MITSUBISHI ELECTRIC

Changes for the Better

MITSUBISHI CNC

Connection Manual

C70

IB-1500261(ENG)-M

Introduction

This manual explains the items required for installing and connecting the C70.
Read this manual thoroughly and understand the product's functions and performance before starting to use.
This manual is written on the assumption that all option functions are added, but the actually delivered device may not have all functions.
The unit names, cable names and various specifications are subject to change without notice. Please confirm these before placing an order.
For safe use, fully understand "Precautions for Safety" on the next page first.

Details described in this manual:

⚠ CAUTION

⚠ For items described as "Restrictions" or "Usable State" in this manual, the instruction manual issued by the machine tool builder takes precedence over this manual.

⚠ Items that are not described in this manual must be interpreted as "not possible".

⚠ This manual is written on the assumption that all option functions are added. Confirm the specifications issued by the machine tool builder before use.

⚠ Refer to the Instruction Manual issued by each machine tool builder for details on each machine tool.

⚠ Some screens and functions may differ depending on each NC system (or version), and some functions may not be possible. Please confirm the specifications before use.

Refer to the following documents.

GOT2000 Series User's Manual (Hardware) SH-081194ENG
GT16 User's Manual (Hardware) SH-080928ENG
GT15 User's Manual SH-080528ENG
QCPU User's Manual (Hardware Design, Maintenance and Inspection) SH-080483ENG
MDS-D2/DH2 Series Specifications Manual ..... IB-1501124(ENG)
MDS-D2/DH2 Series Instruction Manual ..... IB-1501127(ENG)
MDS-DM2 Series Specifications Manual ..... IB-1501136(ENG)
MDS-DM2 Series Instruction Manual ..... IB-1501139(ENG)
MDS-DJ Series Specifications Manual ..... IB-1501130(ENG)
MDS-DJ Series Instruction Manual ..... IB-1501133(ENG)
MDS-D/DH Series Instruction Manual ..... IB-1500025(ENG)
MDS-D-SVJ3/SPJ3 Series Instruction Manual ..... IB-1500193(ENG)
MDS-DM Series Instruction Manual ..... IB-1500893(ENG)
Safety Handbook (Original Instructions) ..... IB-1501026(ENG)

Precautions for Safety

Always read this manual and enclosed documents before installation, operation, maintenance and inspection to ensure correct usage. Thoroughly understand the basics, safety information and precautions of the devices before using.
This manual classifies the safety precautions into "DANGER", "WARNING" and "CAUTION".

⚠DANGER	**When the user could be subject to imminent fatalities or serious injuries if handling is mistaken.**
⚠WARNING	**When the user could be subject to fatalities or serious injuries if handling is mistaken.**
⚠CAUTION	**When the user could be subject to injuries or the property could be damaged if handling is mistaken.**

Note that the items under "⚠ CAUTION" could lead to serious consequences as well depending on the situation. All the items are important and must always be observed.

The following sings indicate prohibition and compulsory.

	**This sign indicates prohibited behavior (must not do).** **For example,  indicates "Keep fire away".**
	**This sign indicated a thing that is pompously (must do).** **For example,  indicates "it must be grounded".**

The meaning of each pictorial sing is as follows.

				
CAUTION	**CAUTION rotated object**	**CAUTION HOT**	**Danger Electric shock risk**	**Danger explosive**
				
Prohibited	**Disassembly is prohibited**	**KEEP FIRE AWAY**	**General instruction**	**Earth ground**

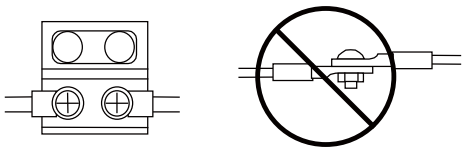
For Safe Use

This product is not designed or manufactured on the assumption that the product will be used for the equipment or systems that are to be subject to any fatal consequences. Please inquire our customer service department about any particular usage other than the normal usage as a machine tool.

1. Items related to prevention of electric shocks.

⚠ WARNING

- Do not open/close the front cover while the power is ON or during operation. The high voltage terminals and charged sections will be exposed, and this could result in electric shocks.
- Do not remove the front cover even when the power is OFF, except for the wiring works or periodic inspections. The inside of the controller and servo drive unit are charged, and this could result in electric shocks.
- Always wait at least 15 minutes after turning the power OFF. Then, check the voltage with a tester, etc., before wiring works, inspections or connecting with peripheral devices. Failure to observe this could result in electric shocks.
- Earth ground the controller, servo drive unit and servomotor according to the local laws. (In Japan, ground the 200V Series input products with Class C or higher protective grounding and the 400V Series input with Class D or higher protective grounding.)
- All wiring works, maintenance and inspections must be carried out by a qualified technician. Failure to observe this could result in electric shocks. Contact your nearby Service Center or Service Station for replacing parts and servicing.
- Wire the controller, servo drive unit and servomotor after installation. Failure to observe this could result in electric shocks.
- Do not operate the switches with wet hands. Failure to observe this could result in electric shocks.
- Do not damage, apply excessive stress, place heavy things on or sandwich the cables. Failure to observe this could result in electric shocks.
- Insulate the power lead using a fixed terminal block. Failure to observe this could result in electric shocks.



- Completely turn off the all lines of the power supply externally before wiring. Not completely turning off all power could result in electric shock or damage to the product.
- When turning on the power supply or operating the module after wiring, be sure that the module's terminal covers are correctly attached. Not attaching the terminal cover could result in electric shock.

2. Items related to prevention of fire

⚠ CAUTION
Install the controller, servo drive unit, servomotor and regenerative resistor on non-combustible material. Installation directly on or near combustible materials could result in fires.
If any malfunction in the unit is observed, shut off the power at the unit's input power side. Continuous flow of large current could result in fires.
Install an appropriate NFB (circuit breaker) and MC (contactor) on the power input section of the servo drive unit and configure the sequence that shuts the power off upon drive unit's emergency stop or alarm.
When a breaker is shared for multiple power supply units, the breaker may not function upon short-circuit failure in a small capacity unit. Do not share a breaker for multiple units as this is dangerous.
Incorrect wiring and connections could cause the devices to damage or burn.

3. Items related to prevention of bodily injury or property damage

⚠ DANGER
When transporting or installing a built-in IPM spindle or linear servomotor, be careful so that your hand or property will not be trapped in the servomotors or other metal objects. Also keep the devices with low magnetic tolerance away from the product.

⚠ CAUTION
Do not apply voltages to other than those indicated in the connection manual for the controller or specifications manual for the servo drive unit. Failure to observe this could cause the devices to rupture or damage, etc.
Incorrect terminal connections could cause the devices to rupture or damage, etc.
Incorrect polarity (+ -) could cause the devices to rupture or damage, etc.
Persons wearing medical devices, such as pacemakers, must stay away from this unit. The electromagnetic waves could adversely affect the medical devices.
Fins on the rear of the unit, regenerative resistor and servomotor, etc., will be hot during operation and for a while after the power has been turned OFF. Do not touch or place the parts and cables, etc. close to these sections. Failure to observe this could result in burns.
Do not enter the machine's movable range during automatic operation. Keep your hands, feet or face away from the spindle during rotation.

4. General Precautions

Always follow the precautions below. Incorrect handling could result in faults, injuries or electric shocks, etc.

(1) Transportation and installation

⚠ CAUTION

- ⚠ Correctly transport the products according to the weights.
- ⊘ Use servomotor's suspension bolts to transport the servomotor itself. Do not use it to transport the servomotor after installation onto the machine.
- ⚠ Do not stack the products exceeding the indicated limit.
- ⚠ Do not hold the cables, shaft or detector when transporting the servomotor.
- ⚠ Do not transport the controller or servo drive unit by suspending or holding the connected wires or cables.
- ⚠ Do not hold the front cover when transporting the servo drive unit, or the front cover could come off, causing the unit to drop.
- ⚠ Install on a non-combustible place where the unit's or motor's weight can be withstood according to the instruction manual.
- ⚠ The servomotor does not have a complete water-proof (oil-proof) structure. Do not allow oil or water to contact or enter the motor. Prevent the oil-soaked cutting chips from being accumulated on the motor.
- ⚠ When installing the motor facing upwards, take measures on the machine side so that gear oil, etc., will not enter the motor shaft.
- ⚠ Do not remove the detector from the servomotor. (The detector installation screw is treated with sealing.)
- ⚠ Do not allow foreign matters, especially, conductive foreign matters such as screws or metal chips, or combustible foreign matters such as oil, to enter the controller, servo drive unit or servomotor. Failure to observe this could result in rupture or damage.
- ⚠ Do not get on the product or place heavy objects on it.
- ⚠ Provide appropriate distance between the controller/servo drive unit and inner surface of the control panel/other devices.
- ⚠ Do not install or operate the controller, servo drive unit or servomotor that is damaged or has missing parts.
- ⚠ Take care not to cut hands, etc. with the heat radiating fins or metal edges.
- ⚠ Do not block the intake/outtake ports of the servomotor with the cooling fan.

⚠ CAUTION

⚠ Install the controller's display unit and operation board unit on the spot where cutting oil will not reach.

⚠ The controller, servo drive unit and servomotor are precision devices, so do not drop or apply thumping vibration and strong impacts on them.

⚠ Hard disk unit is a precision device, so do not drop or apply strong impacts on it.

⚠ Store and use the units according to the environment conditions indicated in each specifications manual.

⚠ When disinfectants or insecticides must be used to treat wood packaging materials, always use methods other than fumigation (for example, apply heat treatment at the minimum wood core temperature of 56 °C for a minimum duration of 30 minutes (ISPM No. 15 (2009))).
If products such as units are directly fumigated or packed with fumigated wooden materials, halogen substances (including fluorine, chlorine, bromine and iodine) contained in fumes may contribute to the erosion of the capacitors.
When exporting the products, make sure to comply with the laws and regulations of each country.

⚠ Do not use the products in conjunction with any components that contain halogenated flame retardants (bromine, etc). Failure to observe this may cause the erosion of the capacitors.

⚠ Securely fix the motor to the machine. The motor could come off during operation if insecurely fixed.

⚠ Always install the servomotor with reduction gear in the designated direction. Failure to observe this could result in oil leaks.

⚠ Always install a cover, etc., over the shaft so that the rotary section of the spindle motor cannot be touched during motor rotation.

⚠ When using a coupling connection to the servomotor shaft end, do not apply impacts by hammering, etc. The detector could be damaged.

⚠ Use a flexible coupling when connecting with a ball screw, etc., and keep the shaft core deviation smaller than the tolerable radial load of the shaft.

⚠ Do not use a rigid coupling as an excessive bending load will be applied on the shaft and could cause the shaft to break.

⚠ Do not apply a load exceeding the tolerable level onto the motor shaft. The shaft or bearing could be damaged.

❗ Before using this product after a long period of storage, please contact the Mitsubishi Service Station or Service Center.

⚠ Following the UN recommendations, battery units and batteries should be transported based on the international regulations such as those determined by International Civil Aviation Organization (ICAO), International Air Transport Association (IATA), International Maritime Organization (IMO) and U.S. Department of Transportation (DOT).

⚠ Due to ventilation problems, do not install the base units vertically or horizontally when C70 is mounted on a board, etc.

⚠ Install the basic base on a flat surface. Unevenness or warping of the surface can apply undue force to printed circuit boards and lead to operation failures.

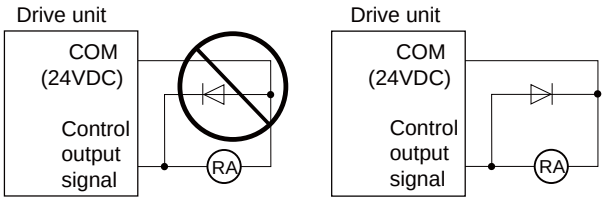
⚠ Avoid installing the base units close to a vibration source, such as a large electromagnetic contactor or no-fuse breaker. Install them on a separate panel or at a safe distance.

⚠ To limit the effects of reflected noise and heat, leave 100mm(3.94inch) or more clearance to instruments fitted in front of CNC CPU (on the rear of the door).
Similarly, leave 50mm(1.97inch) or more clearance between instruments and the left and right sides of the basic base.

(2) Items related to wiring

⚠ CAUTION

- Correctly wire this product. Failure to observe this could result in servomotor runaway, etc.
- Do not install a phase advancing capacitor, surge absorber or radio noise filter on the output side of the servo drive unit.
- Correctly connect the output side (terminal U, V, W). The servomotor will not run properly if incorrectly connected.
- Always install an AC reactor per each power supply unit.
- Always install an appropriate breaker per each power supply unit. A breaker cannot be shared for multiple power supply units.
- Do not directly connect a commercial power supply to the servomotor. Failure to observe this could result in faults.
- When using an inductive load such as relays, always connect a diode in parallel to the load as a noise countermeasure.
- When using a capacitive load such as a lamp, always connect a protective resistor in series to the load to suppress rush currents.
- Do not mistake the direction of the surge absorption diode to be installed on the DC relay for the control output signal. If mistaken, the signal will not be output due to fault in the drive unit, and consequently the protective circuit, such as emergency stop, could be disabled.



- Do not connect or disconnect the connection cables between each unit while the power is ON.
- Do not connect or disconnect the PCBs while the power is ON.
- Do not pull the cables when connecting/disconnecting it.
- Securely tighten the cable connector fixing screw or fixing mechanism. Insufficient fixing could result in dislocation during operation.
- Always treat the shield cables indicated in the Connection Manual with grounding measures such as cable clamps.
- Separate the signal wire from the drive line or power line when wiring.
- Carry out wiring so that there is no possibility of short circuit between wires, nor of dangerous state.

⚠ CAUTION

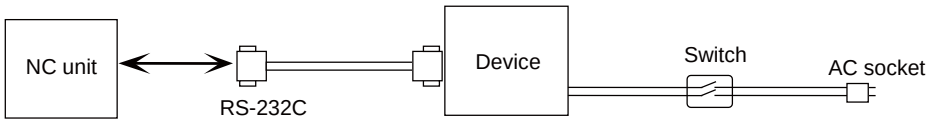
⚠ Use wires and cables whose wire diameter, heat resistance level and bending capacity are compatible with the system.

Ground the device according to the requirements of the country where the device is to be used.

⚠ Wire the heat radiating fins and wires so that they do not contact.

⚠ When using the RS-232C device as a peripheral device, caution must be paid for connector connection/ disconnection.

Always use a double-OFF type AC power supply switch on the device side, and connect/disconnect the connector with the AC power supply on the device side OFF.



⚠ Be sure to ground the earth terminal FG and LG. Not doing so could result in electric shock or operation failure. (Ground resistance: 100Ω or less)

⚠ When wiring in the unit, be sure that it is done correctly by checking the product's rated voltage and the terminal layout. Connecting a power supply that is different from the rating or incorrectly wiring the product could result in fire or damage.

⚠ External connections shall be crimped or pressure welded with the specified tools, or correctly soldered. Imperfect connections could result in short circuit, fire, or operation failure.

⚠ Tighten the terminal screws within the specified torque range. If the terminal screws are loose, it could result in short circuit, fire, or operation failure. Tightening the terminal screws too far may cause damages to the screws and/or the module, resulting in drop, short circuit, or operation failure.

⚠ Be sure there are no foreign matters such as sawdust or wiring debris inside the module. Such debris could cause fire, damage, or operation failure.

⚠ The module has an ingress prevention label on its top to prevent foreign matter, such as wiring debris, from entering the module during wiring.

Do not remove this label during wiring.

Before starting system operation, be sure to remove this label because of heat dissipation.

⚠ When connecting to a personal computer and a unit with the USB interface, an electric shock or a unit failure may occur.

Operate these correctly according to the manual of a unit and a personal computer.

Observe the following cautions when a personal computer in an AC power supply is used.

(1) For a personal computer that uses a 3-pin power plug or power plug with a ground lead type, make sure to use a plug socket including a ground input electrode or ground the earth lead, respectively.

(2) For a personal computer that uses a 2-pin power plug without ground lead, make sure to connect the unit to the personal computer according to the following procedures.

And, it is recommended to supply the same power supply line to a personal computer and the unit.

(a) Pull out the power plug of the personal computer from the AC outlet.

(b) Confirm that the power plug of the personal computer has been pulled out from the AC outlet, and connect USB cables.

(c) Insert the power plug of the personal computer into the AC outlet.

(3) Adjustments

⚠ CAUTION
⚠ Check and adjust programs and each parameter before starting operation. Unpredictable operations could occur depending on the machine.
⚠ Do not make drastic adjustments or changes as the operation could become unstable.

(4) Usage

⚠ CAUTION
⚠ Use C70 in an environment that meets the general specifications contained in this manual. Using C70 in an environment outside the range of the general specifications could result in electric shock, fire, operation failure, and damage to or deterioration of the product.
⚠ When mounting the module, be sure to insert the module fixing hook on the module's bottom into the module fixing hole on the base unit. Incorrect mounting could cause an operation failure or a damage/drop of the unit.
⚠ Hold down the module loading lever at the module bottom and securely insert the fixing hook into the fixing hole in the base unit. Install the module with the module fixing hole as a supporting point. Incorrect loading of the module can cause an operation failure, failure or drop.
⚠ Be sure to fix all the modules with screws to prevent them from dropping. The fixing screws (M3 x 12) are to be prepared by user. For CNC CPU module, use the attached fixing screws (M3 x 13).
⚠ Tighten the screw in the specified torque range. Under tightening may cause a drop, short circuit or operation failure. Over tightening may cause a drop, short circuit or operation failure due to damage to the screw or module.
⚠ Be sure to install the extension cable to connectors of the basic base unit correctly. After installation, check them for looseness. Poor connections could cause an input or output failure.
⚠ Completely turn off all lines of external power supply used in the system before loading or unloading the module. Not doing so could result in electric shock or damage to the product.
⚠ Do not mount/dismount the modules or base over 50 times. Mounting/dismounting over 50 times may cause an operation failure.
⚠ Do not directly touch the module's conductive parts or electronic parts. Touching these parts could cause an operation failure or give damage to the module.
⚠ Do not touch the radiating fin of the CNC CPU module while an electric current is supplied or in a short while after the power OFF. Touching the fin may cause burns. Take care when removing the unit.
⚠ When removing the unit, always remove the fixing screws and then take the fixing hook out from the fixing hole. Incorrect removal will damage the module fixing hook.

⚠ CAUTION

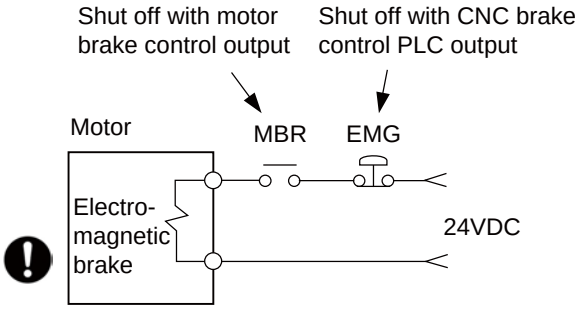
- Install an external emergency stop circuit so that the power will turn OFF followed by the immediate operation stop. A contactor, etc., is required in addition to the shutoff function mounted in the controller.
- Turn OFF the power immediately if any smoke, abnormal noise or odor is generated from the controller, servo drive unit or servomotor.
- Only a qualified technician may disassemble or repair this product.
- Do not alter.
- Use a noise filter, etc. to reduce the effect of electromagnetic disturbances. Electromagnetic disturbances could adversely affect the electronic devices used near the servo drive unit.
- Use the servo drive unit, servomotor and each regenerative resistor with the designated combination. Failure to observe this could result in fires or faults.
- The combination of the servomotor and servo drive unit that can be used is determined. Be sure to check the models of servomotor and servo drive unit before test operation.
- The brakes (electromagnetic brakes) mounted in the servomotor are used for the purpose of holding, and must not be used for normal braking. Also, do not run the motor with the motor brake applied. Motor brake is used for the purpose of holding.
- For the system running via a timing belt, install a brake on the machine side so that safety can be ensured.
- Be sure to confirm SERVO OFF (or READY OFF) when applying the magnetic brake. Also, be sure to confirm SERVO ON prior to releasing the brake.
- When using the DC OFF type electromagnetic brake, be sure to install a surge absorber on the brake terminal.
- Do not connect or disconnect the cannon plug while the electromagnetic brake's power is ON. The cannon plug pins could be damaged by sparks.
- After changing programs/parameters, or after maintenance/inspection, always carry out a test operation before starting actual operation.
- Use the power (input voltage, input frequency, tolerable instantaneous power failure time) that are complied with the power specification conditions indicated in each Specifications manual.
- When making detector cables, do not mistake connection. Failure to observe this could result in malfunction, runaway or fire.

(5) Troubleshooting

⚠ CAUTION

⚠ Use a servomotor with electromagnetic brakes or establish an external brake mechanism for the purpose of holding; this serves as countermeasures for possible hazardous situation caused by power failure or product fault.

⚠ Use a double circuit structure for the electromagnetic brake's operation circuit so that the brakes will activate even when the external emergency stop signal is issued.



⚠ The machine could suddenly restart when the power is restored after an instantaneous power failure, so stay away from the machine. (Design the machine so that the operator safety can be ensured even if the machine restarts.)

⚠ To secure the absolute position, do not shut off the servo drive unit's control power supply when its battery voltage becomes low (warning 9F)

If the battery voltage drop warning alarm occurs, make sure to back up the machining programs, tool data and parameters, etc. with the input/output device before replacing the battery.
Depending on the level of voltage drop, there is the possibility of memory loss. Reload all the data backed up before the alarm occurrence.

(6) Maintenance, inspection and part replacement

⚠ CAUTION

- Periodically back up the programs, tool data and parameters to avoid potential data loss. Also, back up those data before maintenance and inspections.
- When replacing the battery on the controller side, the machining programs, tool data and parameters, etc., should be backed up with the input/output device beforehand.
  In case the memory is damaged in replacing the batteries, reload all the data backed up before the alarm occurrence.
- The electrolytic capacitor's capacity will drop due to deterioration. To prevent secondary damage due to capacitor's faults, Mitsubishi recommends the electrolytic capacitor to be replaced approx. every five years even when used in a normal environment. Contact the Service Center or Service Station for replacements.
- Do not perform a megger test (insulation resistance measurement) during inspection.
- Do not replace parts or devices while the power is ON.
- Do not short-circuit, charge, overheat, incinerate or disassemble the battery.
- There may be a unit filled with substitute Freon in the heat radiating fins of the 37kW or smaller unit. Be careful not to break the heat radiating fins during maintenance or replacement.

(7) Disposal

⚠ CAUTION

- Take the batteries and backlights for LCD off from the controller, servo drive unit and servomotor, and dispose of them as general industrial wastes.
- Do not alter or disassemble controller, servo drive unit, or servomotor.
- Dispose of the spent batteries and the backlights for LCD according to the local laws.

(8) General precautions

To explain the details, drawings given in this instruction manual, etc., may show the unit with the cover or safety partition removed. When operating the product, always place the cover or partitions back to their original position, and operate as indicated in the instruction manual, etc.

Treatment of waste

The following two laws will apply when disposing of this product. Considerations must be made to each law. The following laws are in effect in Japan. Thus, when using this product overseas, the local laws will have a priority. If necessary, indicate or notify these laws to the final user of the product.

(1) Requirements for "Law for Promotion of Effective Utilization of Resources"
   (a) Recycle as much of this product as possible when finished with use.
   (b) When recycling, often parts are sorted into steel scraps and electric parts, etc., and sold to scrap contractors. Mitsubishi recommends sorting the product and selling the members to appropriate contractors.

(2) Requirements for "Law for Treatment of Waste and Cleaning"
   (a) Mitsubishi recommends recycling and selling the product when no longer needed according to item (1) above. The user should make an effort to reduce waste in this manner.
   (b) When disposing a product that cannot be resold, it shall be treated as a waste product.
   (c) The treatment of industrial waste must be commissioned to a licensed industrial waste treatment contractor, and appropriate measures, including a manifest control, must be taken.
   (d) Batteries correspond to "primary batteries", and must be disposed of according to local disposal laws.

Disposal

(Note) This symbol mark is for EU countries only.
This symbol mark is according to the directive 2006/66/EC Article 20 Information for end-users and Annex II.

Your MITSUBISHI ELECTRIC product is designed and manufactured with high quality materials and components which can be recycled and/or reused.
This symbol means that batteries and accumulators, at their end-of-life, should be disposed of separately from your household waste.
If a chemical symbol is printed beneath the symbol shown above, this chemical symbol means that the battery or accumulator contains a heavy metal at a certain concentration. This will be indicated as follows:
Hg: mercury (0,0005%), Cd: cadmium (0,002%), Pb: lead (0,004%)
In the European Union there are separate collection systems for used batteries and accumulators.
Please, dispose of batteries and accumulators correctly at your local community waste collection/ recycling centre.

Please, help us to conserve the environment we live in!

Trademarks

MELDAS, MELSEC, EZSocket, EZMotion, iQ Platform, MELSOFT, GOT, CC-Link, CC-Link/LT and CC-Link IE are either trademarks or registered trademarks of Mitsubishi Electric Corporation in Japan and/or other countries.

Ethernet is a registered trademark of Xerox Corporation in the United States and/or other countries.
Microsoft® and Windows® are either trademarks or registered trademarks of Microsoft Corporation in the United States and/or other countries.
CompactFlash and CF are either trademarks or registered trademarks of SanDisk Corporation in the United States and/or other countries.

Other company and product names that appear in this manual are trademarks or registered trademarks of the respective companies.

本製品の取扱いについて

(日本語 /Japanese)
本製品は工業用 (クラス A) 電磁環境適合機器です。販売者あるいは使用者はこの点に注意し、住商業環境以外での使用をお願いいたします。

Handling of our product

(English)
This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

본 제품의 취급에 대해서

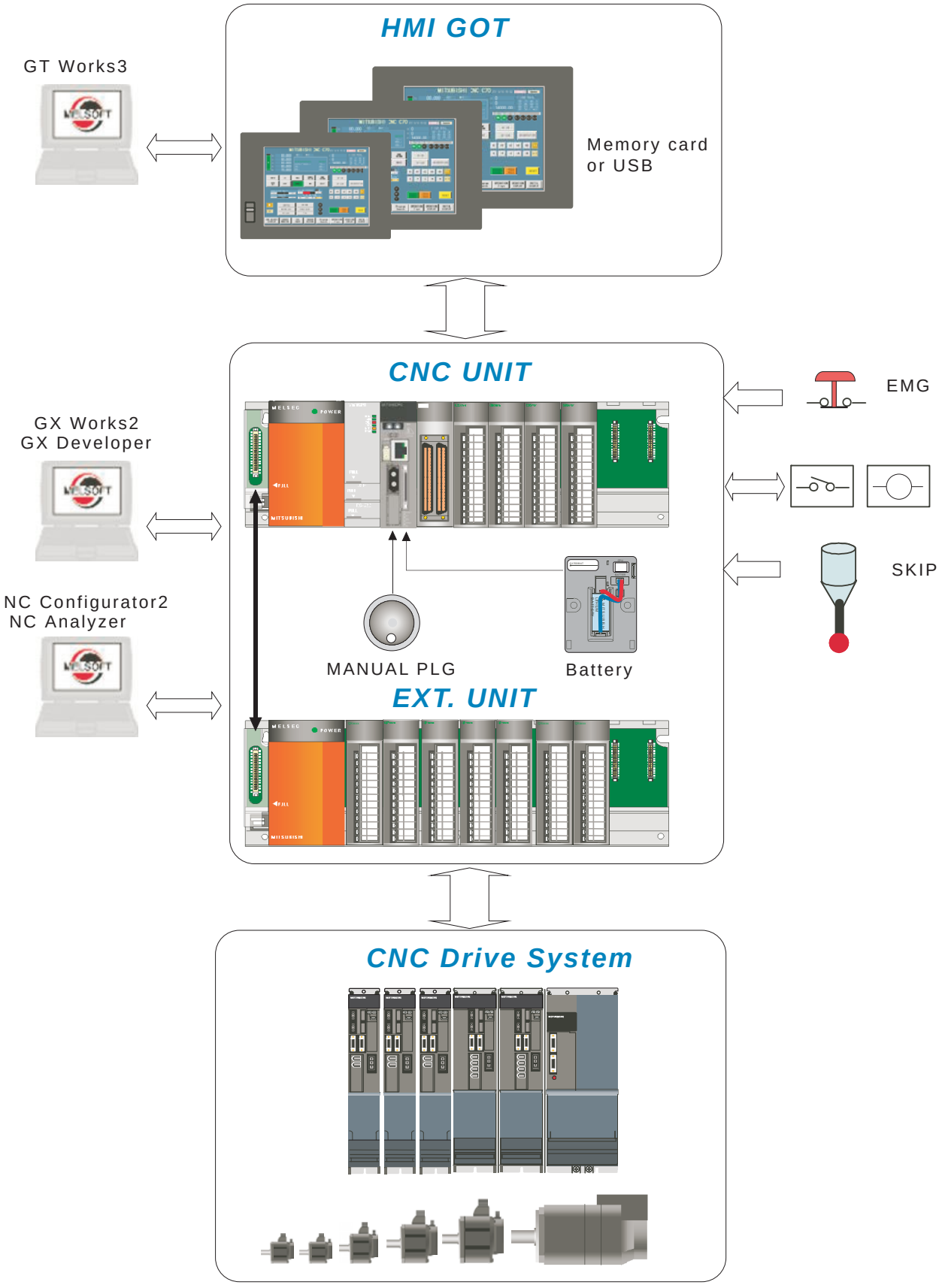
(한국어 /Korean)
이 기기는 업무용 (A 급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며 가정외의 지역에서 사용하는 것을 목적으로 합니다 .

CONTENTS

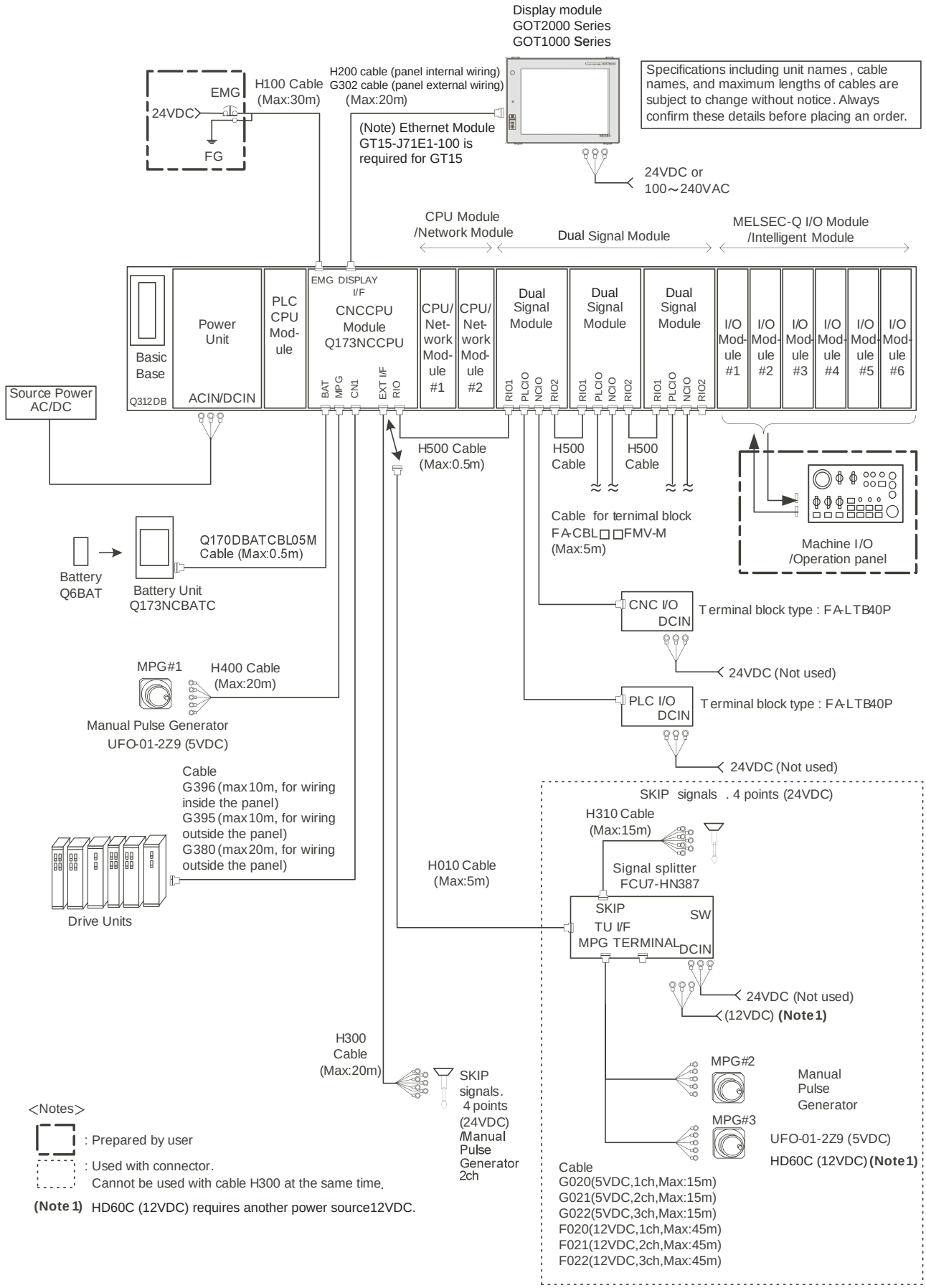
1

System Configuration

1.1 System Basic Configuration Drawing



1.2 General Connection Diagram



1.3 Component Modules

1.3.1 CNC Control Unit

(1) Basic base

Model name	Remarks	Reference
Q35DB	5 slots	QCPU User's Manual (Hardware Design, Maintenance and Inspection) (SH(NA)-080483ENG)
Q38DB	8 slots	
Q312DB	12 slots	

(2) Power supply

Model name	Remarks	Reference
Q61P	Input power supply : 100 to 240VAC Output power supply : 5VDC Output current:6A	QCPU User's Manual (Hardware Design, Maintenance and Inspection) (SH(NA)-080483ENG)
Q63P	Input power supply: 24VDC Output power supply: 5VDC Output current: 6A	
Q64PN	Input power supply : 100 to 240VAC Output power supply : 5VDC Output current : 8.5A	
Q64P	Input power supply: 100 to 120VAC/ 200 to 240VAC Output power supply: 5VDC Output current: 8.5A (Note) Out of production	

(3) PLC CPU

Model name	Remarks	Reference
Q03UDCPU	Program capacity: 30k steps	QCPU User's Manual (Hardware Design, Maintenance and Inspection) (SH(NA)-080483ENG)
Q04UDHCPU	Program capacity: 40k steps	
Q06UDHCPU	Program capacity: 60k steps	
Q13UDHCPU	Program capacity:130k steps	
Q26UDHCPU	Program capacity:260k steps	
Q03UDECPU	Ethernet built-in type, Program capacity: 30k steps	
Q04UDEHCPU	Ethernet built-in type, Program capacity: 40k steps	
Q06UDEHCPU	Ethernet built-in type, Program capacity: 60k steps	
Q10UDEHCPU	Ethernet built-in type, Program capacity: 100k steps	
Q13UDEHCPU	Ethernet built-in type, Program capacity: 130k steps	
Q26UDEHCPU	Ethernet built-in type, Program capacity: 260k steps	
Q03UDVCPU	High-speed type, Program capacity: 30k steps (Note)	
Q04UDVCPU	High-speed type, Program capacity: 40k steps (Note)	
Q06UDVCPU	High-speed type, Program capacity: 60k steps (Note)	
Q13UDVCPU	High-speed type, Program capacity: 130k steps (Note)	
Q26UDVCPU	High-speed type, Program capacity: 260k steps (Note)	

(Note) The High-Speed Universal model is compatible with the safety observation function, but not yet certified under the European safety standards "EN ISO 13849-1 Cat3 PL d" or "EN62061/SIL CL2" by TÜV.

(4) CNC CPU module

Model name	Remarks
Q173NCCPU-S01	CNC CPU module
Battery kit	One each of following accessories are provided: Battery holder unit+Connection cable (0.5m) Q173NCBATC(Q170DBATC), Battery Q6BAT

(5) Battery holder unit

Model name	Remarks
Q173NCBATC	Battery holder unit

(6) Input module

(a) AC

Model name	Remarks	Reference
QX10	16 points, 100 to 120VAC 8mA(100VAC, 60Hz)/7mA(100VAC, 50Hz) Response time: 20ms 16 points/common, 18-point terminal block	I/O module Type Building Block User's Manual (SH(NA)-080042)
QX28	8 points, 100 to 240VAC 17mA(200VAC, 60Hz) /14mA(200VAC, 50Hz)/8mA(100VAC, 60Hz)/ 7mA(100VAC, 50Hz) Response time: 20ms 8 points/common, 18-point terminal block	

(b) DC (positive common type)

Model name	Remarks	Reference
QX40	16 points, 24VDC, 4mA, Response time: 1/5/10/20/70ms 16 points/common, Positive common type 18-point terminal block	I/O module Type Building Block User's Manual (SH(NA)-080042)
QX40-S1	16 points, 24VDC, 6mA, Response time: 0.1/0.2/0.4/0.6/1ms 16 points/common, Positive common type 18-point terminal block	
QX41	32 points, 24VDC, 4mA, Response time: 1/5/10/20/70ms 32 points/common, Positive common type 40-pin connector	
QX41-S1	32 points, 24VDC, 4mA, Response time: 0.1/0.2/0.4/0.6/1ms 32 points/common, Positive common type 40-pin connector	
QX42	64 points, 24VDC, 4mA, Response time: 1/5/10/20/70ms 32 points/common, Positive common type 40-pin connector	
QX42-S1	64 points, 24VDC, 4mA, Response time: 0.1/0.2/0.4/0.6/1ms 32 points/common, Positive common type 40-pin connector	

(c) DC sensor

Model name	Remarks	Reference
QX70	16 points, 5/12VDC, 1.2mA(5VDC)/3.3mA(12VDC) Response time: 1/5/10/20/70ms 16 points/common, Positive/negative common type 18-point terminal block	I/O module Type Building Block User's Manual (SH(NA)-080042)
QX71	32 points, 5/12VDC, 1.2mA(5VDC)/3.3mA(12VDC) Response time: 1/5/10/20/70ms 32 points/common, Positive/negative common type 40-pin connector	
QX72	64 points, 5/12VDC, 1.2mA(5VDC)/3.3mA(12VDC) Response time: 1/5/10/20/70ms 32 points/common, Positive/negative common type 40-pin connector	

(d) DC (negative common type)

Model name	Remarks	Reference
QX80	16 points, 24VDC, 4mA Response time: 1/5/10/20/70ms 16 points/common, Negative common type 18-point terminal block	I/O module Type Building Block User's Manual (SH(NA)-080042)
QX81	32 points, 24VDC, 4mA Response time: 1/5/10/20/70ms 32 points/common, Negative common type 37-pin D sub-connector	
QX82	64 points, 24VDC, 4mA Response time: 1/5/10/20/70ms 32 points/common, Negative common type 40-pin connector	
QX82-S1	64 points, 24VDC 4mA Response time: 0.2/0.3/0.5/0.7/1.3ms 32 points/common, Negative common type 40-pin connector	

(7) Analog input module

(a) Voltage input module

Model name	Remarks	Reference
Q68ADV	8 channels, Input: -10 to 10VDC Output (resolution): 0 to 4000; -4000 to 4000; 0 to 12000; -12000 to 12000; 0 to 16000; -16000 to 16000 Conversion speed: 80µs/channel 18-point terminal block	Analog-Digital Converter Module User's Manual (SH(NA)-080055)

(b) Current input module

Model name	Remarks	Reference
Q62AD-DGH	2 channels, Input: 4 to 20mADC Output (resolution): 0 to 32000; 0 to 64000 Conversion speed: 10ms/2channels 18-point terminal block, Channels are isolated, Power supply for 2-wire transmitter	Channel Isolated High Resolution Analog-Digital Converter Module/Channel Isolated High Resolution Analog-Digital Converter Module (With Signal Conditioning Function) User's Manual (SH(NA)-080277)
Q68ADI	8 channels, Input: 0 to 20mADC Output (resolution): 0 to 4000; -4000 to 4000; 0 to 12000; -12000 to 12000; 0 to 16000; -16000 to 16000 Conversion speed: 80µs/channel 18-point terminal block	Analog-Digital Converter Module User's Manual (SH(NA)-080055)

(c) Voltage/current input module

Model name	Remarks	Reference
Q64AD	4 channels, Input: -10 to 10VDC, 0 to 20mADC Output (resolution): 0 to 4000; -4000 to 4000; 0 to 12000; -12000 to 12000; 0 to 16000; -16000 to 16000 Conversion speed: 80µs/channel 18-point terminal block	Analog-Digital Converter Module User's Manual (SH(NA)-080055)
Q64AD-GH	4 channels, Input: -10 to 10VDC, 0 to 20mADC Output (resolution): 0 to 32000; -32000 to 32000; 0 to 64000; -64000 to 64000 Conversion speed: 10ms/4channels 18-point terminal block, Channels are isolated	Channel Isolated High Resolution Analog-Digital Converter Module/Channel Isolated High Resolution Analog-Digital Converter Module (With Signal Conditioning Function) User's Manual (SH(NA)-080277)

(8) Output module

(a) Relay

Model name	Remarks	Reference
QY10	16 points, 24VDC/240VAC, 2A/point, 8A/common Response time: 12ms 16 points/common 18-point terminal block	I/O module Type Building Block User's Manual (SH(NA)-080042)
QY18A	8 points, 24VDC/240VAC, 2A/point Response time: 12ms 18-point terminal block, All relays isolated	

(b) Triac

Model name	Remarks	Reference
QY22	16 points, 100 to 240VAC, Minimum load voltage Current: 24VAC, 100mA/100/240VAC, 25mA, OFF-time leakage current: 1.5mA(120VAC)/ 3mA(240VAC) Response time: 1ms+0.5 cycle 16 points/common, 18-point terminal block Surge killer provided	I/O module Type Building Block User's Manual (SH(NA)-080042)

(c) Transistor (sink type)

Model name	Remarks	Reference
QY40P	16 points, 12 to 24VDC OFF-time leakage current: 0.1mA Response time: 1ms, 16 points/common, Sink type 18-point terminal block, Thermal protection provided, Short circuit protection provided Surge killer provided	I/O module Type Building Block User's Manual (SH(NA)-080042)
QY41P	32 points, 12 to 24VDC OFF-time leakage current: 0,1mA Response time: 1ms, 32 points/common, Sink type 40-pin connector, Thermal protection provided Short circuit protection provided Surge killer provided	
QY42P	64 points, 12 to 24VDC OFF-time leakage current: 0.1mA Response time: 1ms, 32 points/common, Sink type 40-pin connector, Thermal protection provided Short circuit protection provided Surge killer provided	
QY50	16 points, 12 to 24VDC OFF-time leakage current: 0.1mA Response time: 1ms, 16 points/common, Sink type 18-point terminal block, Surge killer provided Fuse provided	

(d) Transistor (independent)

Model name	Remarks	Reference
QY68A	8 points, 5 to 24VDC OFF-time leakage current: 0.1mA Response time: 10ms, Sink/source type 18-point terminal block, Surge killer provided All points isolated	I/O module Type Building Block User's Manual (SH(NA)-080042)

(e) TTL CMOS

Model name	Remarks	Reference
QY70	16 points, 5 to 12VDC, Response time: 0.5ms 16 points/common, Sink type 18-point terminal block, Fuse provided	I/O module Type Building Block User's Manual (SH(NA)-080042)
QY71	32 points, 5 to 12VDC, Response time: 0.5ms 32 points/common, Sink type 40-pin connector, Fuse provided	

(f) Transistor (source type)

Model name	Remarks	Reference
QY80	16 points, 12 to 24VDC OFF-time leakage current: 0.1mA Response time: 1ms, 16 points/common Source type, 18-point terminal block Surge killer provided, Fuse provided	I/O module Type Building Block User's Manual (SH(NA)-080042)
QY81P	32 points, 12 to 24VDC OFF-time leakage current: 0.1mA Response time: 1ms, 32 points/common Source type, 37-pin D sub-connector, Thermal protection provided, Short circuit protection provided, Surge killer provided	
QY82P	64 points, 12 to 24VDC OFF-time leakage current: 0.1mA Response time: 1ms, 32 points/common Source type, 40-pin connector, Thermal protection provided Short circuit protection provided Surge killer provided	

(9) Analog output module

(a) Voltage output module

Model name	Remarks	Reference
Q68DAVN	8 channels Input (resolution): 0 to 4000; -4000 to 4000; 0 to 12000; -12000 to 12000; -16000 to 16000 Output: -10 to 10VDC Conversion speed: 80µs/channel 18-point terminal block, Transformer insulation between power supply and output modules	Digital-Analog Converter Module User's Manual (SH(NA)-080054)

(b) Current input module

Model name	Remarks	Reference
Q68DAIN	8 channels Input (resolution): 0 to 4000; -4000 to 4000; 0 to 12000; -12000 to 12000 Output: 0 to 20mADC Conversion speed: 80µs/channel 18-point terminal block, Transformer insulation between power supply and output modules	Digital-Analog Converter Module User's Manual (SH(NA)-080054)

(c) Voltage/current output module

Model name	Remarks	Reference
Q62DAN	2 channels Input (resolution): 0 to 4000; -4000 to 4000; 0 to 12000; -12000 to 12000; -16000 to 16000 Output: -10 to 10VDC, 0 to 20mADC Conversion speed: 80µs/channel 18-point terminal block, Transformer insulation between power supply and output modules	Digital-Analog Converter Module User's Manual (SH(NA)-080054)
Q62DA-FG	2 channels Input (resolution): 0 to 12000; -12000 to 12000; -16000 to 16000 Output: -12 to 12VDC, 0 to 22mADC Conversion speed: 10ms/2channels 18-point terminal block, Channels are isolated	Channel Isolated Digital-Analog Converter Module User's Manual (SH(NA)-080281)
Q64DAN	4 channels Input (resolution): 0 to 4000; -4000 to 4000; 0 to 12000; -12000 to 12000; -16000 to 16000 Output: -10 to 10VDC, 0 to 20mADC Conversion speed: 80µs/channel 18-point terminal block, Transformer insulation between power supply and output modules	Digital-Analog Converter Module User's Manual (SH(NA)-080054)

(10) Interrupt input module

Model name	Remarks	Reference
QI60	16 points, 24VDC 4mA Response time: 0.1/0.2/0.4/0.6/1ms 16 points/common, 18-point terminal block	I/O module Type Building Block User's Manual (SH(NA)-080042)

(11) Temperature input module

(a) RTD

Model name	Remarks	Reference
Q64RD	4 channels Platinum RTD (Pt100(JIS C1604-1997, IEC 751 1983), JPt100(JISC1604-1981)) Conversion speed: 40ms/channel 18-point terminal block	RTD Input Module Channel Isolated RTD Input Module User's Manual (SH(NA)-080142)
Q64RD-G	4 channels Platinum RTD (Pt100(JIS C1604-1997, IEC 751 1983), JPt100(JISC1604-1981), Ni100Ω(DIN43760 1987)) Conversion speed: 40ms/channel 18-point terminal block, Channels are isolated	

(b) Thermocouple

Model name	Remarks	Reference
Q64TD	4 channels, Thermocouple (JIS C1602-1995) Conversion speed: 40ms/channel 18-point terminal block	Thermocouple Input Module Channel Isolated Thermocouple/Micro Voltage Input Module User's Manual (SH(NA)-080141)
Q64TDV-GH	4 channels, Thermocouple (JIS C1602-1995) Micro voltage input range: -100mV to 100mV Conversion speed: (sampling period × 3)/channel 18-point terminal block	
Q64TCTT	4 channels, Thermocouple (K, J, T, B, S, E, R, N, U, L, PLII, W5Re/W26Re) Without heater disconnection detection Sampling period: 0.5s/4channels 18-point terminal block	Temperature Control Module User's Manual (SH(NA)-080121)
Q64TCTTBW	4 channels, Thermocouple (K, J, T, B, S, E, R, N, U, L, PLII, W5Re/W26Re) With heater disconnection detection Sampling period: 0.5s/4channels 2 units of 18-point terminal block	

(c) Platinum RTD

Model name	Remarks	Reference
Q64TCRT	4 channels, Platinum RTD (Pt100, JPt100) Without heater disconnection detection Sampling period: 0.5s/4channels 18-point terminal block	Temperature Control Module User's Manual (SH(NA)-080121)
Q64TCRTBW	4 channels, Platinum RTD (Pt100, JPt100) With heater disconnection detection Sampling period: 0.5s/4channels 2 units of 18-point terminal block	

(d) Loop controller

Model name	Remarks	Reference
Q62HLC	Loop control module Thermocouple input 2ch, 5 modes of PID control Output: 4 to 20mA	Loop Control Module User's Manual (SH(NA)-080573ENG)

(12) Channel isolated pulse input module

Model name	Remarks	Reference
QD60P8-G	8 channels 30kpps/10kpps/1kpps/100pps/50pps/ 10pps/1pps/0.1pps Count input signal: 5/12 to 24VDC	Channel Isolated Pulse Input Module User's Manual (SH(NA)-080313E)

(13) High-speed counter module

Model name	Remarks	Reference
QD62	2 channels, 200/100/10kpps Count input signal: 5/12/24VDC External input: 5/12/24VDC Coincidence output: transistor (sink type) 12/24VDC, 0.5A/point, 2A/common 40-pin connector	High-Speed Counter Module User's Manual (SH(NA)-080036)
QD62D	2 channels, 500/200/100/10kpps Count input signal: EIA Standard RS-422-A (differential line driver level) External input: 5/12/24VDC Coincidence output: transistor (sink type) 12/24VDC, 0.5A/point, 2A/common 40-pin connector	
QD62E	2 channels, 200/100/10kpps Count input signal: 5/12/24VDC External input: 5/12/24VDC Coincidence output: transistor (source type) 12/24VDC, 0.1A/point, 0.4A/common 40-pin connector	

(14)Ethernet

Model name	Remarks	Reference
QJ71E71-100	10BASE-T/100BASE-TX	Q Corresponding MELSEC Communication Protocol Reference Manual (SH(NA)-080008)
QJ71E71-B2	10BASE2	
QJ71E71-B5	10BASE5	

(15)Serial communication

Model name	Remarks	Reference
QJ71C24N	RS-232 1 channel, RS-422/485 1 channel Transmission rate: 230.4kbps (Total)	Q Corresponding Serial Communication Module User's Manual (Basic) (SH(NA)-080006)
QJ71C24N-R2	RS-232 2 channels Transmission rate: 230.4kbps (Total)	
QJ71C24N-R4	RS-422/485 2 channels Transmission rate: 230.4kbps (Total)	

(16) MES interface module

Model name	Remarks	Reference
QJ71MES96	10BASE-T/100BASE-TX 1 channel (Note) MX MESInterface and CF card are separately required.	MES Interface Module User's Manual (SH(NA)-080644ENG)

(17) MELSECNET/H

(a) SI/QSI optical interface

Model name	Remarks	Reference
QJ71LP21-25	SI/QSI/H-PCF/Broad-band H-PCF optical cable, Double loop PLC to PLC network (control/normal station)/ Remote I/O net (remote master station)	Q Corresponding MELSECNET/H Network System Reference Manual(PLC to PLC network) (SH(NA)-080049) Q Corresponding MELSECNET/H Network System Reference Manual(Remote I/O network) (SH(NA)-080124) For QnA/Q4AR MELSECNET/10 Network System Reference Manual (IB(NA)-66690)
QJ71LP21S-25	SI/QSI/H-PCF/Broad-band H-PCF optical cable, Double loop PLC to PLC network (control/normal station)/ Remote I/O net (remote master station) With external supply power	
QJ72LP25-25	SI/QSI/H-PCF/Broad-band H-PCF optical cable, Double loop Remote I/O net (remote I/O station)	

(b) GI optical interface

Model name	Remarks	Reference
QJ71LP21G	GI optical cable, Double loop PLC to PLC network (control/normal station)/ Remote I/O net (remote master station)	Q Corresponding MELSECNET/H Network System Reference Manual(PLC to PLC network) (SH(NA)-080049) Q Corresponding MELSECNET/H Network System Reference Manual(Remote I/O network) (SH(NA)-080124) For QnA/Q4AR MELSECNET/10 Network System Reference Manual (IB(NA)-66690)
QJ72LP25G	GI optical cable, Double loop Remote I/O net (remote I/O station)	Q corresponding MELSECNET/H Network System Reference Manual(Remote I/O network) (SH(NA)-080124)

(c) Coaxial interface

Model name	Remarks	Reference
QJ71BR11	3C-2V/5C-2V coaxial cable, Single bus PLC to PLC network (control/normal station)/ Remote I/O net (remote master station)	Q Corresponding MELSECNET/H Network System Reference Manual(PLC to PLC network) (SH(NA)-080049) Q Corresponding MELSECNET/H Network System Reference Manual(Remote I/O network) (SH(NA)-080124) For QnA/Q4AR MELSECNET/10 Network System Reference Manual (IB(NA)-66690)
QJ72BR15	3C-2V/5C-2V coaxial cable, Single bus Remote I/O net (remote I/O station)	Q corresponding MELSECNET/H Network System Reference Manual(Remote I/O network) (SH(NA)-080124)

(18) CC-Link

Model name	Remarks	Reference
QJ61BT11N	For master/local station, For QCPU Compatible with CC-Link Ver.2	CC-Link System Master/Local Module User's Manual SH(NA)-080394E

(19) CC-Link IE controller network

Model name	Remarks	Reference
QJ71GP21-SX	CC-Link IE Optical double loop interface module (1000BASE-SX) Control/normal station	CC-Link IE Controller Network Reference Manual (SH(NA)-080668)
QJ71GP21S-SX	CC-Link IE Optical double loop interface module (1000BASE-SX) Control/normal station With external power supply	

(20) FL-net (OPCN-2)

(a) Ver.2.00

Model name	Remarks	Reference
QJ71FL71-T-F01	10BASE-T/100BASE-TX	FL-net(OPCN-2) Interface Module User's Manual (SH(NA)-080350E)
QJ71FL71-B2-F01	10BASE2	
QJ71FL71-B5-F01	10BASE5	

(b) Ver.1.00

Model name	Remarks	Reference
QJ71FL71-T	10BASE-T	FL-net(OPCN-2) Interface Module User's Manual (SH(NA)-080350E)
QJ71FL71-B2	10BASE2	
QJ71FL71-B5	10BASE5	

(21) AS-i

Model name	Remarks	Reference
QJ71AS92	Master station	AS-i Master Module User's Manual (Hardware) (IB(NA)-0800122E)

(22) Extension base

Model name	Remarks	Reference
Q63B	3 slots; for mounting Q series modules including power supply module	QCPU User's Manual (Hardware Design, Maintenance and Inspection) (SH(NA)-080483ENG)
Q65B	5 slots; for mounting Q series modules including power supply module	
Q68B	8 slots; for mounting Q series modules including power supply module	
Q612B	12 slots; for mounting Q series modules including power supply module	
Q52B	2 slots; for mounting Q series modules excluding power supply module	
Q55B	5 slots; for mounting Q series modules excluding power supply module	

(23) Spring clamp terminal block

Model name	Remarks	Reference
Q6TE-18S	For 16 points I/O modules, 0.3 to 1.5mm^2 (AWG22 to 16)	Spring Clamp Terminal Block Model Q6TE-18S User's Manual (IB(NA)-0800204E)

(24) Terminal block adapter

Model name	Remarks	Reference
Q6TA32	For 32 points I/O modules, 0.5mm^2 (AWG20)	Insulation Displacement Connector for MELSEC-Q Series 32-Point I/O Module User's Manual (IB(NA)-0800228E)
Q6TA32-TOL	Q6TA32 exclusive tool	

(25) Connector/terminal block converter module

Model name	Remarks	Reference
A6TBX36-E	For negative common type input modules (standard type)	I/O module Type Building Block User's Manual (SH(NA)-080042)
A6TBX54-E	For negative common type input modules (2-wire type)	
A6TBX70	For positive common type input modules (3-wire type)	
A6TBX70-E	For negative common type input modules (3-wire type)	
A6TBY36-E	For source type output modules (standard type)	
A6TBY54-E	For source type output modules (2-wire type)	
A6TBXY36	For positive common type input modules and sink type output modules (standard type)	
A6TBXY54	For positive common type input modules and sink type output modules (2-wire type)	

(26) Cable

(a) Cables for CNC CPU

Cable type	Application	Max. length	Standard cable length (m)	Remarks
F020	Manual pulse generator: 1ch	45m	0.5, 1, 2, 3, 5, 7, 10, 15, 20	12V power supply type can be used. For Signal splitter
F021	Manual pulse generator: 2ch	45m	0.5, 1, 2, 3, 5, 7, 10, 15, 20	
F022	Manual pulse generator: 3ch	45m	0.5, 1, 2, 3, 5, 7, 10, 15, 20	
G020	Manual pulse generator: 1ch	15m	0.5, 1, 2, 3, 5, 7, 10, 15	5V power supply type can be used. For Signal splitter
G021	Manual pulse generator: 2ch	15m	0.5, 1, 2, 3, 5, 7, 10, 15	
G022	Manual pulse generator: 3ch	15m	0.5, 1, 2, 3, 5, 7, 10, 15	
G302	Display module communication (STP cross)	20m	1, 2, 3, 5, 10, 15, 20	For panel external wiring
G303	Display module communication (STP straight)	20m	1, 2, 3, 5, 10, 15, 20	For panel external wiring, when using a HUB.
G380	Optical communication cable	20m	5, 10, 12, 15, 20	For wiring between drive units (outside panel) For optical communication repeater unit
G395	Optical communication cable	10m	1, 2, 3, 5, 7, 10	For wiring between drive units (outside panel) For wiring between NC-drive units
G396	Optical communication cable	10m	0.3, 0.5, 1, 2, 3, 5	For wiring between drive units (inside panel)
H010	Signal splitter connection	5m	0.5, 1, 2, 3, 5	
H100	Emergency stop	30m	0.5, 1, 2, 3, 5, 7, 10, 15, 20	
H200	Display module communication (UTP cross)	20m	1, 2, 3, 5, 10, 15, 20	For panel internal wiring.
H300	SKIP/manual pulse generator input	20m	0.5, 1, 2, 3, 5, 7, 10, 15, 20	
H310	SKIP connection	15m	0.5, 1, 2, 3, 5, 7, 10, 15	For Signal splitter
H400	Manual pulse generator: 1ch for 5V	20m	0.5, 1, 2, 3, 5, 7, 10, 15, 20	
H500	Dual-signal module communication	0.5m	0.1, 0.2, 0.3, 0.5	
H810	Connection cable between I/O extension connector unit (FCU7-HN831) and external Input/output unit (GT15-DIOR)	1m	0.5, 0.75, 1	

(Note) The Standard cable length column shows the lengths of the cable available from MITSUBISHI.

(b) Cable for connector and terminal block changeover unit

Model name	Remarks	Reference
AC05TB	For A6TBXY36/A6TBXY54/A6TBX70 (positive common/sink type modules), 0.5m	I/O module Type Building Block User's Manual (SH(NA)-080042)
AC10TB	For A6TBXY36/A6TBXY54/A6TBX70 (positive common/sink type modules), 1m	
AC20TB	For A6TBXY36/A6TBXY54/A6TBX70 (positive common/sink type modules), 2m	
AC30TB	For A6TBXY36/A6TBXY54/A6TBX70 (positive common/sink type modules), 3m	
AC50TB	For A6TBXY36/A6TBXY54/A6TBX70 (positive common/sink type modules), 5m	
AC80TB	For A6TBXY36/A6TBXY54/A6TBX70 (positive common/sink type modules), 8m *Common current not exceeding 0.5A	
AC100TB	For A6TBXY36/A6TBXY54/A6TBX70 (positive common/sink type modules), 10m *Common current not exceeding 0.5A	
AC05TB-E	For A6TBX36-E/A6TBY36-E/A6TBX54-E /A6TBY54-E/A6TBX70-E (negative common, source type modules), 0.5m	
AC10TB-E	For A6TBX36-E/A6TBY36-E/A6TBX54-E /A6TBY54-E/A6TBX70-E (negative common, source type modules), 1m	
AC20TB-E	For A6TBX36-E/A6TBY36-E/A6TBX54-E /A6TBY54-E/A6TBX70-E (negative common, source type modules), 2m	
AC30TB-E	For A6TBX36-E/A6TBY36-E/A6TBX54-E/ A6TBY54-E/A6TBX70-E (negative common, AC30TB-E source type modules), 3m	
AC50TB-E	For A6TBX36-E/A6TBY36-E/A6TBX54-E /A6TBY54-E/A6TBX70-E (negative common, source type modules), 5m	

(c) Cable for drive unit

Cable type	Application	Max. length	Standard cable length (m)	Remarks
CNP2E-1-□M	Motor side PLG cable Spindle side accuracy detector TS5690 cable	30m	2, 3, 4, 5, 7, 10, 15, 20, 25, 30	
CNV22J-K1P-0.3M	For HF-KP (Servo) Motor side detector relay cable (motor side) Compatible with only IP65	0.3m	0.3	(load side angle)
CNV22J-K2P-0.3M	For HF-KP (Servo) Motor side detector relay cable (motor side) Compatible with only IP65	0.3m	0.3	(reverse load side angle)
CNV2E-8P-□M	For HF/HF-H, HF-KP (Tool spindle) Motor side detector cable (for A48/A51/A74N(/A74)) / For HF-KP (Servo) Motor side detector relay cable (Drive unit side)	30m	2, 3, 4, 5, 7, 10, 15, 20, 25, 30	
CNV2E-9P-□M	For HF/HF-H, HF-KP (Tool spindle) Motor side detector cable (for A48/A51/A74N(/A74))	30m	2, 3, 4, 5, 7, 10, 15, 20, 25, 30	
CNV2E-D-□M	MDS-B-SD unit cable	30m	2, 3, 4, 5, 7, 10, 15, 20, 25, 30	
CNV2E-HP-□M	MDS-B-HR unit cable	30m	2,3,4,5,7,10,15,20,25,30	
CNV2E-K1P-□M	For HF-KP (Servo) Motor side detector cable Compatible with only IP65	10m	2, 3, 5, 7, 10	(load side angle)
CNV2E-K2P-□M	For HF-KP (Servo) Motor side detector cable Compatible with only IP65	10m	2, 3, 5, 7, 10	(reverse load side angle)
DG21-□M	Battery cable	5m	0.3, 0.5, 1, 5	(For drive unit (except MDS-DJ Series) - battery unit)
DG22-□M	Battery cable	5m	0.3, 0.5, 1, 5	(For drive unit - drive unit (except MDS-DJ Series)) (Note) This cable is required to supply the power from the battery unit to multiple drive units.
DG23-□M	Battery cable	5m	0.3, 0.5, 1, 5	(For drive unit (except MDS-DJ Series) - battery box) (Note) The battery box side is connected using a bare conductor or a terminal bar.
DG24-□M	5V spply/DO output cable	5m	0.3, 0.5, 1, 5	(For drive unit (except MDS-DJ Series) - battery box) (Note) The battery box side is connected using a bare conductor or a terminal bar.
MR-BKS1CBL□M-A1-H	<200V Series> Brake cable for HF-KP	10m	2, 3, 5, 7, 10	(load side angle)
MR-BKS1CBL□M-A2-H	<200V Series> Brake cable for HF-KP	10m	2, 3, 5, 7, 10	(reverse load side angle)
MR-PWS1CBL□M-A1-H	<200V Series> Power cable for HF-KP	10m	2, 3, 5, 7, 10	(load side angle)
MR-PWS1CBL□M-A2-H	<200V Series> Power cable for HF-KP	10m	2, 3, 5, 7, 10	(reverse load side angle) (Note) It can not be used with HF-KP13.
SH21	Power supply communication cable Power backup unit communication cable Cable for Auxiliary axis/Servo drive unit	30m	0.35, 0.5, 1, 2, 3, 5, 10, 15, 20, 30	

(Note) The Standard cable length column shows the lengths of the cable available from MITSUBISHI.

(27) Relay terminal unit

(a) Unit

Model name	Remarks	Reference
A6TE2-16SRN	40 pin connector For 24VDC Transistor output unit (sink type module)	Relay Terminal Module User's Manual (Hardware) A6TE2-16SRN (IB(NA)-66833)

(b) Cable

Model name	Remarks	Reference
AC06TE	For A6TE2-16SRN 0.6m	Relay Terminal Module User's Manual (Hardware) A6TE2-16SRN (IBNA)-66833)
AC10TE	For A6TE2-16SRN 1m	
AC30TE	For A6TE2-16SRN 3m	
AC50TE	For A6TE2-16SRN 5m	
AC100TE	For A6TE2-16SRN 10m	

(28) Extension cable

Model name	Remarks	Reference
QC05B	0.45m cable	QCPU User's Manual (Hardware Design, Maintenance and Inspection) (SH(NA)-080483ENG)
QC06B	0.6m cable	
QC12B	1.2m cable	
QC30B	3m cable	
QC50B	5m cable	
QC100B	10m cable	

(29) Connector

Model name	Remarks	Reference
A6CON1	Soldering type 32 point-connector (40-pin connector)	I/O module Type Building Block User's Manual (SH(NA)-080042)
A6CON2	Crimp-contact type 32 point-connector (40-pin connector)	
A6CON3	Flat cable pressure displacement type 32-point connector (40-pin connector)	
A6CON4	Soldering type 32 point-connector (40-pin connector; two-way cable can be mounted)	
A6CON1E	Soldering type 32 point-connector (37-pin D sub-connector)	
A6CON2E	Crimp-contact type 32 point-connector (37-pin D sub-connector)	
A6CON3E	Flat cable pressure displacement type 32-point connector (37-pin D sub-connector)	

(30) Memory card

Model name	Remarks	Reference
Q2MEM-2MBS	Small SRAM memory card 2MB	QCPU User's Manual(Hardware Design,Maintenance and Inspection)(SH(NA)-080483ENG)

(31) CC-Link Remote I/O unit
(a) Thread terminal block type

Model name	Remarks	Reference
AJ65SBTB1-32D	Input 32 points: 24VDC (positive/negative common shared type), 1- wire, terminal block type, response time: 1.5 ms	CC-Link System Compact Type Remote I/O Module User's Manual(SH-4007)
AJ65SBTB1-32TE1	Output 32 points: 12/24VDC (0.5A), transistor output (source type), 1-wire, terminal block type	

(b) Waterproof connector type

Model name	Remarks	Reference
AJ65FBTA4-16DE	Input 16 points: 24VDC (negative common), 4-wire, super-slim waterproof type, response time: 1.5 ms	CC-Link System Compact Type Remote I/O Module User's Manual(SH-4007)
AJ65FBTA2-16TE	Output 16 points: 12/24VDC (1.0A), transistor output (source type), 2-wire, super-slim waterproof type	

1.3.2 GOT

1.3.2.1 GT27

(1) GOT
(a) GT2712

Model name	Remarks	Reference
GT2712-STBA	12.1-type SVGA[800×600 dots] TFT color liquid crystal display, 65536 colors <Multimedia and video/RGB and multi-touch supported> 100-240VAC, user memory, memory for storage(ROM):57MB, operation memory (RAM):128MB - Requiring GT Designer3 Version1(GOT2000) 1.117X or later.	GT27 General Description (IB-0800502)
GT2712-STBD	12.1-type SVGA[800×600 dots] TFT color liquid crystal display, 65536 colors <Multimedia and video/RGB and multi-touch supported> 24VDC, user memory, storage memory (ROM):57MB, operation memory (RAM):128MB - Requiring GT Designer3 Version1(GOT2000) 1.117X or later.	

(b) GT2710

Model name	Remarks	Reference
GT2710-STBA	10.4-type SVGA[800×600 dots] TFT color liquid crystal display, 65536 colors <Multimedia and video/RGB and multi-touch supported> 100-240VAC, user memory, memory for storage(ROM):57MB, operation memory (RAM):128MB - Requiring GT Designer3 Version1(GOT2000) 1.117X or later.	GT27 General Description(IB-0800502)
GT2710-STBD	10.4-type SVGA[800×600 dots] TFT color liquid crystal display, 65536 colors <Multimedia and video/RGB and multi-touch supported> 24VDC, user memory, memory for storage(ROM):57MB, operation memory (RAM):128MB - Requiring GT Designer3 Version1(GOT2000) 1.117X or later.	

(c) GT2708

Model name	Remarks	Reference
GT2708-STBA	8.4-type SVGA[800×600 dots] TFT color liquid crystal display, 65536 colors <Multimedia and video/RGB and multi-touch supported> 100-240VAC, user memory, memory for storage(ROM):57MB, operation memory (RAM):128MB - Requiring GT Designer3 Version1(GOT2000) 1.117X or later.	GT27 General Description(IB-0800502)
GT2708-STBD	8.4-type SVGA[800×600 dots] TFT color liquid crystal display, 65536 colors <Multimedia and video/RGB and multi-touch supported> 24VDC, user memory, memory for storage(ROM):57MB, operation memory (RAM):128MB - Requiring GT Designer3 Version1(GOT2000) 1.117X or later.	

(2) SD card

Model name	Remarks	Reference
L1MEM-2GBSD	2GB SD memory card for GOT	

(3) Protection sheet

Model name	Remarks	Reference
GT25-12PSCC	Protection sheet for 12.1-type (Clear, 5 sheets)	GOT2000 Series Protective Sheet for GT27/GT25/GT23 User's Manual (IB-0800499)
GT25-10PSCC	Protection sheet for 10.4-type ((Clear, 5 sheets)	
GT25-08PSCC	Protection sheet for 8.4-type (Clear, 5 sheets)	

1.3.2.2 GT16

(1) GOT

(a) GT1695M

Model name	Remarks	Reference
GT1695M-XTBA	15.0 type, XGA [1024×768 dots] TFT color liquid crystal display (High intensity and wide angle view), 65536 colors <Multi-media and video/RGB supported> 100-240VAC, built-in flash memory 15MB	GT16 General Description (IB(NA)-0800434E)
GT1695M-XTBD	15.0 type, XGA [1024×768 dots] TFT color liquid crystal display (High intensity and wide angle view), 65536 colors <Multi-media and video/RGB supported> 24VDC, built-in flash memory 15MB	

(b) GT1685M

Model name	Remarks	Reference
GT1685M-STBA	12.1 type, SVGA [800×600 dots] TFT color liquid crystal display (High intensity and wide angle view), 65536 colors <Multi-media and video/RGB supported> 100-240VAC, built-in flash memory 15MB	GT16 General Description (IB(NA)-0800434E)
GT1685M-STBD	12.1 type, SVGA [800×600 dots] TFT color liquid crystal display (High intensity and wide angle view), 65536 colors <Multi-media and video/RGB supported> 24VDC, built-in flash memory 15MB	

(c) GT1675M

Model name	Remarks	Reference
GT1675M-STBA	10.4 type, SVGA [800×600 dots] TFT color liquid crystal display (High intensity and wide angle view), 65536 colors <Multi media and video/RGB supported> 100-240VAC, built-in flash memory 15MB	GT16 General Description (IB(NA)-0800434E)
GT1675M-STBD	10.4 type, SVGA [800×600 dots] TFT color liquid crystal display (High intensity and wide angle view), 65536 colors <Multi media and video/RGB supportedd> 24VDC, built-in flash memory 15MB	

(d) GT1665M

Model name	Remarks	Reference
GT1665M-STBA	8.4 type, SVGA [800×600 dots] TFT color liquid crystal display (High intensity and wide angle view), 65536 colors <Multi media and video/RGB supported> 100-240VAC, built-in flash memory 15MB	GT16 General Description (IB(NA)-0800434E)
GT1665M-STBD	8.4 type, SVGA [800×600 dots] TFT color liquid crystal display (High intensity and wide angle view), 65536 colors <Multi media and video/RGB supported> 24VDC, built-in flash memory 15MB	

(2) Option function board

Model name	Remarks	Reference
GT16-MESB	For MES interface function	GT16 MES Interface Function Board User's Manual (IB(NA)-0800427E)

(3) CF card

Model name	Remarks	Reference
GT05-MEM-128MC	Flash ROM 128MB	GOT1000 Series CF Card/ Memory Card Adaptor User's Manual (IB-800302)
GT05-MEM-256MC	Flash ROM 256MB	
GT05-MEM-512MC	Flash ROM 512MB	
GT05-MEM-1GC	Flash ROM 1GB	
GT05-MEM-2GC	Flash ROM 2GB	

(4) Protection sheet

Model name	Remarks	Reference
GT16-90PSCB	Protection sheet for 15.0 type (Clear, 5 sheets)	GT16 Protective Sheet User's Manual (IB(NA)-0800426E)
GT16-90PSGB	Protection sheet for 15.0 type (Anti-glare, 5 sheets)	
GT16-80PSCB	Protection sheet for 12.1 type (Clear, 5 sheets)	
GT16-80PSGB	Protection sheet for 12.1 type (Anti-glare, 5 sheets)	
GT16-70PSCB	Protection sheet for 10.4 type (Clear, 5 sheets)	
GT16-70PSGB	Protection sheet for 10.4 type (Anti-glare, 5 sheets)	
GT16-60PSCB	Protection sheet for 8.4 type (Clear, 5 sheets)	
GT16-60PSGB	Protection sheet for 8.4 type (Anti-glare, 5 sheets)	

1.3.2.3 GT15

(1) GOT

(a) GT1595

Model name	Remarks	Reference
GT1595-XTBA	15.0 type, XGA [1024×768 dots] TFT color liquid crystal display (High intensity and wide angle view), 65536 colors, 100-240VAC, built-in flash memory 9MB (Note) Out of production	GT15 General Description (IB(NA)-0800322E)
GT1595-XTBD	15.0 type, XGA [1024×768 dots] TFT color liquid crystal display (High intensity and wide angle view), 65536 colors, 24VDC, built-in flash memory 9MB (Note) Out of production	

(b) GT1585

Model name	Remarks	Reference
GT1585V-STBA	12.1 type, SVGA [800×600 dots] TFT color liquid crystal display (High intensity and wide angle view), 65536 colors <Video/RGB supported> 100-240VAC, built-in flash memory 9MB	GT15 General Description (IB(NA)-0800322E)
GT1585V-STBD	12.1 type, SVGA [800×600 dots] TFT color liquid crystal display (High intensity and wide angle view), 65536 colors <Video/RGB supported> 24VDC, built-in flash memory 9MB	
GT1585-STBA	12.1 type, SVGA [800×600 dots] TFT color liquid crystal display (High intensity and wide angle view), 65536 colors 100-240VAC, built-in flash memory 9MB	
GT1585-STBD	12.1 type, SVGA [800×600 dots] TFT color liquid crystal display (High intensity and wide angle view), 65536 colors 24VDC, built-in flash memory 9MB	

(c) GT1575

Model name	Remarks	Reference
GT1575V-STBA	10.4 type, SVGA [800×600 dots] TFT color liquid crystal display (High intensity and wide angle view), 65536 colors <Video/RGB supported> 100-240VAC, built-in flash memory 9MB	GT15 General Description (IB(NA)-0800322E)
GT1575V-STBD	10.4 type, SVGA [800×600 dots] TFT color liquid crystal display (High intensity and wide angle view), 65536 colors <Video/RGB supported> 24VDC, built-in flash memory 9MB	
GT1575-STBA	10.4 type, SVGA [800×600 dots] TFT color liquid crystal display (High intensity and wide angle view), 65536 colors 100-240VAC, built-in flash memory 9MB	
GT1575-STBD	10.4 type, SVGA [800×600 dots] TFT color liquid crystal display (High intensity and wide angle view), 65536 colors 24VDC, built-in flash memory 9MB	

(2) Communication unit

(a) Ethernet communication unit

Model name	Remarks	Reference
GT15-J71E71-100	Ethernet (100Base-TX/10Base-T) unit Necessary for connecting to Q173NCCPU	GT15 Ethernet communication unit User's Manual (IB(NA)-0800314E)

(3) Option function board

Model name	Remarks	Reference
GT15-QFNB	Select either of these models when using GOT options (MELSEC-Q/QnA circuit monitor functions).	GT15 Option Function Board/ Option Function Board with Add-on Memory User's Manual (IB(NA)-0800301E)
GT15-QFNB16M		
GT15-QFNB32M		
GT15-QFNB48M		
GT15-MESB48M		

(4) Protection sheet

Model name	Remarks	Reference
GT15-90PSCB	Protection sheet for 15.0 type (Clear/5 sheets) (Note) Out of production	GT15 Protective Sheet User's Manual (IB(NA)-0800295E)
GT15-80PSCB	Protection sheet for 12.1 type (Clear/5 sheets)	
GT15-70PSCB	Protection sheet for 10.4 type (Clear/5 sheets)	

1.3.2.4 Option

(1) CF card extension interface

Model name	Remarks	Reference
GT15-CFEX-C08-SET	CF card extension interface (front)	GT15 CF card extension unit User's Manual (IB(NA)-0800367E)

(2) External input/output unit

Model name	Remarks	Reference
GT15-DIOR	(Input)16 points/Output for scan 8 points 24VDC about 4mA (Output)16 points+1 point (RUN output) 24VDC 0.1A/point (Negative common input/source type output)	GT15 External I/O Unit (Negative Common Input/ Source Type Output) User's Manual (IB(NA)-0800425E)
GT15-DIO	(Input)16 points/Output for scan 8 points 24VDC about 4mA (Output)16 points+1 point (RUN output) 24VDC 0.1A/point (Positive common input/sink type output)	GT15 External I/O Unit (Positive Common Input/Sink Type Output) User's Manual (IB(NA)-0800382E)

1.3.3 Peripheral Device

(1) Signal splitter

Model name	Remarks
FCU7-HN387	Option (Manual pulse generator is required for 2 or 3 axes specifications)

(2) Manual pulse generator

Model name	Remarks
UFO-01-2Z9	5V specifications
HD60C	12V specifications, for connection to operation panel I/O module 12V power supply is separately required.

(3) I/O extension connector unit

Model name	Remarks
FCU7-HN831	Point extension unit of external input/output unit GT15-DIOR

1.3.4 Dual Signal Module

(1) Dual signal module

Model name	Remarks
Q173SXY	I/O duplication monitoring module (Maximum 3 modules)
Q173SXY-2	I/O duplication monitoring module (High speed type) (Maximum 3 modules)

(2) Terminal block

Model name	Remarks
FA-LTB40P	Terminal block converter module (Arrangement : MITSUBISHI ELECTRIC ENGINEERING COMPANY LIMITED)

(3) Cable

Model name	Remarks
FA-CBL□□FMV-M	Cable for terminal block converter module (Cable length□□ = 05:0.5m, 10:1m, 20:2m, 30:3m, 50:5m) (Arrangement : MITSUBISHI ELECTRIC ENGINEERING COMPANY LIMITED)

2

General Specifications

For the specifications of GOT, CNC servo/spindle drive unit and I/O module, refer to the manuals written in “System Configuration: Component Modules".

2.1 Installation Environment Conditions

C70, which is an open equipment, must be installed within a sealed metal control panel (IP54 or higher). C70 must also be used and stored under the conditions listed in the table of specifications below.

Item	Specification					
Operating ambient Temperature	0 to 55°C (32 to 131°F)					
Storage ambient Temperature	-25 to 75°C (-13 to 167°F)					
Operating ambient Humidity	5 to 95%RH non-condensing					
Storage ambient Humidity	5 to 95%RH non-condensing					
Vibration resistance			Frequency	Acceleration	Amplitude	Sweep count
	Under intermittent vibration		10 to 57Hz	-	0.075mm	10 times each in X, Y, Z directions (For 80 min.)
			57to 150Hz	9.8m/s^2	-	
	Under continuous vibration		10 to 57Hz	-	0.035mm	
			57 to 150Hz	4.9m/s^2	-	
Shock resistance	147m/s^2 , 3 times in each of 3 directions X, Y, Z					
Operating ambience	No corrosive gases nor inflammable gases					
Operating altitude	2000m(6561.68ft.) or less **(Note 3)**					
Installation location	Inside control panel					
Overvoltage category **(Note 1)**	II or less					
Pollution level **(Note 2)**	2 or less					

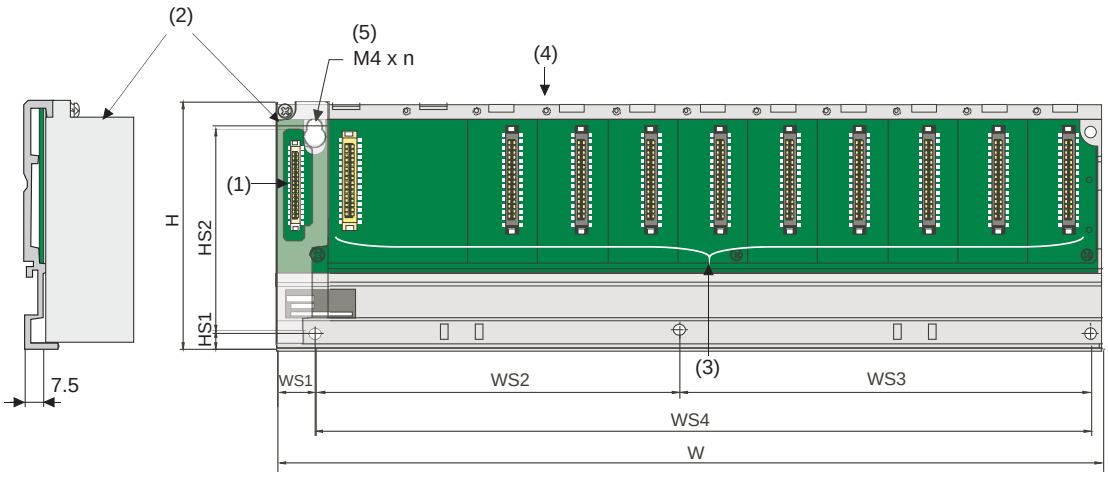
(Note 1) This indicates the section of the power supply to which the equipment is assumed to be connected between the public electrical power distribution network and the machinery within premises. Category II applies to equipment for which electrical power is supplied from fixed facilities. The surge voltage withstand level for up to the rated voltage of 300V is 2500V.

(Note 2) This index indicates the degree to which conductive material is generated in terms of the environment in which the equipment is used. Pollution level 2 is when only non-conductive pollution occurs. A temporary conductivity caused by condensing must be expected occasionally.

(Note 3) Do not use or store C70 under pressure higher than the atmospheric pressure of altitude 0m. Doing so can cause an operation failure.

(Note 4) The following environment conditions are also required for the layout design.
- No large amount of conductible dust, iron filings, oil mist, salt, or organic solvents
- No direct sunlight
- No strong electrical or magnetic fields
- No direct vibrations nor shocks on C70

2.2 Base Unit



	Q35DB	Q38DB	Q312DB	Q63B	Q65B	Q68B	Q612B
n	4	5	5	4	4	5	5
W	245	328	439	189	245	328	439
WS1	15.5						
WS2	-	170±0.3	170±0.3	-	-	190±0.3	190±0.3
WS3	-	138±0.3	249±0.3	-	-	116±0.3	227±0.3
WS4	224.5±0.3	-	-	167±0.3	222.5±0.3	-	-
H	98						
HS1	7						
HS2	80±0.3						

[mm]

No.	Name	Application
(1)	Extension cable connector	Connector to which the extension cables are connected for sending and receiving signals from the extension base unit.
(2)	Base cover	Protective cover of extension cable connector. Before an extension cable is connected, the area of the base cover surrounded by the groove under the word "OUT" on the base cover must be removed with a tool such as nippers.
(3)	Module connector	Connector for installing the Q series power supply module, CPU module, I/O modules, and intelligent function module. To the connectors located in the spare space where these modules are not installed, attach the supplied connector cover or the blank cover module QG60 to prevent entry of dirt.
(4)	Module fixing screw hole	Screw hole for fixing the module to the base unit. Screw size: M3×12
(5)	Base fixing hole	Hole for fixing this base unit onto the panel of the control panel. (for M4 screw)

(Note) DIN rail installation is not available when installing the CNC CPU module onto the basic base unit.
The installation may cause the module's malfunction due to vibration.

2.3 Power Supply

C70 uses Q61P (100-240VAC input, 5VDC 6A output), Q63P (24VDC input, 5VDC 6A output), Q64PN (100-240VAC input, 5VDC 8.5A output), or Q64P (100-120VAC/200-240VAC input, 5VDC 8.5A output).
(Note) Q64P has gone out of production.

Specifications

Item		Q61P
Base loading position		Q series power supply module loading slot
Applicable base unit		Q38DB, Q312DB, Q63B, Q65B, Q68B, Q612B
Input power supply		100 - 240VAC+10%-15% (85 - 264VAC)
Input frequency		50/60Hz±5%
Input voltage distortion factor		5% or less
Max. input apparent power		130VA
Inrush current		20A 8ms or less*4
Rated output current	5VDC	6A
	24VDC	-
Overcurrent protection*1	5VDC	6.6A or more
	24VDC	-
Overvoltage protection**2	5VDC	5.5 to 6.5V
Efficiency		70% or more
Permissible instantaneous power off time*3		20ms or less
Dielectric withstand voltage		Across inputs/LG and outputs/FG 2830VAC rms/3 cycles (Altitude: 2000m)
IInsulation resistance		Across inputs and outputs (LG and FG separated), across inputs for LG/FG, across outputs for LG/FG 10MΩ or more by insulation resistance tester (500VDC)
Noise immunity		By noise simulator of 1500Vp-p noise voltage, 1μs noise width and 25 to 60Hz noise frequency Noise voltage IEC61000-4-4, 2kV
Operation display		LED display (Normal: ON(Green), Error: OFF)
Fuse		Built-in (Unchangeable by user)
Contact output section	Application	ERR contact
	Rated switching voltage/current	24VDC, 0.5A
	Minimum switching load	5VDC, 1mA
	Response time	OFF to ON:10ms or less, ON to OFF:12ms or less
	Life time	Mechanical: 20 million times or more Electrical: 100 thousand times or more at rated switching voltage/current
	Surge suppressor	None
	Fuse	None
Terminal screw size		M3.5 screw
Applicable size of wire		0.75 to 2mm^2
Applicable crimping terminal		RAV1.25-3.5, RAV2-3.5
Applicable tightening torque		0.66 to 0.89N m
Mass [kg]		0.4

Item		Q63P	Q64PN	Q64P (discontinued)
Base loading position		Q series power supply module loading slot		
Applicable base unit		Q38DB, Q312DB, Q63B, Q65B, Q68B, Q612B		
Input power supply		24VDC+30%-35% (15.6 to 31.2VDC)	100 to 240VAC+10%-15% (85 to 264VAC)	100 to 120VAC+10%-15% /200 to 240VAC+10%-15% (85 to 132VAC/170 to 264VAC)
Input frequency		-	50/60Hz±5%	
Input voltage distortion factor		-	5% or less	
Max. input apparent power		45W	160VA	
Input current		at 24VDC input: 1.82A or less at 15.6VDC input: 2.8A or less	at 100VAC input: 1.3A or less at 200VAC input: 0.75A or less	
Repetitive peak current		-	4A or less	
Inrush current		100A 1ms or less (at 24VDC input)	20A 8ms or less*4	
Rated output current	5VDC	6A	8.5A	
	24VDC	-	-	
Overcurrent protection*1	5VDC	6.6A or more	9.9A or more	
	24VDC	-	-	
Overvoltage protection**2	5VDC	5.5 to 6.5V		
Efficiency		70% or more		
Permissible instantaneous power off time*3		10ms or less (at 24VDC input)	20ms or less	
Dielectric withstand voltage		500VAC across primary and 5VDC	Across inputs/LG and outputs/FG 2,830VAC rms/3 cycles (Altitude: 2,000m (6,561.68ft.))	
Insulation resistance		10MΩ or more (measured with an insulation resistance tester)	Input and LG batched, output and FG batched, batch input-LG, batch output-FG 10MΩ or m ore by insulation resistance tester (500VDC)	
Noise immunity		By noise simulator of 500Vp-p noise voltage, 1μs noise width and 25 to 60Hz noise frequen-cy	By noise simulator of 1,500Vp-p noise voltage, 1μs noise width and 25 to 60Hz noise frequency Noise voltage IEC61000-4-4, 2kV	
Operation display		LED display (Normal: ON(Green), Error: OFF)	LED display (Normal: ON(Green), Error: OFF)	LED display (Normal: ON(Green), Error: OFF)*5
Fuse		Built-in (Unchangeable by user)		
Contact output section	Application	ERR contact		
	Rated switching voltage/current	24VDC, 0.5A		
	Minimum switching load	5VDC, 1mA		
	Response time	OFF to ON: 10ms or less , ON to OFF: 12ms or less		
	Life time	Mechanical: 20 million times or m ore Electrical: 100 thousand times or more at rated switching voltage/current		
	Surge suppressor	None		
	Fuse	None		
Terminal screw s ize		M3.5 screw		
Applicable size of wire		0.75 to 2mm^2		
Applicable crimping terminal		RAV1.25-3.5, RAV2-3.5		
Applicable tightening torque		0.66 to 0.89 N m		
Mass [kg]		0.33	0.47	0.4

*1: Overcurrent protection
The overcurrent protection device shuts off the 5V, 24VDC circuit and stops the system if the current flowing in the circuit exceeds the specified value.
The LED of the power supply module is turned off or lights up in dim green when voltage is lowered.
If this device is activated, switch the input power supply off and eliminate the cause such as insufficient current capacity or short. Then, a few minutes later, switch it on to restart the system.
The initial start for the system takes place when the current value becomes normal.

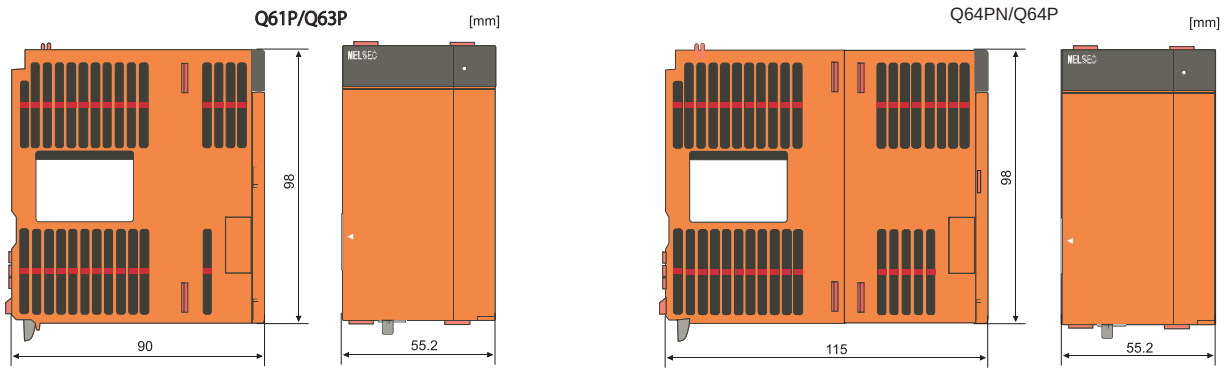
*2: Overvoltage protection
The overvoltage protection device shuts off the 5VDC circuit and stops the system if a voltage of 5.5VDC or more is applied to the circuit.
When this device is activated, the power supply module LED is switched OFF.
To restart the system, switch the input power OFF, then a few minutes later ON.
The initial start for the system will take place.
The power supply module must be changed if the system is not booted and the LED remains OFF.

*3: Permissible instantaneous power off time
(1) For AC input power supply
(a) An instantaneous power failure lasting less than 20ms will cause AC down to be detected, but operation will continue.
(b) An instantaneous power failure lasting in excess of 20ms may cause the operation to continue or initial start to take place depending on the power supply load.
Further, when the AC supply of the AC input module is the same as that of the power supply module, it prevents the sensor connected to the AC input module, which is ON at power-off, from turning OFF by switching off the power supply.
However, if only the AC input module is connected to the AC line, which is connected to the power supply, detection of the AC down for the power supply module may be delayed by the capacitor in the AC input module. Thus, connect a load of approx. 30mA per AC input module to the AC line.
(2) For DC input power supply
(a) An instantaneous power failure lasting less than 10ms* will cause 24VDC down to be detected, but operation will continue.
(b) An instantaneous power failure lasting in excess of 10ms* may cause the operation to continue or initial start to take place depending on the power supply load.
*: This is for a 24VDC input. This is 10ms or less for less than 24VDC.

*4: Inrush current
When power is switched on again immediately (within 5 seconds) after power-off, an inrush current of more than the specified value (2ms or less) may flow. Reapply power 5 seconds after power-off.
When selecting a fuse and breaker in the external circuit, take account of the blow out, detection characteristics and above matters.

*5: Operation indication
During the operation, do not allow the input voltage to change from 200VAC level (170 to 264VAC) to 100VAC level (85 to 132VAC).
(If changed, the POWER LED of the module turns off and the system operation stops.)

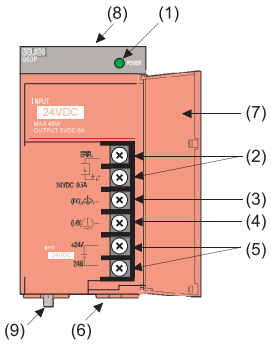
Outline dimension



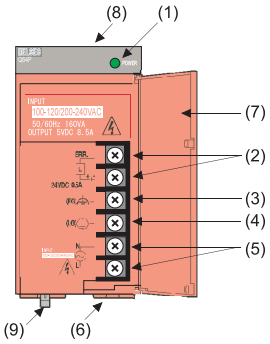
Names of parts

The following shows the names of the parts of each power module.

- Q63P (24VDC input, 5VDC 6A output)
- Q61P (100 - 240VAC input, 5VDC 6A output)
- Q64PN(100-240VAC input, 5VDC 8.5A output)
- Q64P (100 to 120VAC/200 to 240VAC input, 5VDC 8.5A output)



Q63P



Q61P/Q64PN/Q64P

(1) POWER LED

Q61P/Q64PN/Q64P

ON(green): Normal (5VDC output, instantaneous power failure within 20ms)

OFF:

- The power supply module is out of order while AC power supply is ON. (5VDC error, internal circuit failure, blown fuse)
- Over current protection or over voltage protection operated.
- AC power supply is not ON
- Power failure (including an instantaneous power failure of more than 20ms)

Q63P

ON(green): Normal (5VDC output, instantaneous power failure within 10ms)

OFF:

- The power supply module is out of order while DC power supply is ON. (5VDC error, internal circuit failure, blown fuse)
- Over current protection or over voltage protection operated.
- DC power supply is not ON
- Power failure (including an instantaneous power failure of more than 10ms)

(2) $\overline{\text{ERR}}$ terminal

Q61P/Q64PN/Q64P

- Turned ON when the whole system operates normally.
- This terminal turns OFF (opens) when the AC power is not input, a stop error (including a reset) occurs in the CPU module, or the fuse is blown.
- In a Multiple CPU system configuration, turned OFF when a stop error occurs in any of the CPU modules.
- Normally OFF when loaded in an extension base unit.

Q63P

- Turned ON when the whole system operates normally.
- This terminal turns OFF (opens) when the DC power is not input, a stop error (including a reset) occurs in the CPU module, or the fuse is blown.
- In a Multiple CPU system configuration, turned OFF when a stop error occurs in any of the CPU modules.
- Normally OFF when loaded in an extension base unit.

(3) FG terminal

Ground terminal connected to the shield pattern of the printed circuit board.

(4) LG terminal

- Grounding for the power supply filter.
- This terminal has potential of 1/2 of the input voltage for AC input (Q61P, Q64PN and Q64P).
- This is also a protective earth terminal (PE).

(5) Power input terminals

- Power input terminals connected to a power supply of 100VAC or 200VAC. (Q64PN and Q64P)
- Power input terminals connected to a power supply of 24VDC. (Q63P)
- Power input terminals connected to a power supply of 100-200VAC.(Q61P)

(6) Terminal screw

M3.5 × 7 screw

(7) Terminal cover

Protective cover of the terminal block

(8) Module fixing screw hole

Used to fix the module to the base unit.

M3 × 12 screw (user-prepared) (Tightening torque: 0.36 to 0.48 N m)

(9) Module loading lever

Used to load the module into the base unit.

(Note 1) Q63P is dedicated for inputting a voltage of 24VDC. Q63P may break down unless connected to 24VDC for inputting or with reversed polarity.

(Note 2) Ensure that the earth terminals LG and FG are grounded. (Ground resistance: 100 or less)
Since the LG terminals have potential of 1/2 input voltage, the operator may receive an electric shock when touching metal parts.

(Note 3) When Q61P, Q63P, Q64PN or Q64P is loaded on the extension base unit, a system error cannot be detected by the $\overline{\text{ERR}}$ terminal. ($\overline{\text{ERR}}$ terminal is always OFF.)

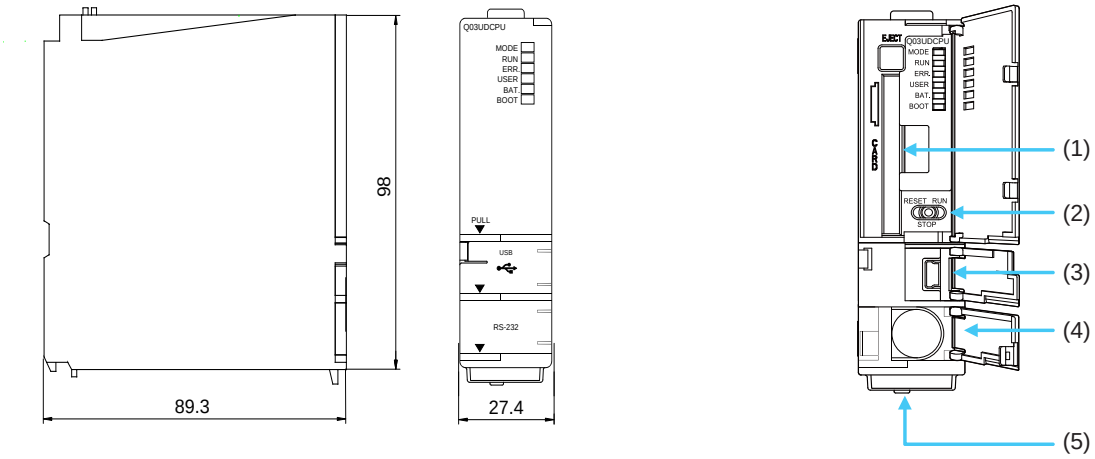
(Note 4) Q64P automatically switches the input range 100/200VAC.
Therefore, it is not compatible with the intermediate voltage (133 to 169VAC).
The CPU module may not work normally if the above intermediate voltage is applied.
Also note that Q64P may break down when connected to the power supply whose voltage or frequency is out of the specifications.

2.4 PLC CPU

For the further details than the following descriptions, refer to "QCPU User's Manual (Hardware Design, Maintenance and Inspection)" (SH(NA)-080483ENG).

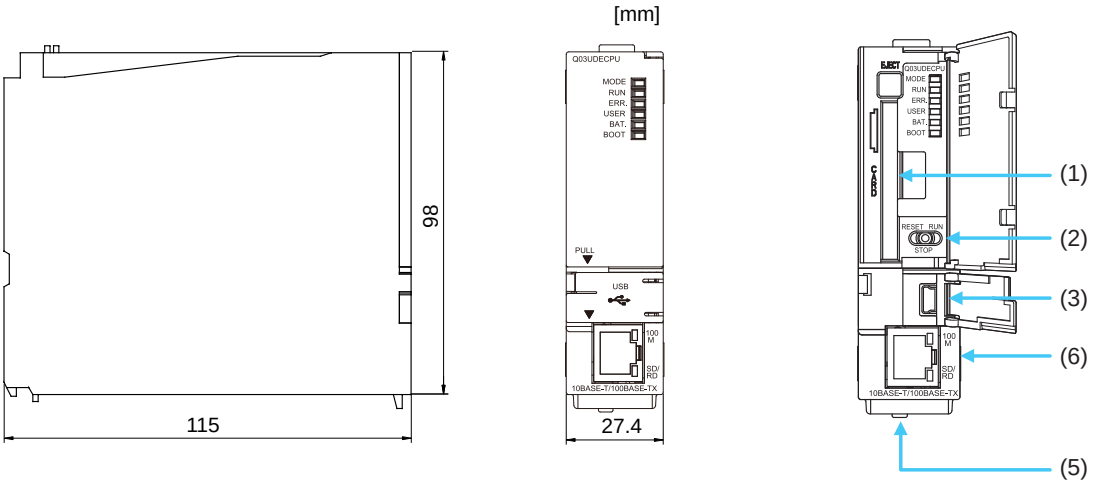
Dimension and Names of parts

[mm]



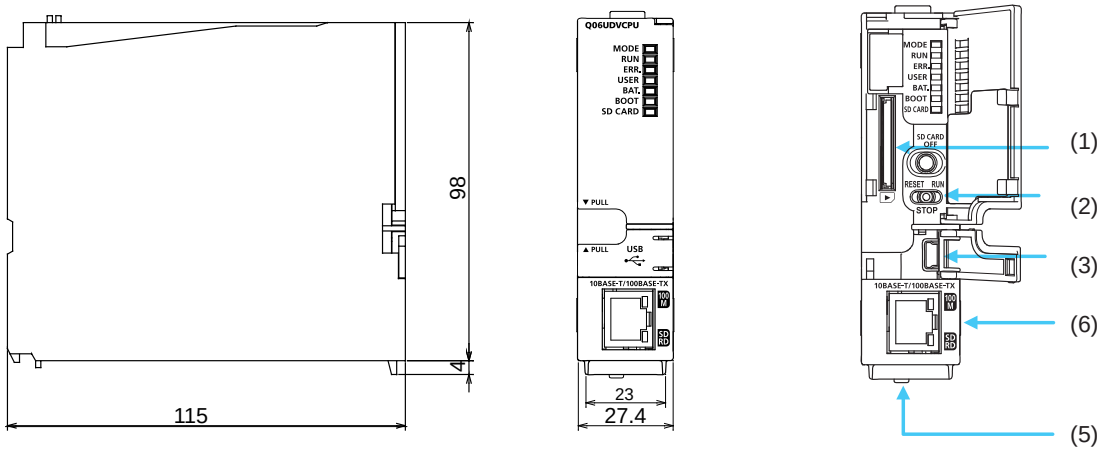
[Q03UDCPU / Q04UDHCPU / Q06UDHCPU / Q13UDHCPU / Q26UDHCPU]

[mm]



[Q03UDECPU / Q04UDEHCPU / Q06UDEHCPU / Q10UDEHCPU / Q13UDEHCPU / Q26UDEHCPU]

[mm]



[Q03UDVCPU / Q04UDVCPU / Q06UDVCPU / Q13UDVCPU / Q26UDVCPU]

(1) CARD : Memory card slot for C70
(2) SW : RUN, STOP and RESET switches
(3) USB : USB connector for the connection of a tool
(4) RS232 : RS-232C connector for the connection of a tool
(5) BAT : Battery

PLC CPU module type	Frequency of battery usage*1	Power-ON time ratio*2	Life time of the battery		
			Guaranteed value*3 (70 ℃)	Actual service value*4 (40 ℃)	Backup time after alarm*5
Q03UD(E)CPU	1	0%	30,100hr	43,800hr	600hr
		30%	43,000hr	43,800hr	600hr
		50%	43,800hr	43,800hr	600hr
		70%	43,800hr	43,800hr	600hr
		100%	43,800hr	43,800hr	600hr
	2	0%	25,300hr	43,800hr	600hr
		30%	36,100hr	43,800hr	600hr
		50%	43,800hr	43,800hr	600hr
		70%	43,800hr	43,800hr	600hr
		100%	43,800hr	43,800hr	600hr
Q04UD(E)HCPU	1	0%	30,100hr	43,800hr	600hr
		30%	43,000hr	43,800hr	600hr
		50%	43,800hr	43,800hr	600hr
		70%	43,800hr	43,800hr	600hr
		100%	43,800hr	43,800hr	600hr
	2	0%	4,300hr	32,100hr	384hr
		30%	6,100hr	43,800hr	384hr
		50%	8,600hr	43,800hr	384hr
		70%	14,300hr	43,800hr	384hr
		100%	43,800hr	43,800hr	384hr

PLC CPU module type	Frequency of battery usage*1	Power-ON time ratio*2	Life time of the battery		
			Guaranteed value*3 (70 ℃)	Actual service value*4 (40 ℃)	Backup time after alarm*5
Q06UD(E)HCPU	1	0%	25,300hr	43,800hr	600hr
		30%	36,100hr	43,800hr	600hr
		50%	43,800hr	43,800hr	600hr
		70%	43,800hr	43,800hr	600hr
		100%	43,800hr	43,800hr	600hr
	2	0%	4,200hr	32,100hr	384hr
		30%	6,000hr	43,800hr	384hr
		50%	8,400hr	43,800hr	384hr
		70%	14,000hr	43,800hr	384hr
		100%	43,800hr	43,800hr	384hr
	3	0%	2,300hr	19,200hr	192hr
		30%	3,200hr	27,400hr	192hr
		50%	4,600hr	38,400hr	192hr
		70%	7,600hr	43,800hr	192hr
		100%	43,800hr	43,800hr	192hr
Q10UD(E)HCPU Q13UD(E)HCPU Q20UD(E)HCPU Q26UD(E)HCPU	1	0%	22,600hr	43,800hr	600hr
		30%	32,200hr	43,800hr	600hr
		50%	43,800hr	43,800hr	600hr
		70%	43,800hr	43,800hr	600hr
		100%	43,800hr	43,800hr	600hr
	2	0%	4,100hr	26,200hr	384hr
		30%	5,800hr	37,400hr	384hr
		50%	8,200hr	43,800hr	384hr
		70%	13,600hr	43,800hr	384hr
		100%	43,800hr	43,800hr	384hr
	3	0%	2,300hr	18,600hr	192hr
		30%	3,200hr	26,500hr	192hr
		50%	4,600hr	37,200hr	192hr
		70%	7,600hr	43,800hr	192hr
		100%	43,800hr	43,800hr	192hr
	4	0%	1,500hr	13,800hr	144hr
		30%	2,100hr	19,700hr	144hr
		50%	3,000hr	27,600hr	144hr
		70%	5,000hr	43,800hr	144hr
		100%	43,800hr	43,800hr	144hr

PLC CPU module type	Extended SRAM cassette	Power-ON time ratio *2	Battery life		
			Guaranteed value *3	Actual service value (Reference value) *4	Backup power time after an alarm *5
Q03UDVCPU	Unused	0%	41,400 hours 4.72 years	43,800 hours 5.00 years	600 hours 25 days
		30%	43,800 hours 5.00 years		
		50%			
		70%			
		100%			
	Q4MCA-1MBS	0%	26,600 hours 3.03 years	43,800 hours 5.00 years	600 hours 25 days
		30%	38,000 hours 4.33 years		
		50%	43,800 hours 5.00 years		
		70%			
		100%			
	Q4MCA-2MBS	0%	23,100 hours 2.63 years	43,800 hours 5.00 years	600 hours 25 days
		30%	33,000 hours 3.76 years		
		50%	43,800 hours 5.00 years		
		70%			
		100%			
	Q4MCA-4MBS	0%	17,400 hours 1.98 years	43,800 hours 5.00 years	600 hours 25 days
		30%	24,800 hours 2.83 years		
		50%	34,800 hours 3.97 years		
		70%	43,800 hours 5.00 years		
		100%			
	Q4MCA-8MBS	0%	11,000 hours 1.25 years	43,800 hours 5.00 years	600 hours 25 days
		30%	15,700 hours 1.79 years		
		50%	22,000 hours 2.51 years		
		70%	36,600 hours 4.17 years		
		100%	43,800 hours 5.00 years		

PLC CPU module type	Extended SRAM cassette	Power-ON time ratio *2	Battery life		
			Guaranteed value *3	Actual service value (Reference value) *4	Backup power time after an alarm *5
Q04UDVCPU	Not used	0%	31,700 hours 3.61 years	43,800 hours 5.00 years	600 hours 25 days
		30%	43,800 hours 5.00 years		
		50%			
		70%			
		100%			
	Q4MCA-1MBS	0%	22,000 hours 2.51 years	43,800 hours 5.00 years	600 hours 25 days
		30%	31,400 hours 3.58 years		
		50%	43,800 hours 5.00 years		
		70%			
		100%			
	Q4MCA-2MBS	0%	19,600 hours 2.23 years	43,800 hours 5.00 years	600 hours 25 days
		30%	28,000 hours 3.19 years		
		50%	39,200 hours 4.47 years		
		70%	43,800 hours 5.00 years		
		100%			
	Q4MCA-4MBS	0%	15,300 hours 1.74 years	43,800 hours 5.00 years	600 hours 25 days
		30%	21,800 hours 2.48 years		
		50%	30,600 hours 3.49years		
		70%	43,800 hours 5.00 years		
		100%			
	Q4MCA-8MBS	0%	10,100 hours 1.15 years	43,800 hours 5.00 years	600 hours 25 days
		30%	14,400 hours 1.64 years		
		50%	20,200 hours 2.30 years		
		70%	33,600 hours 3.83 years		
		100%	43,800 hours 5.00 years		

PLC CPU module type	Extended SRAM cassette	Power-ON time ratio *2	Battery life		
			Guaranteed value *3	Actual service value (Reference value) *4	Backup power time after an alarm *5
Q06UDVCPU Q13UDVCPU Q26UDVCPU	Not used	0%	30,600 hours 3.49 years	43,800 hours 5.00 years	600 hours 25 days
		30%	43,700 hours 4.98 years		
		50%	43,800 hours 5.00 years		
		70%			
		100%			
	Q4MCA-1MBS	0%	21,500 hours 2.45 years	43,800 hours 5.00 years	600 hours 25 days
		30%	30,700 hours 3.50 years		
		50%	43,000 hours 4.90 years		
		70%	43,800 hours 5.00 years		
		100%			
	Q4MCA-2MBS	0%	19,100 hours 2.18years	43,800 hours 5.00 years	600 hours 25 days
		30%	27,200 hours 3.10 years		
		50%	38,200 hours 4.36 years		
		70%	43,800 hours 5.00 years		
		100%			
	Q4MCA-4MBS	0%	15,000 hours 1.71 years	43,800 hours 5.00 years	600 hours 25 days
		30%	21,400 hours 2.44 years		
		50%	30,000 hours 3.42years		
		70%	43,800 hours 5.00 years		
		100%			
	Q4MCA-8MBS	0%	10,000 hours 1.14 years	43,800 hours 5.00 years	600 hours 25 days
		30%	14,200 hours 1.62 years		
		50%	20,000 hours 2.28 years		
		70%	33,300 hours 3.80 years		
		100%	43,800 hours 5.00 years		

*1: The frequency of battery usage indicated battery consumption of PLC CPU. (Target CPU modules for Q03UDCPU, Q04UDHCPU, and Q06UDHCPU are the first 5 digits of the serial No. is “10012” or later.) The bigger the frequency of battery usage is, the higher amount of battery per unit time is consumed. The frequency of battery usage depends on the elements (a) and (b). The following table shows the relationship between the combination pattern of (a) and (b) and the frequency of battery usage.

Elemets to decide how much battery is used		Frequency of battery usage
(a) Battery long-life function (Note)	(b) State of a file storage during standard RAM Size of a register file during RAM (SR) < Unit: word	
With setting	-	1
Without setting	No file register or 0k<SR <= 128k	2
	128k<SR <= 384k	3
	384k<SR	4

(Note) Refer to the following manual for battery long-life function.
QnUCPU User’s Manual (Function Explanation, Program Fundamentals) SH-080807(ENG)

*2: The power-on time ratio indicates the ratio of PLC power-on time to one day (24 hours).
(When the total power-on time is 12 hours and the total power-off time is 12 hours, the power-on time ratio is 50%.)

*3: The guaranteed value; equivalent to the total power failure time that is calculated based on the characteristics value of the memory (SRAM) supplied by the manufacturer and under the storage ambient temperature range of -25 to 75 (operating ambient temperature of 0 to 55).

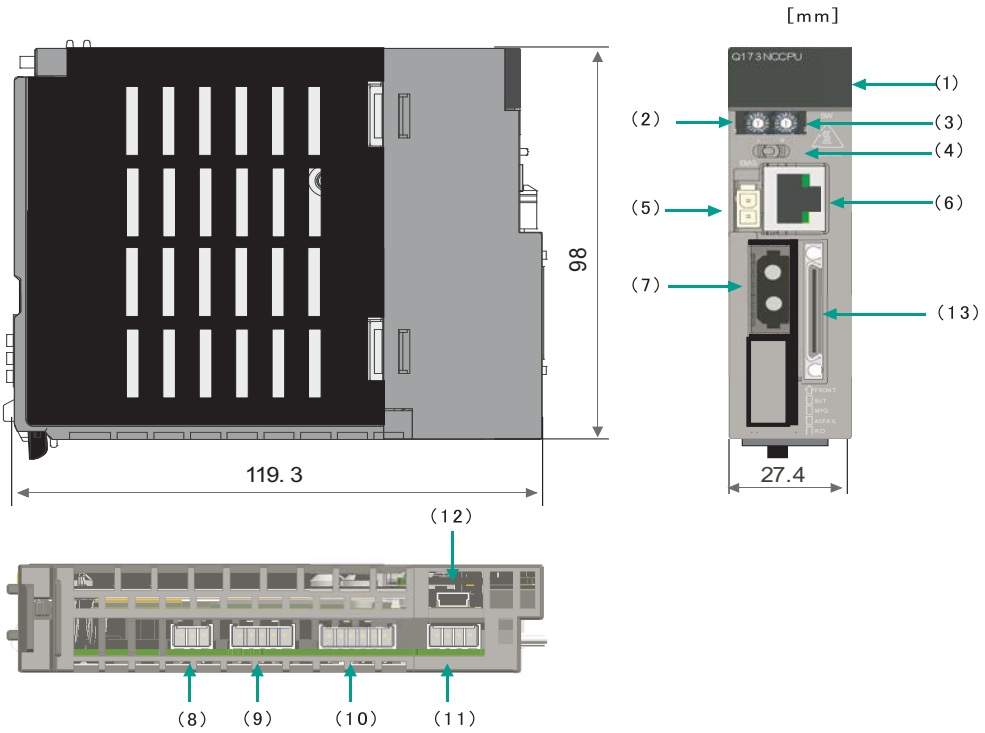
*4: The actual service value; equivalent to the total power failure time that is calculated based on the measured value and under the storage ambient temperature of 40. This value is intended for reference only, as it varies with characteristics of the memory.

*5: In the following status, the backup time after power OFF is 3 minutes.
-The battery connector is disconnected.
-The lead wire of the battery is broken.

(6) Ethernet: Ethernet connector

2.5 CNC CPU Module

Dimension and Names of parts



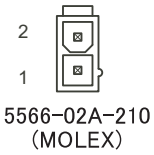
(1) LED : Display of state/alarm code (with 3 digits)

(2) SW1 : Rotary switch for maintenance (usually set to “0”)

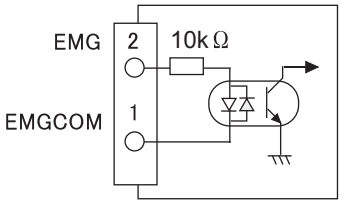
(3) SW2 : Rotary switch for maintenance (usually set to “0”)

(4) SW : (Not used)

(5) EMG : Connector for the emergency stop signal input



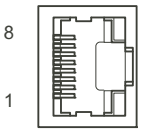
1	IN	EMGCOM
2	IN	EMG



Input type : Current sinking/sourcing
Insulation method : Photocoupler insulation
Input voltage : 24VDC (+10/-15%, ripple ratio within 5%)
OFF voltage/current : 17.5VDC or more / 3.0mA or less
ON voltage/current : 1.8VDC or less / 0.18mA or less
Input resistance : Approximate 10k
Response time (OFF -> ON or ON -> OFF): 1ms
Applicable size of wire : 0.3mm^2

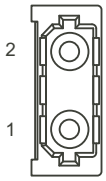
(Note) The emergency stop function suits "Stop category 1" of European safety standard “EN60204-1".

(6) DISPLAY I/F : Connector for display (GOT)



1	OUT	TD+
2	OUT	TD−
3	IN	RD+
4		CMTR
5		CMTR
6	IN	RD−
7		CMTT
8		CMTT

(7) CN1 : Connector for servo/spindle drive unit



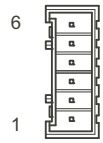
1	IN	RD
2	OUT	TD

(8) RIO : Connector for Dual signal module

1	IN/OUT	RXTXH
2	IN/OUT	RXTXL
3		SG(V)

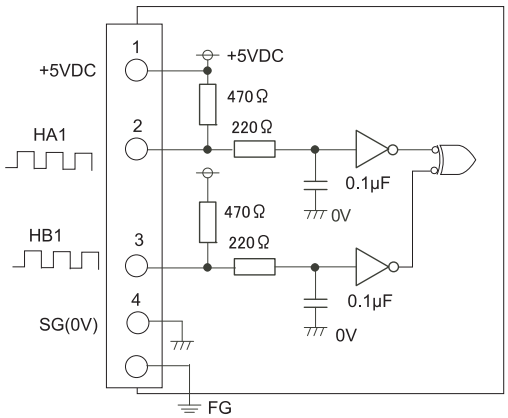
(9) AC FAIL : (Not used)

(10) MPG : Connector for 5V manual pulse generator

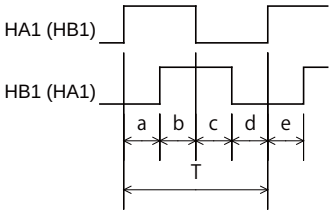


53426-0610
(MOLEX)

1	OUT	5VDC
2	IN	HA1
3	IN	HB1
4	OUT	SG(0V)
5		---
6		FG



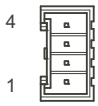
Input pulse signal type : 90° phase difference between HA1 and HB1.
Max. input pulse frequency : 5kHz
Number of pulses per rotation : 100pulse/rev
Input signal voltage : H level 3.5V to 5.25V, L level 0V to 0.5V
Power voltage for pulse generators : 5VDC±10%
Max. output current for pulse generators: :100mA



a.b.c.d.e: HA1 or HB1 rising edge (falling edge) phase difference = T/4 ± T/10

T: Ha1 or HB1 phase cycle (Min. 10 μ s)

(11) BAT : Connector for battery

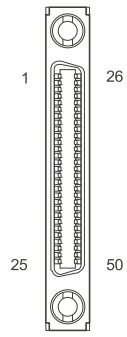


53426-0410
(MOLEX)

1	IN	FG
2		
3	IN	BAT(−)
4	IN	BAT(+)

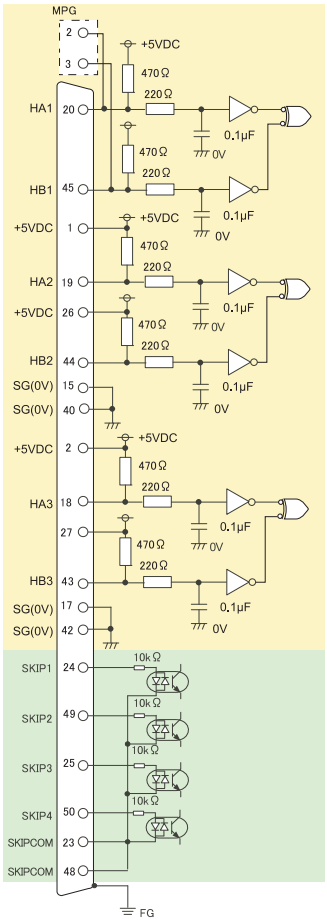
(12) Service : Connector for MITSUBISHI's servicing (Do not connect any object. It damages NC unit or PC.)

(13) EXT I/F : Connector for the expansion connection of skip signal/ 5V manual pulse generator

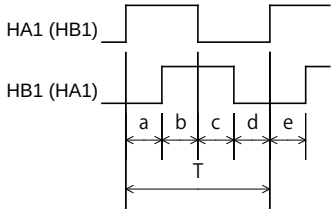


HDR-EC50LFDT1-SDL+
(HONDA)

1	OUT	5V	26	OUT	5V
2	OUT	5V	27	OUT	5V
3	OUT	SG(0V)	28	OUT	SG(0V)
4	(Reserve)		29	OUT	
11			30	(Reserve)	
12	OUT	SG(0V)	36		
13		(Reserve)	37	OUT	SG(0V)
14		(Reserve)	38		(Reserve)
15	OUT	SG(0V)	39		(Reserve)
16		(Reserve)	40	OUT	SG(0V)
17	OUT	SG(0V)	41		(Reserve)
18	IN	HA3	42	OUT	SG(0V)
19	IN	HA2	43	IN	HB3
20	IN	HA1	44	IN	HB2
21		(Reserve)	45	IN	HB1
22		(Reserve)	46		(Reserve)
23	IN	SKIPCOM	47		(Reserve)
24	IN	SKIP1	48	IN	SKIPCOM
25	IN	SKIP3	49	IN	SKIP2
			50	IN	SKIP4

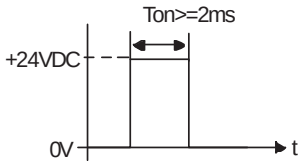


---Manual pulse generator I/F specification----
Input pulse signal type: 90°phase difference between HA1 and HB1.
Max. input pulse frequency : 5kHz
Number of pulses per rotation: 100pulse/rev
Input signal voltage : H level 3.5V to 5.25V, L level 0V to 0.5V
Output power voltage : +5VDC -10% -10%
Max. output current : 100mA
(Note) The connector MPG and EXT I/F have input pins for HA1 and HB1. Use either of the connectors.



a.b.c.d.e: HA1 or HB1 rising edge (falling edge) phase difference = T/4 ± T/10
T: HA1 or HB1 cycle (Min. 10μs)

---SKIP I/F specification---
Input ON voltage : 18V or more to 25.2V or less
Input ON current : 2mA or more
Input OFF voltage : 4V or less
Input OFF current : 0.4mA or less
Input signal holding time (Ton) : 2ms or more
Internal response time :0.08ms or less

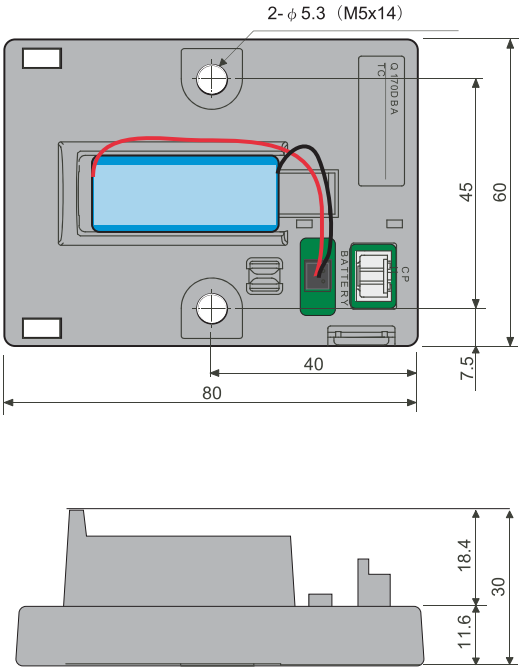


(Note) NC recognizes input signals of 2ms or more as the valid skip signals. If machine contacts (relay, etc.) are used, malfunctions will occur due to chattering. Use semiconductor contacts (transistor, etc.).

2.6 Battery Box for CNC CPU (Q173NCCPU)

Set the battery (Q6BAT) in the battery holder unit (Q173NCBATC).

Dimension



Life time of the battery

CNC CPU module type	Power-on time ratio*1	Life time of the battery (Q6BAT)		
		Guaranteed value*2 (75C°)	Actual service value*3 (40C°)	Backup time after alarm*4
Q173NCCPU	0%	20,000hr	43,800hr	90hr (after SM51 or SM52 ON)
	30%	27,000hr		
	50%	31,000hr		
	70%	36,000hr		
	100%	43,800hr		

*1: The power-on time ratio indicates the ratio of C70 power-on time to one day (24 hours). (When the total power-on time is 12 hours and the total power-off time is 12 hours, the power-on time ratio is 50%.)

*2: The guaranteed value; equivalent to the total power failure time that is calculated based on the characteristics value of the memory (SRAM) supplied by the manufacturer and under the storage ambient temperature range of -25 to 75 (operating ambient temperature of 0 to 55).

*3: The actual service value; equivalent to the total power failure time that is calculated based on the measured value and under the storage ambient temperature of 40. This value is intended for reference only, as it varies with characteristics of the memory.

*4: In the following status, the backup time after power OFF is 3 minutes.
- The battery connector is disconnected.
- The lead wire of the battery is broken.

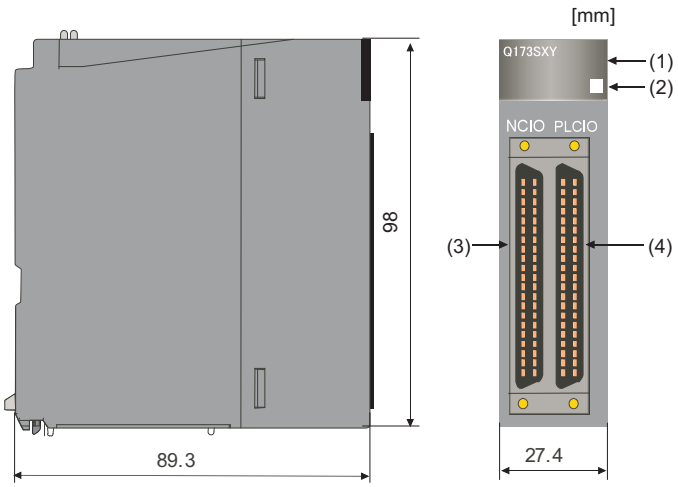
*5: The battery should be changed after 5 years of use even an alarm has not occurred.

2.7 Dual Signal Module

Use the dual signal module within the following specifications.

Items	Specifications	
	Q173SXY	Q173SXY-2
Number of input points	32 points x 2 systems (32 points for PLC CPU control + 32 points for CNC CPU control, 20 points x 2 systems for safety input, 12 points x 2 systems for feedback input for output)	
Input insulation method	Photocoupler insulation	
Rated input voltage	24VDC (+20/-15%, ripple ratio within 5%)	
Rated input current	Approximate 4mA	
Input derating	Refer to the derating figure	
ON voltage / ON current	19V or more / 3mA or more	
OFF voltage / OFF current	11V or less / 1.7mA or less	
Input resistance	Approximate 5.6kΩ	
Input response time	PLC CPU control input: 10ms (default value for digital filter) CNC CPU control input: 10ms (for CR filter)	PLC CPU control input: 10ms (default value for digital filter) CNC CPU control input: 2ms (for CR filter)
Input common method	32 points/common (Common terminal 1A01, 1A02, 2A01, 2A02) (NCIO connector and PLCIO connector have each different common)	
Input type	Type 1, Current sinking	
Number of output points	12 points x 2 systems (12 points for PLC CPU control + 12 points for CNC CPU control)	
Output insulation method	Photocoupler insulation	
Rated load voltage	24VDC(+20/-15%)	
Maximum load current	(0.1A x 8 points, 0.2A x 4 points) x 2 systems Common current: 1.6A or less for each connector	
Utilisation category	DC12/DC13	
Maximum rush current	0.7A,10ms or less (1.4A, 10ms or less for 0.2A output pin)	
OFF-time leakage current	0.1mA or less	
ON-time maximum voltage drop	0.1VDC(TYP.)0.1A, 0.2VDC(MAX.)0.1A	
Output response time	1ms or less (at rated load and resistance load)	
Output common method	12 points/common (Common terminal 1B01, 1B02, 2B01, 2B02) (NCIO connector and PLCIO connector have each different common)	
Output	Current sourcing	
Surge killer	Zener diode	
Fuse	Not provided	
External power supply	24VDC (+20/-15%, ripple ratio within 5%)	
Protection	Provided (thermal protection and short circuit protection) Thermal protection works for each 2 points. Short circuit protection works for each 1 point. (1 to 3A/point)	
Withstand voltage	560VAC rms/3cycles (at 2000m elevation)	
Insulation resistance	10MΩ or more (measured with an insulation resistance tester)	
Noise withstand level	Simulator noise 500Vp-p, Noise width 1μs measured with a noise simulator with noise frequency 25 to 60Hz	
	First transient noise IEC61000-4-4: 1kV	
Protection degree	IP2X	
Number of I/O occupational points	32 points (with I/O assignments as 32 points I/O mixed unit)	
Operation display	ON display (LED) and 32 input points display for PLC CPU control	
External connection method	40-pin connector	
Applicable size of wire	0.3mm^2 (for A6CON1 and A6CON4)	
Connector for external wiring	A6CON1, A6CON2, A6CON3, A6CON4 (sold separately)	
Terminal block changeover unit	FA-LTB40P (Cable FA-CBL□□FMV-M)	
5VDC internal power dissipation	200mA (TYP. when all points are ON)	
Mass	0.15kg	

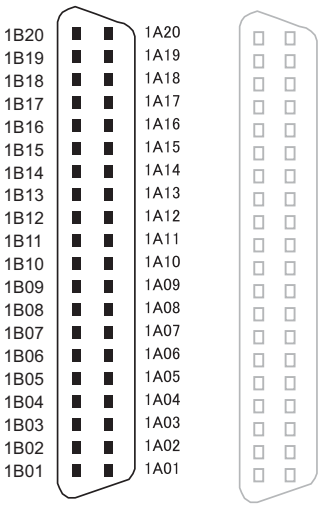
Names of parts



(1) LED:
Shows the input signal state of PLCIO.
(2)Module No. sticker:
Module Nos. (1 to 3) should be written on this sticker when multiple dual signal modules are mounted.

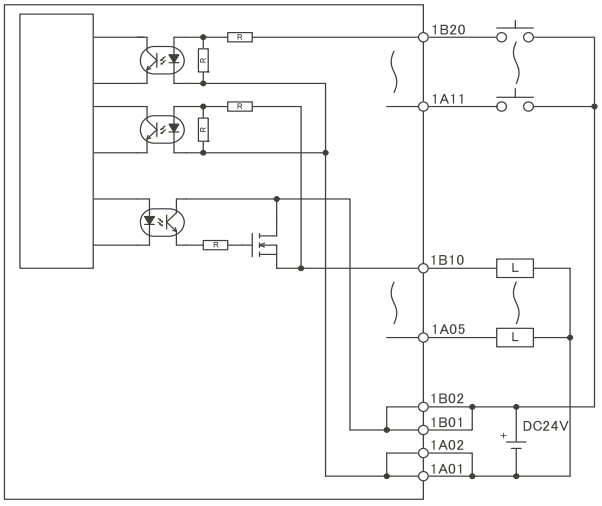
(3) NCIO:

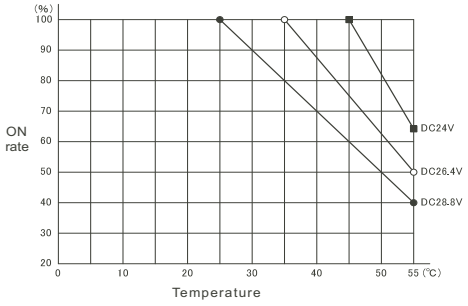
Connector for I/O signals controlled by NCCPU (Q173NCCPU)



1B20	IN	NC-X00
1B19	IN	NC-X01
1B18	IN	NC-X02
1B17	IN	NC-X03
1B16	IN	NC-X04
1B15	IN	NC-X05
1B14	IN	NC-X06
1B13	IN	NC-X07
1B12	IN	NC-X08
1B11	IN	NC-X09
1B10(*)	IN/OUT	NC-Y0A/X0A
1B09(*)	IN/OUT	NC-Y0B/X0B
1B08	IN/OUT	NC-Y0C/X0C
1B07	IN/OUT	NC-Y0D/X0D
1B06	IN/OUT	NC-Y0E/X0E
1B05	IN/OUT	NC-Y0F/X0F
1B04		---
1B03		---
1B02		24VDC(COM1)
1B01		24VDC(COM1)

1A20	IN	NC-X10
1A19	IN	NC-X11
1A18	IN	NC-X12
1A17	IN	NC-X13
1A16	IN	NC-X14
1A15	IN	NC-X15
1A14	IN	NC-X16
1A13	IN	NC-X17
1A12	IN	NC-X18
1A11	IN	NC-X19
1A10(*)	IN/OUT	NC-Y1A/X1A
1A09(*)	IN/OUT	NC-Y1B/X1B
1A08	IN/OUT	NC-Y1C/X1C
1A07	IN/OUT	NC-Y1D/X1D
1A06	IN/OUT	NC-Y1E/X1E
1A05	IN/OUT	NC-Y1F/X1F
1A04		---
1A03		---
1A02		0V(COM2)
1A01		0V(COM2)



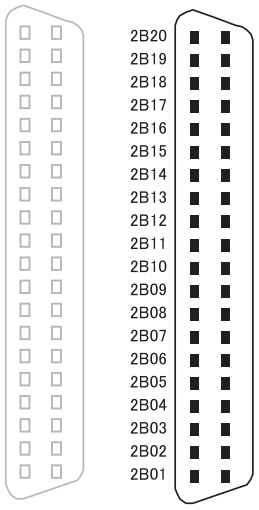


(Note 1) Output pins with (*) allow 0.2A output. Other pins have 0.1A output.

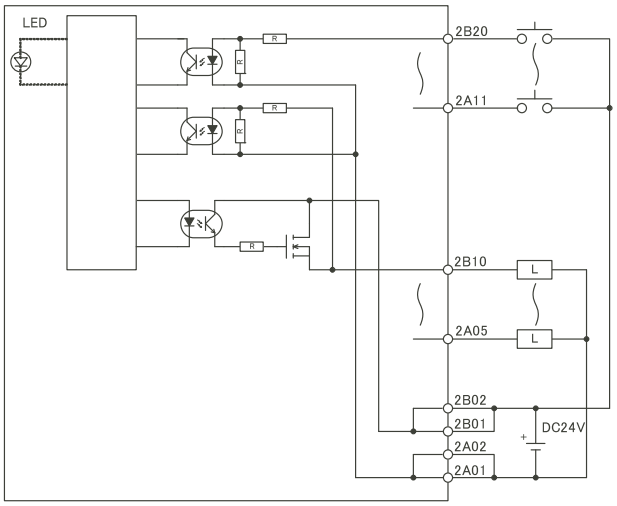
(Note 2) Pins with signal names "NC-Y0A" and "NC-X0A" are the output signals controlled by CNC CPU. When any of the signals is output to Y0A, the signal is input to X0A as a feedback signal.

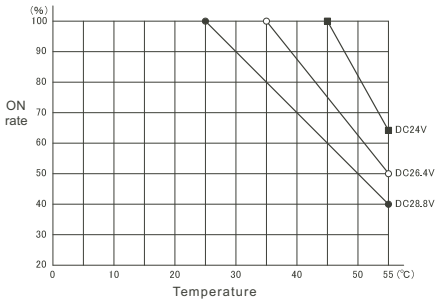
(Note 3) The device Nos. written above are for the assignment on hardware. These Nos. are different from the device Nos. to be actually used.

(4) PLCIO: Connector for I/O signals controlled by PLCCPU (QnUDHCPU).



2B20	IN	PLC-X00	2A20	IN	PLC-X10
2B19	IN	PLC-X01	2A19	IN	PLC-X11
2B18	IN	PLC-X02	2A18	IN	PLC-X12
2B17	IN	PLC-X03	2A17	IN	PLC-X13
2B16	IN	PLC-X04	2A16	IN	PLC-X14
2B15	IN	PLC-X05	2A15	IN	PLC-X15
2B14	IN	PLC-X06	2A14	IN	PLC-X16
2B13	IN	PLC-X07	2A13	IN	PLC-X17
2B12	IN	PLC-X08	2A12	IN	PLC-X18
2B11	IN	PLC-X09	2A11	IN	PLC-X19
2B10(*)	IN/OUT	PLC-Y0A/X0A	2A10(*)	IN/OUT	PLC-Y1A/X1A
2B09(*)	IN/OUT	PLC-Y0B/X0B	2A09(*)	IN/OUT	PLC-Y1B/X1B
2B08	IN/OUT	PLC-Y0C/X0C	2A08	IN/OUT	PLC-Y1C/X1C
2B07	IN/OUT	PLC-Y0D/X0D	2A07	IN/OUT	PLC-Y1D/X1D
2B06	IN/OUT	PLC-Y0E/X0E	2A06	IN/OUT	PLC-Y1E/X1E
2B05	IN/OUT	PLC-Y0F/X0F	2A05	IN/OUT	PLC-Y1F/X1F
2B04		---	2A04		---
2B03		---	2A03		---
2B02		24VDC(COM1)	2A02		0V(COM2)
2B01		24VDC(COM1)	2A01		0V(COM2)





(Note 1) Output pins with (*) allow 0.2A output. Other pins have 0.1A output.
(Note 2) The device Nos. written above are for the assignment on hardware. These Nos. are different from the device Nos. to be actually used.

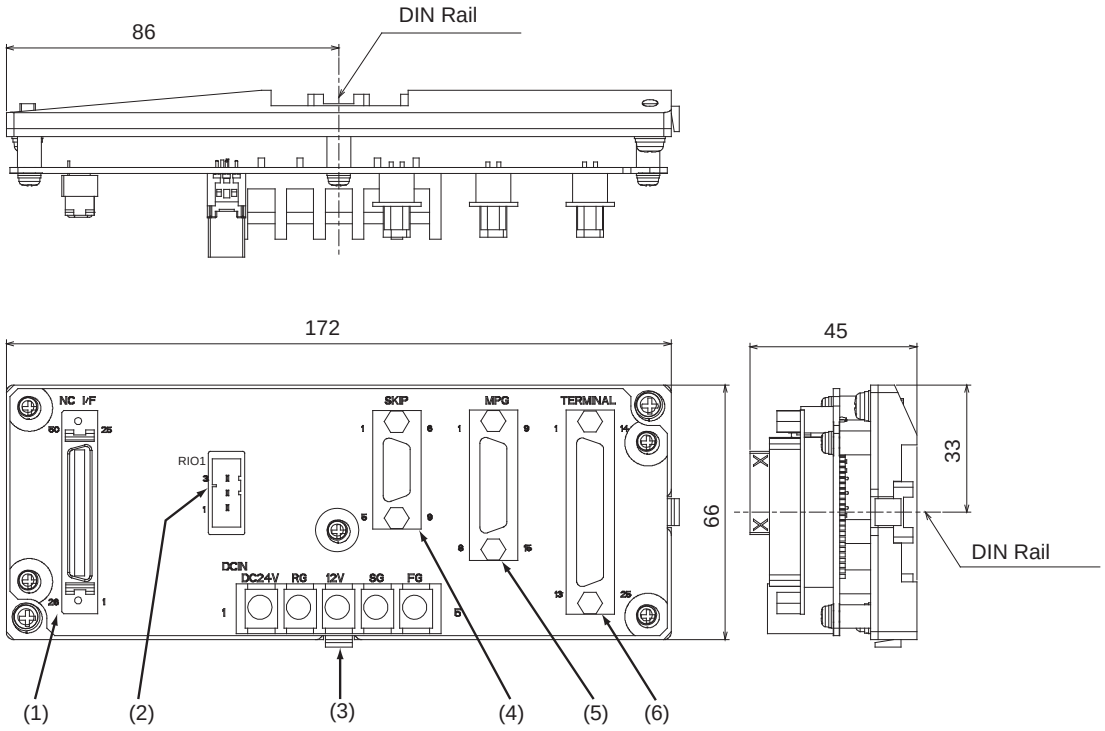
Cable side connector type

Connector type	Pressure displace-ment type	Crimp-contact type	Soldering type
Connector	FCN-367J040-AU/F	FCN-363J040	FCN-361J040-AU
Contact	-	AWG#24 to #28: FCN-363J-AU AWG#22 to #26: FCN-363J-AU/S	-
Case	-	FCN-360C040-B FCN-360C040-D (Wide-mouthed type) FCN-360C040-E (Long screw type)	
		-	FCN-360C040-H/E (Side-mouthed type) FCN-360C040-J1 (Sloped-mouth cover) FCN-360C040-J2 (Thin sloped-mouth cover)
Manufacturer	FUJITSU Component		

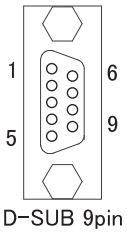
2.8 Signal Splitter

(Note) Signal splitter allows DIN rail installation only.

Dimension and Names of parts



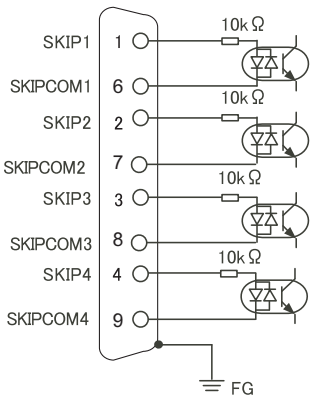
(1) NC I/F : Connector for CNC CPU
(2) RIO1 : (Not used)
(3) DCIN : Terminal block for power supply (Used for the 12V power supply type manual pulse generator)
(4) SKIP : Connector for skip signal



D-SUB 9pin

1	IN	SKIP1
2	IN	SKIP2
3	IN	SKIP3
4	IN	SKIP4
5		---

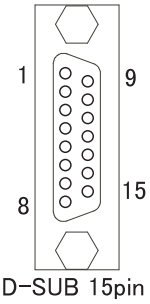
6	IN	COM1
7	IN	COM2
8	IN	COM3
9	IN	COM4



---SKIP I/F specification---
Input ON voltage : 18V or more to 25.2V or less
Input ON current : 6mA or more
Input OFF voltage : 4V or less
Input OFF current : 2mA or less
Input signal holding time (Ton) : 2ms or more
Internal response time : 0.08ms or less

(Note) NC recognizes input signals of 2ms or more as the valid skip signals. If machine contacts (relay, etc.) are used, malfunctions will occur due to chattering. Use semiconductor contacts (transistor, etc.).

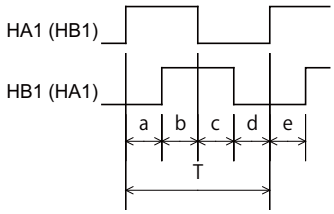
(5) MPG : 5V/12V Connector for manual pulse generator



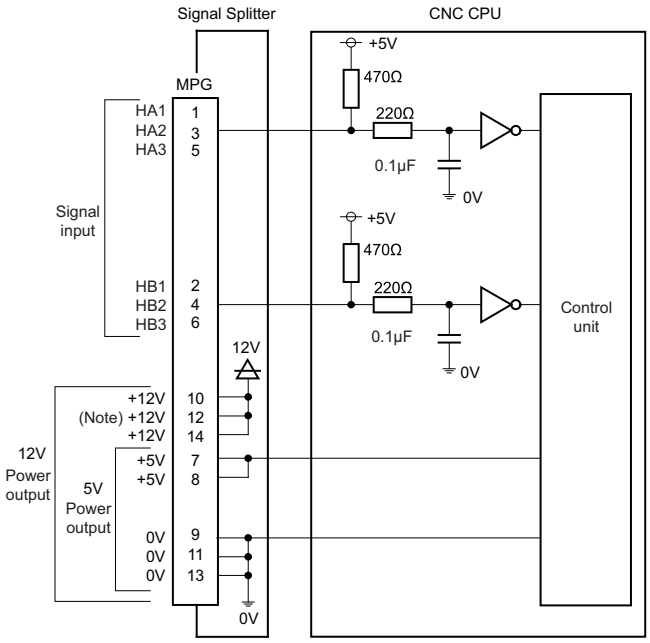
1	IN	HA1
2	IN	HB1
3	IN	HA2
4	IN	HB2
5	IN	HA3
6	IN	HB3
7	OUT	+5VDC
8	OUT	+5VDC

9	OUT	SG(0V)
10	OUT	+12VDC
11	OUT	SG(0V)
12	OUT	+12VDC
13	OUT	SG(0V)
14	OUT	+12VDC
15		---

	5V manual pulse generator (UFO-01-2Z9) input conditions	12V manual pulse generator (HD60C) input conditions
Input pulse signal type	HA1 and HB1 phases (with phase difference 90°) (Refer to the waveform below.)	
Input signal voltage	H level 3.5V to 5.25V L level 0V to 0.5V	
Max. input pulse frequency	5kHz	
Pulse generators power supply voltage	5VDC±10%	5VDC±10%
Current consumption	100mA or less	
Number of pulses per rotation	100 pulse/rev	25 pulse/rev



a.b.c.d.e: HA1 or HB1 rising edge (falling edge) phase difference = T/4 ± T/10
T: HA1 or HB1 cycle (Min. 10µs)



(Note) 12V power is separately required to connect 12V manual pulse generator.
(Refer to 4.9 Connecting the Manual Pulse Generator)

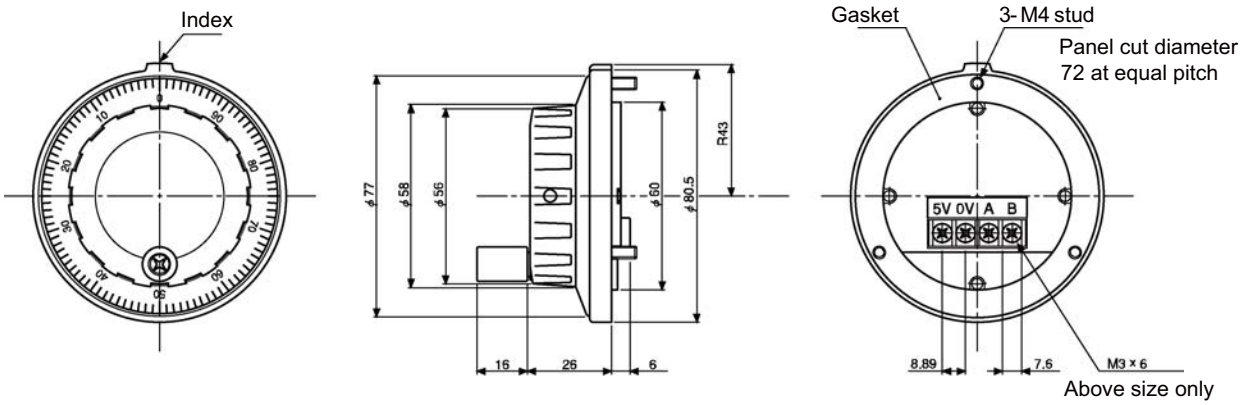
(6) TERMINAL : (Not used)

2.9 Manual Pulse Generator

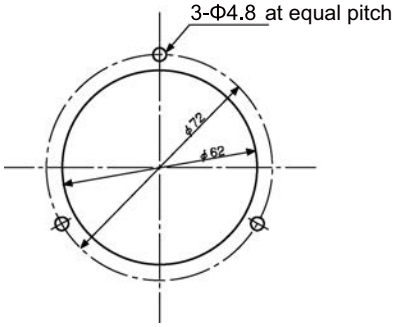
[UFO-01-2Z9]

5V manual pulse generator (100 pulse/rev)

<Outline dimension>



<Panel cut drawing>

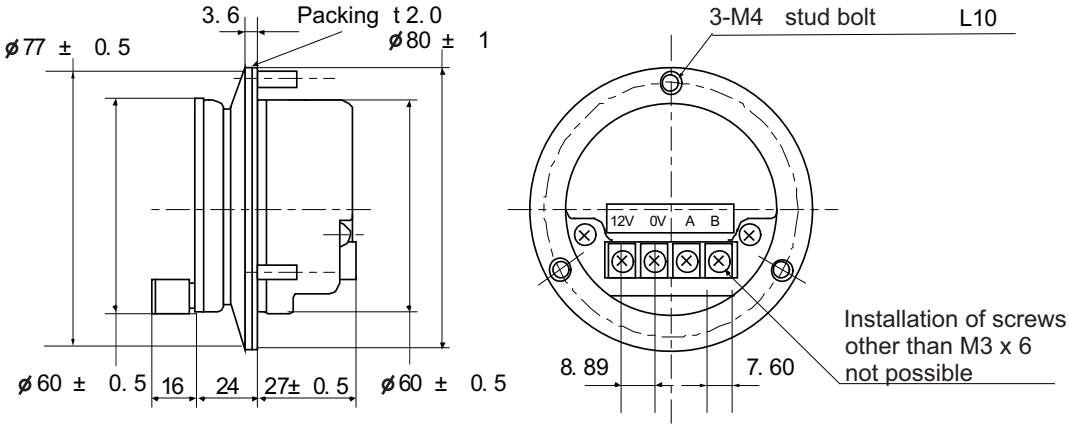


Produced by NIDEC NEMICON CORPORATION

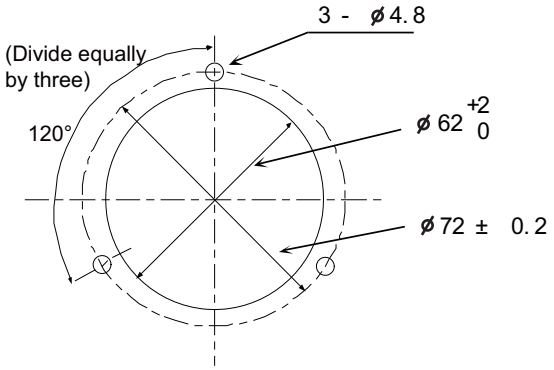
[HD60C]

12V manual pulse generator (25 pulse/rev)

<Outline dimension>

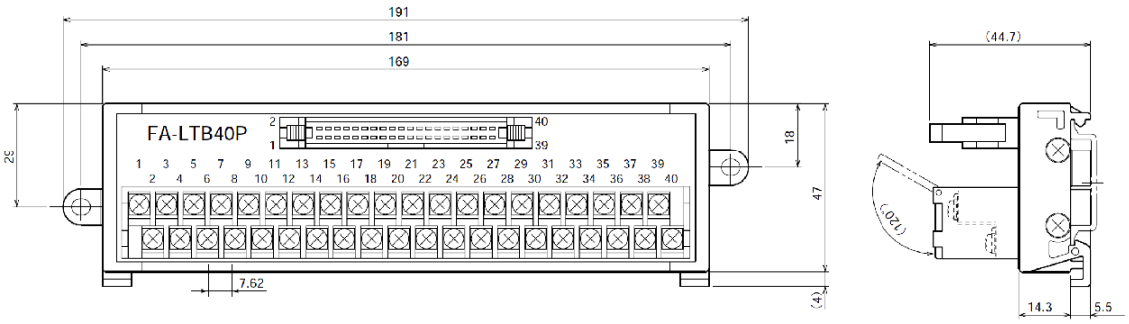


<Panel cut dimension drawing>



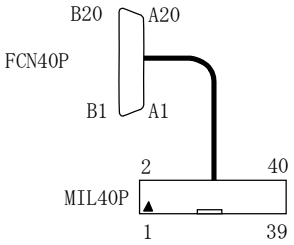
2.10 Terminal block for Dual Signal Module (Recommended)

Terminal block converter module FA-LTB40P, produced by MITSUBISHI ELECTRIC ENGINEERING, is recommended to connect the dual signals to the dual signal module. Use the connection cable FA-CBL ☐☐ FMV-M produced by MITSUBISHI ELECTRIC ENGINEERING.
A dual signal module requires two units of terminal converter modules and two cables.

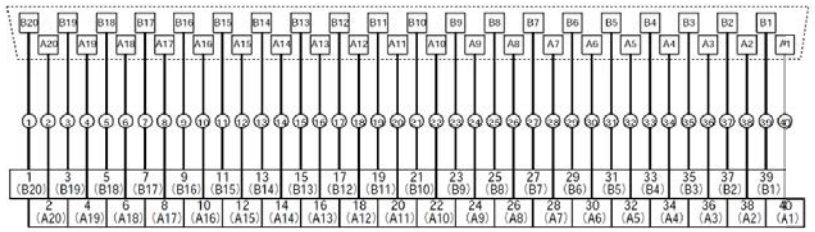


FA-CBL ☐☐ FMV-M cable (length: 05 as 0.5m, 10 as 1m, 20 as 2m, 30 as 3m and 50 as 5m)

Connector and the terminal block



Connection diagram



(Note 1) Connect 24VDC to the terminals No.37 and 39, OV to the terminals No.38 and 40.
(Note 2) Input/output cables must be protected against damage and mechanical stress/movement.
The installation must be that short circuits between cores (of multicore cables) cannot be possible or do not lead to hazardous situation.
(Note 3) EMG-Switches must employ 2 NC contacts and be of direct opening type. (IEC60947-5-1 Annex K, IEC60947-5-5)

2.11 I/O Extension Connector Unit

General specifications of I/O Extension connector unit is same as that of GOT. Refer to the instruction manual of GOT you are using.

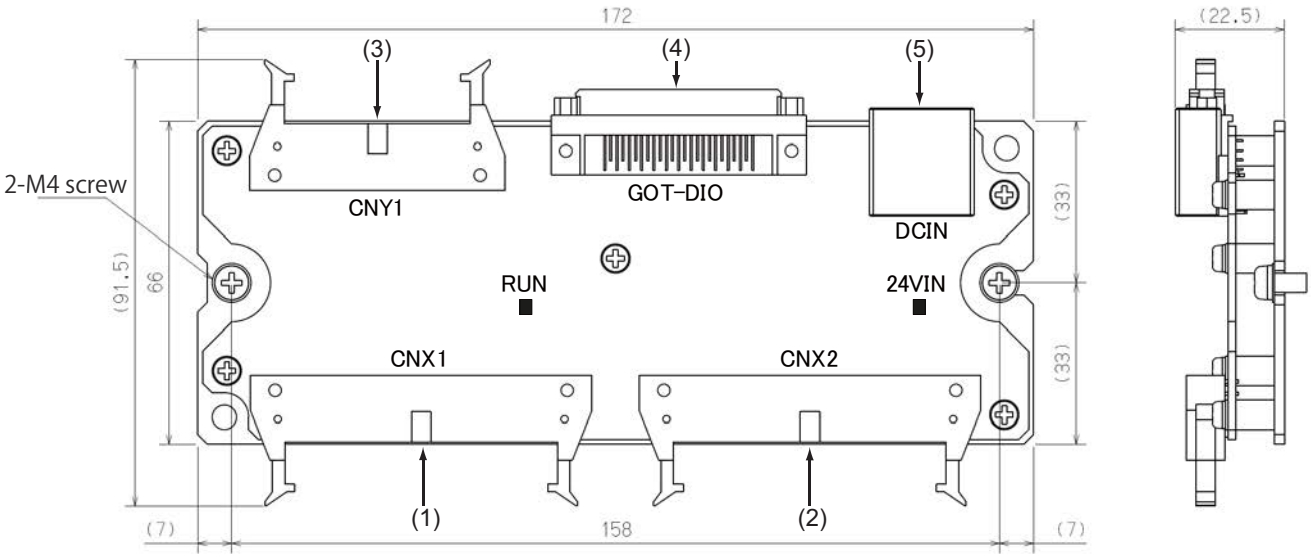
As for input/output specifications, they are basically same as GT15-DIOR unit apart from the number of input points is extended to 64points. Refer to the instruction manual for GT15-DIOR unit.

(Note) This unit is dedicated to GT15-DIOR (sink iput/source output). It cannot be used for GT15-DIO (source input/sink output)

Specifications list

Item	Specification
External connection method	Input connector: MIL-40 pin connector x 2 (CNX1, CNX2) Output connector: MIL-26 pin connector x 1 (CNY1)
Applicable size of wire	Batch solderless type: AWG28 1.27 pitch flat cable Multicore cable solderless type: AQG24-28 twisted cable
External power supply	[Voltage] 24VDC (20.4 - 28.8V, Ripple ratio: Less than 5%)
	[Current] 1.85A
	[Connector] DCIN connector (Supply from CNX1 or CNX3 connector is available) (Applicable size of electric wire: AWG16 - 20)
Connection cable between GT15 and DIOR	H810 cable (Install FCU7-HN831 unit in the same panel as GOT.)
Input method	Dynamic scan method/sink input
The number of input points	64 points (16 points x 4, 4 points of output for scan are used)
Cycle of dynamic scan	13.3ms
Output method	Direct output/source output
The number of output points	16 points + 1point(RUN)
Protection function	Generic output signal: Overload protection function, Overheat protection function (inside GT15-DIOR) RUN output signal: Overload protection function (inside FCU7-HN831) (Recovers automatically when overload or overheat is resolved.)
LED display	24VINDC, RUN output(RUN)
Outline dimension	172×66[91.5]×22.5 (The figure inside brackets indicates the dimension to the tip of the connector.)

Outline dimension and names of each parts



(1) CNX1

Connector: 3432-6002-LCPL * 3M

(Cable side: 7940-□□00SC/3448-7940)

Pin number	Name of the signal	
	B	A
20	X00	X10
19	X01	X11
18	X02	X12
17	X03	X13
16	X04	X14
15	X05	X15
14	X06	X16
13	X07	X17
12	X08	X18
11	X09	X19
10	X0A	X1A
9	X0B	X1B
8	X0C	X1C
7	X0D	X1D
6	X0E	X1E
5	X0F	X1F
4	COM0	COM1
3	COM0	COM1
2	(24VDC)	(0V)
1	(24VDC)	(0V)

(2) CNX2

Connector: 3432-6002-LCPL * 3M
(Cable side: 7940-□□00SC/3448-7940)

Pin number	Name of the signal	
	B	A
20	X20	X30
19	X21	X31
18	X22	X32
17	X23	X33
16	X24	X34
15	X25	X35
14	X26	X36
13	X27	X37
12	X28	X38
11	X29	X39
10	X2A	X3A
9	X2B	X3B
8	X2C	X3C
7	X2D	X3D
6	X2E	X3E
5	X2F	X3F
4	COM2	COM3
3	COM2	COM3
2	(24VDC)	(0V)
1	(24VDC)	(0V)

(3) CNY1

Connector: 3429-5002-LCPL * 3M
(Cable side: 7926-□□00SC/3448-7926)

Pin number	Name of the signal	
	B	A
13	Y00	Y08
12	Y01	Y09
11	Y02	Y0A
10	Y03	Y0B
9	Y04	Y0C
8	Y05	Y0D
7	Y06	Y0E
6	Y07	Y0F
5	0V	0V
4	0V	0V
3	N.C	N.C
2	RUN	N.C
1	0V	N.C

(4) GOT-DIO

Connector: PCS-E50LMD+ * HONDA TSUSHIN KOGYO
(Cable side: PCS-E50FA)

Pin number	Name of the signal	Pin number	Name of the signal
25	XD0E	50	XD0F
24	XD0C	49	XD0D
23	XD0A	48	XD0B
22	XD08	47	XD09
21	XD06	46	XD07
20	XD04	45	XD05
19	XD02	44	XD03
18	XD00	43	XD01
17	XSCN06	42	XSCN07
16	XSCN04	41	XSCN05
15	XSCN02	40	XSCN03
14	XSCN00	39	XSCN01
13	YD0E	38	YD0F
12	YD0C	37	YD0D
11	YD0A	36	YD0B
10	YD08	35	YD09
9	YD06	34	YD07
8	YD04	33	YD05
7	YD02	32	YD03
6	YD00	31	YD01
5	N.C	30	RUN
4	24VDC	29	0V
3	24VDC	28	0V
2	24VDC	27	0V
1	24VDC	26	0V

(5) DCIN

Connector: 2-178313-5 * Tyco Electronics
(Cable side: 2-178288-3)

Pin number	Name of the signal
3	FG
2	0V
1	24VDC

(Note 1) Xxx or Yxx. in this chapter does not indicate the internal device No.

(Note 2) Connect to common signal which is determined for each input signal since dynamic scan method is applied for the input method. (If the common is connected to 24DVC, it does not operate normally.)
X00 to X0F: COM0 is used as the common
X10 to X1F: COM1 is used as the common
X20 to X2F: COM2 is used as the common
X30 to X3F: COM is used as the common

(Note 3) It is recommended to use DCIN as a connecter for 24VDC input, but it is available to supply from CNX1 or CNX2. In this case, make sure to wire more than 2 pins.

(Note 4) Pressure welding connector for multicore cable is also required for a cable side connecter which connects to CNX1, CNX2 or CNY1 connecter.
UFS-□□B-04* YAMAICHI ELECTRONICS

3

Installation

3.1 Module Installation

3.1.1 Precautions for Handling

⚠CAUTION

⚠ Use C70 in an environment that meets the general specifications contained in this manual. Using C70 in an environment outside the range of the general specifications could result in electric shock, fire, operation failure, and damage to or deterioration of the product.

⚠ When mounting the module, be sure to insert the module fixing hook on the module's bottom into the module fixing hole on the base unit. Incorrect mounting could cause an operation failure or a damage/drop of the unit.

⚠ Hold down the module loading lever at the module bottom and securely insert the fixing hook into the fixing hole in the base unit. Install the module with the module fixing hole as a supporting point. Incorrect loading of the module can cause an operation failure, failure or drop.

⚠ Be sure to fix all the modules with screws to prevent them from dropping.
The fixing screws (M3 x 12) are to be prepared by user. For CNC CPU module, use the attached fixing screws (M3 x 13).

⚠ Tighten the screw in the specified torque range. Under tightening may cause a drop, short circuit or operation failure. Over tightening may cause a drop, short circuit or operation failure due to damage to the screw or module.

⚠ Be sure to install the extension cable to connectors of the basic base unit correctly. After installation, check them for looseness. Poor connections could cause an input or output failure.

⚠ Completely turn off all lines of external power supply used in the system before loading or unloading the module. Not doing so could result in electric shock or damage to the product.

⚠ Do not mount/dismount the modules or base over 50 times. Mounting/dismounting over 50 times may cause an operation failure.

⚠ Do not directly touch the module's conductive parts or electronic parts. Touching these parts could cause an operation failure or give damage to the module.

⚠ Do not touch the radiating fin of the CNC CPU module while an electric current is supplied or in a short while after the power OFF. Touching the fin may cause burns. Take care when removing the unit.

⚠ When removing the unit, always remove the fixing screws and then take the fixing hook out from the fixing hole. Incorrect removal will damage the module fixing hook.

This section describes precautions for handling the CPU modules, I/O modules, power supply modules and basic base unit, etc.

(1) Do not drop or apply strong impact on the modules, terminal block connectors and pin connectors.

(2) Do not remove modules printed circuit boards from the case in order to avoid failure.

(3) The module fixing screws and terminal block screws within the tightening torque range specified below

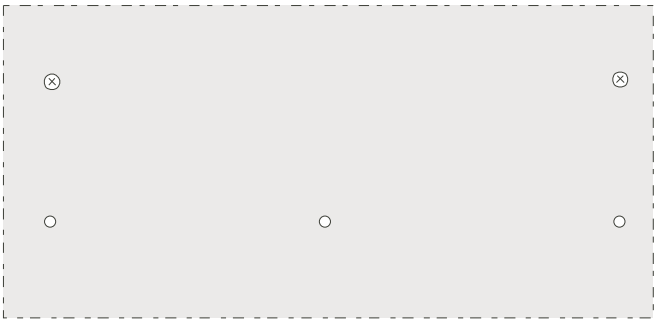
Location of screw	Tightening torque range
CNC CPU module fixing screw (M3 × 13 screw)	0.36 to 0.48N·m
Module fixing screw (M3 × 12 screw)	0.36 to 0.48N·m
I/O module terminal block screw (M3 screw)	0.42 to 0.58N·m
I/O module terminal block fixing screw (M3.5 screw)	0.68 to 0.92N·m
Power supply module terminal screw (M3.5 screw)	0.68 to 0.92N·m

(4) Make sure to install the power supply module on the basic base unit and extension base unit. When the power supply module is not installed and if the I/O modules and intelligent function module installed on the basic base unit are light load type, the modules may be operated. In this case, because a voltage becomes unstable, we cannot guarantee the operation.

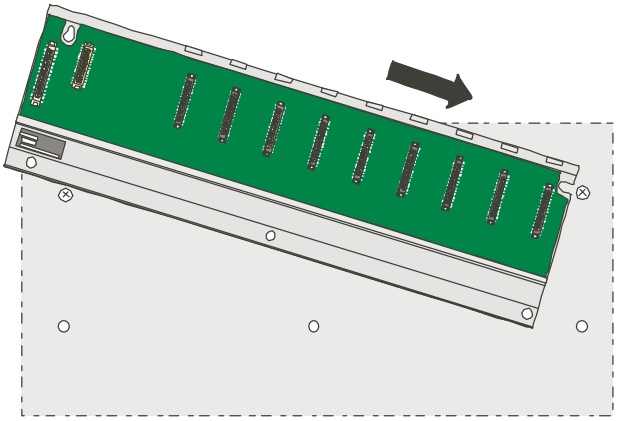
(5) When an extension cable is used, do not bind the cable together with the main circuit (high voltage, heavy current) line or lay them close to each other. Keep the cable at least 100 mm away from the line.

(6) Be sure to use the fixing screws and fix the basic base unit on the panel to avoid an operation failure due to vibrations.
Install the basic base unit in the following procedure.

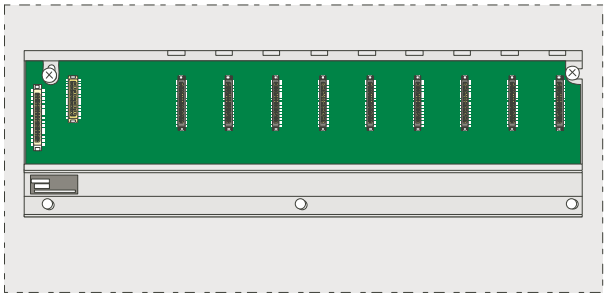
(a) Fit the two fixing screws for top of the basic base unit to the panel.



(b) Place the right-hand side notch of the basic base unit onto the right-hand side screw.



(c) Place the left-hand side pear-shaped hole of the basic base unit onto the left hand side screw.



(d) Fit the fixing screws into the fixing screw holes in the basic base unit bottom and re-tighten all the fixing screws.

(Note) Install the basic base unit to a panel, with no module installed in the right slot.
Remove the basic base unit after unloading the module from the right-end slot.

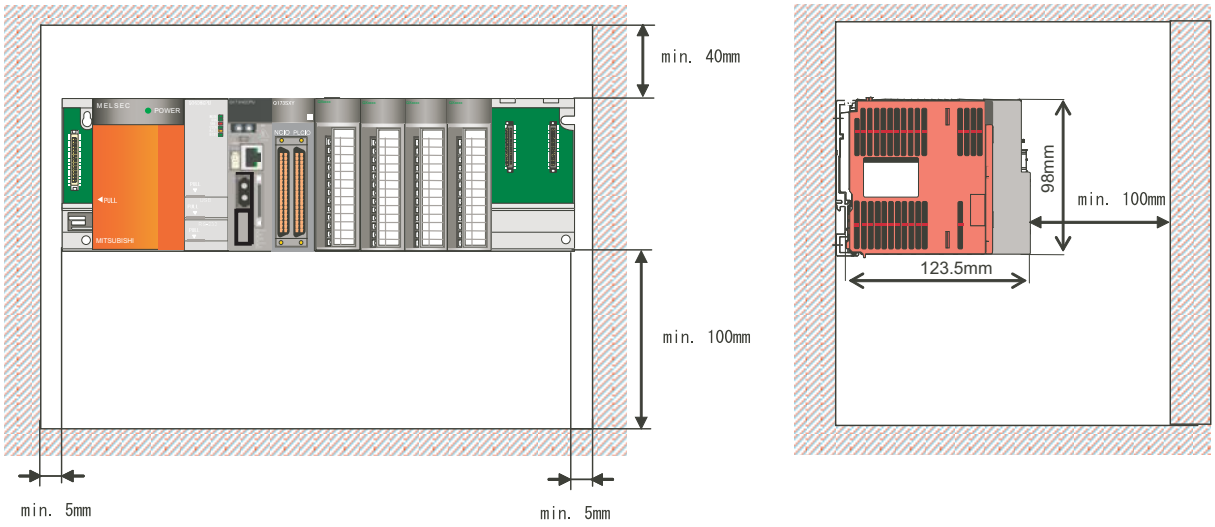
3.1.2 Precautions for Installation of Basic Base Unit

Install C70 to a panel, etc., considering enough about operability, maintainability and environmental resistance.

(1) Unit installation position

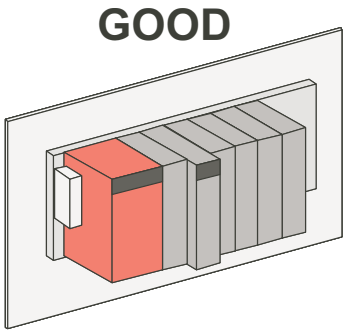
For enhanced ventilation and ease of module replacement, leave the following space between the module top/bottom and structure/parts.

(Note) DIN rail installation is not available.

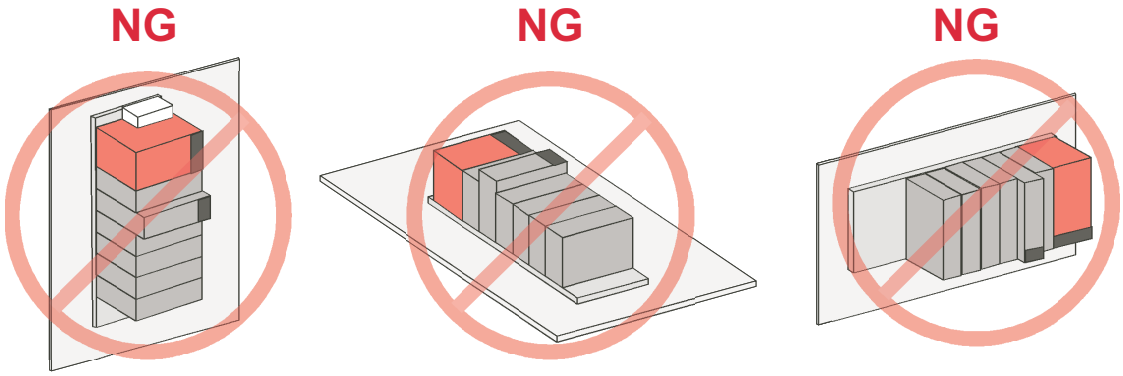


(2) Unit installation orientation

(a) Since C70 generates heat, it should be fitted on a well ventilated location in the orientation shown below for heat release.



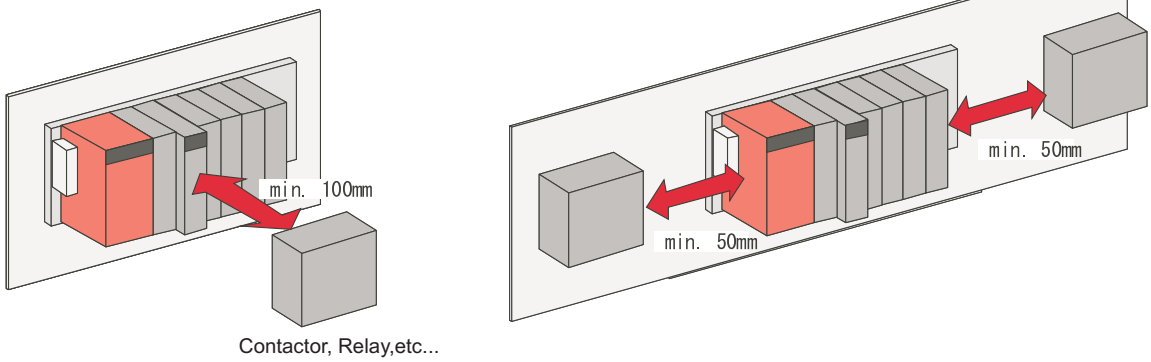
(b) Do not use it in either of the orientations shown below.



(3) Installation surface
Fit the base unit on a flat surface. If the installation surface is not even, this may strain the printed circuit boards and cause malfunctions.

(4) Installation of the unit in an area where the other devices are installed
Avoid fitting basic unit in proximity to vibration sources such as large electromagnetic contractors and no-fuse circuit breakers; fit the unit on a separate panel or at a distance.

(5) Distances from the other devices
In order to avoid the effects of radiated noise and heat, provide the clearances indicated below between C70 and the other devices (contactors and relays).
- In front of CNC CPU: 100 mm (3.94 inch) or more
- On the right and left of C70: 50 mm (1.97 inch) or more



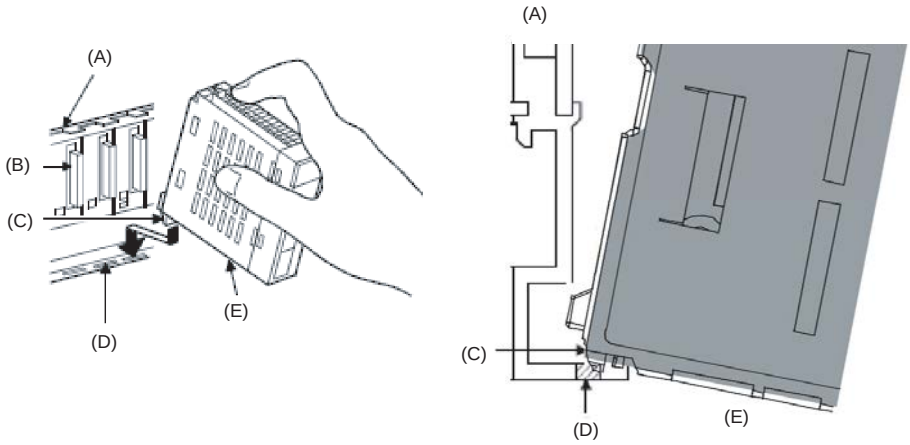
3.1.3 Module Installation and Removal

This section explains how to install and remove a power supply module, PLC CPU module, CNC CPU module, input/output module and intelligent function module or another module to and from the base unit.

Module installation and removal to/from Q3 ☐ DB, Q6 ☐ B

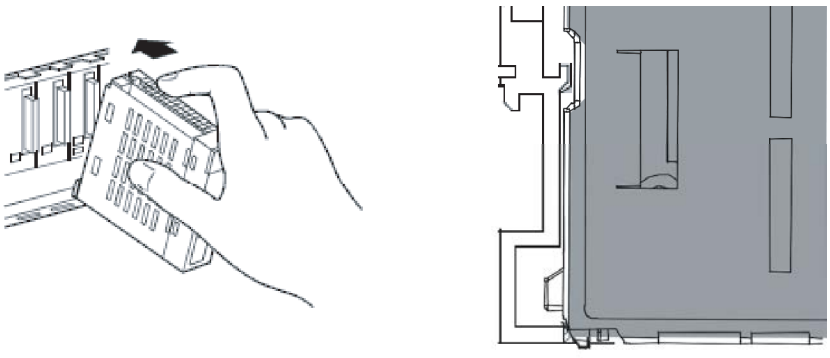
Installation

(1) Insert the module fixing hook into the module fixing hole of the base unit.



(A) Base unit
(B) Module connector
(C) Module fixing hook
(D) Module fixing hole
(E) Module

(2) Push the module in the direction of arrow to install it into the base unit.



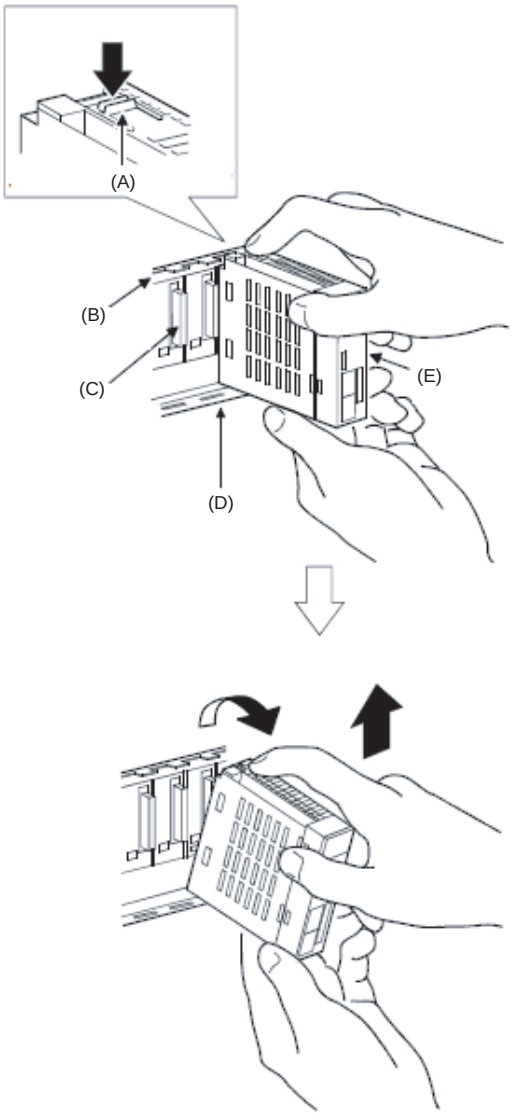
(3) Make sure that the module is installed in the base unit correctly.

(4) Fix the unit with screws on the base unit.

(Note) Be sure to fix all the modules with screws to prevent them from dropping.
The fixing screws (M3 x 12) are to be prepared by user.
For CNC CPU module, use the attached fixing screws (M3 x 13).

Removal

(1) Remove the module fixing screws.
(2) Hold the module with both hands, and push the hook on the top of the module with a finger until it stops.
(3) While pushing the hook, and using the bottom of the module as a support, pull the module toward you.
(4) Lift the module upwards and remove the module fixing hook from the module fixing hole.



(A) Module fixing hook
(B) Base unit
(C) Module connector
(D) Module fixing hole
(E) Module

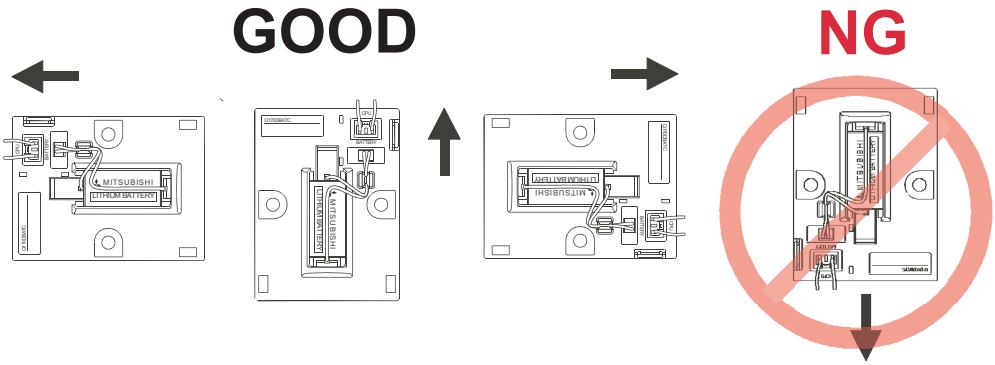
3.2 Precautions for Mounting the Battery Holder Unit

Fix the battery holder unit (Q170DBATC) on the panel with screws, paying particular attention to the mounting location and direction of the unit. The fixing screws (M5 x 14) are to be prepared by user.

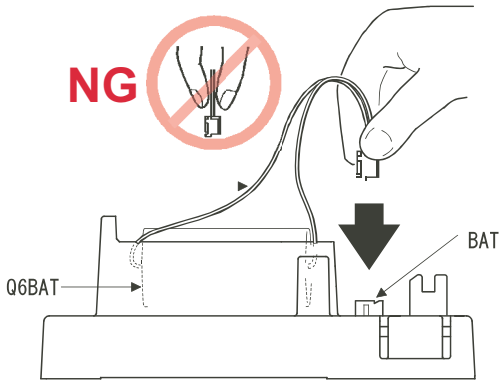
(1) Mounting location of the unit
Mount the battery holder unit less than 50cm away from the CNC CPU (as the battery cable is 50cms long).

(2) Mounting face
Mount the battery holder unit on a flat face.

(3) Mounting direction of the unit
Do not mount the battery holder unit with the bottom up, which may lead the leakage of the battery liquid when the battery gets broken.



(4) Make sure to hold the connector when connecting and removing the cable.



Make sure to insert the connector until it clicks into place, when connecting.

(Note) Carry out wiring so that there is no possibility of short circuit nor dangerous state between wires.

3.3 Calculating Heat Generation by C70

The ambient temperature inside the control panel storing the C70 must be suppressed to a C70 operating ambient temperature of 55°C(131°F).
For the design of radiation from the storing panel, it is necessary to know the average power consumption (heating value) of the devices and instruments stored in the control panel. Here the method of obtaining the average power consumption of C70 is described. From the power consumption, calculate a rise in ambient temperature inside the control panel.

The power consuming parts of C70 are roughly classified into six blocks as shown below.
The following shows how to calculate the average power consumption in each block.

(1) Power consumption of the power supply module
The power conversion efficiency of the power module is approx. 70 [%], i.e., 30 [%] of the output power is consumed by heating. As a result, 3/7 of the output power becomes the power consumption.
Therefore the calculation formula is as follows.

$$W_{pw} = \frac{3}{7} \times (I_{5v} \times 5)\ [W]$$

I_{5V} : Current consumption of logic 5 VDC circuit of each module

(2) Power consumption of a total of 5 VDC logic section of each module (including CPU module)
The power consumption of the 5 VDC output circuit section of the power module is the power consumption of each module (including the current consumption of the basic base).

$$W_{5V} = I_{5V} \times 5\ [W]$$

(3) A total of 24 VDC average power consumption of the output module (power consumption for simultaneous ON points)
The average power of the external 24 VDC power is the total power consumption of each module.

$W_{24V} = I_{24V} \times 24$ x ratio of simultaneous ON [W]
I_{24V} : Average current consumption of internal consumption power supply of the output module 24VDC [A]
It is not applied for the power supply unit which supplies 24VDC from outside and has no 24VDC output.

(4) Average power consumption due to voltage drop in the output section of the output module
(Power consumption for simultaneous ON points)

$W_{OUT} = I_{OUT} \times$ Vdrop $\times$ Number of output points $\times$ Simultaneous ON rate [W]
I_{OUT} : Output current (Current in actual use) [A]
Vdrop : Voltage drop in each output module [V]

(5) Average power consumption of the input section of the input module (Power consumption for simultaneous ON points)

$W_{IN} = I_{IN} \times E \times$ Number of input points $\times$ Simultaneous ON rate [W]
I_{IN} : Input current (Effective value for AC) [A]
E : Input voltage (Voltage in actual use) [V]

(6) Power consumption of the external power supply section of the intelligent function module

$W_S = I_{5V} \times 5 + I_{24V} \times 24 + I_{100V} \times 100$ [W]

The total of the power consumption values calculated in (1) to (6) becomes the C70 overall power consumption.

$W = W_{PW} + W_{5V} + W_{24V} + W_{OUT} + W_{IN} + W_S$ [W]

From this overall power consumption [W], calculate the heating value and a rise in ambient temperature inside the control panel.
The outline of the calculation formula for a rise in ambient temperature inside the control panel is shown below.

$T = \frac{W}{UA}$ [°C]

W : C70 overall power consumption (value obtained above)
A : Surface area inside the control panel[m2]
U : When the ambient temperature inside the control panel is uniformed by a fan.....6
When air inside the control panel is not circulated 4

When a rise in ambient temperature inside the control panel exceeds the specified limit, it is recommended that you install a heat exchanger in the control panel to lower the ambient temperature inside the control panel. If a normal ventilating fan is used, dust will be sucked into C70 together with the external air, and it may affect the performance of C70.

(7) Example of average power consumption calculation (Q173NCCPU use)

(a) System configuration

Q64PN	Q04UDH CPU	Q173NC CPU	Q173 SXY	QX80	QY80	QJ71 FL71-T-F01	Q38DB

(b) 5VDC/24VDC current consumption of each module

Unit	5VDC current consumption	24VDC current consumption
Q04UDHCPU **(Note)**	0.39[A]	
Q173NCCPU	1.25[A]	
Q173SXY	0.20[A]	0.02[A]
QX80 **(Note)**	0.05[A]	
QY80P **(Note)**	0.08[A]	4.00[A]
QJ71FL71-T-F01 **(Note)**	0.50[A]	
Q38DB **(Note)**	0.23[A]	

(Note) 5VDC current consumption of the MELSEC standard module may be changed. It must be always confirmed in the latest manual.

(c) Power consumption of power module

$W_{PW} = 3 / 7 \times (0.39 + 1.25 + 0.20 + 0.05 + 0.08 + 0.50 + 0.23) \times 5 = 5.79$ [W]

(d) Power consumption of a total of 5VDC logic section of each module

$W_{5V} = (0.39 + 1.25 + 0.20 + 0.05 + 0.08 + 0.50 + 0.23) \times 5 = 13.5$ [W]

(e) A total of 24VDC average power consumption of the output module

$W_{24V} = 0.02 \times 24 + 4.00 \times 24 = 96.48$ [W]

(f) Average power consumption due to voltage drop in the output section of the output module

$W_{OUT} = 0.1 \times 0.2 \times 24 \times 1 + 0.5 \times 0.3 \times 16 \times 1 = 2.88$ [W]

(g) Average power consumption of the input section of the input module

$W_{IN} = 0.004 \times 24 \times 40 \times 1 + 0.004 \times 24 \times 16 \times 1 = 5.38$ [W]

(h) Power consumption of the power supply section of the intelligent function module.

$W_S = 0$ [W]

(i) Power consumption of overall system

$W = 5.79 + 13.5 + 96.48 + 2.88 + 5.38 = 124.0$[W]

4

Wiring and Connecting

4.1 Precautions

⚠CAUTION

⚠ Be sure to ground of earth terminal FG and LG. Not doing so could result in electric shock or operation failure. (Ground resistance: 100Ω or less)

⚠ When wiring in the unit, be sure that it is done correctly by checking the product's rated voltage and the terminal layout. Connecting a power supply that is different from the rating or incorrectly wiring the product could result in fire or damage.

⚠ External connections shall be crimped or pressure welded with the specified tools, or correctly soldered. Imperfect connections could result in short circuit, fire, or operation failure.

⚠ Tighten the terminal screws within the specified torque range. If the terminal screws are loose, it could result in short circuit, fire, or operation failure. Tightening the terminal screws too far may cause damages to the screws and/or the module, resulting in drop, short circuit, or operation failure.

⚠ Be sure there are no foreign matters such as sawdust or wiring debris inside the module. Such debris could cause fire, damage, or operation failure.

⚠ The module has an ingress prevention label on its top to prevent foreign matter, such as wiring debris, from entering the module during wiring.
Do not remove this label during wiring.
Before starting system operation, be sure to remove this label because of heat dissipation.

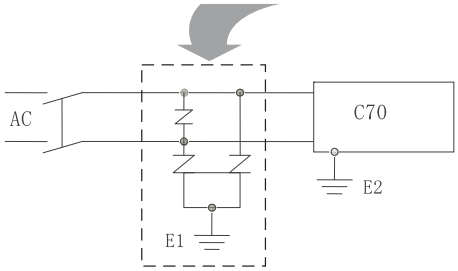
4.1.1 Power supply wiring

(a) 100VAC, 200VAC and 24VDC wires should be twisted as dense as possible respectively. Connect the modules with the shortest distance.
Use the wires of the following core size for wiring.

Application	Recommended core size
100VAC, 200VAC, 24VDC wires	0.75 to 2mm^2
I/O equipment	0.3 to 0.75mm^2 (Outer diameter: 2.8mm^2 or less)
Ground wire	2.0mm^2 or more

(b) Do not bunch or lay them closely the main circuit (high voltage, large current) cables of the 100VAC and 24VDC with the I/O signal cables. Keep the cable at least 100 mm away from the line.

(c) As a countermeasure to power surge due to thunder, connect a surge absorber for thunder as shown below.



(Note 1) Separate the ground of the surge absorber for thunder (E1) from that of CNC control unit (E2).
(Note 2) Select a surge absorber for thunder whose power supply voltage does not exceed the maximum allowable circuit voltage even if at the time of maximum power supply voltage elevation.

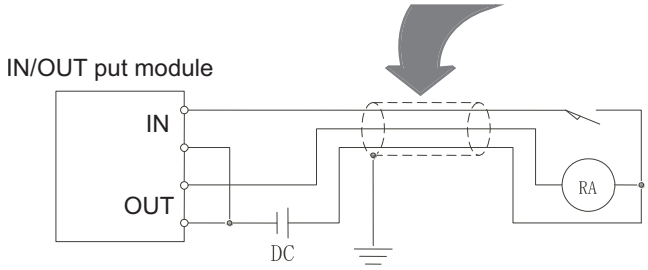
4.1.2 Wiring of I/O equipment

(a) Insulation-sleeved crimping terminals cannot be used with the terminal block.
It is recommended to cover the wire connections of the crimping terminals with mark or insulation tubes.

(b) The wires used for connection to the terminal block should be 0.3 to 0.75mm^2 in core and 2.8mm (0.11inch) or less in outside diameter.

(c) Run the input and output lines away from each other.

(d) When the wiring cannot be run away from the main circuit and power lines, use a batch-shielded cable and ground it on the CNC control unit side.



(e) Where wiring runs through piping, ground the piping without fail.

(f) Run the 24VDC input line away from the 100VAC and 200VAC lines.

(g) Wiring of 200m (656.17ft.) or more distance will give rise to leakage currents due to the wiring capacity, resulting in a fault.
Refer to the troubleshooting chapter of the I/O Module User's Manual.

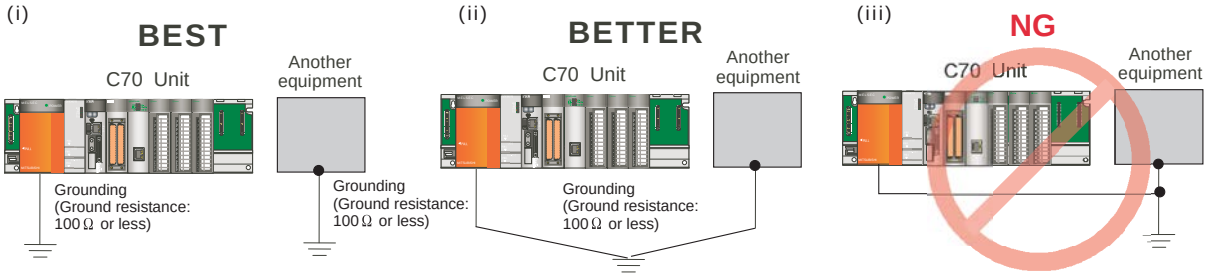
(h) As a countermeasure to power surge due to thunder, separate AC lines from DC lines and connect a surge absorber for thunder (refer to "Wiring and Connecting: Precautions:Power supply wiring").
Without the countermeasures, an I/O device failure could occur due to thunder.

4.1.3 Grounding

To ground the cable, follow the steps (a) to (c) shown below.

(a) Use the dedicated grounding as independent as possible.
(Ground resistance: 100Ω or less)

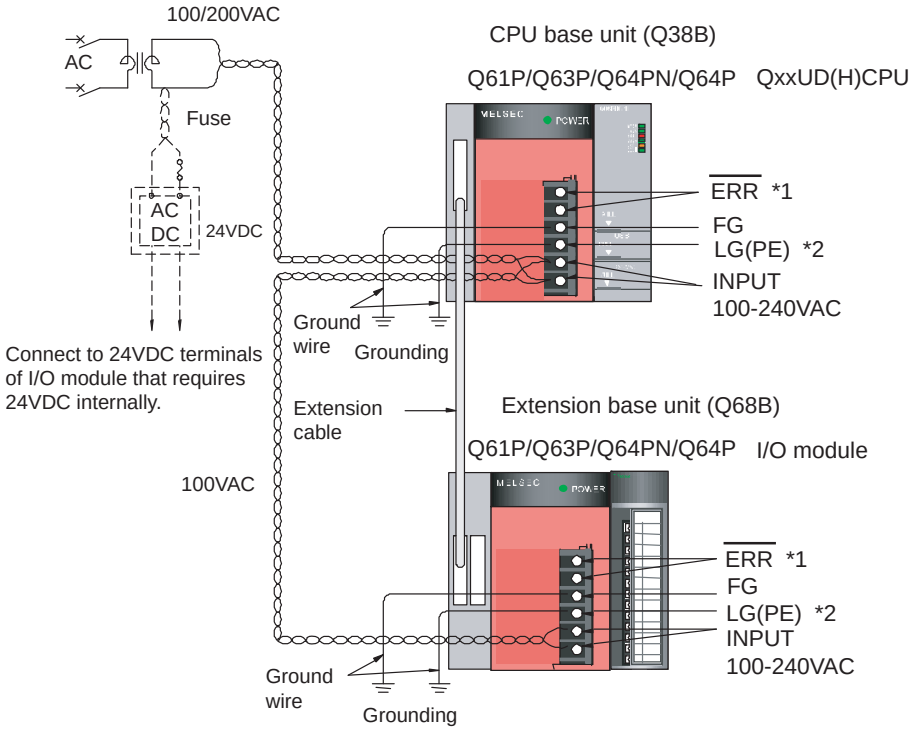
(b) When CNC control unit and another equipment cannot be departed to ground the cable each other, use (ii) Common Grounding shown below.



(c) Use the grounding cable of 2 mm^2 or more.
Position the ground-contact point as nearly to CNC control unit as possible, and use the total length of the grounding cable as short as possible.

4.2 Wiring to the Power Supply Module

The following diagram shows the wiring example of power lines, grounding lines, etc. to the basic base unit and the extension base unit.



*1: The $\overline{\text{ERR}}$ terminal turns ON/OFF as described below.

<When the power supply module is mounted on the main base unit>

The terminal turns OFF (opens) when the AC power is not input, a CPU module stop error (including a reset) occurs, or the fuse of the power supply module is blown.

<When the power supply module is mounted on the extension base unit>

The terminal is always OFF(open).

*2: Be sure to ground the LG terminal of Q64P and Q64PN, which are used as protective earth (PE).

(Note 1) Use the possibly thickest (up to 2 mm^2) wires for the 100/200 VAC and 24 VDC power cables. Always use crimp terminals for the terminal block wiring. To prevent a short circuit caused by any loosen screws, use 0.8mm thick crimp terminals with insulation sleeves. Up to 2 terminals can be attached to a terminal area.

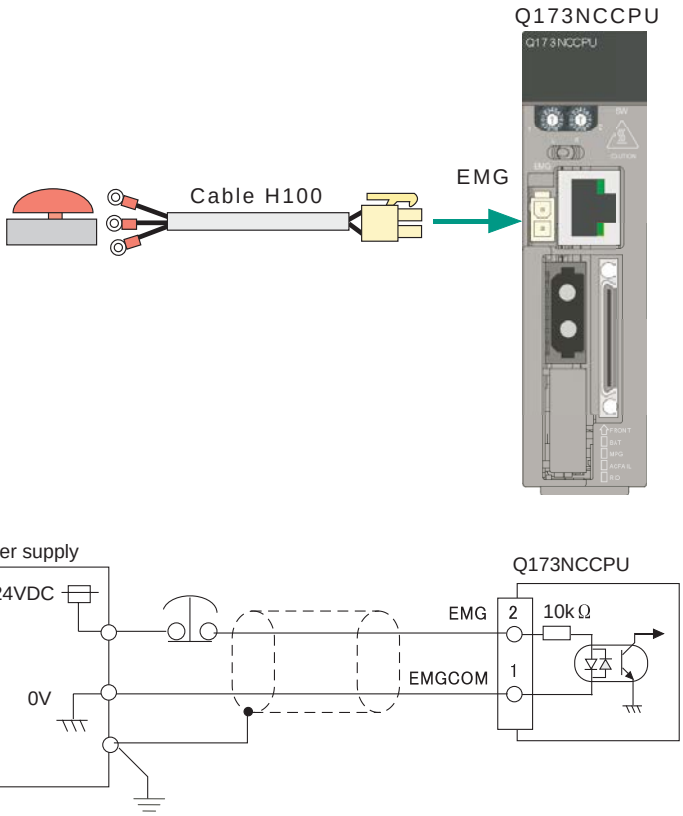
(Note 2) Be sure to ground the earth terminal LG(PE) and FG (Ground resistance: 100Ω or less). If LG(PE) terminals and FG terminals are connected without grounding the wires, the modules may be susceptible to noise.
In addition, since the LG terminals have potential of 1/2 input voltage, the operator may receive an electric shock when touching metal parts.

(Note 3) No system error can be detected by the $\overline{\text{ERR}}$ terminal of an extension base unit. ($\overline{\text{ERR}}$ terminal is always set off.)

(Note 4) Q64P has gone out of production.

4.3 Connecting the Emergency Stop Signal

Connect the emergency stop signal to the connector EMG.
An external power supply is required, because Q173NCCPU module does not have 24VDC output for the emergency stop signal.

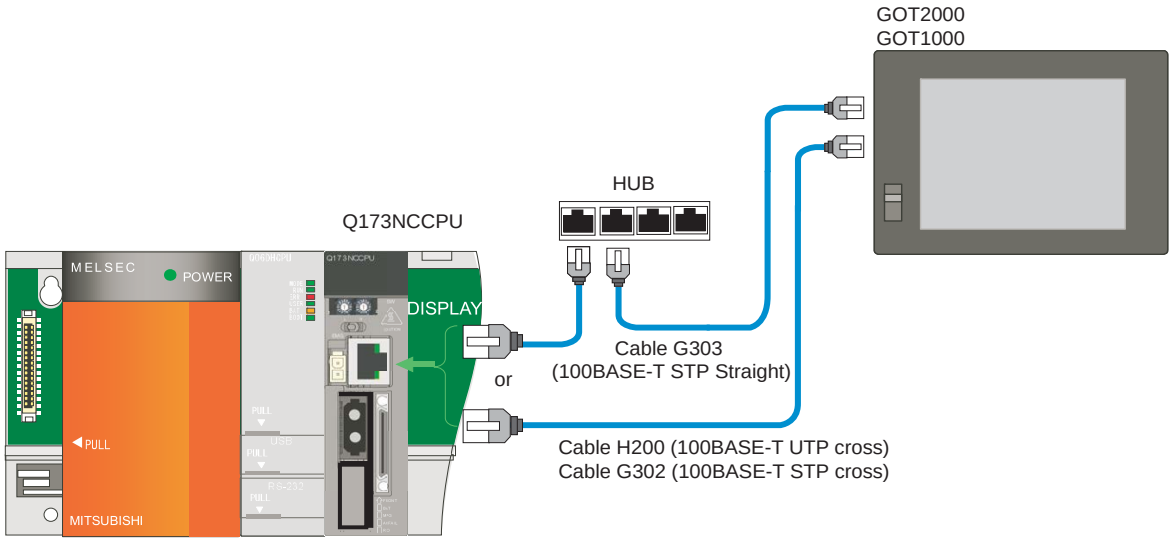


Related items: Cable drawing: "Cable : H100 Cable"

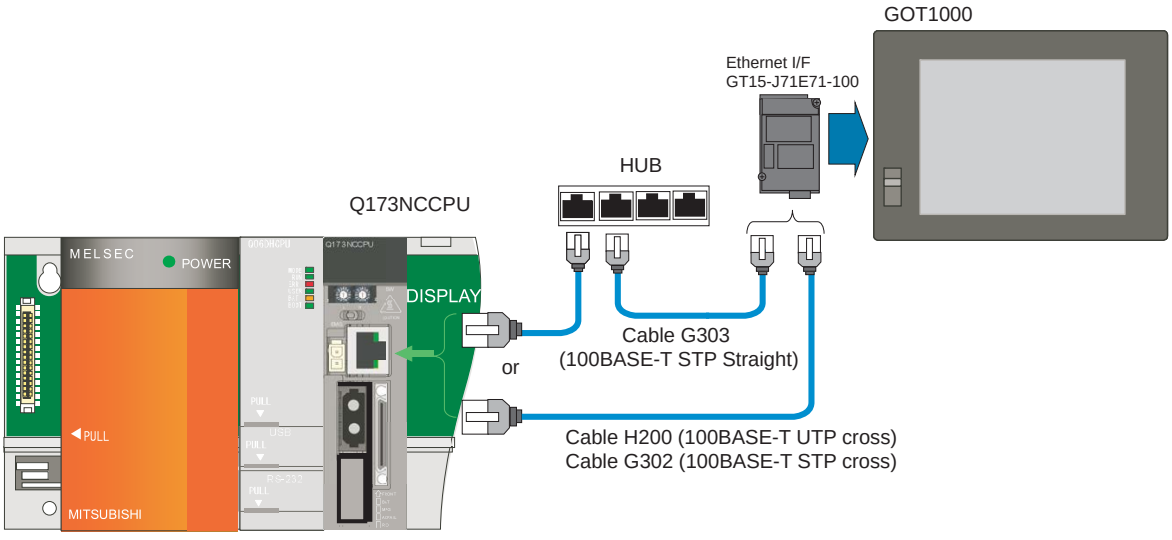
4.4 Connecting the GOT

Connect a LAN cable to the connector DISPLAY I/F for the connection of the display module such as GOT2000 series or GOT1000 series.
Refer to "GOT2000 Series Connection Manual(Mitsubishi Products)"(SH(NA)-081197ENG) for the connection of GOT2000 series.
Refer to "GOT1000 Series Connection Manual 1/3" (SH(NA)-080532ENG) for the connection of GOT1000 series. Ethernet communication module is separately required for GT15.

[GT27]
[GT16]



[GT15]

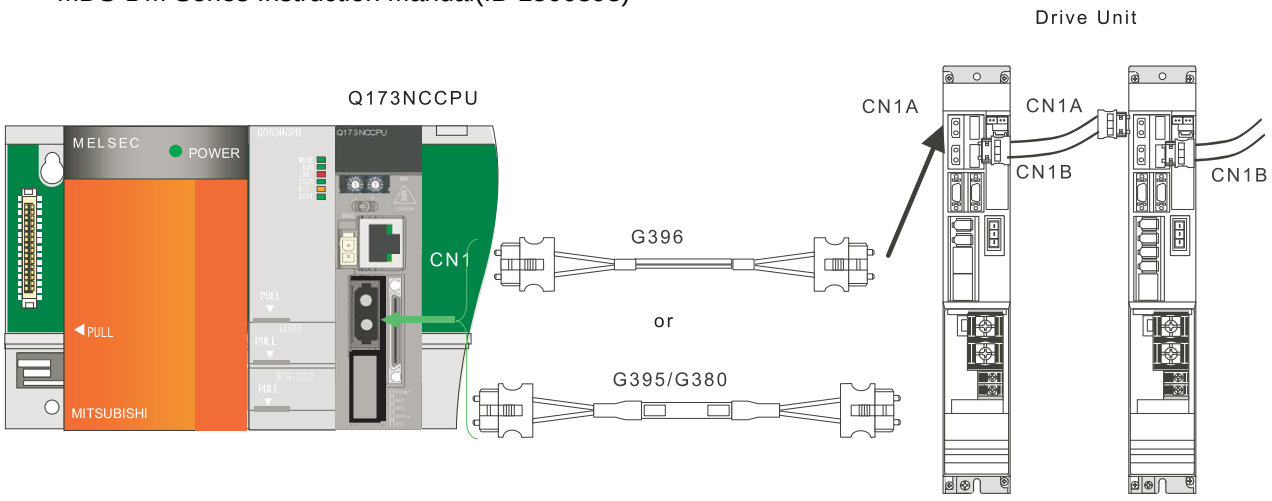


Use the cable, connector and hub that comply the IEEE802.3 100BASE-TX standard.
Cross connection cable is used for one-to-one connection with display module. Straight connection cable is usually used for the connection through a hub.
Shielded twisted pair cable (STP) is necessary to run a LAN cable out of the control panel. Install a ferrite core (TDK product, ZCAT3035-1330) around the cable. (Refer to “EMC Installation Guideline: EMC Countermeasure Parts: Ferrite Core Installation Method” to see how to install the ferrite core.)
Be sure to separate the LAN cable from the drive line, because LAN cables are easily affected by noise.
H200 cable is an unshielded twisted pair cable (UTP), which is a cross connection cable. The cable is available for one-to-one connection with Q173NCCPU in the same control panel.

4.5 Connecting the Servo Drive Unit

Connect an optical fiber cable to the connector CN1 for the connection of the optical communication servo drive units: MDS-D2/DH2 Series, MDS-DM2 Series,and MDS-DJ Series.
Refer to the following manuals for the details on the servo drive units (basic wiring and so on).

- MDS-D2/DH2 Series Specifications Manual (IB-1501124)
- MDS-D2/DH2 Series Instruction Manual (IB-1501127)
- MDS-DM2 Series Specifications Manual (IB-1501136)
- MDS-DM2 Series Instruction Manual (IB-1501139)
- MDS-DJ Series Specifications Manual (IB-1501130)
- MDS-DJ Series Instruction Manual (IB-1501133)
- MDS-D/DH Series Specifications Manual (IB-1500875)
- MDS-D/DH Series Instruction Manual (IB-1500025)
- MDS-D-SVJ3/SPJ3 Series Specifications Manual (IB-1500158)
- MDS-D-SVJ3/SPJ3 Series Instruction Manual (IB-1500193)
- MDS-DM Series Specifications Manual(IB-1500891)
- MDS-DM Series Instruction Manual(IB-1500893)



<Related items>
Cable drawing: "Cable: G395 Cable, G396 Cable, G380 Cable"

4.5.1 Precautions for handling the optical fiber cable

Special precautions, differing from the conventional cable, are required when laying and handling the optical fiber cable.

(1) General precautions]

(a) A protective cap is attached to the optical module and optical fiber cable mounted on the PCB when the system is delivered. Leaving this protective cap unattached could result in connection faults from the adherence of dirt and dust. Do not remove the protective cap when not connecting the cable. If dirty, wipe off lightly with a piece of dry gauze, etc. (Do not use solvents such as alcohol as the optical fiber material could melt.)

(b) Be sure to hold the connector section when connecting or disconnecting the optical connector. Unless you hold the connector section, the optical fiber cable may be damaged and disabled.

(c) The optical connector cannot be connected in reversed. Check the connector orientation when connecting it. Align the connector lock lever with the lock holes on the PCB's optical module, and press the connector straight in. Confirm that the lock lever connects with the optical module and that a "click" is heard.

(d) When disconnecting the optical fiber cable from the PCB, press the lock release buttons on the lock lever, and pull out the cable while holding the connector section. The connector could be damaged if the cable is pulled without pressing down on the lock release buttons.

(e) Do not apply excessive force onto the optical fiber cable by stepping on it or dropping tools, etc., on it.

(2)Precautions for laying the cable

(a) Do not apply a force exceeding the cable's tolerable tension. Binding the cables too tight with tie-wraps could result in an increased loss or a disconnection. Use a cushioning material such as a sponge or rubber when bundling the cables and fix so that the cables do not move.

(b) Do not connect the cables with a radius less than the tolerable bending radius. Excessive stress could be applied near the connector connection section and cause the optical characteristics to drop. The cable bending radius should be 10 times or more than the outer diameter at the reinforced sheath, and 20 times or more than the outer diameter at the fiber cord section.

(c) Do not apply torsion to the optical fiber cable. Laying a twisted cable could cause the optical characteristics to drop.

(d) When laying the cables in a conduit, avoid applying stress on the fiber cord and connector connection section. Use the tensile end such as a pulling eye or cable grip, etc.

(e) Fix the reinforced sheath with a cable clamp so that the mass of the optical fiber cable is not directly applied on the fiber cord and connector connection section.

(f) Never bundle the cables with vinyl tape. The plasticizing material in the vinyl tape could cause the POF cable to break.

(g) Loop the excessive cable with twice or more than the minimum bending radius R. (Confirm the minimum bending radius in the specifications of your optical fiber cable.)

(Note 1) Binding the cables too tight with tie-wraps could result in an increased loss or a disconnection. Use a cushioning material such as sponge or rubber when bundling the cables and fix so that the cables do not move.
Recommended clamp material: CKN-13SP KITAGAWA INDUSTRIES

(Note 2) Never bundle the cables with vinyl tape. The plasticizing material in the vinyl tape could cause the cable reinforced sheath section to break.

(Note 3) Loop the excessive cable with twice or more than the minimum bending radius.

(Note 4) Criteria for optical cable selection

<G396 Cable>
Wire material: Optical communication cable POF type (Core: Plastic)
Application: Use when wiring a cable of 10m or less inside the panel.
Min. bending radius:

Cable	Minimum bending radius
2-core parallel cord	30mm or more

<G395 Cable>
Wire material: Optical communication cable POF type (Core: Plastic)
Application: Use when wiring a cable of 10m or less outside the panel.
Min. bending radius:

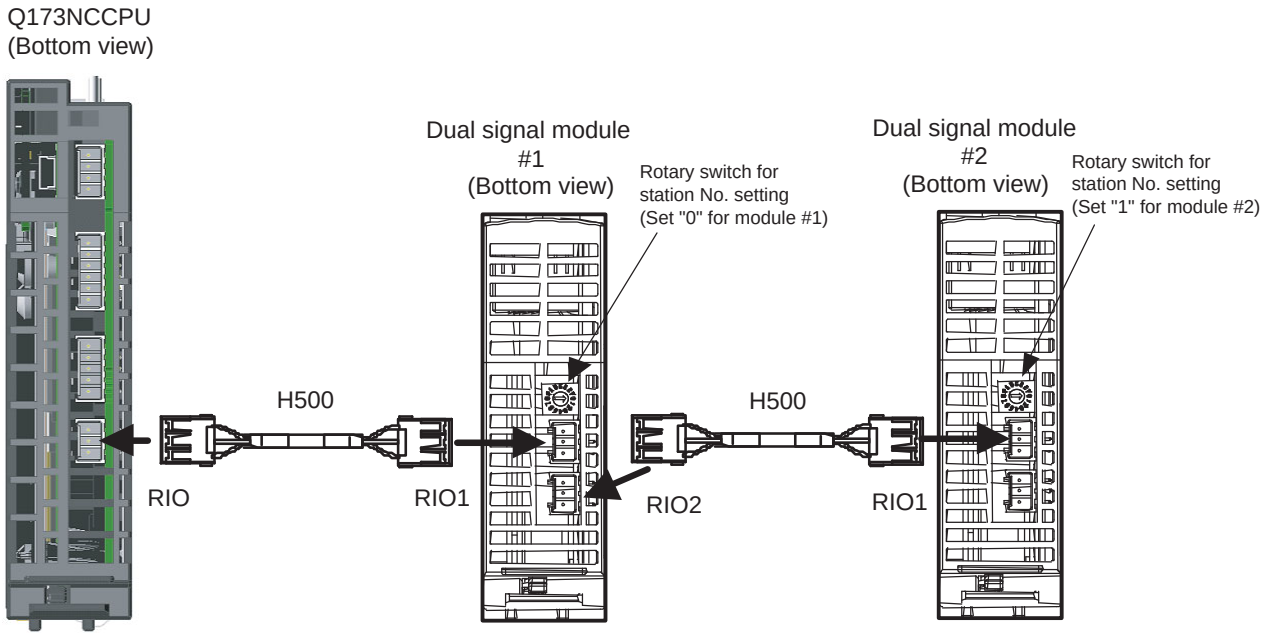
Cable	Minimum bending radius
2-core cable (section with reinforced sheath)	50mm or more
2-core cable (section without reinforced sheath)	30mm or more

<G380 Cable>
Wire material: Optical communication cable PCF type (Core: Glass)
Application: Use when the desired cable length is between 10 and 20m. (G395 or G396 is rather recommended when it's shorter than 10m.)
Min. bending radius:

Cable	Minimum bending radius
2-core cable (section with reinforced sheath)	50mm or more
2-core cable (section without reinforced sheath)	25mm or more

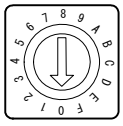
4.6 Connecting the Dual Signal Module

Connect a relay cable to the connector RIO for the connection of the dual signal module.
Use the connector RIO1 on the dual signal module.
When several dual signal modules (maximum 3 modules) are mounted, use the connector RIO2 to connect to RIO1 on the next dual signal module.
Station No. setting is necessary to connect several dual signal modules.



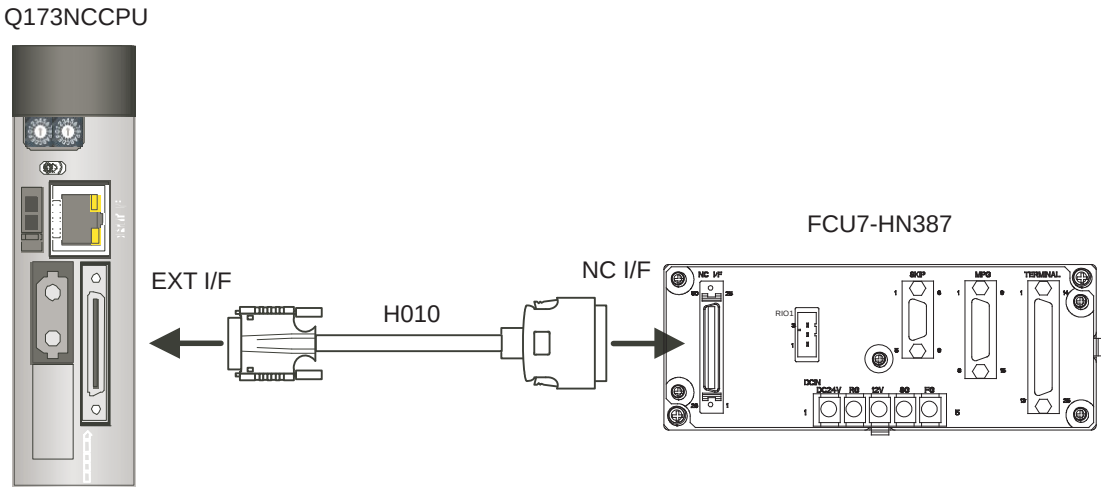
<Related items>
Cable drawing: "Cable: H500 Cable"

(Note) A communication failure will occur when a wrong station No. has been set for the dual signal module. ("0" is set as default.)

Switch name	Function	Setting
CS 	Station No. setting	Available to mount up to 3 modules. Set within the range of 0 to 2. Module #1 -> Set "0" Module #2 -> Set "1" Module #3 -> Set "2"

4.7 Connecting the Signal Splitter

Connect a relay cable to the connecter EXT I/F for the connection of the signal splitter(FCU7-HN387).
Skip (sensor) signals (refer to Wiring and Connecting: Connecting the Skip Signal (Sensor)) and the signals from manual pulse generator(s) (refer to Wiring and Connecting: Connecting the Manual Pulse Generator) can be connected to the signal splitter.
Install the signal splitter on a DIN rail.

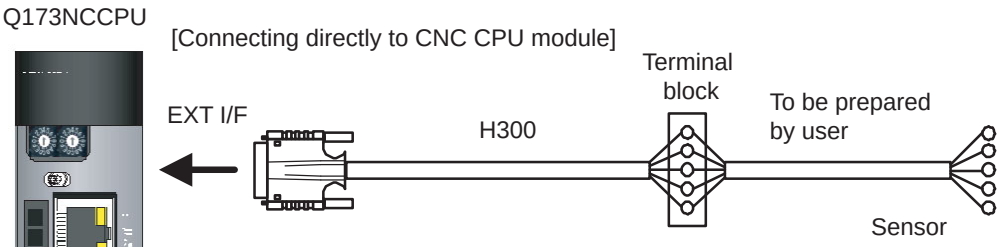


(Note) Neither the connector RIO nor TERMINAL of the signal splitter is currently available.

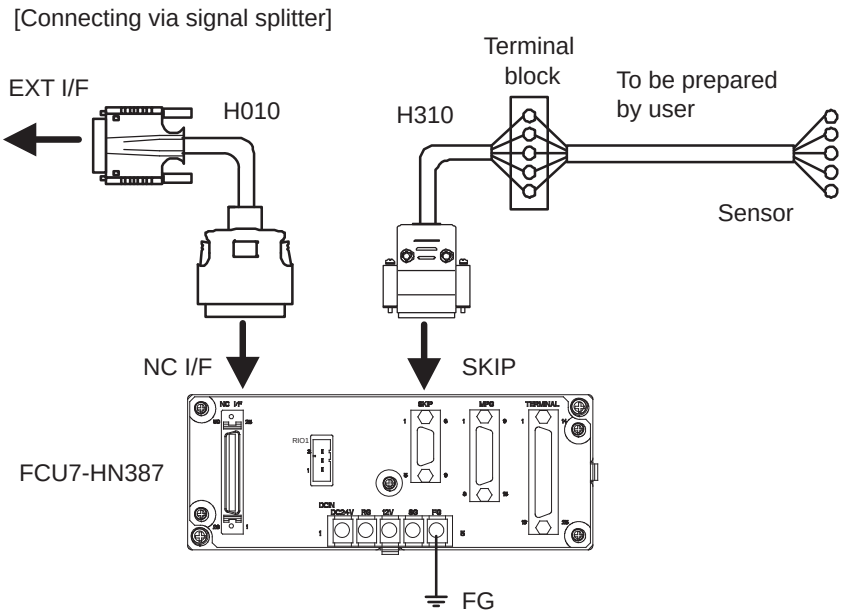
<Related items>
Cable drawing: "Cable: H010 Cable"

4.8 Connecting the Skip Signal (Sensor)

Connect the skip signals to the connector EXT I/F on CNC CPU module, or the connector SKIP on signal splitter.
H300 cable is used as composite cable with manual pulse generators. Use a terminal block for the relay connection.
Skip signals are used for processing the high-speed signals. Shielding is necessary for the cable that connects the terminal block and the sensor.
H310 cable is applied when the signal splitter (FCU7-HN387) is used.



(Note 1) H300 cable is a composite cable with manual pulse generator(s).
(Note 2) Refer to "(13) EXT I/F" in "2.5 CNC CPU Module" for the specification details.



(Note 1) Be sure to connect the terminal block FG of the signal splitter to the ground (FG).
(Note 2) Refer to "(4) SKIP" in "2.8 Signal Splitter" for the specification details.

<Related items>
Cable drawing: "Cable: H300 Cable, H310 Cable"

4.9 Connecting the Manual Pulse Generator

Connect the signals of manual pulse generator(s) to any of the following connectors.
- Connector MPG or EXT I/F on CNC CPU module
- Connector MPG on signal splitter (FCU7-HN387)

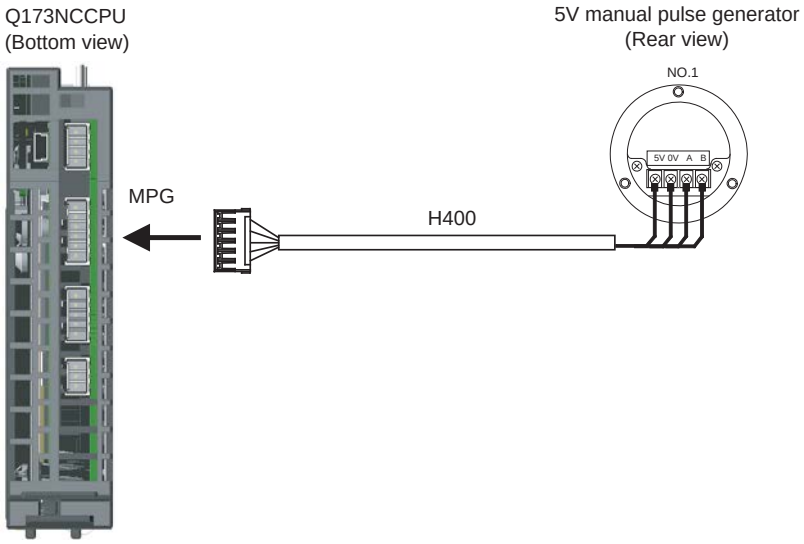
All of the connectors above allow the connection of 5V power supply type manual pulse generator (UFO-01-2Z9). The connector MPG on signal splitter allows the connection of 12V power supply type manual pulse generator (HD60C) as well.

(Note) Set the parameter shown below to suit the manual pulse generator used.
- 5V manual pulse generator (UFO-01-2Z9): #1240 set12/bit0 = 1 (100 pulse/rev)
- 12V manual pulse generator (HD60C): #1240 set12/bit0 = 0 (25 pulse/rev)

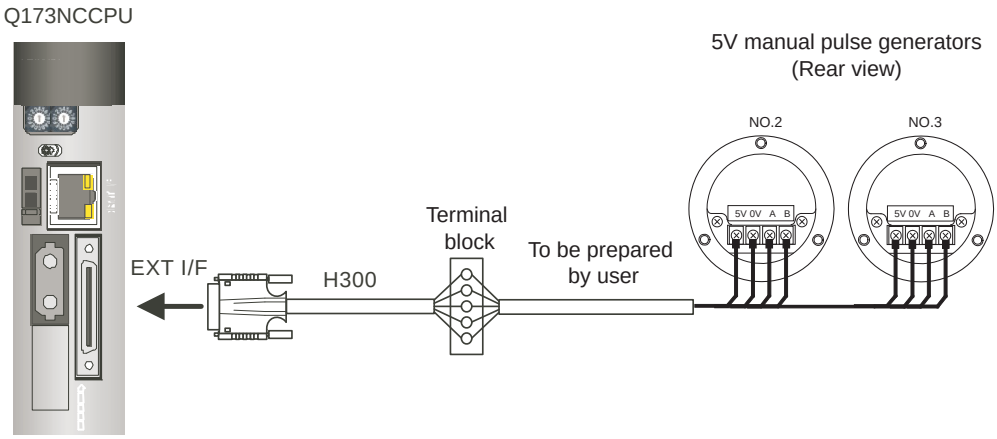
(1) Connecting directly to CNC CPU module

Connect signals from manual pulse generator(s) to the connector MPG.
The connector EXT I/F is applied when the channel 2 and 3 are used.
5V power supply type is available as of manual pulse generator.

When connecting a 5V manual pulse generator



When connecting two 5V manual pulse generators



(Note) Channel 2 and 3 are uned in this wiring example. H300 cable is a composite cable with skip signal.

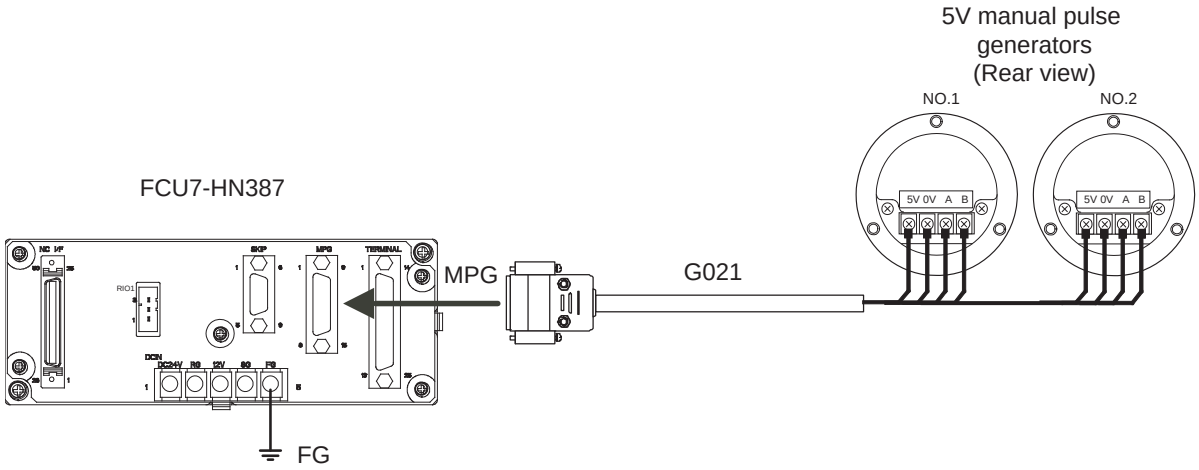
<Related items>
Cable drawing: "Cable: H400 Cable, H300 Cable"

(Note 1) When selecting a manual pulse generator, make sure that its case and 0V terminal are insulated.
(Note 2) When connecting cables using a terminal block, etc., never fail to observe the followings.
- The total length of the cables from the connector on C70's side to the terminal area of manual pulse generators has to be within the maximum cable length (20m).
- Have the cable shield single-point-grounded on C70's side, and cover the cable with the shield up to near the manual pulse generators.(It is required to relay the shield also.)
- For relay cables, use wire material of cross section equivalent to UL1061-2464 AWG26 x 2P or above.

(2) Connecting via signal splitter

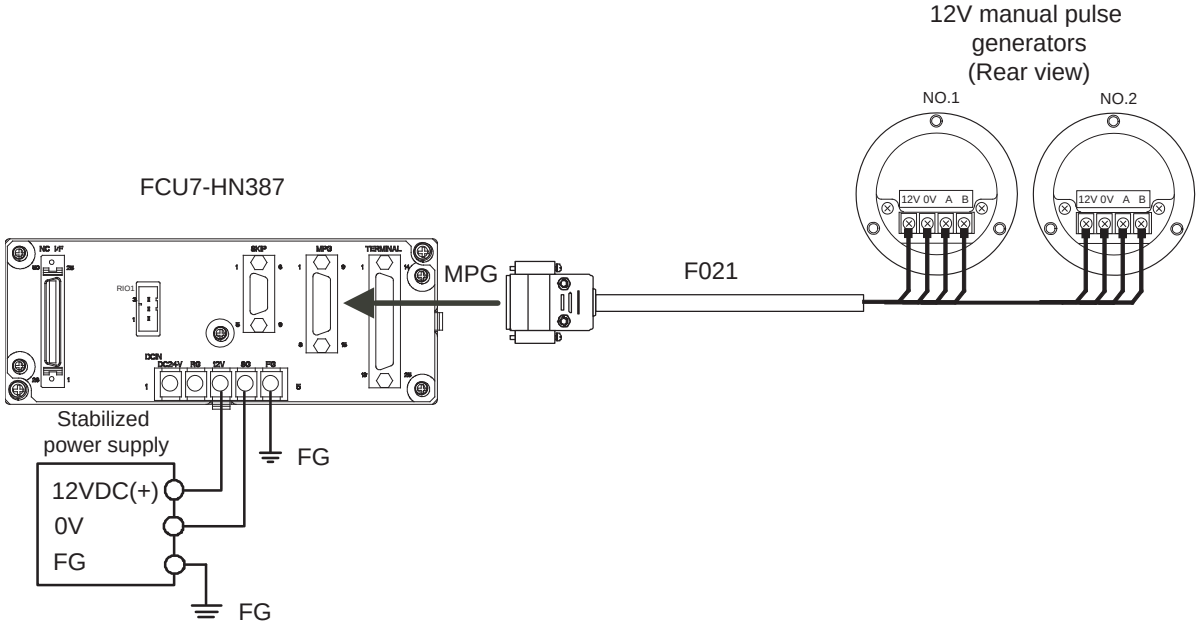
Both 5V power supply type and 12V power supply type manual pulse generator can be connected to the signal splitter. 12V power supply type requires extra 12V power supply.

When connecting two 5V manual pulse generators



(Note) Be sure to connect the terminal block FG of the signal splitter to the ground (FG).

When connecting two 12V manual pulse generators



(Note) Be sure to connect the terminal block FG of the signal splitter to the ground (FG). Connect a 12VDC power supply between the 12V terminal block and FG.

<Related items>
Cable drawing: "Cable: F020/F021/F022 Cable, G020/G021/G022 Cable"

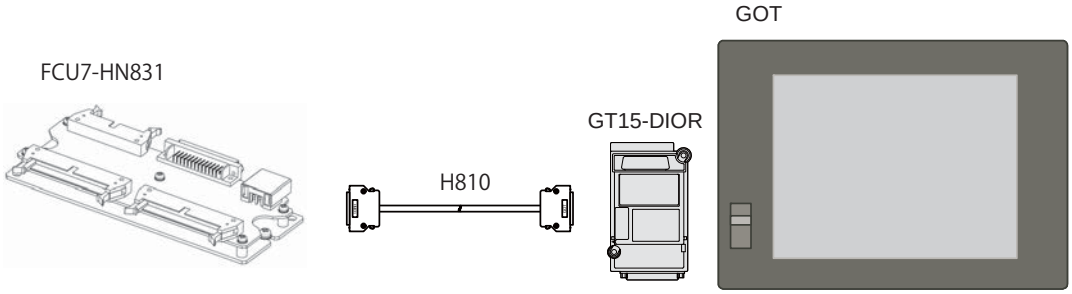
Cables for the connection of manual pulse generators to signal splitter

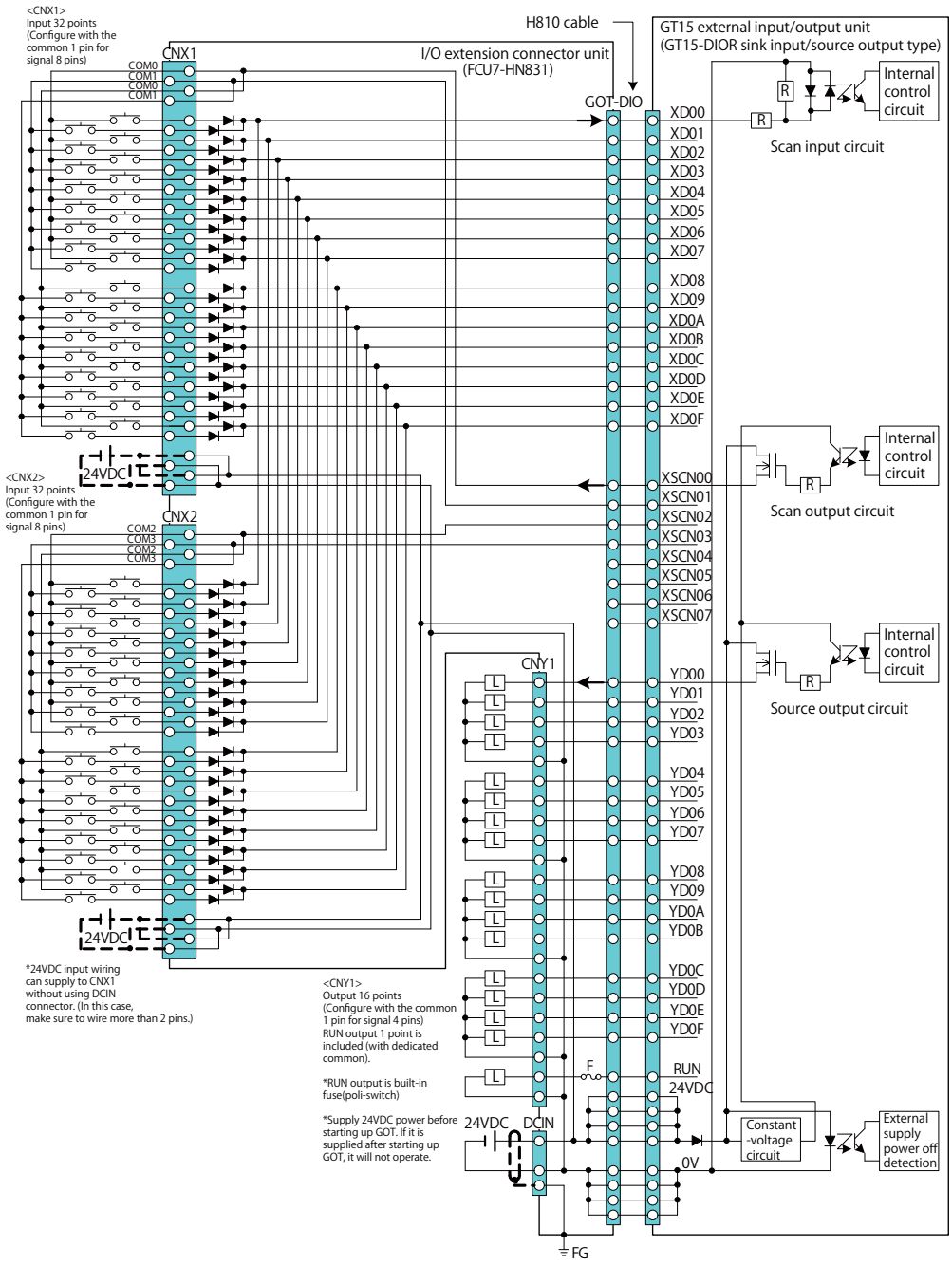
Power supply type	1ch	2ch	3ch
5V power supply type	G020		
	G021	G021	
	G022	G022	G022
12V power supply type	F020		
	F021	F021	
	F022	F022	F022

(Note 1) When selecting a manual pulse generator, make sure that its case and 0V terminal are insulated.
(Note 2) 24VDC supply is not required for the terminal block of signal splitter. 12VDC supply is required for the 12V power supply type manual pulse generator only.

4.10 Connecting the I/O Extension Connector Unit

Connect a relay cable to GT15-DIOR external input/output unit for the connection of I/O extension connector unit(FCU7-HN831).





(Note) Make sure to install FCU7-HN831 unit in the same panel as GOT. Separate FCU7-HN831 unit from the drive line or power line when wiring.

Appendix 1

EMC Installation Guidelines

Refer to the "EMC Installation Guidelines BNP-B8582-45" for details related to the drive section (servo/spindle drive unit).

Appendix 1.1 Introduction

EMC Directives became mandatory as of January 1, 1996. The subject products must have a CE mark attached indicating that the product complies with the Directives.
As the NC unit is a component designed to control machine tools, it is believed that it is not a direct EMC Directives subject. However, we would like to introduce the following measure plans to back up EMC Directives compliance of the machine tool as the NC unit is a major component of the machine tools.

(1) Methods of installation in control/operation panel
(2) Methods of wiring cables to outside of panel
(3) Introduction of members for measures

Mitsubishi is carrying out tests to confirm the compliance to the EMC Directives under the environment described in this manual. However, the level of the noise will differ according to the equipment type and layout, control panel structure and wiring lead-in, etc. Thus, we ask that the final noise level be confirmed by the machine manufacturer.

Appendix 1.2 EMC Directives

The EMC Directives largely regulate the following two items.

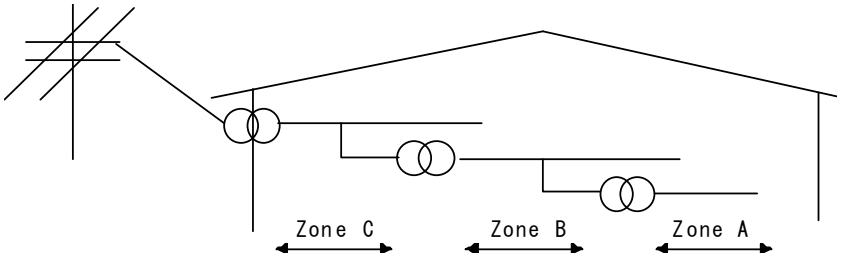
- Emission:Capacity to prevent output of obstructive noise that adversely affects external devices.
- Immunity:Capacity to not malfunction due to obstructive noise from external source.

The details of each level are classified in the table below.

It is assumed that the Standards and test details required for a machine tool are the same as these.

Class	Name	Details	EN Standards	
Emission				
	Radiated noise	Restriction of electromagnetic noise radiated through the air	EN61000-6-4 (General industrial machine) EN61800-3 (Motor control unit)	EN55011 (CLASS: A)
	Conductive noise	Restriction of electromagnetic noise discharged from power supply line		
Immunity				
	Static electricity electrical discharge	(Example) Regulation of withstand level of static electricity electrical discharge accumulated in human body	EN61000-6-2 (General industrial machine) EN61800-3 (Motor control unit)	EN61000-4-2
	Radiation immunity	(Example) Simulation of immunity from digital wireless telephones		EN61000-4-3
	Burst immunity	(Example) Regulation of withstand level of noise from relay or plug and play		EN61000-4-4
	Conductive immunity	(Example) Regulation of withstand level of noise flowed from power supply wires, etc.		EN61000-4-6
	Power supply frequency magnetic field	(Example) Regulation of electromagnetic noise of 50/60Hz power supply frequency		EN61000-4-8
	Power supply dip (fluctuation)	(Example) Regulation of power voltage drop withstand level		EN61000-4-11
	Surge	(Example) Regulation of withstand level of noise caused by lightning		EN61000-4-5

EMC immunity zone covers Zone B (and Zone A).
Install a power supply to the CNC control unit within Zone B.



Zone B indicates the power supply stepped down from the public electrical power distribution network by two steps or more of the insulation transformer.

Appendix 1.3 EMC Measures

The main items relating to EMC measures include the following.

(1) Store the device in a sealed metal panel.
(2) Ground all conductors that are floating electrically. Decrease the impedance.
(3) Increase the distance between the drive line and signal wire.
(4) Shield the cables wired outside of the panel.
(5) Install a noise filter.

Take care to the following items to suppress the noise radiated outside of the panel.

(1) Accurately ground the devices.
(2) Use shielded cables.
(3) Increase the electrical seal of the panel. Reduce the gaps and holes.

Appendix 1.4 Panel Structure

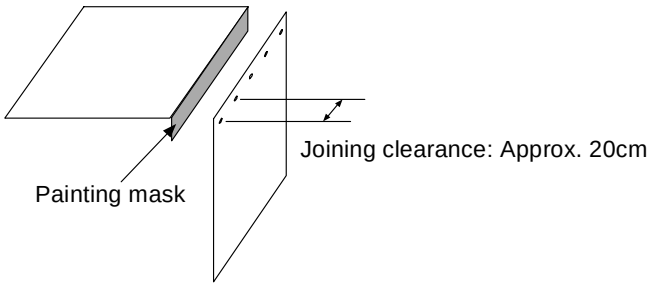
CNC control unit, which is an open equipment, must be installed within a sealed metal control panel (IP54 or higher).

The design of the control panel is a very important factor for the EMC measures, so take the following measures into consideration.

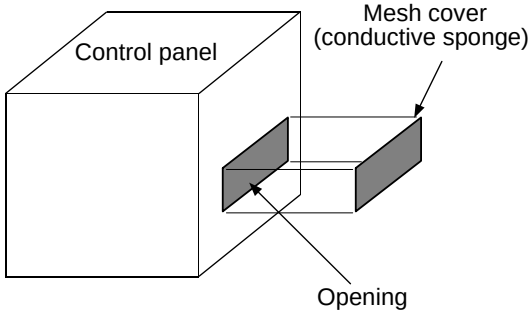
MITSUBISHI carried out the EMC test by installing the unit in the control panel with an attenuation property of maximum 37dB and average 30dB (30 to 300Hz, measured by 3m method).

Appendix 1.4.1 Measures for Control Panel Body

(1) Use metal for all members configuring the panel.
(2) When joining the metal plate, treat the welded or contacting sections so that the impedance is reduced, and then fix with screws.



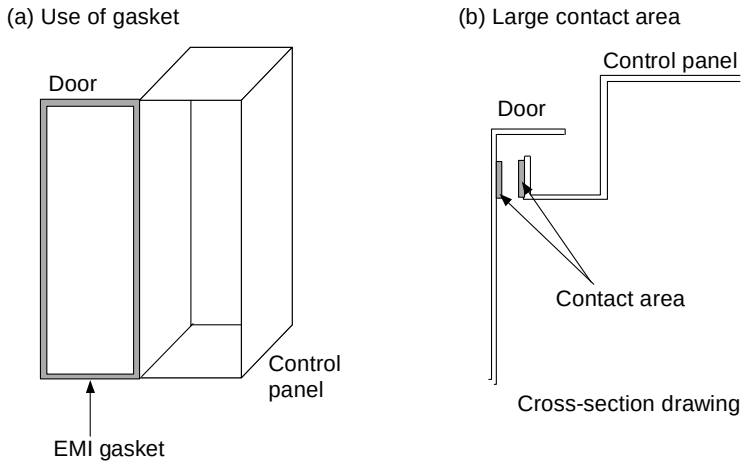
(3) Note that if the plate warps due to the screw fixing, etc. By creating a clearance, noise could leak from that place.
(4) Plate (nickel tin) the metal plate surface at the grounding plate, and connect the connections with a low impedance.
(5) If there is a large opening, such as ventilation holes, make sure to close the hole.



(Note 1) Using screws to fix the plates that have been painted is the same as an insulated state. Peel the paint and fix the screws.

Appendix 1.4.2 Measures for Door

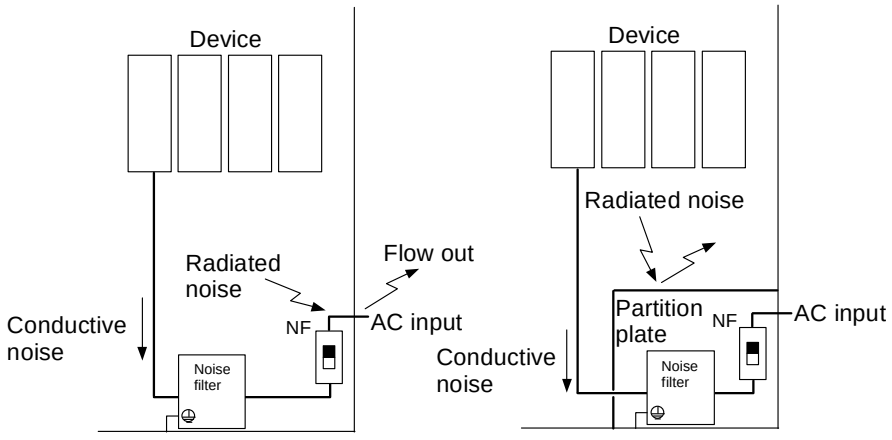
(1) Use metal for all materials configuring the panel.
(2) When joining the door, use a gasket to lower the impedance of the contacting sections, or use a structure with a large contact area as shown below.
(3) The EMI gasket or conductive packing must contact the metal surface uniformly and at the correct position.



(Note 1) When not using a gasket, ground the control panel grounding with a grounding wire to lower the door's impedance.
(Note 2) Using screws to fix the plates that have been painted (attachment of packing) is the same as an insulated state. Peel the paint and fix the screws.

Appendix 1.4.3 Measures for Power Supply

(1) Shield the power supply section and insert a filter to prevent the noise from flowing in or out.
Selection of the noise filter capacity will differ according to the drive unit and devices being used.
Refer to the "EMC Installation Guidelines" (BNP-B8582-45).



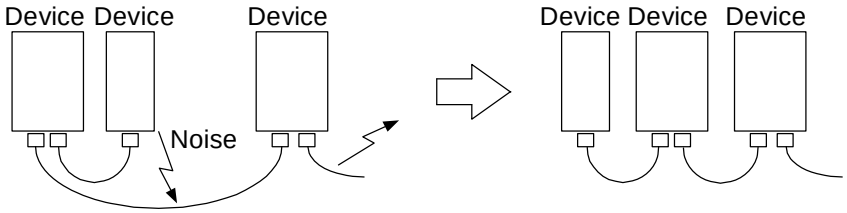
(Note 1) The conductive noise can be suppressed by inserting a noise filter, but the radiated noise will flow out.
(Note 2) The conductive and radiated noise can both be suppressed by adding a partition plate to the noise filter.

Appendix 1.5 Measures for Wiring in Panel

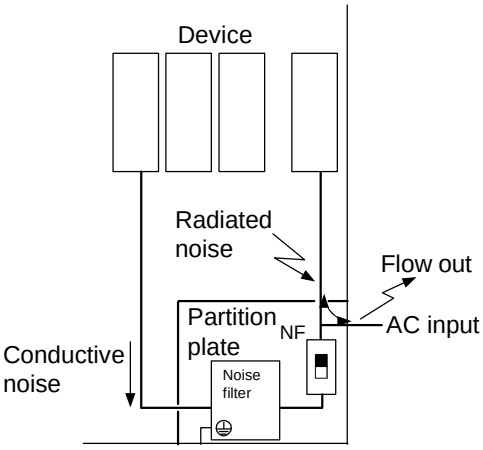
Cables act as antennas to propagate unnecessary noise, and thus must be appropriately shielded and treated. The following measures must be sufficiently considered for the cables that carry out high-speed communication.

Appendix 1.5.1 Precautions for Wiring in Panel

(1) If the cables are led unnecessary in the panel, they will pick up noise. Pay attention to the device layout and wire length so that the wiring length is as short as possible.



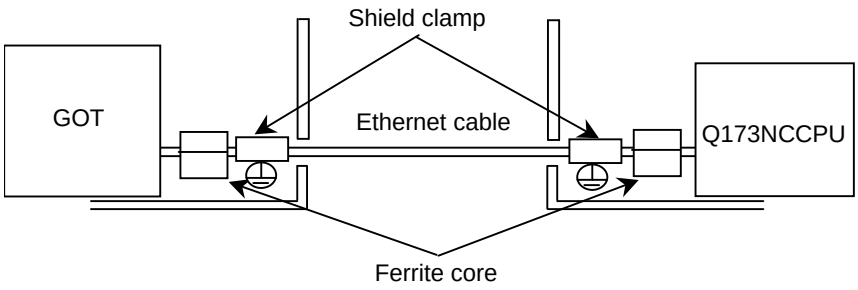
(2) Always connect the grounding wire to the FG terminal indicated on the device.
(3) Keep the distance between the drive line and detector cable to the drive section motor as far apart as possible when wiring.
(4) Do not lead the power supply wire around the panel without using a filter.



Appendix 1.5.2 Shield Treatment of Cables

Use shielded cables for the cables wired outside the panel.
Use a shield clamp within 10cm of the lead-out port from the panel. (Refer to "EMC Countermeasure Parts : Shield Clamp Fitting".)

(1) Ethernet cable



- Use a shield clamp within 10cm from the panel's inlet/ outlet.
- Install a ferrite core on both ends of the connected units.

(Note) Ferrite cores are not required when wiring is done within the panel.

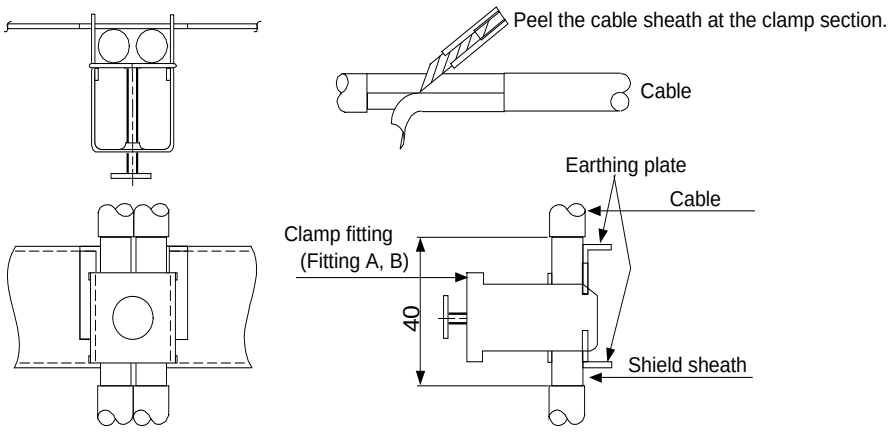
Appendix 1.6 EMC Countermeasure Parts

Appendix 1.6.1 Shield Clamp Fitting

The effect can be improved by directly connecting the cable's shield sheath to the grounding plate as shown below.
Install the grounding plate near the outlet (within 10cm) of each panel, and press against the grounding plate with the clamp fitting. If the cables are thin, several can be bundled and clamped together.
To provide sufficient frame ground, install the grounding plate directly on the cabinet or connect with a grounding wire.

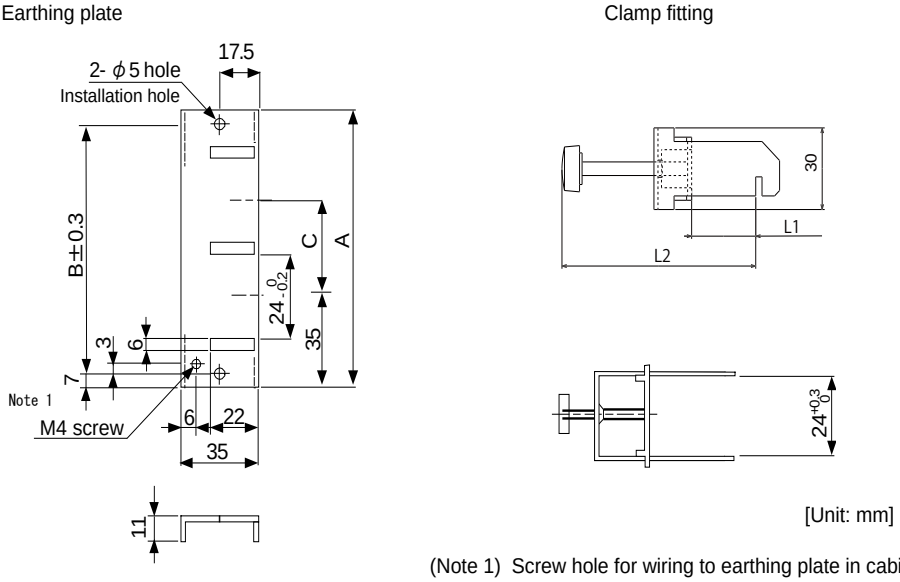
	A	B	C	Enclosed fittings
Ground Plate #D	100	86	30	Clamp fitting A×2
Ground Plate #E	70	56	-	Clamp fitting B×1

	L1 (maximum dimension when it is open)	L2 (reference dimension)
Clamp fitting A	25	(77)
Clamp fitting B	12	(54)



View of clamp section

・Outline drawing



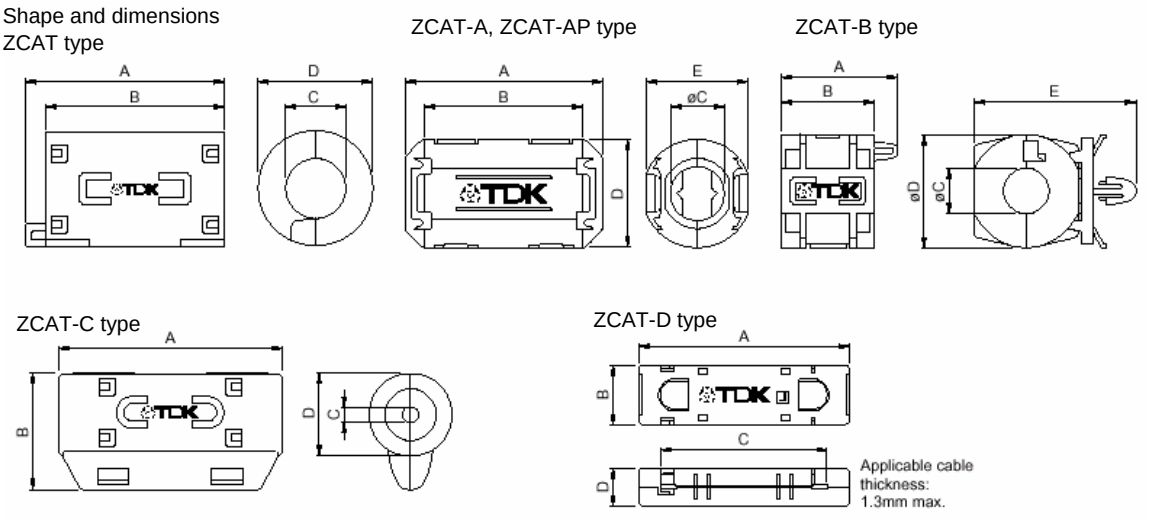
[Unit: mm]

(Note 1) Screw hole for wiring to earthing plate in cabinet.
(Note 2) The earthing plate thickness is 1.6mm.

Appendix 1.6.2 Ferrite Core

The ferrite core is mounted integrally with the plastic case.
This can be installed with one touch without cutting the interface cable or power supply cable.
This ferrite core is effective against common mode noise, allowing measures against noise without affecting the quality of the signal.

Shape and dimensions
ZCAT type



Recommended ferrite core: TDK ZCAT Series

Unit : mm

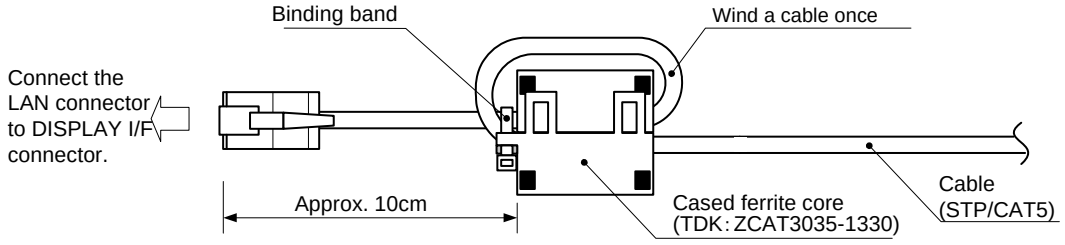
Part Name	A	B	øC	øD	E	Applicable cable outer diameter	Mass (g)
ZCAT1518-0730-M(-BK)*1	22±1	18±1	7±1	15±1	-	7max.	6
ZCAT1518-0730(BK)*2	22±1	18±1	7±1	15±1	-	7max.	6
ZCAT2017-0930-M(-BK)	21±1	17±1	9±1	20±1	-	9max.	11
ZCAT2032-0930-M(-BK)*1	36±1	32±1	9±1	19.5±1	-	9max.	22
ZCAT2032-0930(-BK)*2	36±1	32±1	9±1	19.5±1	-	9max.	22
ZCAT2132-1130-M(-BK)*1	36±1	32±1	11±1	20.5±1	-	11max.	22
ZCAT2132-1130(-BK)*2	36±1	32±1	11±1	20.5±1	-	11max.	22
ZCAT3035-1330-M(-BK)*1	39±1	34±1	13±1	30±1	-	13max.	63
ZCAT3035-1330(-BK)*2	39±1	34±1	13±1	30±1	-	13max.	63
ZCAT1525-0430AP-M(-BK)	25±1	20±1	4±1	15±1	11.5±1	2.5 to 4 (USB)	7
ZCAT1325-0530A-M(-BK)*1	25±1	20±1	5±1	12.8±1	11.2±1	3 to 5 (USB)	7
ZCAT1325-0530A(-BK)	25±1	20±1	5±1	12.8±1	11.2±1	3 to 5 (USB)	7
ZCAT1730-0730A-M(-BK)	30±1	23±1	7±1	16.5±1	15±1	4 to 7 (USB)	12
ZCAT2035-0930A-M(-BK)*1	35±1	28±1	9±1	19.5±1	17.4±1	6 to 9	22
ZCAT2035-0930A(-BK)	35±1	28±1	9±1	19.5±1	17.4±1	6 to 9	22
ZCAT2235-1030A-M(-BK)	35±1	28±1	10±1	21.5±1	20±1	8 to 10	27
ZCAT2436-1330A-M(-BK)	36±1	29±1	13±1	23.5±1	22±1	10 to 13	29
ZCAT2017-0930B-M(-BK)	21±1	17±1	9±1	20±1	28.5±1	9max.	12
ZCAT2749-0430C-M(-BK)	49±1	27±1	4.5±1	19.5±1	-	4.5max.	26
ZCAT4625-3430D(-BK)	45.5±1	24.5±1	34±1	12±1	-	26 For core flat cable	32
ZCAT4625-3430DT(-BK)*3	45.5±1	24.5±1	34±1	13±1	-	26 For core flat cable	32
ZCAT6819-5230D(-BK)	67.5±1	18.5±1	52±1	16±1	-	40 For core flat cable	58
ZCAT6819-5230DT(-BK)*3	67.5±1	18.5±1	52±1	17±1	-	40 For core flat cable	58

*1 The M stamp is attached.
*2 A fixing band is attached at shipment.
*3 The core is fixed with double-sided tape. (The tape is enclosed with the part.)
● ZCAT-B type: Cabinet fixing type installation hole ø4.8 to 4.9mm, plate thickness 0.5 to 2mm
● ZCAT-AP, ZCAT-C type: Structure that prevents easy opening after case is closed.

Ferrite Core Installation Method

Connect the ferrite cores in the following manner.

(1) Wind a cable once around the ferrite core.
(2) Attach the case by pressing until a click sound is heard.
(3) Fix with a binding band so that the ferrite core position does not shift.



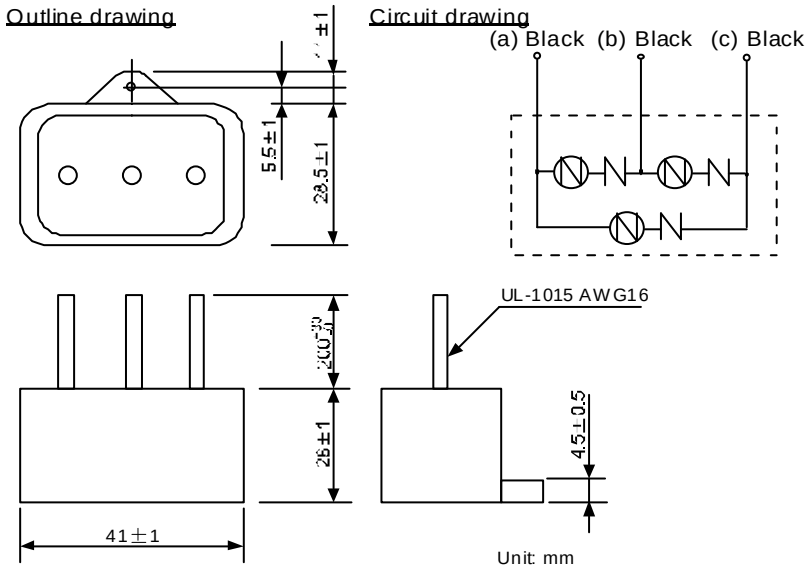
(Note) Ferrite cores are not required for wiring in panel.

Appendix 1.6.3 Surge Absorber

Make sure that the surge does not directly enter the AC line of the general-purpose stabilized power supply (user-prepared) supplying power to the CNC control unit and the peripheral devices. Select the following product or equivalent for the surge absorber.
Refer to the manufacturer catalog for detailed characteristics, outline and connection methods of the surge absorber.

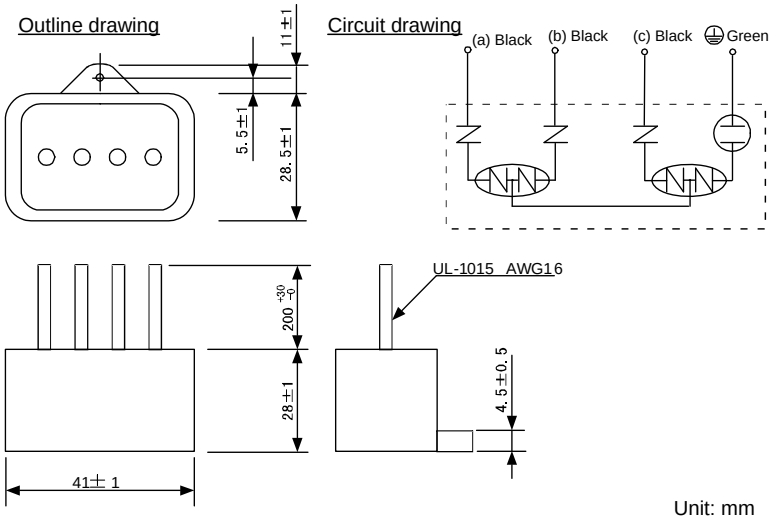
(1) Part name: RAV-781BYZ-2
Manufacturer: OKAYA ELECTRIC INDUSTRIES

Circuit voltage 50/60Hz Vrms	Max. tolerable circuit voltage	Clamp voltage V±10%	Surge withstand level 8/20 μs	Surge electrical discharge start voltage 1.2/50 μs	Static capacity	Working temperature range
250V 3-phase	300V	783V	2500A	20kV	75pF	-20 to +70°C



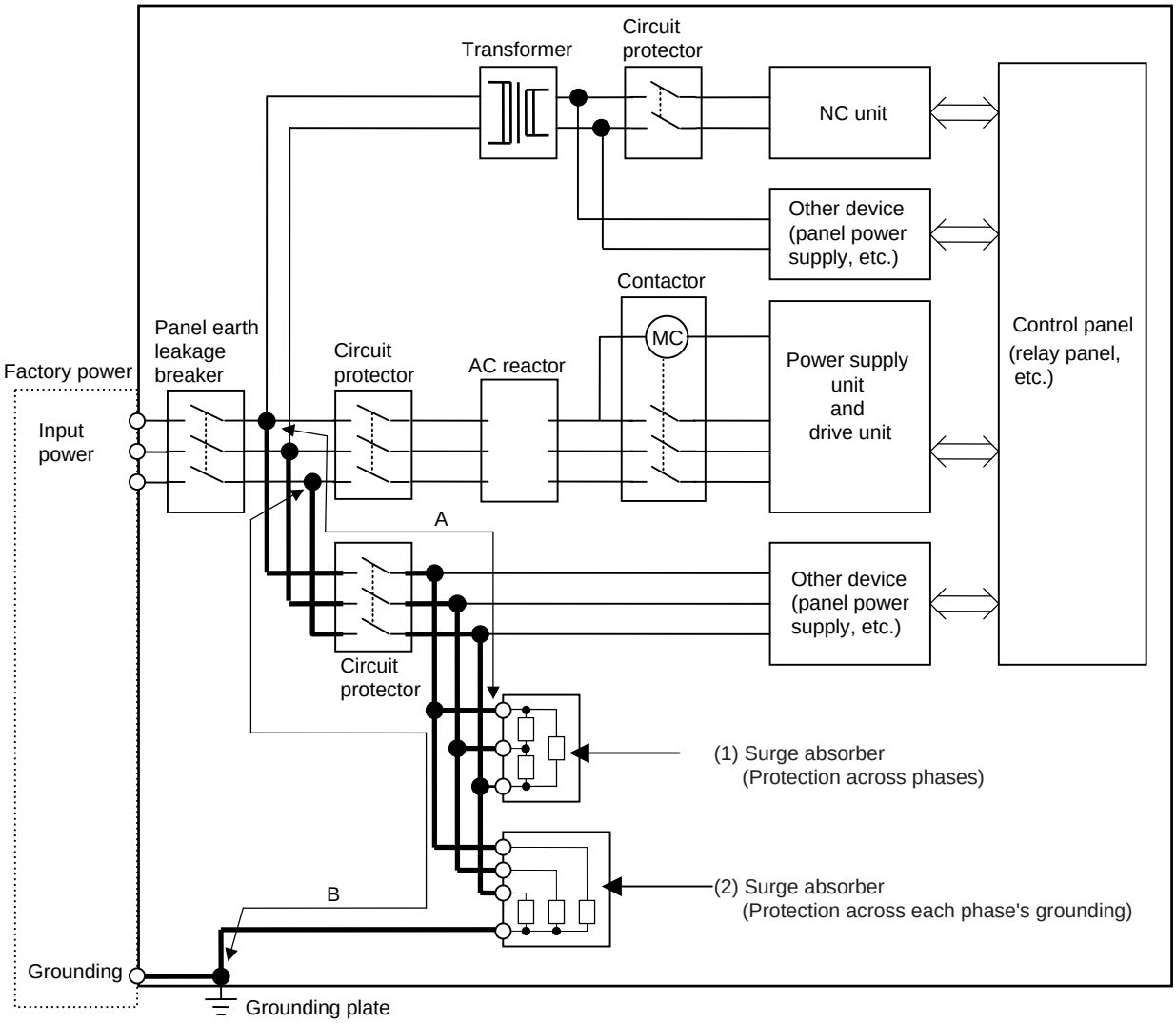
(2) Part name: RAV-781BXZ-4
Manufacturer: OKAYA ELECTRIC INDUSTRIES

Circuit voltage 50/60Hz Vrms	Max. tolerable circuit voltage	Clamp voltage V±10%	Surge withstand level 8/20 μs	Surge electrical discharge start voltage 1.2/50 μs	Static capacity	Working temperature range
250V 3-phase	300V	700V	2500A	2kV	75pF	-20 to +70°C



Example of surge absorber installation

An example of installing the surge absorber in the machine control panel is shown below.
A short-circuit fault will occur in the surge absorber if a surge exceeding the tolerance is applied. Thus, install a circuit protection breaker in the stage before the surge absorber. Note that almost no current flows to the surge absorber during normal use, so a breaker installed as the circuit protection for another device can be used for the surge absorber.



⚠CAUTION

1. The wires from the surge absorber should be connected without extensions.
2. If the surge absorber cannot be installed just with the enclosed wires, keep the wiring length of A and B to 2m or less. If the wires are long, the surge absorber's performance may drop and inhibit protection of the devices in the panel.
3. Surge absorber to be selected varies depending on input power voltage.

Appendix 1.6.4 Selection of Stabilized Power Supply

Consider the following characteristics when selecting the stabilized power supply (prepared by machine manufacturer).
Use a power supply that complies with CE Marking or that follows the safety standards given below.

Stabilized power supply selection items

Item		Standard setting	Remarks
Output	Voltage fluctuation	±5%	±5% or less of 24VDC output
	Ripple noise	120mV (max.)	
	Spike noise	500mV (max.)	
Output current		-	Refer to the maximum current consumption of the unit in use and calculate.
Output holding time		20ms (min.)	Instantaneous power failure time (AC side)

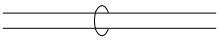
Standards

Safety Standards : UL1950, CSA C22.2 No. 234 approved, IEC950 compliant
Noise Terminal Voltage : FCC Class A, VCCI-Class A
High Harmonics Current Restrictions : IEC61000-3-2

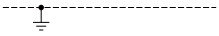
Appendix 2

Cable

(Note) Symbols for writing cable drawings

(1)  indicates twisted pair.

(2)  indicates the shield sheath.

(3)  indicates shield clamping to the grounding plate.

(4) In the cable drawings, the partner of the twisted pair cable is given a priority, so the pin No. of the connectors at both ends are not necessary in number of order.

(5) Equivalent parts can be used for the connector, contact and wire material.

Appendix 2.1 Cable Wire and Assembly

(1) Cable wire

The specifications of the wire used for each cable, and the machining methods are shown in this section. When manufacturing the detector cable and battery connection cable, use the recommended wires shown below or equivalent products.

(a) Heat resistant specifications cable

Wire type (special order part)	Finish outer diameter	Sheath material	No. of pairs	Wire characteristics					
				Configuration	Conductive resistor	Withstand voltage	Insulation resistance	Heat resistance temperature	Flexibility
BD20288 Compound 6-pair shielded cable Specification No. Bangishi-17145 (Note 1)	8.7mm	Heat resistant PVC	2 ($0.5mm^2$)	100 strands/ 0.08mm	40.7Ω/km or less	500VAC/ 1min	1000MΩ/ km or more	105C°	70×10^4 times or more at R200
			4 ($0.2mm^2$)	40 strands/ 0.08mm	103Ω/km or less				

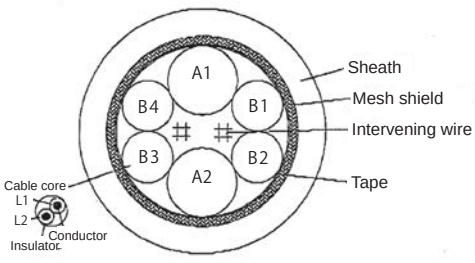
(b) General-purpose heat resistant specifications cable

Wire type (special order part)	FFinish outer diameter	Sheath material	No. of pairs	Wire characteristics					
				Configuration	Conductive resistor	Withstand voltage	Insulation resistance	Heat resistance temperature	Flexibility
BD20032 Compound 6-pair shielded cable Specification No. Bangishi-16903 Revision No. 3 (Note 1)	8.7mm	PVC	2 ($0.5mm^2$)	100 strands/ 0.08mm	40.7Ω/km or less	500VAC/ 1min	1000MΩ/ km or more	60C°	100×10^4 times or more at R200
			4 ($0.2mm^2$)	40 strands/ 0.08mm	103Ω/km or less				

(Note 1) Bando Electric Wire (Contact: +81-48-461-0561 http://www.bew.co.jp)

(Note 2) The Mitsubishi standard cable is the (a) Heat resistant specifications cable. For MDS-C1/CH series, (b) or equivalent is used as the standard cable.

Compound 6-pair cable structure drawing

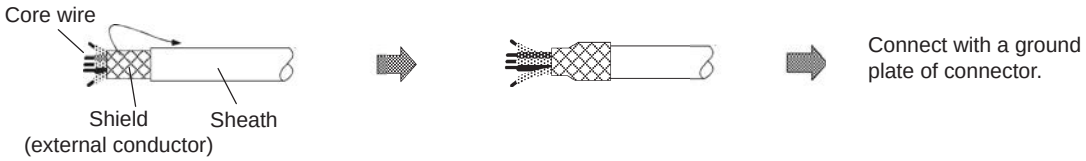


Core identification

Pair No.	Insulator color	
	L1	L2
A1 ($0.5mm^2$)	Red	White
A2 ($0.5mm^2$)	Black	White
B1 ($0.2mm^2$)	Brown	Orange
B2 ($0.2mm^2$)	Blue	Green
B3 ($0.2mm^2$)	Purple	White
B4 ($0.2mm^2$)	Yellow	White

(2) Cable assembly

Assemble the cable with the cable shield wire securely connected to the ground plate of the connector.



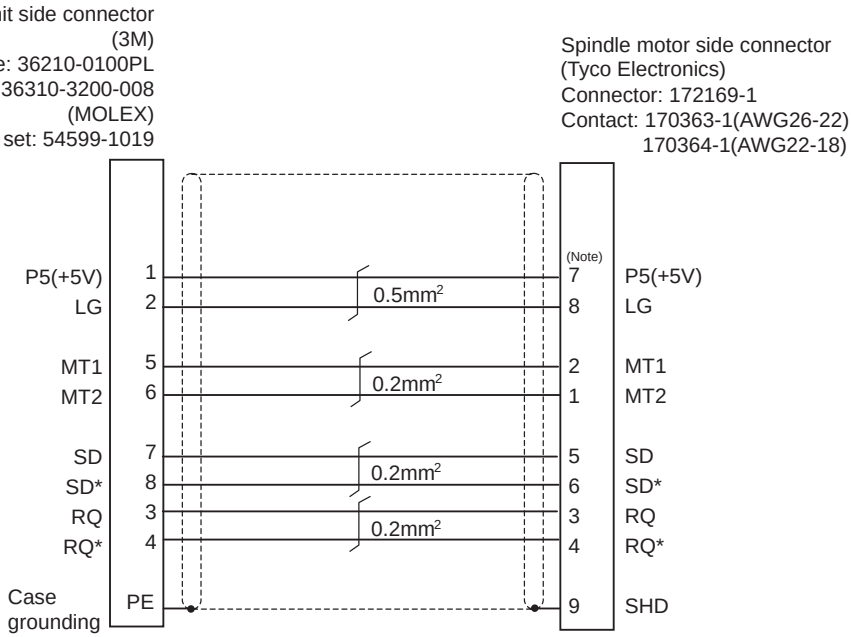
Appendix 2.2 CNP2E-1 Cable

Max. cable length: 30m

Application: Motor side PLG cable

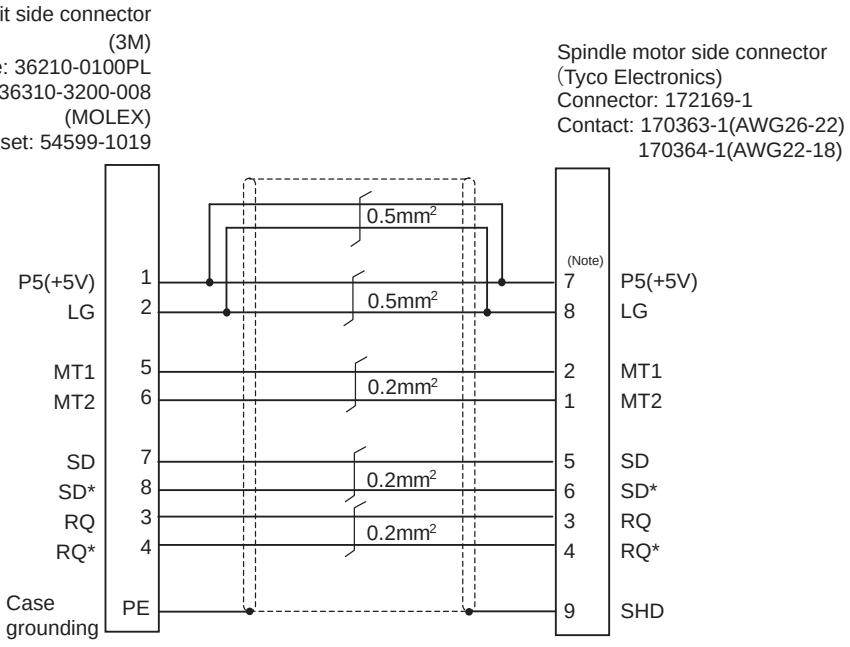
Spindle side accuracy detector

TS5690 cable



(Note) For the pin "7" or "8", use the contact "170364-1".
For the other pins, use the contact "170363-1".

<Cable connection diagram (for 15m or less)>



(Note) For the pin "7" or "8", use the contact "170364-1".
For the other pins, use the contact "170363-1".

<Cable connection diagram (for 15m to 30m)>

Appendix 2.3 CNV22J-K1P / CNV22J-K2P Cable

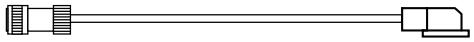
Max. cable length: 0.3m

Application: HF-KP (Servo) Motor side detector relay cable (motor side)

Compatible with only IP65

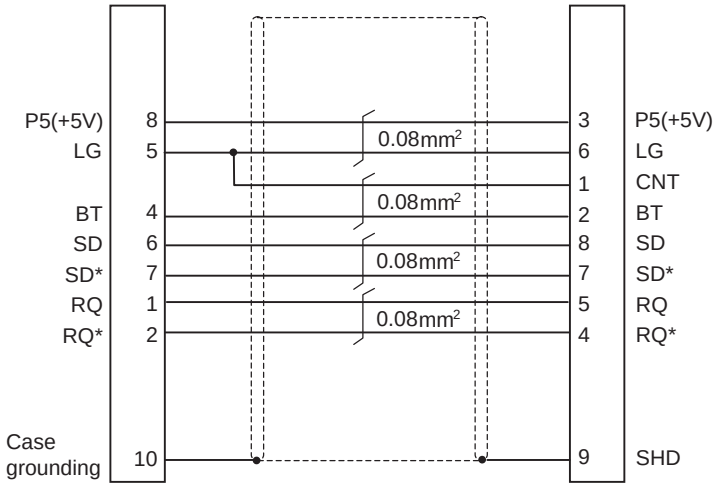
CNV22J-K1P (load side angle)

CNV22J-K2P (reverse load side angle)



Servo drive unit side connector
(DDK)
Plug: CM10-CR10P-M

Servo motor detector/
Ball screw side detector side c
Plug: 1747464-1
Contact: 1674335-4



<Cable connection diagram>

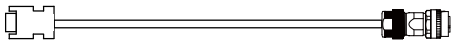
Appendix 2.4 CNV2E-8P/CNV2E-9P Cable

Max. cable length: 30m

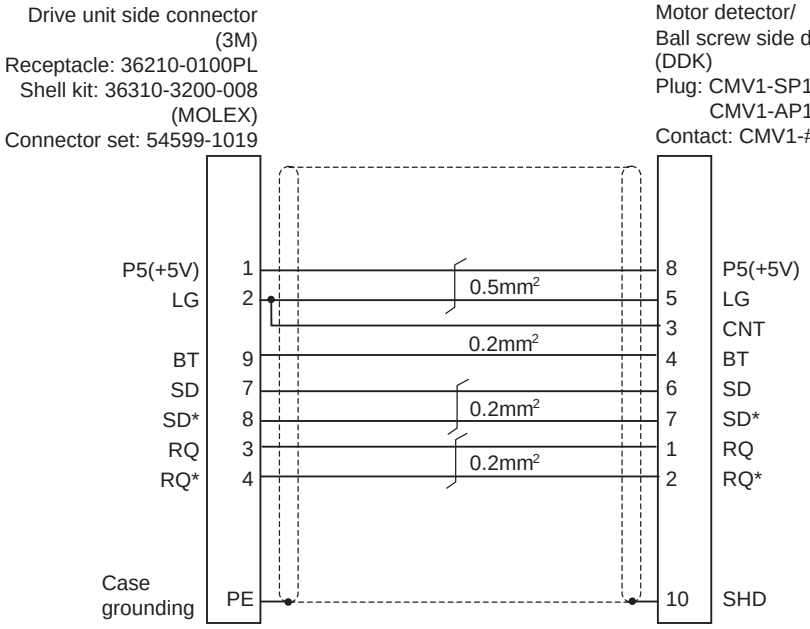
Application:

For HF/HF-H, HF-KP (Tool spindle) Motor side detector cable (for A48/A51/A74N(/A74))/
For HF-KP (Servo) Motor side detector relay cable (Drive unit side) (CNV2E-8P)

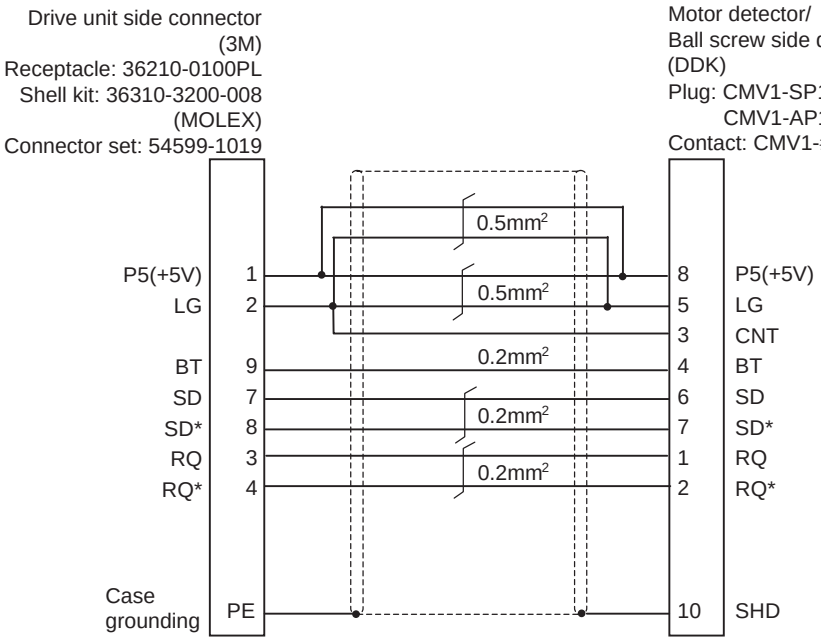
CNV2E-8P (Straight)



CNV2E-9P (Angle)



<Cable connection diagram (for 15m or less)>

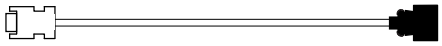


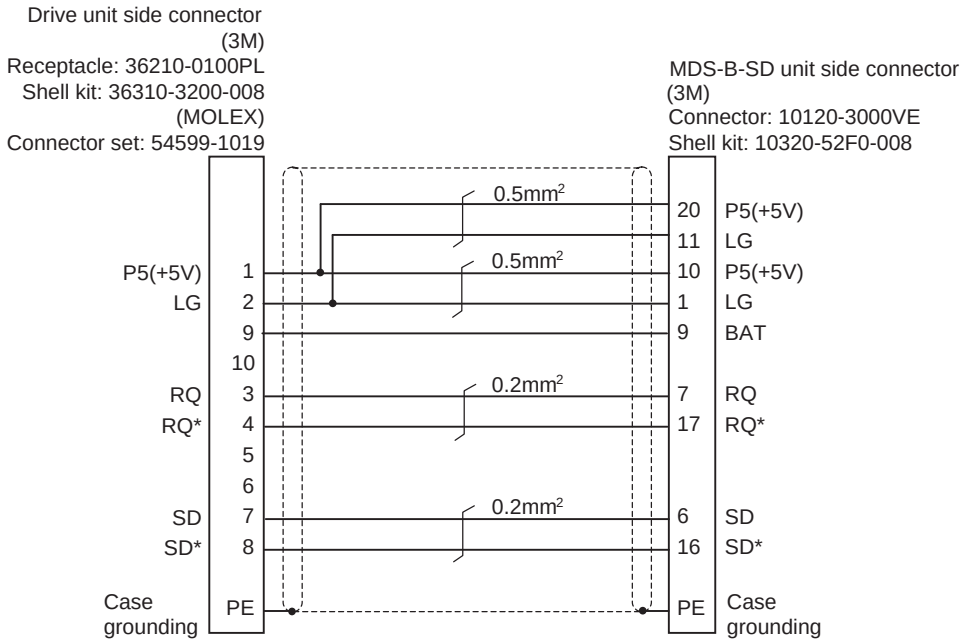
<Cable connection diagram (for 15m to 30m)>

Appendix 2.5 CNV2E-D Cable

Max. cable length: 30m

Application: MDS-B-SD unit cable



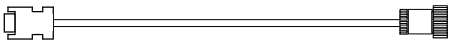


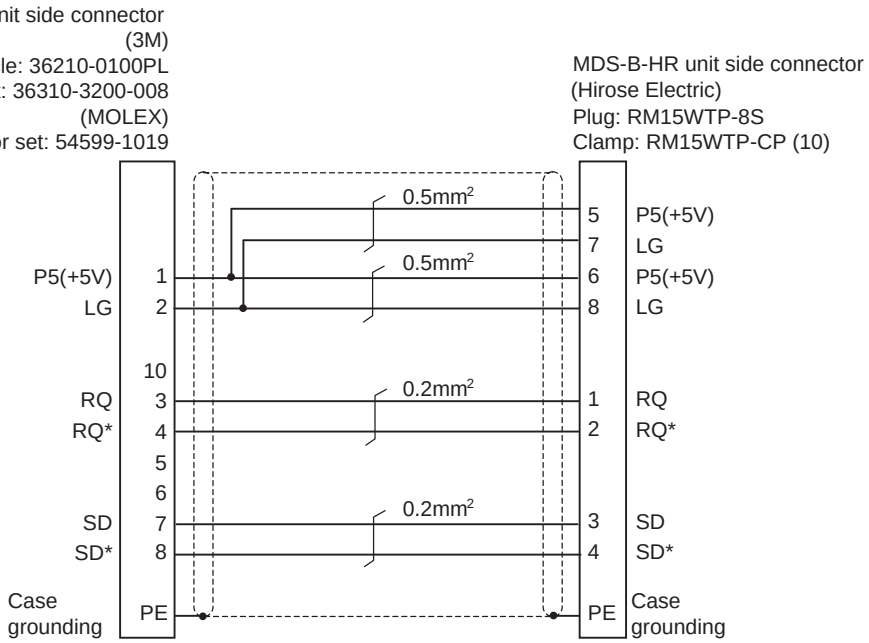
<Cable connection diagram>

Appendix 2.6 CNV2E-HP Cable

Max. cable length: 30m

Application: MDS-B-HR unit cable





<Cable connection diagram>

Appendix 2.7 CNV2E-K1P / CNV2E-K2P Cable

Max. cable length: 10m

Application: For HF-KP (Servo) Motor side detector cable

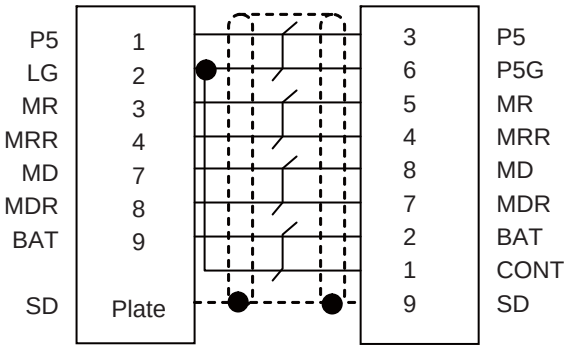
Compatible with only IP65

CNV2E-K1P (load side angle)

CNV2E-K2P (reverse load side angle)

Servo drive unit side connector
(3M)
Receptacle : 36210-0100PL
Shell kit : 36310-3200-008
(MOLEX)
Connector set : 54599-1019

Servo motor detector connector
(Tyco Electronics AMP)
Connector : 1674320-1

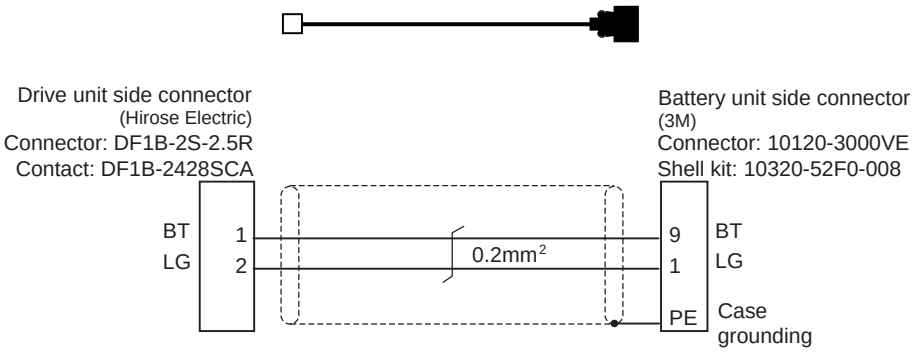


<Cable connection diagram>

Appendix 2.8 DG21 Cable

Max. cable length: 5m

Application: Battery cable (For drive unit - battery unit)



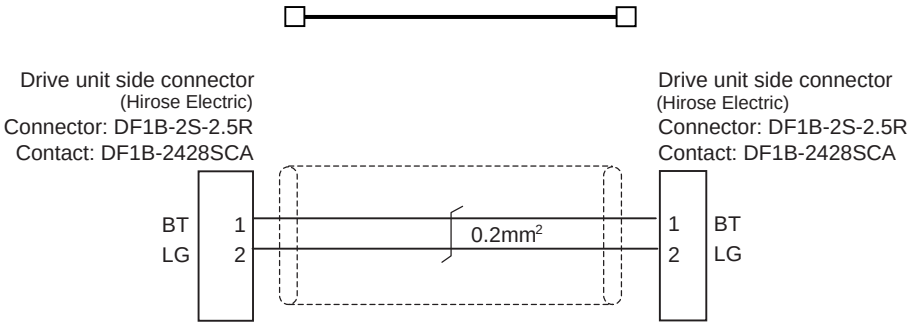
<Cable connection diagram between drive unit and MDS-A-BT/ A6BAT(MR-BAT)(MDS-BTCASE)>

Appendix 2.9 DG22 Cable

Max. cable length: 5m

Application: Battery cable (For drive unit - drive unit)

(Note) This cable is required to supply the power from the battery unit to multiple drive units.



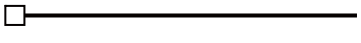
<Cable connection diagram between drive unit and drive unit>

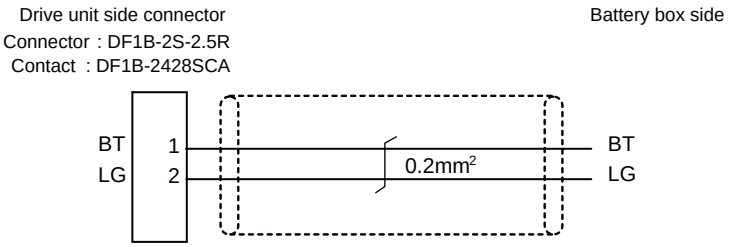
Appendix 2.10 DG23 Cable

Max. cable length: 5m

Application: Battery cable (For drive unit - battery box)

(Note) The battery box side is connected using a bare conductor or a terminal bar.





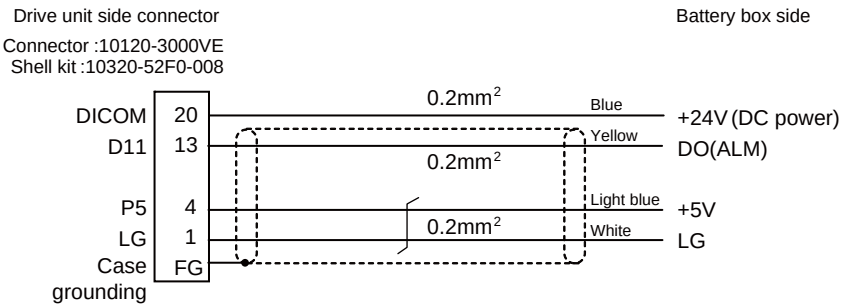
<DG23 cable connection diagram (Connection cable between drive unit and MDS-BTBOX-36)>

Appendix 2.11 DG24 Cable

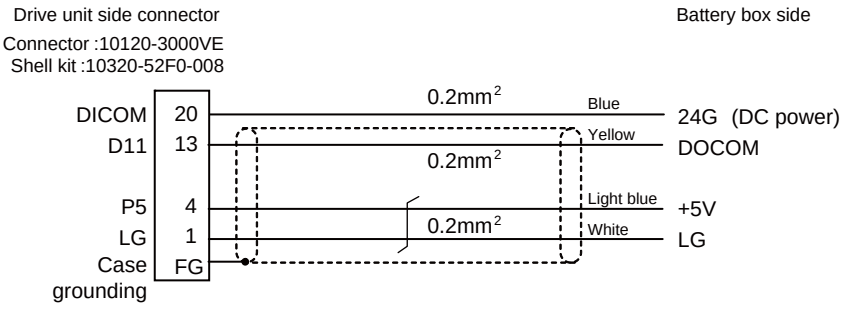
Max. cable length: 5m

Application: 5V spply/DO output cable (For drive unit - battery box)

(Note) The battery box side is connected using a bare conductor or a terminal bar.



<DG24 cable connection diagram (Connection cable for alarm output between drive unit and MDS-BTBOX-36)>
(For MDS-D2/DH2)

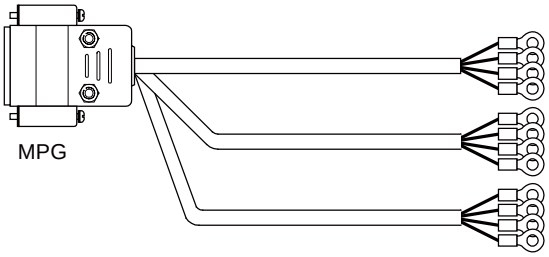


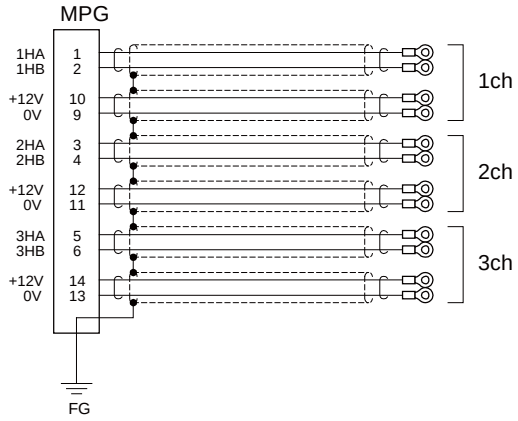
<DG24 cable connection diagram (Connection cable for alarm output between drive unit and MDS-BTBOX-36)>
(For MDS-DM2)

Appendix 2.12 F020/F021/F022 Cable

Max. cable length: 45m

Application: Manual Pulse Generator (12VDC spec)





[HANDLE]
Connector: CDA-15P
Contact: CD-PC-111 x 12
Case: HDA-CTH
Recommended manufacturer:
Hirose Electric

Wire material: B-22(19)U x 2SJ-1 x 9
Recommended manufacturer:
Sumitomo Electric Industries

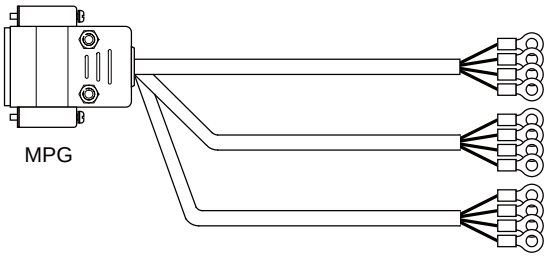
[1ch][2ch][3ch]
Crimp terminal: V1.25-3 x 12
Recommended manufacturer: JST

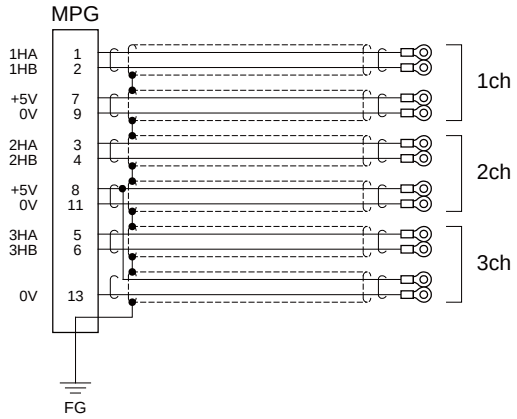
Cable name	1ch	2ch	3ch
F020 cable	○		
F021 cable	○	○	
F022 cable	○	○	○
○: Usable channel			

(Note) Fold the cable shield over the sheath, and wrap copper foil tape over it. Connect the wound copper foil tape to GND plate of the connector.

Appendix 2.13 G020/G021/G022 Cable

Max. cable length: 15m
Application: Manual Pulse Generator (5VDC spec)





HANDLE]
Connector: CDA-15P
Contact: CD-PC-111 x 11
Case: HDA-CTH
Recommended manufacturer:
Hirose Electric

Wire material: B-22(19)U x 2SJ-1 x 9
Recommended manufacturer:
Sumitomo Electric Industries

[1ch][2ch][3ch]
Crimp terminal: V1.25-3 x 12
Recommended manufacturer: JST

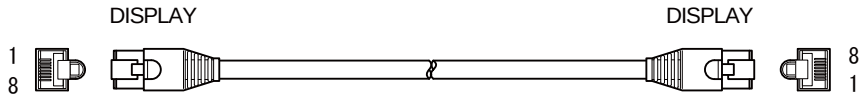
Cable name	1ch	2ch	3ch
G020 cable	○		
G021 cable	○	○	
G022 cable	○	○	○
○: Usable channel			

(Note) Fold the cable shield over the sheath, and wrap copper foil tape over it. Connect the wound copper foil tape to GND plate of the connector.

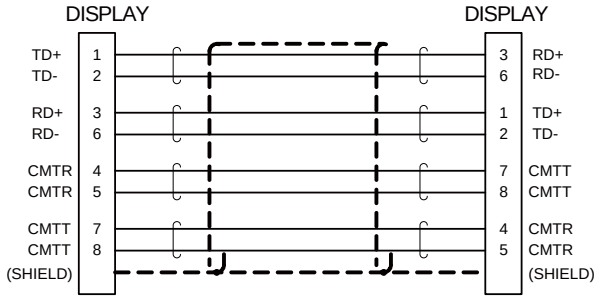
Appendix 2.14 G302 Cable

Max. cable length: 20m

Application: Display module communication (STP cross)



[DISPLAY]
Connector: 5-1479185-3
Boots: 9-336513-7
Manufacturer: Tyco Electronics



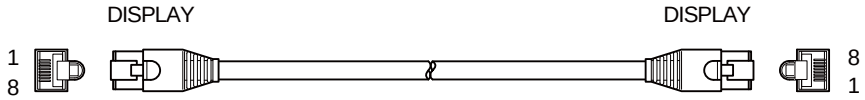
[DISPLAY]
Connector: 5-1479185-3
Boots: 9-336513-7
Manufacturer: Tyco Electronics

Wire material: Ethernet Cat.5e AWG24 4P with shield

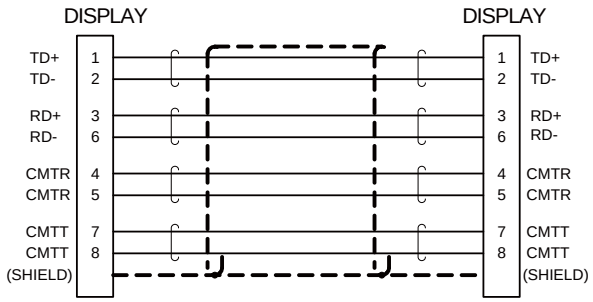
Appendix 2.15 G303 Cable

Max. cable length: 20m

Application: Display module communication (STP straight)



[DISPLAY]
Connector: 5-1479185-3
Boots: 9-336513-7
Manufacturer: Tyco Electronics



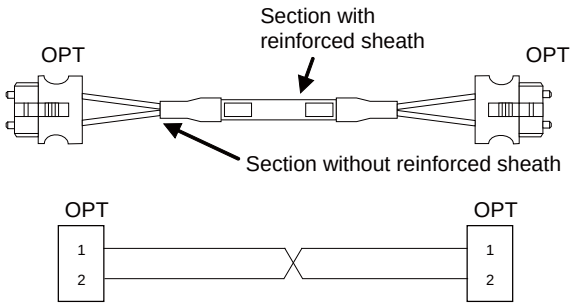
[DISPLAY]
Connector: 5-1479185-3
Boots: 9-336513-7
Manufacturer : Tyco Electronics

Wire material: Ethernet Cat.5e AWG24 4P with shield

Appendix 2.16 G380 Cable

Max. cable length: 20m

Application: Optical communication cable
for wiring between drive units (outside panel)
for optical communication repeater unit
Use this when the desired cable length is between 10 and 20m.
(G395 or G396 is rather recommended when it's shorter than 10m.)



[OPT]
Connector: CF-2D101-S
Recommended manufacturer:
Japan Aviation Electronics

Wire material:
Hard clad type PCF optic cable
Recommended manufacturer:
Oki Electric Cable

Cable	Minimum bending radius: R
2-core cable (section with reinforced sheath)	50mm
2-core cable (section without reinforced sheath)	25mm

(Note 1) Binding the cables too tight with tie-wraps could result in an increased loss or a disconnection. Use a cushioning material such as a sponge or rubber when bundling the cables and fix so that the cables do not move. Recommended clamp material: CKN-13SP KITAGAWA INDUSTRIES.

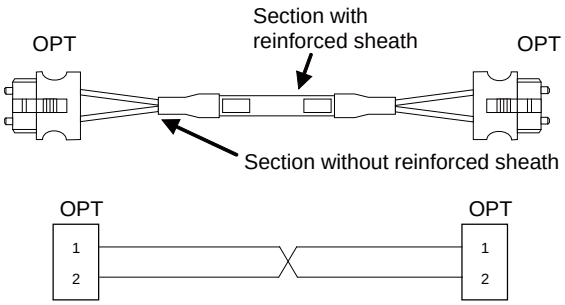
(Note 2) Never bundle the cables with vinyl tape. The plasticizing material in the vinyl tape could cause the PCF cable reinforced sheath to damage.

(Note 3) Loop the excessive cable with twice or more than the minimum bending radius.

Appendix 2.17 G395 Cable

Max. cable length: 10m

Application: Optical communication cable
for wiring between drive units (outside panel)
for wiring between NC-drive units
Use when wiring outside of the panel with a cable of 10m or less.



[OPT]
Connector: PF-2D103
Recommended manufacturer:
Japan Aviation Electronics

Wire material: ESCA Premium
Recommended manufacturer:
MITSUBISHI RAYON

Cable	Minimum bending radius: R
2-core cable (section with reinforced sheath)	50mm
2-core cable (section without reinforced sheath)	30mm

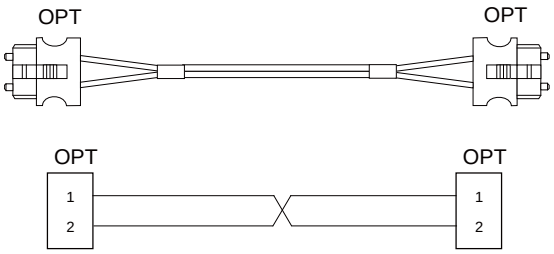
(Note 1) Binding the cables too tight with tie-wraps could result in an increased loss or a disconnection. Use a cushioning material such as a sponge or rubber when bundling the cables and fix so that the cables do not move. Recommended clamp material: CKN-13SP KITAGAWA INDUSTRIES.

(Note 2) Never bundle the cables with vinyl tape. The plasticizing material in the vinyl tape could cause the POF cable to break.

(Note 3) Loop the excessive cable with twice or more than the minimum bending radius.

Appendix 2.18 G396 Cable

Max. cable length: 10m
Application: Optical communication cable
for wiring between drive units (inside panel)
Use when wiring in the panel with a cable of 10m or less.



[OPT]
Connector: PF-2D103
Recommended manufacturer:
Japan Aviation Electronics

Wire material: ESCA Premium
Recommended manufacturer:
MITSUBISHI RAYON

Cable	Minimum bending radius: R
2-core parallel cord	30mm

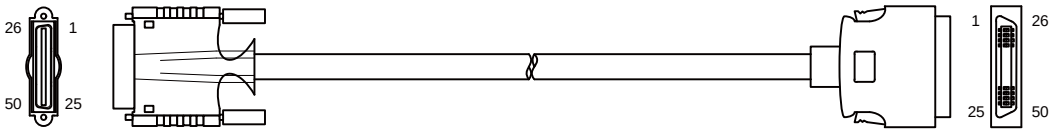
(Note 1) Binding the cables too tight with tie-wraps could result in an increased loss or a disconnection. Use a cushioning material such as a sponge or rubber when bundling the cables and fix so that the cables do not move. Recommended clamp material: CKN-13SP KITAGAWA INDUSTRIES.
(Note 2) Never bundle the cables with vinyl tape. The plasticizing material in the vinyl tape could cause the POF cable to break.
(Note 3) Loop the excessive cable with twice or more than the minimum bending radius.

Appendix 2.19 H010 Cable

Max. cable length: 5m

Application: Signal splitter connection

EXT I/F NC I/F



[EXT I/F]
Connector: HDR-E50MSG1+
Case: HDR-E50LPH
Manufacturer: HONDA TSUSHIN KOGYO CO., LTD

(Note) Fold the cable shield over the sheath, and wrap copper foil tape over it.
Connect the wound copper foil tape to shield plate of the connector.

	EXT I/F	NC I/F	
5V	1	1	5V
5V	26	26	5V
5V	2	2	5V
5V	27	27	5V
SG	3	3	SG
SG	28	28	SG
AB	4	4	AB
SG	29	29	SG
TXDH	5	5	TXDH
TXDL	30	30	TXDL
RXDH	6	6	RXDH
RXDL	31	31	RXDL
DTRH	7	7	DTRH
DTRL	32	32	DTRL
DSRH	8	8	DSRH
DSRL	33	33	DSRL
TBEMG1	9	9	TBEMG1
TBEMG2	34	34	TBEMG2
DEAD1	10	10	DEAD1
DEAD2	35	35	DEAD2
TBENA1	11	11	TBENA1
TBENA2	36	36	TBENA2
SG	12	12	SG
SG	37	37	SG
EMGIN1	13	13	EMGIN1
EMGIN2	38	38	EMGIN2
EMGOUT1	14	14	EMGOUT1
EMGOUT2	39	39	EMGOUT2
SG	15	15	SG
SG	40	40	SG
TXRXH	16	16	TXRXH
TXRXL	41	41	TXRXL
SG	17	17	SG
SG	42	42	SG
HA3	18	18	HA3
HB3	43	43	HB3
HA2	19	19	HA2
HB2	44	44	HB2
HA1	20	20	HA1
HB1	45	45	HB1
N.C.	21	21	N.C.
N.C.	46	46	N.C.
N.C.	22	22	N.C.
N.C.	47	47	N.C.
SKIPCOM	23	23	SKIPCOM
SKIPCOM	48	48	SKIPCOM
SKIP1	24	24	SKIP1
SKIP2	49	49	SKIP2
SKIP3	25	25	SKIP3
SKIP4	50	50	SKIP4
(SHIELD)			(SHIELD)

Wire material: UL20276-SB(MA) 25PX28AWG
Recommended manufacturer: Hitachi Cable, Ltd.

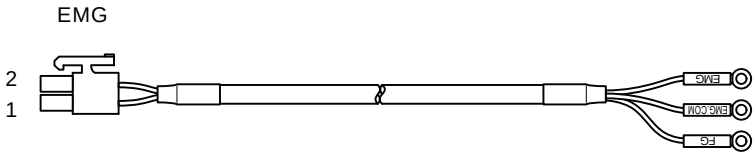
[NC I/F]
Connector: 10150-6000EL
Case: 10350-3210-000
Manufacturer: 3M

(Note) Fold the cable shield over the sheath, and wrap copper foil tape over it.
Connect the wound copper foil tape to shield plate of the connector.

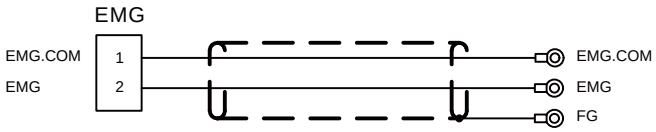
Appendix 2.20 H100 Cable

Max. cable length: 30m

Application: Emergency stop signal



[EMG]
Connector: 5557-02R-210
Contact: 5556PBT
Manufacturer: MOLEX



Crimp terminal: R1.25-3.5
Recommended manufacturer: JST

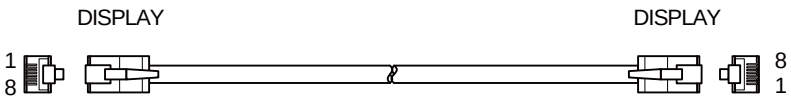
(Note) Connect the the cable shield to the FG terminal.

Wire material: 2464 VSV 2 * AWG22
Recommended manufacturer: Bando Electric Wire

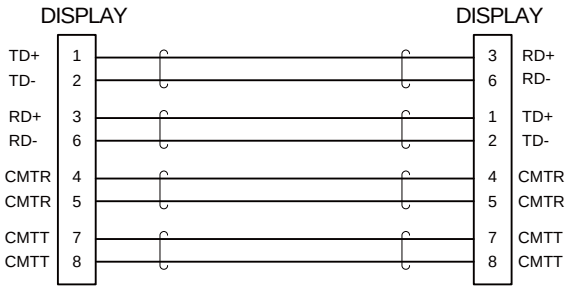
Appendix 2.21 H200 Cable

Max. cable length: 20m

Application: Display module communication (UTP cross)



[DISPLAY]
Connector: 5-558530
Manufacturer: Tyco Electronics



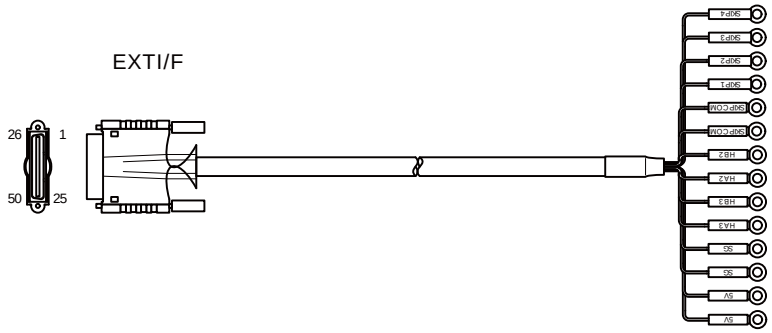
[DISPLAY]
Connector: 5-558530
Manufacturer: Tyco Electronics

Wire material: Ethernet Cat.5e AWG24 4P

Appendix 2.22 H300 Cable

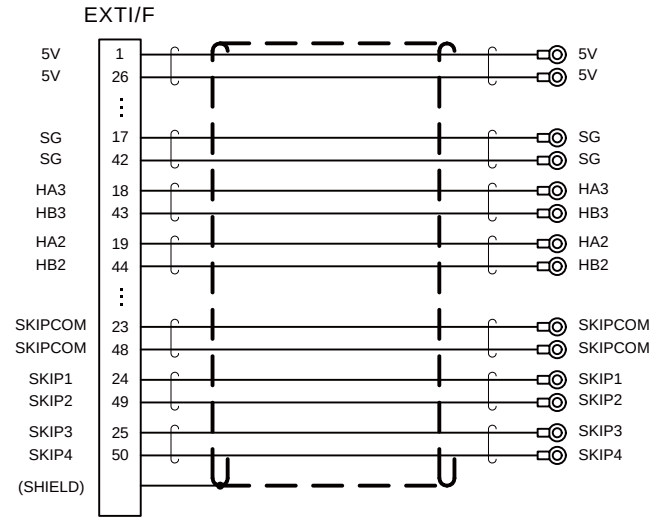
Max. cable length: 20m

Application: SKIP/manual pulse generator



[EXT I/F]
Connector: HDR-E50MSG1+
Case: HDR-E50LPH
Manufacturer: HONDA TSUSHIN KOGYO CO., LTD

(Note) Fold the cable shield over the sheath, and wrap copper foil tape over it.
Connect the wound copper foil tape to shield plate of the connector.

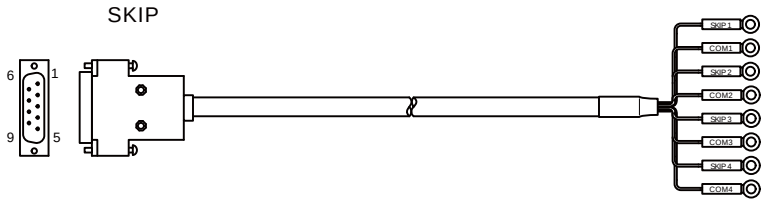


Crimp terminal: R1.25-3.5
Recommended manufacturer: JST

Wire material: UL1061-2464 AWG26 * 7P
Recommended manufacturer: Oki Electric Cable

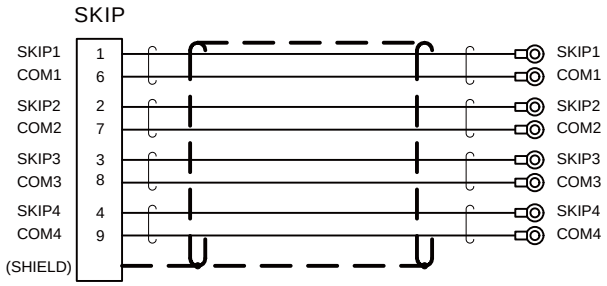
Appendix 2.23 H310 Cable

Max. cable length: 15m
Application: SKIP for Signal splitter



[SKIP]
Connector: CDE-9PF
Contact: CD-PC-121
Case: HDE-CTH
Manufacturer: Hirose Electric

(Note) Fold the cable shield over the sheath, and wrap copper foil tape over it.
Connect the wound copper foil tape to shield plate of the connector.

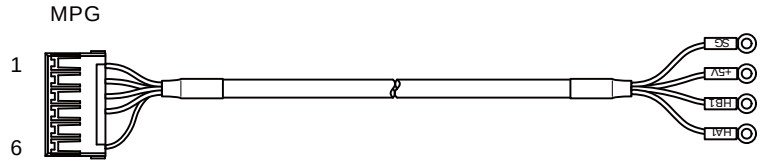


Crimp terminal: R1.25-3.5
Recommended manufacturer: JST

Wire material: UL1061-2464 AWG26 * 4P
Recommended manufacturer: Oki Electric Cable

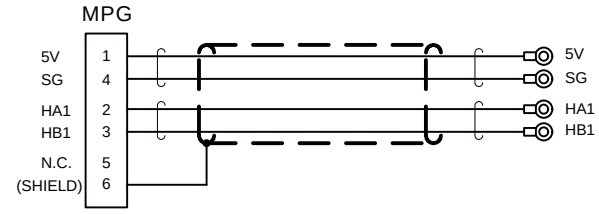
Appendix 2.24 H400 Cable

Max. cable length: 20m
Application: Manual pulse generator (5V type)



[MPG]
Connector: 51103-0600
Contact: 50351-8000
Manufacturer: MOLEX

(Note) Connect the the cable shield to the connecter pin No.6.



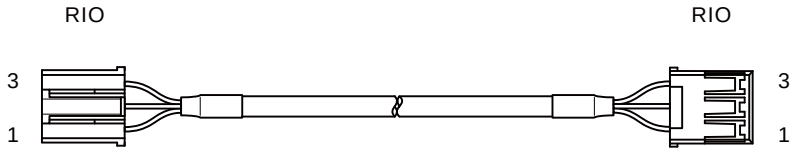
Crimp terminal: R1.25-3.5
Recommended manufacturer: JST

Wire material: UL1061-2464 AWG26 * 2P
Recommended manufacturer: Oki Electric Cable
(Note) Non twisted pair is acceptable as wire material.
When using non twisted pair cables, use the following.
Wire material: 2464VSV 4 * AWG24
Recommended manufacturer: Bando Electric Wire

Appendix 2.25 H500 Cable

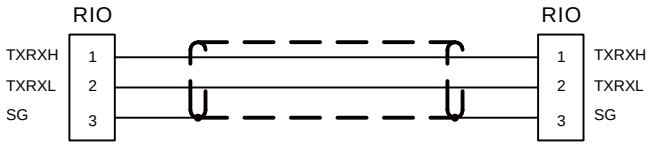
Max. cable length: 0.5m

Application: For dual-signal module communication



[RIO]
Connector: 51103-0300
Contact: 50351-8000
Manufacturer: MOLEX

(Note) Connect the the cable shield to the connecter pin No.3.



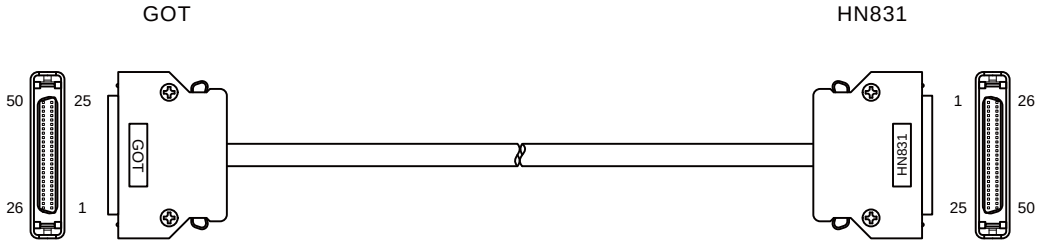
Wire material: 2464 VSV 2×AWG22
Recommended manufacturer: Bando Electric Wire

[RIO]
Connector: 51103-0300
Contact: 50351-8000
Manufacturer: MOLEX

(Note) Connect the the cable shield to the connecter pin No.3.

Appendix 2.26 H810 Cable

Max. cable length: 1m
Application: I/O extension connector unit communication



[GOT]
Connector: PCS-E50FA
Case: PCS-E50LA
Recommended manufacturer:
HONDA TSUSHIN KOGYO CO., LTD

(Note) Fold the cable shield over the sheath, and wrap copper foil tape over it.
Connect the wound copper foil tape to shield plate of the connector.

GOT		HN831
DC24V	1 – 1	DC24V
DC24V	2 – 2	DC24V
DC24V	3 – 3	DC24V
DC24V	4 – 4	DC24V
YD00	6 – 6	YD00
YD02	7 – 7	YD02
YD04	8 – 8	YD04
YD06	9 – 9	YD06
YD08	10 – 10	YD08
YD0A	11 – 11	YD0A
YD0C	12 – 12	YD0C
YD0E	13 – 13	YD0E
SCOM0	14 – 14	SCOM0
SCOM2	15 – 15	SCOM2
SCOM4	16 – 16	SCOM4
SCOM6	17 – 17	SCOM6
XD00	18 – 18	XD00
XD02	19 – 19	XD02
XD04	20 – 20	XD04
XD06	21 – 21	XD06
XD08	22 – 22	XD08
XD0A	23 – 23	XD0A
XD0C	24 – 24	XD0C
XD0E	25 – 25	XD0E
0V	26 – 26	0V
0V	27 – 27	0V
0V	28 – 28	0V
0V	29 – 29	0V
N.C.	5 – 5	N.C.
RUN	30 – 30	RUN
YD01	31 – 31	YD01
YD03	32 – 32	YD03
YD05	33 – 33	YD05
YD07	34 – 34	YD07
YD09	35 – 35	YD09
YD0B	36 – 36	YD0B
YD0D	37 – 37	YD0D
YD0F	38 – 38	YD0F
SCOM1	39 – 39	SCOM1
SCOM3	40 – 40	SCOM3
SCOM5	41 – 41	SCOM5
SCOM7	42 – 42	SCOM7
XD01	43 – 43	XD01
XD03	44 – 44	XD03
XD05	45 – 45	XD05
XD07	46 – 46	XD07
XD09	47 – 47	XD09
XD0B	48 – 48	XD0B
XD0D	49 – 49	XD0D
XD0F	50 – 50	XD0F
(SHIELD)		(SHIELD)

[HN831]
Connector: PCS-E50FA
Case: PCS-E50LA
Recommended manufacturer:
HONDA TSUSHIN KOGYO CO., LTD

(Note) Fold the cable shield over the sheath, and wrap copper foil tape over it.
Connect the wound copper foil tape to shield plate of the connector.

Wire material: UL20276-SB(MA) 25PX28AWG
Recommended manufacturer: Hitachi Cable, Ltd.

(Note) H810 cable is a connection cable which is supplied by us. The connector which is accompanied with GT15-DIOR unit is not required.

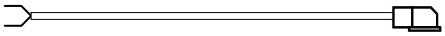
Appendix 2.27 MR-BKS1CBL-A1-H / MR-BKS1CBL-A2-H Cable

Max. cable length: 10m

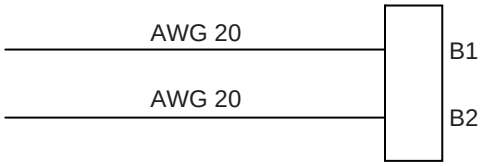
Application: <200V Series> Brake cable for HF-KP

MR-BKS1CBL-A1-H (load side angle)

MR-BKS1CBL-A2-H (reverse load side angle)



Servo motor brake connector
(Japan Aviation Electronics)
Connector: JN4FT02SJ1
Hood, Socket insulator,
Bushing and Ground nut
Contact: ST-TMH-S-C1B-100(A534G)
Crimp tool: CT160-3TMH5B



<Cable connection diagram>

Appendix 2.28 MR-PWS1CBL-A1-H / MR-PWS1CBL-A2-H Cable

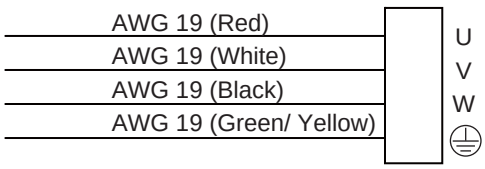
Max. cable length: 10m

Application: <200V Series> Power cable for HF-KP

MR-PWS1CBL-A1-H (load side angle)

MR-PWS1CBL-A2-H (reverse load side angle)

Servo motor power supply connector
(Japan Aviation Electronics)
Connector: JN4FT04SJ1
Hood, Socket insulator,
Bushing and Grand nut
Contact: ST-TMH-S-C1B-100(A534G)
Crimp tool: CT160-3TM5B



<Cable connection diagram>

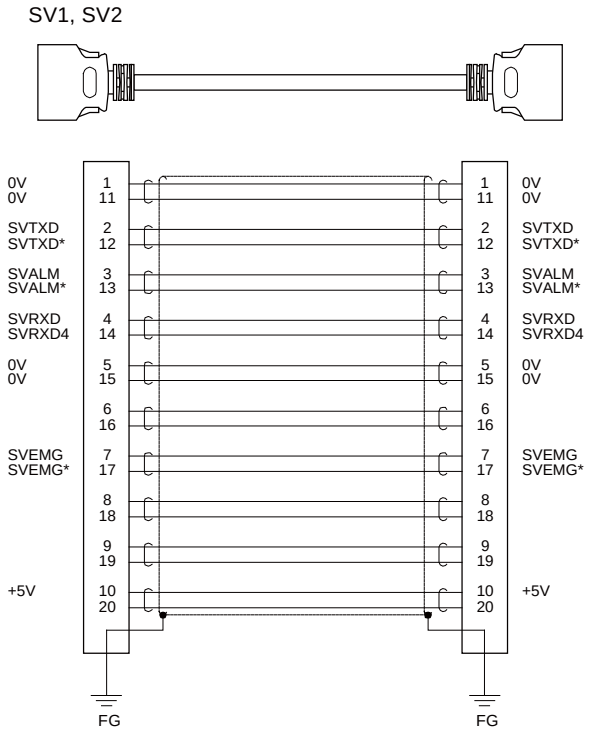
Appendix 2.29 SH21 Cable

Max. cable length: 30m

Application: Power supply communication cable

Power backup unit communication cable

Cable for Auxiliary axis/Servo drive units



[SV1, SV2]
Plug: 10120-3000VE
Shell: 10320-52F0-008
Recommended manufacturer: 3M

Wire material:
UL20276 AWG28×10P
Recommended manufacturer:
Toyokuni Electric Cable

Plug: 10120-3000VE
Shell: 10320-52F0-008
Recommended manufacturer: 3M

(Note) Fold the cable shield over the sheath, and wrap copper foil tape over it. Connect the wound copper foil tape to GND plate of the connector.

Appendix 3

Restrictions for Lithium Batteries

Appendix 3.1 Restriction for Packing

The United Nations Dangerous Goods Regulations "Article 12" became effective from 2003. When transporting lithium batteries with means subject to the UN Regulations, such as by air transport, measures corresponding to the Regulations must be taken.
The UN Regulations classify the batteries as dangerous goods (Class 9) or not dangerous goods according to the lithium metal content. To ensure safety during transportation, lithium batteries (battery unit) directly exported from Mitsubishi are packaged in a dedicated container (UN package) for which safety has been confirmed.
When the customer is transporting these products with means subject to the UN Regulations, such as air transport, the shipper must follow the details explained in the section "Transportation Restrictions for Lithium Batteries: Handling by User".
The followings are restrictions for transportation. Each restriction is specified based on the recommendation of the United Nations.

Area	Transportation method	Restriction	Special clause
World	Air	ICAO, IATA	-
World	Marine	IMO	188
United States	All (air, marine, land)	DOT	49 CFR 173.185
Europe	land	RID, ADR	188

Appendix 3.1.1 Target Products

The following Mitsubishi NC products use lithium batteries. If the lithium metal content exceeds 1g for battery cell and 2g for battery, the battery is classified as dangerous good (Class9).
In order to avoid an accidental actuation during the transportation, all lithium battery products incorporated in a machinery or device must be fixed securely and must be shipped with wrapped over the outer package as to prevent damage or short-circuits.

(1) Materials falling under Class 9

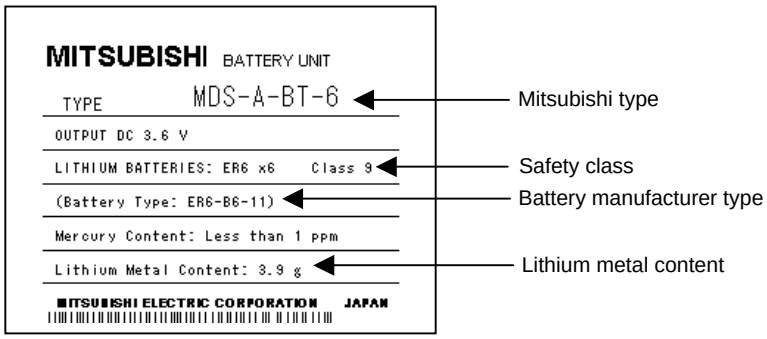
Mitsubishi type (Type for arrangement)	Battery type	Lithium metal content	Number of incorporated ER6V batteries	Application (Data backup)	Battery class	Outline dimension drawing
MDS-A-BT-4	ER6-B4-11	2.6g	4 batteries	For servo detector	Battery	Refer to "Battery Option" in the specification manual for drive unit you are using for the outline dimension drawing for servo.
MDS-A-BT-6	ER6-B6-11	3.9g	6 batteries	For servo detector		
MDS-A-BT-8	ER6-B8-11	5.2g	8 batteries	For servo detector		
FCU6-BT4-D1	Combination of ER6-B4D-11 and ER6V battery cell	2.6g+0.65g	5 batteries	For servo detector/ NC SRAM		
CR23500SE-CJ5	CR23500SE-CJ5	1.52g	-	For NC SRAM (M500)	Battery cell	

(2) Materials not falling under Class 9

Mitsubishi type (Type for arrangement)	Battery type	Lithium metal content	Number of incorporated ER6V batteries	Application (Data backup)	Battery class	Outline dimension drawing
MDS-A-BT-2	ER6-B2-12	1.3g	2 batteries	For servo detector	Battery	Refer to "Battery Option" in the specification manual for drive unit you are using for the outline dimension drawing for servo.
FCU6-BTBOX series	2CR5	1.96g	-	For NC SRAM/ servo detector		
CR2032 (for built-in battery)	CR2032	0.067g	-	For NC SRAM/	Battery cell	
CR2450 (for built-in battery)	CR2450	0.173g	-	For NC SRAM		
ER6, ER6V series (for built-in battery)	ER6, ER6V	0.65g	-	For NC SRAM/ servo detector		
A6BAT(MR-BAT)	ER17330V	0.48g	-	For servo detector		
Q6BAT	Q6BAT	0.49g	-	For NC SRAM		
MR-J3BAT	ER6V	0.65g	-	For servo detector		

(Note) If the number of batteries exceeds 24 batteries for the battery cell or 12 batteries for the battery, the dedicated packing (for materials falling under Class 9) is required.

(Example) Rating nameplate for battery units



Appendix 3.1.2 Handling by User

The following technical opinion is solely Mitsubishi's opinion. The shipper must confirm the latest IATA Dangerous Goods Regulations, IMDG Codes and laws and orders of the corresponding export country. These should be checked by the company commissioned for the actual transportation.

IATA: International Air Transport Association

IMDG Code: A uniform international code for the transport of dangerous goods by seas determined by IMO (International Maritime Organization).

■ **When shipping isolated lithium battery products**

(1) Reshipping in Mitsubishi UN packaging (Class 9)

Mitsubishi packing applies package specifications complying with the UN Packing Instruction. The user only needs to add the following details before shipping. (Consult with the shipping company for details.)

(a) Indication of container usage mark on exterior box (Label with following details recorded.)

[1] Proper shipping name (Lithium batteries)

[2] UN NO. (UN3090 for isolated battery, UN3091 for battery incorporated in a device or included)

[3] Shipper and consignee's address and name

Example of completing form

SHIPPER: CONSIGNEE:

Shipper information Consignee information

PROPER SHIPPING NAME LITHIUM BATTERIES

UN NO.: UN3090 CLASS: 9 SUBSIDIARY RISK

PACKING GROUP: II PACKING INST.: 903

[4] A care label with a telephone number for additional information (120×110mm)

(A care label is to be attached on the outer package.Shipping less than or equal to 4 isolated batteries incorporated in machinery does not need care label.)

Lithium battery care label (Air transportation sample)

(b) Preparation of shipping documents and declaration of dangerous goods
For information required in description, refer to "Appendix2-2 Product information data sheet".

(2) When packaged by user
The user must follow UN Regulations when packing, preparing for shipping and preparing the indications, etc.
(a) Packing a lithium battery falling under Class 9
[1] Consult with The Ship Equipment Inspection Society of Japan for details on packaging.
[2] Prepare for shipping as explained in "(1) Reshipping in Mitsubishi UN packaging".
The Ship Equipment Inspection Society of Japan Headquarters Telephone: 03-3261-6611 Fax: 03-3261-6979
(b) Packing a lithium battery not falling under Class 9
[1] Cells and batteries are separated so as to prevent short circuits and are stored in a strong outer packaging (12 batteries or less, 24 battery cells or less).
[2] Prepare for the certificates or test results showing compliance to drop test from 1.2m in height. (The safety test results have been obtained from the battery manufacturer. Consult with Mitsubishi when the safety test results are required.)
[3] Prepare for shipping as explained in "(1) Reshipping in Mitsubishi UN packaging (Class 9)".

■ **When shipping lithium batteries incorporating in a device or machinery**
Dedicated packaging (UN packaging) is not required for batteries incorporated in device or machinery. Yet, make sure to fix the contents securely before the transportation as to prevent damage and short-circuit.
If machinery and devices which incorporates lithium battery is not waterproof, package must be waterproof material.
Check with your shipping company for details on packing and transportation.

Appendix 3.1.3 Reference

Refer to the following materials for details on the regulations and responses.
Guidelines regarding transportation of lithium batteries and lithium ion batteries (Edition 2)..... Battery Association of Japan

Appendix 3.2 Products information data sheet (ER battery)

MSDS system does not cover the product used in enclosed state. The ER battery described in this section applies to that product.
This description is applied to the normal use, and is provided as reference but not as guarantee.
This description is based on the lithium battery's (ER battery) hazardous goods data sheet (Products information data sheet) which MITSUBISHI has researched, and will be applied only to the ER batteries described in "Transportation Restrictions for Lithium Batteries: Restriction for Packing".

(1) Outline of hazard

Principal hazard and effect	Not found.
Specific hazard	As the chemical substance is stored in a sealed metal container, the battery itself is not hazardous. But when the internal lithium metal attaches to human skin, it causes a chemical skin burn. As a reaction of lithium with water, it may ignite or forms flammable hydrogen gas.
Environmental effect	Not found.
Possible state of emergency	Damages or short-circuits may occur due to external mechanical or electrical pressures.

(2) First-aid measure

Inhalation	If a person inhales the vapor of the substance due to the battery damage, move the person immediately to fresh air. If the person feels sick, consult a doctor immediately.
Skin contact	If the content of the battery attaches to human skin, wash off immediately with water and soap. If skin irritation persists, consult a doctor.
Eye contact	In case of contact with eyes due to the battery damage, rinse immediately with a plenty of water for at least 15 minutes and then consult a doctor.
Ingestion	If swallowed, consult a doctor immediately.

(3) Fire-fighting measure

Appropriate fire-extinguisher	Dry sand, dry chemical, graphite powder or carbon dioxide gas
Special fire-fighting measure	Keep the battery away from the fireplace to prevent fire spreading.
Protectors against fire	Fire-protection gloves, eye/face protector (face mask), body/skin protective cloth

(4) Measure for leakage

Environmental precaution	Dispose of them immediately because strong odors are produced when left for a long time.
How to remove	Get them absorbed into dry sand and then collect the sand in an empty container.

(5) Handling and storage

Handling	**Cautions for safety handling**	Do not peel the external tube or damage it. Do not dispose of the battery in fire or expose it to heat. Do not immerse the battery in water or get it wet. Do not throw the battery. Do not disassemble, modify or transform the battery. Do not short-circuit the battery.
Storage	**Appropriate storage condition**	Avoid direct sunlight, high temperature and high humidity. (Recommended temp. range: +5 to +35C°, humidity: 70%RH or less)
	Material to avoid	Flammable or conductive material (Metal: may cause a short-circuit)

(6) Physical/chemical properties

Appearance	**Physical form**	Solid
	Shape	Cylinder type
	Smell	Odorless
	pH	Not applicable (insoluble)
	Boiling point/Boiling range, Melting point, Decomposition temperature, Flash point	No information

(7) Stability and reactivity

Stability	Stable under normal handling condition.
Condition to avoid	Do not mix multiple batteries with their terminals uninsulated. This may cause a short-circuit, resulting in heating, bursting or ignition.
Hazardous decomposition products	Irritative or toxic gas is emitted in the case of fire.

(8) Toxicological information

As the chemical substance is stored in a sealed metal container, the battery has no harmfulness. Just for reference, the table below describes the main substance of the battery.

< Lithium metal >

Acute toxicity	No information
Local effect	Corrosive action in case of skin contact

< Thionyl chloride >

Acute toxicity	Lc_{50}: 500ppm (inhaled administration to rat)
Local effect	The lungs can be damaged by chronic cough, dyspnea and asthma.

< Aluminum chloride >

Acute toxicity	L_{D50}: 3700ppm (oral administration to rat)
Local effect	Not found.

< Lithium chloride >

Acute toxicity	L_{D50}: 526ppm (oral administration to rat)
Local effect	The central nerves and kidney can be influenced.

< Carbon black >

Acute toxicity	L_{D50}: 2,000mg/kg > (rat)
Carcinogenicity	LARC group 2 (suspected of being carcinogenic)

(9) Ecological information

Mobility, Persistence/Decomposability, Bio-accumulation potential, Ecological toxicity	Not found.

(10) Caution for disposal

Dispose of the battery following local laws or regulations.

Pack the battery properly to prevent a short-circuit and avoid contact with water.

Appendix 3.3 Issuing Domestic Law of the United States for Primary Lithium Battery Transportation

Federal Aviation Administration (FAA) and Research and Special Programs Administration (RSPA) announced an additional regulation (interim final rule) for the primary lithium batteries transportation restrictions item in "Federal Register" on Dec.15 2004.
This regulation became effective from Dec.29, 2004. This law is a domestic law of the United States, however if also applies to the domestic flight and international flight departing from or arriving in the United States. Therefore, when transporting lithium batteries to the United State, or within the United State, the shipper must take measures required to transport lithium batteries. Refer to the Federal Register and the code of Federal Regulation ("Transportation Restrictions for Lithium Batteries: Reference") for details.

Appendix 3.3.1 Outline of Regulation

(1) Transporting primary lithium battery by passenger aircraft is forbidden.
  (a) Excluding primary lithium battery for personal use in a carry-on or checked luggage (Lithium metal content should be not more than 5g for cell and 25g for battery. For details on the lithium metal content, refer to "Transportation Restrictions for Lithium Batteries: Target Products".)
(2) When transporting primary lithium battery by cargo aircraft, indicate that transportation by passenger aircraft is forbidden on the exterior box.

Appendix 3.3.2 Target Products

All NC products for which the lithium batteries are used are subject to the regulation.
(Refer to the table "Transportation Restrictions for Lithium Batteries: Target Products".)

Appendix 3.3.3 Handling by User

The "Transportation Restrictions for Lithium Batteries: Outline of Regulation" described above is solely Mitsubishi's opinion. The shipper must confirm orders of "Transportation Restrictions for Lithium Batteries: Reference" described below for transportation method corresponding the regulation.
These should be checked by the company commissioned for the actual lithium battery transportation.

(1) Indication of exterior box

When transporting primary lithium battery by cargo aircraft, indicate that transportation by passenger aircraft is forbidden on the exterior box.

Display example

PRIMARY LITHIUM BATTERIES **FORBIDDEN FOR TRANSPORT ABOARD PASSENGER AIRCRAFT.**

  (a) The character color must be displayed with contrast. (black characters against white background, black characters against yellow background, etc.)
  (b) The height (size) of characters to be displayed is prescribed depending on the packaging mass. (When the total mass is over 30kg: at least 12mm, When the total mass is less than 30kg: at least 6mm)

Appendix 3.3.4 Reference

(1) 49CFR (Code of Federal Regulation, Title49) (173.185 Lithium batteries and cells.)
  Search from the following URL.
  http://www.gpoaccess.gov/cfr/index.html
(2) DOT regulation body (Department of Transportation)
  Search "69fr-75207.pdf" from the following URL.
  http://phmsa.dot.gov/hazmat

Appendix 3.4 Restriction related to EU Battery Directive

EU Battery Directive (2006/66/EC) has been enforced since September 26th in 2008. Hereby, battery and machinery incorporating battery marketed in European Union countries must be in compliance with the EU Battery Directive.
Lithium battery provided by MITSUBISHI are subjected to this restriction.

Appendix 3.4.1 Important Notes

Follow the instruction bellow as shipping products incorporating MITSUBISHI device.
(1) When shipping products incorporating MITSUBISHI device any time later than September 26th, 2008, the symbol mark shown as Figure 1 in section "Information for end-user" is required to be attached on the machinery or on the package. Also, the explanation of the symbol must be added.
(2) Machinery with battery and maintenance battery produced before the EU Battery Directive are also subjected to the restriction. When shipping those products to EU countries later than September 26th, 2008, follow the instruction explained in (1).

Appendix 3.4.2 Information for end-user

Figure 1

Note: This symbol mark is for EU countries only.

This symbol mark is according to the directive 2006/66/EC Article 20 Information for end-users and Annex II.

Your MITSUBISHI ELECTRIC product is designed and manufactured with high quality materials and components which can be recycled and/or reused. This symbol means that batteries and accumulators, at their end-of-life, should be disposed of separately from your household waste.

If a chemical symbol is printed beneath the symbol shown above, this chemical symbol means that the battery or accumulator contains a heavy metal at a certain concentration. This will be indicated as follows:Hg: mercury (0,0005%), Cd: cadmium (0,002%), Pb: lead (0,004%)

In the European Union there are separate collection systems for used batteries and accumulators. Please, dispose of batteries and accumulators correctly at your local community waste collection/recycling centre.

Please, help us to conserve the environment we live in!

Appendix 3. Restrictions for Lithium Batteries

Appendix 4

Precautions for Compliance to UL/c-UL Standards

Appendix 4. Precautions for Compliance to UL/c-UL Standards

Observe the following matters to comply with UL/c-UL Standards.
Refer to "Instruction Manual for Compliance with UL/c-UL Standard" (BNP-B2429-003) for details.

(1) Selection of external 24VDC power supply unit (The unit shall be prepared by the machine tool builder.)
The stabilized power supply unit supplying 24VDC to CNC control unit complies with the UL Standards on the condition that is a UL-approved part.
Use a UL-approved part for the stabilized power supply unit supplying 24VDC to each unit.

(2) Unit ambient temperature
CNC control unit complies with the UL Standards on the condition that the unit is used at a temperature less than the maximum ambient temperature given in chapter 2.
Make sure that the maximum ambient temperature of each unit does not exceed the temperature given in chapter 2.

Revision History

Date of revision	Manual No.	Revision details
Dec. 2006	IB(NA)1500261-A	First edition created.
Jan. 2007	IB(NA)1500261-B	Second edition created. - Maximum lengths were added or corrected for some cable types. - The explanations of the battery holder unit were added. - Mistakes were corrected.
Sept. 2007	IB(NA)1500261-C	Third edition created. - The section composition was greatly changed. - The following sections were added. - 3. General Specifications (Environmental Conditions) - 5. Panel Cut Dimension Drawing / Installation Dimension Drawing - 6. Installation and Wiring - 7. Connections of Modules - Appendix 1. EMC Installation Guidelines - Appendix 3. Cable/Connector for CNC CPU - Appendix 4. Servo/Spindle Cable and Connector Specifications (MDS-D/DH Series) - Appendix 5. Servo/Spindle Cable and Connector Specifications (MDS-D-SVJ3/ SPJ3 Series) - Appendix 6. Transportation Restrictions for Lithium Batteries - Appendix 7. Precautions for Compliance to UL/c-UL Standards - Mistakes were corrected.
Mar. 2008	IB(NA)1500261-D	Fourth edition created. - The section composition was greatly changed: - "1. Introduction" was merged to the "Introduction" in the beginning of this manual. - Explanations of the modules' specifications were all merged in "3. General Specifications". - "4. Outline Drawing", "5. Panel Cut Dimension Drawing" and "Appendix 2. Connector Layout" were merged into the chapter of "General Specifications". - "6. Installation and Wiring" were divided into two sections, "Installation" and "Wiring and Connecting". - "7. Connections of Modules" was merged into the section of "Wiring and Connecting". - Chapter and section Nos. were all revised according to the changes above. - "Example of surge absorber installation" of "Appendix 1.6.3 Surge Absorber" was corrected. - Mistakes were corrected.
Jul. 2008	IB(NA)1500261-E	Fifth edition created. - "3.1.3 Installation and Removal of Module" was added. - Mistakes were corrected.
Sep. 2010	IB(NA)1500261-H	Sixth edition created. - Following chapters are corrected as "1.3 Component Modules" is updated. - 2. General Specifications - 4. Wiring and Connecting - Following chapters are reviewed. - 1.2 General Connection Diagram - 1.3 Component Modules - 3.3 Calculating Heat Generation by C70 - Following chapters are added. - 2.11 I/O Extension Connector Unit - 4.10 Connecting the I/O Extension Connector Unit (Continued on the following page)

Date of revision	Manual No.	Revision details
		(Continued from the previous page) - Following chapters are deleted. - "Appendix 2. Cable and Connector for CNC CPU" - "Appendix 3. Servo/Spindle Cable and Connector Specifications (MDS-D/DH Series)" - "Appendix 4. Servo/Spindle Cable and Connector Specifications(MDS-D-SVJ3/SPJ3 Series)" - Added new contents in the following chapters. - 2.5 CNC CPU Module (19) MPG, (13) EXT I/F Timing chart for HA1/HB1 is added. - 2.6 Battery Box for CNC CPU (Q173NCCPU) Guideline when changing a battery is added. - 2.8 Signal Splitter Input condition and a figure for input/output circuit are added. - 2.9 Manual Pulse Generator HD60 is added - Corrected the mistakes
Dec. 2010	IB(NA)1500261-J	Seventh edition created. - Revised the explanation to support the newly-added power supply module Q64PN, G302 cable, and G303 cable. - 1.2 General Connection Diagram - 1.3.1 CNC Control Unit - 2.3 Power Supply - 4.2 Wiring to the Power Supply Module - 4.4 Connecting the GOT - Appendix 2.11 G302 Cable - Appendix 2.12 G303 Cable - Changed the section Nos.according to the addition of Appendix 2.11 and 2.12. - Revised the figures in Appendix 2.16-2.23 - Corrected the mistakes
Jun. 2012	IB(NA)1500261-K	Eighth edition created. - "Handling of our product" was added. - CNC CPU model Q10UDEHCPU was added to the descriptions in "1.3.1 CNC Control Unit" and "2.4 PLC CPU". - The discontinued power supply unit Q64P are now mentioned after Q64PN and notes that say Q64PN has gone out of production were added. - Reference manual information in "1.3 Component Modules" was updated. - "1.3.1 CNC Control Unit - (26) Cable - (c) Cable for drive unit" was corrected as follows: deleted: CNV2E-6P, CNV2E-7P added : CNV2E-HP - "Appendix 2.3 CNV2E-8P/CNV2E-9P Cable" was added and the subsequent sections were accordingly renumbered. - Minor errors were corrected.
Oct. 2012	IB(NA)1500261-L	Ninth edition created. - Corrected values of condenser capacity, pulse frequency, and currency limits in the following sections: - 2.5 CNC CPU Module (10) MPG and (13) EXT I/F - 2.8 Signal Splitter (5) MPG - Reinforced the description of (Note 2) in "4.9 Connecting the Manual Pulse Generator - (1) Connecting directly to CNC CPU module" by adding a sentence "(It is required to relay the shield also.)". - Added a note regarding use of non twisted pair cables to "Appendix 2.24 H400 Cable".

Date of revision	Manual No.	Revision details
Nov. 2014	IB(NA)1500261-M	Tenth edition created. - Added or corrected the following chapters for handling GOT2000 Series. [Added] - 1.3.2.1 GT27 [Corrected] - 4.4 Connecting the GOT - 4.10 Connecting the I/O Extension Connector Unit - Changed the section Nos. according to the addition of the chapter 1.3.2.1. - CNC CPU models; Q03UDVCPU, Q04UDVCPU, Q06UDVCPU, Q13UDVCPU, and Q26UDVCPU, were added to the descriptions in "1.3.1 CNC Control Unit" and "2.4 PLC CPU". - Corrected the following chapters for handling MDS-D2/DH2 Series, MDS-DM2 Series, and MDS-DJ Series. - 4.5 Connecting the Servo Drive Unit - Corrected the mistakes.

Global Service Network

AMERICA

MITSUBISHI ELECTRIC AUTOMATION INC. (AMERICA FA CENTER)

Central Region Service Center
500 CORPORATE WOODS PARKWAY, VERNON HILLS, ILLINOIS 60061, U.S.A.
TEL: +1-847-478-2500 / FAX: +1-847-478-2650

Michigan Service Satellite
ALLEGAN, MICHIGAN 49010, U.S.A.
TEL: +1-847-478-2500 / FAX: +1-847-478-2650

Ohio Service Satellite
LIMA, OHIO 45801, U.S.A.
TEL: +1-847-478-2500 / FAX: +1-847-478-2650
CINCINATTI, OHIO 45201, U.S.A.
TEL: +1-847-478-2500 / FAX: +1-847-478-2650

Minnesota Service Satellite
ROGERS, MINNESOTA 55374, U.S.A.
TEL: +1-847-478-2500 / FAX: +1-847-478-2650

West Region Service Center
16900 VALLEY VIEW AVE., LAMIRADA, CALIFORNIA 90638, U.S.A.
TEL: +1-714-699-2625 / FAX: +1-847-478-2650

Northern CA Satellite
SARATOGA, CALIFORNIA 95070, U.S.A.
TEL: +1-714-699-2625 / FAX: +1-847-478-2650

Pennsylvania Service Satellite
PITTSBURG, PENNSYLVANIA 15644, U.S.A.
TEL: +1-732-560-4500 / FAX: +1-732-560-4531

Connecticut Service Satellite
TORRINGTON, CONNECTICUT 06790, U.S.A.
TEL: +1-732-560-4500 / FAX: +1-732-560-4531

South Region Service Center
1845 SATTELITE BOULEVARD STE. 450, DULUTH, GEORGIA 30097, U.S.A.
TEL +1-678-258-4529 / FAX +1-678-258-4519

Texas Service Satellites
GRAPEVINE, TEXAS 76051, U.S.A.
TEL: +1-678-258-4529 / FAX: +1-678-258-4519
HOUSTON, TEXAS 77001, U.S.A.
TEL: +1-678-258-4529 / FAX: +1-678-258-4519

Tennessee Service Satellite
Nashville, Tennessee, 37201, U.S.A.
TEL: +1-678-258-4529 / FAX: +1-678-258-4519

Florida Service Satellite
WEST MELBOURNE, FLORIDA 32904, U.S.A.
TEL: +1-678-258-4529 / FAX: +1-678-258-4519

Canada Region Service Center
4299 14TH AVENUE MARKHAM, ONTARIO L3R OJ2, CANADA
TEL: +1-905-475-7728 / FAX: +1-905-475-7935

Canada Service Satellite
EDMONTON, ALBERTA T5A 0A1, CANADA
TEL: +1-905-475-7728 FAX: +1-905-475-7935

Mexico Region Service Center
MARIANO ESCOBEDO 69 TLALNEPANTLA, 54030 EDO. DE MEXICO
TEL: +52-55-3067-7500 / FAX: +52-55-9171-7649

Monterrey Service Satellite
MONTERREY, N.L., 64720, MEXICO
TEL: +52-81-8365-4171

BRAZIL

MELCO CNC do Brasil Comércio e Servicos S.A

Brazil Region Service Center
ACESSO JOSE SARTORELLI, KM 2.1 CEP 18550-000, BOITUVA-SP, BRAZIL
TEL: +55-15-3363-9900 / FAX: +55-15-3363-9911

EUROPE

MITSUBISHI ELECTRIC EUROPE B.V.
GOTHAER STRASSE 10, 40880 RATINGEN, GERMANY
TEL: +49-2102-486-0 / FAX: +49-2102-486-5910

Germany Service Center
KURZE STRASSE. 40, 70794 FILDERSTADT-BONLANDEN, GERMANY
TEL: + 49-711-770598-123 / FAX: +49-711-770598-141

France Service Center DEPARTEMENT CONTROLE NUMERIQUE
25, BOULEVARD DES BOUVETS, 92741 NANTERRE CEDEX FRANCE
TEL: +33-1-41-02-83-13 / FAX: +33-1-49-01-07-25

France (Lyon) Service Satellite DEPARTEMENT CONTROLE NUMERIQUE
120, ALLEE JACQUES MONOD 69800 SAINT PRIEST FRANCE
TEL: +33-1-41-02-83-13 / FAX: +33-1-49-01-07-25

Italy Service Center
VIALE COLLEONI, 7 - CENTRO DIREZIONALE COLLEONI PALAZZO SIRIO INGRESSO 1
20864 AGRATE BRIANZA (MB), ITALY
TEL: +39-039-6053-342 / FAX: +39-039-6053-206

Italy (Padova) Service Satellite
VIA G. SAVELLI, 24 - 35129 PADOVA, ITALY
TEL: +39-039-6053-342 / FAX: +39-039-6053-206

U.K. Branch
TRAVELLERS LANE, HATFIELD, HERTFORDSHIRE, AL10 8XB, U.K.
TEL: +49-2102-486-0 / FAX: +49-2102-486-5910

Spain Service Center
CTRA. DE RUBI, 76-80-APDO. 420
08173 SAINT CUGAT DEL VALLES, BARCELONA SPAIN
TEL: +34-935-65-2236 / FAX: +34-935-89-1579

Poland Service Center
UL.KRAKOWSKA 50, 32-083 BALICE, POLAND
TEL: +48-12-630-4700 / FAX: +48-12-630-4701

Mitsubishi Electric Turkey A.Ş Ümraniye Şubesi
Turkey Service Center
ŞERIFALI MAH. NUTUK SOK. NO.5 34775
ÜMRANIYE, ISTANBUL, TURKEY
TEL: +90-216-526-3990 / FAX: +90-216-526-3995

Czech Republic Service Center
KAFKOVA 1853/3, 702 00 OSTRAVA 2, CZECH REPUBLIC
TEL: +420-59-5691-185 / FAX: +420-59-5691-199

Russia Service Center
213, B.NOVODMITROVSKAYA STR., 14/2, 127015 MOSCOW, RUSSIA
TEL: +7-495-748-0191 / FAX: +7-495-748-0192

MITSUBISHI ELECTRIC EUROPE B.V. (SCANDINAVIA)
Sweden Service Center
HAMMARBACKEN 14 191 49 SOLLENTUNA, SWEDEN
TEL: +46-8-6251000 / FAX: +46-8-966877

Bulgaria Service Center
4 A.LYAPCHEV BOUL., POB 21, BG-1756 SOFIA, BULGARIA
TEL: +359-2-8176009 / FAX: +359-2-9744061

Ukraine (Kharkov) Service Center
APTEKARSKIY LANE 9-A, OFFICE 3, 61001 KHARKOV, UKRAINE
TEL: +380-57-732-7774 / FAX: +380-57-731-8721

Ukraine (Kiev) Service Center
4-B, M. RASKOVOYI STR., 02660 KIEV, UKRAINE
TEL: +380-44-494-3355 / FAX: +380-44-494-3366

Belarus Service Center
OFFICE 9, NEZAVISIMOSTI PR.177, 220125 MINSK, BELARUS
TEL: +375-17-393-1177 / FAX: +375-17-393-0081

South Africa Service Center
5 ALBATROSS STREET, RHODESFIELD, KEMPTON PARK 1619, GAUTENG, SOUTH AFRICA
TEL: +27-11-394-8512 / FAX: +27-11-394-8513

ASEAN

MITSUBISHI ELECTRIC ASIA PTE. LTD. (ASEAN FA CENTER)

Singapore Service Center
307 ALEXANDRA ROAD #05-01/02 MITSUBISHI ELECTRIC BUILDING SINGAPORE 159943
TEL: +65-6473-2308 / FAX: +65-6476-7439

Malaysia (KL) Service Center
60, JALAN USJ 10 /1B 47620 UEP SUBANG JAYA SELANGOR DARUL EHSAN, MALAYSIA
TEL: +60-3-5631-7605 / FAX: +60-3-5631-7636

Malaysia (Johor Baru) Service Center
17 & 17A, JALAN IMPIAN EMAS 5/5, TAMAN IMPIAN EMAS, 81300 SKUDAI, JOHOR MALAYSIA.
TEL: +60-7-557-8218 / FAX: +60-7-557-3404

Philippines Service Center
UNIT NO.411, ALABAMG CORPORATE CENTER KM 25. WEST SERVICE ROAD
SOUTH SUPERHIGHWAY, ALABAMG MUNTINLUPA METRO MANILA, PHILIPPINES 1771
TEL: +63-2-807-2416 / FAX: +63-2-807-2417

VIETNAM

MITSUBISHI ELECTRIC VIETNAM CO.,LTD

Vietnam (Ho Chi Minh) Service Center
UNIT 01-04, 10TH FLOOR, VINCOM CENTER 72 LE THANH TON STREET, DISTRICT 1,
HO CHI MINH CITY, VIETNAM
TEL: +84-8-3910 5945 / FAX: +84-8-3910 5946

Vietnam (Hanoi) Service Satellite
6th Floor, Detech Tower, 8 Ton That Thuyet Street, My Dinh 2 Ward, Nam Tu Liem District, Hanoi,Vietnam
TEL: +84-4-3937-8075 / FAX: +84-4-3937-8076

INDONESIA

PT. MITSUBISHI ELECTRIC INDONESIA

Indonesia Service Center (Cikarang Office)
JL.Kenari Raya Blok G2-07A Delta Silicon 5, Lippo Cikarang-Bekasi 17550, INDONESIA
TEL: +62-21-2961-7797 / FAX: +62-21-2961-7794

THAILAND

MITSUBISHI ELECTRIC FACTORY AUTOMATION (THAILAND) CO.,LTD

Thailand Service Center
12TH FLOOR, SV.CITY BUILDING, OFFICE TOWER 1, NO. 896/19 AND 20 RAMA 3 ROAD,
KWAENG BANGPONGPANG, KHET YANNAWA, BANGKOK 10120,THAILAND
TEL: +66-2-682-6522-31 / FAX: +66-2-682-6020

INDIA

MITSUBISHI ELECTRIC INDIA PVT. LTD.

India Service Center
2nd FLOOR, TOWER A & B, DLF CYBER GREENS, DLF CYBER CITY,
DLF PHASE-III, GURGAON 122 002, HARYANA, INDIA
TEL: +91-124-4630 300 / FAX: +91-124-4630 399
Ludhiana satellite office
Jamshedpur satellite office

India (Pune) Service Center
EMERALD HOUSE, EL-3, J-BLOCK, MIDC BHOSARI. PUNE – 411 026, MAHARASHTRA, INDIA
TEL: +91-20-2710 2000 / FAX: +91-20-2710 2100
Baroda satellite office
Mumbai satellite office

India (Bangalore) Service Center
PRESTIGE EMERALD, 6TH FLOOR, MUNICIPAL NO. 2,
LAVELLE ROAD, BANGALORE - 560 043, KAMATAKA, INDIA
TEL: +91-80-4020-1600 / FAX: +91-80-4020-1699
Chennai satellite office
Coimbatore satellite office

OCEANIA

MITSUBISHI ELECTRIC AUSTRALIA LTD.

Australia Service Center
348 VICTORIA ROAD, RYDALMERE, N.S.W. 2116 AUSTRALIA
TEL: +61-2-9684-7269 / FAX: +61-2-9684-7245

CHINA

MITSUBISHI ELECTRIC AUTOMATION (CHINA) LTD. (CHINA FA CENTER)

China (Shanghai) Service Center
1-3,5-10,18-23/F, NO.1386 HONG QIAO ROAD, CHANG NING QU,
SHANGHAI 200336, CHINA
TEL: +86-21-2322-3030 / FAX: +86-21-2308-3000
China (Ningbo) Service Dealer
China (Wuxi) Service Dealer
China (Jinan) Service Dealer
China (Hangzhou) Service Dealer
China (Wuhan) Service Satellite

China (Beijing) Service Center
9/F, OFFICE TOWER 1, HENDERSON CENTER, 18 JIANGUOMENNEI DAJIE,
DONGCHENG DISTRICT, BEIJING 100005, CHINA
TEL: +86-10-6518-8830 / FAX: +86-10-6518-8030
China (Beijing) Service Dealer

China (Tianjin) Service Center
UNIT 2003, TIANJIN CITY TOWER, NO 35 YOUYI ROAD, HEXI DISTRICT,
TIANJIN 300061, CHINA
TEL: +86-22-2813-1015 / FAX: +86-22-2813-1017
China (Shenyang) Service Satellite
China (Changchun) Service Satellite

China (Chengdu) Service Center
ROOM 407-408, OFFICE TOWER AT SHANGRI-LA CENTER, NO. 9 BINJIANG DONG ROAD,
JINJIANG DISTRICT, CHENGDU, SICHUAN 610021, CHINA
TEL: +86-28-8446-8030 / FAX: +86-28-8446-8630

China (Shenzhen) Service Center
ROOM 2512-2516, 25/F., GREAT CHINA INTERNATIONAL EXCHANGE SQUARE, JINTIAN RD.S.,
FUTIAN DISTRICT, SHENZHEN 518034, CHINA
TEL: +86-755-2399-8272 / FAX: +86-755-8218-4776
China (Xiamen) Service Dealer
China (Dongguan) Service Dealer

KOREA

MITSUBISHI ELECTRIC AUTOMATION KOREA CO., LTD. (KOREA FA CENTER)

Korea Service Center
8F, Gangseo Hangang Xi-tower, 401 Yangcheon-ro, Gangseo-gu, Seoul 157-801, KOREA
TEL: +82-2-3660-9602 / FAX: +82-2-3664-8668

Korea Taegu Service Satellite
4F KT BUILDING, 1630 SANGYEOK-DONG, BUK-KU, DAEGU 702-835, KOREA
TEL: +82-53-382-7400 / FAX: +82-53-382-7411

TAIWAN

MITSUBISHI ELECTRIC TAIWAN CO., LTD. (TAIWAN FA CENTER)

Taiwan (Taichung) Service Center (Central Area)
NO.8-1, INDUSTRIAL 16TH RD., TAICHUNG INDUSTRIAL PARK, SITUN DIST.,
TAICHUNG CITY 40768, TAIWAN R.O.C.
TEL: +886-4-2359-0688 / FAX: +886-4-2359-0689

Taiwan (Taipei) Service Center (North Area)
10F, NO.88, SEC.6, CHUNG-SHAN N. RD., SHI LIN DIST., TAIPEI CITY 11155, TAIWAN R.O.C.
TEL: +886-2-2833-5430 / FAX: +886-2-2833-5433

Taiwan (Tainan) Service Center (South Area)
11F-1., NO.30, ZHONGZHENG S. ROAD, YONGKANG DISTRICT, TAINAN CITY 71067, TAIWAN, R.O.C.
TEL: +886-6-252-5030 / FAX: +886-6-252-5031

Notice

Every effort has been made to keep up with software and hardware revisions in the contents described in this manual. However, please understand that in some unavoidable cases simultaneous revision is not possible.
Please contact your Mitsubishi Electric dealer with any questions or comments regarding the use of this product.

Duplication Prohibited

MITSUBISHI CNC

MITSUBISHI ELECTRIC CORPORATION
HEAD OFFICE : TOKYO BLDG.,2-7-3 MARUNOUCHI,CHIYODA-KU,TOKYO 100-8310,JAPAN

MODEL	C70
MODEL CODE	100-011
Manual No.	IB-1500261

IB(NA)1500261(ENG)-M(1411)MEE
Made in JAPAN