1.25 mm^2	
	Tightening torque		Approx. 6 to 8 N·m	
	Allowable wiring length		200 m	
Operation indication			LED indication (lit when ON); color: green	
Mass			210 g	

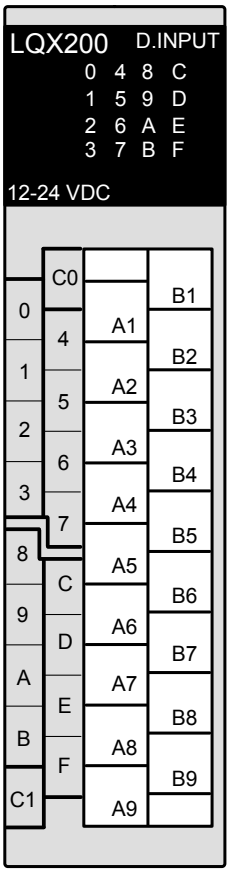
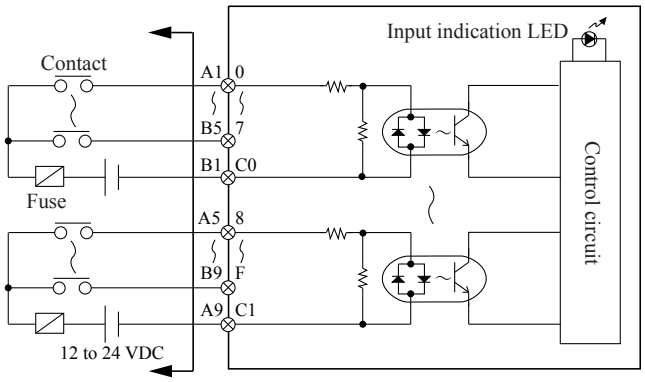


Figure 3-9 LQX200 and LQX201 Appearance



(Note 1) The diagram shown above applies to both the LQX200 and the LQX201.
(Note 2) While the power connection is shown to be a (-) common above, it can also be used as a (+) common.

Figure 3-10 LQX200 and LQX201 Circuit

3.6 LQX210, LQX211 (Built-in signal latches, 24 VDC, 16 points)

Table 3-6 LQX210 and LQX211 Specifications

Item			Specification	
Module type			LQX210	LQX211
Number of inputs			16 inputs	
Insulation method			Photocoupler insulation	
Rated input voltage			24 VDC	
Rated input current			Approx. 10 mA	
Input voltage range			20 to 26.4 VDC	
ON voltage/current			20 VDC or more/8.6 mA or more	
OFF voltage/current			4 VDC or less/1.3 mA or less	
Input impedance			Approx. 2.2 kΩ	
Minimum input pulse width ton toff ON OFF		ton	15 ms or more	0.5 ms or more
		toff	50 ms+3TRC (*)	5 ms+3TRC (*)
Signal latch priority			Input signal preferred (See Subsection 4.3.2.)	
Latch reset method			Turn on the Y coil of the address to reset.	
Internal current dissipation			110 mA or less	170 mA or less
Number of commons			8 inputs/common	
Dielectric voltage			1,500 VAC, 1 minute (between external terminals in a batch and ground)	
External wiring	Connection method		18-point terminal block connector (screw: M3)	
	Compatible wire		0.3 to 1.25 mm^2	
	Tightening torque		Approx. 6 to 8 N·m	
	Allowable wiring length		200 m	
Operation indication			LED indication (lit when ON); color: green	
Mass			230 g	

(*) TRC: Remote I/O transfer time

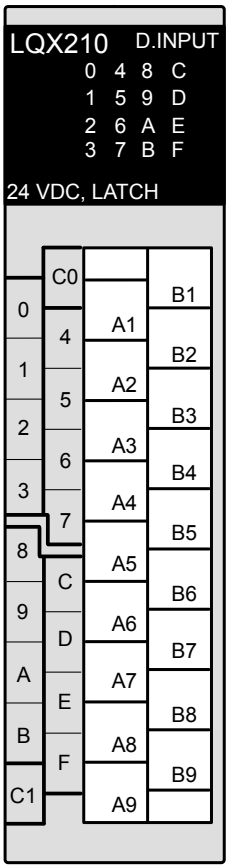
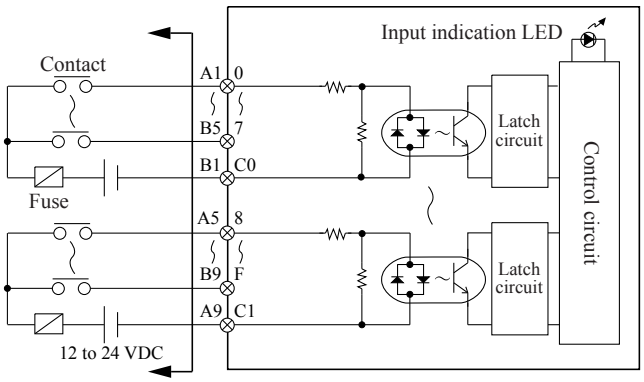


Figure 3-11 LQX210 and LQX211 Appearance



(Note 1) The diagram shown above applies to both the LQX210 and the LQX211.
(Note 2) While the power connection is shown to be a (-) common above, it can also be used as a (+) common.

Figure 3-12 LQX210 and LQX211 Circuit

3.7 LQX220 (48 VDC, 16 points)

Table 3-7 LQX220 Specifications

Item		Specification
Number of inputs		16 inputs
Insulation method		Photocoupler insulation
Rated input voltage		48 VDC
Rated input current		Approx. 10 mA (48 VDC)
Input voltage range		48 VDC + 10%/-15%
ON voltage/current		40 VDC or more/8.3 mA or more
OFF voltage/current		8 VDC or less/1.7 mA or less
Input impedance		Approx. 4.7 kΩ
Response time	OFF→ON	15 ms or less
	ON→OFF	25 ms or less
Internal current dissipation		110 mA or less
Number of commons		8 inputs/common
Dielectric voltage		1,500 VAC, 1 minute (between external terminals in a batch and ground)
External wiring	Connection method	18-point terminal block connector (screw: M3)
	Compatible wire	0.3 to 1.25 mm^2
	Tightening torque	Approx. 6 to 8 N·m
	Allowable wiring length	200 m
Operation indication		LED indication (lit when ON); color: green
Mass		230 g

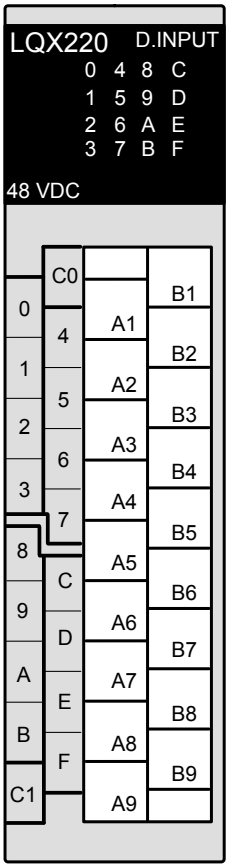
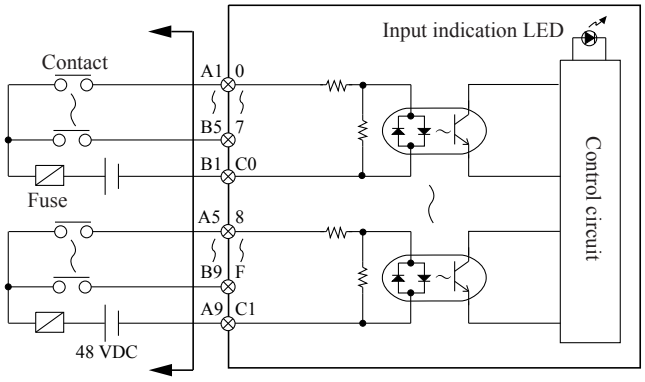


Figure 3-13 LQX220 Appearance



(Note) While the power connection is shown to be a (-) common above, it can also be used as a (+) common.

Figure 3-14 LQX220 Circuit

3.8 LQX240 (100 VDC, 16 points)

Table 3-8 LQX240 Specifications

Item		Specification
Number of inputs		16 inputs
Insulation method		Photocoupler insulation
Rated input voltage		100 VDC
Rated input current		Approx. 5 mA
Input voltage range		85 to 121 VDC
ON voltage/current		85 VDC or more/3.8 mA or more
OFF voltage/current		25 VDC or less/1.0 mA or less
Input impedance		Approx. 22 kΩ
Response time	OFF→ON	15 ms or less
	ON→OFF	20 ms or less
Internal current dissipation		110 mA or less
Number of commons		8 inputs/common
Dielectric voltage		1,500 VAC, 1 minute (between external terminals in a batch and ground)
External wiring	Connection method	18-point terminal block connector (screw: M3)
	Compatible wire	0.3 to 1.25 mm^2
	Tightening torque	Approx. 6 to 8 N·m
	Allowable wiring length	200 m
Operation indication		LED indication (lit when ON); color: green
Mass		230 g

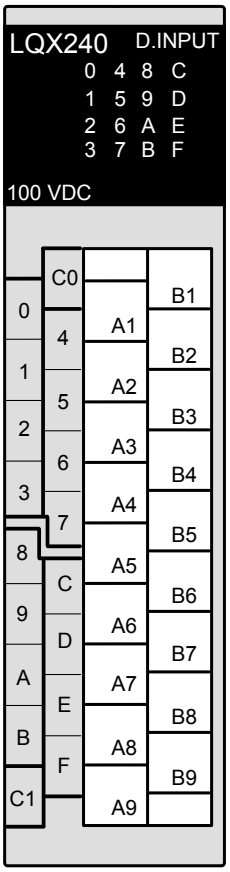
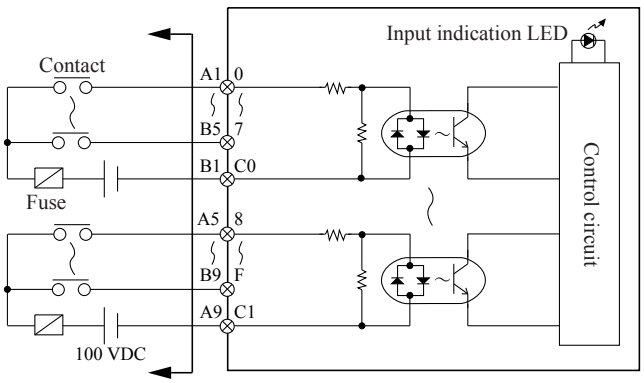


Figure 3-15 LQX240 Appearance



(Note) While the power connection is shown to be a (-) common above, it can also be used as a (+) common.

Figure 3-16 LQX240 Circuit

3.9 LQX250 (Built-in signal latches, 100 VDC, 16 points)

Table 3-9 LQX250 Specifications

Item		Specification
Number of inputs		16 inputs
Insulation method		Photocoupler insulation
Rated input voltage		100 VDC
Rated input current		Approx. 5 mA
Input voltage range		85 to 110 VDC
ON voltage/current		85 VDC or more/3.8 mA or more
OFF voltage/current		25 VDC or less/1.0 mA or less
Input impedance		Approx. 22 kΩ
Minimum input pulse width ton toff ON OFF	ton	15 ms or more
	toff	50 ms + 3TRC (*)
Signal latch priority		Input signal preferred (See Subsection 4.3.2.)
Latch reset method		Turn on the Y coil of the address to reset.
Internal current dissipation		110 mA or less
Number of commons		8 inputs/common
Dielectric voltage		1,500 VAC, 1 minute (between external terminals in a batch and ground)
External wiring	Connection method	18-point terminal block connector (screw: M3)
	Compatible wire	0.3 to 1.25 mm^2
	Tightening torque	Approx. 6 to 8 N·m
	Allowable wiring length	200 m
Operation indication		LED indication (lit when ON); color: green
Mass		230 g

(*) TRC: Remote I/O transfer time

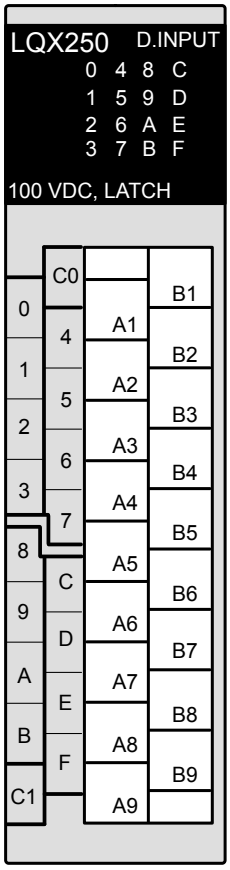
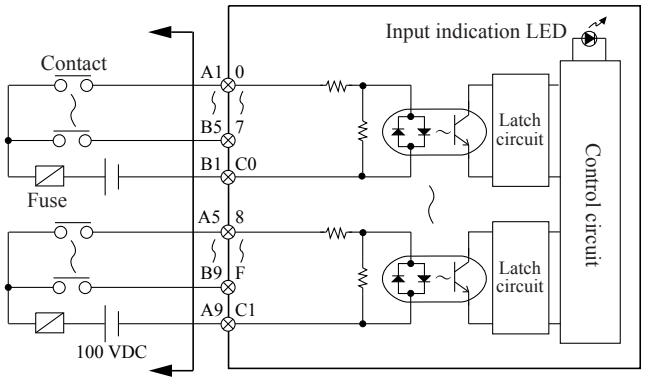


Figure 3-17 LQX250 Appearance



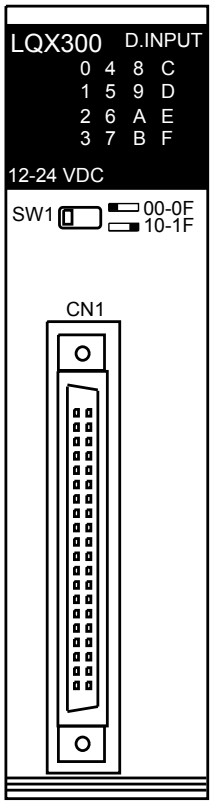
(Note) While the power connection is shown to be a (-) common above, it can also be used as a (+) common.

Figure 3-18 LQX250 Circuit

3.10 LQX300 (12 to 24 VDC, 32 points)

Table 3-10 LQX300 Specifications

Item		Specification
Number of inputs		32 inputs
Insulation method		Photocoupler insulation
Rated input voltage		12 to 24 VDC
Rated input current		4.1 mA (24 VDC), 2 mA (12 VDC)
Limitation on the number of simultaneous ONs		None
Input voltage range		10.2 to 26.4 VDC
ON voltage/current		9 VDC or more/1.4 mA or more
OFF voltage/current		3 VDC or less/0.3 mA or less
Input impedance		Approx. 5.6 kΩ
Response time	OFF→ON	10 ms or less
	ON→OFF	10 ms or less
Internal current dissipation		150 mA or less
Number of commons		32 inputs/common
Dielectric voltage		1,500 VAC, 1 minute (between external terminals in a batch and ground)
External wiring	Connection method	40-point connector (Model FCN36 manufactured by Fujitsu Devices Inc.)
	Compatible wire	200 m or less
Operation indication		LED indication (lit when ON); color: green Selection indication by SW1
Mass		150 g



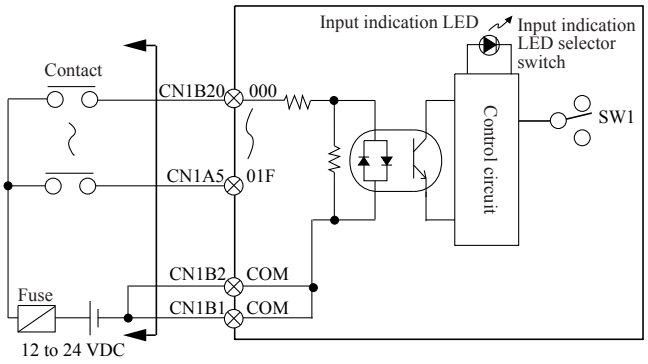
Input indication LED selector switch

To display input data on the LED, set the switch as specified in the table below.

Switch setting	Display data (*)
Left side	X000 to 00F
Right side	X010 to 01F

(*) A starting address of X000 is assumed.

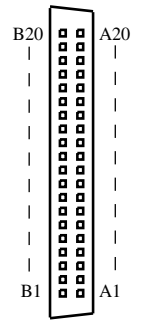
Figure 3-19 LQX300 Appearance



(Note) While the power connection is shown to be a (-) common above, it can also be used as a (+) common.

Figure 3-20 LQX300 Circuit

■ Pin configuration



Module front view

■ Address assignments (assuming a starting address of X000)

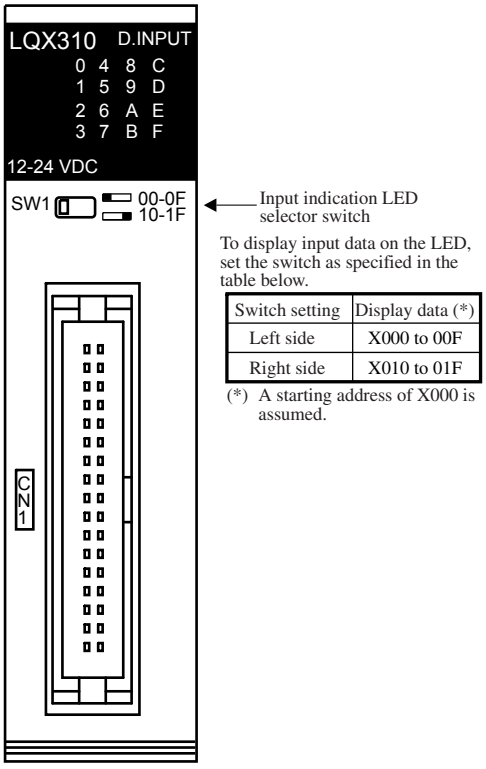
Table 3-11 LQX300 Address Assignments

Pin No.	Address	Pin No.	Address	Pin No.	Address	Pin No.	Address
CN1B20	X000	CN1B10	X00A	CN1A20	X010	CN1A10	X01A
CN1B19	X001	CN1B9	X00B	CN1A19	X011	CN1A9	X01B
CN1B18	X002	CN1B8	X00C	CN1A18	X012	CN1A8	X01C
CN1B17	X003	CN1B7	X00D	CN1A17	X013	CN1A7	X01D
CN1B16	X004	CN1B6	X00E	CN1A16	X014	CN1A6	X01E
CN1B15	X005	CN1B5	X00F	CN1A15	X015	CN1A5	X01F
CN1B14	X006	CN1B4	Reserved	CN1A14	X016	CN1A4	Reserved
CN1B13	X007	CN1B3	Reserved	CN1A13	X017	CN1A3	Reserved
CN1B12	X008	CN1B2	COM	CN1A12	X018	CN1A2	Reserved
CN1B11	X009	CN1B1	COM	CN1A11	X019	CN1A1	Reserved

3.11 LQX310 (12 to 24 VDC, 32 points)

Table 3-12 LQX310 Specifications

Item		Specification
Number of inputs		32 inputs
Insulation method		Photocoupler insulation
Rated input voltage		12 to 24 VDC
Rated input current		4.1 mA (24 VDC), 2 mA (12 VDC)
Limitation on the number of simultaneous ONs		None
Input voltage range		10.2 to 26.4 VDC
ON voltage/current		9 VDC or more/1.4 mA or more
OFF voltage/current		3 VDC or less/0.3 mA or less
Input impedance		Approx. 5.6 kΩ
Response time	OFF→ON	10 ms or less
	ON→OFF	10 ms or less
Internal current dissipation		150 mA or less
Number of commons		32 inputs/common
Dielectric voltage		1,500 VAC, 1 minute (between external terminals in a batch and ground)
External wiring	Connection method	34-point connector (Model FRC3 manufactured by DDK Ltd.)
	Compatible wire	200 m or less
Operation indication		LED indication (lit when ON); color: green Selection indication by SW1
Mass		150 g

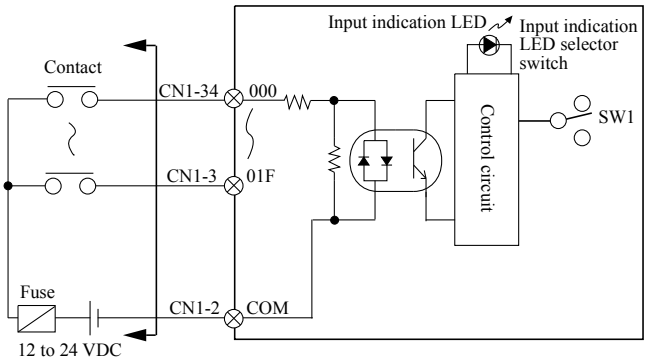


To display input data on the LED, set the switch as specified in the table below.

Switch setting	Display data (*)
Left side	X000 to 00F
Right side	X010 to 01F

(*) A starting address of X000 is assumed.

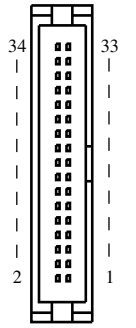
Figure 3-21 LQX310 Appearance



(Note) While the power connection is shown to be a (-) common above, it can also be used as a (+) common.

Figure 3-22 LQX310 Circuit

■ Pin configuration



Module front view

■ Address assignments (assuming a starting address of X000)

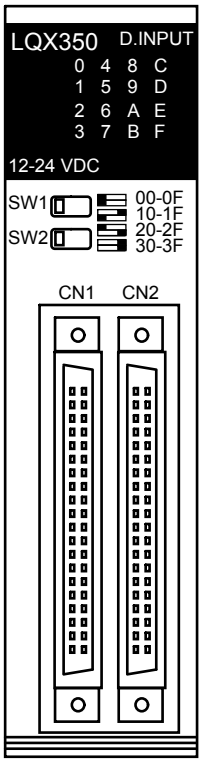
Table 3-13 LQX310 Address Assignments

Pin No.	Address	Pin No.	Address	Pin No.	Address	Pin No.	Address
CN1-34	X000	CN1-26	X008	CN1-18	X010	CN1-10	X018
CN1-33	X001	CN1-25	X009	CN1-17	X011	CN1-9	X019
CN1-32	X002	CN1-24	X00A	CN1-16	X012	CN1-8	X01A
CN1-31	X003	CN1-23	X00B	CN1-15	X013	CN1-7	X01B
CN1-30	X004	CN1-22	X00C	CN1-14	X014	CN1-6	X01C
CN1-29	X005	CN1-21	X00D	CN1-13	X015	CN1-5	X01D
CN1-28	X006	CN1-20	X00E	CN1-12	X016	CN1-4	X01E
CN1-27	X007	CN1-19	X00F	CN1-11	X017	CN1-3	X01F
				CN1-2	COM	CN1-1	Reserved

3.12 LQX350 (12 to 24 VDC, 64 points)

Table 3-14 LQX350 Specifications

Item		Specification
Number of inputs		64 inputs
Insulation method		Photocoupler insulation
Rated input voltage		12 to 24 VDC
Rated input current		4.1 mA (24 VDC), 2 mA (12 VDC)
Limitation on the number of simultaneous ONs		Yes (See Figure 3-25, "Limitation on the number of simultaneous ONs for the LQY350.")
Input voltage range		10.2 to 26.4 VDC
ON voltage/current		9 VDC or more/1.4 mA or more
OFF voltage/current		3 VDC or less/0.3 mA or less
Input impedance		Approx. 5.6 kΩ
Response time	OFF→ON	10 ms or less
	ON→OFF	10 ms or less
Internal current dissipation		170 mA or less
Number of commons		32 inputs/common
Dielectric voltage		1,500 VAC, 1 minute (between external terminals in a batch and ground)
External wiring	Connection method	40-point connector (Model FCN36 manufactured by Fujitsu Devices Inc.)
	Compatible wire	200 m or less
Operation indication		LED indication (lit when ON); color: green Selection indication by SW1 and SW2
Mass		170 g



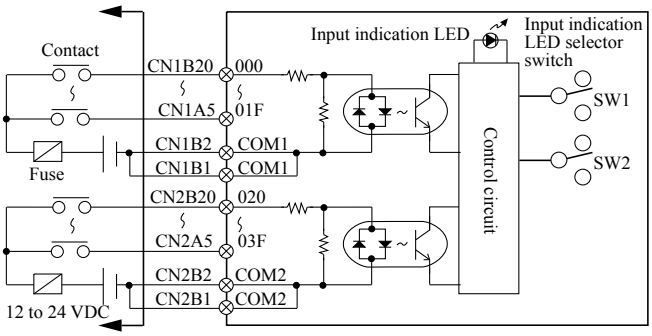
Input indication LED selector switch

To display input data on the LED, set the switch as specified in the table below.

SW1	SW2	Display data (*)
Left side	Left side	X000 to 00F
Right side	Left side	X010 to 01F
Left side	Right side	X020 to 02F
Right side	Right side	X030 to 03F

(*) A starting address of X000 is assumed.

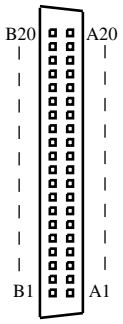
Figure 3-23 LQX350 Appearance



(Note) While the power connection is shown to be a (-) common above, it can also be used as a (+) common.

Figure 3-24 LQX350 Circuit

■ Pin configuration
(Module front view)



The pin configuration of CN1 is the same as that of CN2.

■ Address assignments
(assuming a starting address of X000)

Table 3-15 LQX350 Address Assignments

Pin No.	Address	Pin No.	Address	Pin No.	Address	Pin No.	Address
CN1B20	X000	CN1A20	X010	CN2B20	X020	CN2A20	X030
CN1B19	X001	CN1A19	X011	CN2B19	X021	CN2A19	X031
CN1B18	X002	CN1A18	X012	CN2B18	X022	CN2A18	X032
CN1B17	X003	CN1A17	X013	CN2B17	X023	CN2A17	X033
CN1B16	X004	CN1A16	X014	CN2B16	X024	CN2A16	X034
CN1B15	X005	CN1A15	X015	CN2B15	X025	CN2A15	X035
CN1B14	X006	CN1A14	X016	CN2B14	X026	CN2A14	X036
CN1B13	X007	CN1A13	X017	CN2B13	X027	CN2A13	X037
CN1B12	X008	CN1A12	X018	CN2B12	X028	CN2A12	X038
CN1B11	X009	CN1A11	X019	CN2B11	X029	CN2A11	X039
CN1B10	X00A	CN1A10	X01A	CN2B10	X02A	CN2A10	X03A
CN1B9	X00B	CN1A9	X01B	CN2B9	X02B	CN2A9	X03B
CN1B8	X00C	CN1A8	X01C	CN2B8	X02C	CN2A8	X03C
CN1B7	X00D	CN1A7	X01D	CN2B7	X02D	CN2A7	X03D
CN1B6	X00E	CN1A6	X01E	CN2B6	X02E	CN2A6	X03E
CN1B5	X00F	CN1A5	X01F	CN2B5	X02F	CN2A5	X03F
CN1B4	Reserved	CN1A4	Reserved	CN2B4	Reserved	CN2A4	Reserved
CN1B3	Reserved	CN1A3	Reserved	CN2B3	Reserved	CN2A3	Reserved
CN1B2	COM1	CN1A2	Reserved	CN2B2	COM2	CN2A2	Reserved
CN1B1	COM1	CN1A1	Reserved	CN2B1	COM2	CN2A1	Reserved

■ Limitation on the number of simultaneous ONs

The operating ambient temperature poses the limitation, shown below, on the number of simultaneous ONs for the LQX350. Attempted use past this limitation will degrade the product life.

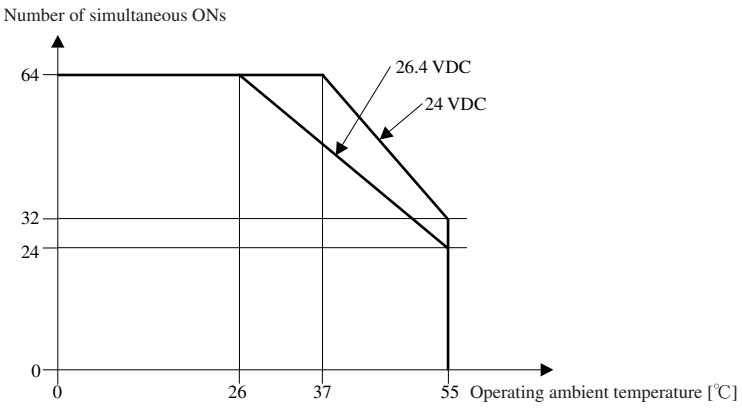
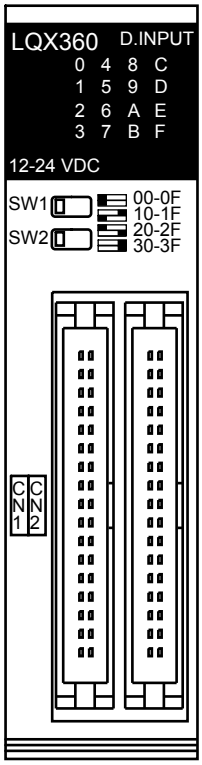


Figure 3-25 Limitation on the Number of Simultaneous ONs for the LQX350

3.13 LQX360 (12 to 24 VDC, 64 points)

Table 3-16 LQX360 Specifications

Item		Specification
Number of inputs		64 inputs
Insulation method		Photocoupler insulation
Rated input voltage		12 to 24 VDC
Rated input current		4.1 mA (24 VDC), 2 mA (12 VDC)
Limitation on the number of simultaneous ONs		Yes (See Figure 3-28, "Limitation on the number of simultaneous ONs for the LQY360.")
Input voltage range		10.2 to 26.4 VDC
ON voltage/current		9 VDC or more/1.4 mA or more
OFF voltage/current		3 VDC or less/0.3 mA or less
Input impedance		Approx. 5.6 kΩ
Response time	OFF→ON	10 ms or less
	ON→OFF	10 ms or less
Internal current dissipation		170 mA or less
Number of commons		32 inputs/common
Dielectric voltage		1,500 VAC, 1 minute (between external terminals in a batch and ground)
External wiring	Connection method	34-point connector (Model FRC3 manufactured by DDK Ltd.)
	Compatible wire	200 m or less
Operation indication		LED indication (lit when ON); color: green Selection indication by SW1 and SW2
Mass		170 g



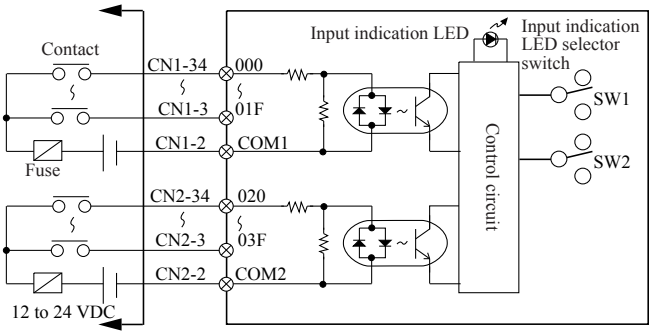
Input indication LED selector switch

To display input data on the LED, set the switch as specified in the table below.

SW1	SW2	Display data (*)
Left side	Left side	X000 to 00F
Right side	Left side	X010 to 01F
Left side	Right side	X020 to 02F
Right side	Right side	X030 to 03F

(*) A starting address of X000 is assumed.

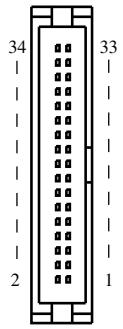
Figure 3-26 LQX360 Appearance



(Note) While the power connection is shown to be a (-) common above, it can also be used as a (+) common.

Figure 3-27 LQX360 Circuit

■ Pin configuration
(Module front view)



The pin configuration of CN1 is the same as that of CN2.

■ Address assignments
(assuming a starting address of X000)

Table 3-17 LQX360 Address Assignments

Pin No.	Address	Pin No.	Address	Pin No.	Address	Pin No.	Address
CN1-34	X000	CN1-18	X010	CN2-34	X020	CN2-18	X030
CN1-33	X001	CN1-17	X011	CN2-33	X021	CN2-17	X031
CN1-32	X002	CN1-16	X012	CN2-32	X022	CN2-16	X032
CN1-31	X003	CN1-15	X013	CN2-31	X023	CN2-15	X033
CN1-30	X004	CN1-14	X014	CN2-30	X024	CN2-14	X034
CN1-29	X005	CN1-13	X015	CN2-29	X025	CN2-13	X035
CN1-28	X006	CN1-12	X016	CN2-28	X026	CN2-12	X036
CN1-27	X007	CN1-11	X017	CN2-27	X027	CN2-11	X037
CN1-26	X008	CN1-10	X018	CN2-26	X028	CN2-10	X038
CN1-25	X009	CN1-9	X019	CN2-25	X029	CN2-9	X039
CN1-24	X00A	CN1-8	X01A	CN2-24	X02A	CN2-8	X03A
CN1-23	X00B	CN1-7	X01B	CN2-23	X02B	CN2-7	X03B
CN1-22	X00C	CN1-6	X01C	CN2-22	X02C	CN2-6	X03C
CN1-21	X00D	CN1-5	X01D	CN2-21	X02D	CN2-5	X03D
CN1-20	X00E	CN1-4	X01E	CN2-20	X02E	CN2-4	X03E
CN1-19	X00F	CN1-3	X01F	CN2-19	X02F	CN2-3	X03F
CN1-2	COM1	CN1-1	Reserved	CN2-2	COM2	CN2-1	Reserved

■ Limitation on the number of simultaneous ONs

The operating ambient temperature poses the limitation, shown below, on the number of simultaneous ONs for the LQX360. Attempted use past this limitation will degrade the product life.

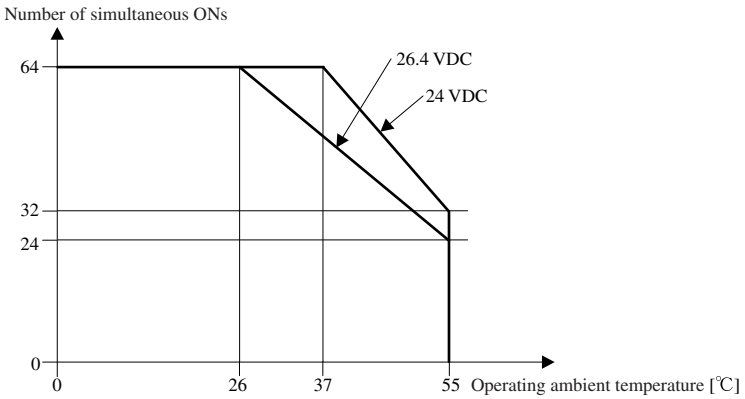


Figure 3-28 Limitation on the Number of Simultaneous ONs for the LQX360

3.14 LQY100 (Contact outputs, a-contacts × 16)

Table 3-18 LQY100 Specifications

Item		Specification
Number of outputs		16 outputs (a-contacts × 16)
Insulation method		Relay insulation
Rated output		100 to 220 VAC: 2.0 A/output, 5 A/common 12 to 24 VDC: 2.0 A/output, 5 A/common 48 VDC: 0.5 A/output 100 to 110 VDC: 0.1 A/output
Maximum output voltage		250 VAC, 125 VDC
Minimum output current		100 to 220 VAC: 10 mA 48 VDC, 100 to 110 VDC: 10 mA 12 to 24 VDC: 20 mA
Maximum rush current		5 A, 100 ms or less
Response time	OFF→ON	15 ms or less
	ON→OFF	15 ms or less
Maximum switching frequency		1,800 cycles/hour
Service life (electrical) of relay		Approx. 70,000 cycles of make-and-break operation (2 A at 220 VAC [COS φ = 0.4], 2 A at 24 VDC [L/R = 7 ms], make-and-break operation frequency of 1,800 cycles per hour, normal temperature and normal humidity)
Internal current dissipation		780 mA or less
Number of commons		8 outputs/common
Dielectric voltage		1,500 VAC, 1 minute (between external terminals in a batch and ground)
External wiring	Connection method	18-point terminal block connector (screw: M3)
	Compatible wire	0.3 to 1.25 mm^2
	Tightening torque	Approx. 6 to 8 N·m
	Allowable wiring length	200 m
Operation indication		LED indication (lit when ON); color: green
Mass		220 g

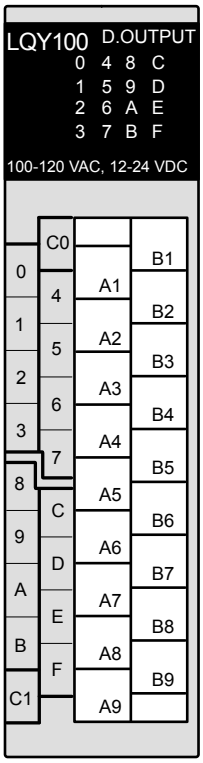
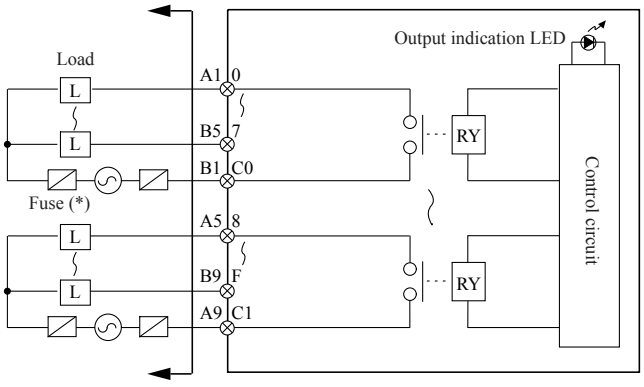


Figure 3-29 LQY100 Appearance



(*) Install a fuse to meet the following requirements:
- Rated breaking current of 10 A
- Install a fuse on the positive side of a DC load, or on both sides of an AC load.

Figure 3-30 LQY100 Circuit

3.15 LQY140 (Contact outputs, a-contacts × 8)

Table 3-19 LQY140 Specifications

Item		Specification
Number of outputs		8 outputs (a-contacts × 8)
Insulation method		Relay insulation
Rated output		100 to 250 VAC: 2.0 A/output 12 to 24 VDC: 2.0 A/output 48 VDC: 0.5 A/output 100 to 110 VDC: 0.1 A/output
Maximum output voltage		250 VAC, 125 VDC
Minimum output current		100 to 220 VAC: 10 mA 48 VDC, 100 to 110 VDC: 10 mA 12 to 24 VDC: 20 mA
Maximum rush current		5 A, 100 ms or less
Response time	OFF→ON	15 ms or less
	ON→OFF	15 ms or less
Maximum switching frequency		1,800 cycles/hour
Service life (electrical) of relay		Approx. 70,000 cycles of make-and-break operation (2 A at 220 VAC [COS φ = 0.4], 2 A at 24 VDC [L/R = 7 ms], make-and-break operation frequency of 1,800 cycles per hour, normal temperature and normal humidity)
Internal current dissipation		400 mA or less
Number of commons		One input/common (independent common)
Dielectric voltage		1,500 VAC, 1 minute (between external terminals in a batch and ground)
External wiring	Connection method	18-point terminal block connector (screw: M3)
	Compatible wire	0.3 to 1.25 mm^2
	Tightening torque	Approx. 6 to 8 N·m
	Allowable wiring length	200 m
Operation indication		LED indication (lit when ON); color: green
Mass		220 g

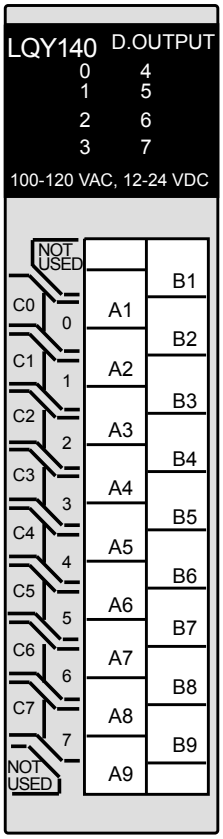
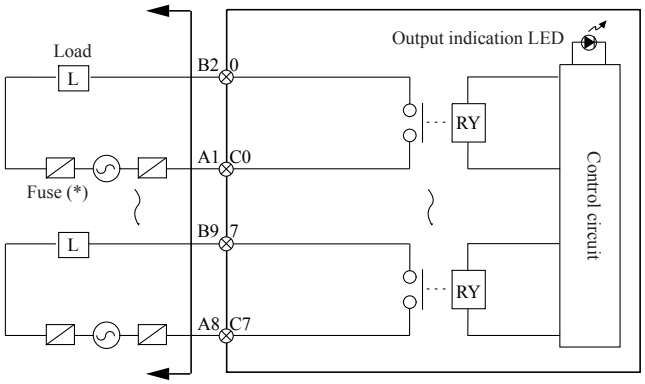


Figure 3-31 LQY140 Appearance



(*) Install a fuse to meet the following requirements:
- Rated breaking current of 5 A
- Install a fuse on the positive side of a DC load, or on both sides of an AC load.

Figure 3-32 LQY140 Circuit

3.16 LQY150 (Contact outputs, b-contacts × 8)

Table 3-20 LQY150 Specifications

Item		Specification
Number of outputs		8 outputs (b-contacts × 8)
Insulation method		Relay insulation
Rated output		100 to 220 VAC: 2.0 A/output 12 to 24 VDC: 2.0 A/output 48 VDC: 0.5 A/output 100 to 110 VDC: 0.1 A/output
Maximum output voltage		250 VAC, 125 VDC
Minimum output current		100 to 220 VAC: 10 mA 100 to 110 VDC, 48 VDC: 10 mA 12 to 24 VDC: 20 mA
Response time	OFF→ON	15 ms or less
	ON→OFF	15 ms or less
Maximum switching frequency		1,800 cycles/hour
Service life (electrical) of relay		Approx. 100,000 cycles of make-and-break operation (1.5 A at 220 VAC [COS φ = 0.4], 1.5 A at 24 VDC [L/R = 7 ms], make-and-break operation frequency of 1,800 cycles per hour, normal temperature and normal humidity)
Internal current dissipation		800 mA or less
Number of commons		One input/common (independent common)
Dielectric voltage		1,500 VAC, 1 minute (between external terminals in a batch and ground)
External wiring	Connection method	18-point terminal block connector (screw: M3)
	Compatible wire	0.3 to 1.25 mm^2
	Tightening torque	Approx. 6 to 8 N·m
	Allowable wiring length	200 m
Operation indication		LED indication (lit when b-contact is open); color: green
Mass		300 g

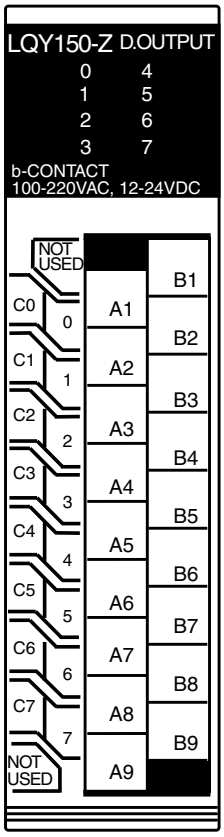
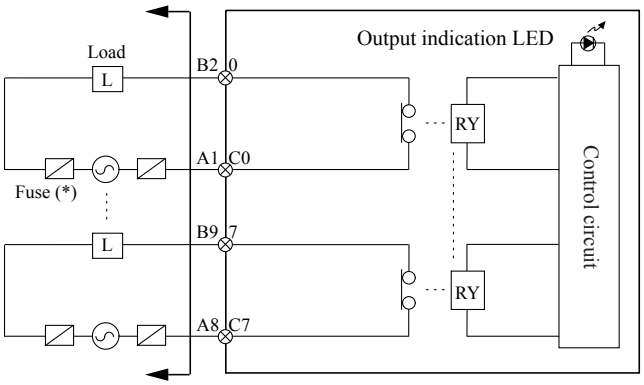


Figure 3-33 LQY150 Appearance



(*) Install a fuse to meet the following requirements:
- Rated breaking current of 5 A
- Install a fuse on the positive side of a DC load, or on both sides of an AC load.

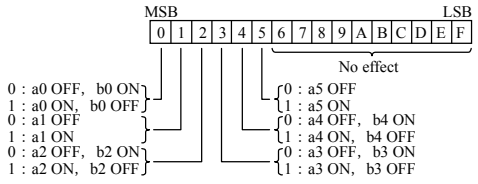
Figure 3-34 LQY150 Circuit

3.17 LQY160 (Contact outputs, a-contacts × 2, c-contacts × 4)

Table 3-21 LQY160 Specifications

Item		Specification
Number of outputs		6 outputs (a-contacts × 2, c-contacts × 4) (*)
Insulation method		Relay insulation
Rated output		100 to 220 VAC: 2.0 A/output 12 to 24 VDC: 2.0 A/output 48 VDC: 0.5 A/output 100 to 110 VDC: 0.1 A/output
Maximum output voltage		250 VAC, 125 VDC
Minimum output current		100 to 220 VAC: 10 mA 48 VDC, 100 to 110 VDC: 10 mA 12 to 24 VDC: 20 mA
Maximum rush current		5 A, 100 ms or less
Response time	OFF→ON	15 ms or less
	ON→OFF	15 ms or less
Maximum switching frequency		1,800 cycles/hour
Service life (electrical) of relay		Approx. 100,000 cycles of make-and-break operation (2 A at 220 VAC [COS φ = 0.4], 2 A at 24 VDC [L/R = 7 ms], make-and-break operation frequency of 1,800 cycles per hour, normal temperature and normal humidity)
Internal current dissipation		320 mA or less
Number of commons		One input/common (independent common)
RY output enable signal Rated input voltage, current		80 to 120 VAC/DC, approx. 10 mA
Dielectric voltage		1,500 VAC, 1 minute (between external terminals in a batch and ground)
External wiring	Connection method	18-point terminal block connector (screw: M3)
	Compatible wire	0.3 to 1.25 mm^2
	Tightening torque	Approx. 6 to 8 N·m
	Allowable wiring length	200 m
Operation indication		LED indication (lit when a contact ON); color: green
Mass		250 g

(*) The address assignments are shown below.



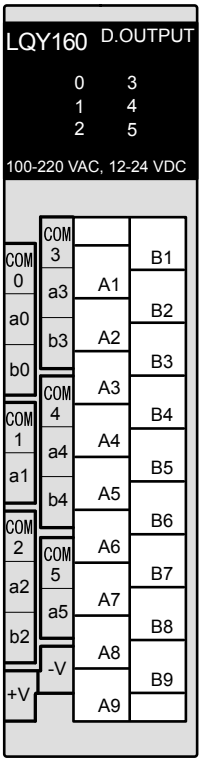
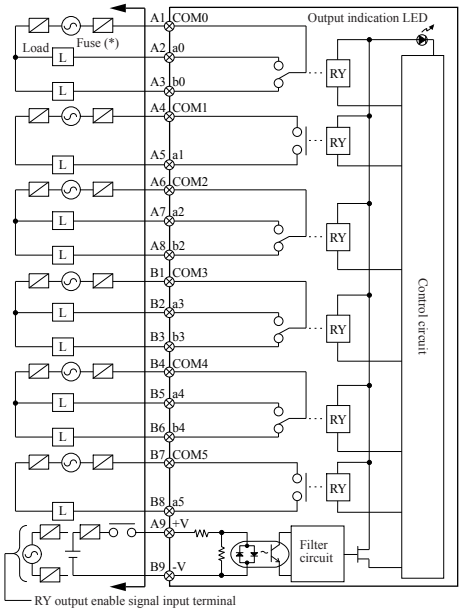


Figure 3-35 LQY160 Appearance



(*) Install a fuse to meet the following requirements:
- Rated breaking current of 5 A
- Install a fuse on the positive side of a DC load, or on both sides of an AC load.

Figure 3-36 LQY160 Circuit

3.18 LQY170 (Contact outputs, a-contacts × 2, c-contacts × 4)

Table 3-22 LQY170 Specifications

Item		Specification
Number of outputs		6 outputs (a-contacts × 2, c-contacts × 4) (*)
Insulation method		Relay insulation
Rated output		100 to 240 VAC: 2.0 A/output 12 to 24 VDC: 2.0 A/output
Maximum output voltage		264 VAC, 110 VDC
Minimum output current		100 to 240 VAC: 10 mA 12 to 24 VDC: 20 mA
Response time	OFF→ON	15 ms or less
	ON→OFF	15 ms or less
Maximum switching frequency		1,800 cycles/hour
Service life (electrical) of relay		Approx. 100,000 cycles of make-and-break operation (2 A at 240 VAC [COS φ = 0.4], 2 A at 24 VDC [L/R = 7 ms], make-and-break operation frequency of 1,800 cycles per hour, normal temperature and normal humidity)
Internal current dissipation		320 mA or less
Number of commons		One input/common (independent common)
RY output enable signal Rated input voltage, current		200 to 240 VAC, 7.5 mA (240 VAC, 50Hz)
Dielectric voltage		2,000 VAC, 1 minute (between the primary and the secondary)
External wiring	Connection method	18-point terminal block connector (screw: M3)
	Compatible wire	0.3 to 2.0 mm^2
	Tightening torque	Approx. 6 to 8 N·m
	Allowable wiring length	200 m or less
Operation indication		LED indication (lit when ON); color: green
Mass		250 g or less

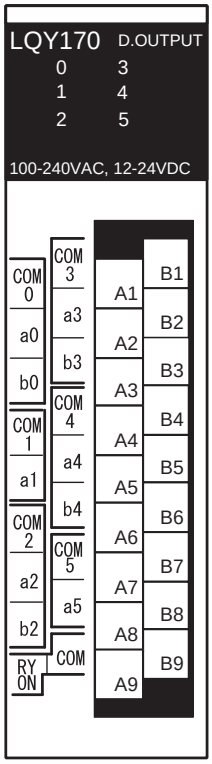
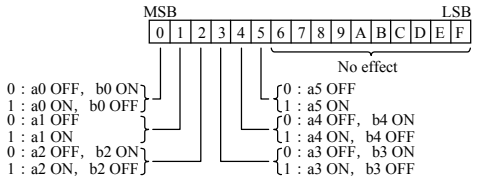
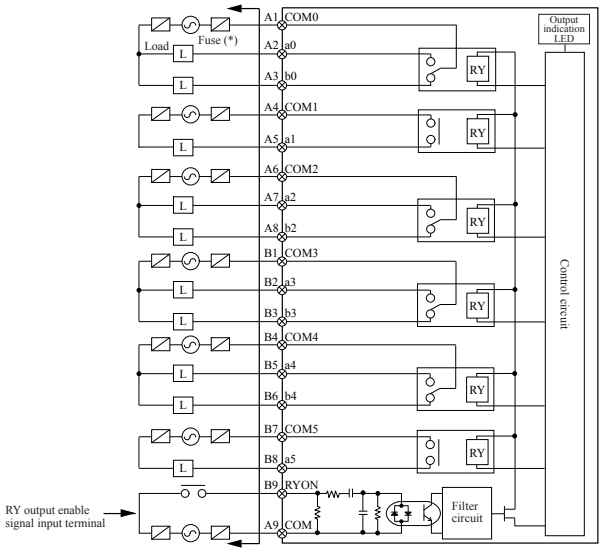


Figure 3-37 LQY170 Appearance

(*) The address assignments are shown below.





(*) Install a fuse to meet the following requirements:
- Rated breaking current of 5 A
- Install a fuse on the positive side of a DC load, or on both sides of an AC load.

Figure 3-38 LQY170 Circuit

3.19 LQY200 (Transistor outputs, 16 points)

Table 3-23 LQY200 Specifications

Item		Specification
Number of outputs		16 outputs
Insulation method		Photocoupler insulation
Rated output		12 to 24 VDC
Output voltage range		10.2 to 26.4 VDC
Maximum output current		0.3 A/output
Maximum rush current		2 A, 10 ms or less
Residual voltage		1.5 V or less
Leak current		0.1 mA or less
Response time	OFF→ON	0.2 ms or less
	ON→OFF	0.3 ms or less (*2)
Internal current dissipation		120 mA or less
Number of commons		16 outputs/common
External power supplies	Voltage	10.2 to 26.4 VDC
	Current	3.5 mA × n (12 VDC) 7.0 mA × n (24 VDC), n: Number of ON outputs
Dielectric voltage		1,500 VAC, 1 minute (between external terminals in a batch and ground)
External wiring	Connection method	18-point terminal block connector (screw: M3)
	Compatible wire	0.3 to 1.25 mm^2
	Tightening torque	Approx. 6 to 8 N·m
	Allowable wiring length	200 m
Operation indication		LED indication (lit when ON); color: green
Mass		210 g

(*1) Use the same power supply for an external power supply and a load power supply.
(*2) Use of a load could result in a delay by up to around 1 s.

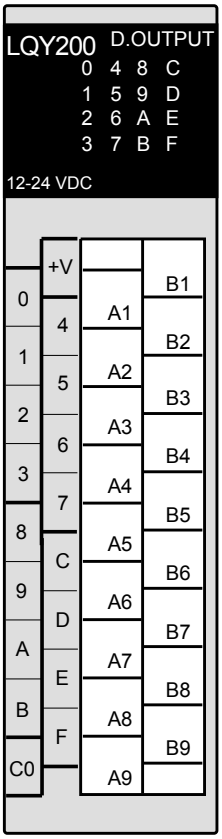
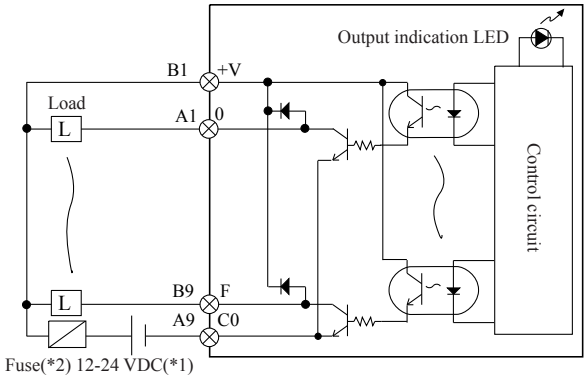


Figure 3-39 LQY200 Appearance



(*1) Use the same power supply for the external power supply (to the +V terminal) and for the load power supply. Use of different power supplies could result in the module malfunctioning.
(*2) Connect a fuse with a rated breaking current of 5 A.

Figure 3-40 LQY200 Circuit

3.20 LQY300 (Transistor outputs, 32 points)

Table 3-24 LQY300 Specifications

Item		Specification
Number of outputs		32 outputs
Insulation method		Photocoupler insulation
Rated output		12 to 24 VDC
Output voltage range		10.2 to 26.4 VDC
Maximum output current		0.1 A/output, 1.6 A/common (*3)
Limitation on the number of simultaneous ONs		Yes (See Figure 3-43, "Limitation on the number of simultaneous ONs for the LQY300.")
Maximum rush current		2 A, 10 ms or less
Residual voltage		1.5 V or less
Leak current		0.1 mA or less
Response time	OFF→ON	0.2 ms or less
	ON→OFF	0.3 ms or less (*2)
Internal current dissipation		260 mA or less
Number of commons		32 outputs/common
External power supplies	Voltage	10.2 to 26.4 VDC
	Current	0.4 mA × n (12 VDC) 0.8 mA × n (24 VDC), n: Number of ONs
Dielectric voltage		1,500 VAC, 1 minute (between external terminals in a batch and ground)
External wiring	Connection method	40-point connector (Model FCN36 manufactured by Fujitsu Devices Inc.)
	Allowable wiring length	200 m or less
Operation indication		LED indication (lit when ON); color: green Selection indication by SW1
Mass		150 g

(*1) Use the same power supply for an external power supply and a load power supply.
(*2) Use of a load could result in a delay by up to around 1 s.
(*3) If using a pressure-contact connector (FCN367J070-AU/F), set it to 1.0A/common.

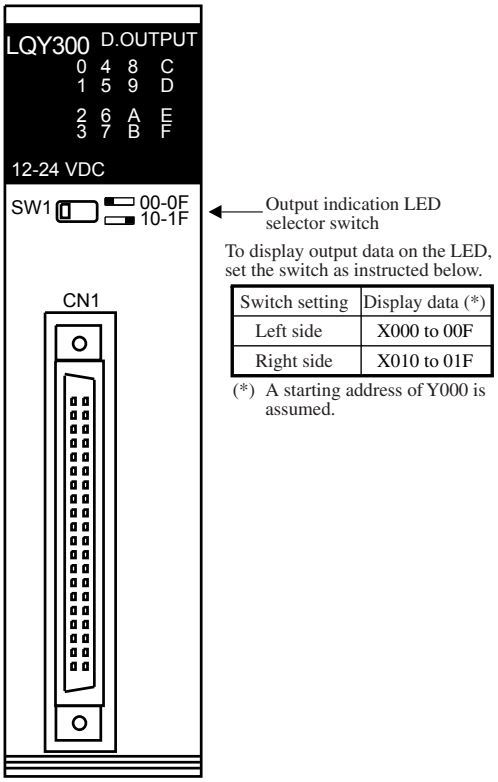
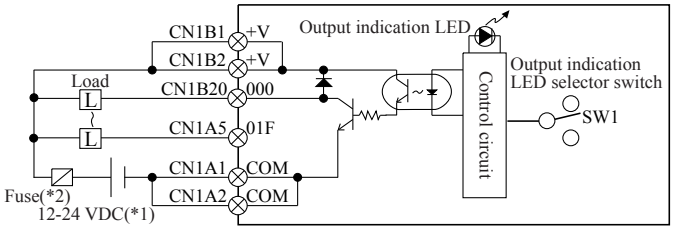


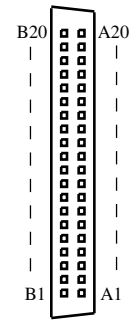
Figure 3-41 LQY300 Appearance



(*1) Use the same power supply for the external power supply (to the +V terminal) and for the load power supply. Use of different power supplies could result in the module malfunctioning.
(*2) Connect a fuse with a rated breaking current of 3 A.

Figure 3-42 LQY300 Circuit

■ Pin configuration



Module front view

■ Address assignments (assuming a starting address of Y000)

Table 3-25 LQY300 Address Assignments

Pin No.	Address	Pin No.	Address
CN2B20	Y000	CN2A20	Y010
CN2B19	Y001	CN2A19	Y011
CN2B18	Y002	CN2A18	Y012
CN2B17	Y003	CN2A17	Y013
CN2B16	Y004	CN2A16	Y014
CN2B15	Y005	CN2A15	Y015
CN2B14	Y006	CN2A14	Y016
CN2B13	Y007	CN2A13	Y017
CN2B12	Y008	CN2A12	Y018
CN2B11	Y009	CN2A11	Y019
CN2B10	Y00A	CN2A10	Y01A
CN2B9	Y00B	CN2A9	Y01B
CN2B8	Y00C	CN2A8	Y01C
CN2B7	Y00D	CN2A7	Y01D
CN2B6	Y00E	CN2A6	Y01E
CN2B5	Y00F	CN2A5	Y01F
CN2B4	Reserved	CN2A4	Reserved
CN2B3	Reserved	CN2A3	Reserved
CN2B2	+V	CN2A2	COM
CN2B1	+V	CN2A1	COM

■ Limitation on the number of simultaneous ONs

(1) Use the same power supply for the external power supply (to the +V terminal) and for the load power supply. Use of different power supplies could result in the module malfunctioning.

(2) The operating ambient temperature and the load current pose the limitation, shown below, on the number of simultaneous ONs for the LQY300. Attempted use past this limitation will degrade the product life.

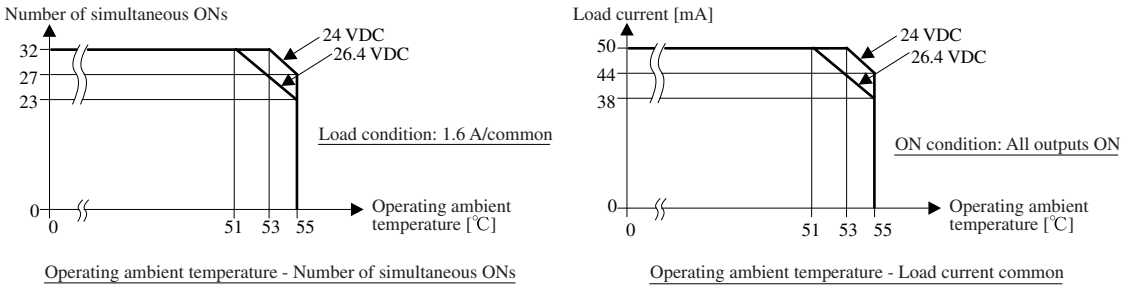


Figure 3-43 Limitation on the Number of Simultaneous ONs for the LQY300

3.21 LQY310 (Transistor outputs, 32 points)

Table 3-26 LQY310 Specifications

Item		Specification
Number of outputs		32 outputs
Insulation method		Photocoupler insulation
Rated output		12 to 24 VDC
Output voltage range		10.2 to 26.4 VDC
Maximum output current		0.1 A/output, 1.6 A/common
Limitation on the number of simultaneous ONs		Yes (See Figure 3-46, "Limitation on the number of simultaneous ONs for the LQY310.")
Maximum rush current		2 A, 10 ms or less
Residual voltage		1.5 V or less
Leak current		0.1 mA or less
Response time	OFF→ON	0.2 ms or less
	ON→OFF	0.3 ms or less (*2)
Internal current dissipation		260 mA or less
Number of commons		32 outputs/common
External power supplies	Voltage	10.2 to 26.4 VDC
	Current	0.4 mA × n (12 VDC) 0.8 mA × n (24 VDC), n: Number of ONs
Dielectric voltage		1,500 VAC, 1 minute (between external terminals in a batch and ground)
External wiring	Connection method	34-point connector (Model FRC3 manufactured by DDK Ltd.)
	Allowable wiring length	200 m or less
Operation indication		LED indication (lit when ON); color: green Selection indication by SW1
Mass		150 g

(*1) Use the same power supply for an external power supply and a load power supply.
(*2) Use of a load could result in a delay by up to around 1 s.

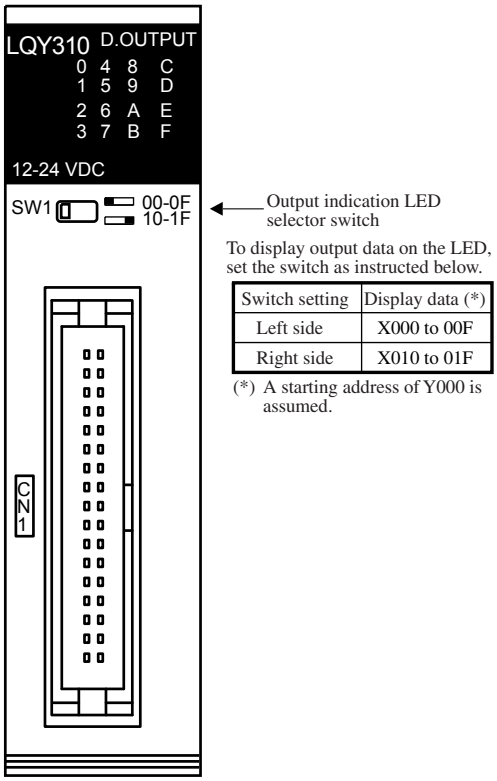
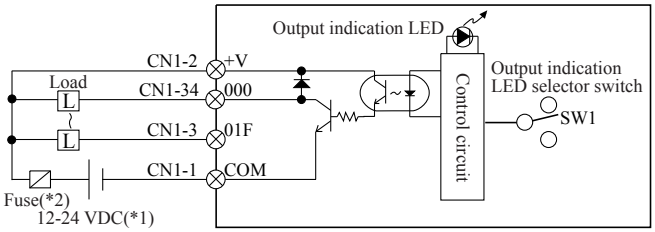


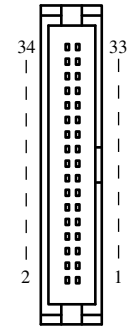
Figure 3-44 LQY310 Appearance



(*1) Use the same power supply for the external power supply (to the +V terminal) and for the load power supply. Use of different power supplies could result in the module malfunctioning.
(*2) Connect a fuse with a rated breaking current of 3 A.

Figure 3-45 LQY310 Circuit

■ Pin configuration



Module front view

■ Address assignments (assuming a starting address of Y000)

Table 3-27 LQY310 Address Assignments

Pin No.	Address	Pin No.	Address	Pin No.	Address	Pin No.	Address
CN1-34	Y000	CN1-26	Y008	CN1-18	Y010	CN1-10	Y018
CN1-33	Y001	CN1-25	Y009	CN1-17	Y011	CN1-9	Y019
CN1-32	Y002	CN1-24	Y00A	CN1-16	Y012	CN1-8	Y01A
CN1-31	Y003	CN1-23	Y00B	CN1-15	Y013	CN1-7	Y01B
CN1-30	Y004	CN1-22	Y00C	CN1-14	Y014	CN1-6	Y01C
CN1-29	Y005	CN1-21	Y00D	CN1-13	Y015	CN1-5	Y01D
CN1-28	Y006	CN1-20	Y00E	CN1-12	Y016	CN1-4	Y01E
CN1-27	Y007	CN1-19	Y00F	CN1-11	Y017	CN1-3	Y01F
				CN1-2	+V	CN1-1	COM

■ Limitation on the number of simultaneous ONs

(1) Use the same power supply for the external power supply (to the +V terminal) and for the load power supply. Use of different power supplies could result in the module malfunctioning.

(2) The operating ambient temperature and the load current pose the limitation, shown below, on the number of simultaneous ONs for the LQY310. Attempted use past this limitation will degrade the product life.

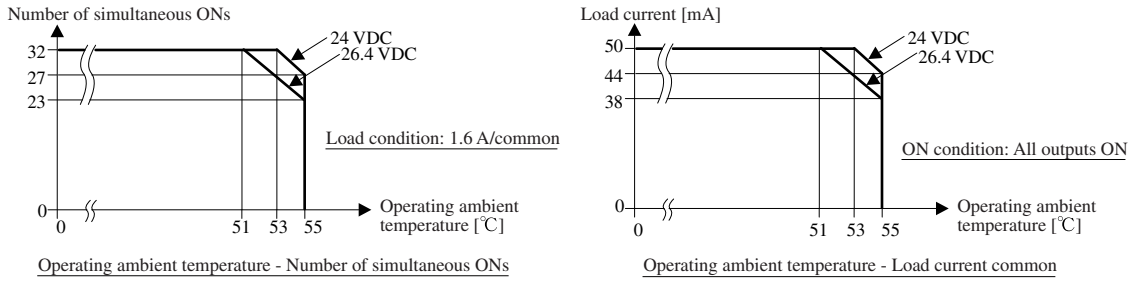


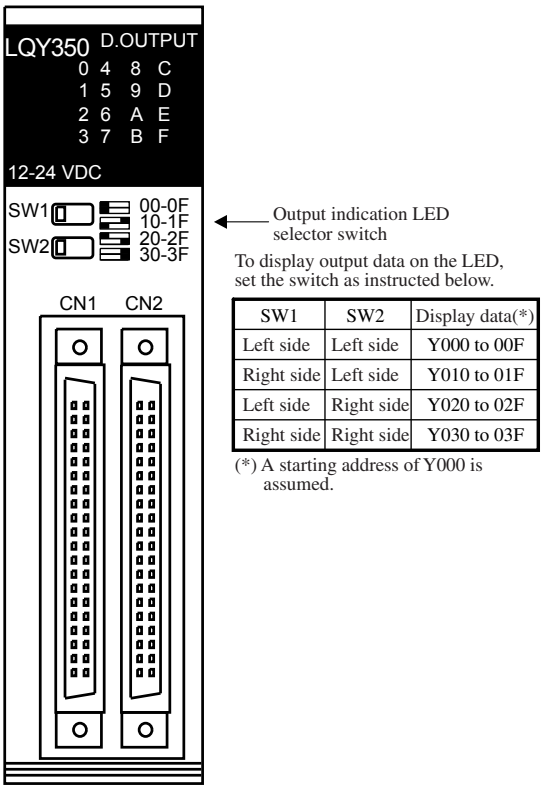
Figure 3-46 Limitation on the Number of Simultaneous ONs for the LQY310

3.22 LQY350 (Transistor outputs, 64 points)

Table 3-28 LQY350 Specifications

Item		Specification
Number of outputs		64 outputs
Insulation method		Photocoupler insulation
Rated output		12 to 24 VDC
Output voltage range		10.2 to 26.4 VDC
Maximum output current		0.1 A/output, 1.6 A/common (*3)
Limitation on the number of simultaneous ONs		Yes (See Figure 3-49, "Limitation on the number of simultaneous ONs for the LQY350.")
Maximum rush current		2 A, 10 ms or less
Residual voltage		1.5 V or less
Leak current		0.1 mA or less
Response time	OFF→ON	0.2 ms or less
	ON→OFF	0.3 ms or less (*2)
Internal current dissipation		400 mA or less
Number of commons		32 outputs/common
External power supplies (*1)	Voltage	10.2 to 26.4 VDC
	Current	0.4 mA × n (12 VDC) 0.8 mA × n (24 VDC), n: Number of ONs
Dielectric voltage		1,500 VAC, 1 minute (between external terminals in a batch and ground)
External wiring	Connection method	40-point connector (Model FCN36 manufactured by Fujitsu Devices Inc.)
	Allowable wiring length	200 m or less
Operation indication		LED indication (lit when ON); color: green Selection indication by SW1 and SW2
Mass		170 g

(*1) Use the same power supply for an external power supply and a load power supply.
(*2) Use of a load could result in a delay by up to around 1 s.
(*3) If using a pressure-contact connector (FCN367J040-AU/F), set it to 1.0A/common.

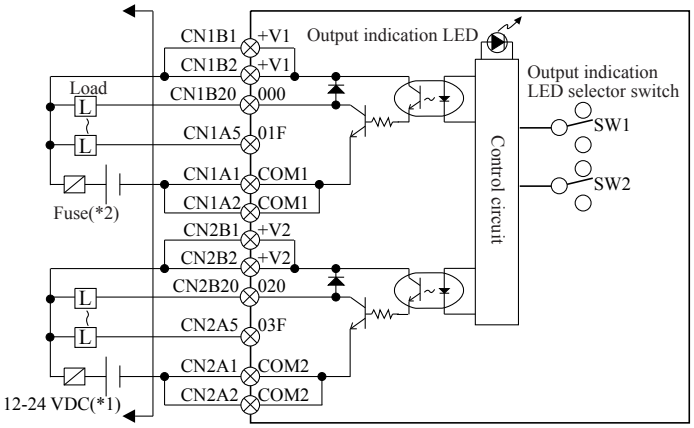


To display output data on the LED, set the switch as instructed below.

SW1	SW2	Display data(*)
Left side	Left side	Y000 to 00F
Right side	Left side	Y010 to 01F
Left side	Right side	Y020 to 02F
Right side	Right side	Y030 to 03F

(*) A starting address of Y000 is assumed.

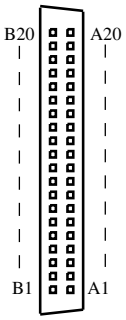
Figure 3-47 LQY350 Appearance



(*1) Use the same power supply for the external power supply (to the +V terminal) and for the load power supply. Use of different power supplies could result in the module malfunctioning.
(*2) Connect a fuse with a rated breaking current of 3 A.

Figure 3-48 LQY350 Circuit

■ Pin configuration
(Module front view)



The pin configuration of CN1 is the same as that of CN2.

■ Address assignments (assuming a starting address of Y000)

Table 3-29 LQY350 Address Assignments

Pin No.	Address	Pin No.	Address	Pin No.	Address	Pin No.	Address
CN1B20	Y000	CN1A20	Y010	CN2B20	Y020	CN2A20	Y030
CN1B19	Y001	CN1A19	Y011	CN2B19	Y021	CN2A19	Y031
CN1B18	Y002	CN1A18	Y012	CN2B18	Y022	CN2A18	Y032
CN1B17	Y003	CN1A17	Y013	CN2B17	Y023	CN2A17	Y033
CN1B16	Y004	CN1A16	Y014	CN2B16	Y024	CN2A16	Y034
CN1B15	Y005	CN1A15	Y015	CN2B15	Y025	CN2A15	Y035
CN1B14	Y006	CN1A14	Y016	CN2B14	Y026	CN2A14	Y036
CN1B13	Y007	CN1A13	Y017	CN2B13	Y027	CN2A13	Y037
CN1B12	Y008	CN1A12	Y018	CN2B12	Y028	CN2A12	Y038
CN1B11	Y009	CN1A11	Y019	CN2B11	Y029	CN2A11	Y039
CN1B10	Y00A	CN1A10	Y01A	CN2B10	Y02A	CN2A10	Y03A
CN1B9	Y00B	CN1A9	Y01B	CN2B9	Y02B	CN2A9	Y03B
CN1B8	Y00C	CN1A8	Y01C	CN2B8	Y02C	CN2A8	Y03C
CN1B7	Y00D	CN1A7	Y01D	CN2B7	Y02D	CN2A7	Y03D
CN1B6	Y00E	CN1A6	Y01E	CN2B6	Y02E	CN2A6	Y03E
CN1B5	Y00F	CN1A5	Y01F	CN2B5	Y02F	CN2A5	Y03F
CN1B4	Reserved	CN1A4	Reserved	CN2B4	Reserved	CN2A4	Reserved
CN1B3	Reserved	CN1A3	Reserved	CN2B3	Reserved	CN2A3	Reserved
CN1B2	+V1	CN1A2	COM1	CN2B2	+V2	CN2A2	COM2
CN1B1	+V1	CN1A1	COM1	CN2B1	+V2	CN2A1	COM2

■ Limitation on the number of simultaneous ONs

(1) Use the same power supply for the external power supply (to the +V terminal) and for the load power supply. Use of different power supplies could result in the module malfunctioning.

(2) The operating ambient temperature and the load current pose the limitation, shown below, on the number of simultaneous ONs for the LQY350. Attempted use past this limitation will degrade the product life.

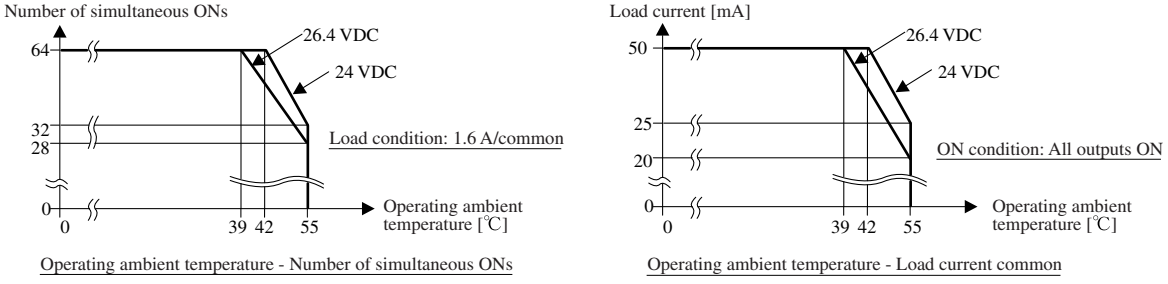


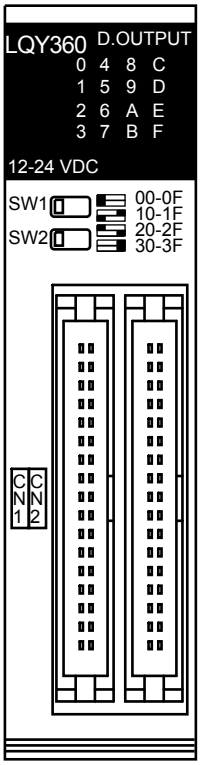
Figure 3-49 Limitation on the Number of Simultaneous ONs for the LQY350

3.23 LQY360 (Transistor outputs, 64 points)

Table 3-30 LQY360 Specifications

Item		Specification
Number of outputs		64 inputs
Insulation method		Photocoupler insulation
Rated output		12 to 24 VDC
Output voltage range		10.2 to 26.4 VDC
Maximum output current		0.1 A/output, 1.6 A/common
Limitation on the number of simultaneous ONs		Yes (See Figure 3-52, "Limitation on the number of simultaneous ONs for the LQY360.")
Maximum rush current		2 A, 10 ms or less
Residual voltage		1.5 V or less
Leak current		0.1 mA or less
Response time	OFF→ON	0.2 ms or less
	ON→OFF	0.3 ms or less (*2)
Internal current dissipation		400 mA or less
Number of commons		32 outputs/common
External power supplies (*1)	Voltage	10.2 to 26.4 VDC
	Current	0.4 mA × n (12 VDC) 0.8 mA × n (24 VDC), n: Number of ONs
Dielectric voltage		1,500 VAC, 1 minute (between external terminals in a batch and ground)
External wiring	Connection method	34-point connector (Model FRC3 manufactured by DDK Ltd.)
	Allowable wiring length	200 m or less
Operation indication		LED indication (lit when ON); color: green Selection indication by SW1 and SW2
Mass		170 g

(*1) Use the same power supply for an external power supply and a load power supply.
(*2) Use of a load could result in a delay by up to around 1 s.



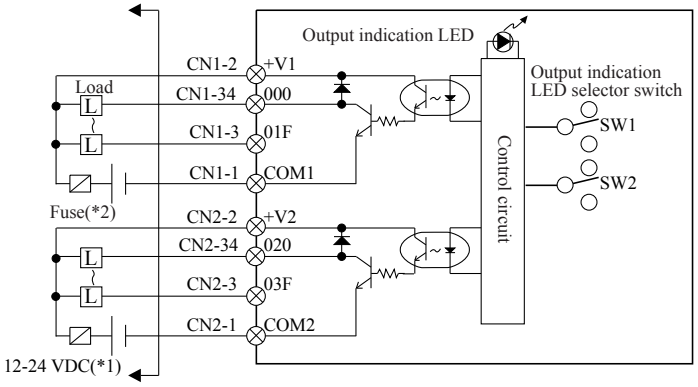
Output indication LED selector switch

To display output data on the LED, set the switch as instructed below.

SW1	SW2	Display data(*)
Left side	Left side	Y000 to 00F
Right side	Left side	Y010 to 01F
Left side	Right side	Y020 to 02F
Right side	Right side	Y030 to 03F

(*) A starting address of Y000 is assumed.

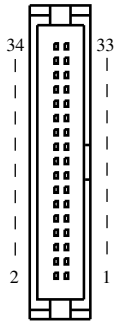
Figure 3-50 LQY360 Appearance



(*1) Use the same power supply for the external power supply (to the +V terminal) and for the load power supply. Use of different power supplies could result in the module malfunctioning.
(*2) Connect a fuse with a rated breaking current of 3 A.

Figure 3-51 LQY360 Circuit

■ Pin configuration
(Module front view)



The pin configuration of CN1 is the same as that of CN2.

■ Address assignments (assuming a starting address of Y000)

Table 3-31 LQY360 Address Assignments

Pin No.	Address	Pin No.	Address	Pin No.	Address	Pin No.	Address
CN1-34	Y000	CN1-18	Y010	CN2-34	Y020	CN2-18	Y030
CN1-33	Y001	CN1-17	Y011	CN2-33	Y021	CN2-17	Y031
CN1-32	Y002	CN1-16	Y012	CN2-32	Y022	CN2-16	Y032
CN1-31	Y003	CN1-15	Y013	CN2-31	Y023	CN2-15	Y033
CN1-30	Y004	CN1-14	Y014	CN2-30	Y024	CN2-14	Y034
CN1-29	Y005	CN1-13	Y015	CN2-29	Y025	CN2-13	Y035
CN1-28	Y006	CN1-12	Y016	CN2-28	Y026	CN2-12	Y036
CN1-27	Y007	CN1-11	Y017	CN2-27	Y027	CN2-11	Y037
CN1-26	Y008	CN1-10	Y018	CN2-26	Y028	CN2-10	Y038
CN1-25	Y009	CN1-9	Y019	CN2-25	Y029	CN2-9	Y039
CN1-24	Y00A	CN1-8	Y01A	CN2-24	Y02A	CN2-8	Y03A
CN1-23	Y00B	CN1-7	Y01B	CN2-23	Y02B	CN2-7	Y03B
CN1-22	Y00C	CN1-6	Y01C	CN2-22	Y02C	CN2-6	Y03C
CN1-21	Y00D	CN1-5	Y01D	CN2-21	Y02D	CN2-5	Y03D
CN1-20	Y00E	CN1-4	Y01E	CN2-20	Y02E	CN2-4	Y03E
CN1-19	Y00F	CN1-3	Y01F	CN2-19	Y02F	CN2-3	Y03F
CN1-2	+V1	CN1-1	COM1	CN2-2	+V2	CN2-1	COM2

■ Limitation on the number of simultaneous ONs

(1) Use the same power supply for the external power supply (to the +V terminal) and for the load power supply. Use of different power supplies could result in the module malfunctioning.

(2) The operating ambient temperature and the load current pose the limitation, shown below, on the number of simultaneous ONs for the LQY360. Attempted use past this limitation will degrade the product life.

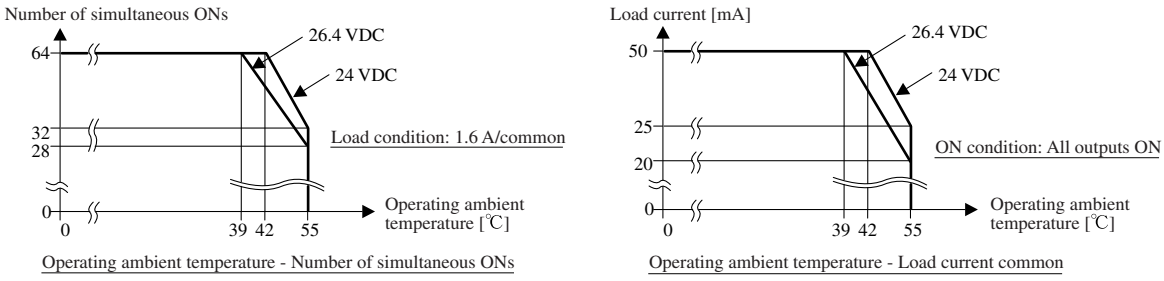


Figure 3-52 Limitation on the Number of Simultaneous ONs for the LQY360

3.24 LQZ300 (Input-output integrated module)

Table 3-32 Common Specifications

Item		Specification
Internal current dissipation		300 mA or less
Dielectric voltage		1,500 VAC, 1 minute (between external terminals in a batch and ground)
External wiring	Connection method	40-point connector (Model FCN36 manufactured by Fujitsu Devices Inc.)
	Allowable wiring length	200 m or less
Operation indication		LED indication (lit when ON); color: green Selection indication by SW1 and SW2
Mass		170 g

Be sure to set the partition of the mounting base in which this module is installed to FREE. The FIX setting would cause the module to malfunction. For how to set mounting base partitions, refer to “S10mini CPU (Manual number SME-1-100).”

Table 3-33 Input Specifications

Item		Specification
Number of inputs		32 inputs
Insulation method		Photocoupler insulation
Rated input voltage		12 to 24 VDC
Rated input current		4.1 mA (24 VDC), 2.1 mA (12 VDC)
Limitation on the number of simultaneous ONs		Yes (See Figure 3-55, “Limitation on the number of simultaneous ONs for the LQZ300.”)
Input voltage range		10.2 to 26.4 VDC
ON voltage/current		9 VDC or more/1.4 mA or more
OFF voltage/current		3 VDC or less/0.3 mA or less
Input impedance		Approx. 5.6 kΩ
Response time	OFF→ON	10 ms or less
	ON→OFF	10 ms or less
Number of commons		32 inputs/common

Table 3-34 Output Specifications

Item		Specification
Number of outputs		32 inputs
Insulation method		Photocoupler insulation
Rated output voltage		12 to 24 VDC
Output voltage range		10.2 to 26.4 VDC
Maximum output current		0.1 A/output, 1.6 A/common
Limitation on the number of simultaneous ONs		Yes (See Figure 3-55, “Limitation on the number of simultaneous ONs for the LQZ300.”)
Maximum rush current		2 A, 10 ms or less
Residual voltage		2 V or less
Leak current		0.1 mA or less
Response time	OFF→ON	0.2 ms or less
	ON→OFF	0.3 ms or less (*1)
Number of commons		32 outputs/common
External power supplies (*2)	Voltage	10.2 to 26.4 VDC
	Current	0.4 mA × n (12 VDC) 0.8 mA × n (24 VDC) n: Number of ONs

(*1) Use of a load could result in a delay by up to around 1 s.
(*2) Use the same power supply for an external power supply and a load power supply.

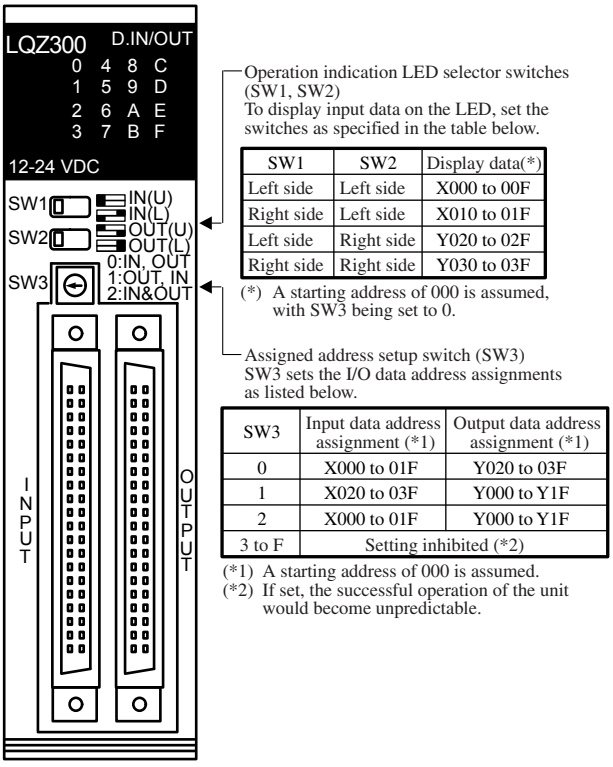
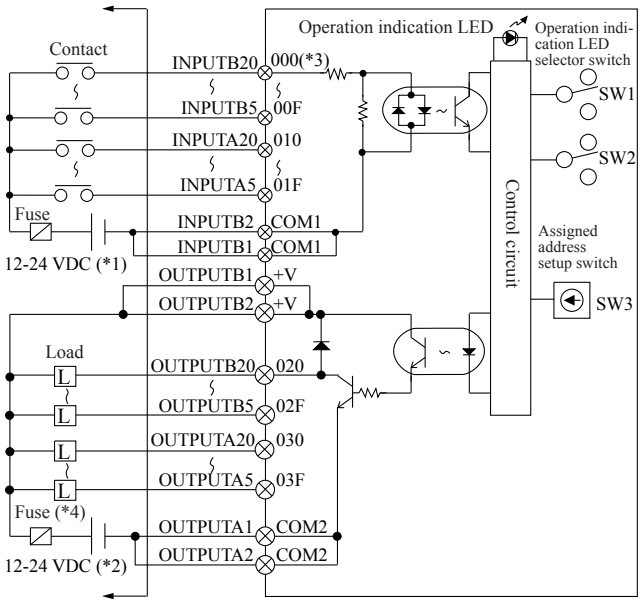


Figure 3-53 LQZ300 Appearance

CAUTION

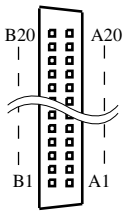
Power off the module before setting SW3 to avoid possible malfunctioning and failures.
Particularly, if an external power supply is attached to a connector, remember to switch off both the unit and the external power supply.



(*1) While the power connection is shown to be a (-) common above, it can also be used as a (+) common.
(*2) Use the same power supply for the external power supply for the output circuit and for the load power supply.
(*3) Address assignments to the connector terminal numbers depend on SW3. For the relationship between the setting of SW3 and address assignments, see Figure 3-53, "LQZ300 appearance."
(*4) Connect a fuse with a rated breaking current of 3 A.

Figure 3-54 LQZ300 Circuit

■ Pin configuration (Module front view)



The pin configuration is the same for the input and output connectors.

■ To set SW3 to 0 (assuming a starting address of 000)

Table 3-35 LQZ300 Address Assignments (1)

Pin No.	Address	Pin No.	Address	Pin No.	Address	Pin No.	Address
INPUTB20	X000	INPUTA20	X010	OUTPUTB20	Y020	OUTPUTA20	Y030
INPUTB19	X001	INPUTA19	X011	OUTPUTB19	Y021	OUTPUTA19	Y031
INPUTB18	X002	INPUTA18	X012	OUTPUTB18	Y022	OUTPUTA18	Y032
INPUTB17	X003	INPUTA17	X013	OUTPUTB17	Y023	OUTPUTA17	Y033
INPUTB16	X004	INPUTA16	X014	OUTPUTB16	Y024	OUTPUTA16	Y034
INPUTB15	X005	INPUTA15	X015	OUTPUTB15	Y025	OUTPUTA15	Y035
INPUTB14	X006	INPUTA14	X016	OUTPUTB14	Y026	OUTPUTA14	Y036
INPUTB13	X007	INPUTA13	X017	OUTPUTB13	Y027	OUTPUTA13	Y037
INPUTB12	X008	INPUTA12	X018	OUTPUTB12	Y028	OUTPUTA12	Y038
INPUTB11	X009	INPUTA11	X019	OUTPUTB11	Y029	OUTPUTA11	Y039
INPUTB10	X00A	INPUTA10	X01A	OUTPUTB10	Y02A	OUTPUTA10	Y03A
INPUTB9	X00B	INPUTA9	X01B	OUTPUTB9	Y02B	OUTPUTA9	Y03B
INPUTB8	X00C	INPUTA8	X01C	OUTPUTB8	Y02C	OUTPUTA8	Y03C
INPUTB7	X00D	INPUTA7	X01D	OUTPUTB7	Y02D	OUTPUTA7	Y03D
INPUTB6	X00E	INPUTA6	X01E	OUTPUTB6	Y02E	OUTPUTA6	Y03E
INPUTB5	X00F	INPUTA5	X01F	OUTPUTB5	Y02F	OUTPUTA5	Y03F
INPUTB4	Reserved	INPUTA4	Reserved	OUTPUTB4	Reserved	OUTPUTA4	Reserved
INPUTB3	Reserved	INPUTA3	Reserved	OUTPUTB3	Reserved	OUTPUTA3	Reserved
INPUTB2	COM1	INPUTA2	Reserved	OUTPUTB2	+V	OUTPUTA2	COM2
INPUTB1	COM1	INPUTA1	Reserved	OUTPUTB1	+V	OUTPUTA1	COM2

■ To set SW3 to 1 (assuming a starting address of 000)

Table 3-35 LQZ300 Address Assignments (2)

Pin No.	Address	Pin No.	Address	Pin No.	Address	Pin No.	Address
INPUTB20	X020	INPUTA20	X030	OUTPUTB20	Y000	OUTPUTA20	Y010
INPUTB19	X021	INPUTA19	X031	OUTPUTB19	Y001	OUTPUTA19	Y011
INPUTB18	X022	INPUTA18	X032	OUTPUTB18	Y002	OUTPUTA18	Y012
INPUTB17	X023	INPUTA17	X033	OUTPUTB17	Y003	OUTPUTA17	Y013
INPUTB16	X024	INPUTA16	X034	OUTPUTB16	Y004	OUTPUTA16	Y014
INPUTB15	X025	INPUTA15	X035	OUTPUTB15	Y005	OUTPUTA15	Y015
INPUTB14	X026	INPUTA14	X036	OUTPUTB14	Y006	OUTPUTA14	Y016
INPUTB13	X027	INPUTA13	X037	OUTPUTB13	Y007	OUTPUTA13	Y017
INPUTB12	X028	INPUTA12	X038	OUTPUTB12	Y008	OUTPUTA12	Y018
INPUTB11	X029	INPUTA11	X039	OUTPUTB11	Y009	OUTPUTA11	Y019
INPUTB10	X02A	INPUTA10	X03A	OUTPUTB10	Y00A	OUTPUTA10	Y01A
INPUTB9	X02B	INPUTA9	X03B	OUTPUTB9	Y00B	OUTPUTA9	Y01B
INPUTB8	X02C	INPUTA8	X03C	OUTPUTB8	Y00C	OUTPUTA8	Y01C
INPUTB7	X02D	INPUTA7	X03D	OUTPUTB7	Y00D	OUTPUTA7	Y01D
INPUTB6	X02E	INPUTA6	X03E	OUTPUTB6	Y00E	OUTPUTA6	Y01E
INPUTB5	X02F	INPUTA5	X03F	OUTPUTB5	Y00F	OUTPUTA5	Y01F
INPUTB4	Reserved	INPUTA4	Reserved	OUTPUTB4	Reserved	OUTPUTA4	Reserved
INPUTB3	Reserved	INPUTA3	Reserved	OUTPUTB3	Reserved	OUTPUTA3	Reserved
INPUTB2	COM1	INPUTA2	Reserved	OUTPUTB2	+V	OUTPUTA2	COM2
INPUTB1	COM1	INPUTA1	Reserved	OUTPUTB1	+V	OUTPUTA1	COM2

■ To set SW3 to 2 (assuming a starting address of 000)

Table 3-35 LQZ300 Address Assignments (3)

Pin No.	Address	Pin No.	Address	Pin No.	Address	Pin No.	Address
INPUTB20	X000	INPUTA20	X010	OUTPUTB20	Y000	OUTPUTA20	Y010
INPUTB19	X001	INPUTA19	X011	OUTPUTB19	Y001	OUTPUTA19	Y011
INPUTB18	X002	INPUTA18	X012	OUTPUTB18	Y002	OUTPUTA18	Y012
INPUTB17	X003	INPUTA17	X013	OUTPUTB17	Y003	OUTPUTA17	Y013
INPUTB16	X004	INPUTA16	X014	OUTPUTB16	Y004	OUTPUTA16	Y014
INPUTB15	X005	INPUTA15	X015	OUTPUTB15	Y005	OUTPUTA15	Y015
INPUTB14	X006	INPUTA14	X016	OUTPUTB14	Y006	OUTPUTA14	Y016
INPUTB13	X007	INPUTA13	X017	OUTPUTB13	Y007	OUTPUTA13	Y017
INPUTB12	X008	INPUTA12	X018	OUTPUTB12	Y008	OUTPUTA12	Y018
INPUTB11	X009	INPUTA11	X019	OUTPUTB11	Y009	OUTPUTA11	Y019
INPUTB10	X00A	INPUTA10	X01A	OUTPUTB10	Y00A	OUTPUTA10	Y01A
INPUTB9	X00B	INPUTA9	X01B	OUTPUTB9	Y00B	OUTPUTA9	Y01B
INPUTB8	X00C	INPUTA8	X01C	OUTPUTB8	Y00C	OUTPUTA8	Y01C
INPUTB7	X00D	INPUTA7	X01D	OUTPUTB7	Y00D	OUTPUTA7	Y01D
INPUTB6	X00E	INPUTA6	X01E	OUTPUTB6	Y00E	OUTPUTA6	Y01E
INPUTB5	X00F	INPUTA5	X01F	OUTPUTB5	Y00F	OUTPUTA5	Y01F
INPUTB4	Reserved	INPUTA4	Reserved	OUTPUTB4	Reserved	OUTPUTA4	Reserved
INPUTB3	Reserved	INPUTA3	Reserved	OUTPUTB3	Reserved	OUTPUTA3	Reserved
INPUTB2	COM1	INPUTA2	Reserved	OUTPUTB2	+V	OUTPUTA2	COM2
INPUTB1	COM1	INPUTA1	Reserved	OUTPUTB1	+V	OUTPUTA1	COM2

CAUTION

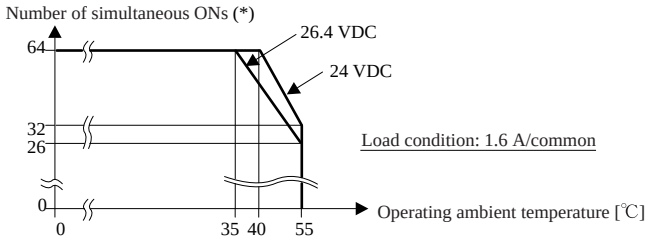
- Be sure to connect the input and output connectors correctly. Reverse connection of the input and output connectors could damage to the module.
- Wire an external power supply to the output section with correct polarities. Incorrect polarity setting could cause damage to the module.
- The LQZ300 and our product (Model LWX000) differ in their connector terminal assignment. To avoid damage to the module, do not attach a connector wired for the LQZ300 to the LWX000.

■ Limitation on the number of simultaneous ONs

(1) Use the same power supply for the external power supply (to the +V terminal) and for the load power supply. Use of different power supplies could result in the module malfunctioning.

(2) The operating ambient temperature and the load current pose the limitation, shown below, on the number of simultaneous ONs for this module. Attempted use past this limitation will degrade the product life.

■ Ambient temperature derating



(*) The number of simultaneous ONs is the sum total of the number of ON inputs and outputs.

With simultaneous ONs limited to 32, for example, the following combinations are possible:

① All inputs ON + All outputs OFF
② All inputs OFF + All outputs ON
③ 16 inputs ON + 16 outputs ON
④ 20 inputs ON + 12 outputs ON
and so on

■ Output load current derating to turn on all inputs and outputs

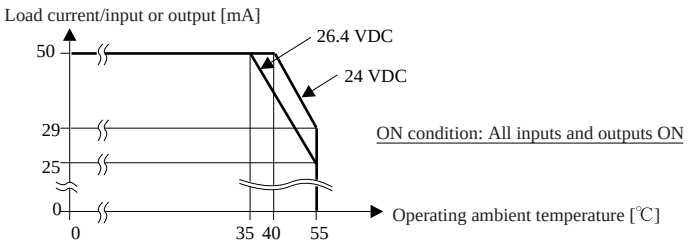


Figure 3-55 Limitation on the Number of Simultaneous ONs for the LQZ300

3.25 LQC000 (Pulse counter)

Table 3-36 LQC000 Specifications

Item			Specification	
Operation mode			Mode 1	Mode 2
Operation mode setup method			Terminal block B1 and B2 open	Terminal block B1 and B2 shorted
Counting range			0 to +16,383	-8,192 to +8,191
Number of input channels			One channel	
Input	Input format	Single-phase input	Up count	
		Two-phase input	Up/down count	
		Stop input	Enable type	Latch type
	Input method		No-voltage/voltage transistor type	
	Input frequency		20 kHz or less (duty ratio 50%)	
	Filter time constant		Approx. 5 μs	
	Rated input voltage		12 to 24 VDC	
	Input voltage range		10.2 to 26.4 VDC	
	Rated input current		Approx. 7 mA (12 VDC), approx. 14 mA (24 VDC)	
	ON voltage/current		10 VDC or more/5.3 mA or more	
	OFF voltage/current		3 VDC or less/0.8 mA or less	
Output	Compare result output format		Count value <, =, > compare value (coincident output is latch)	
	Rated output voltage		12 to 24 VDC	
	Output voltage range		10.2 to 26.4 VDC	
	Maximum output current		0.3 A	
	Response time		1 ms or less	
	External power supplies	Voltage	10.2 to 26.4 VDC	
		Current	3.5 mA × n (12 VDC), 7.0 mA × n (24 VDC), n: Number of ONs	
Internal current dissipation			150 mA or less	
Insulation method			Photocoupler insulation	
Dielectric voltage			1,500 VAC, 1 minute (primaries and ground)	
External wiring	Connection method		18-point terminal block connector (screw: M3)	
	Compatible wire		0.3 to 1.25 mm^2	
	Tightening torque		Approx. 6 to 8 N･m	
	Allowable wiring length		50 m or less (shielded twisted-pair cable)	
Mass			210 g	

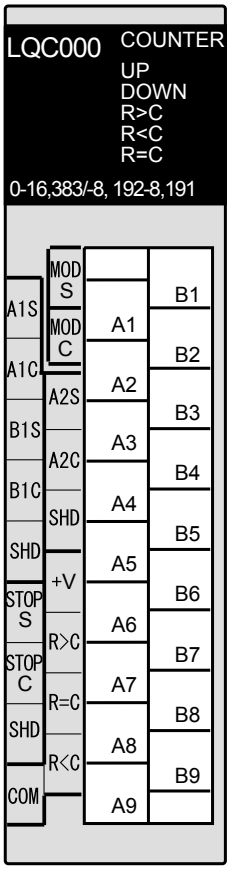


Figure 3-56 LQC000 Appearance

Be sure to set the partition of the mounting base in which this module is installed to FREE. The FIX setting would disable the module. For how to set mounting base partitions, refer to "S10mini CPU (Manual number SME-1-100)."

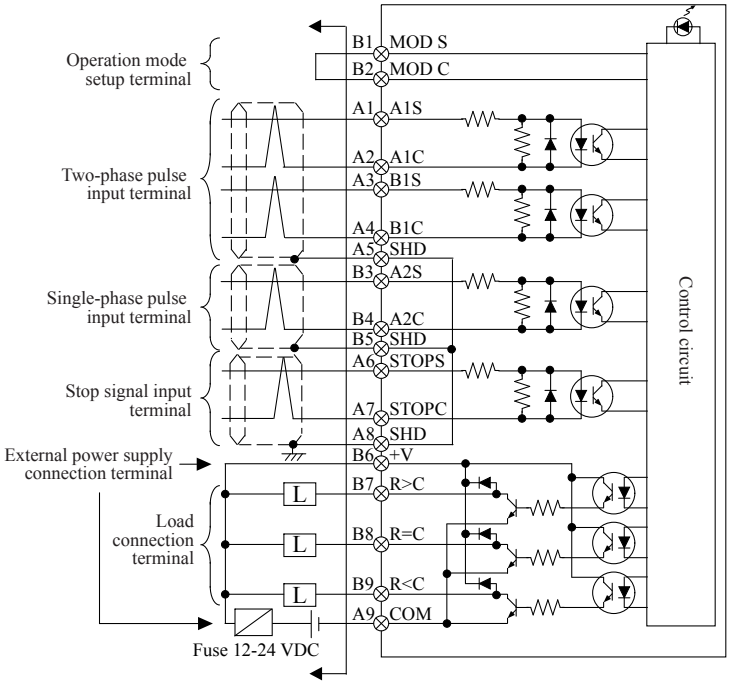


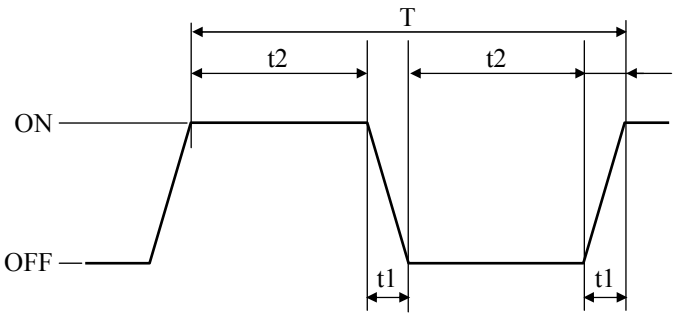
Figure 3-57 LQC000 Circuit

CAUTION

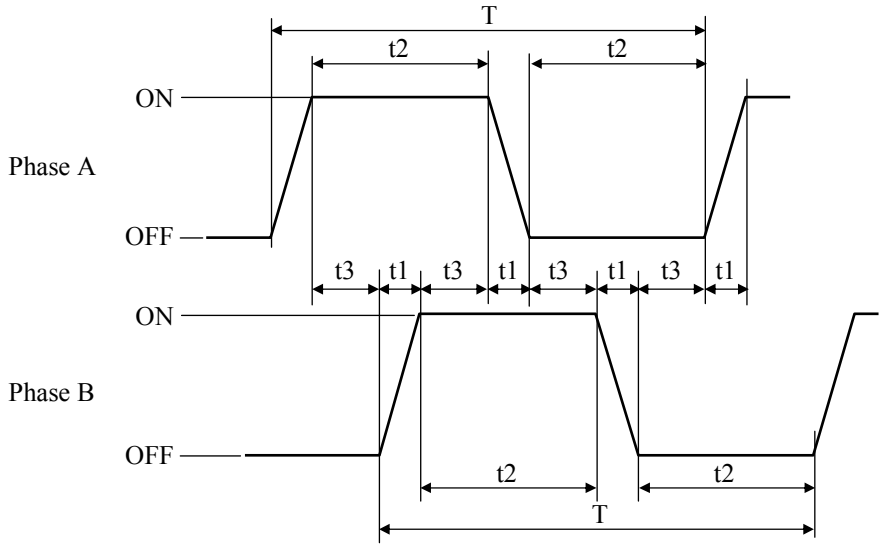
- Use the same power supply for an external power supply and a load power supply. Use of different power supplies could result in the module malfunctioning.
- To prevent the module from malfunctioning or failure, switch the module off before shorting or opening operating mode setup terminals.

Inputs to this module must be pulse signals as shown in Figure 3-58.

■ Single-phase input



■ Two-phase input



Symbol	Meaning	Specifications
T	Frequency of pulses	20 kHz or lower
t1	Rise/Fall time	2.5μs or less
t2	Duty ratio (cycle) with pulse frequency T	50% ±10%
t3	Phase difference	90º ±20º

Figure 3-58 Pulse Waveform Specifications

3.26 LQA000 (Voltage inputs, 4 points)

Table 3-37 LQA000 Specifications

Item		Specification		
Input range		±5 VDC	±10 VDC	+1 to 5 VDC
RANGE switch setting		0	1	2
Number of input channels		Four channels		
Insulation method		Photocoupler insulation (common to four channels)		
Maximum input voltage		±15 V	±15 V	±12 V
Number of A/D conversion bits		12 bits (sign + 11 bits)		
Conversion rate		±2,000 digit/±5 V 0 digit: 0 V	±2,000 digit/ ±10 V 0 digit: 0 V	±2,000 digit/±4 V 0 digit: 0 V
Total accuracy	Ambient temperature 25°C	±8 digits or less		
	Ambient temperature 0 to 55°C	±20 digits or less		
Maximum response time	MODE 1	5 ms + TRC (remote I/O transfer) 5 ms + RC (J.NET transfer)		
	MODE 2	5 ms + 4TRC (remote I/O transfer) 5 ms + RC (J.NET transfer)		
Input filter		Attenuation factor: 9.1 dB/60 Hz Time constant: approx. 5 ms		
Input impedance	Power ON	5 MΩ or more		
	Power OFF	3 kΩ or more		
Internal current dissipation		Module REV A: 500 mA or less		
		Module REV B or later: 580 mA or less		
Dielectric voltage		1,500 VAC, 1 minute (between external terminals in a batch and ground)		
External wiring	Connection method	18-point terminal block connector (screw: M3)		
	Compatible wire	0.3 to 1.25 mm^2		
	Tightening torque	Approx. 6 to 8 N·m		
	Allowable wiring length	200 m (shielded twisted-pair cable)		
Mass		230 g		

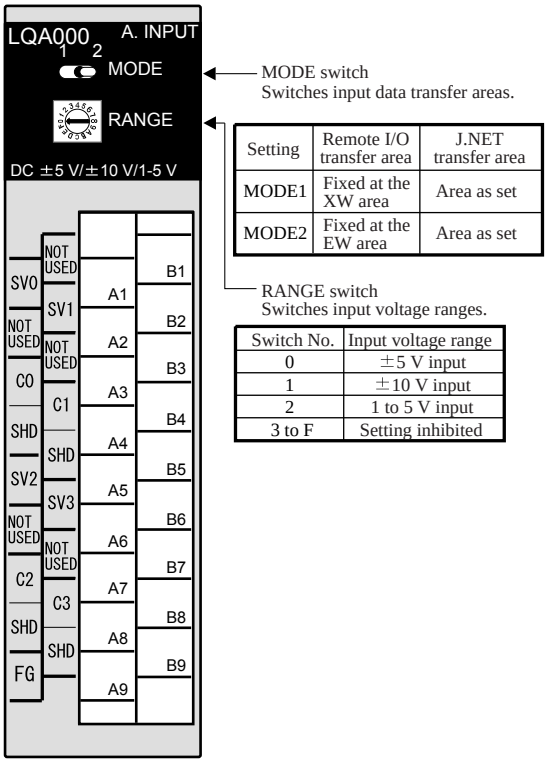


Figure 3-59 LQA000 Appearance

- The response delay does not include input filter delays.
- TRC denotes a remote I/O transfer time.
- RC denotes a refresh cycle time set from J.NET.
- While a data transfer on remote I/O or J.NET is suspended, the input data is held at its value in effect just before the suspension of the transfer.

CAUTION

Power off the module before setting the MODE and RANGE switches.

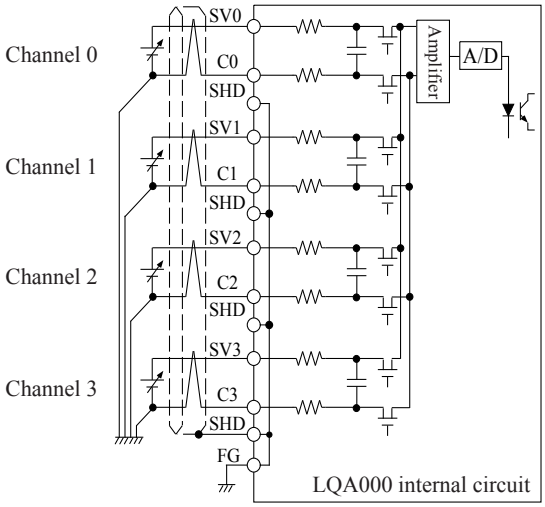


Figure 3-60 LQA000 Circuit

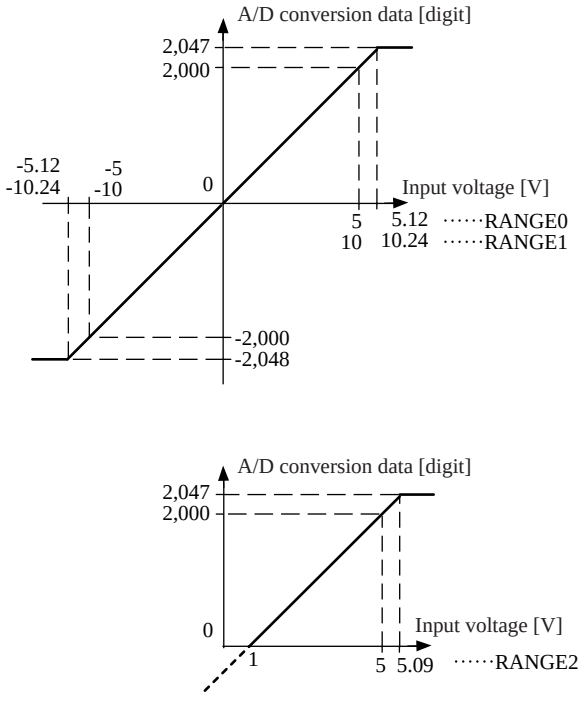


Figure 3-61 LQA000 A/D Conversion Characteristics

(1) MODE 1 input data format (Data area: XW area)

	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
Word 1	S	Channel 0 A/D conversion data											0	0	0	0
Word 2	S	Channel 1 A/D conversion data											0	0	0	0
Word 3	S	Channel 2 A/D conversion data											0	0	0	0
Word 4	S	Channel 3 A/D conversion data											0	0	0	0

A/D conversion data: -2,048 to +2,047 (S: Sign bit)　　Fixed at 0

- A/D conversion data in times of overflow
  Positive side: +2,047 (H7FF)
  Negative side: -2,048 (H800)
- Immediately after power ON (approximately 500 ms), the A/D conversion data is set to H000.

(2) MODE 2 input data format (Data area: EW area)

	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
Word 1	S	S	S	S	S	Channel 0 A/D conversion data										
Word 2	S	S	S	S	S	Channel 1 A/D conversion data										
Word 3	S	S	S	S	S	Channel 2 A/D conversion data										
Word 4	S	S	S	S	S	Channel 3 A/D conversion data										

The content of the sign bit is reflected here.　　A/D conversion data: -2,048 to +2,047 (S: Sign bit)

- A/D conversion data in times of overflow
  Positive side: +2,047 (H7FF)
  Negative side: -2,048 (H800)
- Immediately after power ON (approximately 500 ms), the data in the EW area is set to H8000 (invalid data).

Figure 3-62　LQA000 Input Data Format

3.27 LQA050 (Voltage inputs, 8 points, common input for the SC* side of each channel)

Table 3-38 LQA050 Specifications

Item		Specification		
Input range		±5 VDC	±10 VDC	+1 to 5 VDC
Number of input channels		Eight channels		
Insulation method		Photocoupler insulation (common to eight channels)		
Maximum input voltage		±14 V		
Number of A/D conversion bits		12 bits (sign + 11 bits) or 14 bits (sign + 13 bits)		
Conversion rate		±2,000 digit/±5 V (±8,000 digit/±5 V) 0 digit: 0 V	±2,000 digit/±10 V (±8,000 digit/±10 V) 0 digit: 0 V	2,000 digit/4 V (8,000 digit/4 V) 0 digit: 1 V
Total accuracy	Ambient temperature 25°C	±0.15%/Full scale (12 bit: 6 digit, 14 bit: 24 digit)		
	Ambient temperature 0 to 55°C	±0.4%/ Full scale (12 bit: 16 digit, 14 bit: 64 digit)		
Maximum response time	MODE 1	5.12 ms + TRC (remote I/O transfer) 5.12 ms + RC (J.NET transfer)		
	MODE 2	5.12 ms + 8TRC (remote I/O transfer) 5.12 ms + RC (J.NET transfer)		
	MODE 3	5.12 ms + TRC (remote I/O transfer) 5.12 ms + RC (J.NET transfer)		
	MODE 4	5.12 ms + 4TRC (remote I/O transfer) 5.12 ms + RC (J.NET transfer)		
Input filter		Attenuation factor: 8.9 dB/60 Hz Time constant: 4.8 ms		
Input impedance	Power ON	5 MΩ or more		
	Power OFF	4.8 kΩ or more		
Internal current dissipation		500 mA or less		
Dielectric voltage		500 VAC, 1 minute (between external terminals in a batch and ground)		
External wiring	Connection method	18-point terminal block connector (screw: M3)		
	Compatible wire	0.3 to 1.25 mm^2		
	Tightening torque	6 to 8 kg·cm		
	Allowable wiring length	200 m (shielded twisted-pair cable)		
Mass		170 g		

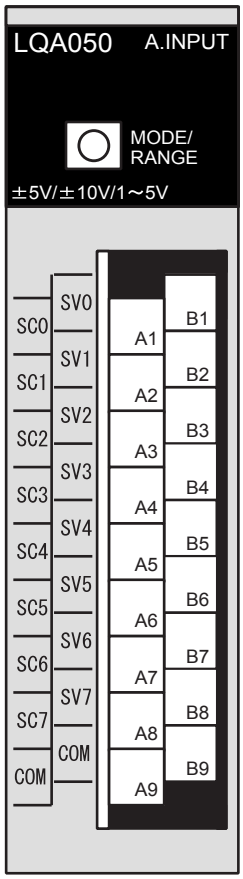


Figure 3-63 LQA050 Appearance

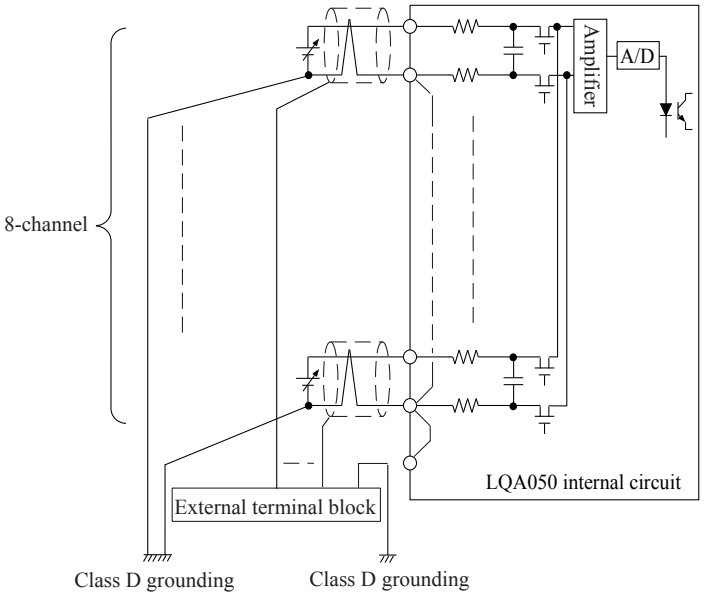
• MODE/RANGE switch − Description

Switch setting	Input voltage		Description of mode	Switch setting	Input voltage		Description of mode
0	MODE 1	±5 V	Performs 12-bit A/D conversions on inputs and sets the resulting 8-channel data in the XW area.	8	MODE 3	±5 V	Performs 14-bit A/D conversions on inputs and sets the resulting 8-channel data in the XW area.
1		±10 V		9		±10 V	
2		1 to 5 V		A		1 to 5 V	
3		Prohibited setting		B		Prohibited setting	
4	MODE 2	±5 V	Performs 12-bit A/D conversions on inputs and sets the resulting 8-channel data in the EW area.	C	MODE 4	±5 V	Performs 12-bit A/D conversions on inputs and sets the resulting 8-channel data in the EW area. (Provided as a mode for use on existing S10mini hardware systems.)
5		±10 V		D		±10 V	
6		1 to 5 V		E		1 to 5 V	
7		Prohibited setting		F		Prohibited setting	

- The response delay does not include input filter delays.
- TRC denotes a remote I/O transfer time.
- RC denotes a refresh cycle time set from J.NET.
- While a data transfer on remote I/O or J.NET is suspended, the input data is held at its value in effect just before the suspension of the transfer.

CAUTION

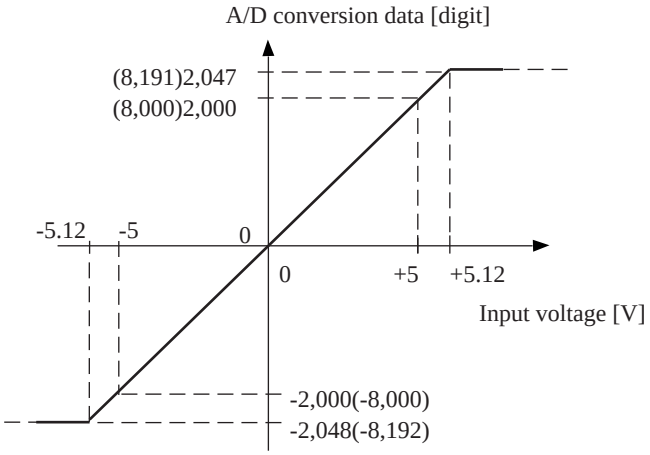
Power off the module before setting the MODE and RANGE switches.



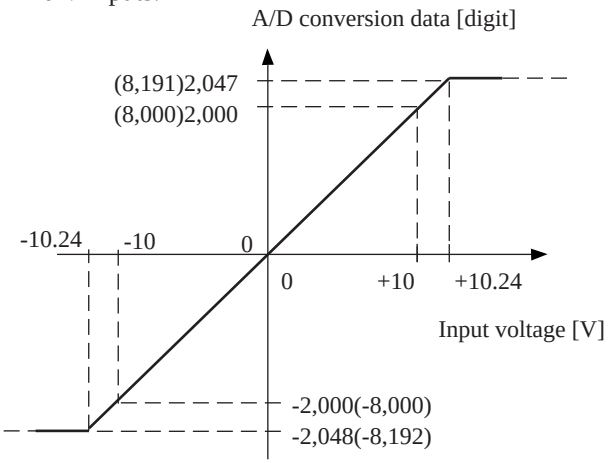
CAUTION
Wire the cable shield to the external terminal block and use Class D grounding collectively.

Figure 3-64 LQA050 Circuit

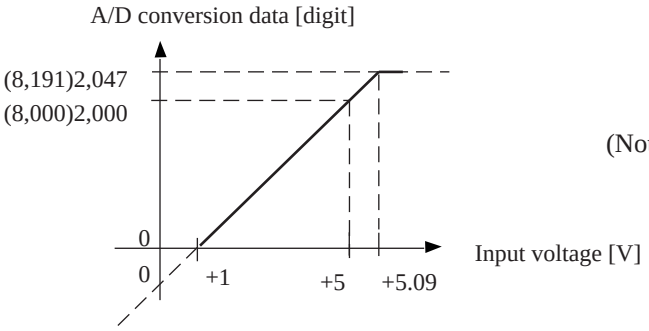
Given ±5 V inputs:



Given ±10 V inputs:



Given 1 to 5 V inputs:



(Note) Each number in parentheses is the result of a 14-bit conversion.

Figure 3-65 LQA050 A/D Conversion Characteristics

(1) MODE 1 input data format (Data area: XW area)

	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
Word 1	S	Channel 0 A/D conversion data											0	0	0	0
Word 2	S	Channel 1 A/D conversion data											0	0	0	0
Word 3	S	Channel 2 A/D conversion data											0	0	0	0
Word 4	S	Channel 3 A/D conversion data											0	0	0	0
Word 5	S	Channel 4 A/D conversion data											0	0	0	0
Word 6	S	Channel 5 A/D conversion data											0	0	0	0
Word 7	S	Channel 6 A/D conversion data											0	0	0	0
Word 8	S	Channel 7 A/D conversion data											0	0	0	0

A/D conversion data: -2,048 to +2,047 (S: Sign bit)　　Fixed at 0

- A/D conversion data in times of overflow
  Positive side: +2,047 (H7FF)
  Negative side: -2,048 (H800)
- Immediately after power ON (approximately 500 ms), the A/D conversion data is set to H000.

(2) MODE 2 input data format (Data area: EW area, a continuous area for setting 8-channel data in it)

	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
Word 1	S	S	S	S	S	Channel 0 A/D conversion data										
Word 2	S	S	S	S	S	Channel 1 A/D conversion data										
Word 3	S	S	S	S	S	Channel 2 A/D conversion data										
Word 4	S	S	S	S	S	Channel 3 A/D conversion data										
Word 5	S	S	S	S	S	Channel 4 A/D conversion data										
Word 6	S	S	S	S	S	Channel 5 A/D conversion data										
Word 7	S	S	S	S	S	Channel 6 A/D conversion data										
Word 8	S	S	S	S	S	Channel 7 A/D conversion data										

The content of the sign bit is reflected here.　　A/D conversion data: -2,048 to +2,047 (S: Sign bit)

- A/D conversion data in times of overflow
  Positive side: +2,047 (H7FF)
  Negative side: -2,048 (H800)
- Immediately after power ON (approximately 500 ms), the A/D conversion data is set to H000.

Figure 3-66　LQA050 Input Data Formats (1/2)

(3) MODE 3 input data format (Data area: XW area)

	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
Word 1	S	Channel 0 A/D conversion data													0	0
Word 2	S	Channel 1 A/D conversion data													0	0
Word 3	S	Channel 2 A/D conversion data													0	0
Word 4	S	Channel 3 A/D conversion data													0	0
Word 5	S	Channel 4 A/D conversion data													0	0
Word 6	S	Channel 5 A/D conversion data													0	0
Word 7	S	Channel 6 A/D conversion data													0	0
Word 8	S	Channel 7 A/D conversion data													0	0

A/D conversion data: -8,192 to +8,191 (S: Sign bit)　　Fixed at 0

- A/D conversion data in times of overflow
  Positive side: +8,191 (H1FFF)
  Negative side: -8,192 (HE000)
- Immediately after power ON (approximately 500 ms), the A/D conversion data is set to H000.

(4) MODE 4 input data format (Data area: EW area, where the two halves of the 8-channel data are set separately)

	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
Word 1	S	S	S	S	S	Channel 0 A/D conversion data										
Word 2	S	S	S	S	S	Channel 1 A/D conversion data										
Word 3	S	S	S	S	S	Channel 2 A/D conversion data										
Word 4	S	S	S	S	S	Channel 3 A/D conversion data										
Word 5	S	S	S	S	S	Channel 4 A/D conversion data										
Word 6	S	S	S	S	S	Channel 5 A/D conversion data										
Word 7	S	S	S	S	S	Channel 6 A/D conversion data										
Word 8	S	S	S	S	S	Channel 7 A/D conversion data										

The content of the sign bit is reflected here.　　A/D conversion data: -2,048 to +2,047 (S: Sign bit)

- A/D conversion data in times of overflow
  Positive side: +2,047 (H7FF)
  Negative side: -2,048 (H800)
- Immediately after power ON (approximately 500 ms), the A/D conversion data is set to H000.

Figure 3-66　LQA050 Input Data Formats (2/2)

3.28 LQA055 (Voltage inputs, 8 points, different input for the SC* side of each channel)

Table 3-39 LQA055 Specifications

Item		Specification		
Input range		±5 VDC	±10 VDC	+1 to 5 VDC
Number of input channels		Eight channels		
Insulation method		Photocoupler insulation (common to eight channels)		
Maximum input voltage		±14 V		
Number of A/D conversion bits		12 bits (sign + 11 bits) or 14 bits (sign + 13 bits)		
Conversion rate		±2,000 digit/±5 V (±8,000 digit/±5 V) 0 digit: 0 V	±2,000 digit/±10 V (±8,000 digit/±10 V) 0 digit: 0 V	2,000 digit/4 V (8,000 digit/4 V) 0 digit: 1 V
Total accuracy	Ambient temperature 25°C	±0.15%/Full scale (12 bit: 6 digit, 14 bit: 24 digit)		
	Ambient temperature 0 to 55°C	±0.4%/ Full scale (12 bit: 16 digit, 14 bit: 64 digit)		
Maximum response time	MODE 1	5.12 ms + TRC (remote I/O transfer) 5.12 ms + RC (J.NET transfer)		
	MODE 2	5.12 ms + 8TRC (remote I/O transfer) 5.12 ms + RC (J.NET transfer)		
	MODE 3	5.12 ms + TRC (remote I/O transfer) 5.12 ms + RC (J.NET transfer)		
	MODE 4	5.12 ms + 4TRC (remote I/O transfer) 5.12 ms + RC (J.NET transfer)		
Input filter		Attenuation factor: 8.9 dB/60 Hz Time constant: 4.8 ms		
Input impedance	Power ON	5 MΩ or more		
	Power OFF	4.8 kΩ or more		
Internal current dissipation		500 mA or less		
Dielectric voltage		500 VAC, 1 minute (between external terminals in a batch and ground)		
External wiring	Connection method	18-point terminal block connector (screw: M3)		
	Compatible wire	0.3 to 1.25 mm^2		
	Tightening torque	6 to 8 kg·cm		
	Allowable wiring length	200 m (shielded twisted-pair cable)		
Mass		170 g		

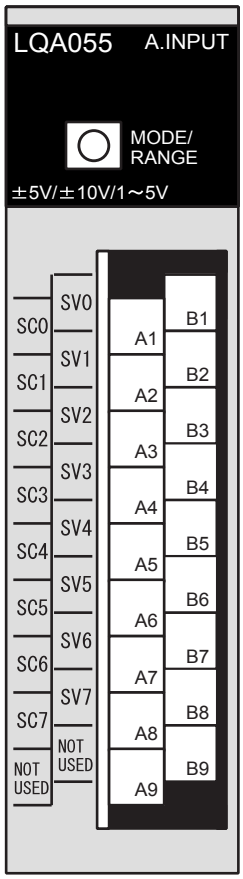


Figure 3-67 LQA055 Appearance

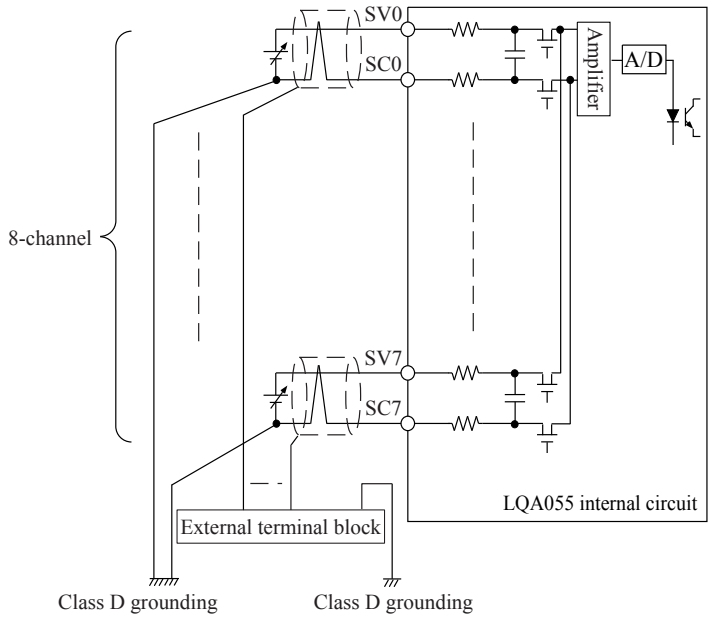
• MODE/RANGE switch − Description

Switch setting	Input voltage		Description of mode	Switch setting	Input voltage		Description of mode
0	MODE 1	±5 V	Performs 12-bit A/D conversions on inputs and sets the resulting 8-channel data in the XW area.	8	MODE 3	±5 V	Performs 14-bit A/D conversions on inputs and sets the resulting 8-channel data in the XW area.
1		±10 V		9		±10 V	
2		1 to 5 V		A		1 to 5 V	
3		Prohibited setting		B		Prohibited setting	
4	MODE 2	±5 V	Performs 12-bit A/D conversions on inputs and sets the resulting 8-channel data in the EW area.	C	MODE 4	±5 V	Performs 12-bit A/D conversions on inputs and sets the resulting 8-channel data in the EW area. (Provided as a mode for use on existing S10mini hardware systems.)
5		±10 V		D		±10 V	
6		1 to 5 V		E		1 to 5 V	
7		Prohibited setting		F		Prohibited setting	

- The response delay does not include input filter delays.
- TRC denotes a remote I/O transfer time.
- RC denotes a refresh cycle time set from J.NET.
- While a data transfer on remote I/O or J.NET is suspended, the input data is held at its value in effect just before the suspension of the transfer.

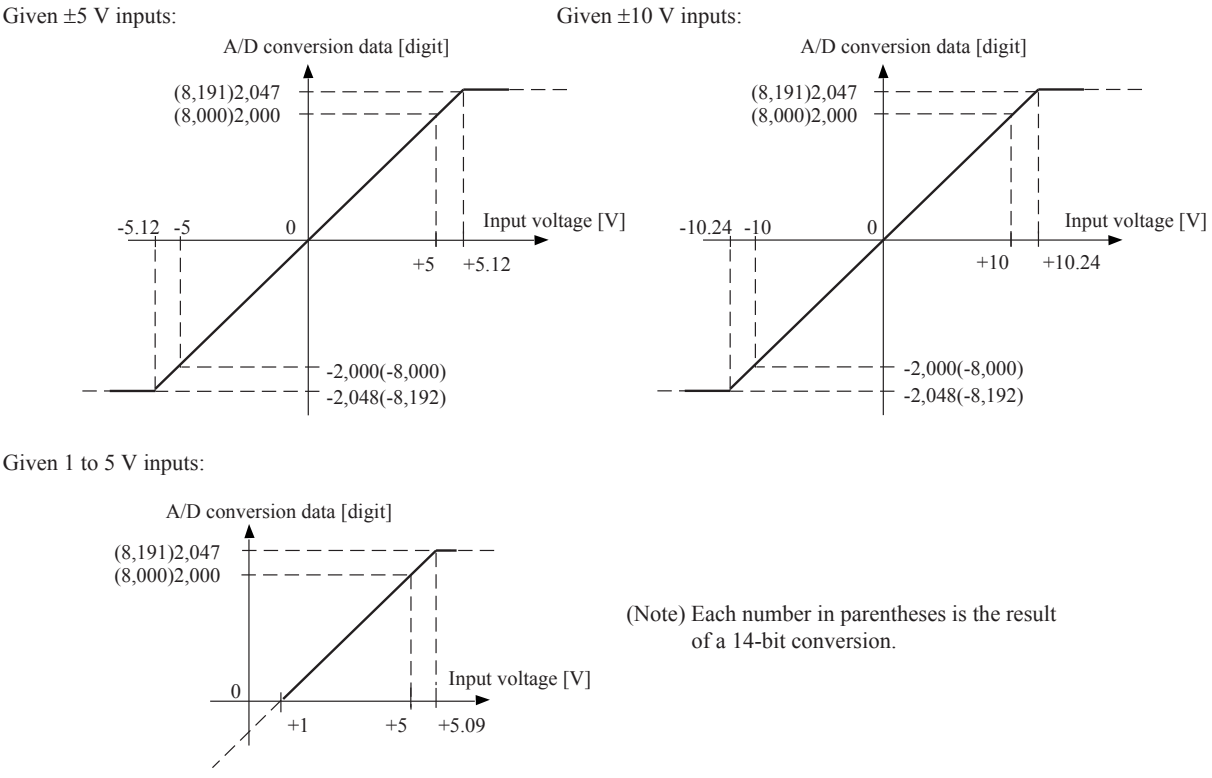
CAUTION

Power off the module before setting the MODE and RANGE switches.



CAUTION
Wire the cable shield to the external terminal block and use Class D grounding collectively.

Figure 3-68 LQA055 Circuit



(Note) Each number in parentheses is the result of a 14-bit conversion.

Figure 3-69 LQA055 A/D Conversion Characteristics

(1) MODE 1 input data format (Data area: XW area)

	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
Word 1	S	Channel 0 A/D conversion data											0	0	0	0
Word 2	S	Channel 1 A/D conversion data											0	0	0	0
Word 3	S	Channel 2 A/D conversion data											0	0	0	0
Word 4	S	Channel 3 A/D conversion data											0	0	0	0
Word 5	S	Channel 4 A/D conversion data											0	0	0	0
Word 6	S	Channel 5 A/D conversion data											0	0	0	0
Word 7	S	Channel 6 A/D conversion data											0	0	0	0
Word 8	S	Channel 7 A/D conversion data											0	0	0	0

A/D conversion data: -2,048 to +2,047 (S: Sign bit)　　Fixed at 0

- A/D conversion data in times of overflow
  Positive side: +2,047 (H7FF)
  Negative side: -2,048 (H800)
- Immediately after power ON (approximately 500 ms), the A/D conversion data is set to H000.

(2) MODE 2 input data format (Data area: EW area, a continuous area for setting 8-channel data in it)

	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
Word 1	S	S	S	S	S	Channel 0 A/D conversion data										
Word 2	S	S	S	S	S	Channel 1 A/D conversion data										
Word 3	S	S	S	S	S	Channel 2 A/D conversion data										
Word 4	S	S	S	S	S	Channel 3 A/D conversion data										
Word 5	S	S	S	S	S	Channel 4 A/D conversion data										
Word 6	S	S	S	S	S	Channel 5 A/D conversion data										
Word 7	S	S	S	S	S	Channel 6 A/D conversion data										
Word 8	S	S	S	S	S	Channel 7 A/D conversion data										

The content of the sign bit is reflected here.　　A/D conversion data: -2,048 to +2,047 (S: Sign bit)

- A/D conversion data in times of overflow
  Positive side: +2,047 (H7FF)
  Negative side: -2,048 (H800)
- Immediately after power ON (approximately 500 ms), the A/D conversion data is set to H000.

Figure 3-70　LQA055 Input Data Formats (1/2)

(3) MODE 3 input data format (Data area: XW area)

	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
Word 1	S	Channel 0 A/D conversion data													0	0
Word 2	S	Channel 1 A/D conversion data													0	0
Word 3	S	Channel 2 A/D conversion data													0	0
Word 4	S	Channel 3 A/D conversion data													0	0
Word 5	S	Channel 4 A/D conversion data													0	0
Word 6	S	Channel 5 A/D conversion data													0	0
Word 7	S	Channel 6 A/D conversion data													0	0
Word 8	S	Channel 7 A/D conversion data													0	0

A/D conversion data: -8,192 to +8,191 (S: Sign bit)　　Fixed at 0

- A/D conversion data in times of overflow
  Positive side: +8,191 (H1FFF)
  Negative side: -8,192 (HE000)
- Immediately after power ON (approximately 500 ms), the A/D conversion data is set to H000.

(4) MODE 4 input data format (Data area: EW area, where the two halves of the 8-channel data are set separately)

	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
Word 1	S	S	S	S	S	Channel 0 A/D conversion data										
Word 2	S	S	S	S	S	Channel 1 A/D conversion data										
Word 3	S	S	S	S	S	Channel 2 A/D conversion data										
Word 4	S	S	S	S	S	Channel 3 A/D conversion data										
Word 5	S	S	S	S	S	Channel 4 A/D conversion data										
Word 6	S	S	S	S	S	Channel 5 A/D conversion data										
Word 7	S	S	S	S	S	Channel 6 A/D conversion data										
Word 8	S	S	S	S	S	Channel 7 A/D conversion data										

The content of the sign bit is reflected here.　　A/D conversion data: -2,048 to +2,047 (S: Sign bit)

- A/D conversion data in times of overflow
  Positive side: +2,047 (H7FF)
  Negative side: -2,048 (H800)
- Immediately after power ON (approximately 500 ms), the A/D conversion data is set to H000.

Figure 3-70　LQA055 Input Data Formats (2/2)

3.29 LQA100 (Current inputs, 4 points)

Table 3-40 LQA100 Specifications

Item		Specification
Input range		4 to 20 mA DC
Number of input channels		Four channels
Insulation method		Photocoupler insulation (common to four channels)
Maximum input current		±25 mA
Number of A/D conversion bits		12 bits (sign + 11 bits)
Conversion rate		2,000 digit/16 mA 0 digit: 4 mA
Total accuracy	Ambient temperature 25°C	±8 digits or less
	Ambient temperature 0 to 55°C	±20 digits or less
Maximum response time	MODE 1	5 ms + TRC (remote I/O transfer) 5 ms + RC (J.NET transfer)
	MODE 2	5 ms + 4TRC (remote I/O transfer) 5 ms + RC (J.NET transfer)
Input filter		Attenuation factor: 9.1 dB/60 Hz Time constant: approx. 5 ms
Input impedance	Power ON	250 Ω or more
	Power OFF	230 Ω or more
Internal current dissipation		Module REV A: 500 mA or less
		Module REV B or later: 580 mA or less
Dielectric voltage		1,500 VAC, 1 minute (between external terminals in a batch and ground)
External wiring	Connection method	18-point terminal strip connector (screw: M3)
	Compatible wire	0.3 to 1.25 mm^2
	Tightening torque	Approx. 6 to 8 N·m
	Allowable wiring length	200 m (shielded twisted-pair cable)
Mass		230 g

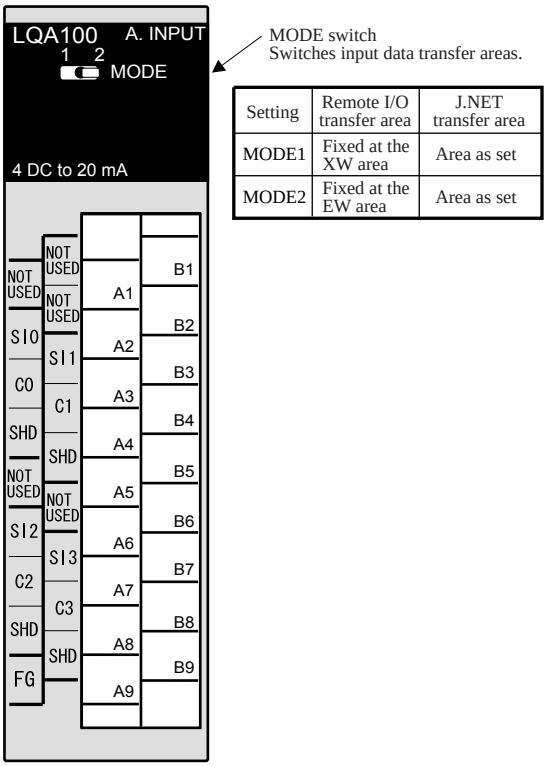


Figure 3-71 LQA100 Appearance

- The response delay does not include input filter delays.
- TRC denotes a remote I/O transfer time.
- RC denotes a refresh cycle time set from J.NET.
- While a data transfer on remote I/O or J.NET is suspended, the input data is held at its value in effect just before the suspension of the transfer.

CAUTION

Power off the module before setting the MODE switch.

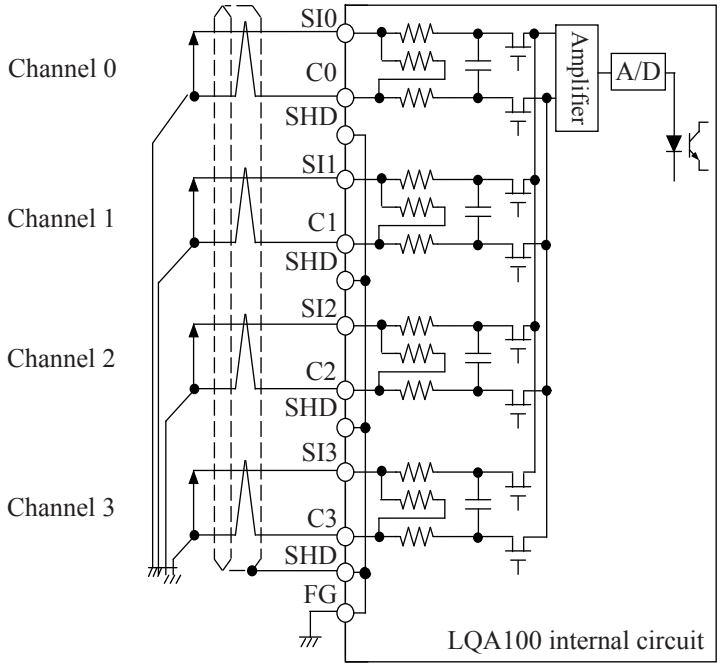


Figure 3-72 LQA100 Circuit

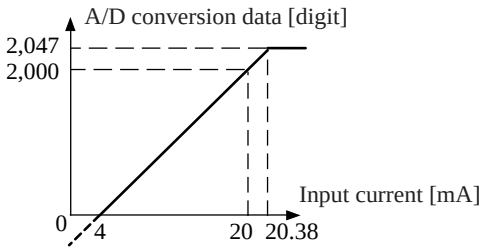


Figure 3-73 LQA100 A/D Conversion Characteristics

(1) MODE 1 input data format (Data area: XW area)

	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
Word 1	S	Channel 0 A/D conversion data											0	0	0	0
Word 2	S	Channel 1 A/D conversion data											0	0	0	0
Word 3	S	Channel 2 A/D conversion data											0	0	0	0
Word 4	S	Channel 3 A/D conversion data											0	0	0	0

A/D conversion data: 0 to +2,047 (S: Sign bit)(*)

Fixed at 0

(*) While the sign bit is normally 0, it is set to 1 when an input current less than 4 mA is received, in which case the accuracy of the A/D conversion data is not warranted.

- A/D conversion data in times of overflow
  Positive side: +2,047 (H7FF)
  Negative side: -2,048 (H800)
- Immediately after power ON (approximately 500 ms), the A/D conversion data is set to H000.

(2) MODE 2 input data format (Data area: EW area)

	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
Word 1	S	S	S	S	S	Channel 0 A/D conversion data										
Word 2	S	S	S	S	S	Channel 1 A/D conversion data										
Word 3	S	S	S	S	S	Channel 2 A/D conversion data										
Word 4	S	S	S	S	S	Channel 3 A/D conversion data										

The content of the sign bit is reflected here.

A/D conversion data: 0 to +2,047 (S: Sign bit)(*)

(*) While the sign bit is normally 0, it is set to 1 when an input current less than 4 mA is received, in which case the accuracy of the A/D conversion data is not warranted.

- A/D conversion data in times of overflow
  Positive side: +2,407 (H7FF)
  Negative side: -2,048 (H800)
- Immediately after power ON (approximately 500 ms), the data in the EW area is set to H8000 (invalid data).

Figure 3-74 LQA100 Input Data Format

3.30 LQA150 (Current inputs, 8 points, common input for the SC* side of each channel)

Table 3-41 LQA150 Specifications

Item		Specification
Input range		4 to 20 mA
Number of input channels		Eight channels
Insulation method		Photocoupler insulation (common to eight channels)
Maximum input voltage		24 mA
Number of A/D conversion bits		12 bits (sign + 11 bits) or 14 bits (sign + 13 bits)
Conversion rate		2,000 digit/16 mA (8,000 digit/16 mA) 0 digit: 4 mA
Total accuracy	Ambient temperature 25°C	±0.15%/Full scale (12 bit: 6 digit, 14 bit: 24 digit)
	Ambient temperature 0 to 55°C	±0.4%/Full scale (12 bit: 16 digit, 14 bit: 64 digit)
Maximum response time	MODE 1	5.12 ms + TRC (remote I/O transfer) 5.12 ms + RC (J.NET transfer)
	MODE 2	5.12 ms + 8TRC (remote I/O transfer) 5.12 ms + RC (J.NET transfer)
	MODE 3	5.12 ms + TRC (remote I/O transfer) 5.12 ms + RC (J.NET transfer)
	MODE 4	5.12 ms + 4TRC (remote I/O transfer) 5.12 ms + RC (J.NET transfer)
Input filter		Attenuation factor: 8.9 dB/60 Hz Time constant: 4.8 ms
Input impedance	Power ON	250 Ω or more
	Power OFF	237 Ω or more
Internal current dissipation		550 mA or less
Dielectric voltage		500 VAC, 1 minute (between external terminals in a batch and ground)
External wiring	Connection method	18-point terminal block connector (screw: M3)
	Compatible wire	0.3 to 1.25 mm^2
	Tightening torque	6 to 8 kg•cm
	Allowable wiring length	200 m (shielded twisted-pair cable)
Mass		170 g

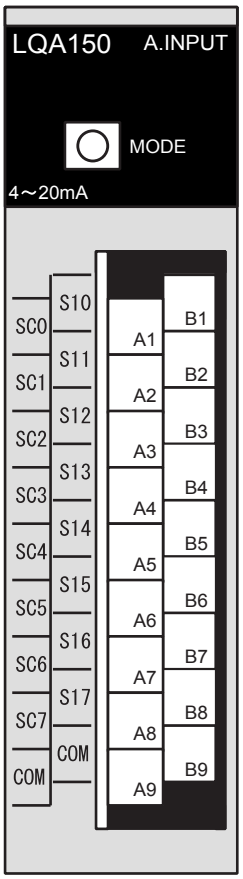


Figure 3-75 LQA150 Appearance

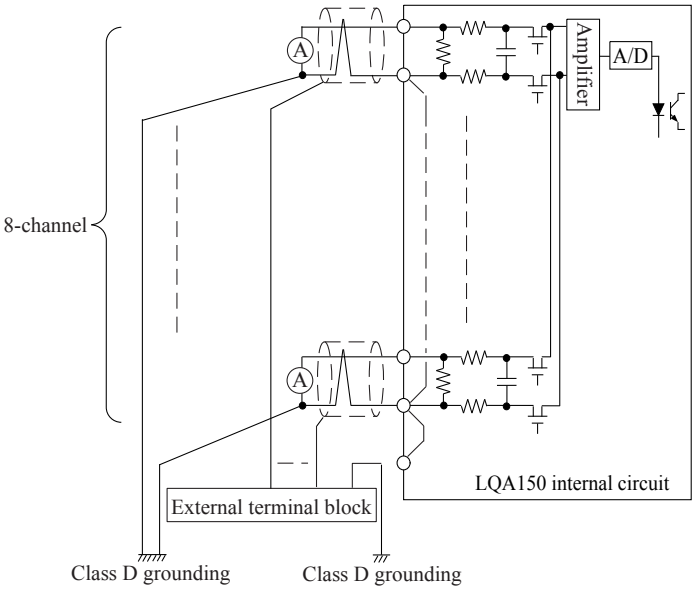
• MODE switch − Description

Switch setting	Input voltage		Description of mode	Switch setting	Input voltage		Description of mode
0	MODE 1	4 to 20 mA	Performs 12-bit A/D conversions on inputs and sets the resulting 8-channel data in the XW area.	8	MODE 3	4 to 20 mA	Performs 14-bit A/D conversions on inputs and sets the resulting 8-channel data in the XW area.
1		Prohibited setting		9		Prohibited setting	
2				A			
3				B			
4	MODE 2	4 to 20 mA	Performs 12-bit A/D conversions on inputs and sets the resulting 8-channel data in the EW area.	C	MODE 4	4 to 20 mA	Performs 12-bit A/D conversions on inputs and sets the resulting 8-channel data in the EW area. (Provided as a mode for use on existing S10mini hardware systems.)
5		Prohibited setting		D		Prohibited setting	
6				E			
7				F			

- The response delay does not include input filter delays.
- TRC denotes a remote I/O transfer time.
- RC denotes a refresh cycle time set from J.NET.
- While a data transfer on remote I/O or J.NET is suspended, the input data is held at its value in effect just before the suspension of the transfer.

CAUTION

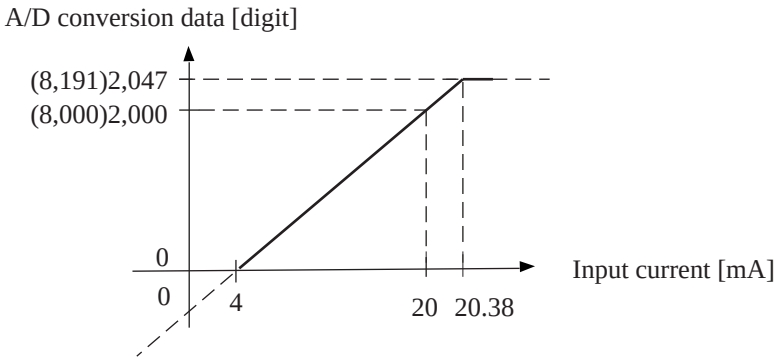
Power off the module before setting the MODE switch.



CAUTION
Wire the cable shield to the external terminal block and use Class D grounding collectively.

Figure 3-76 LQA150 Circuit

Given 4 to 20 mA inputs:



(Note) Each number in parentheses is the result of a 14-bit conversion.

Figure 3-77 LQA150 A/D Conversion Characteristics

(1) MODE 1 input data format (Data area: XW area)

	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
Word 1	S	Channel 0 A/D conversion data											0	0	0	0
Word 2	S	Channel 1 A/D conversion data											0	0	0	0
Word 3	S	Channel 2 A/D conversion data											0	0	0	0
Word 4	S	Channel 3 A/D conversion data											0	0	0	0
Word 5	S	Channel 4 A/D conversion data											0	0	0	0
Word 6	S	Channel 5 A/D conversion data											0	0	0	0
Word 7	S	Channel 6 A/D conversion data											0	0	0	0
Word 8	S	Channel 7 A/D conversion data											0	0	0	0

A/D conversion data: 0 to 2,047 (S: Sign bit)　　Fixed at 0

- A/D conversion data in times of overflow
  Positive side: +2,047 (H7FF)
  Negative side: -2,048 (H800)
- Immediately after power ON (approximately 500 ms), the A/D conversion data is set to H000.

(2) MODE 2 input data format (Data area: EW area, a continuous area for setting 8-channel data in it)

	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
Word 1	S	S	S	S	S	Channel 0 A/D conversion data										
Word 2	S	S	S	S	S	Channel 1 A/D conversion data										
Word 3	S	S	S	S	S	Channel 2 A/D conversion data										
Word 4	S	S	S	S	S	Channel 3 A/D conversion data										
Word 5	S	S	S	S	S	Channel 4 A/D conversion data										
Word 6	S	S	S	S	S	Channel 5 A/D conversion data										
Word 7	S	S	S	S	S	Channel 6 A/D conversion data										
Word 8	S	S	S	S	S	Channel 7 A/D conversion data										

The content of the sign bit is reflected here.　　A/D conversion data: 0 to 2,047 (S: Sign bit)

- A/D conversion data in times of overflow
  Positive side: +2,047 (H7FF)
  Negative side: -2,048 (H800)
- Immediately after power ON (approximately 500 ms), the A/D conversion data is set to H000.

Figure 3-78　LQA150 Input Data Formats (1/2)

(3) MODE 3 input data format (Data area: XW area)

	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
Word 1	S	Channel 0 A/D conversion data													0	0
Word 2	S	Channel 1 A/D conversion data													0	0
Word 3	S	Channel 2 A/D conversion data													0	0
Word 4	S	Channel 3 A/D conversion data													0	0
Word 5	S	Channel 4 A/D conversion data													0	0
Word 6	S	Channel 5 A/D conversion data													0	0
Word 7	S	Channel 6 A/D conversion data													0	0
Word 8	S	Channel 7 A/D conversion data													0	0

A/D conversion data: 0 to 8,191 (S: Sign bit)　　Fixed at 0

- A/D conversion data in times of overflow
  Positive side: +8,191 (H1FFF)
  Negative side: -8,192 (HE000)
- Immediately after power ON (approximately 500 ms), the A/D conversion data is set to H000.

(4) MODE 4 input data format (Data area: EW area, where the two halves of the 8-channel data are set separately)

	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
Word 1	S	S	S	S	S	Channel 0 A/D conversion data										
Word 2	S	S	S	S	S	Channel 1 A/D conversion data										
Word 3	S	S	S	S	S	Channel 2 A/D conversion data										
Word 4	S	S	S	S	S	Channel 3 A/D conversion data										
Word 5	S	S	S	S	S	Channel 4 A/D conversion data										
Word 6	S	S	S	S	S	Channel 5 A/D conversion data										
Word 7	S	S	S	S	S	Channel 6 A/D conversion data										
Word 8	S	S	S	S	S	Channel 7 A/D conversion data										

The content of the sign bit is reflected here.　　A/D conversion data: 0 to 2,047 (S: Sign bit)

- A/D conversion data in times of overflow
  Positive side: +2,047 (H7FF)
  Negative side: -2,048 (H800)
- Immediately after power ON (approximately 500 ms), the A/D conversion data is set to H000.

Figure 3-78　LQA150 Input Data Formats (2/2)

3.31 LQA155 (Current inputs, 8 points, different input for the SC* side of each channel)

Table 3-42 LQA155 Specifications

Item		Specification
Input range		4 to 20 mA
Number of input channels		Eight channels
Insulation method		Photocoupler insulation (common to eight channels)
Maximum input voltage		24 mA
Number of A/D conversion bits		12 bits (sign + 11 bits) or 14 bits (sign + 13 bits)
Conversion rate		2,000 digit/16 mA (8,000 digit/16 mA) 0 digit: 4 mA
Total accuracy	Ambient temperature 25°C	±0.15%/Full scale (12 bit: 6 digit, 14 bit: 24 digit)
	Ambient temperature 0 to 55°C	±0.4%/Full scale (12 bit: 16 digit, 14 bit: 64 digit)
Maximum response time	MODE 1	5.12 ms + TRC (remote I/O transfer) 5.12 ms + RC (J.NET transfer)
	MODE 2	5.12 ms + 8TRC (remote I/O transfer) 5.12 ms + RC (J.NET transfer)
	MODE 3	5.12 ms + TRC (remote I/O transfer) 5.12 ms + RC (J.NET transfer)
	MODE 4	5.12 ms + 4TRC (remote I/O transfer) 5.12 ms + RC (J.NET transfer)
Input filter		Attenuation factor: 8.9 dB/60 Hz Time constant: 4.8 ms
Input impedance	Power ON	250 Ω or more
	Power OFF	237 Ω or more
Internal current dissipation		550 mA or less
Dielectric voltage		500 VAC, 1 minute (between external terminals in a batch and ground)
External wiring	Connection method	18-point terminal block connector (screw: M3)
	Compatible wire	0.3 to 1.25 mm^2
	Tightening torque	6 to 8 kg･cm
	Allowable wiring length	200 m (shielded twisted-pair cable)
Mass		170 g

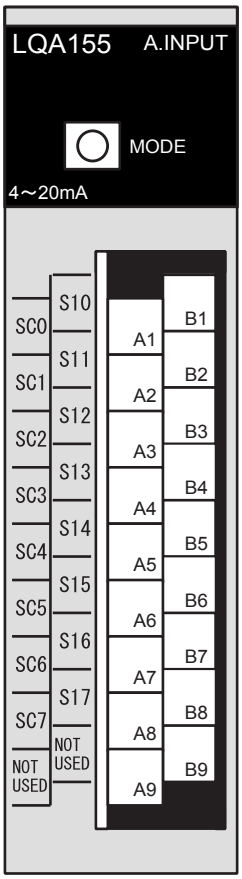


Figure 3-79 LQA155 Appearance

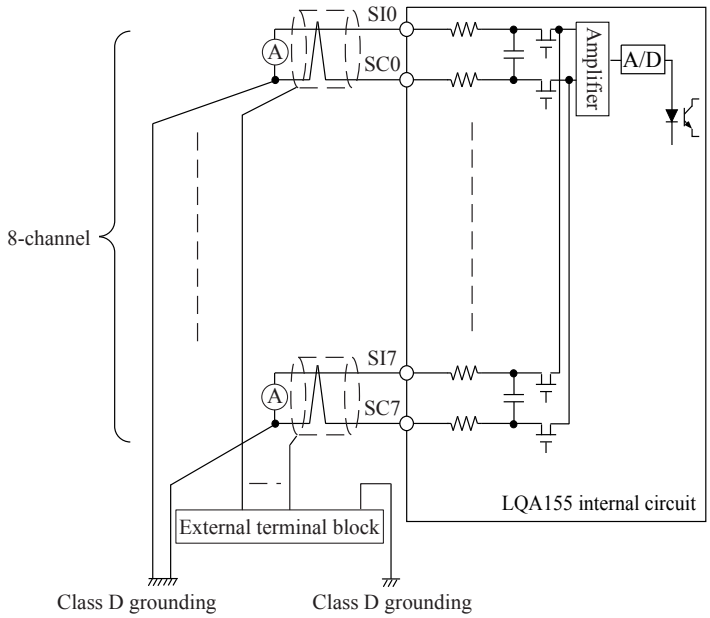
• MODE switch − Description

Switch setting	Input voltage		Description of mode	Switch setting	Input voltage		Description of mode
0	MODE 1	4 to 20 mA	Performs 12-bit A/D conversions on inputs and sets the resulting 8-channel data in the XW area.	8	MODE 3	4 to 20 mA	Performs 14-bit A/D conversions on inputs and sets the resulting 8-channel data in the XW area.
1		Prohibited setting		9		Prohibited setting	
2				A			
3				B			
4	MODE 2	4 to 20 mA	Performs 12-bit A/D conversions on inputs and sets the resulting 8-channel data in the EW area.	C	MODE 4	4 to 20 mA	Performs 12-bit A/D conversions on inputs and sets the resulting 8-channel data in the EW area. (Provided as a mode for use on existing S10mini hardware systems.)
5		Prohibited setting		D		Prohibited setting	
6				E			
7				F			

- The response delay does not include input filter delays.
- TRC denotes a remote I/O transfer time.
- RC denotes a refresh cycle time set from J.NET.
- While a data transfer on remote I/O or J.NET is suspended, the input data is held at its value in effect just before the suspension of the transfer.

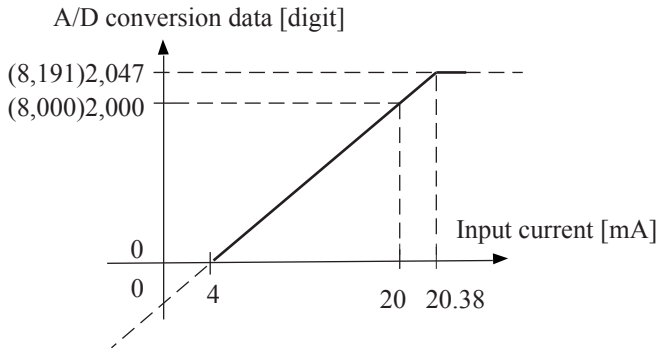
CAUTION

Power off the module before setting the MODE switch.



CAUTION
Wire the cable shield to the external terminal block and use Class D grounding collectively.

Figure 3-80 LQA155 Circuit



(Note) Each number in parentheses is the result of a 14-bit conversion.

Figure 3-81 LQA155 A/D Conversion Characteristics

(1) MODE 1 input data format (Data area: XW area)

	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
Word 1	S	Channel 0 A/D conversion data											0	0	0	0
Word 2	S	Channel 1 A/D conversion data											0	0	0	0
Word 3	S	Channel 2 A/D conversion data											0	0	0	0
Word 4	S	Channel 3 A/D conversion data											0	0	0	0
Word 5	S	Channel 4 A/D conversion data											0	0	0	0
Word 6	S	Channel 5 A/D conversion data											0	0	0	0
Word 7	S	Channel 6 A/D conversion data											0	0	0	0
Word 8	S	Channel 7 A/D conversion data											0	0	0	0

A/D conversion data: 0 to 2,047 (S: Sign bit)　　Fixed at 0

- A/D conversion data in times of overflow
  Positive side: +2,047 (H7FF)
  Negative side: -2,048 (H800)
- Immediately after power ON (approximately 500 ms), the A/D conversion data is set to H000.

(2) MODE 2 input data format (Data area: EW area, a continuous area for setting 8-channel data in it)

	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
Word 1	S	S	S	S	S	Channel 0 A/D conversion data										
Word 2	S	S	S	S	S	Channel 1 A/D conversion data										
Word 3	S	S	S	S	S	Channel 2 A/D conversion data										
Word 4	S	S	S	S	S	Channel 3 A/D conversion data										
Word 5	S	S	S	S	S	Channel 4 A/D conversion data										
Word 6	S	S	S	S	S	Channel 5 A/D conversion data										
Word 7	S	S	S	S	S	Channel 6 A/D conversion data										
Word 8	S	S	S	S	S	Channel 7 A/D conversion data										

The content of the sign bit is reflected here.　　A/D conversion data: 0 to 2,047 (S: Sign bit)

- A/D conversion data in times of overflow
  Positive side: +2,047 (H7FF)
  Negative side: -2,048 (H800)
- Immediately after power ON (approximately 500 ms), the A/D conversion data is set to H000.

Figure 3-82　LQA155 Input Data Formats (1/2)

(3) MODE 3 input data format (Data area: XW area)

	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
Word 1	S	Channel 0 A/D conversion data													0	0
Word 2	S	Channel 1 A/D conversion data													0	0
Word 3	S	Channel 2 A/D conversion data													0	0
Word 4	S	Channel 3 A/D conversion data													0	0
Word 5	S	Channel 4 A/D conversion data													0	0
Word 6	S	Channel 5 A/D conversion data													0	0
Word 7	S	Channel 6 A/D conversion data													0	0
Word 8	S	Channel 7 A/D conversion data													0	0

A/D conversion data: 0 to 8,191 (S: Sign bit)　　Fixed at 0

- A/D conversion data in times of overflow
  Positive side: +8,191 (H1FFF)
  Negative side: -8,192 (HE000)
- Immediately after power ON (approximately 500 ms), the A/D conversion data is set to H000.

(4) MODE 4 input data format (Data area: EW area, where the two halves of the 8-channel data are set separately)

	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
Word 1	S	S	S	S	S	Channel 0 A/D conversion data										
Word 2	S	S	S	S	S	Channel 1 A/D conversion data										
Word 3	S	S	S	S	S	Channel 2 A/D conversion data										
Word 4	S	S	S	S	S	Channel 3 A/D conversion data										
Word 5	S	S	S	S	S	Channel 4 A/D conversion data										
Word 6	S	S	S	S	S	Channel 5 A/D conversion data										
Word 7	S	S	S	S	S	Channel 6 A/D conversion data										
Word 8	S	S	S	S	S	Channel 7 A/D conversion data										

The content of the sign bit is reflected here.　　A/D conversion data: 0 to 2,047 (S: Sign bit)

- A/D conversion data in times of overflow
  Positive side: +2,047 (H7FF)
  Negative side: -2,048 (H800)
- Immediately after power ON (approximately 500 ms), the A/D conversion data is set to H000.

Figure 3-82　LQA155 Input Data Formats (2/2)

3.32 LQA200 (Resistance temperature detector inputs, 4 points)

Table 3-43 LQA200 Specifications

Item		Specification		
Input range		-100 to 100°C	-200 to +350°C	200 to +500°C
RANGE switch setting		0	1	2
Number of input channels		Four channels		
Insulation method		Photocoupler insulation (common to four channels)		
Number of A/D conversion bits		12 bits (sign + 11 bits)		
Conversion rate (Bridge output voltage)		±2,000 digit /±100 mV	±2,000 digit /±300 mV	±2,000 digit /±400 mV
Total accuracy	Ambient temperature 25°C	±20 digits or less		
	Ambient temperature 0 to 55°C	±40 digits or less		
Maximum response time	MODE 1	10 ms + TRC (remote I/O transfer) 10 ms + RC (J.NET transfer)		
	MODE 2	10 ms + 4TRC (remote I/O transfer) 10 ms + RC (J.NET transfer)		
Input filter		Attenuation factor: 40 dB/60 Hz, Time constant: approx. 0.3 s		
Internal current dissipation		Module REV A: 500 mA or less		
		Module REV B or later: 580 mA or less		
Dielectric voltage		1,500 VAC, 1 minute (between external terminals in a batch and ground)		
External wiring	Connection method	18-point terminal block connector (screw: M3)		
	Compatible wire	0.3 to 1.25 mm^2		
	Tightening torque	Approx. 6 to 8 N·m		
	Allowable wiring length	200 m (shielded twisted-pair cable)		
Mass		240 g		

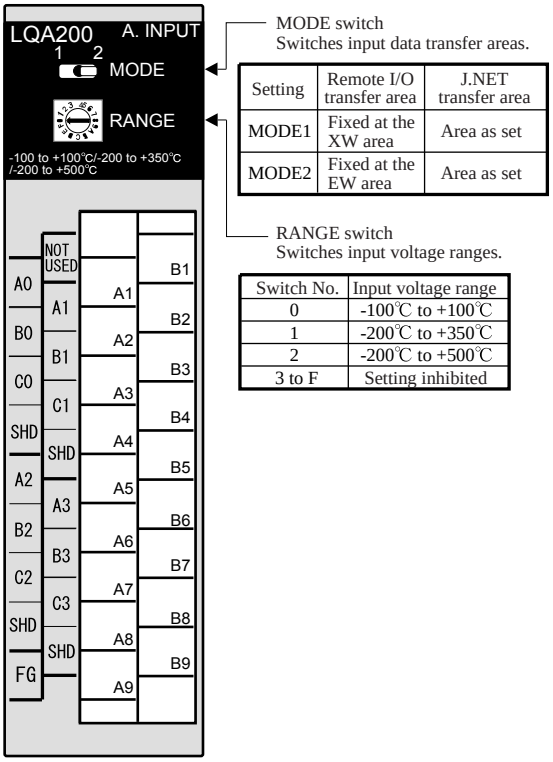
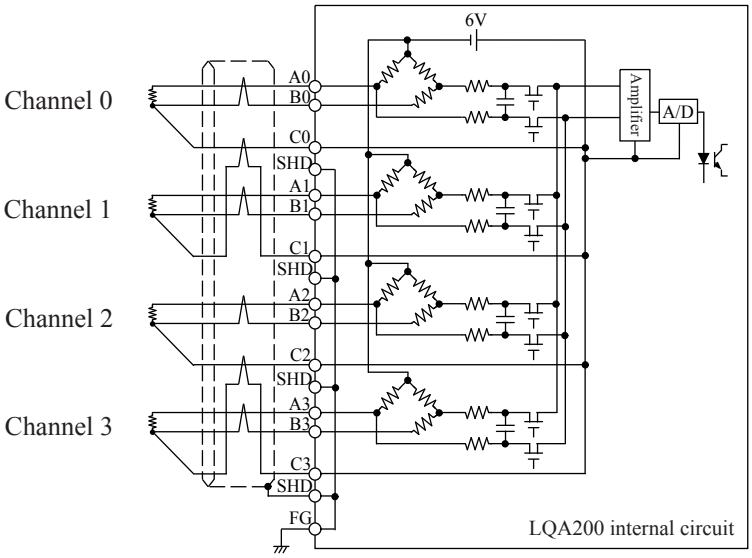


Figure 3-83 LQA200 Appearance

- The response delay does not include input filter delays.
- TRC denotes a remote I/O transfer time.
- RC denotes a refresh cycle time set from J.NET.
- While a data transfer on remote I/O or J.NET is suspended, the input data is held at its value in effect just before the suspension of the transfer.

CAUTION

Power off the module before setting the MODE and RANGE switches.

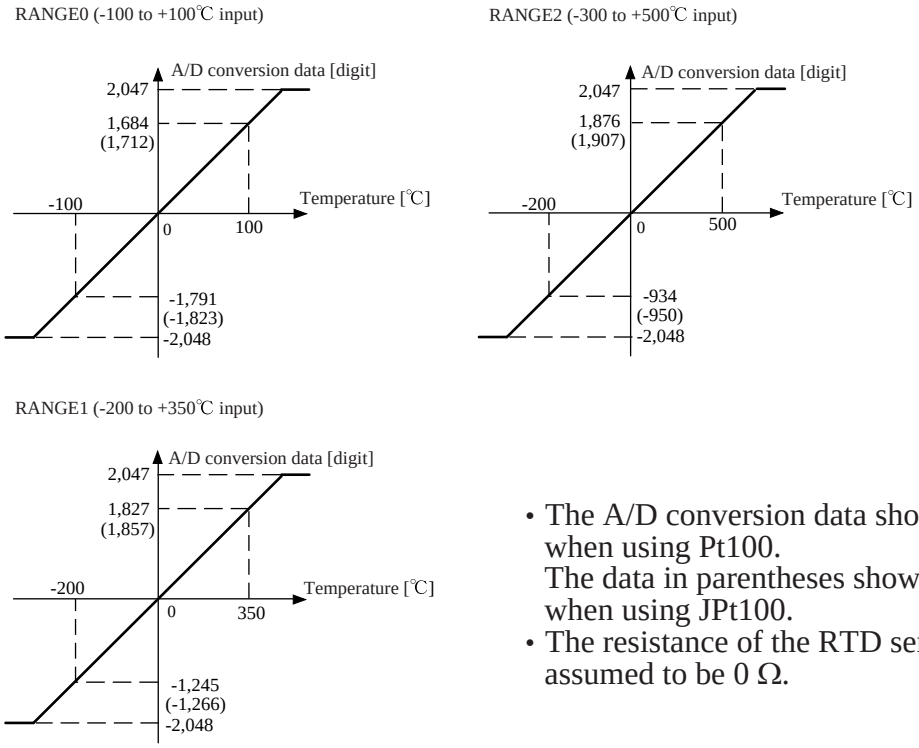


$$\text{Bridge output} = \left(\frac{25\,(\text{Rxt} - 100)}{26\,(2{,}500 + \text{Rxt})} - \frac{4\text{r}\,(\text{Rxt} - 100)}{6{,}250{,}000} \right) \times 6\ \text{V}$$

Rxt: Resistance of the RTD (resistance temperature detector) at t℃

r : Resistance of the RTD service wire

Figure 3-84 LQA200 Circuit



- The A/D conversion data shows the values when using Pt100.
  The data in parentheses shows the values when using JPt100.
- The resistance of the RTD service wire is assumed to be 0 Ω.

Figure 3-85 LQA200 A/D Conversion Characteristics

(1) Mode 1 input data format (Data area: XW area)

	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
Word 1	S	Channel 0 A/D conversion data											0	0	0	0
Word 2	S	Channel 1 A/D conversion data											0	0	0	0
Word 3	S	Channel 2 A/D conversion data											0	0	0	0
Word 4	S	Channel 3 A/D conversion data											0	0	0	0

A/D conversion data: -2,048 to +2,047 (S: Sign bit)　　Fixed at 0

- A/D conversion data in times of overflow
  Positive side: +2,407 (H7FF)
  Negative side: -2,408 (H800)
- Immediately after power ON (approximately 500 ms), the A/D conversion data is set to H000.

(2) Mode 2 input data format (Data area: EW area)

	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
Word 1	S	S	S	S	S	Channel 0 A/D conversion data										
Word 2	S	S	S	S	S	Channel 1 A/D conversion data										
Word 3	S	S	S	S	S	Channel 2 A/D conversion data										
Word 4	S	S	S	S	S	Channel 3 A/D conversion data										

The content of the sign bit is reflected here.　　A/D conversion data: -2,048 to +2,047 (S: Sign bit)

- A/D conversion data in times of overflow
  Positive side: +2,407 (H7FF)
  Negative side: -2,408 (H800)
- Immediately after power ON (approximately 500 ms), the data in the EW area is set to H8000 (invalid data).

Figure 3-86　LQA200 Input Data Format

3.33 LQA201 (Resistance inputs, 4 points)

Table 3-44 LQA201 Specifications

Item		Specification		
Input range		-50 to 150°C	-200 to +100°C	-100 to +300°C
RANGE switch setting		0	1	2
Number of input channels		Four channels		
Insulation method		Photocoupler insulation (common to four channels)		
Number of A/D conversion bits		12 bits (sign + 11 bits)		
Conversion rate (Bridge output voltage)		±2,000 digit /±125 mV	±2,000 digit /±200 mV	±2,000 digit /±250 mV
Total accuracy	Ambient temperature 25°C	±20 digits or less		
	Ambient temperature 0 to 55°C	±40 digits or less		
Maximum response time	MODE 1	10 ms + TRC (remote I/O transfer) 10 ms + RC (J.NET transfer)		
	MODE 2	10 ms + 4TRC (remote I/O transfer) 10 ms + RC (J.NET transfer)		
Input filter		Attenuation factor: 40 dB/60 Hz, Time constant: approx. 0.3 s		
Internal current dissipation		Module REV A: 500 mA or less		
		Module REV B or later: 580 mA or less		
Dielectric voltage		1,500 VAC, 1 minute (between external terminals in a batch and ground)		
External wiring	Connection method	18-point terminal block connector (screw: M3)		
	Compatible wire	0.3 to 1.25 mm^2		
	Tightening torque	Approx. 6 to 8 N•m		
	Allowable wiring length	200 m (shielded twisted-pair cable)		
Mass		240 g		

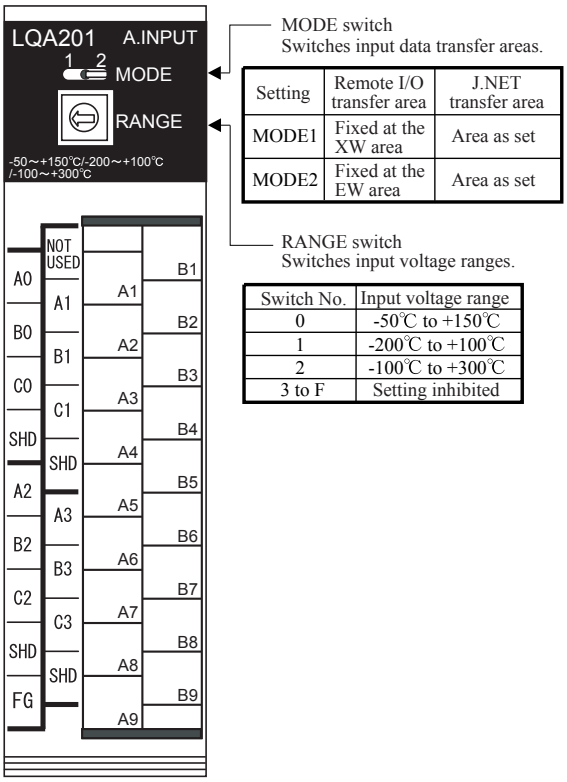
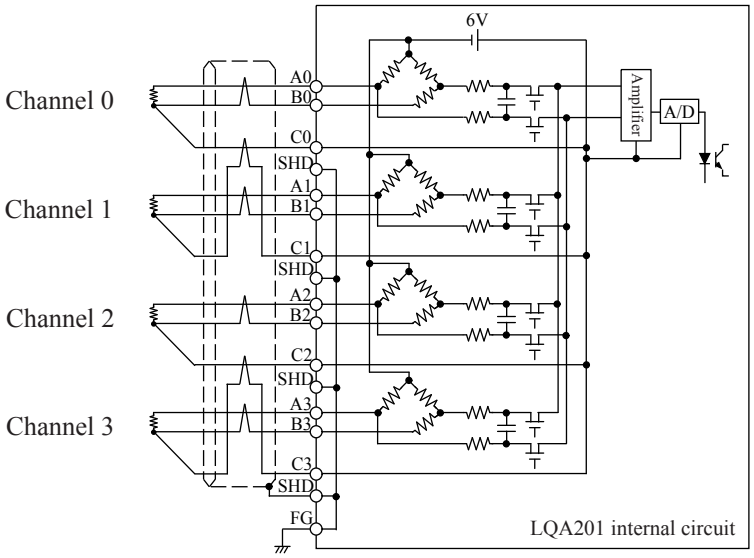


Figure 3-87 LQA201 Appearance

- The response delay does not include input filter delays.
- TRC denotes a remote I/O transfer time.
- RC denotes a refresh cycle time set from J.NET.
- While a data transfer on remote I/O or J.NET is suspended, the input data is held at its value in effect just before the suspension of the transfer.

CAUTION

Power off the module before setting the MODE and RANGE switches.

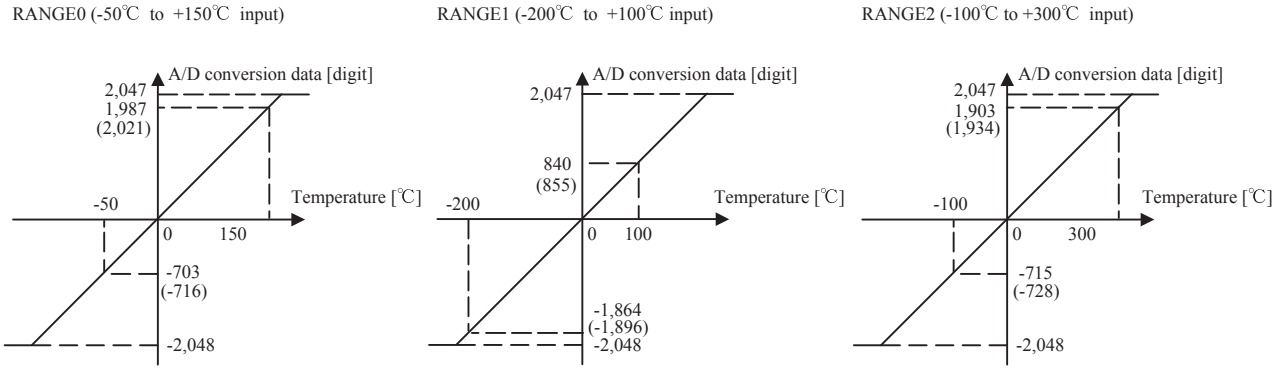


$$\text{Bridge output} = \left(\frac{25\,(\text{Rxt} - 100)}{26\,(2{,}500 + \text{Rxt})} - \frac{4\text{r}\,(\text{Rxt} - 100)}{6{,}250{,}000} \right) \times 6\ \text{V}$$

Rxt: Resistance of the RTD (resistance temperature detector) at t℃

r : Resistance of the RTD service wire

Figure 3-88 LQA201 Circuit



- The A/D conversion data shows the values when using Pt100. The data in parentheses shows the values when using JPt100.
- The resistance of the RTD service wire is assumed to be 0 Ω.

Figure 3-89 LQA201 A/D Conversion Characteristics

(1) Mode 1 input data format (Data area: XW area)

	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
Word 1	S	Channel 0 A/D conversion data											0	0	0	0
Word 2	S	Channel 1 A/D conversion data											0	0	0	0
Word 3	S	Channel 2 A/D conversion data											0	0	0	0
Word 4	S	Channel 3 A/D conversion data											0	0	0	0

A/D conversion data: -2,048 to +2,047 (S: Sign bit)

Fixed at 0

- A/D conversion data in times of overflow
  Positive side: +2,407 (H7FF)
  Negative side: -2,408 (H800)
- Immediately after power ON (approximately 500 ms), the A/D conversion data is set to H000.

(2) Mode 2 input data format (Data area: EW area)

	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
Word 1	S	S	S	S	S	Channel 0 A/D conversion data										
Word 2	S	S	S	S	S	Channel 1 A/D conversion data										
Word 3	S	S	S	S	S	Channel 2 A/D conversion data										
Word 4	S	S	S	S	S	Channel 3 A/D conversion data										

The content of the sign bit is reflected here.

A/D conversion data: -2,048 to +2,047 (S: Sign bit)

- A/D conversion data in times of overflow
  Positive side: +2,407 (H7FF)
  Negative side: -2,408 (H800)
- Immediately after power ON (approximately 500 ms), the data in the EW area is set to H8000 (invalid data).

Figure 3-90 LQA201 Input Data Format

3.34 LQA500 (Voltage outputs, 4 points)

Table 3-45 LQA500 Specifications

Item		Specification		
Output range		±5 VDC	±10 VDC	+1 to 5 VDC
RANGE switch setting		0	1	2
Number of output channels		Four channels		
Insulation method		Photocoupler insulation (common to four channels)		
Load resistance		2 kΩ or more		
Number of D/A conversion bits		12 bits (sign + 11 bits)		12 bits (unsigned)
Conversion rate		±5 V/2,000 digit 0 V: 0 digit	±10 V/2,000 digit 0 V: 0 digit	±4 V/4,000 digit 1 V: 0 digit
Total accuracy	Ambient temperature 25°C	±20 mV or less	±40 mV or less	±10 mV or less
	Ambient temperature 0 to 55°C	±50 mV or less	±100 mV or less	±25 mV or less
Maximum response time	MODE 1	4 ms + TRC (remote I/O transfer) 4 ms + RC (J.NET transfer)		
	MODE 2	4 ms + 4TRC (remote I/O transfer) 4 ms + RC (J.NET transfer)		
Internal current dissipation		Module REV A: 500 mA or less		
		Module REV B or later: 530 mA or less		
Dielectric voltage		1,500 VAC, 1 minute (between external terminals in a batch and ground)		
External wiring	Connection method	18-point terminal block connector (screw: M3)		
	Compatible wire	0.3 to 1.25 mm^2		
	Tightening torque	Approx. 6 to 8 N·m		
	Allowable wiring length	200 m (shielded twisted-pair cable)		
Mass		240 g		

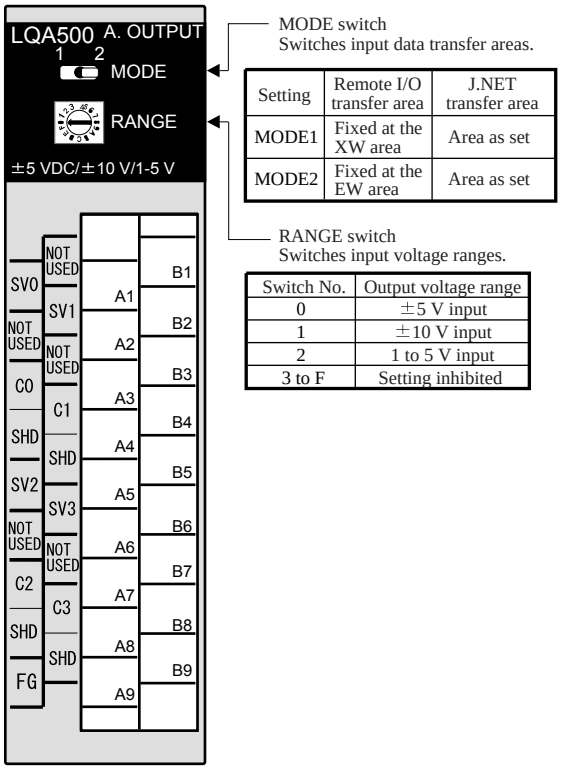


Figure 3-91 LQA500 Appearance

- TRC denotes a remote I/O transfer time.
- RC denotes a refresh cycle time set from J.NET.
- While a data transfer on remote I/O or J.NET is suspended, the output data is held at its value in effect just before the suspension of the transfer, regardless of the status of the OUTPUT HOLD terminal.

CAUTION

Power off the module before setting the MODE and RANGE switches.

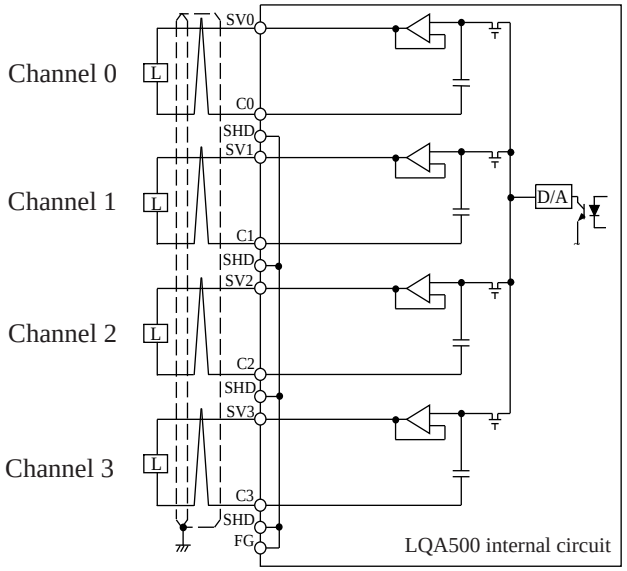


Figure 3-92 LQA500 Circuit

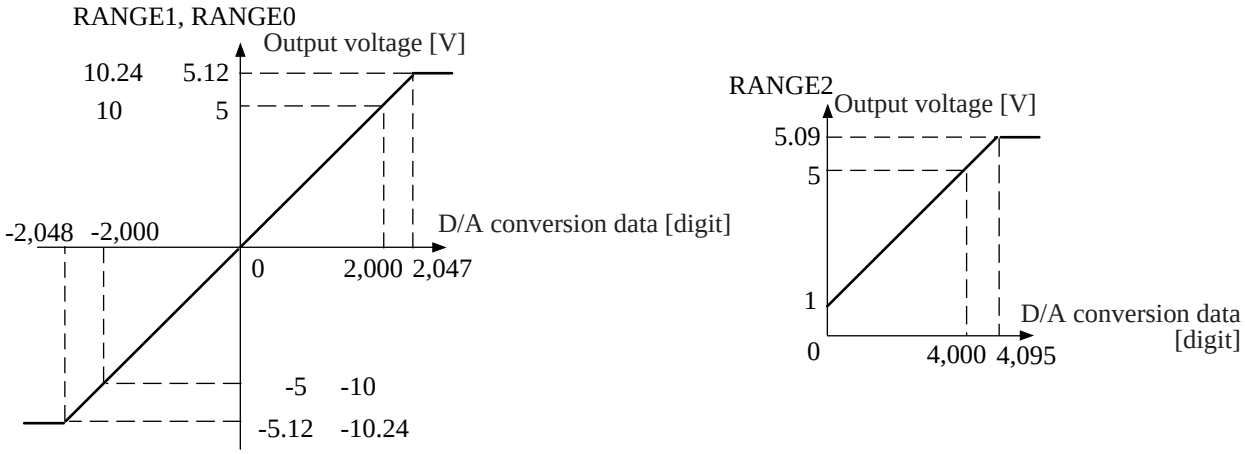


Figure 3-93 LQA500 D/A Conversion Characteristics

(1) Mode 1 output data format (Data area: YW area)

- RANGE switch set to 0 or 1

	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
Word 1	S	Channel 0 D/A conversion data														No effect
Word 2	S	Channel 1 D/A conversion data														No effect
Word 3	S	Channel 2 D/A conversion data														No effect
Word 4	S	Channel 3 D/A conversion data														No effect

D/A conversion data: -2,048 to +2,047
(S: Sign bit)

- RANGE switch set to 2

	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
Word 1	Channel 0 D/A conversion data															No effect
Word 2	Channel 1 D/A conversion data															No effect
Word 3	Channel 2 D/A conversion data															No effect
Word 4	Channel 3 D/A conversion data															No effect

D/A conversion data: 0 to 4,095

(2) Mode 2 output data format (Data area: EW area)

- RANGE switch set to 0 or 1

	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
Word 1	No effect				S	Channel 0 D/A conversion data										
Word 2	No effect				S	Channel 1 D/A conversion data										
Word 3	No effect				S	Channel 2 D/A conversion data										
Word 4	No effect				S	Channel 3 D/A conversion data										

D/A conversion data: -2,048 to +2,047
(S: Sign bit)

- RANGE switch set to 2

	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
Word 1	No effect				Channel 0 D/A conversion data											
Word 3	No effect				Channel 1 D/A conversion data											
Word 3	No effect				Channel 2 D/A conversion data											
Word 4	No effect				Channel 3 D/A conversion data											

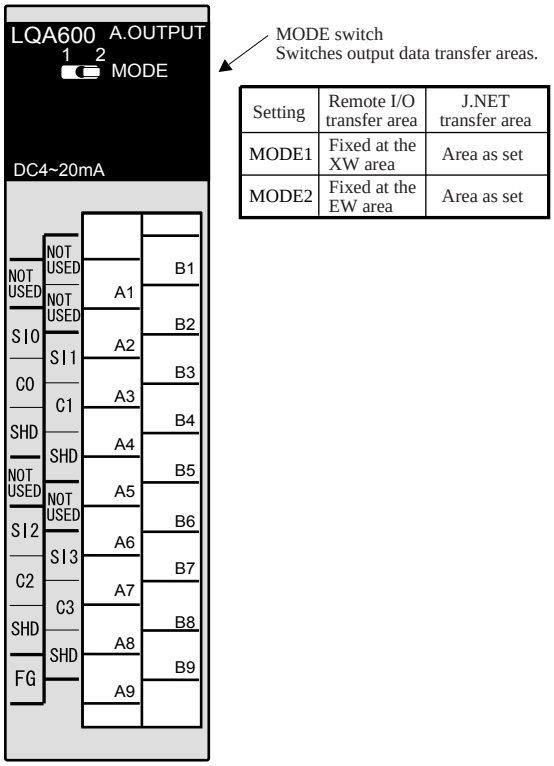
D/A conversion data: 0 to 4,095

Figure 3-94 LQA500 Output Data Format

3.35 LQA600 (Current outputs, 4 points)

Table 3-46 LQA600 Specifications

Item		Specification
Output range		4 to 20 mA DC
Number of output channels		Four channels
Insulation method		Photocoupler insulation (common to four channels)
Load resistance		600 Ω or less
Number of D/A conversion bits		12 bits (unsigned)
Conversion rate		16 mA/4,000 digit 4 mA: 0 digit
Total accuracy	Ambient temperature 25°C	±0.04 mA or less
	Ambient temperature 0 to 55°C	±0.1 mA or less
Maximum response time	MODE 1	4 ms + TRC (remote I/O transfer) 4 ms + RC (J.NET transfer)
	MODE 2	4 ms + 4TRC (remote I/O transfer) 4 ms + RC (J.NET transfer)
Internal current dissipation		Module REV A: 500 mA or less
		Module REV B or later: 530 mA or less
Dielectric voltage		1,500 VAC, 1 minute (between external terminals in a batch and ground)
External wiring	Connection method	18-point terminal block connector (screw: M3)
	Compatible wire	0.3 to 1.25 mm^2
	Tightening torque	Approx. 6 to 8 N·m
	Allowable wiring length	200 m or less (shielded twisted-pair cable)
Mass		240 g



Setting	Remote I/O transfer area	J.NET transfer area
MODE1	Fixed at the XW area	Area as set
MODE2	Fixed at the EW area	Area as set

Figure 3-95 LQA600 Appearance

- TRC denotes a remote I/O transfer time.
- RC denotes a refresh cycle time set from J.NET.
- While a data transfer on remote I/O or J.NET is suspended, the output data is held at its value in effect just before the suspension of the transfer, regardless of the status of the OUTPUT HOLD terminal.

CAUTION

Power off the module before setting the MODE switch.

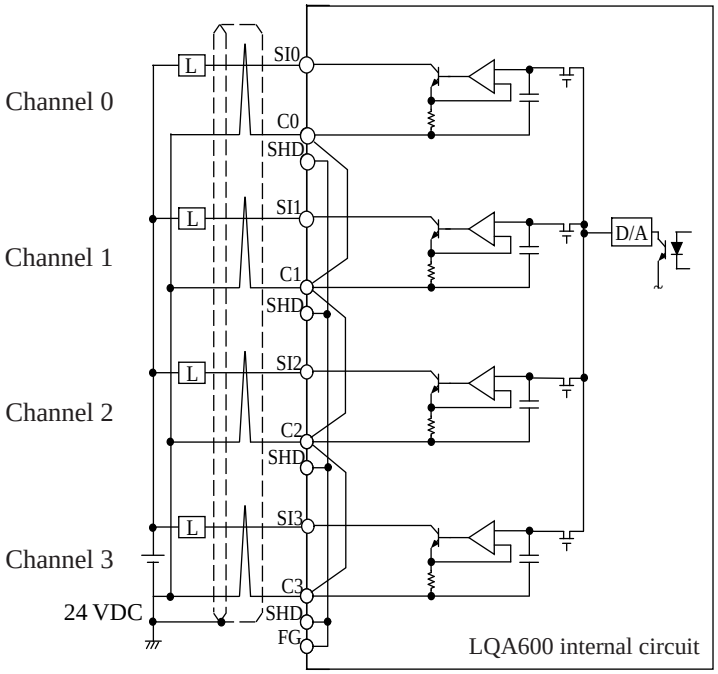


Figure 3-96 LQA600 Circuit

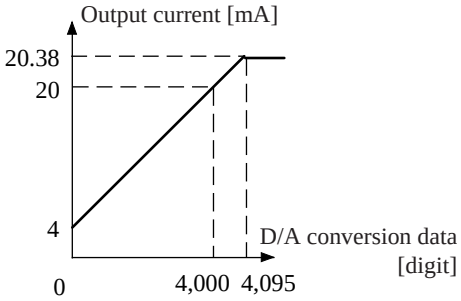


Figure 3-97 LQA600 D/A Conversion Characteristics

(1) Mode 1 output data format (Data area: YW area)

	2^{15} 2^{14} 2^{13} 2^{12} 2^{11} 2^{10} 2^{9} 2^{8} 2^{7} 2^{6} 2^{5} 2^{4}	2^{3} 2^{2} 2^{1} 2^{0}
Word 1	Channel 0 D/A conversion data	No effect
Word 2	Channel 1 D/A conversion data	No effect
Word 3	Channel 2 D/A conversion data	No effect
Word 4	Channel 3 D/A conversion data	No effect

D/A conversion data: 0 to 4,095

(2) Mode 2 output data format (Data area: EW area)

	2^{15} 2^{14} 2^{13} 2^{12}	2^{11} 2^{10} 2^{9} 2^{8} 2^{7} 2^{6} 2^{5} 2^{4} 2^{3} 2^{2} 2^{1} 2^{0}
Word 1	No effect	Channel 0 D/A conversion data
Word 2	No effect	Channel 1 D/A conversion data
Word 3	No effect	Channel 2 D/A conversion data
Word 4	No effect	Channel 3 D/A conversion data

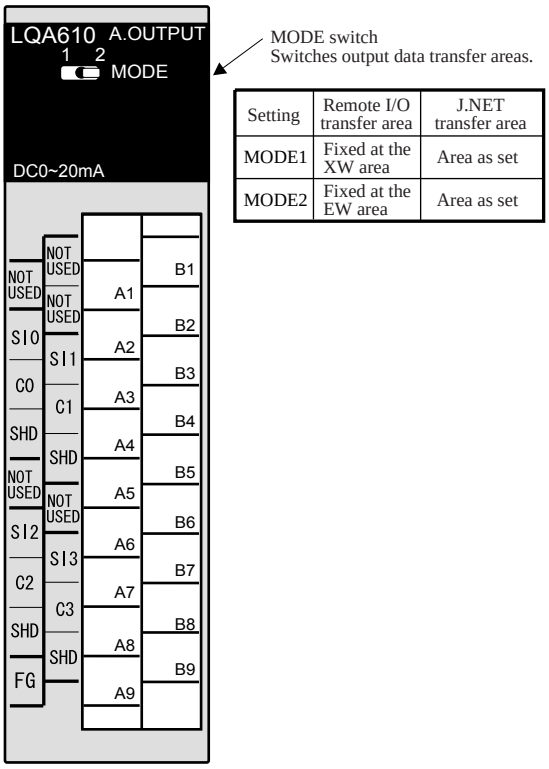
D/A conversion data: 0 to 4,095

Figure 3-98 LQA600 Output Data Format

3.36 LQA610 (Current outputs, 4 points)

Table 3-47 LQA610 Specifications

Item		Specification
Output range		4 to 20 mA DC
Number of output channels		Four channels
Insulation method		Photocoupler insulation (common to four channels)
Load resistance		500 Ω or less
Number of D/A conversion bits		12 bits (unsigned)
Conversion rate		20 mA/4,000 digit 0 mA: 0 digit
Total accuracy	Ambient temperature 25°C	±0.04 mA or less
	Ambient temperature 0 to 55°C	±0.1 mA or less
Maximum response time	MODE 1	4 ms + TRC (remote I/O transfer) 4 ms + RC (J.NET transfer)
	MODE 2	4 ms + 4TRC (remote I/O transfer) 4 ms + RC (J.NET transfer)
Internal current dissipation		Module REV A: 500 mA or less
		Module REV B or later: 530 mA or less
Dielectric voltage		1,500 VAC, 1 minute (between external terminals in a batch and ground)
External wiring	Connection method	18-point terminal block connector (screw: M3)
	Compatible wire	0.3 to 1.25 mm^2
	Tightening torque	Approx. 6 to 8 N·m
	Allowable wiring length	200 m or less (shielded twisted-pair cable)
Mass		240 g



Setting	Remote I/O transfer area	J.NET transfer area
MODE1	Fixed at the XW area	Area as set
MODE2	Fixed at the EW area	Area as set

Figure 3-99 LQA610 Appearance

- The response delay does not include input filter delays.
- TRC denotes a remote I/O transfer time.
- RC denotes a refresh cycle time set from J.NET.
  While a data transfer on remote I/O or J.NET is suspended, the output data is held at its value in effect just before the suspension of the transfer, regardless of the status of the OUTPUT HOLD terminal.

CAUTION

Power off the module before setting the MODE switch.

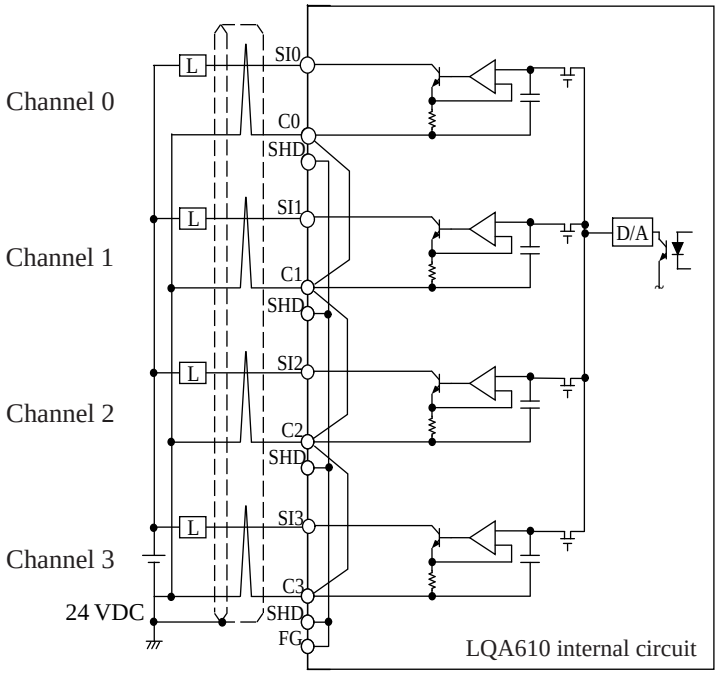


Figure 3-100 LQA610 Circuit

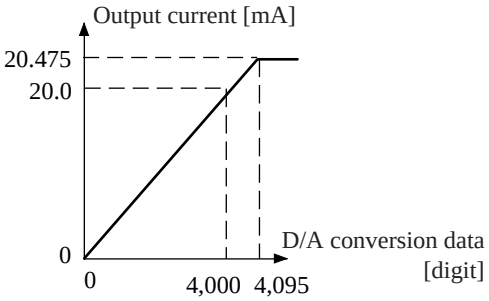


Figure 3-101 LQA610 D/A Conversion Characteristics

(1) Mode 1 output data format (Data area: YW area)

	2^{15} 2^{14} 2^{13} 2^{12} 2^{11} 2^{10} 2^{9} 2^{8} 2^{7} 2^{6} 2^{5} 2^{4}	2^{3} 2^{2} 2^{1} 2^{0}
Word 1	Channel 0 D/A conversion data	No effect
Word 2	Channel 1 D/A conversion data	No effect
Word 3	Channel 2 D/A conversion data	No effect
Word 4	Channel 3 D/A conversion data	No effect

D/A conversion data: 0 to 4,095

(2) Mode 2 output data format (Data area: EW area)

	2^{15} 2^{14} 2^{13} 2^{12} 2^{11} 2^{10} 2^{9} 2^{8} 2^{7} 2^{6} 2^{5} 2^{4} 2^{3} 2^{2} 2^{1} 2^{0}
Word 1	No effect / Channel 0 D/A conversion data
Word 2	No effect / Channel 1 D/A conversion data
Word 3	No effect / Channel 2 D/A conversion data
Word 4	No effect / Channel 3 D/A conversion data

D/A conversion data: 0 to 4,095

Figure 3-102 LQA610 Output Data Format

3.37 LQA301, LQA310 (Scan-type separately insulated analog inputs)

Table 3-48 LQA301 and LQA310 Specifications

Item		Specification
Module type		A/D conversion module: LQA301
		Scanner module: LQA310
Number of input channels		4 channels/scanner module Up to 28 channels/unit
Insulation method		Photo MOS relay, flying capacitor type
Rated input: E		±5 VDC
Maximum input: E		±15 VDC
Inter-common allowable voltage: ECM		±500 VDC (Inter-channel potential difference: Up to 500 V)
Number of A/D conversion bits		12 bits (Sign + 11 bits)
Conversion rate		±2000 digit/±5 V (0 digit: 0 V)
Total accuracy	Ambient temperature 25°C	±8 digits or less
	Ambient temperature 0 to 55°C	±12 digits or less
Maximum response time		(20 ms × Number of scanner modules) + 4TRC
Input filter		Attenuation factor: 35 dB//60 Hz Time constant: approx. 150 ms
Input impedance	Power ON	1 MΩ or more
	Power OFF	1 MΩ or more
Internal current dissipation		LQA301: 500 mA or less, LQA310: 100 mA or less
Dielectric voltage		500 VDC, 1 minute (between external terminals in a batch and ground)
External wiring	Connection method	18-point terminal block connector (screw: M3)
	Compatible wire	0.3 to 1.25 mm^2
	Tightening torque	Approx. 6 to 8 N·m
	Allowable wiring length	200 m or less (shielded twisted-pair cable)
Mass		LQA301: 170 g, LQA310: 220 g

- The response delay does not include input filter delays.
- TRC denotes a remote I/O transfer time.
- While a data transfer on remote I/O is suspended, the input data is held at its value in effect just before the suspension of the transfer.
- No external wiring is required for the A/D conversion module.
- This module gives the station module the appearance of functioning the same way as the analog input module (LQA000) in mode 2.

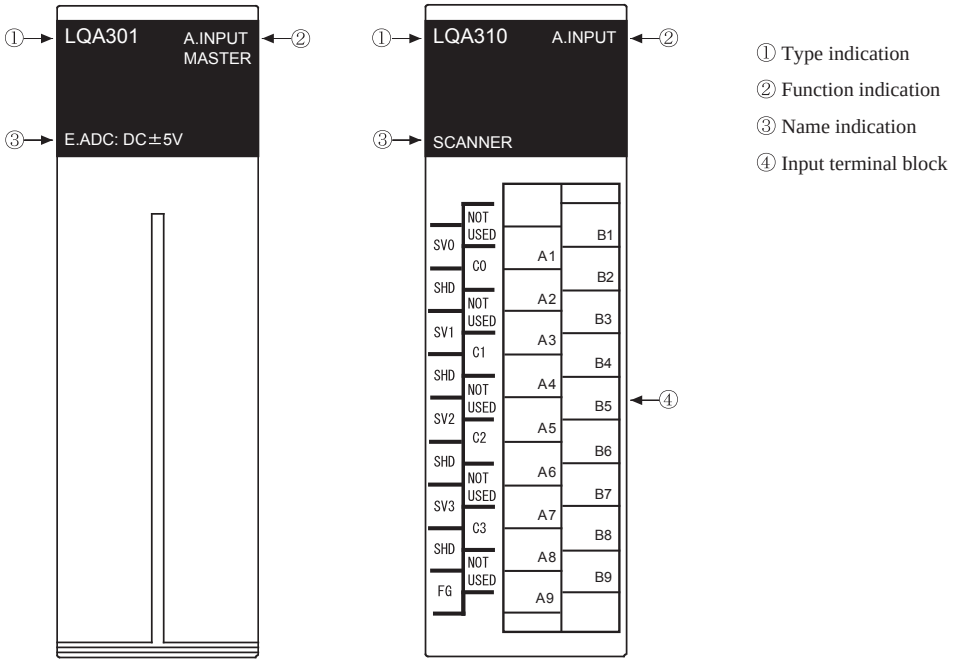


Figure 3-103 LQA301 and LQA310 Appearance

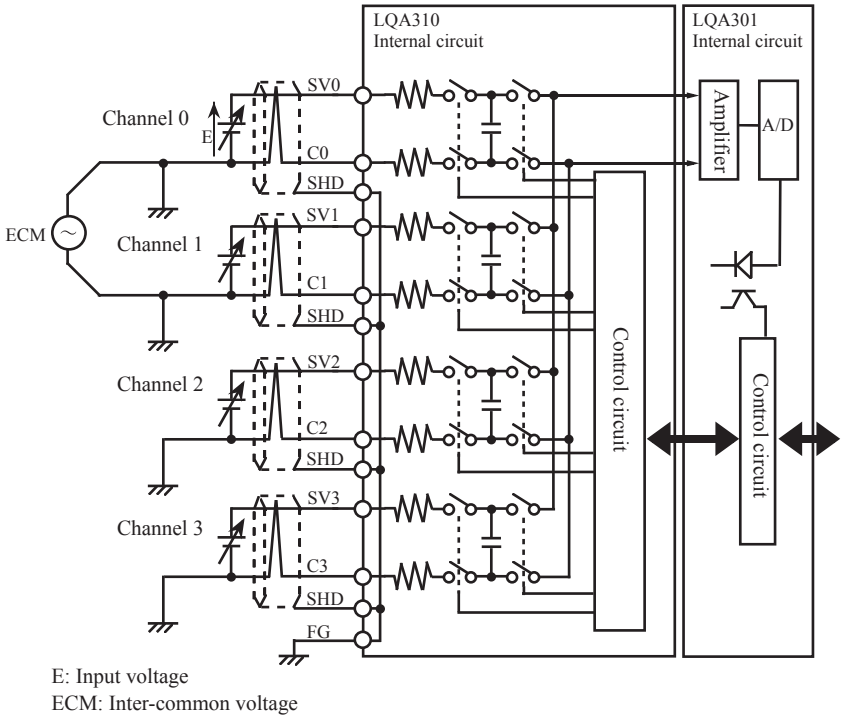


Figure 3-104 LQA301 and LQA310 Circuit

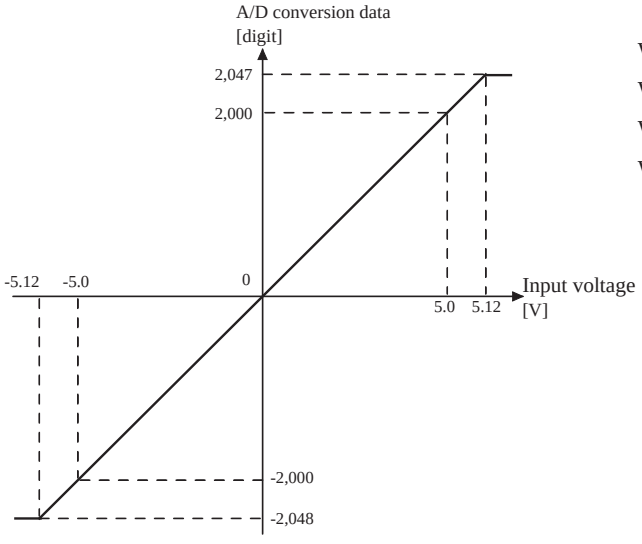


Figure 3-105 LQA301 and LQA310 A/D Conversion Characteristics

	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{0}
Word 1	S	S	S	S	S	Channel 0 A/D conversion data	
Word 2	S	S	S	S	S	Channel 1 A/D conversion data	
Word 3	S	S	S	S	S	Channel 2 A/D conversion data	
Word 4	S	S	S	S	S	Channel 3 A/D conversion data	

The content of the sign bit is reflected here.

A/D conversion data: -2,048 to +2,047 (S: Sign bit)

- A/D conversion data in times of overflow
  Positive side: +2,047 (H7FF)
  Negative side: -2,048 (H800)
- Immediately after power ON (approximately 800 ms), the data in the EW area is set to H8000 (invalid data).

Figure 3-106 Input Data Format (Data area: EW area)

3.38 LQA800, LQA810 (Scan-type commonly insulated analog inputs)

Table 3-49 LQA800 and LQA810 Specifications

Item		Specification
Module type		A/D conversion module: LQA800
		Scanner module: LQA810
Number of input channels		4 channels/scanner module Up to 28 channels/unit
Insulation method		Photocoupler insulation
Rated input: E		±5 VDC
Maximum input: E		±15 VDC
Inter-common allowable voltage: ECM		±60 VDC (Inter-channel potential difference: Up to 500 V)
Number of A/D conversion bits		12 bits (Sign + 11 bits)
Conversion rate		±2,000 digit/±5 V (0 digit: 0 V)
Total accuracy	Ambient temperature 25°C	±8 digits or less
	Ambient temperature 0 to 55°C	±12 digits or less
Maximum response time		Remote I/O transfer: (20 ms × Number of scanner modules) + 4TRCs J.NET transfer: (20 ms × Number of scanner modules) + RC
Input filter		Attenuation factor: 14 dB/60 Hz Time constant: approx. 10 ms
Input impedance	Power ON	5 MΩ or more
	Power OFF	5 MΩ or more
Internal current dissipation		LQA800: 500 mA or less, LQA810: 100 mA or less
Dielectric voltage		1,500 VAC, 1 minute (between external terminals in a batch and ground)
External wiring	Connection method	18-point terminal block connector (screw: M3)
	Compatible wire	0.3 to 1.25 mm^2
	Tightening torque	Approx. 6 to 8 N·m
	Allowable wiring length	200 m or less (shielded twisted-pair cable)
Mass		LQA800: 170 g, LQA810: 220 g

- The response delay does not include input filter delays.
- TRC denotes a remote I/O transfer time. RC denotes a refresh cycle time set from J.NET.
- While a data transfer on remote I/O or J.NET is suspended, the input data is held at its value in effect just before the suspension of the transfer.
- No external wiring is required for the A/D conversion module.
- This module gives the station module the appearance of functioning the same way as the analog input module (LQA000) in mode 2.

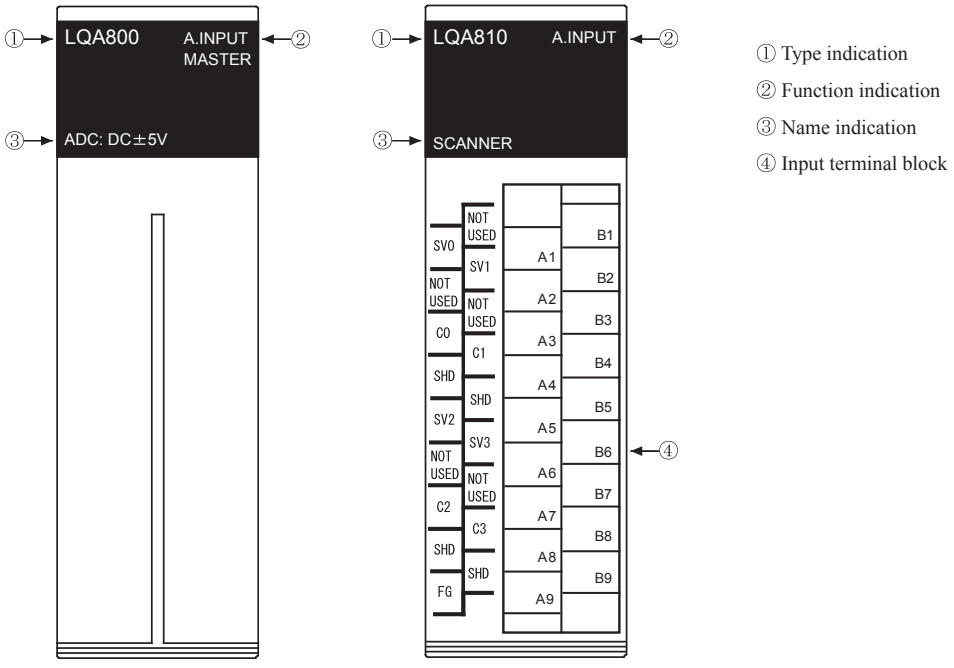


Figure 3-107 LQA800 and LQA810 Appearance

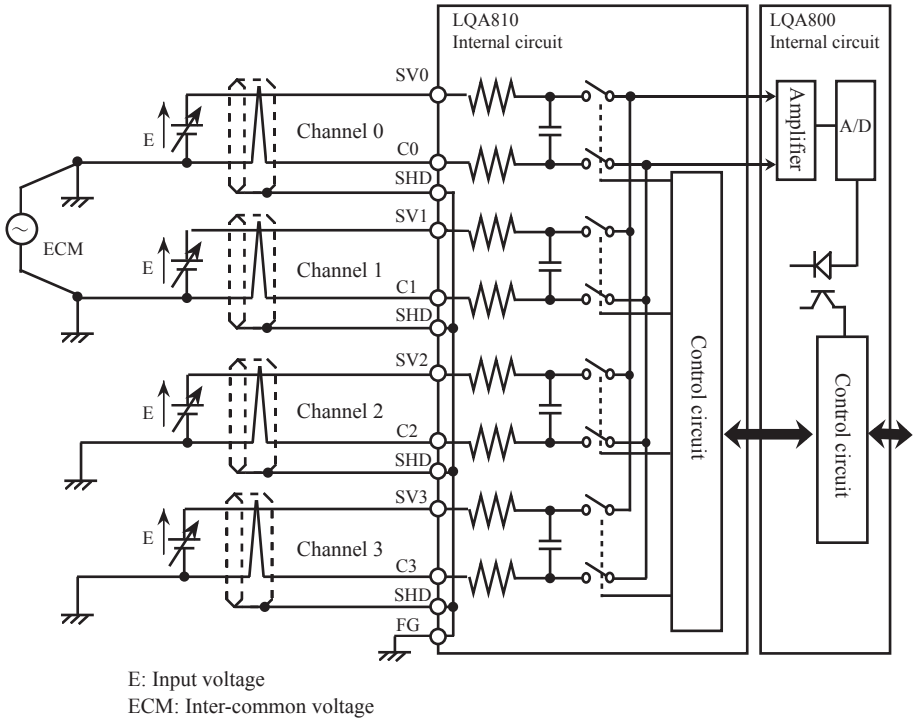


Figure 3-108 LQA800 and LQA810 Circuit

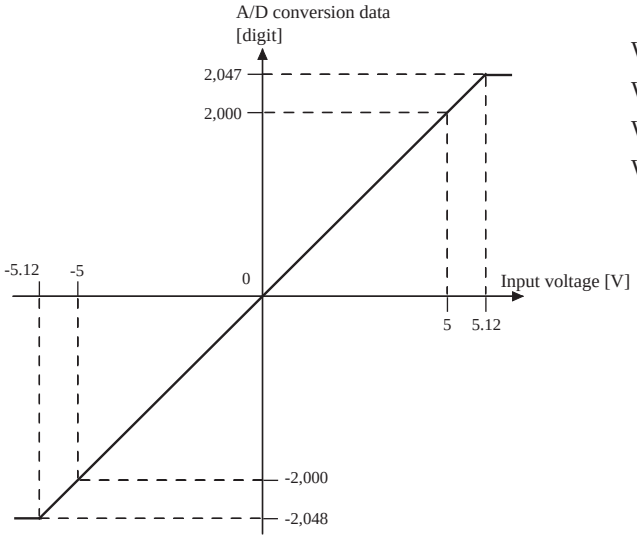


Figure 3-109 LQA800 and LQA810 A/D Conversion Characteristics

	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}		2^{0}
Word 1	S	S	S	S	S	Channel 0	A/D conversion data	
Word 2	S	S	S	S	S	Channel 1	A/D conversion data	
Word 3	S	S	S	S	S	Channel 2	A/D conversion data	
Word 4	S	S	S	S	S	Channel 3	A/D conversion data	

The content of the sign bit is reflected here.

A/D conversion data: -2,048 to +2,047 (S: Sign bit)

- A/D conversion data in times of overflow
  Positive side: +2,047 (H7FF)
  Negative side: -2,048 (H800)
- Immediately after power ON (approximately 800 ms), the data in the EW area is set to H8000 (invalid data).

Figure 3-110 Input Data Format (for Remote I/O Communication)

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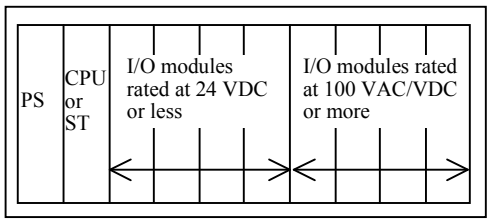
4 HANDLING

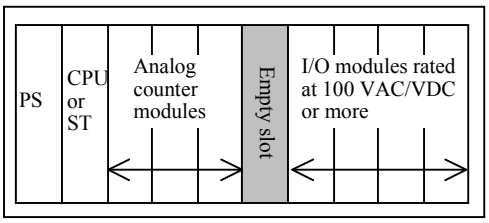
4.1 Mounting I/O Modules

In mounting I/O modules in a CPU or I/O unit, take notice of the precautions below to guard them against noise interference from connections external to them. For information on how to mount scan-type analog input modules, see Section 4.7, “Handling Scan-type Analog Input Modules.”

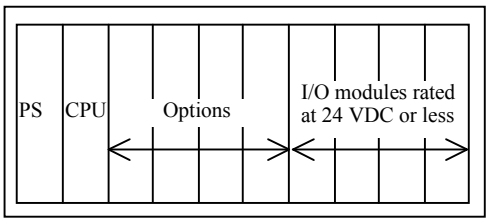
- Do not install an I/O module rated at 100 VAC or 100 VDC or more in the slot adjacent to the CPU module. Keep such I/O modules as apart from the CPU module as possible. If it unavoidable to install such a slot in the slot adjacent to the CPU module, keep a cable extension of at least 100 mm and then use a shielded cable, surge killer or any other appropriate means to protect against noise.
- In installing option modules and I/O modules in a single CPU mounting base, install the option modules without an empty slot intervening from the slot adjacent to the CPU module, leaving one slot space apart from the I/O modules. Further, keep the wirings for option and I/O modules separated.
- Install I/O modules rated at 24 VDC or less and those rated at 100 VAC or 100 VDC or more apart from one another.
- Install analog input/output and analog counter modules one slot space apart from I/O modules rated at 100 VAC or 100 VDC or more.
- Separate wirings for I/O modules according to their operating voltage.



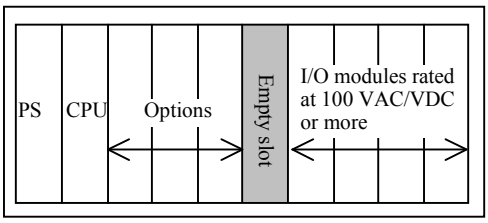
Separate wirings for I/O modules according to their operating voltage.



Install analog input/output and analog counter modules one slot space apart from I/O modules.



Keep the wirings for option and I/O modules separated.



Install option modules leaving them one slot space apart from the I/O modules.

Figure 4-1 Mounting I/O Modules

4.2 Wiring I/O Modules

4.2.1 Digital input/output modules

- Keep I/O cables at least 10 cm apart from any cable carrying heavy current.
- Keep I/O cables rated 12/24 VDC apart from I/O cables rated at 100/200 VAC and 100 VDC.
- If an I/O cable extends over such a long haul that it runs locally in parallel with a cable carrying heavy current, use a multicore cable with electrostatic shield in its place. Be sure to ground the shield of the cable.
- When wiring through a duct or conduit, be sure to ground that duct or conduct.
- When determining a wire length, consider the floating capacity of the cable.
- Use solderless terminals to wire cables to a terminal block.
- Use the connector types recommended in the table below to wire those modules that use a connector to wire their input and output.

<LQX300, LQX350, LQY300, LQY350, LQZ300>

Connection method	Compatible connector type
Soldered connection	Fujitsu Devices Inc. FCN-361J040-AU connector FCN-360C040-B connector cover
Solderless connection	Fujitsu Devices Inc. FCN-363J040 housing FCN-363J-AU contact FCN-360C040-B connector cover
Pressure connection	Fujitsu Devices Inc. FCN-367J040-AU/F

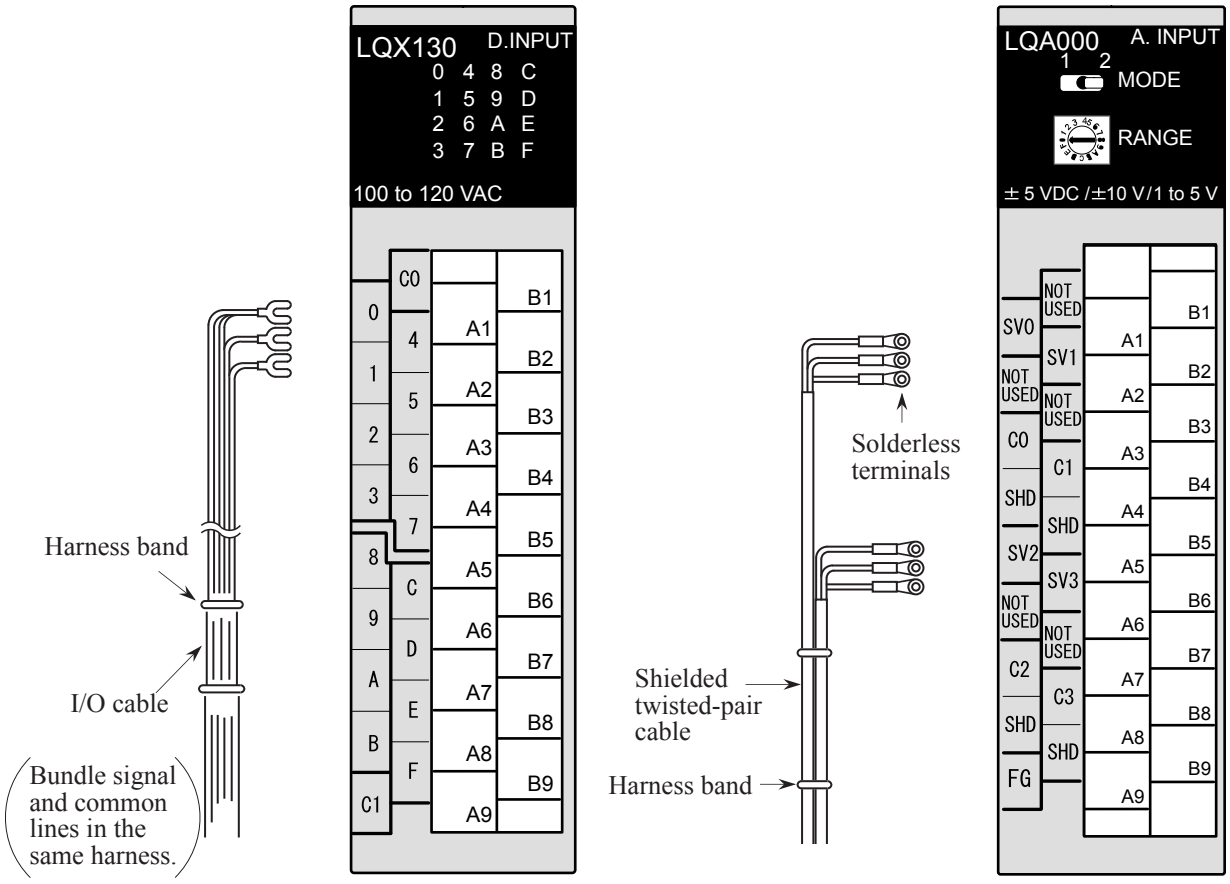
<LQX310, LQX360, LQY310, LQY360>

Connection method	Compatible connector type
Pressure connection	DDK Ltd. FRC3-O34-10S

4.2.2 Analog input/output modules

Because analog input/output modules handle low-level analog signals, the following points, as well as the precautions noted above, should deserve special notice:

- Use a dedicated harness to bundle these modules and separate it from that for AC digital signals.
- In mounting these modules in a unit, concentrate them on the CPU or station module side or in the last slot to the extent possible to facilitate their separation from AC digital signals.
- Use shielded twisted-pair cables for cabling.
- If marked noise interference is likely to enter a cable, ground the cable shield at the entrance of the enclosure. Limit the cable extension to 10 cm or less or to a minimum required.



<Wiring LQX*** and LQY***> <Wiring LQA***and LQC000>

Figure 4-2 Wiring I/O Modules

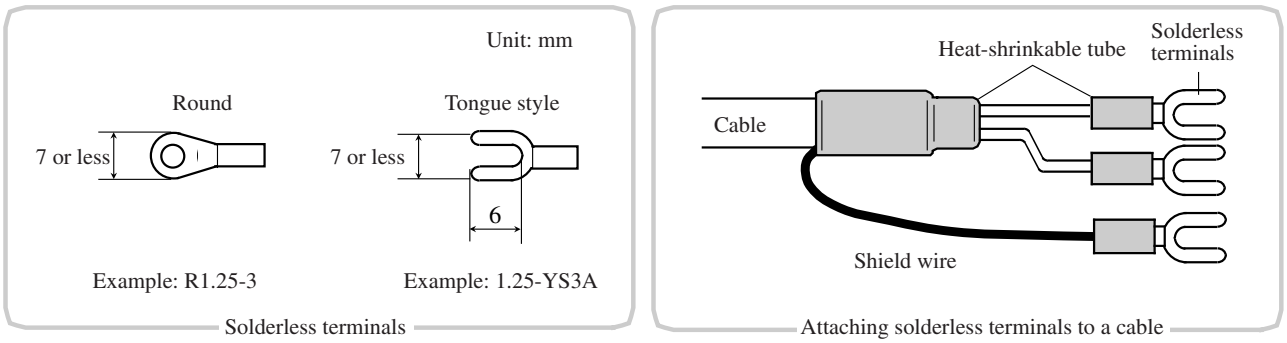


Figure 4-3 Solderless Terminals

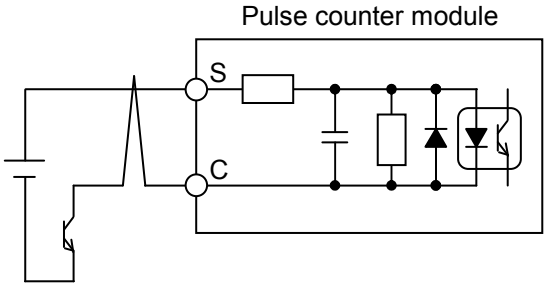
4.2.3 Pulse counter modules

Pulse counter modules count pulses by detecting the rising and falling edges of the pulse signal input from the external source. These modules are inherently susceptible to noise, which you can see in their specifications. For this reason, when you wire these modules, follow the caution instructions listed below so that no noise may be added to the input signal.

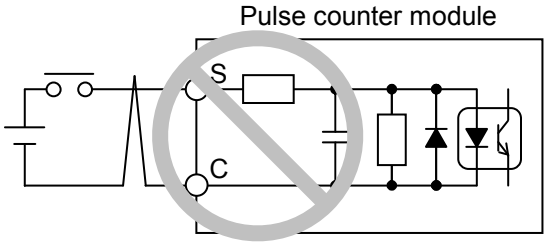
CAUTION

- When wiring a pulse counter module, be sure to wire it with a shielded twisted-pair cable and ground the cable by Class D grounding.
- The shielded twisted-pair cable must be laid at least 30 centimeters away from noise sources, such as power cables and input/output cables. Never lay it in parallel with those noise sources, and the length of the cable laid must be shortest possible.
- If a counting error occurs in the pulse counter module that has been wired according to the above rules, lay the shielded twisted-pair cable in a special duct or conduit, and then ground the duct or conduit.
- Any input terminals that need not be used must be wired as follows:
  - If the pulse counter module is used with one-phase pulse input, short the two input terminals of each of the two pairs of two-phase pulse input terminals; that is, short A1S and A1C together, then short B1S and B1C together, and then ground them all together.
  - If it is used with two-phase pulse input, short the one-phase pulse input terminals A2S and A2C together and then ground them together.
  - If the stop-signal input terminals STOPS and STOPC need not be used, short them together and then ground them together.
- A pulse generator may be connected to the pulse counter module by using either voltage-transistor connection or no-voltage-transistor connection (see below). Voltage-transistor connection should be used when grounding is made on the pulse generator side. No-voltage-transistor connection should be used when grounding is made on the pulse counter module side.
- Do not connect a contact to any pulse input terminal. Disregarding this rule may result in counting errors due to contact bouncing during closing and opening of the contact.

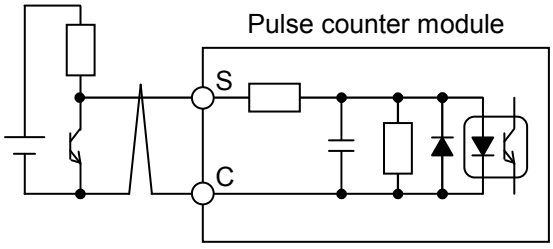
■ Voltage-transistor connection



■ Voltage-contact connection (prohibited)



■ No-voltage-transistor connection



4.3 Handling Digital Input and Output Modules

4.3.1 Digital input modules

Leakage current could end up in false AC inputs, such as a contactless switch or switch with a neon lamp. Connect a resistance to the input terminal as shown below to reduce the input impedance of the input module.

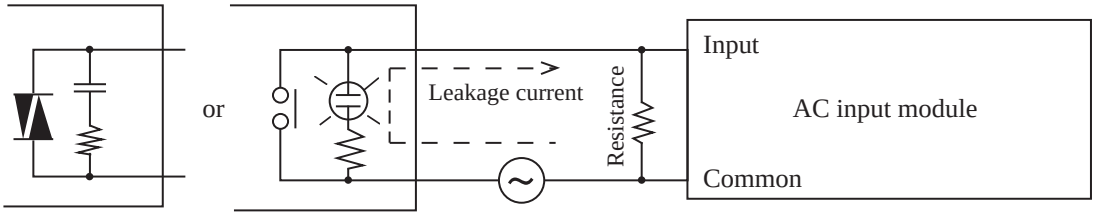


Figure 4-4 Connecting a Resistance to an AC Input Module

If leakage current makes for false DC inputs, such as a switch with an LED indicator, connect a resistance as shown below to hold the voltage present between the input terminal and the common to the OFF voltage or below.

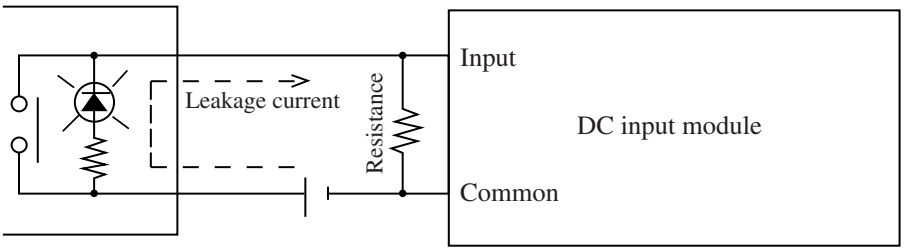
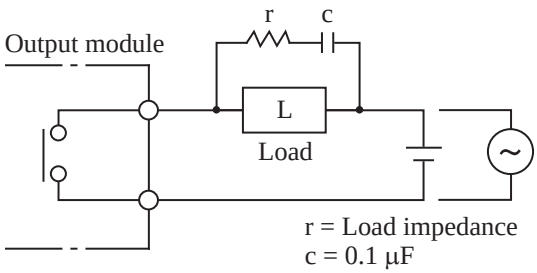
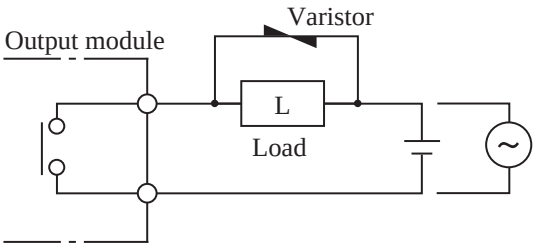


Figure 4-5 Connecting a Resistance to a DC Input Module

(a) Applied to AC and DC



(b) Applied to AC and DC



(c) DC only

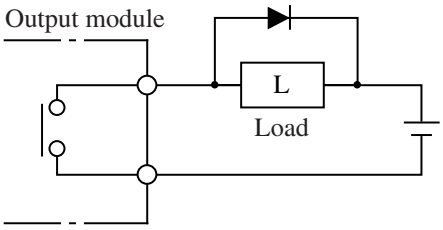
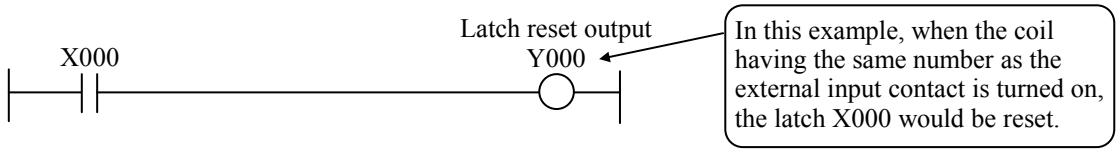


Figure 4-6 Surge Absorbers Circuit

4.3.2 Digital input modules with built-in signal latches
(LQX110, LQX151, LQX210, LQX211, LQX250)

(1) How to use the module

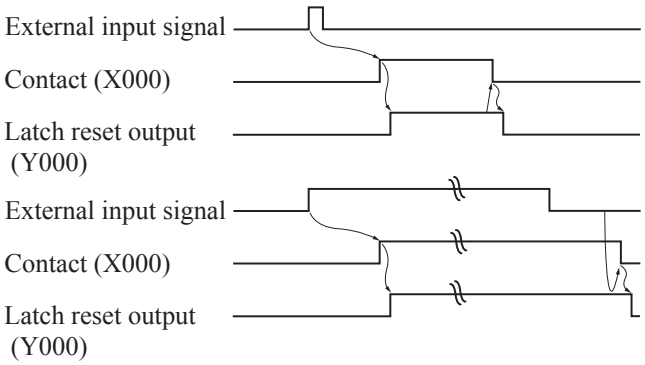
Any digital input module with built-in signal latches contains signal memory elements (flip-flops or, simply, FFs) which are used to store external input signals. Once an external input signal is turned on, a given contact (e.g., X000) will remain on indefinitely, so the circuit containing the contact must perform latch reset output, depending on the contact used as the condition.



(2) Operational overview

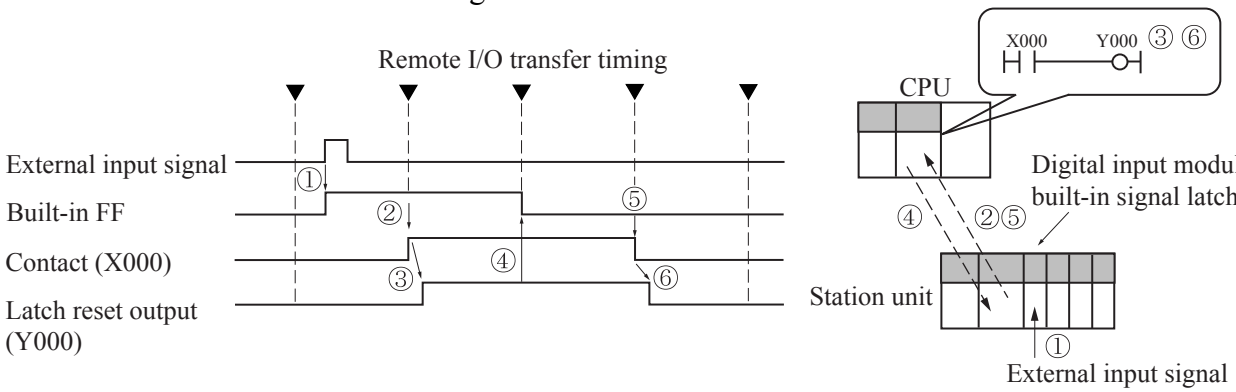
An operational overview of the digital input modules with built-in signal latches is given below in terms of external input signals and the contact and latch reset output shown above.

- If an external input signal is a narrow pulse, the contact will be turned off by the latch reset output.
- If an external input signal is a wide pulse, the contact will remain on even after execution of the latch reset output as long as the signal remains on.



(3) Operation timing

The figure below shows the relationships between the contact, latch reset output, sequence cycles, and remote I/O transfer cycles used in conjunction with digital input modules with built-in signal latches.



Description of the timing chart:

① When the external input signal (X000) is turned on, the module's built-in FF is latched. The input indicator LED in the module's front panel comes on when the FF is latched and goes out when it is reset.

② The "on" data of the FF is transferred to the contact data item X000 in the CPU by a remote I/O transfer.

③ The ladder program used turns on the latch reset output (Y000).

④ The output (Y000) is transferred to the module by a next remote I/O transfer and the FF is reset simultaneously.

⑤ The data of the reset FF is transferred to the CPU's internal memory by a next remote I/O transfer and X000 is turned off.

⑥ The ladder program turns off Y000.

(4) Usage precautions

- The partition setting for the mount base on which to mount any module of this sort must be FREE. If the setting is FIX, the module will not operate. For information on the partition setting, refer to "S10mini CPU (Manual number SME-1-100)."
- To transfer the "on" data of the external contact properly, the "off" duration of the external contact must be at least 50 ms plus three TRCs (5 ms plus three TRCs for the LQX211), where each TRC is a remote I/O transfer time period.

4.3.3 Contact output modules (LQY100, LQY140, LQY150, LQY160, LQY170)

(1) Surge absorber

Where a contact output module drives an L-load, a fly-back voltage could be generated upon on-to-off transitions, causing noise to occur. If an L-load is used, the installation of a surge absorber like that explained below is recommended.

* The installation of a surge absorber is required for driving an L-load from a DC power supply.

(2) Relay contact life

The relays used for the contact output module have life.

If these relays are intended to be operated at rated voltage and rated current, their expected service life is approximately 100,000 switching operations (*) (1,800 cycles per hour). However, if the relays are operated at a higher voltage and a higher current level than the rated, their useful service life will be shorter than expected. The other factors that will make the service life shorter than expected are the following: ambient operating environment, type of the load connected, in-rush current, and serge. So, pay special attention to those factors when installing any of the above-mentioned hardware modules. As a rule, each of these factors should be checked before using the hardware module to which a load is actually connected, or the hardware module should be replaced regularly before its service life is over. It is recommended that, where a long service life is required of a hardware module, the hardware module should be a transistor output module or triac output module, not a hardware module containing a relay for output.

(*) The expected service life of the model LQY100 and LQY140 relay DO module is approximately 70,000 switching operations.

4.3.4 a- and c-contact integrated modules (LQY160, LQY170)

The LQY160, LQY170 includes two a-contact outputs and four c-contact outputs. Directions for using the c-contact outputs follow.

(1) While the relay is on, the b-contact opens as the a-contact closes; while the relay is off, the a-contact opens as the b-contact closes.

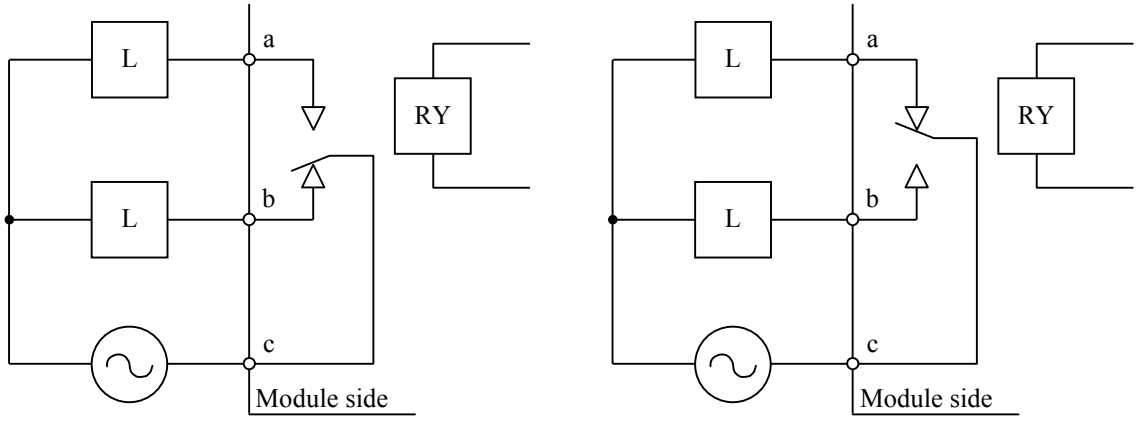


Figure 4-7 LQY160 and LQY170 Contact Output Actions

(2) The c-contact typically touches either contact when the other contact is released, but contact-to-contact arcing could cause the a- and b-contacts to be shorted to each other. Never make a connection like that shown below, because such a connection is hazardous.

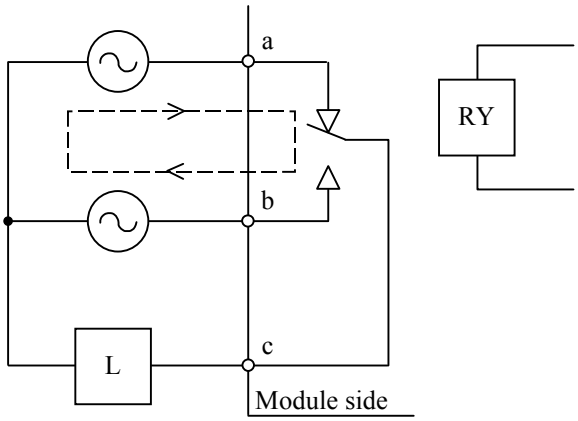


Figure 4-8 Example of a Prohibited Connection of the LQY160 and LQY170

(3) Voltage supply to the RY output enable signal input terminal

LQY160 and LQY170 are put to an operation status by supplying the rated voltage to the RY output enable signal input terminal.

When no voltage is supplied to the RY output enable signal input terminal, the b-contact side of every relay contact is turned on.

4.3.5 Circuit protection fuses

Install fuses as described below to minimize the burnout and damage to I/O modules, attachments and connections.

Table 4-1 I/O Module Fuse Ratings

Module type	Fuse rated breaking current	Fuse location
LQY100	10 A	Install one fuse per common. Install one on the positive side of a DC load, or on both sides of an AC load.
LQY140 LQY150 LQY160 LQY170	5 A	Install one fuse per point. Install one on the positive side of a DC load, or on both sides of an AC load.
LQY200	5 A	Install one fuse per common. Install one on the positive side of a 24 VDC power supply.
LQY300 LQY310	3 A	Install one fuse per common. Install one on the positive side of a 24 VDC power supply.
LQY350 LQY360	3 A	Install one fuse per common. Install one on the positive side of a 24 VDC power supply.
LQZ300	3 A	Install one fuse per common. Install one on the positive side of a 24 VDC power supply.

CAUTION

Install a protective circuit, such as a fuse or circuit protector, in the external power supply. The protective circuit must be one matched to the rating of the power supply.

4.4 Handling Pulse Counter Modules

4.4.1 Functions

(1) Input

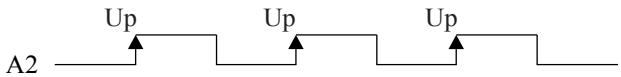
(a) Operation mode setting

Set an operation mode by shorting or opening terminal block B1 and B2.

Between B1 and B2	Open	Short
Operation mode	Operation mode 1	Operation mode 2

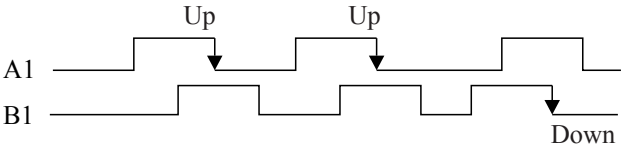
(b) Single-phase pulse input

A signal input from A2 causes the pulse counter to increment at the timing shown below.



(c) Two-phase pulse input

Signal inputs from A1 and B1 cause the pulse counter to increment or decrement at the timing shown below.



■ The pulse counter module functions as a ring counter.

• In operation mode 1

When the counter increments from +16,383 once, the count is set to 0.

When the counter decrements from 0 once, the count is set to +16,383.

• In operation mode 2

When the counter increments from +8,191 once, the count is set to -8,192.

When the counter decrements from -8,192, the count is set to +8,191.

■ The simultaneous application of single- and two-phase pulses to the pulse counter module will cause it to malfunction.

(d) Stop input

• Operation mode 1

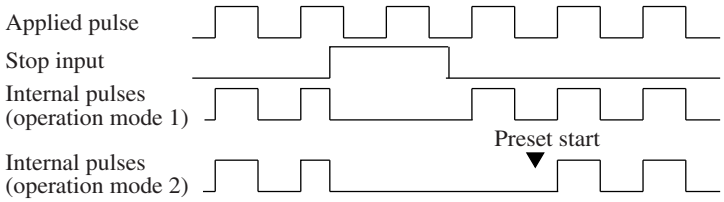
Applying an ON voltage to the pulse counter module disables it from retrieving pulse signals.

Applying an OFF voltage to the pulse counter module enables it to retrieve pulse signals.

• Operation mode 2

Applying an ON voltage to the pulse counter module disables it from retrieving pulse signals.

Applying an OFF voltage to the pulse counter module and then setting a control code and implementing a preset start enables it to retrieve pulses.



(e) Comparator output

The result of comparison of compare data value R and count value C is output.

R>C: Output when R>C.

R<C: Output when R<C.

R=C: Output when R=C. R=C held until a latch reset is implemented by setting a control code.

(f) LED indications

• Pulse input indication LED

Flashes in sync with a count of single- or two-phase pulses.

• Compare result indication LED

Lights in sync with comparator output.

■ The comparator output timing and the LED display timing vary with the operation mode.

• Operation mode 1

The contents of internal registers are directly output for comparator output and LED displays, regardless of the presence or absence of pulse input. When the comparator data register is loaded with data anew, for example, the comparator output and LED displays will vary even if no pulse input signals are present.

• Operation mode 2

Comparator output and LED displays vary as pulse input is implemented. When the comparator data register is loaded with data anew, for example, the comparator output and LED displays will vary in the wake of the pulse input.

4.4.2 Usage

(1) Registering mounting addresses in the data area

Writing and reading data to and from the LQC000 is carried out by way of data areas (EW400 to EWFB0). It is necessary to register a module mounting address (XW***, YW***) in the data area before using the LQC000. For more information on registering module mounting addresses, refer to Section 3.2, "Address Registration, " in "4-Channel Analog Pulse Counter For Windows® (Manual number SAE-3-142)."

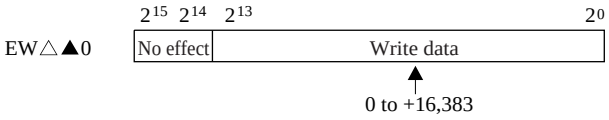
(a) Data area format

The data area format is shown below.

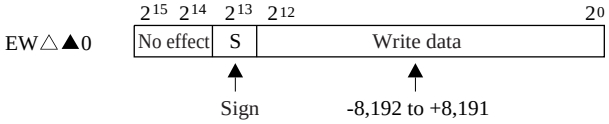
EW△▲0	Write data
EW△▲0+10	Control code
EW△▲0+20	Read data
EW△▲0+30	Status code

(b) Write data

■ Operation mode 1

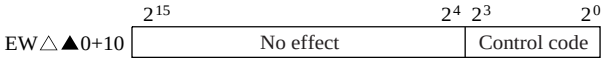


■ Operation mode 2



(c) Control code

When implementing a preset start and a comparator value set, write the preset or comparator value to the write data area before setting a control code in it.



■ Operation mode 1

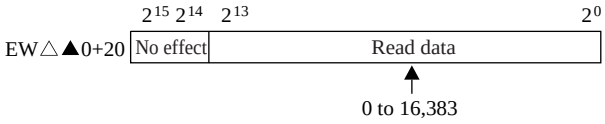
Control code	Explanation	Action when set
8	Count stop	Stops pulse measurement.
4	Preset start	Sets a preset value in the counter and starts measurement.
2	Compare value set	Sets a compare value in the comparator register and starts measurement.
1	Latch reset	Resets the match output signal latched and starts measurement.
None of above	No effect	–

■ Operation mode 2

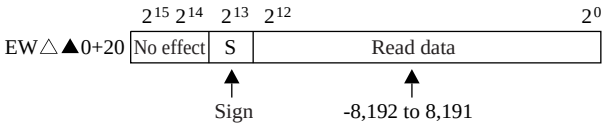
Control code	Explanation	Action when set
8	Count stop	Stops pulse measurement.
4	Preset start	Sets a preset value in the counter and starts measurement.
2	Compare value set	Sets a compare value in the comparator register.
1	Latch reset	Resets the match output signal latched.
None of above	No effect	–

(d) Read data

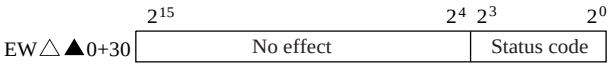
■ Operation mode 1



■ Operation mode 2



(e) Status code



■ Operation mode 1

Status code	Explanation	Status
8	Count stop	Counting stopped
4	R>C	Compare data value larger than the count value
2	R=C	Compare data value equal to the count value
1	R<C	Compare data value less than the count value

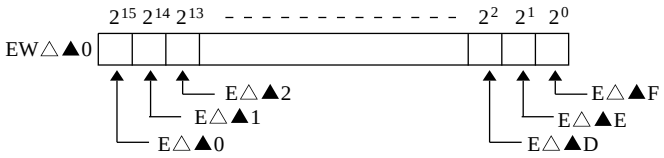
If R=C has been latched, status code 2 (R=C) is set even though the comparator result is R>C or R<C.

■ Operation mode 2

Status code	Explanation	Status
8	Count stop	Sets the last transferred control code.
4	Preset start	
2	Compare value set	
1	Latch reset	

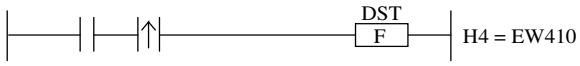
(f) Data area bit structure

Because the EW data area is structured as shown below, an operation code and a status code in it can be used as a ladder contact and a coil, respectively.



When a preset restart is implemented, for example, it can be set either as an arithmetic function or as a coil as shown below.

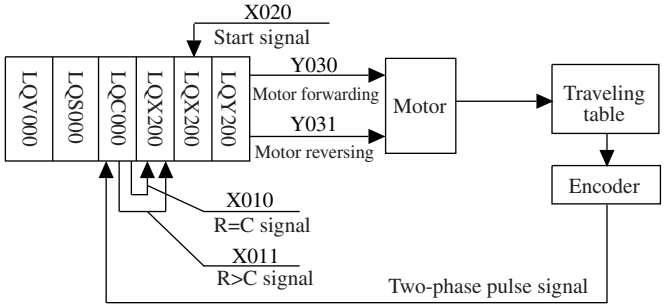
- Using an arithmetic function



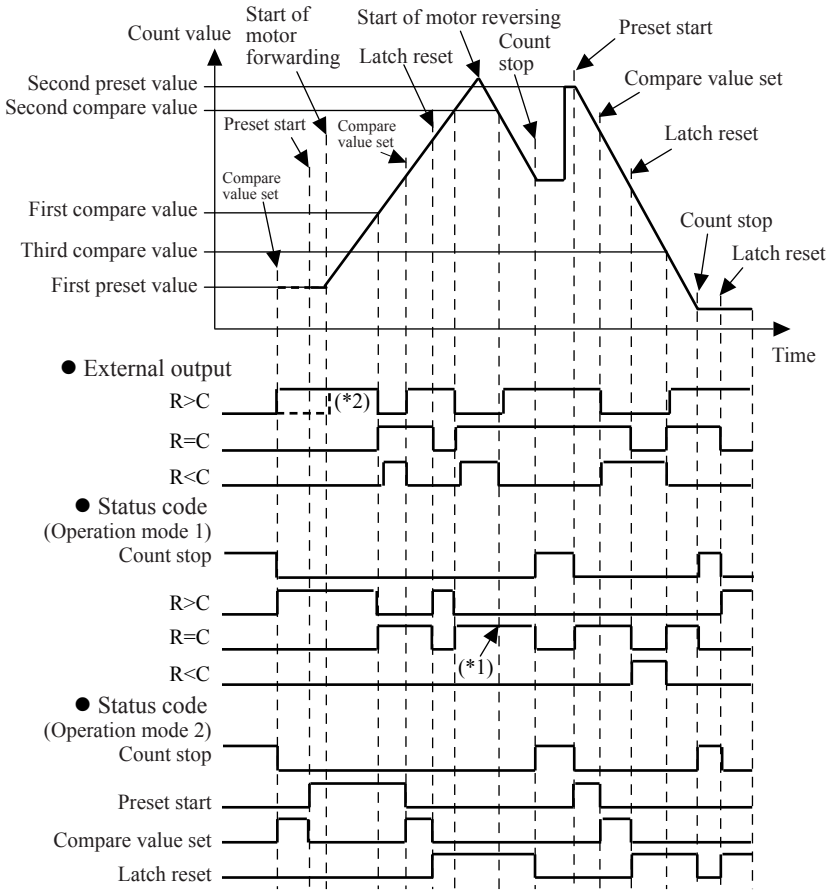
- Using a coil

(g) Sample program

- Operation: Start a motor with an externally supplied start signal and then measure the pulses generated from an encoder rotating with the movement of the traveling table to let the motor move to a predefined position and stop.
- Requirement: Let the program run in the flow shown Figurer 4-10.
- Configuration: See below.



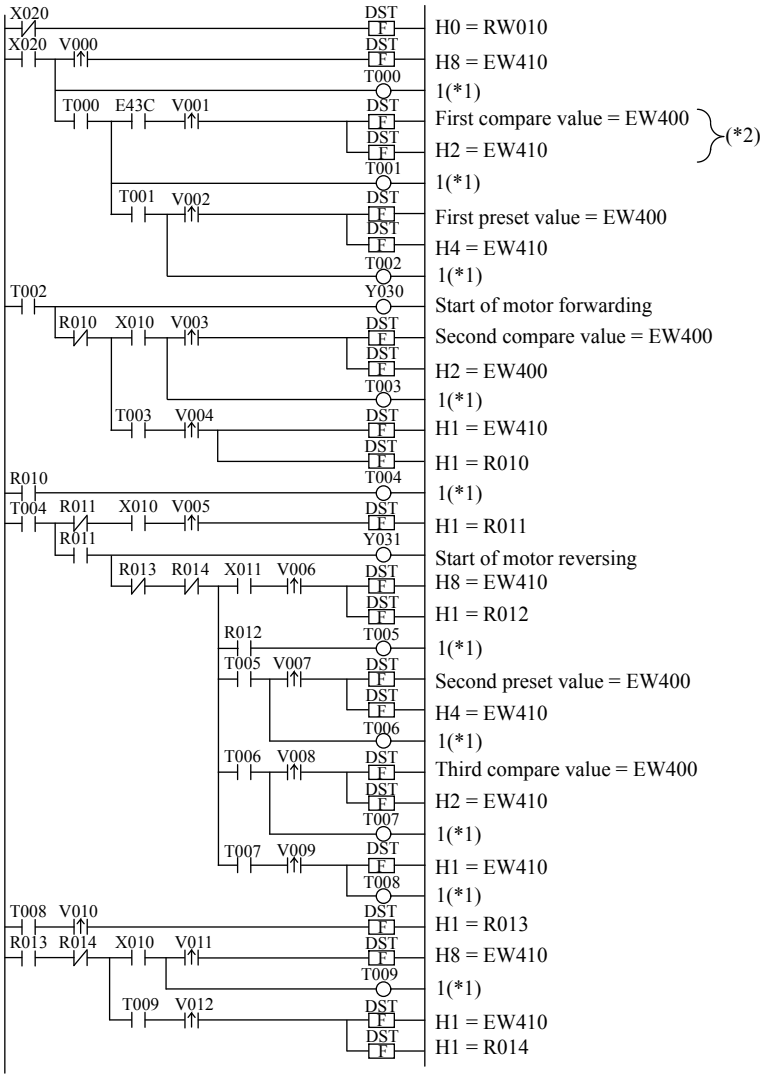
- Mounting address registration: Assume that the LQC000 is allocated between EW400 and EW430.



(*1) If R=C is set, the status code is held at R=C until the latch is reset.

(*2) In operation mode 2, the flow designated by continuous dotted lines takes place.

Figure 4-9 Operation Flowchart



(*1) Allow for a length of time that is longer than or equal to the remote I/O transfer time (for example, 100 ms).

(*2) Set data in the write data before setting a control code in it.

Figure 4-10 Sample Program

(2) Status of the LQC000 (installed in the I/O unit) immediately after the unit is switched ON
This also holds true when the LQC00 is installed in the CPU unit and then the CPU unit is switched ON.

Table 4-2 Status of the LQC000 Immediately after the I/O Unit is Switched ON

Operation mode		Common to both operation modes 1 and 2
Module status		Count stop
LQC000 internal register	Preset value	0
	Compare value	0
	Count value	0
Compare output	R<C	OFF
	R=C	OFF
	R>C	OFF
LED indication	R>C	OFF
	R=C	OFF
	R<C	OFF

(3) Operation following a suspension of a remote I/O transfer
See the table below.

Table 4-3 Status of the LQC000 Following a Suspension of a Remote I/O Transfer

Operation mode		Operation mode 1		Operation mode 2 (*1)		Operation mode 2 (*2)	
Remote I/O status		Transfer suspended	Transfer resumed	Transfer suspended	Transfer resumed	Transfer suspended	Transfer resumed
Module status		Normal operation (*3)	Normal operation	Normal operation (*3)	Normal operation	Count stop	Normal operation
LQC000 internal register	Preset value					Clear	
	Compare value					Hold	
	Count value					Clear	
Compare output	R<C					Hold	
	R=C					OFF	
	R>C					Hold	
LED indication	R>C					Hold	
	R=C					OFF	
	R<C	Normal operation (*3)	Normal operation	Normal operation (*3)	Normal operation	Hold	Normal operation

(*1) The output hold terminals of the station module are shorted.
(*2) The output hold terminals of the station module are opened.
(*3) The behavior of the LQC000 is determined by the control code that had been set immediately before the suspension of the transfer.

(4) Status of the LQC000 (installed in the I/O unit) upon OFF to ON transitions in CPU unit power

Table 4-4 Status of the LQC000 (Installed in the I/O Unit) Upon OFF to ON Transitions in CPU Unit Power

Operation mode		Operation mode 1		Operation mode 2 (*1)		Operation mode 2 (*2)	
CPU unit power status		OFF	OFF → ON	OFF	OFF → ON	OFF	OFF → ON
Module status		Normal operation (*3)	Normal operation	Normal operation (*3)	Normal operation	Count stop	Normal operation
LQC000 internal register	Preset value					Clear	
	Compare value					Hold	
	Count value					Clear	
Compare output	R<C					Hold	
	R=C					OFF	
	R>C					Hold	
LED indication	R>C					Hold	
	R=C					OFF	
	R<C	Normal operation (*3)	Normal operation	Normal operation (*3)	Normal operation	Hold	Normal operation

(*1) The output hold terminals of the station module are shorted.

(*2) The output hold terminals of the station module are opened.

(*3) The behavior of the LQC000 is determined by the control that had been set immediately before the suspension of the transfer.

4.5 Handling 4-Channel Analog Input/Output Modules

Analog input and output modules support two modes of operation. Use the mode setup switch up in the front panel of the module to choose between them. For more information on setting these modes, see 3, “Individual Specifications.”

Mode 1: High-speed response type. If an analog input or output module uses all the four channels, it will occupy 64 I/O points. (Response time is: LQA000/LQA100: 5 ms + TRC, LQA200/LQA201: 10 ms + TRC, LQA500/LQA600/LQA610: 4 ms + TRC)

Mode 2: Low-speed response type. No matter how many channels are used, it will occupy 16 I/O points. (Response time is: LQA000/LQA100: 5 ms + 4TRC, LQA200/LQA201: 10 ms + 4TRC, LQA500/LQA600/LQA610: 4 ms + 4TRC)

(TRC: Remote I/O transfer time)

4.5.1 If mode 1 is set

Analog data is moved in and out of the XW and YW area in this mode.

The number of channels available depends on the I/O count setting of the CPU and the remote I/O station.

Channel No.	Input (output) address	I/O setting			
		128 I/Os	64 I/Os	32 I/Os	16 I/Os
0	XW(YW)△▲0	√	√	√	√
1	XW(YW)△▲0+10	√	√	√	im
2	XW(YW)△▲0+20	√	√	im	im
3	XW(YW)△▲0+30	√	√	im	im

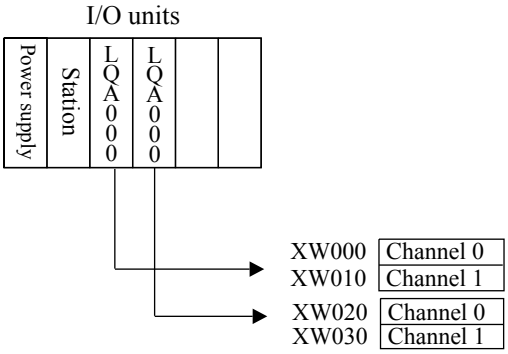
√: Possible im: Impossible
△▲: 16 I/O points: 00 to 7F
32 I/O points: 00 to 7E
64 I/O points: 00 to 7C
128 I/O points: 00 to 78

CAUTION

With an I/O point setting of 128, undefined data will enter XW△▲ + 40 to XW△▲ + 70.

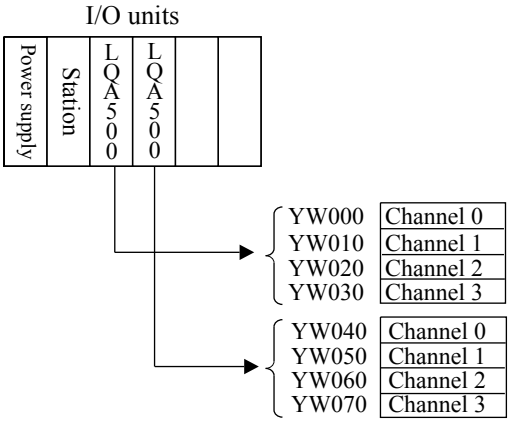
<Use example 1>

- Set the starting address of each I/O unit to 000.
- Set the number of I/O points to 32.
- Mount the unit in slots 0 and 1.



<Use example 2>

- Set the starting address of each I/O unit to 000.
- Set the number of I/O points to 64.
- Mount the unit in slots 0 and 1.



4.5.2 If mode 2 is set

Analog data is moved in and out of the EW area in this mode. To perform input and output to and from the EW area, the input and output addresses and the module type must be registered by using a programming tool. To find out more on registering such information, refer to one of the manuals named below.

Manual name	Manual number
S10 Tools For Windows® V7	SAE-3-120
LADDER CHART For Windows®	SAE-3-121
4-CHANNEL ANALOG PULSE COUNTER For Windows®	SAE-3-142

The table below gives the correspondence between registration numbers and allocated data areas.

Table 4-5 Registration Numbers and Allocated Data Areas

Registration number	Allocated data area	Registration number	Allocated data area
01	EW400 to 430	13	EWA00 to A30
02	EW480 to 4B0	14	EWA80 to AB0
03	EW500 to 530	15	EWB00 to B30
04	EW580 to 5B0	16	EWB80 to BB0
05	EW600 to 630	17	EWC00 to C30
06	EW680 to 6B0	18	EWC80 to CB0
07	EW700 to 730	19	EWD00 to D30
08	EW780 to 7B0	20	EWD80 to DB0
09	EW800 to 830	21	EWE00 to E30
10	EW880 to 8B0	22	EWE80 to EB0
11	EW900 to 930	23	EWF00 to F30
12	EW980 to 9B0	24	EWF80 to FB0

The flow of data for allocating the XW (YW)000 to registration number 01 is shown below.

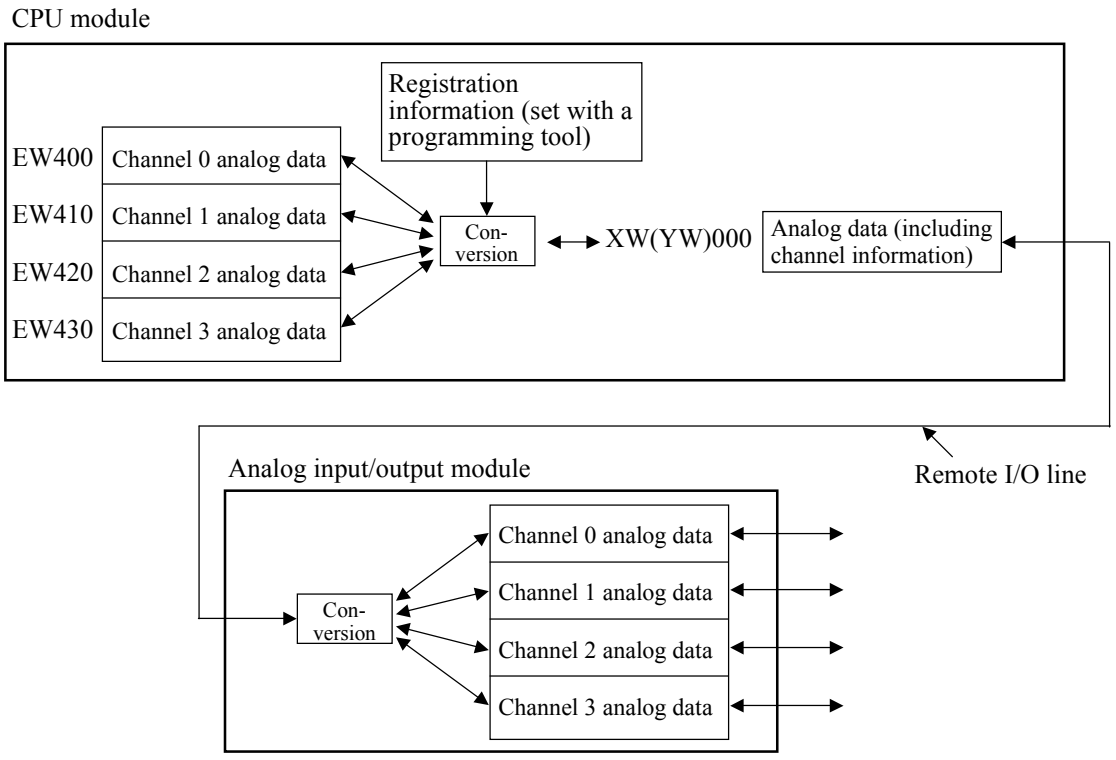


Figure 4-11 Allocation Example

4.6 Handling 8-Channel Analog Input Modules

8-channel analog input modules operate in four difference modes, as described below. Each mode can be set by operating the MODE and/or RANGE switches on the module's front panel. For details, see Chapter 3, "Individual Specifications."

- MODE1: A high-speed response mode with a maximum response time of 5.12 ms plus one TRC. This mode will occupy 128 I/O points (12-bit A/D conversion data) if all the available eight channels are used.
- MODE2: A low-speed response mode with a maximum response time of 5.12 ms plus eight TRCs. This mode will occupy 16 I/O points, regardless of how many channels are used among the available eight.
- MODE3: A high-speed response mode with a maximum response time of 5.12 ms plus one TRC. This mode will occupy 128 I/O points (14-bit A/D conversion data) if all the available eight channels are used.
- MODE4: A low-speed response mode with a maximum response time of 5.12 ms plus four TRCs. This mode will occupy 32 I/O points, regardless of how many channels are used among the available eight.

(Note) Each TRC is a remote I/O transfer duration.

4.6.1 MODE1 setting

This mode of operation inputs analog data to the XW area and, as shown below, allows you to use as many channels as determined by the I/O point count set in the CPU and remote I/O station.

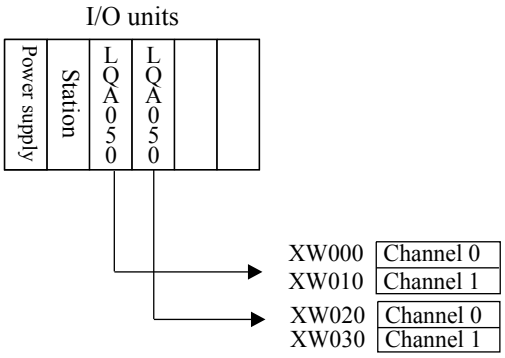
Channel No.	Input address	I/O setting			
		128 I/Os	64 I/Os	32 I/Os	16 I/Os
0	XW△▲0	√	√	√	√
1	XW△▲0+10	√	√	√	im
2	XW△▲0+20	√	√	im	im
3	XW△▲0+30	√	√	im	im
4	XW△▲0+40	√	im	im	im
5	XW△▲0+50	√	im	im	im
6	XW△▲0+60	√	im	im	im
7	XW△▲0+70	√	im	im	im

√: Possible im: Impossible
△▲: 16 I/O points: 00 to 7F
32 I/O points: 00 to 7E
64 I/O points: 00 to 7C
128 I/O points: 00 to 78

<Use example 1>

If you wish to use two channels:

- Set the I/O address of the I/O unit to XW000.
- Set the I/O point count to 32.
- Mount LQA050 modules in slot nos. 0 and 1.



4.6.2 MODE2 setting

This mode of operation writes analog data to the EW area and reads it from that area. To input analog data to the EW area, you must register input addresses and module types with your user system by using an appropriate programming tool. For details, refer to the following manuals:

Manual name	Manual number
S10 Tools For Windows® V7	SAE-3-120
LADDER CHART For Windows®	SAE-3-121

The table below gives the correspondence between registration numbers and allocated data areas.

Registration number	Allocated data area	Registration number	Allocated data area
01	EW400 to 470	13	EWA00 to A70
02	EW480 to 4F0	14	EWA80 to AF0
03	EW500 to 570	15	EWB00 to B70
04	EW580 to 5F0	16	EWB80 to BF0
05	EW600 to 670	17	EWC00 to C70
06	EW680 to 6F0	18	EWC80 to CF0
07	EW700 to 770	19	EWD00 to D70
08	EW780 to 7F0	20	EWD80 to DF0
09	EW800 to 870	21	EWE00 to E70
10	EW880 to 8F0	22	EWE80 to EF0
11	EW900 to 970	23	EWF00 to F70
12	EW980 to 9F0	24	EWF80 to FF0

CAUTION

When using MODE2, check the model and revision of the CPU/LPU you are using, as well as the version of the programming tool.
The list below indicates the required models and revisions associated with the CPU/LPU and the versions of programming tools in order to use MODE2.

Module types and revisions:

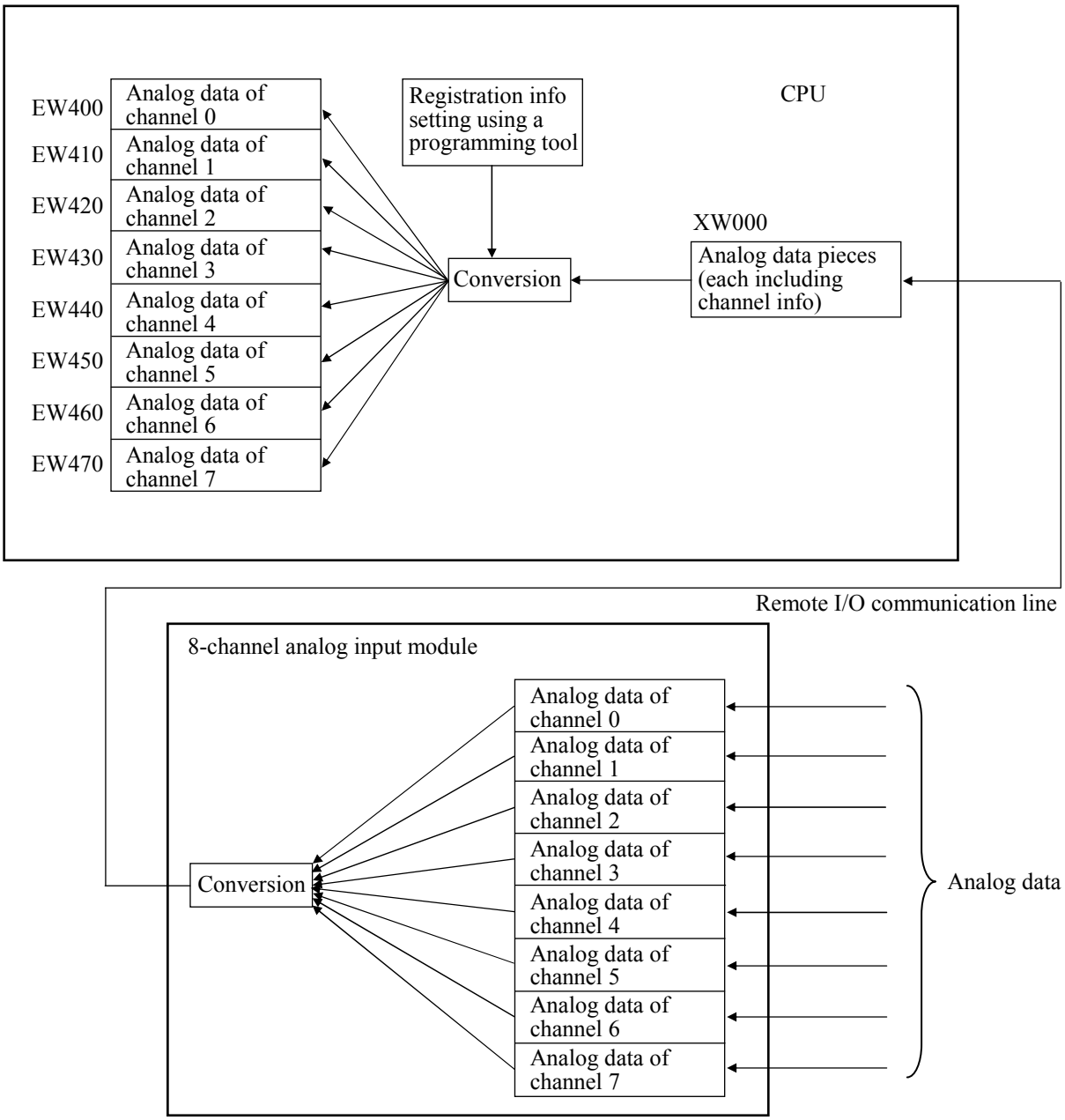
Module type	Indicator indication	Tool window indication	Module revision
LQP000	CPMS M15 or later	–	G or later
LQP010	CPMS M15 or later	–	G or later
LQP011	CPMS M15 or later	–	H or later
LQP120	CPMS M14 or later	–	E or later
LQP510	–	Ver.2.0 Rev.1.0 or later	F or later
LQP710	–	Ver.2.0 Rev.1.0 or later	C or later

Revisions of programming tool:

Type	Version
S10V ladder chart system	Ver1.0, Rev3.0
S10mini ladder chart system	Ver7.0, Rev6.0

- Each module revision in the above table can be found on the bar code label affixed on the top of the module housing. It is the rightmost letter of the alphabet in the bar code.
- MODE2 is not usable on S10/2α Series CPUs. On these CPUs, use MODE4.
- MODE2 is not usable on any CPU or LPU revision earlier than those listed in the above table. On earlier CPU or LPU revisions, use MODE4.

The schematic diagram below shows the flow of data that will occur when the address XW000 is assigned to registration no. 1.



4.6.3 MODE3 setting

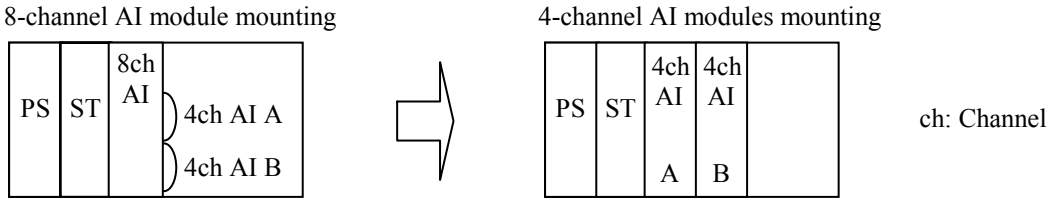
This mode of operation inputs analog data to the XW area. The details of the input operation are the same as those of MODE1.

4.6.4 MODE4 setting

This mode of operation writes analog data to the EW area and reads it from that area.
This mode operates with the prior version of the programming tool and CPU/LPU of the previous REV (They should be prior to the revisions of the CPU/LPU and programming tool versions designated for MODE2). If used, the mode will treat one single 8-channel analog input module as if two 4-channel analog input modules were installed in its place.
To input analog data to the EW area, you must register input addresses and module types with your user system by using an appropriate programming tool. (To accomplish this, use the same procedure as used for MODE2. For information on the required manuals and the relationships between all possible registration numbers and allocated data areas, see Section 4.6.2, "MODE2 setting.")

• Module mounting

Any 8-channel analog input module used in this mode is treated as if two conventional 4-channel analog input modules were mounted in a single slot. The figures below shows examples of mounting an 8-channel AI module and two 4-channel AI modules.



Settings:

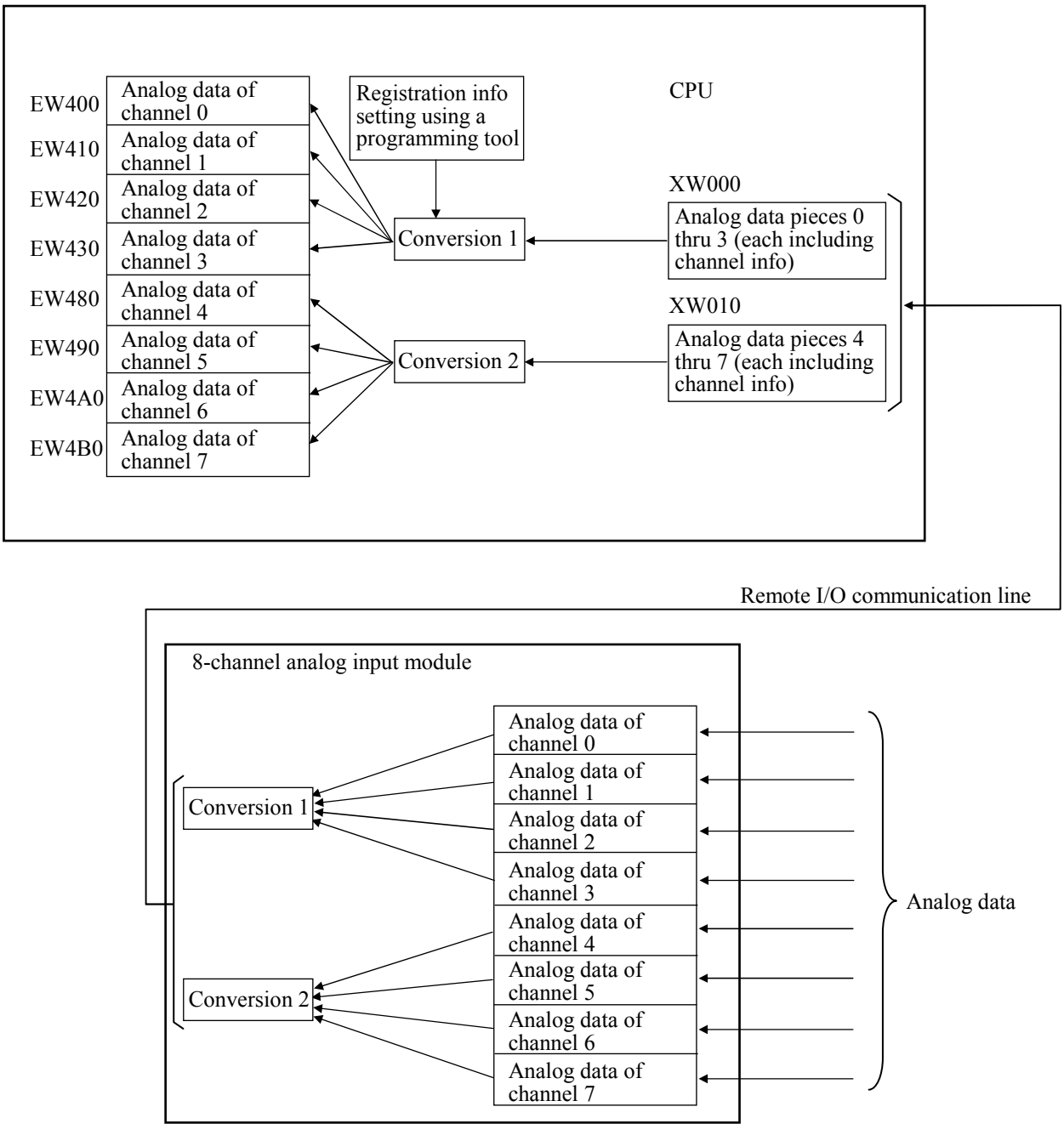
Item	When 4-channel AI modules are mounted	When an 8-channel AI module is mounted
Set ST point count	16	32
Module type registration	Setting of the mounted module's type is required.	Set "LQA000". (*)

(*) The number of "LQA000" should be equal to 2. This setting also applies to the 2α series CPU.

The schematic diagram below shows the flow of data that will occur when the following examples of settings are made:

Examples:

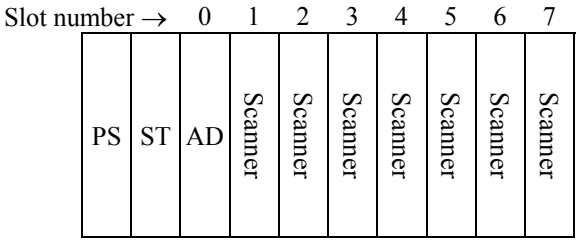
Registration No.	Input address	Module type
Registration No.1	00 (XW000)	LQA000
Registration No.2	01 (XW010)	LQA000



4.7 Handling Scan-type Analog Input Modules

4.7.1 Mounting modules

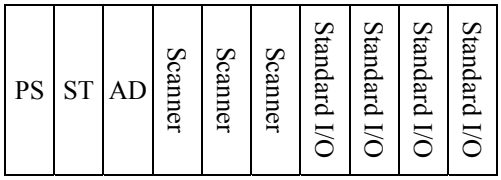
Use the A/D conversion module and scanner modules in the combinations listed below. They cannot be installed in a CPU unit mount base or I/O unit mount base.



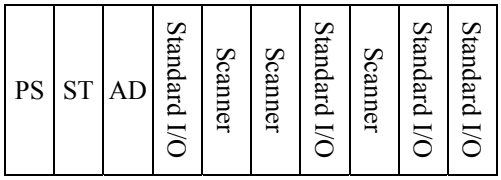
Description	Separately insulated	Commonly insulated
PS	LQV000 or LQV020 or LQV100	
ST	LQS000	LQS000 or LQS020
AD	LQA301	LQA800
Scanner	LQA310	LQA810

- Mount the A/D conversion module in I/O slot 0. It cannot be mounted in I/O slots 1 to 7.
- Up to seven scanner modules can be installed in I/O slots 1 to 7. Mount them in these slots from the leftmost position.
- Other I/O modules can be installed in I/O slots 1 to 7 as well. When they are installed concurrently with the A/D conversion module and scanner modules, however, they cannot intervene between the A/D conversion module (I/O slot 0) and scanner modules. Install them in the slots to the right of the scanner modules.

<Correct>



<Incorrect>



4.7.2 Wiring modules

Follow the instructions in Section 4.2, “Wiring I/O Modules,” to wire modules.

4.7.3 Usage

Scan-type analog input modules enter analog data into the EW area. To perform input into the EW area, the input and output addresses and the module type must be registered by using a programming tool. To find out more on registering such information, refer to one of the manuals named below. When registering the module type, register it as LQA000.

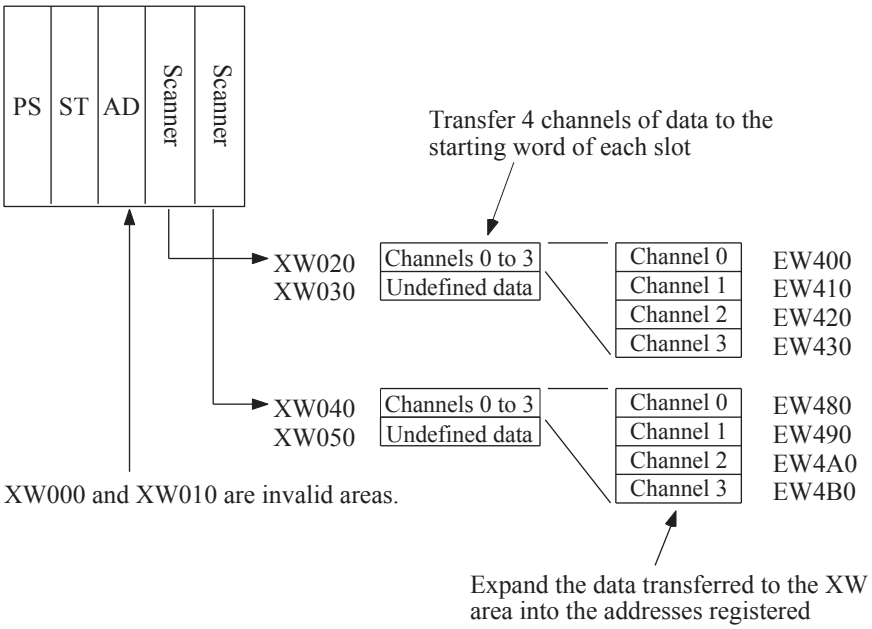
Manual name	Manual number
S10 Tools For Windows® V7	SAE-3-120
LADDER CHART For Windows®	SAE-3-121
4-CHANNEL ANALOG PULSE COUNTER For Windows®	SAE-3-142

<Use example>

- Set the starting address of each I/O unit to 000.
- Set the number of I/O points to 32.
- Register addresses as specified in the table below.

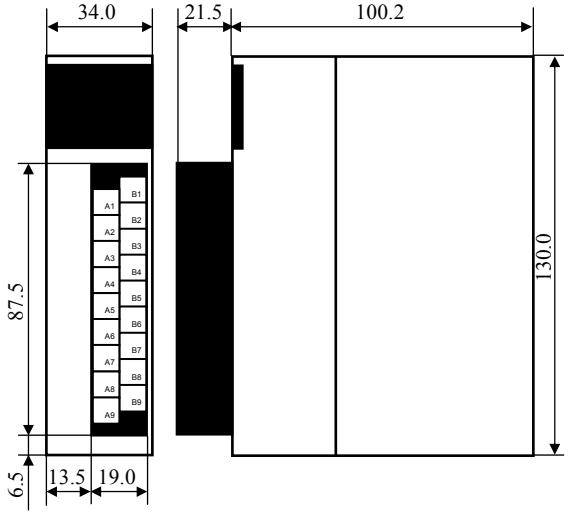
No. (Allocated data area)	Module name	Address
01 (EW400-430)	LQA000, LQA100, PAF300(AI)	02
02 (EW480-4B0)	LQA000, LQA100, PAF300(AI)	04

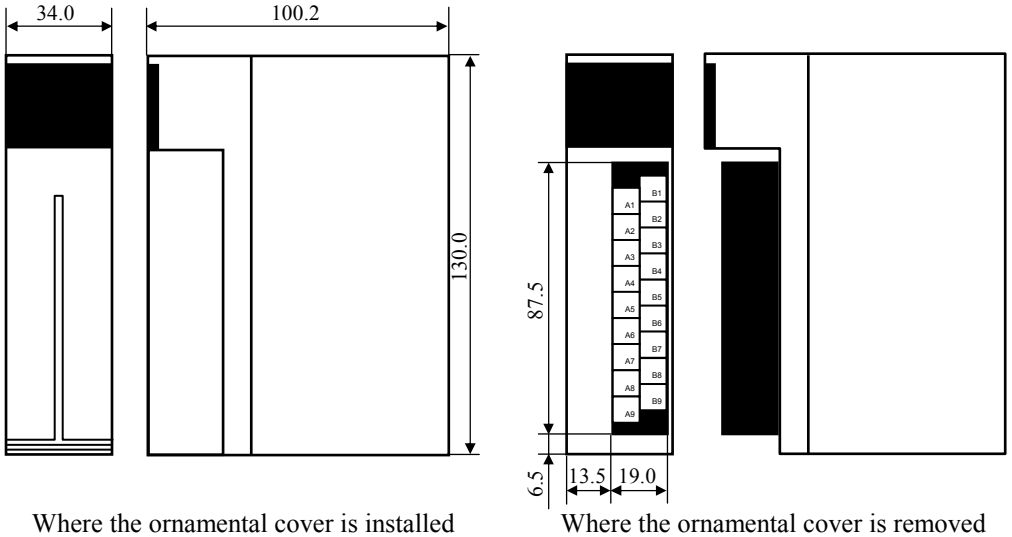
- Mount the scanner module in slots 0 and 1.



4.8 External Dimensions

Table 4-6 External Dimensions (1/3)

<table>
<tr><th>No.</th><th>Type</th><th>External dimensions</th></tr>
<tr><td>1</td><td>LQX110
LQX130
LQX210
LQX211
LQX240
LQX250
LQY150
LQY160
LQC000
LQA000
LQA050
LQA055
LQA100
LQA150
LQA155
LQA200
LQA201
LQA500
LQA600
LQA610
LQA301
LQA310
LQA800
LQA810</td><td> 

(Unit: mm)</td></tr>
<tr><td>2</td><td>LQX200
LQX201
LQY100
LQY140
LQY200</td><td> 

Where the ornamental cover is installed Where the ornamental cover is removed
(Unit: mm)</td></tr>
</table>

Table 4-6 External Dimensions (2/3)

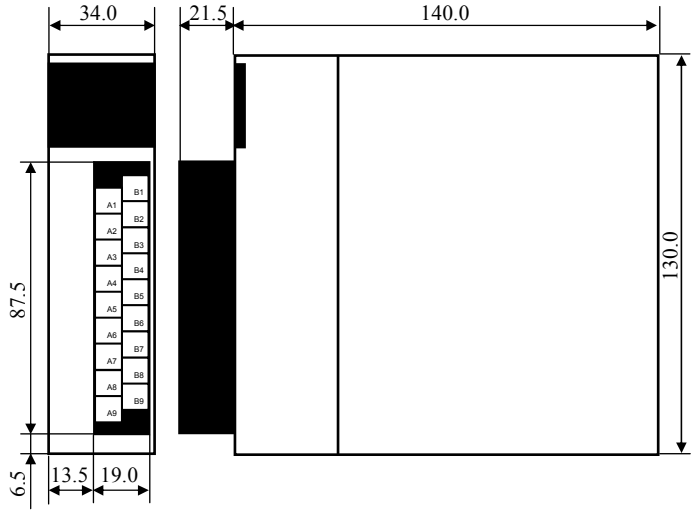
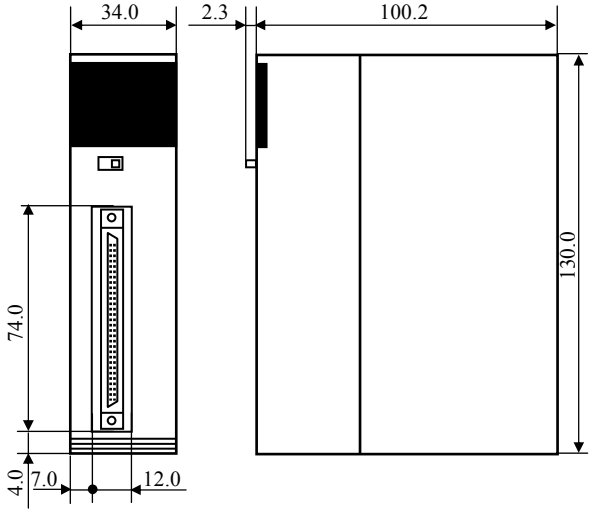
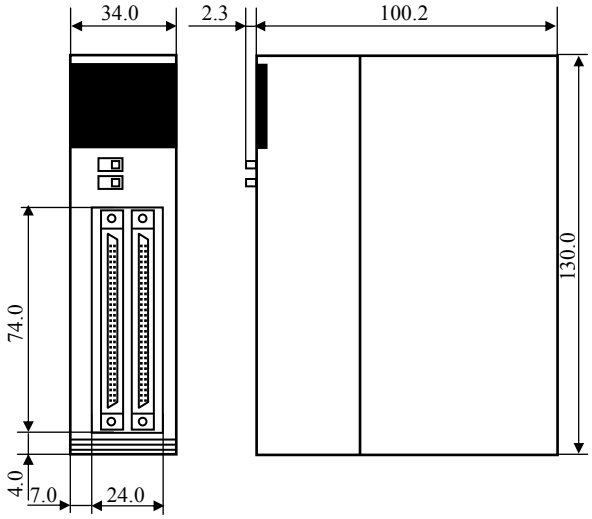
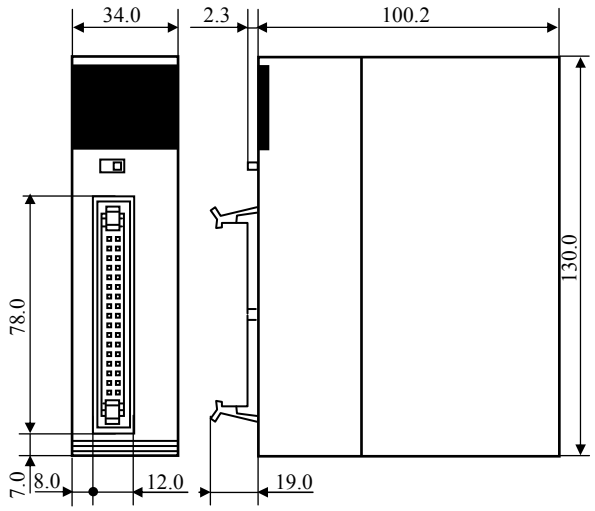
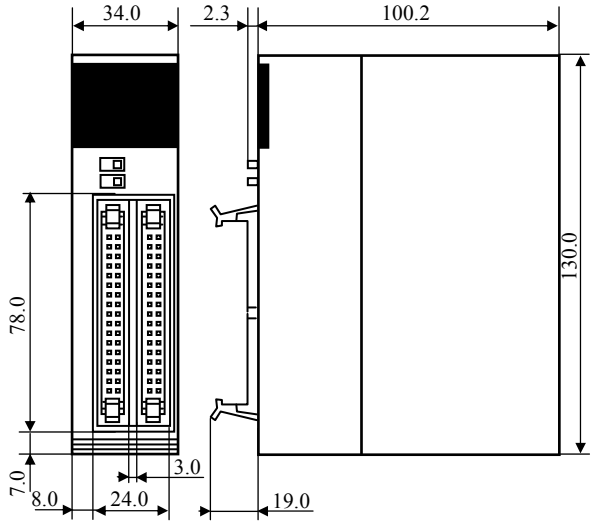
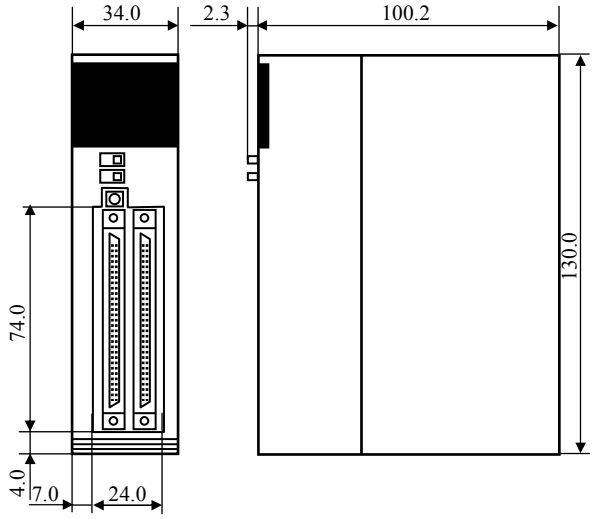
No.	Type	External dimensions
3	LQX150 LQX151 LQY170	 (Unit: mm)
4	LQX300 LQY300	 (Unit: mm)
5	LQX350 LQY350	 (Unit: mm)

Table 4-6 External Dimensions (3/3)

No.	Type	External dimensions
6	LQX310 LQY310	 (Unit: mm)
7	LQX360 LQY360	 (Unit: mm)
8	LQZ300	 (Unit: mm)

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5 HANDLING I/O DATA ON J.NET

The settings and the data formats of J.NET used to transfer I/O data on J.NET are described below.

5.1 J.NET Settings

Set the I/O modules to meet the requirements listed in Table 5-1.

Table 5-1 I/O Settings Required for Using J.NET

Description		Station type	I/O type
Digital input module		AUTO	Setting not required (*)
		I/O	DI
		I/O+DR/DW	DI
		J.STATION (STANDARD)	Setting not required (*)
		J.STATION (EXTENDED)	DI
Digital output module		AUTO	Setting not required (*)
		I/O	DO
		I/O+DR/DW	DO
		J.STATION (STANDARD)	Setting not required (*)
		J.STATION (EXTENDED)	DO
Digital I/O module		AUTO	Setting not required (*)
		J.STATION (STANDARD)	
4-channel analog input module	MODE1	AUTO	Setting not required (*)
		I/O	DI
		I/O+DR/DW	DI
		J.STATION (STANDARD)	Setting not required (*)
		J.STATION (EXTENDED)	DI
	MODE2	J.STATION (EXTENDED)	S10 DI (4ch)
8-channel analog input module	MODE1	AUTO	Setting not required (*)
		I/O	DI
		I/O+DR/DW	DI
		J.STATION (STANDARD)	Setting not required (*)
		J.STATION (EXTENDED)	DI
	MODE2	Not usable	–
	MODE3	AUTO	Setting not required (*)
		I/O	DI
		I/O+DR/DW	DI
		J.STATION (STANDARD)	Setting not required (*)
		J.STATION (EXTENDED)	DI
	MODE4	Not usable	–
4-channel analog output module	MODE1	AUTO	Setting not required (*)
		I/O	DO
		I/O+DR/DW	DO
		J.STATION (STANDARD)	Setting not required (*)
		J.STATION (EXTENDED)	DO
	MODE2	J.STATION (EXTENDED)	S10 DO (4ch)
Pulse counter module	–	J.STATION (EXTENDED)	S10 PCT

(*) Set the transfer word length, addresses, etc. as instructed in "J.NET (Manual number SME-1-104)."

CAUTION

When using an analog input module and an analog output module in mode 1 or mode 3, set their I/O type to DI or DO. Setting them to AI or AO would corrupt the transfer data.

5.2 Data Formats

When using the modules mentioned below on J.NET, use the data formats shown in Figure 5-1, not in 3, “Individual Specifications.”

Applicable modules: LQA000, LQA050, LQA055, LQA100, LQA150, LQA155, LQA200, LQA201, LQA500, LQA600, LQA610, LQA810

(1) LQA000, LQA100, LQA200, and LQA810 data formats

- When the I/O type is S10 AI (4-channel):

	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
Word 1	0	0	0	0	S	Channel 0 A/D conversion data										
Word 2	0	0	0	0	S	Channel 1 A/D conversion data										
Word 3	0	0	0	0	S	Channel 2 A/D conversion data										
Word 4	0	0	0	0	S	Channel 3 A/D conversion data										

A/D conversion data: -2,048 to +2,047
(S: Sign bit)

- When the station type is AUTO J.STATION (STANDARD) or the I/O type is AI:

	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
Word 1	S	Channel 0 A/D conversion data											0	0	0	0
Word 2	S	Channel 1 A/D conversion data											0	0	0	0
Word 3	S	Channel 2 A/D conversion data											0	0	0	0
Word 4	S	Channel 3 A/D conversion data											0	0	0	0

A/D conversion data: -2,048 to +2,047
(S: Sign bit)

(2) LQA050, LQA055, LQA150, and LQA155 data formats

• Data format used in MODE1 (not dependent on I/O types and station types)

	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
Word 1	S	Channel 0 A/D conversion data											0	0	0	0
Word 2	S	Channel 1 A/D conversion data											0	0	0	0
Word 3	S	Channel 2 A/D conversion data											0	0	0	0
Word 4	S	Channel 3 A/D conversion data											0	0	0	0
Word 5	S	Channel 4 A/D conversion data											0	0	0	0
Word 6	S	Channel 5 A/D conversion data											0	0	0	0
Word 7	S	Channel 6 A/D conversion data											0	0	0	0
Word 8	S	Channel 7 A/D conversion data											0	0	0	0

A/D conversion data: -2,048 to +2,047
(S: Sign bit)

• Data format used in MODE3 (not dependent on I/O types and station types)

	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
Word 1	S	Channel 0 A/D conversion data													0	0
Word 2	S	Channel 1 A/D conversion data													0	0
Word 3	S	Channel 2 A/D conversion data													0	0
Word 4	S	Channel 3 A/D conversion data													0	0
Word 5	S	Channel 4 A/D conversion data													0	0
Word 6	S	Channel 5 A/D conversion data													0	0
Word 7	S	Channel 6 A/D conversion data													0	0
Word 8	S	Channel 7 A/D conversion data													0	0

A/D conversion data: -8,192 to +8,191
(S: Sign bit)

(3) LQA500 data formats

- When the I/O type is S10 AO (4-channel) and the RANGE switch is set in “0” or “1” position:

	2^{15} 2^{14} 2^{13} 2^{12}	2^{11} 2^{10} 2^{9} 2^{8} 2^{7} 2^{6} 2^{5} 2^{4} 2^{3} 2^{2} 2^{1} 2^{0}
Word 1	Unused	S Channel 0 D/A conversion data
Word 2	Unused	S Channel 1 D/A conversion data
Word 3	Unused	S Channel 2 D/A conversion data
Word 4	Unused	S Channel 3 D/A conversion data

D/A conversion data: -2,048 to +2,047
(S: Sign bit)

- When the I/O type is S10 AO (4-channel) and the RANGE switch is set in “2” position:

	2^{15} 2^{14} 2^{13} 2^{12}	2^{11} 2^{10} 2^{9} 2^{8} 2^{7} 2^{6} 2^{5} 2^{4} 2^{3} 2^{2} 2^{1} 2^{0}
Word 1	Unused	Channel 0 D/A conversion data
Word 2	Unused	Channel 1 D/A conversion data
Word 3	Unused	Channel 2 D/A conversion data
Word 4	Unused	Channel 3 D/A conversion data

D/A conversion data: 0 to 4,095
(S: Sign bit)

- When the station type is AUTO J.STATION (STANDARD), or when the I/O type is AI and the RANGE switch is set in “0” or “1” position:

	2^{15} 2^{14} 2^{13} 2^{12} 2^{11} 2^{10} 2^{9} 2^{8} 2^{7} 2^{6} 2^{5}	2^{4} 2^{3} 2^{2} 2^{1} 2^{0}
Word 1	S Channel 0 D/A conversion data	Unused
Word 2	S Channel 1 D/A conversion data	Unused
Word 3	S Channel 2 D/A conversion data	Unused
Word 4	S Channel 3 D/A conversion data	Unused

D/A conversion data: -2,048 to +2,047
(S: Sign bit)

- When the station type is AUTO J.STATION (STANDARD), or when the I/O type is AI and the RANGE switch is set in “2” position:

	2^{15} 2^{14} 2^{13} 2^{12} 2^{11} 2^{10} 2^{9} 2^{8} 2^{7} 2^{6} 2^{5}	2^{4} 2^{3} 2^{2} 2^{1} 2^{0}
Word 1	Channel 0 D/A conversion data	Unused
Word 2	Channel 1 D/A conversion data	Unused
Word 3	Channel 2 D/A conversion data	Unused
Word 4	Channel 3 D/A conversion data	Unused

D/A conversion data: 0 to 4,095
(S: Sign bit)

(4) LQA600 and LQA610 data formats

• When the I/O type is S10 AO (4-channel):

	2^{15} 2^{14} 2^{13} 2^{12}	2^{11} 2^{10} 2^{9} 2^{8} 2^{7} 2^{6} 2^{5} 2^{4} 2^{3} 2^{2} 2^{1} 2^{0}
Word 1	Unused	Channel 0 D/A conversion data
Word 2	Unused	Channel 1 D/A conversion data
Word 3	Unused	Channel 2 D/A conversion data
Word 4	Unused	Channel 3 D/A conversion data

D/A conversion data: 0 to 4,095
(S: Sign bit)

• When the station type is AUTO J.STATION (STANDARD), or the I/O type is AO:

	2^{15} 2^{14} 2^{13} 2^{12} 2^{11} 2^{10} 2^{9} 2^{8} 2^{7} 2^{6} 2^{5}	2^{4} 2^{3} 2^{2} 2^{1} 2^{0}
Word 1	Channel 0 D/A conversion data	Unused
Word 2	Channel 1 D/A conversion data	Unused
Word 3	Channel 2 D/A conversion data	Unused
Word 4	Channel 3 D/A conversion data	Unused

D/A conversion data: 0 to 4,095
(S: Sign bit)

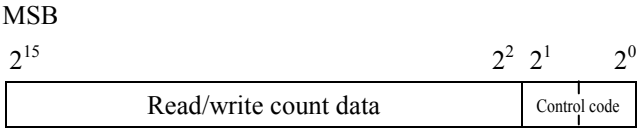
6 HANDLING I/O DATA ON D.Station

6.1 Digital Input/Digital Output/Digital I/O Modules

The data formats that work in normal transfer mode and in analog 4-bit shift mode are the same as those for transferring I/O data on remote I/O.

6.2 Pulse Counter Modules

Table 6-1 Pulse Counter Module Data Format

<table>
<tr><th>Data transfer mode</th><th>Data format</th></tr>
<tr><td>Normal transfer mode</td><td>


Status code when read
<table>
<tr><th>Control code</th><th>Mode 1</th><th>Mode 2</th></tr>
<tr><td>0 0</td><td>Counter stop</td><td>Counter stop</td></tr>
<tr><td>0 1</td><td>Preset start</td><td>Preset start</td></tr>
<tr><td>1 0</td><td>Compare value set</td><td>Compare value set</td></tr>
<tr><td>1 1</td><td>Latch reset</td><td>Latch reset</td></tr>
</table>
<table>
<tr><th>Status code</th><th>Mode 1</th><th>Mode 2</th></tr>
<tr><td>0 0</td><td>Counter stop</td><td>Counter stop</td></tr>
<tr><td>0 1</td><td>R>C</td><td>Preset start</td></tr>
<tr><td>1 0</td><td>R=C</td><td>Compare value set</td></tr>
<tr><td>1 1</td><td>R<C</td><td>Latch reset</td></tr>
</table>
</td></tr>
<tr><td>Analog 4-bit shift mode</td><td>Not usable</td></tr>
</table>

6.3 Analog Input Modules

Always use analog input modules in mode 1.

Table 6-2 Analog Input Module Data Format

<table>
<tr><th>D.STATION's data transfer mode</th><th>Analog classification</th><th>Input data format</th></tr>
<tr><td rowspan="3">Ordinary transfer mode</td><td>4-channel analog mode 1</td><td>
<table>
<tr><th></th><th>2^{15}</th><th>2^{14} 2^{13} 2^{12} 2^{11} 2^{10} 2^{9} 2^{8} 2^{7} 2^{6} 2^{5} 2^{4}</th><th>2^{3} 2^{2} 2^{1} 2^{0}</th></tr>
<tr><td>Word 1</td><td>S</td><td>Channel 0 A/D conversion data</td><td>0 0 0 0</td></tr>
<tr><td>Word 2</td><td>S</td><td>Channel 1 A/D conversion data</td><td>0 0 0 0</td></tr>
<tr><td>Word 3</td><td>S</td><td>Channel 2 A/D conversion data</td><td>0 0 0 0</td></tr>
<tr><td>Word 4</td><td>S</td><td>Channel 3 A/D conversion data</td><td>0 0 0 0</td></tr>
</table>
A/D conversion data: -2,048 to +2,047
(S: Sign bit)
</td></tr>
<tr><td>8-channel analog mode 1</td><td>
<table>
<tr><th></th><th>2^{15}</th><th>2^{14} 2^{13} 2^{12} 2^{11} 2^{10} 2^{9} 2^{8} 2^{7} 2^{6} 2^{5} 2^{4}</th><th>2^{3} 2^{2} 2^{1} 2^{0}</th></tr>
<tr><td>Word 1</td><td>S</td><td>Channel 0 A/D conversion data</td><td>0 0 0 0</td></tr>
<tr><td>Word 2</td><td>S</td><td>Channel 1 A/D conversion data</td><td>0 0 0 0</td></tr>
<tr><td>Word 3</td><td>S</td><td>Channel 2 A/D conversion data</td><td>0 0 0 0</td></tr>
<tr><td>Word 4</td><td>S</td><td>Channel 3 A/D conversion data</td><td>0 0 0 0</td></tr>
<tr><td>Word 5</td><td>S</td><td>Channel 4 A/D conversion data</td><td>0 0 0 0</td></tr>
<tr><td>Word 6</td><td>S</td><td>Channel 5 A/D conversion data</td><td>0 0 0 0</td></tr>
<tr><td>Word 7</td><td>S</td><td>Channel 6 A/D conversion data</td><td>0 0 0 0</td></tr>
<tr><td>Word 8</td><td>S</td><td>Channel 7 A/D conversion data</td><td>0 0 0 0</td></tr>
</table>
A/D conversion data: -2,048 to +2,047
(S: Sign bit)
</td></tr>
<tr><td>8-channel analog mode 3</td><td>
<table>
<tr><th></th><th>2^{15}</th><th>2^{14} 2^{13} 2^{12} 2^{11} 2^{10} 2^{9} 2^{8} 2^{7} 2^{6} 2^{5} 2^{4} 2^{3} 2^{2}</th><th>2^{1} 2^{0}</th></tr>
<tr><td>Word 1</td><td>S</td><td>Channel 0 A/D conversion data</td><td>0 0</td></tr>
<tr><td>Word 2</td><td>S</td><td>Channel 1 A/D conversion data</td><td>0 0</td></tr>
<tr><td>Word 3</td><td>S</td><td>Channel 2 A/D conversion data</td><td>0 0</td></tr>
<tr><td>Word 4</td><td>S</td><td>Channel 3 A/D conversion data</td><td>0 0</td></tr>
<tr><td>Word 5</td><td>S</td><td>Channel 4 A/D conversion data</td><td>0 0</td></tr>
<tr><td>Word 6</td><td>S</td><td>Channel 5 A/D conversion data</td><td>0 0</td></tr>
<tr><td>Word 7</td><td>S</td><td>Channel 6 A/D conversion data</td><td>0 0</td></tr>
<tr><td>Word 8</td><td>S</td><td>Channel 7 A/D conversion data</td><td>0 0</td></tr>
</table>
A/D conversion data: -8,192 to +8,191
(S: Sign bit)
</td></tr>
<tr><td>Analog 4-bit shift mode</td><td>4-channel analog mode 1</td><td>
<table>
<tr><th></th><th>2^{15} 2^{14} 2^{13} 2^{12}</th><th>2^{11}</th><th>2^{10} 2^{9} 2^{8} 2^{7} 2^{6} 2^{5} 2^{4} 2^{3} 2^{2} 2^{1} 2^{0}</th></tr>
<tr><td>Word 1</td><td>S S S S</td><td>S</td><td>Channel 0 A/D conversion data</td></tr>
<tr><td>Word 2</td><td>S S S S</td><td>S</td><td>Channel 1 A/D conversion data</td></tr>
<tr><td>Word 3</td><td>S S S S</td><td>S</td><td>Channel 2 A/D conversion data</td></tr>
<tr><td>Word 4</td><td>S S S S</td><td>S</td><td>Channel 3 A/D conversion data</td></tr>
</table>
Each bit above has the same value as the sign bit.
A/D conversion data: -2,048 to +2,047
(S: Sign bit)
</td></tr>
</table>

(Note) The input data right (approximately 0.5 seconds) after a power-on is /0000.

6.4 Analog Output Modules (LQA500, LQA600, LQA610)

Always use analog output modules in mode 1.

Table 6-3 Analog Output Module Data Format

<table>
<tr><th>Data transfer mode</th><th>Output data format</th></tr>
<tr><td>Normal transfer mode</td><td>
MSB
2^{15} ... 2^4 2^0
Word 1: S | Channel 0 D/A conversion data | 0 0 0 0
Word 2: S | Channel 1 D/A conversion data | 0 0 0 0
Word 3: S | Channel 2 D/A conversion data | 0 0 0 0
Word 4: S | Channel 3 D/A conversion data | 0 0 0 0
D/A conversion data: -2,048 to +2,047 (S: Sign bit) — Fixed at 0

With the LQA500 having the RANGE switch set to 2 and with the LQA600/LQA610, the sign bit becomes the most significant bit of the D/A conversion data. The data ranges from 0 to 4,095.

Output data is set to =/0000 immediately after power ON (for approximately 0.5 second).
</td></tr>
<tr><td>Analog 4-bit shift mode</td><td>
MSB
2^{15} 2^{12} 2^{11} ... 2^0
Word 1: No effect | S | Channel 0 D/A conversion data
Word 2: No effect | S | Channel 1 D/A conversion data
Word 3: No effect | S | Channel 2 D/A conversion data
Word 4: No effect | S | Channel 3 D/A conversion data
D/A conversion data: -2,048 to +2,048 (S: Sign bit)

With the LQA500 having the RANGE switch set to 2 and with the LQA600/610, the sign bit becomes the most significant bit of the D/A conversion data. The data ranges from 0 to 4,095.

Output data is set to =/0000 immediately after power ON (for approximately 0.5 second).
</td></tr>
</table>

6.5 Scan-type Analog Input Modules

The scan-type analog input modules (LQA3***, LQA8**) cannot work in conjunction with a D.Station.

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7 MAINTENANCE

7.1 Preventive Maintenance

The inspections listed below are needed to keep the S10mini running in optimal condition. Carry out these inspections daily or periodically (at least twice a year).

Table 7-1 Inspection Items

No.	Item
①	Module appearance
②	Indicator status
③	Mounting screw and terminal block screw tightness
④	Cable and wire covering status
⑤	Dust adhesion
⑥	Analog precision
⑦	Supply input voltage
⑧	Supply voltage (power supply module and externally fed power supplies)

① Module appearance

Check the module case for flaws, cracks and other defects. Defects in the module case may be a sign of damaged internal circuitry, causing the system to malfunction.

② Indicator status of illumination and indication

Check the indicators for unusual status.

③ Mounting screw and terminal block screw tightness

Check the screws, such as those used to mount the module and the terminal block screws, for tightness.

If found loose, tighten them fully. Loose screws could cause the system to malfunction or get burnt under heat.

④ Cable and wire covering status

Check the cable and wire coverings for defects and abnormal heat. Coverings out of position or heated coverings could cause the system to malfunction, threatening electrical shock hazards and getting the system burnt due to shorts.

⑤ Dust adhesion

Check to see if the module has not caught dust. Remove dust adhering to the module using a vacuum cleaner. Adhering dust could cause a short in internal circuitry, causing the system to get burnt.

CAUTION

The module is susceptible to electrostatic damages. Discharge electrostatic charges from your body before setting switches, attaching or detaching cables, or inserting or removing connectors.

⑥, ⑦ Supply voltage status

Make sure that the I/O voltages of the power supply module and the external supply voltage conform to the specifications.

A supply voltage failing to conform to its rating could result in the system malfunctioning.

Input voltage fluctuations: LQV000: 85 to 132 VAC

LQV100: 85 to 132 VAC, 85 to 132 VDC

LQV020: 20.4 to 28.8 VDC

LQV200: 170 to 264 VAC

Output voltage fluctuations: 5 VDC ± 5%

Test the output voltage of the power supply module at the SERVICE CHECK terminals shown below. (For how to test the operating supply voltages of each module and external supply voltages, refer to the relevant manuals.)

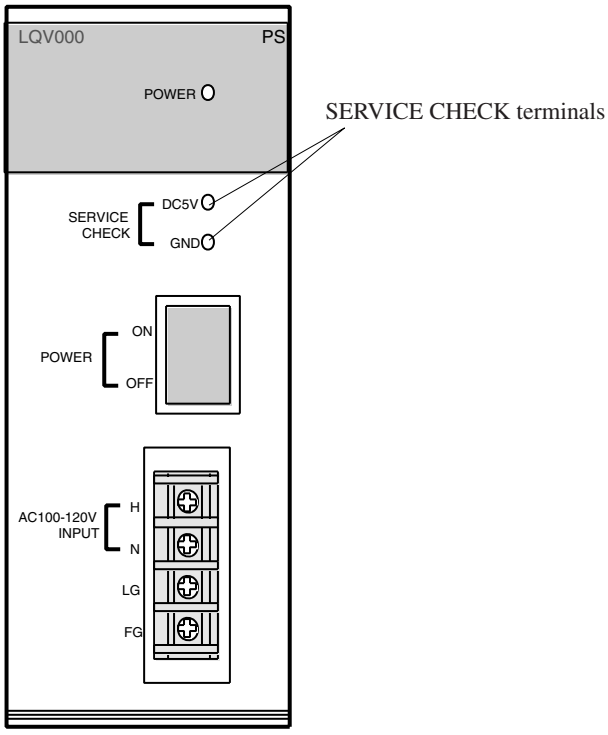

Figure 7-1 LQV000 Appearance

CAUTION
● If the input voltage of the power supply module is within its specified range but it is closer to the upper or lower limit of the range, assume an input power supply error and request inspection from the power supply facility administrator. ● Hot-replacing a module could lead to damage to hardware or software. Be sure to switch modules off before replacing them.

7.2 Troubleshooting

When a module fails, proceed with troubleshooting by following these steps:

(1) Check the status of LED illumination on the power supply module and the CPU indicator.

(2) Replace the module.

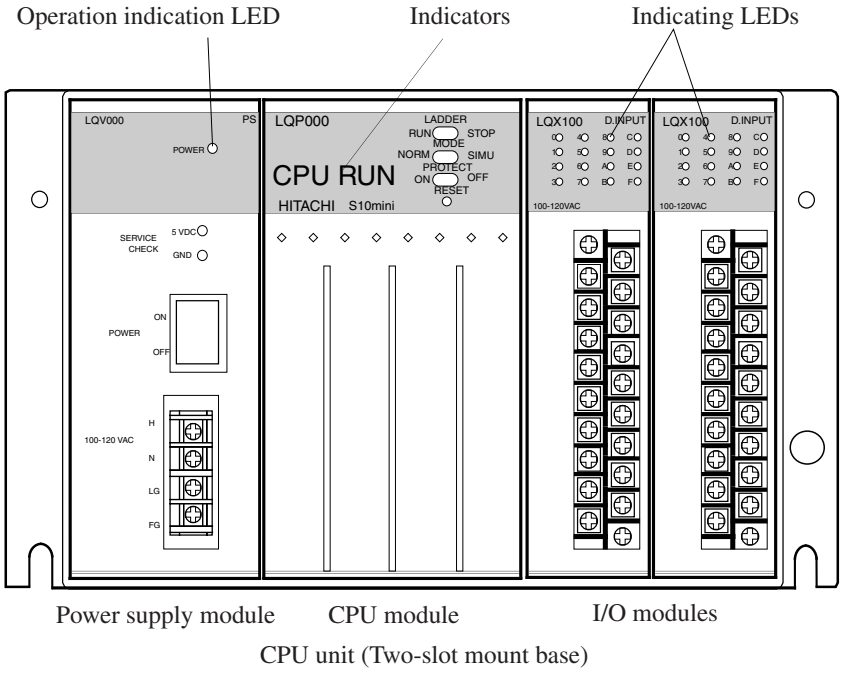

Figure 7-2 Troubleshooting Failures in the CPU Unit

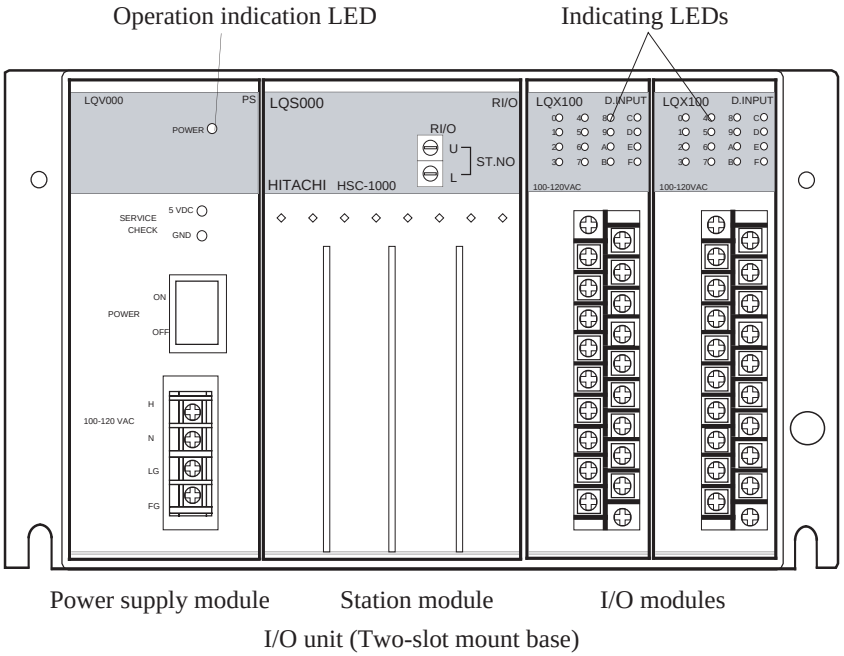

Figure 7-3 Troubleshooting Failures in I/O Units

■ Troubleshooting by checking the status of indicator illumination

- If the power supply module operation indication LED is off, examine the supply voltage and the waveform.
- The CPU module indicator should appear as described below when the CPU is running normally.

Table 7-2 CPU Indicator Indications Showing Normal CPU Status

Indication	Explanation
N△△△	Running program N△△△.
P△△△	Running program P△△△.
E△△△	Has turned on event coil E△△△.
CPU RUN	Running a ladder program and executing a remote I/O transfer.
CPU SIMU	Running a ladder program and has paused a remote I/O transfer.
CPU STOP	Has paused a ladder program and executing a remote I/O transfer.

- If the indicator shows the condition described below, troubleshoot the failure by taking the corrective action suggested.

Table 7-3 CPU Indicator Indication Suggesting an Error

Indication	Corrective action
IO-T-△△△	Transfer of remote I/O data to and from the I/O address (△△0) is disabled. Check the power and remote I/O cables for breakage, the terminator and station number settings for validity, and I/O numbers for duplication.

- If the indicator shows otherwise, refer to “S10mini CPU (Manual number SME-1-100)” and the documentation supplied with the option modules mounted in the CPU mounting base.

■ Troubleshooting by replacing the module

If the problem is not resolved by performing the procedure recommended in "Troubleshooting by checking the status of indicator illumination" above, start troubleshooting as described in the table below.

Table 7-4 Troubleshooting

Module	Failure symptom	Action
Power supply module	The LED remains off.	Replace the power supply module.
I/O modules	All I/O modules are inoperable.	Replace the power supply module.
	The I/O module mounted on an I/O unit is inoperable.	Replace the CPU module.
	Only a particular I/O module is inoperable.	Replace the I/O module.

CAUTION

The customer is cautioned not to replace any internal components of the S10mini CPU, except for the battery. We do not assume responsibility for any consequential damages to our equipment and peripheral devices and for personal injury that may result from such customer replacement. If a module appears to have failed, replace it as a whole.