MITSUBISHI ELECTRIC

Changes for the Better

MITSUBISHI CNC

Maintenance Manual

M800/M80 Series

IB-1501273(ENG)-A

Introduction

This manual covers the items required for maintaining the MITSUBISHI CNC M800/M80 Series. 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 optional 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.

The following screens described in this manual are the screens for Mitsubishi Electric's display unit.
If the display unit you are using is not manufactured by Mitsubishi, please contact the machine tool builder.

Software list
Hardware list
PLC ladder file list
Option
Alarm history
NC message
PLC message
I/F diagnosis
Self diagnosis
Data sampling
Drive monitor

⚠ 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 optional functions are added. Confirm the specifications issued by the machine tool builder before starting to 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 starting to use.**

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

Mitsubishi CNC is designed and manufactured solely for applications to machine tools to be used for industrial purposes.

Do not use this product in any applications other than those specified above, especially those which are substantially influential on the public interest or which are expected to have significant influence on human lives or properties.

1. Items related to prevention of electric shocks

⚠ WARNING

Do not open or remove 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 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, drive unit and motor 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.)

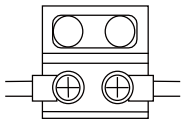
All wiring works, maintenance and inspections must be carried out by a qualified technician. Failure to observe this could result in electric shocks. Contact your nearby Service Center or Service Station for replacing parts and servicing.

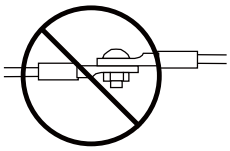
Wire the controller, drive unit and motor after installation. Failure to observe this could result in electric shocks.

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.





2. Items related to prevention of fire

⚠ CAUTION

Install the controller, drive unit, motor 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 power supply side. Continuous flow of large current could result in fires.

Install an appropriate no fuse breaker (NFB) and contactor (MC) on the power input section of the 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 motors or other metal objects. Also keep the devices with low magnetic tolerance away from the product.

⚠ CAUTION
Do not apply voltages to the connectors or terminals other than voltages indicated in the connection and setup manual for the controller or specifications manual for the drive unit. Failure to observe this could cause bursting, damage, etc.
Incorrect connections could cause the devices to rupture or damage, etc. Always connect the cables to the indicated connectors or terminals.
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 motor, 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 mass.**
- **Use motor's suspension bolts to transport the motor itself. Do not use it to transport the motor 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 motor.**
- **Do not transport the controller or drive unit by suspending or holding the connected wires or cables.**
- **Do not hold the front cover when transporting the 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 mass can be withstood according to the instruction manual.**
- **The motor does not have a complete water-proof (oil-proof) structure. Do not allow oil or water to contact or enter the motor. Prevent the cutting chips from being accumulated on the motor as they easily soak up oil.**
- **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 motor. (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, drive unit or motor. Failure to observe this could result in rupture or damage.**
- **Do not get on the product or place heavy objects on it.**
- **Provide prescribed distance between the controller/drive unit and inner surface of the control panel/other devices.**
- **Do not install or operate the controller, drive unit or motor 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 motor with the cooling fan.**
- **Install the controller's display section and operation board section on the spot where cutting oil will not reach.**
- **The controller, drive unit and motor are precision devices, so do not drop or apply thumping vibration and strong impacts on them.**
- **The controller and drive unit are precision devices, so do not drop or apply strong impacts on them.**
- **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.**

⚠ CAUTION

⚠ **Always install the motor 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 motor cannot be touched during motor rotation.**

⚠ **When installing a coupling 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).**

(2) Items related to wiring

⚠ CAUTION

⚠ **Correctly wire this product. Failure to observe this could result in motor runaway, etc.**

⚠ **Do not install a phase advancing capacitor, surge absorber or radio noise filter on the output side of the drive unit.**

⚠ **Correctly connect the output side (terminal U, V, W). The motor will not run properly if incorrectly connected.**

⚠ **Always install an AC reactor per each power supply unit.**

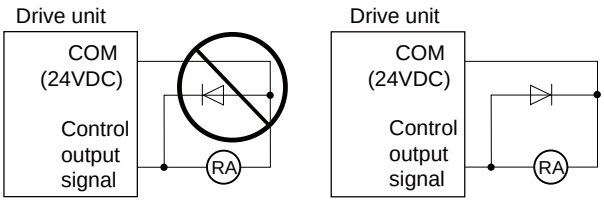
⚠ **Always install an appropriate breaker per each power supply unit. A breaker cannot be shared for multiple power supply units.**

⚠ **Do not directly connect a commercial power supply to the motor. 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 serially 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 cables between units 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 them.**

⚠ **Securely tighten the cable connector fixing screw or fixing mechanism. The motor could come off during operation if insecurely fixed.**

⏚ **Always treat the shield cables indicated in the Connection Manual with grounding measures such as cable clamps.**

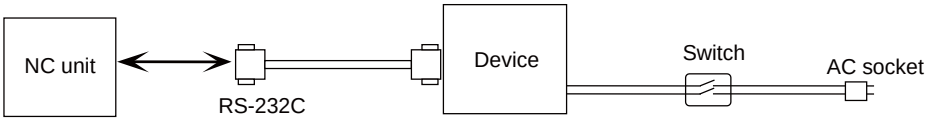
⚠ **Separate the signal wire from the drive line or power line when wiring.**

⚠ **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.**



⚠ CAUTION
⚠ Using a stabilized power supply without overcurrent protection may cause the unit's failure due to miswiring of 24V.
⚠ 12V, 5V, and 3.3V output from connectors are to supply the power for dedicated peripheral devices. Do not use for other equipment to supply the power since we do not guarantee the NC operation by voltage down or noise sneaking.
❗ When using an inductive load such as a relay, always connect a diode in parallel to the load to prevent a counter-electromotive force.
❗ When the rush current exceeds the maximum output current, always connect a protective resistor serially to the load to suppress rush currents.
⚠ The wires from the surge absorber should be connected without extensions.
⚠ 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) Set up

⚠ WARNING
❗ Do not cancel the emergency stop before confirming the basic operation.
❗ Always set the stroke end and stroke limit. Failure to set this could result in collision with the machine end.

⚠ CAUTION
⚠ If the descriptions relating to the "restrictions" and "allowable conditions" conflict between this manual and the machine tool builder's instruction manual. the latter has priority over the former.
⚠ The operations to which no reference is made in this manual should be considered "impossible".
⚠ This manual is complied on the assumption that your machine is provided with all optional functions. Confirm the functions available for your machine before proceeding to operation by referring to the specification issued by the machine tool builder.
⚠ In some NC system versions. there may be cases that different pictures appear on the screen, the machine operates in a different way on some function is not activated.
❗ If the battery low warning is issued, save the machining programs, tool data and parameters in an input/output device, and then replace the battery. When the battery alarm is issued, the machining programs, tool data and parameters may have been destroyed. Replace the battery and then reload the data.
❗ Do not adjust the spindle when possible risks associated with adjustment procedures are not thoroughly taken into consideration.
❗ Be careful when touching spindle's rotating section, or your hand may be caught in or cut.

(4) Adjustments

⚠ CAUTION
⚠ Check and adjust programs and each parameter before starting operation. Failure to observe this could result in unpredictable operations depending on the machine.
⚠ Do not make drastic adjustments or changes as the operation could become unstable.

(5) Usage

⚠ CAUTION

Install an external emergency stop circuit so that the operation can be stopped and the power turns OFF immediately when unforeseen situation occurs. 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, drive unit or motor.

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 in the case where electromagnetic disturbances could adversely affect the electronic devices used near the drive unit.

Use the drive unit, motor and each regenerative resistor with the designated combination. Failure to observe this could result in fires or faults.

The combination of the motor and drive unit that can be used is determined. Be sure to check the models of motor and 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 electromagnetic 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 that are complied with the power specification conditions (input voltage, input frequency, tolerable instantaneous power failure time) indicated in each specifications manual.

When making detector cables, do not mistake connection. Failure to observe this could result in malfunction, runaway or fire.

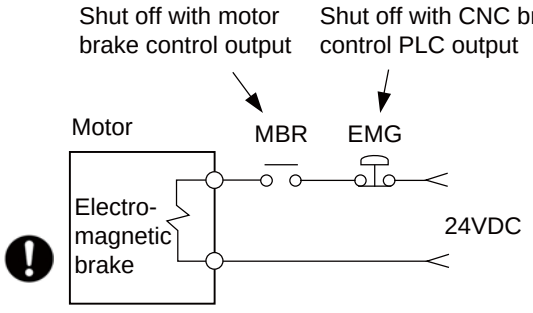
Surge absorber to be selected varies depending on input power voltage.

(6) Troubleshooting

⚠ CAUTION

Use a motor 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 drops (warning 9F) in the servo drive unit side.

If the battery voltage drop warning alarm occurs in the controller side, 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, memory loss could have happened. In that case, reload all the data backed up before the alarm occurrence.

(7) 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 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 replacing the battery.
⚠ 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.

(8) Disposal

⚠ CAUTION
⚠ Take the batteries and backlights for LCD, etc., off from the controller, drive unit and motor, and dispose of them as general industrial wastes.
⊘ Do not alter or disassemble controller, drive unit, or motor.
⚠ Collect and dispose of the spent batteries and the backlights for LCD according to the local laws.
⚠ Dispose the spent cooling fan according to the local laws.

(9) General precautions

To explain the details, drawings given in the 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!

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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 .

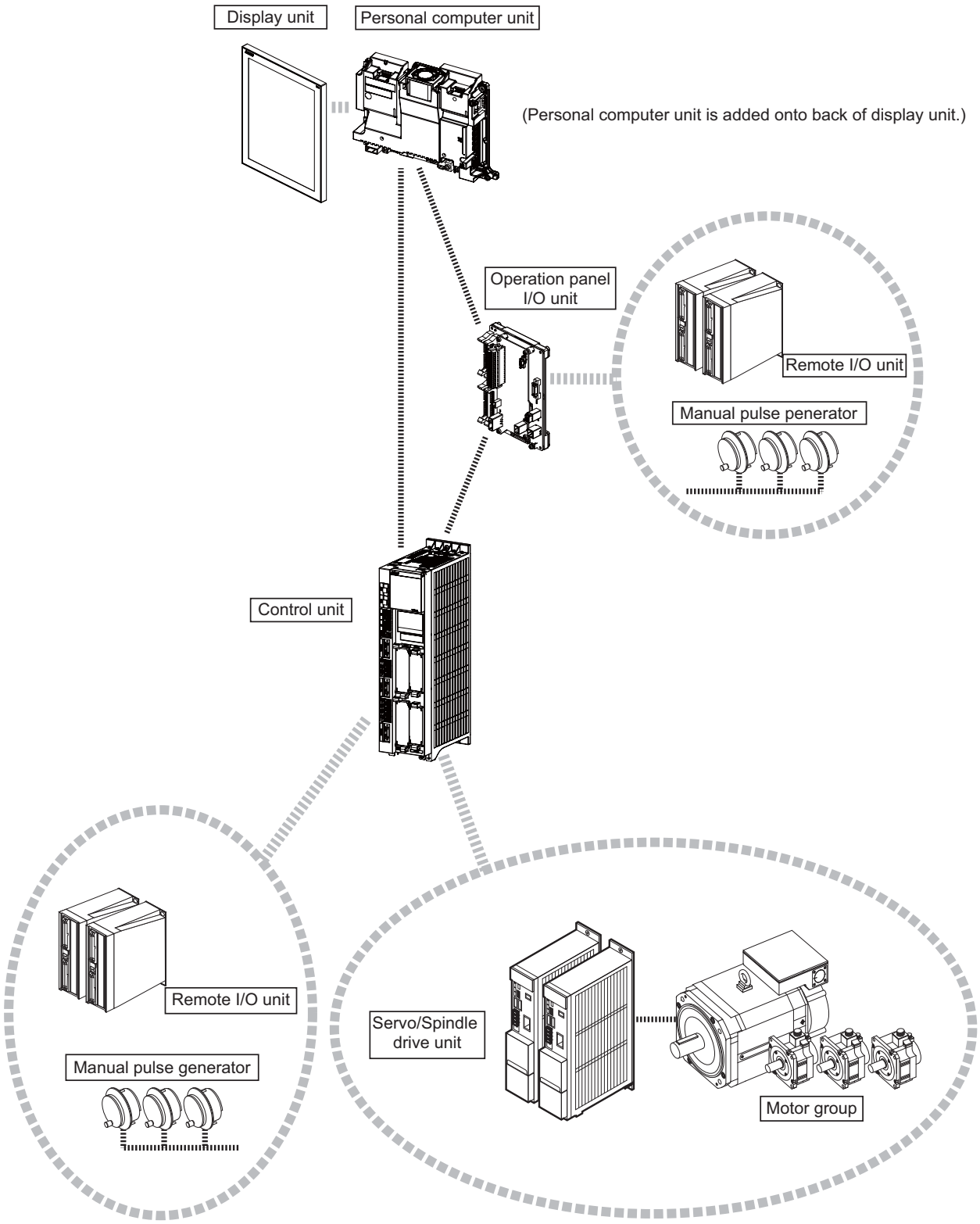
Contents

1

System Basic Configuration

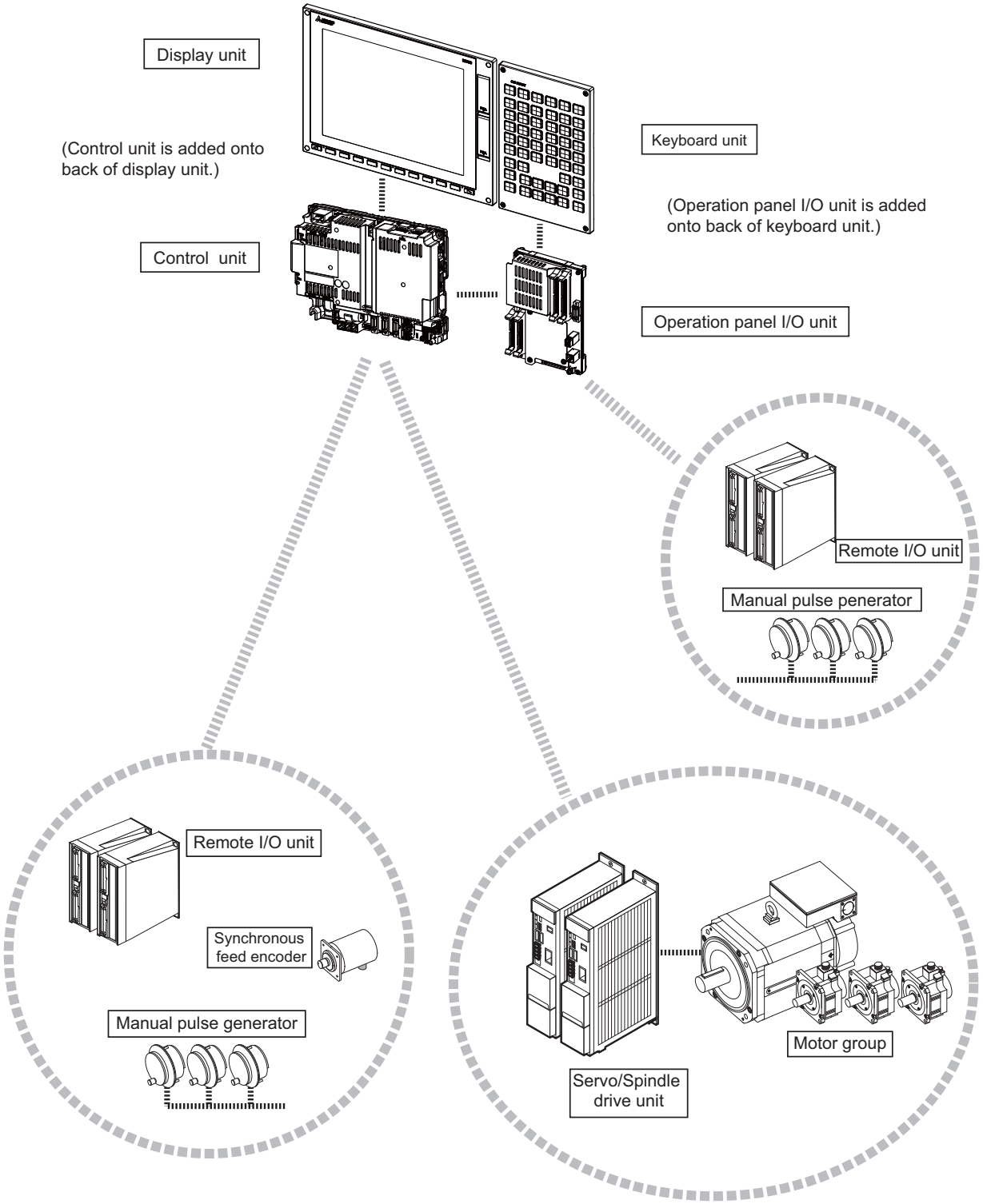
1.1 System Basic Configuration Drawing

[For M800W]



(Note) For the drive unit configuration, refer to the Instruction Manual of the drive unit you use.

[For M800S/M80]



(Note) For the drive unit configuration, refer to the Instruction Manual of the drive unit you use.

1.2 How to Check the System Configuration

How to check the hardware configuration, software configuration, etc. is explained below.

1.2.1 Hardware List

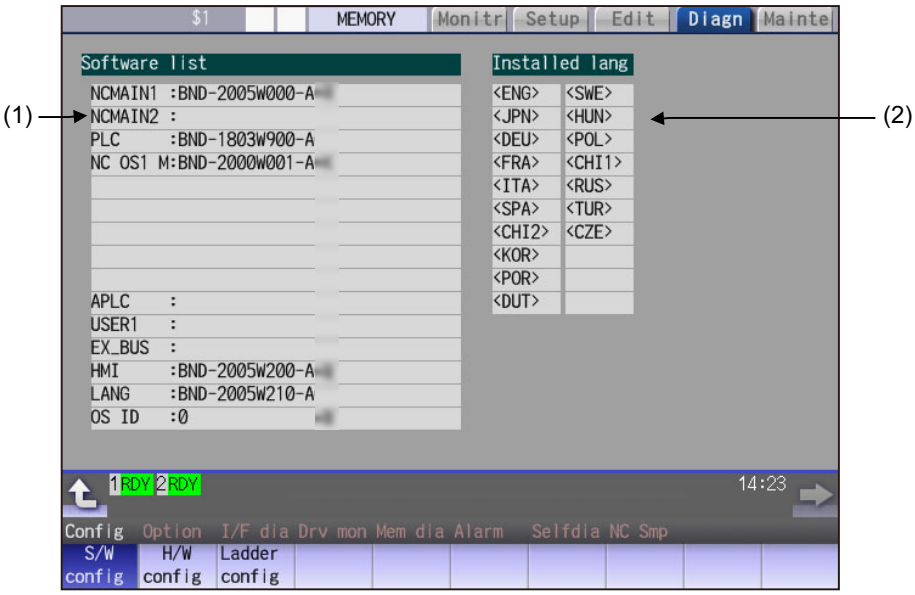
Select [Config]-->[H/W config] on the Diagn screen.

Display item		Details		Remarks
(3)	NC serial No.	This displays the NC model name, serial No, system type, and unit type.		
		NC TYPE :	NC type	
		MODEL NAME :	System type name	
		SERIAL NO. :	Serial No.	
		UNIT NAME :	Unit type	

Display item		Details			Remarks
(4)	Hardware list	This displays each hardware name. Use [PAGE▲] / [PAGE▼] keys to change the pages and refer it.			
		CNC	:WN111 :WN891 :WN091	Main card Back panel card 7SEG-RSW card * The cards which exist in the above order are displayed with top-alignment.	A CNC unit is composed of up to four boards. All of these cards are bus connection.
		ATT CARD	:WN521	Front-side SD IF card	
		EXT	:EX561 :EX562 :EX563	CC-Link expansion unit EtherNet/IP expansion unit PROFIBUS-DP card * The expansion units which exist in the above order are displayed with top-alignment.	The extension unit is a hardware option. The PLC high-speed engine or PROFIBUS card, etc. is connected. The back panel + up to three cards are displayed.
		DISPLAY	:DU191	Display unit	The unit type name differs depending on the model.
		KEYBOARD	:KB046	Keyboard unit	The unit type name differs depending on the connected keyboard unit.
		RIO1[n] RIO2[n] RIO3[n]	:WN301 :WN301 :WN301	Remote IO unit 1(n = 1 ～ 64) Remote IO unit 2(n = 1 ～ 64) Remote IO unit 3(n = 1 ～ 64)	The unit type name differs depending on the connected remote I/O unit. Up to three channels are displayed.

1.2.2 Software List

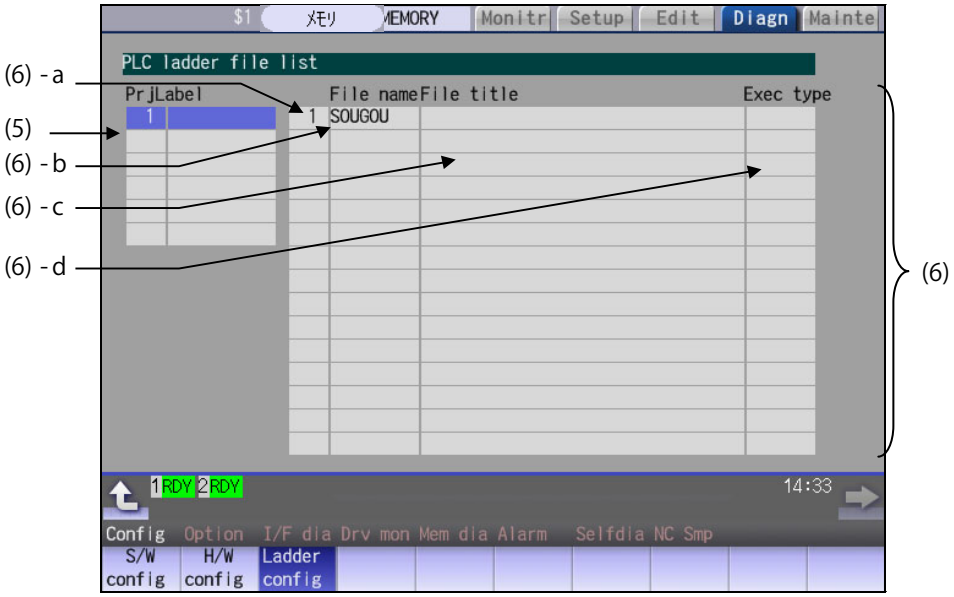
Select [Config]-->[S/W config] on the Diagn screen.



	Display item	Details	Remarks
(1)	Software list	This displays a list of the software being used.	
(2)	Installed lang	This displays a list of loaded languages. <ENG> : English <SWE> : Swedish <JPN> : Japanese <HUN> : Hungarian <DEU> : German <POL> : Polish <FRA> : French <CHI1> : (Simplified) Chinese <ITA> : Italian <RUS> : Russian <SPA> : Spanish <TUR> : Turkish <CHI2> : (Traditional) Chinese <CZE> : Czech <KOR> : Korean (Hangul) <POR> : Portuguese <DUT> : Dutch	

1.2.3 PLC Ladder File List

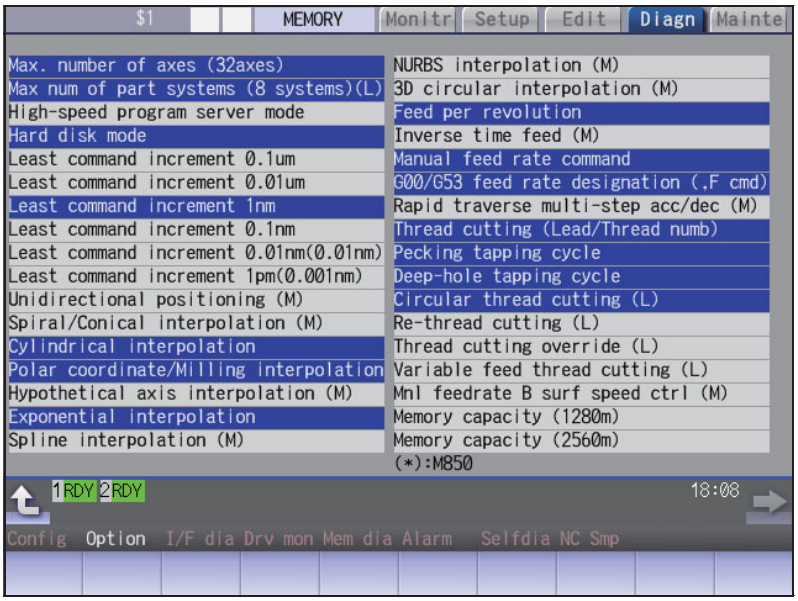
Select [Config]-->[Ladder config] on the Diagn screen.



Display item		Details		Remarks
(5)	Project	This displays a list of project Nos. Change the selected project by pressing the [↑] or [↓] key, and a list of the ladder files which belong to the project.		Up to 10 one-byte alphanumeric characters for the label
(6)	PLC ladder file list	This displays the file name, file title, and execution type for each PLC file. Use PAGE / PAGE keys to change the pages and refer it.		
		(a) Registration No.	This displays the registration No. of each PLC program file.	The total number of registration size and target file to be executed for all projects is as follows. M800W/M800S: 120 M80: 60
		(b) File name	This displays the file name of PLC program file. (data of GX Developer)	Max. 8 characters.
		(c) File label	This displays this file label of PLC program file. (data of GX Developer)	Max. 32 characters.
		(d) Execution type	This displays the execution type of PLC program. HIGH:High-speed PLC program MIDDLE:Middle-speed PLC program INTIAL:Initial state of PLC program WAIT:Standby PLC program LOW:Low-speed PLC program (blank):Not the target of the execution.	

1.2.4 Option

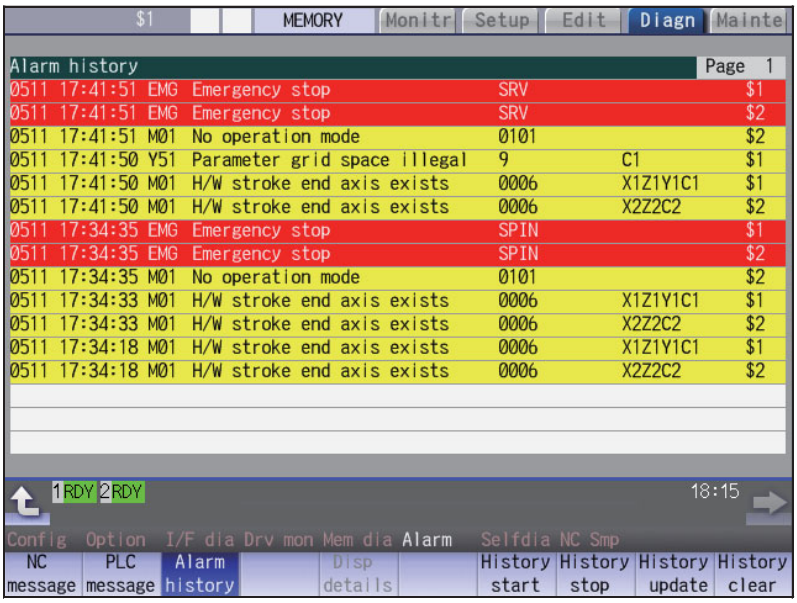
Select [Option] on the Diagn screen.



Display item	Details
(1) Option items	The list of currently usable options are displayed. As for the currently usable options, the background color is displayed in blue. The option set when the power supply was turned ON can be currently used.

1.3 How to Check the Alarm Screen

Select [Alarm]-->[Alarm history] on the Diagn screen.



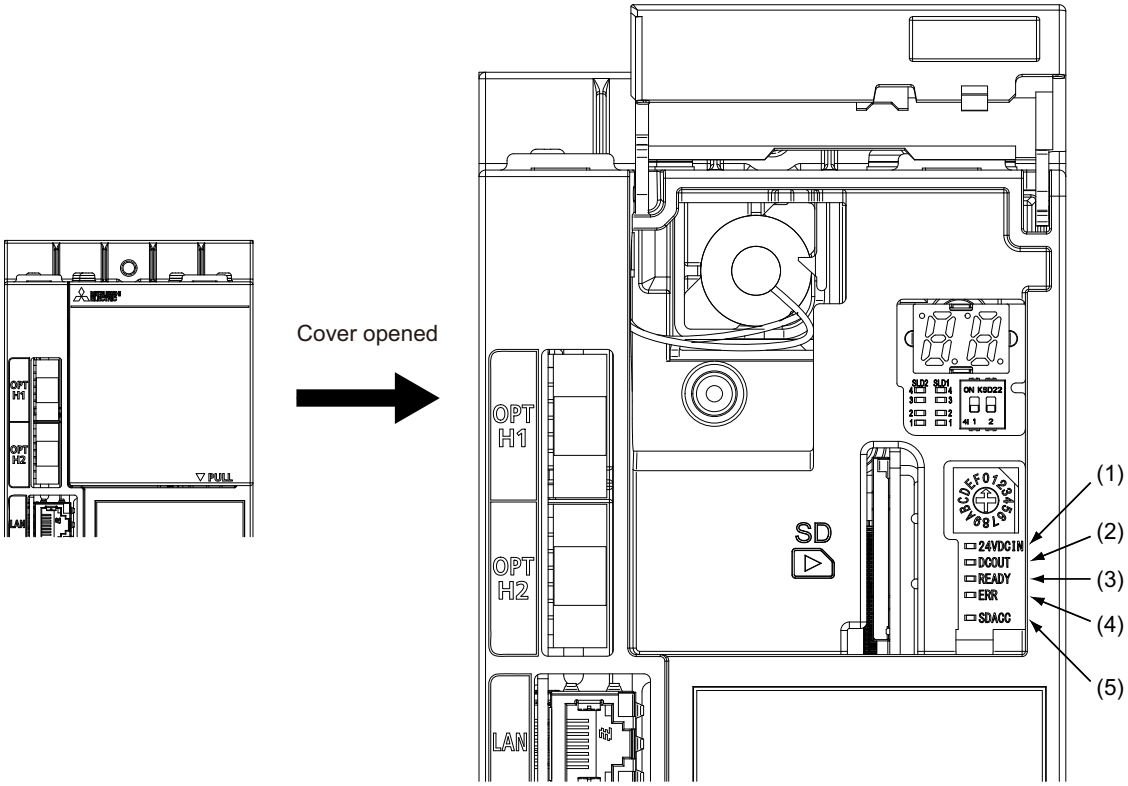
1.4 Each Unit Status Display

Each unit status can be confirmed by checking the LED mounted on each unit.

1.4.1 Control Unit

■ FCU8-MU042/FCU8-MA041 (M800W)

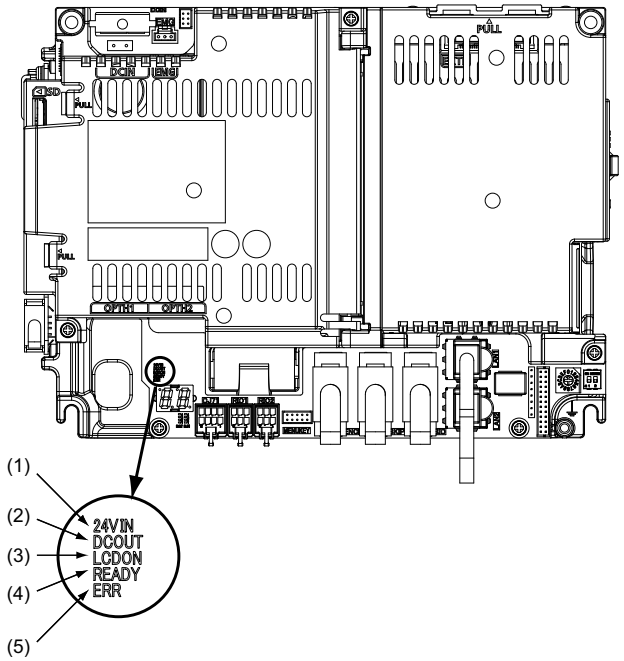
[LED]



No.	Name	Lamp state	Details
(1)	24VDCIN	Lit (Green)	24V power is being supplied from the external power supply.
		Not lit	The following may have caused an error: - No 24V-power supply from the external power supply. - Disconnection of fuse near DCIN connector. - Failure of LED.
(2)	DCOUT	Lit (Green)	The followings are all successfully output; 5V and 3.3V generated from 24V; 2.5V,1.8V,1.5V,1.15V, and 1.1V on the main card.
		Not lit	The followings may have caused an error: - No 24V-power supply from the external power supply. - Failure in any of the power output circuits. - Failure of LED or IC which helps turn the LED ON.
(3)	READY	Lit (Green)	Servo ON (or ready ON) state.
		Not lit	Servo OFF (or ready OFF) state.
(4)	ERR	Lit (Red)	H/W is not operating properly. The followings may have caused an error: - Occurrence of NC watchdog error. - Failure of main CPU card.
		Not lit	H/W is operating properly.
(5)	SDACC	Flashing (Green)	Accessing to front side SD card.
		Not lit	Not accessing to front side SD card.

■ FCU8-MU541/FCU8-MA541/FCU8-MU501/FCU8-MU502 (M800S/M80)

[LED]

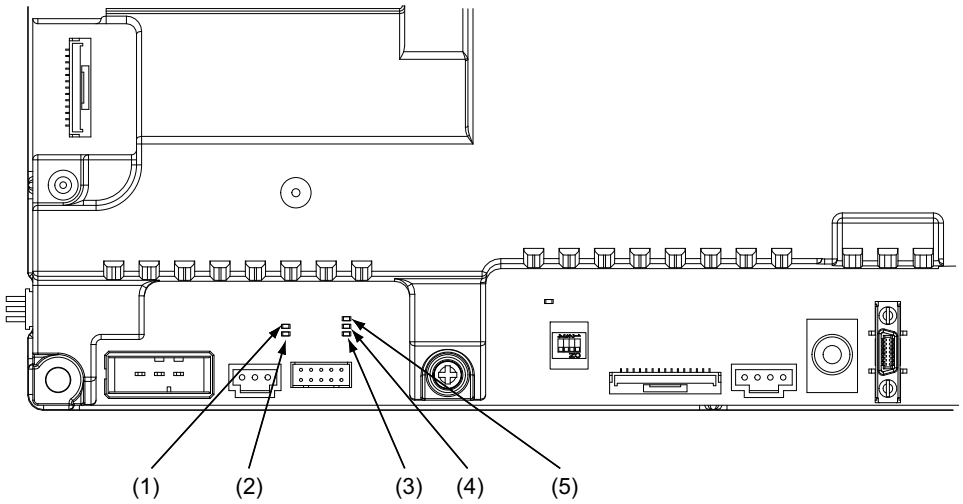


No.	Name	Lamp state	Details
(1)	24VIN	Lit (Green)	24VDC power is being supplied from the external power supply.
		Not lit	The following may have caused an error: - No 24VDC-power supply from the external power supply. - Disconnection of fuse near DCIN connector. - Failure of LED.
(2)	DCOUT	Lit (Green)	Internal voltage is normally output.
		Not lit	The followings may have caused an error: - No 24V-power supply from the external power supply. - Failure in any of the power output circuits. - Failure of LED or IC which helps turn the LED ON.
(3)	LCDON	Lit (Green)	12VDC for the backlight of display unit is normally output.
		Not lit	The followings may have caused an error: - Failure of 12VDC output in control unit. - 24VDC input voltage is +20V or less.
(4)	READY	Lit (Green)	Ready ON state.
		Not lit	Ready OFF state.
(5)	ERR	Lit (Red)	H/W is not operating properly. The followings may have caused an error: - Occurrence of NC watchdog error. - Failure of main CPU card.
		Not lit	H/W is operating properly.

1.4.2 Personal Computer Unit

■ FCU8-PC231 (M800W)

[LED]

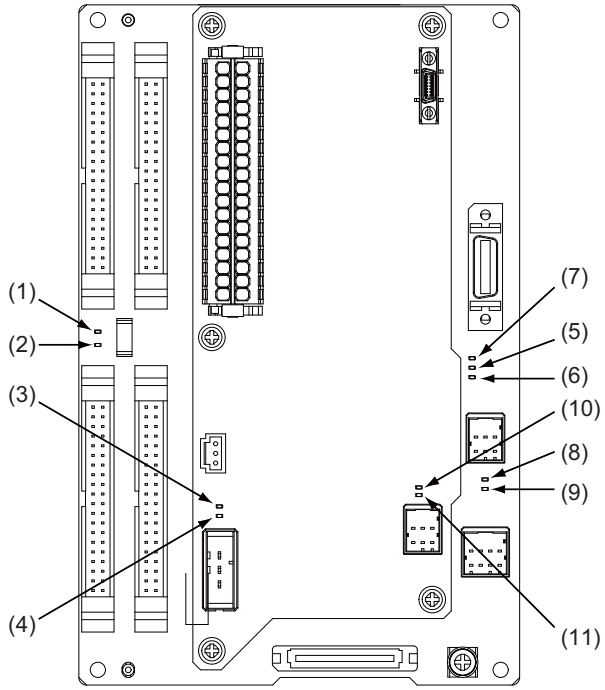


No.	Name	Function	Color	Status	
				Normal	At fault
(1)	DCIN	24VDC input observation	Green	Lit	Not lit
(2)	DCOUT	DC internal power supply output observation	Green	Lit	Not lit
(3)	12V	12VDC output observation	Green	Lit	Not lit
(4)	5V	5VDC output observation	Green	Lit	Not lit
(5)	3.3V	3.3VDC output observation	Green	Lit	Not lit

1.4.3 Operation Panel I/O Unit

■ FCU8-DX830/FCU8-DX837 (M800W)

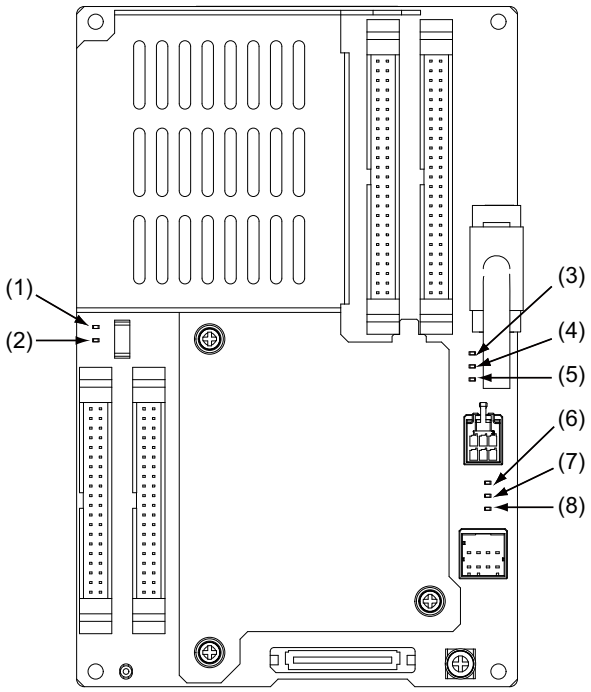
[LED]



No.	Name	Function	Color	Status		Details
				Normal	At fault	
(1)	24VDCIN	Energization status of 24VDC input of DCIN connector	Green	Lit	Not lit	Lit when a current is applied.
(2)	EMG	Emergency stop input status	Red	Not lit	Lit	Lit when an emergency stop has occurred.
(3)	DOCOM	Energization status of DC24V input (DOCOM) of CG32/CG34 connector	Green	Lit	Not lit	Lit when a current is applied.
(4)	FUSE	Fuse status	Green	Lit	Not lit	Not lit when a fuse has been blown out.
(5)	5VIN	5V power supply circuit status	Green	Lit	Not lit	Lit when the circuit is normally operated.
(6)	3VIN	3.3V power supply circuit status	Green	Lit	Not lit	Lit when the circuit is normally operated.
(7)	12VON	12V power supply circuit status	Green	Lit	Not lit	Lit when the circuit is normally operated.
(8)	ALM1	RIO communication error	Red	Not lit	Lit	Lit when RIO communication error has occurred.
(9)	ALM2	RIO communication error	Red	Not lit	Lit	Lit when RIO communication error has occurred.
(10)	ALM3	RIO communication error	Red	Not lit	Lit	Lit when RIO communication error has occurred.
(11)	ALM4	RIO communication error	Red	Not lit	Lit	Lit when RIO communication error has occurred.

■ FCU8-DX750 (M800S/M80)

[LED]

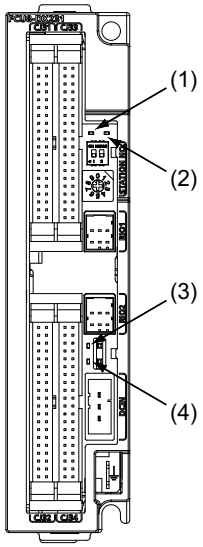


No.	Name	Function	Color	Status		Details
				Normal	At fault	
(1)	FUSE	Fuse status	Green	Lit	Not lit	Not lit when a fuse has been blown out.
(2)	DOCOM	Energization status of DC24V input (DOCOM) of CJ38/CJ40 connector	Green	Lit	Not lit	Lit when a current is applied.
(3)	12VON	12V power supply circuit status	Green	Lit	Not lit	Lit when the circuit is normally operated.
(4)	5VIN	5V power supply circuit status	Green	Lit	Not lit	Lit when the circuit is normally operated.
(5)	3VIN	3.3V power supply circuit status	Green	Lit	Not lit	Lit when the circuit is normally operated.
(6)	ALM1	RIO communication error	Red	Not lit	Lit	Lit when RIO communication error has occurred.
(7)	ALM2	RIO communication error	Red	Not lit	Lit	Lit when RIO communication error has occurred.
(8)	ALM3	RIO communication error	Red	Not lit	Lit	Lit when RIO communication error has occurred.

1.4.4 Remote I/O Unit

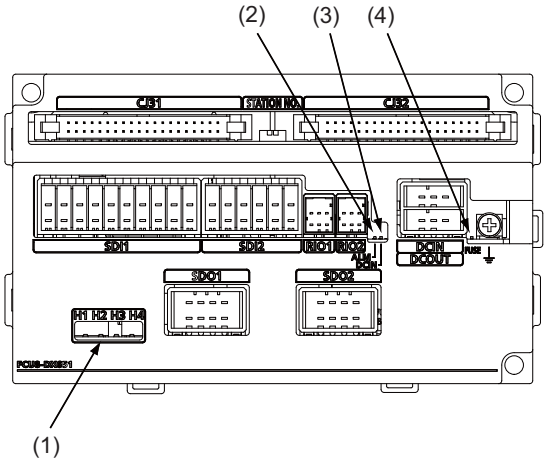
■ FCU8-DX220/FCU8-DX230/FCU8-DX231/FCU8-DX213/FCU8-DX651/FCU8-DX654

[LED : FCU8-DX220 / FCU8-DX230 / FCU8-DX231 / FCU8-DX213 / FCU8-DX654]



No.	Name	Function	Color	Status		Details
				Normal	At fault	
(1)	RIOVER	RIO communication status	Green	Lit during RIO 2.0 communication Not lit during RIO 1.0 communication		
(2)	ALM	RIO communication error	Red	Not lit	Lit	Lit when RIO communication error has occurred.
(3)	FUSE	Fuse status	Green	Lit	Not lit	Not lit when a fuse has been blown out.
(4)	24VDCIN	Energization status of 24VDC input of DCIN connector	Green	Lit	Not lit	Lit when a current is applied.

[LED : FCU8-DX651]

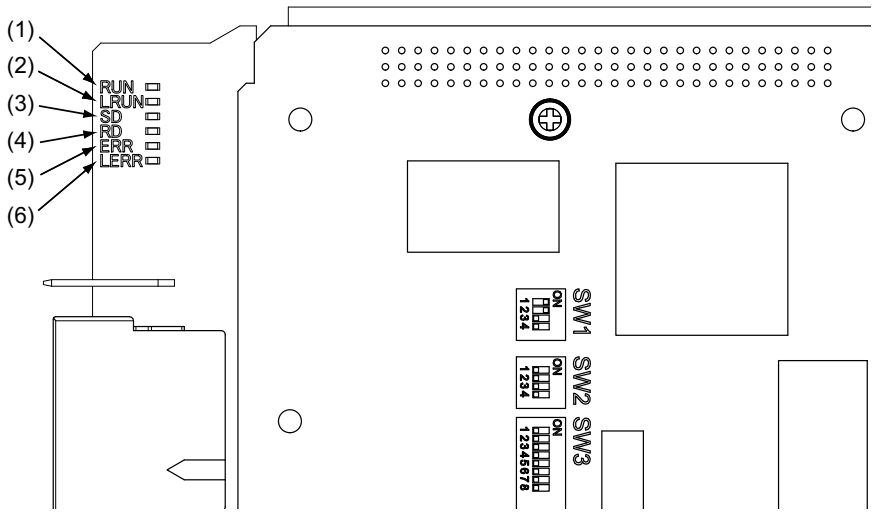


No.	Name	Function	Color	Status		Details
				Normal	At fault	
(1)	H1	Safety relay output SYR00 status	Green	Lit	Not lit	Not lit when a relay has been blown out.
	H2	Safety relay output SYR01 status	Green	Lit	Not lit	Not lit when a relay has been blown out.
	H3	Safety relay output SYR02 status	Green	Lit	Not lit	Not lit when a relay has been blown out.
	H4	Safety relay output SYR03 status	Green	Lit	Not lit	Not lit when a relay has been blown out.
(2)	ALM	RIO communication error	Red	Not lit	Lit	Lit when RIO communication error has occurred.
(3)	DCIN	Energization status of 24VDC input of DCIN connector	Green	Lit	Not lit	Lit when a current is applied.
(4)	FUSE	Fuse status	Green	Lit	Not lit	Not lit when a fuse has been blown out.

1.4.5 CC-Link Expansion Unit

■ FCU8-EX561

[LED]



No.	Name	Color	Status	Details
(1)	RUN	Green	Lit	CC-Link module in the normal state
			Not lit	Watchdog timer error
(2)	LRUN	Green	Lit	Data link in process of execution
(3)	SD	Green	Lit	During data transmission
(4)	RD	Green	Lit	During data reception
(5)	ERR	Red	Lit	Switch setting error (LERR is also lit), overlapping of master, parameter error, communication error
			Flashing	Other station data link error (when it is master station)
(6)	LERR	Red	Lit	Data link communication error
			Flashing	Station and mode change during operation

(Note 1) There is the equivalent LED display in the CC-Link module side, however, the LED display is hidden by the unit cover. Therefore, LED display is also mounted in the WN561 card side and the LED display in the CC-Link module side can be ignored.

(Note 2) The table above is the same as the order of WN561 card.

(Note 3) All LED of WN561 card (RUN, LRUN, SD, RD, ERR, LERR) are lit during resetting of the CC-Link module.

2

Daily Maintenance and Periodic Maintenance

Maintenance is categorized into daily maintenance items (items to be carried at set intervals) and periodic maintenance items (replacement of parts when life is reached).
Some parts will not function in a hardware manner when the life is reached, so these should be replaced before the life is reached.
For details of the inspection and maintenance of the drive section, refer to the instruction manuals for each drive unit.

Class	Name	Life	Inspection/replacement	Remarks
Daily maintenance	Touchscreen		Accordingly (when the touchscreen is slow in reaction or dirty)	
	Escutcheon (display unit area, keyboard, etc.)		Once/two months (Accordingly when dirty)	
Periodic maintenance	Battery (lithium battery)	Cumulative data holding time:45,000 hr	When battery voltage drop caution alarm occurs (Guideline: approx. 5 years)	

2.1 Daily Maintenance

2.1.1 Touchscreen

The touchscreen may become poor sensitive or even may not react at the touch operation when it gets dirt.
Clean the touchscreen frequently.

(1) Cleaning the touchscreen
  (a) When metal powder or sand dust is on the touchscreen, remove it to prevent the scratches.
  (b) Wipe the screen gently with a soft and clean cloth.

(2) Precautions for use
- The polarizing plate (display surface) of the touchscreen surface can be easily scratched, so be careful during handling.
- Glass is used in the touchscreen. Be careful not to drop the touchscreen or allow it to hit hard objects, as the glass may chip or break.
- The polarizing plate may be stained or discolored if drops of water, etc., adhere to it for long periods, so be sure to wipe off any moisture immediately.
- Wipe off any dirt, dust, etc., on the polarizing plate using absorbent cotton or other soft cloth.
- Electronic parts are used in the touchscreen, so be careful of static electricity when handling.
- Never disassemble the touchscreen. Doing so will damage the panel.

(3) Precautions for storage
- Do not store the touchscreen in locations having a high temperature or humidity. (Store within the storage temperature range.)
- When storing the touchscreen as an individual unit, be sure that other objects do not touch or hit the polarizing plate (display surface).
- When storing the touchscreen for long periods, be sure to store in a dark place away from exposure to direct sunlight or fluorescent light.

2.1.2 Escutcheon

(1) Cleaning the escutcheon
  (a) Prepare the front side of the escutcheon to clean.
  (b) Wipe the escutcheon with a soft, clean, dry cloth. If cleaning is still required, put some neutral detergent on a cloth and wipe. Do not use alcohol, thinner, etc.

2.2 Periodic Maintenance

2.2.1 List of Durable Parts

Durable parts	Part type
Battery for control unit	Q6BAT
Personal computer unit cooling fan	109P0424H3013

(*) Contact the Service Center, Service Station, Sales Office or delayer for repairs or part replacement.

2.2.2 Durable Parts Replacement

2.2.2.1 Control Unit Battery

⚠ **The battery is not connected when the machine is delivered. Be sure to connect the battery before starting up.**

A lithium battery in the control unit battery holder retains parameter settings, machining programs and the like, which requires to be backed up at the power OFF.

Battery	Q6BAT
Battery cumulative data holding time	45,000 hours (At 0 to 45° C. The life will be shorter if the temperature is high.)
Battery life	Approx. 5 years (from date of battery manufacture)

[Precautions for handling battery]

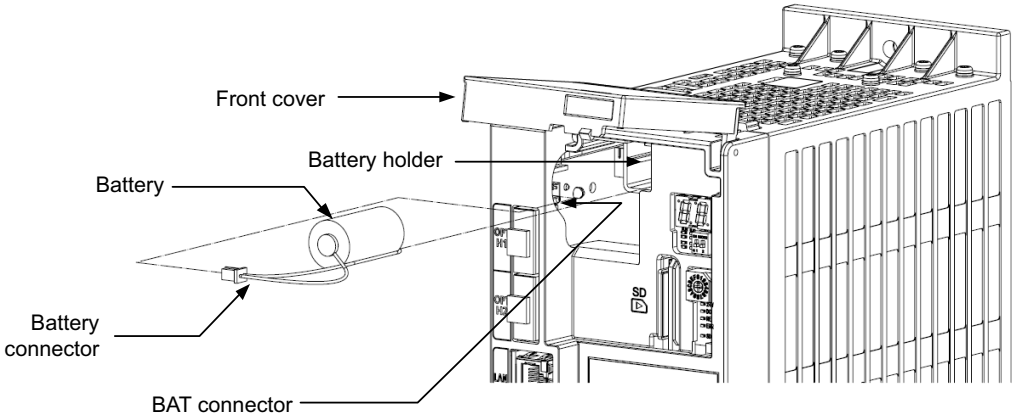
(1) Do not disassemble the battery.
(2) Do not place the battery in flames or water.
(3) Do not pressurize and deform the battery.
(4) This is a primary battery so do not charge it.

> ⚠ **CAUTION**
>
> **Do not short-circuit, charge, overheat, incinerate or disassemble the battery.**

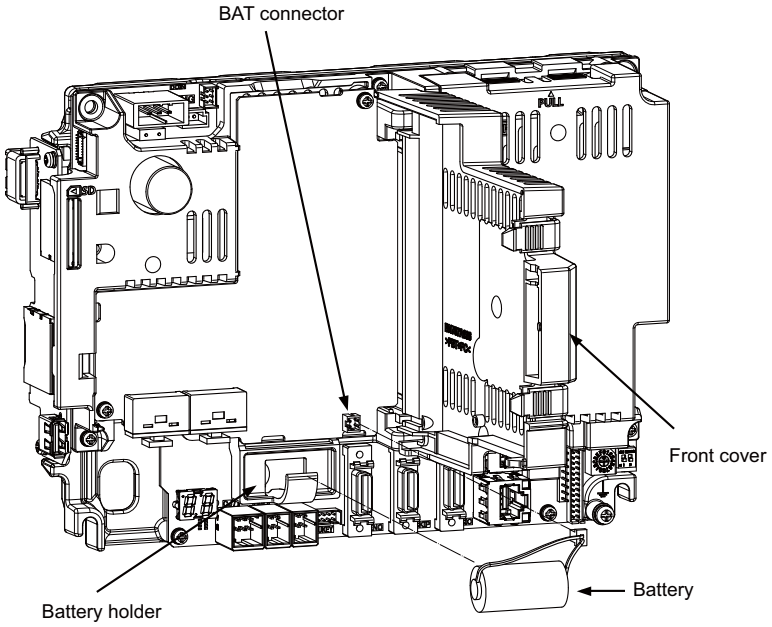
[Replacement procedures]

(1) Check that the machine power is turned OFF. (If the power is not OFF, turn it OFF.)
(2) Confirm that the control unit LED, 7-segment display, etc., are all OFF.
(3) Open the front cover of the control unit.
(4) Remove the connector from the control unit BAT connector.
(5) Replace the old battery with the new battery in the battery holder.
(6) Insert the connector connected to the new battery into the BAT connector. Pay attention to the connector orientation: do not insert backwards.
(7) Close the front cover of the control unit. At this time, confirm that the cover is closed by listening for the "click" sound when the latch catches.

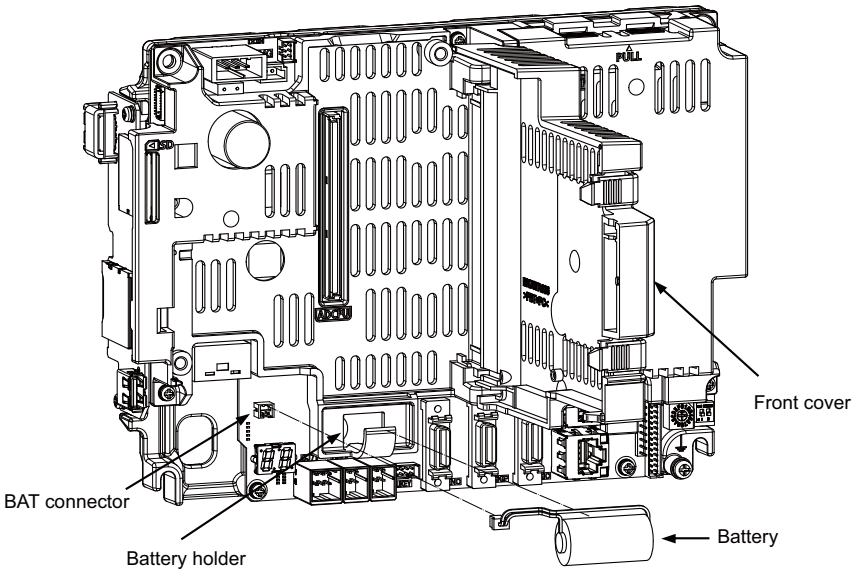
[FCU8-MU042 / FCU8-MA041] (M800W)



[FCU8-MU541 / FCU8-MA541] (M800S)



[FCU8-MU501 / FCU8-MU502] (M80)



2.2.2.2 Personal Computer Unit Cooling Fan

Type	109P0424H3013
Life	60,000 hours (When the rotary speed decreased 30% less than the initial values)

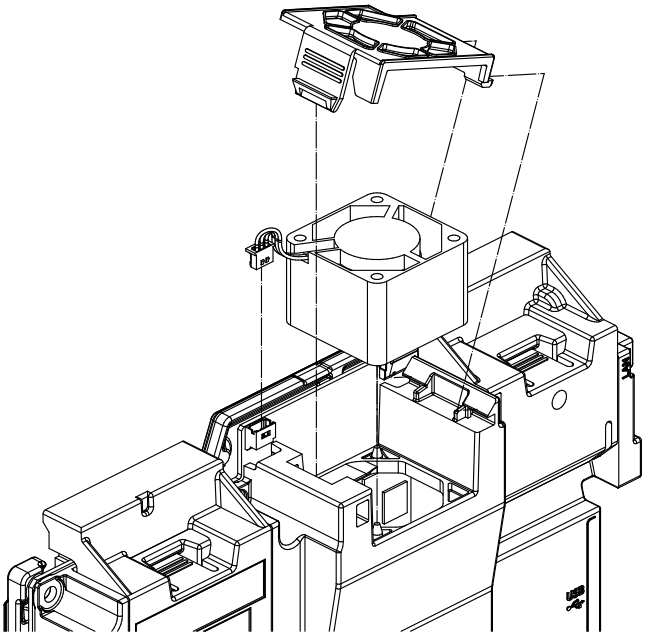
(Note) The life is estimated on the assumption that it is used under 60°C environment. Keep in mind that the value above is not a guaranteed value.

[Replacement procedures]

Always replace the personal computer unit cooling fan with the machine power turned OFF.

(1) Check that the machine power is turned OFF. (If the power is not OFF, turn it OFF.)
(2) Open the electric cabinet door.
(3) Remove the fan cover on the personal computer unit. (Remove the fan cover by holding down the tab on the left side surface.)
(4) Disconnect the cooling fan connector.
(5) Remove the cooling fan from the personal computer unit cooling fan housing.
(6) Replace the cooling fan with new one. Insert the connector from the new cooling fan into the personal computer unit.
(7) Install the fan cover taking care not to pinch the cooling fan wiring with the fan cover.
(8) Confirm that all the cables are correctly connected and close the electric cabinet door.

[FCU8-PC231] (M800W)



⚠ CAUTION

1. Do not replace the cooling fan while the power is ON.

2. Dispose the spent cooling fan according to the local laws.

3

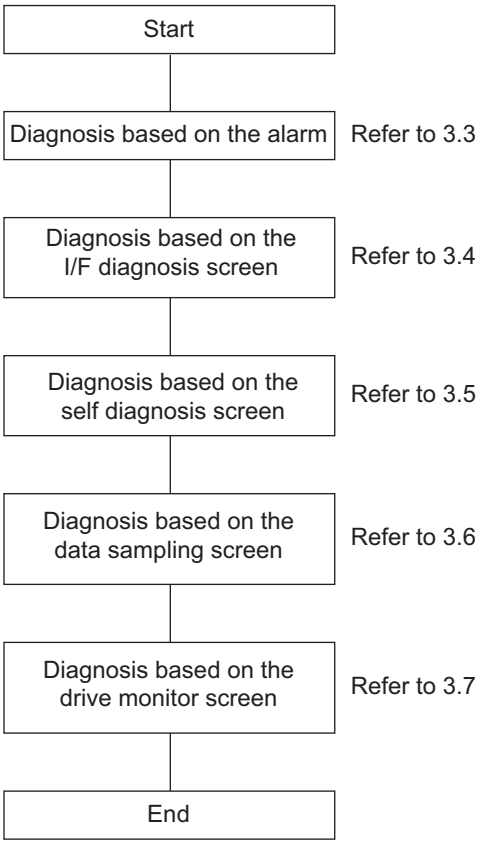
Failure Diagnosis

3.1 Introduction

If trouble occurs during operation, the accurate cause must be found so that adequate measures can be taken. Perform the following checks for this.
Confirm "when", "when doing what", "what kind of trouble" and "how frequently" the trouble occurred. Also check how many years the machine has been operated, and how many hours a day it is used.

3.2 Failure Diagnosis Procedure

Investigate the cause of the failure according to the following procedures.



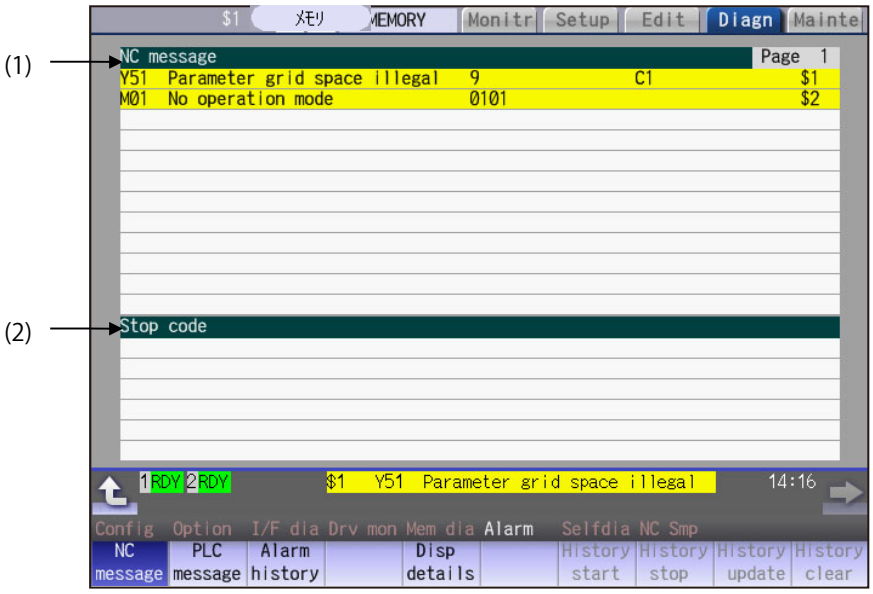
3.3 Diagnosis Based on the Alarm

Alarm information includes the "NC message", "PLC message", and "Alarm history".

3.3.1 How To Check the Alarm Information

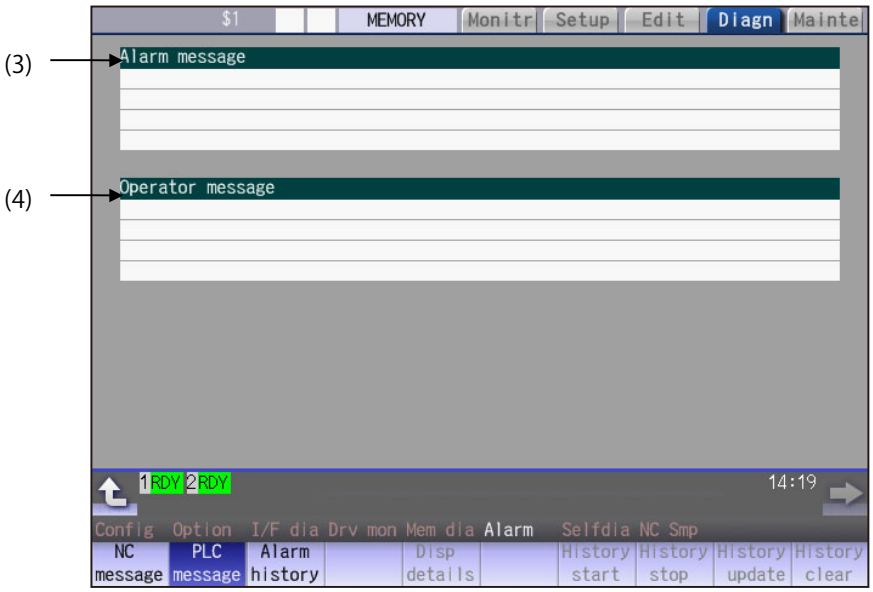
■ NC Message

Select [Alarm]-->[NC message] on the Diagn screen.



■ PLC Message

Select [Alarm]-->[PLC message] on the Diagn screen.



Display items

Display item		Details
(1)	NC alarm	This displays the operation alarms, program errors, MCP alarms, servo alarms, system alarms, etc. Up to 10 messages are displayed in order of priority.
(2)	Stop code	This displays the automatic operation status or stop status during automatic operation. Up to 4 messages are displayed in order of priority.
(3)	Alarm message	Using the PLC programs, this displays messages such as details of machine abnormalities. Up to 4 messages are displayed.
(4)	Operator message	Using the PLC programs, this displays operator information messages. Macro alarm messages are also displayed in this field. Up to 4 messages are displayed.

Message display colors

The messages are color-coded in the following manner.

Message type		Character color	Background color
NC message	Alarm	White	Red
	Warning	Black	Yellow
Stop code		Black	Yellow
Alarm message		White	Red
Operator message		Black	Yellow
NC alarm message at background check		White	Orange

Axis name display

The axis name is displayed in messages for each axis. The axis name is displayed as shown below according to the axis type.

Axis type	Axis name display	Display example	Remarks
NC axis	Control axis name (Name of axis in part system)	XYZ	If the same message occurs for each part system, several NC axes are displayed together.
Spindle	'S' + spindle No.	S1S2	If the same message occurs, several spindles are displayed together.
PLC axis	'P' + PLC axis No.	P1P2	If the same message occurs, several PLC axes are displayed together.
Auxiliary axis	'A' + auxiliary axis No.	A1A2	If the same message occurs, several auxiliary axes are displayed together.

If the same message occurs for different axis types, they will appear as separate messages.

Part system display

The part system name is also displayed if the message is output for each part system. The part system name set in "#1169 system name" is displayed. The part system name does not appear for the 1-part system.

3.3.1.1 Alarm History

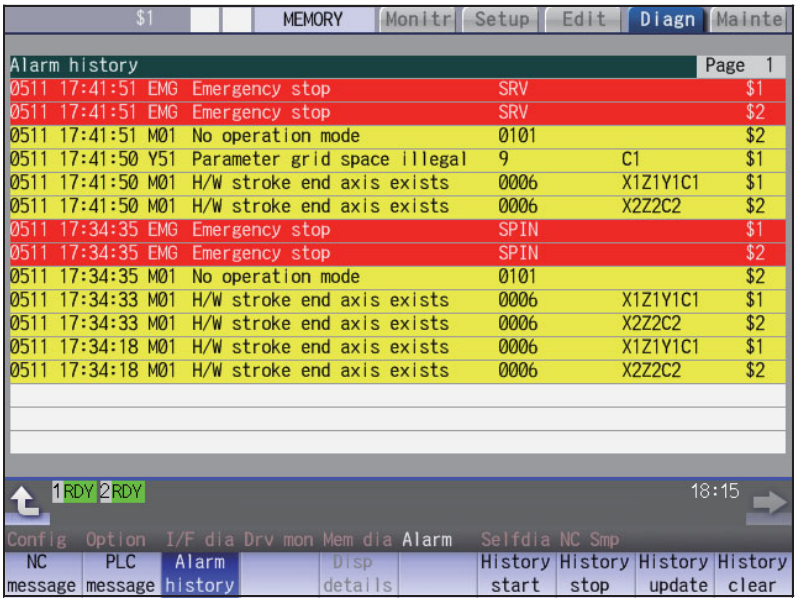
When an alarm occurs, the alarm information is recorded. When the NC power is ON, an alarm is automatically recorded in alarm history. Alarm information is recorded from the latest alarm to 512. Alarm information recorded in the history is NC message and a stop code displayed on "NC message" screen and alarm messages displayed on "PLC message" screen. The range etc. of record are shown as follows.

Record condition: When an alarm occurs (When two or more alarms occur at the same time, up to five alarms are recorded.)

With multi-part system, 1st part system is given priority and recorded. (Following 2nd part system, 3rd part system...)

Number of history: 512 alarms (Whole)

Range of record: NC alarm (alarm, warning), stop code, PLC alarm message



3.3.2 Alarm Message Details

Methods to confirm the alarm message details (Details, Remedy) are as follows.

- Confirm by "Guidance display" on the NC screen
- Confirm by "Alarm manual"

■ To confirm by "Guidance display" on the NC screen

Confirm details with the alarm guidance (alarm message details) displayed on the NC screen by pushing the key.

■ To confirm by "Alarm manual"

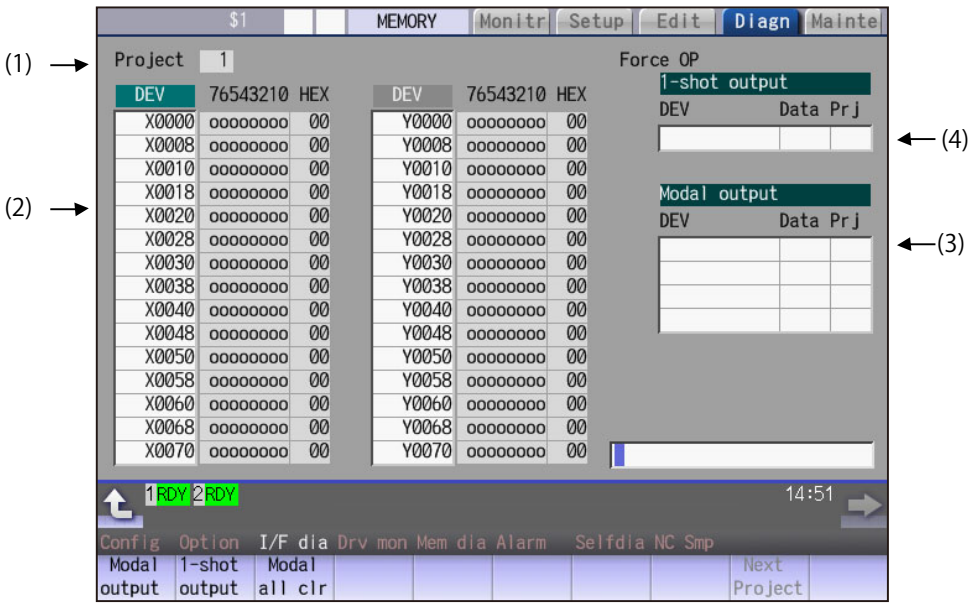
Obtain "M800/M80 Series Alarm/Parameter Manual : IB-1501279" and confirm details.

3.4 Diagnosis Based on the I/F Diagnosis Screen

3.4.1 I/F Diagnosis Screen

Select [I/F dia] on the Diagn screen.

The various input/output signals for the PLC (Programmable Logic Controller) control is confirmed.

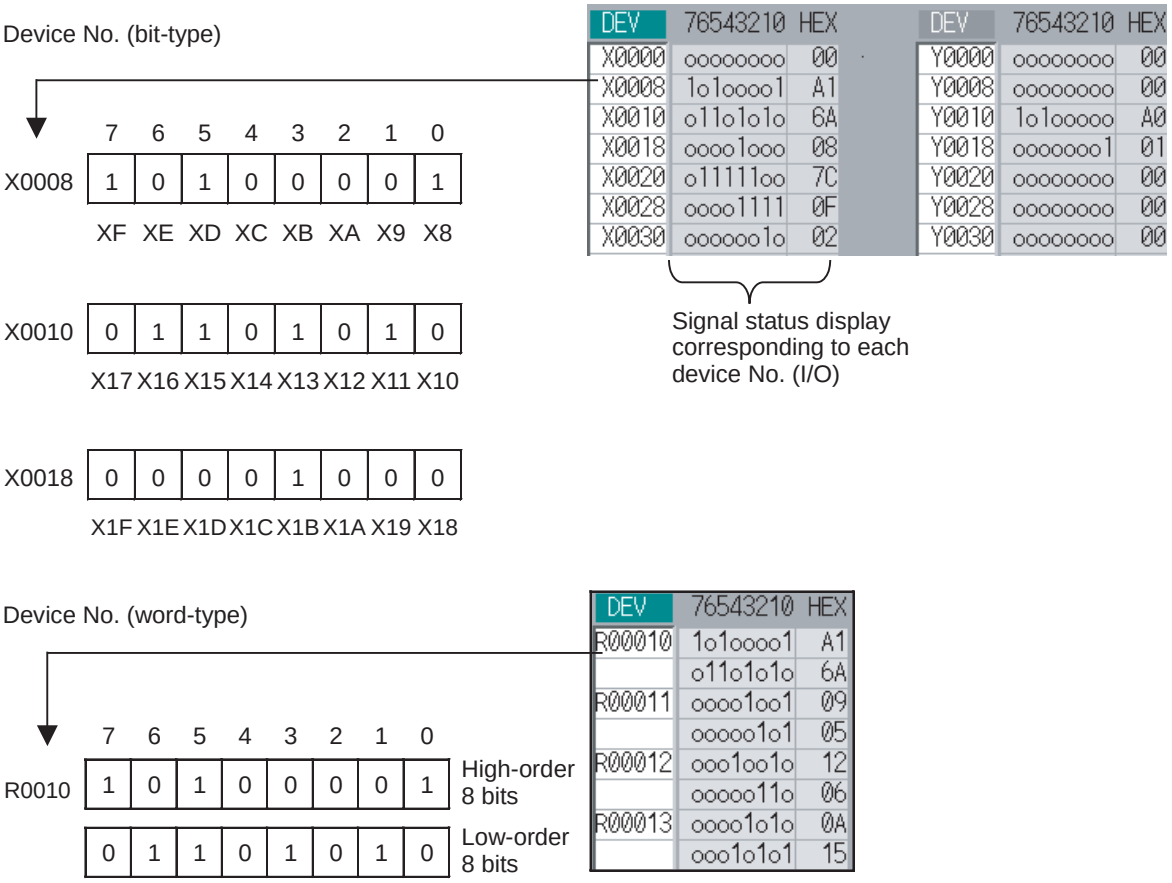


Display items

Display item		Details
(1)	Project	This displays the currently displayed project.
(1)	Device No. and input/ output signal value (binary/ hexadecimal display)	This displays the data from the device Nos. designated in the setting area in numerical order.The data is displayed as binary (bit units) and hexadecimal values.Individual device Nos. can be displayed separately in the left area and right area. Select the valid area with theand |<- key when ->| operations such as display changeover and data setting are carried out. Target devices: X, Y, M, L, F, SB, B, SM, V, SW, SD, TI, TO, TS, TA, STI, STO, STS, STA, CI, CO, CS, CA, D, R, ZR, W X, Y, R, and ZR are common for each project.
(3)	Modal output	This displays the data and device to carry out modal output. The details to be defined are set here when carrying out the modal type forced output of PLC interface signals. Refer to Instruction Manual for details.
(4)	1-shot output	This displays the data and device to carry out one-shot output. The details to be defined are set here when carrying out the one-shot type forced output of PLC interface signals. Refer to Instruction Manual for details.

3.4.2 How to Read the Device No. and Display Data

A device is an address for classifying a signal handled in the PLC. A device No. is a series of numbers attached to that device.



3.4.3 List of Devices for PLC Uses

Device	Device No.	No. of points (Max. No. of points for projects)	Units	Details
X(*)	X0 to X1FFF	8192	1-bit	Input signals to the PLC. Machining input, etc. (Common for projects)
Y	Y0 to Y1FFF	8192	1-bit	Output signals from the PLC. Machining output, etc. (Common for projects)
M	M0 to M122879	122880	1-bit	For temporary memory
L	L0 to L2047	2048	1-bit	Latch relay (Backup memory)
F	F0 to F4095	4096	1-bit	For temporary memory. Alarm message interface.
SB	SB0 to SB7FF	2048	1-bit	MELSEC NET/10 link special relay
B	B0 to B1BFFF	114688	1-bit	MELSEC NET/10 link relay
SM(*)	SM0 to SM16383	16384	1-bit	Special relay
V	V0 to V1023	1024	1-bit	MELSEC NET/10 edge relay
SW	SW0 to SW7FF	2048	16-bit	MELSEC NET/10 link special register
SD	SD0 to SD16383	16384	16-bit	MELSEC NET/10 special register
TI	TI0 to TI4095	4096	1-bit	Timer contact
TO	TO0 to TO4095	4096	1-bit	Timer output
TS	TS0 to TS4095	4096	16-bit	Timer setting value
TA	TA0 to TA4095	4096	16-bit	Timer current value
STI	STI0 to STI255	256	1-bit	Integrated timer contact
STO	STO0 to STO255	256	1-bit	Integrated timer output
STS	STS0 to STS255	256	16-bit	Integrated timer setting value
STA	STA0 to STA255	256	16-bit	Integrated timer current value
CI	CI0 to CI1023	1024	1-bit	Counter contact
CO	CO0 to CO1023	1024	1-bit	Counter output
CS	CS0 to CS1023	1024	16-bit	Counter setting value
CA	CA0 to CA1023	1024	16-bit	Counter current value
D	D0 to D8191	8192	16-bit	Data register, Register for operation
R(*)	R0 to R32767	32768	16-bit	File register, CNC word I/F (common for projects)
ZR(*)	ZR0 to ZR13311	13312	16-bit	File register, User open (common for projects)
W	W0 to W5FFF	24576	16-bit	MELSEC NET/10 link register

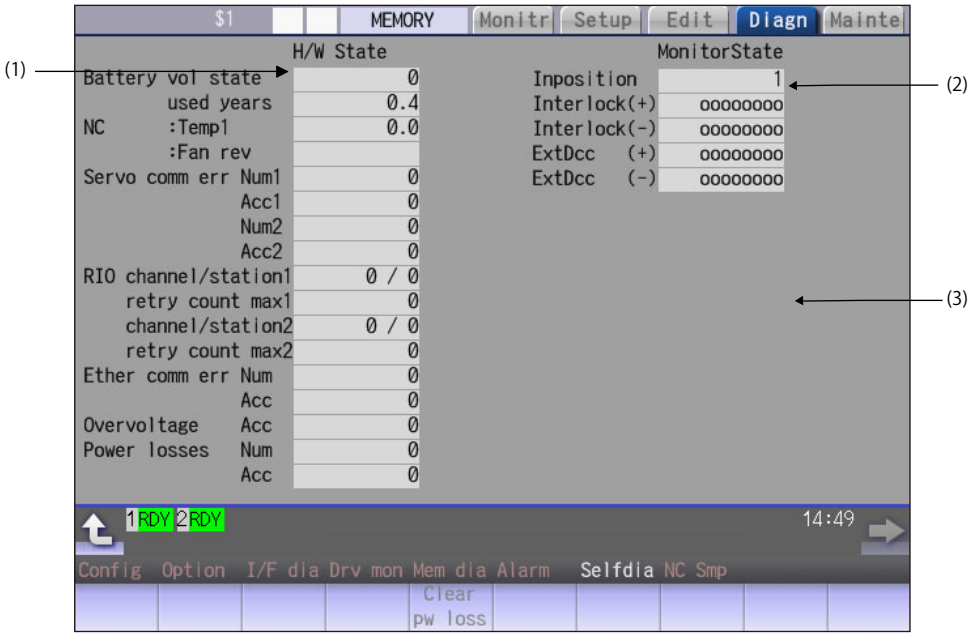
(Note) The use of devices marked with a * mark in the device column has been determined.
Do not use devices other than those corresponding to the input/output signals with the machine side (input/output signals of the remote I/O unit), even if it is an undefined vacant device.

Refer to PLC Development Manual (IB-1501270), PLC Programming Manual (IB-1501271), PLC Interface Manual (IB-1501272) for details on device No. Refer to the specifications issued by the machine tool builder for machine-specific information.

3.5 Diagnosis Based on the Self Diagnosis Screen

3.5.1 Self Diagnosis Screen

Select [Selfdia] on the Diagn screen. The H/W state and NC operation state is confirmed.



Display items

Display item		Details
(1)	H/W state(common for part systems)	This displays H/W state of NC unit and display unit. (Note 1)
(2)	Operation state (Depends on part system)	This displays the state when the operation seems to be stopped in spite that the alarm does not occur. (Note 2)
(3)	System lock	This displays the valid term by the system lock when the system lock is valid.This does not display when the system lock specification is invalid.

(Note 1) As for the NC unit, the contents are as follows.

NC

Display item	Details	
Battery vol state	This displays the current state of the battery voltage as 0 or 1.	
	Condition	**Classification**
	0 (normal state)	-
	1 (detector error) (no battery)	Warning (yellow)
used years	This displays approximate time of the battery used from the last replacement.	
	Condition	**Classification**
	Recommended battery use (5 years) <= Time for the battery used	Warning (yellow)
NC :Temp1	This displays the current temperature of the control unit.	
	Condition (M800S/M80)	**Classification**
	78.5 ℃ < Control unit temp. ≦ 81 ℃	Cautions (gray)
	81 ℃ < Control unit temp.	Warning (yellow)
	Condition (M800W : Main card)	**Classification**
	79 ℃ < Control unit temp. ≦ 84.5 ℃	Cautions (gray)
	84.5 ℃ < Control unit temp.	Warning (yellow)
Fan rev	This displays the current fan rotation speed of the control unit.	
	Condition	**Classification**
	Fan rot. speed <= 4000 r/min	Warning (yellow)

Communication between NC unit and display unit

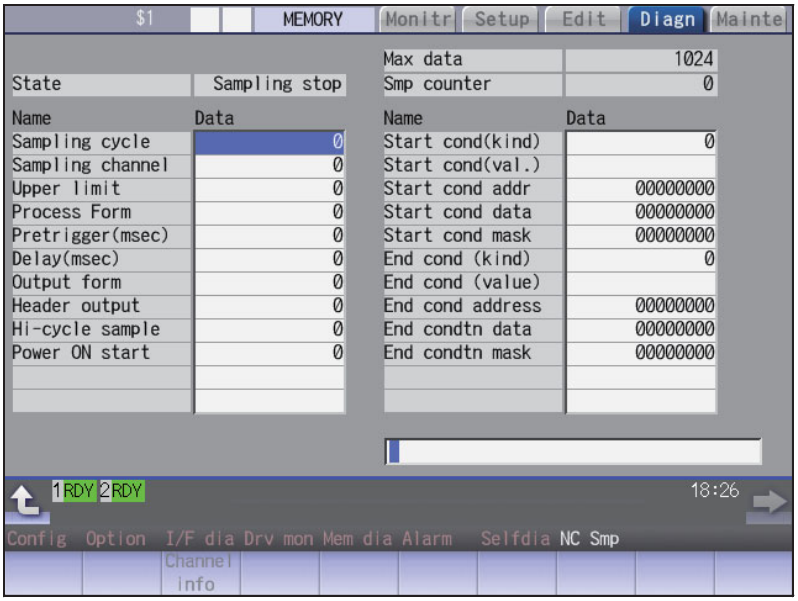
Display item	Details
Servo comm err Num1	This displays the count of occurrence for "Y51 SV commu er: Recv frame No. xx04" after the power ON.
Acc1	This displays the cumulated count of occurrence for " Y51 SV commu er: Recv frame xx04". Press the [Servo clear] menu to clear the cumulated count to "0".
Servo comm err Num2	This displays the count of occurrence for "Y51 SV commu er: Data ID error xx03" after the power ON.
Acc2	This displays the cumulated count of occurrence for "Y51 SV commu er: Data ID error xx03".Press the [Servo clear] menu to clear the cumulated count to "0".
RIO channel/station1	This displays the Channel No./Station No. of occurrence for continuous error after the power ON.
retry count max1	This displays the maximum value of the continuous error after the power ON.
RIO channel/station2	This displays the Channel No./Station No. held even if the power OFF.Press the [RIO clear] menu to clear the Channel No./Station No. to "0/0".
retry count max2	This displays the count held even if the power OFF.Press the [RIO clear] menu to clear the count to "0".
Ether comm err Num	This displays the number of Ethernet communication error after PLC program is executed once.
Acc	This displays the cumulated count of occurrence for " Ether communication error ".Press the [Ether clear] menu to clear the cumulated count to "0".
Overvoltage Acc	This displays the cumulated count of detection frequency of overvoltage after the power ON.
Power losses Num	This displays the count of detection frequency of power losses after the power ON.
Acc	This displays the cumulated count of detection frequency of power losses after the power ON. Press the [Clear pw loss] menu to clear the cumulated count to "0".

(Note 2) The following state can be confirmed.

State	Details
In-position	This displays "1" (in-position state) when the following conditions are satisfied for even one axis. - There is a control axis whose acceleration/deceleration is not zero. - There is a control axis whose servo error exceeds the range designated with the parameter.
Interlock(+)	When the auto interlock +n-th axis signal or the manual interlock +n-th axis signal is OFF, "1" appears for the n-th axis. (Explanation of the display) o o o o o o 1 o 8th axis … 1st axis In the above case, the 2nd axis is interlocked.Even when the number of usable axes is less than 8 in 1 part system, this displays 8 axes fixed.
Interlock(-)	When the auto interlock -n-th axis signal or the manual interlock -n-th axis signal is OFF, "1" appears for the n-th axis.The explanation of the display is same as for the "Interlock (+)".
ExtDcc (+)	When the control axis is moving in (+) direction, "1" appears for the axis if the external deceleration speed is valid, and the feedrate is clamped, exceeding the set value of the external deceleration speed. (Explanation of the display) o o o o o 1 o 1 8th axis … 1st axis In the above case, the 1st axis and the 3rd axis are in external deceleration speed.Even when the number of usable axes is less than 8 in 1 part system, this displays 8 axes fixed.
ExtDcc (-)	When the control axis is moving in (-) direction, "1" appears for the axis if the external deceleration speed is valid, and the feedrate is clamped, exceeding the set value of the external deceleration speed.The explanation of the display is same as for the "ExtDcc" (+).

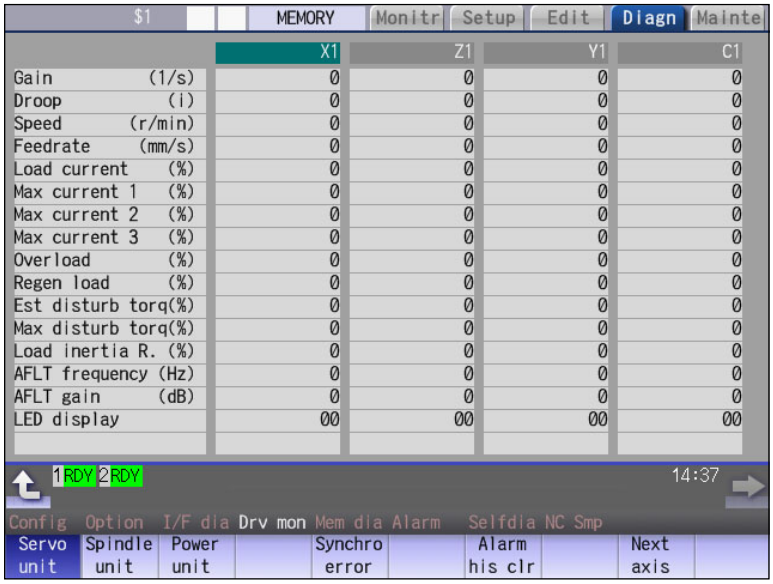
3.6 Diagnosis Based on the Data Sampling Screen

Select [NC Smp] on the Diagn screen.
The NC internal data (speed output from NC to the drive unit, or feedback data from the drive unit, etc.) can be confirmed.



3.7 Diagnosis Based on the Drive Monitor Screen

Select [Drv mon] on the Diagn screen.
The diagnosis information from the drive section (servo axis unit, spindle unit, power supply unit and synchronous error information) can be confirmed.



4

Troubleshooting

If trouble occurs during operation, the accurate cause must be found so that adequate measures can be taken. Perform the following checks for this.

4.1 Troubleshooting

Confirm "when", "when doing what", "what kind of trouble" and "how frequently" the trouble occurred. Also check how many years the machine has been operated, and how many hours a day it is used.

(1) General confirmation items

- Machine tool builder and type of machine

(2) When?

- What time did the trouble occur?
- How long had passed after the power was turned ON?

(3) What kind of trouble?

- What was displayed on the Alarm Diagnosis screen of the display unit?
  Display the Alarm Diagnosis screen, and check the alarm details.
- What was displayed for the machine sequence alarm?

(4) When doing what?

- What was the NC operation mode?
  During automatic operation
  ... Program No., sequence No. and program details when the trouble occurred.
  During manual operation
  ... What was the manual operation mode?
- What was the operation procedure?
- What were the previous and next steps?
- What screen is displayed on the display unit of MTB?
- What is the state of the peripheral devices?
- Did the trouble occur during input/output operations?
- What was the machine side state?
- Did the trouble occur while replacing the tools?
- Did hunting occur in the control axis?

(5) How frequently?

If the trouble occurs infrequently or if it occurs during the operation of another machine, the cause may be an error in the power voltage or the noise, etc. Check whether the power voltage is normal (does it drop momentarily when other machines are operating?), and whether noise measures have been taken.

- How often does the trouble occur in a day? (Times/day)
- Were the peripheral devices operating?
- Check whether the same trouble is repeated during the same operation. (Repeatability)
- Check whether the same trouble occurs when the conditions are changed.
- Does the trouble occur during a specific mode?
- What is the frequency in the same workpiece?
- What is the ambient temperature?
  (Was there a sudden change in the temperature?)
- Is there any contact defect or insulation defect in the cables?
  (Is there any oil or cutting oil splattered onto the cables?)

4.1.1 Possible Causes of Trouble

The most common cause is a cable contact defect and wire breakage defect

- Is the connection correct?
- Are the cables bent or stepped on?
- Are the joints of the cables and connectors deteriorated?
- Was a continuity test done on the cables?
- Are any of the terminal block or connector screws loosen?
- Is any oil or cutting fluid splattering on the cables?
- Was a cable disconnected while the power was ON?
- Is any cable overheated?

Often trouble occurs due to fluctuation in the power voltage or noise from the communication cable.

- Is the power voltage always correct?
- Is the power frequency always correct?
- Does the voltage fluctuate depending on the time?
- Does the voltage drop momentarily when a peripheral device starts operation?
- Was there an instantaneous power failure before the trouble?
- Have measures against noise been taken for each unit?
- Are the communication and power system cables separated and laid?
- Is the communication cable shield sufficient?

The trouble may also occur due to sudden temperature changes or vibration and impact, although this is rare.

- Are the ambient temperature and humidity adequate?
- Is the fan in the panel where the unit is stored rotating?
- Is the panel fixed on a flat and stable floor with little vibration?

5

Replacing Each Unit

5.1 Control Unit

[Replacement procedures]

Always replace the control unit with the machine power turned OFF.

(1) Check that the machine power is turned OFF. (If the power is not OFF, turn it OFF.)
(2) Disconnect all the external cables from the control unit.
For M800S/M80, also disconnect the internal cables from the control unit. (MENUKEY, BL and TP connectors)
(3) Remove the screws fixing the control unit, and remove the control unit from the control unit installation fitting. (Loosen the lower fixing screw(s) first, and then remove the upper fixing screw(s) while supporting the control unit with a hand. Then lift the control unit upward and take it off. The lower fixing screw(s) do(es) not need to be removed.)
(4) Install a new control unit onto the control unit installation fitting with fixing screws.
(5) Connect all the cables back to the control unit. (Always connect the cables to the designated connectors.)
(6) Confirm that all the cables are correctly connected and close the electric cabinet door.

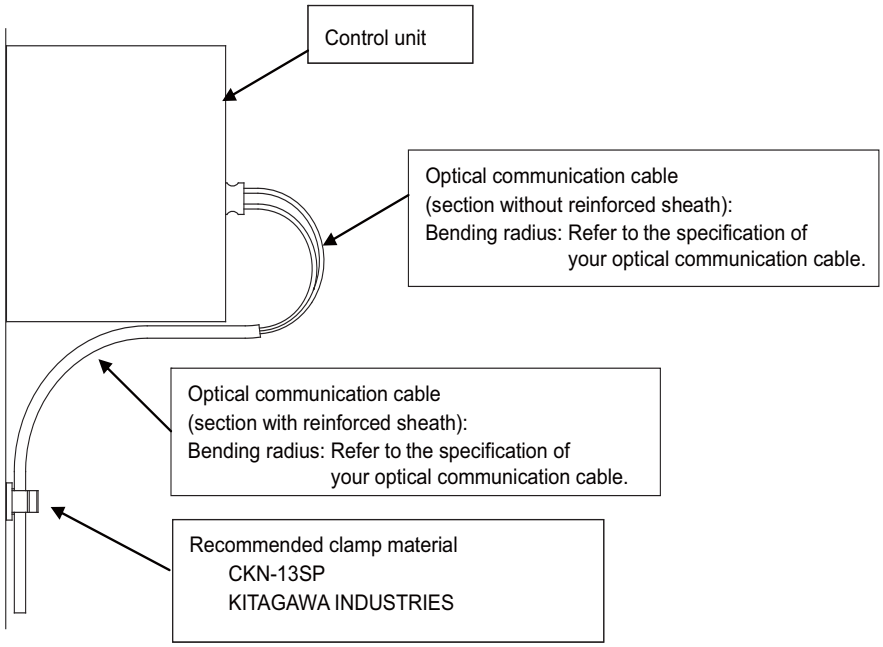
⚠ CAUTION

1. Incorrect connections could cause devices to damage. Connect the cables to designated connectors.

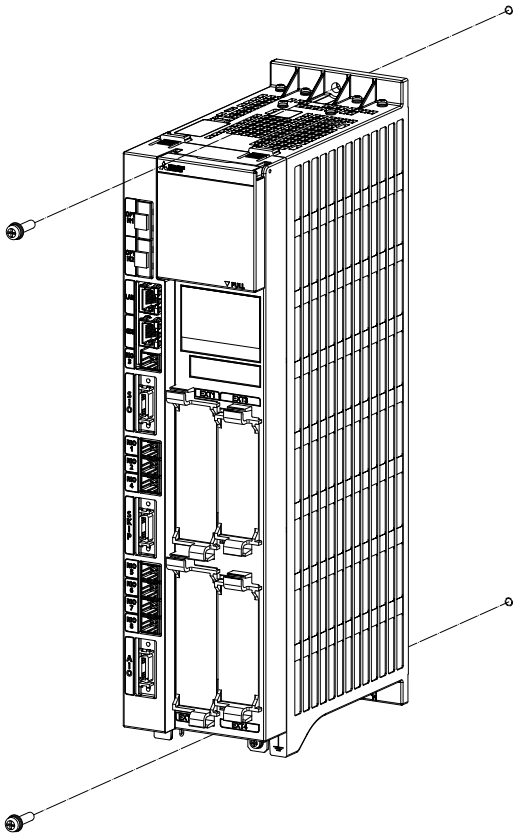
2. Do not replace the control unit while the power is ON.

3. Do not connect or disconnect the cables between units while the power is ON.

(Note) Wire the control unit optical cable as shown below. Refer to the Connection and Setup Manual when handling and wiring optical communication cable.

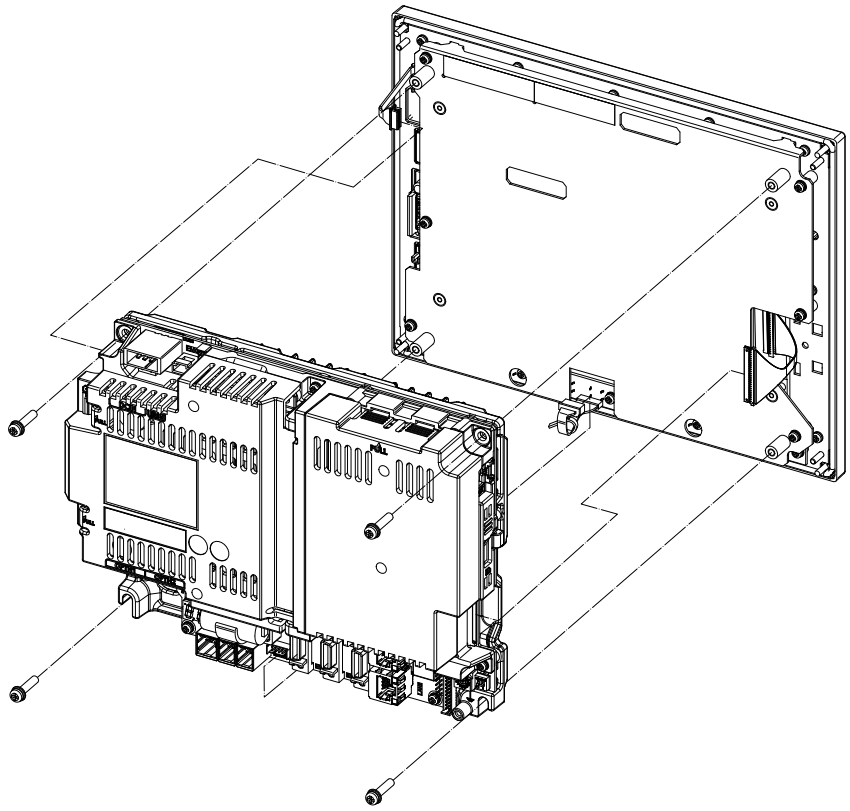


[FCU8-MU042 / FCU8-MA041] (M800W)



Mounting screw size: M5

[FCU8-MU541 / FCU8-MA541 / FCU8-MU501 / FCU8-MU502] (M800S/M80)



Mounting screw size: M4

5.2 Display Unit

[Replacement procedures]

Always replace the display unit with the control unit (machine) power turned OFF.

(1) Check that the machine power is turned OFF. (If the power is not OFF, turn it OFF.)
(2) Open the electric cabinet door.
(3) Disconnect all the cables connected to the display unit.
(4) Remove the screws fixing the display unit and take the display unit off.
(5) Install a new display unit with fixing screws.
(6) Connect all the cables back to the display unit. (Always connect the cables to the designated connectors.)
(7) Confirm that all the cables are correctly connected and close the electric cabinet door.

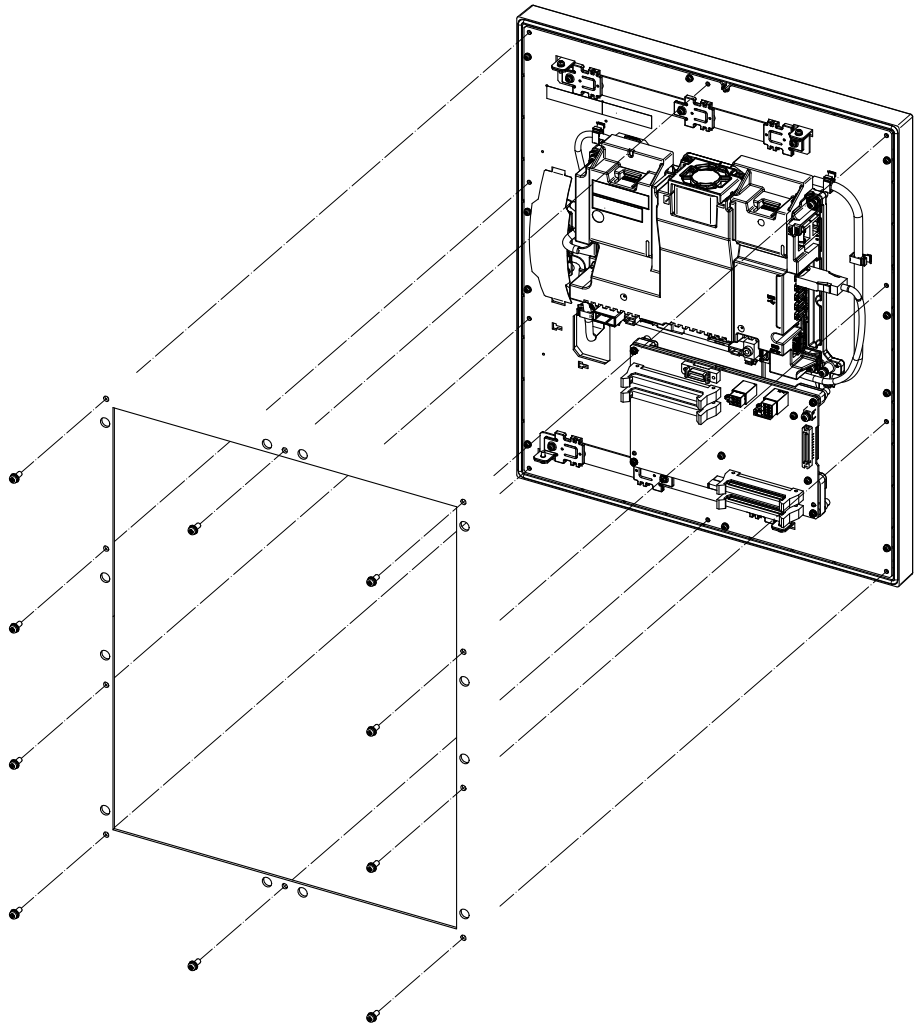
⚠ CAUTION

1. Incorrect connections could cause devices to damage. Connect the cables to designated connectors.

2. Do not replace the display unit while the power is ON.

3. Do not connect or disconnect the cables between units while the power is ON.

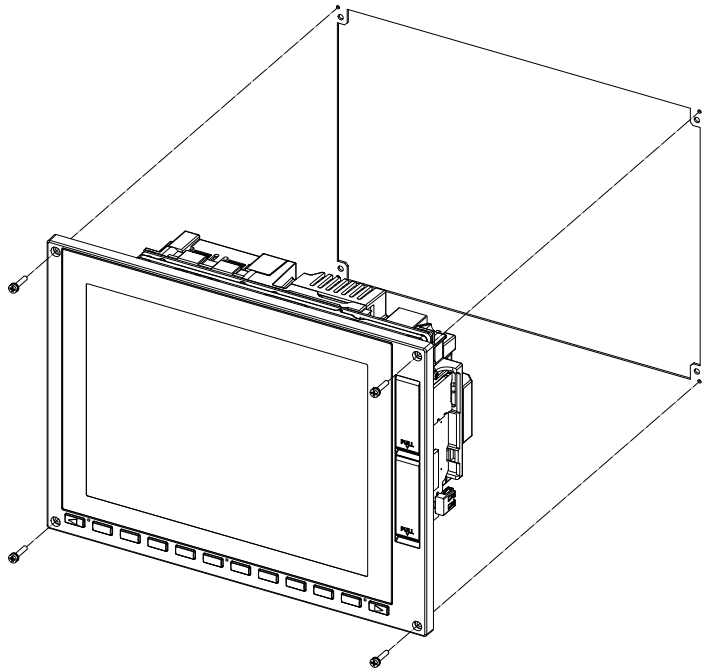
[FCU8-DU191-75 (19-type display unit)]



Fixing screw: Use M4×10 with spring washer and plain washer (10 screws).

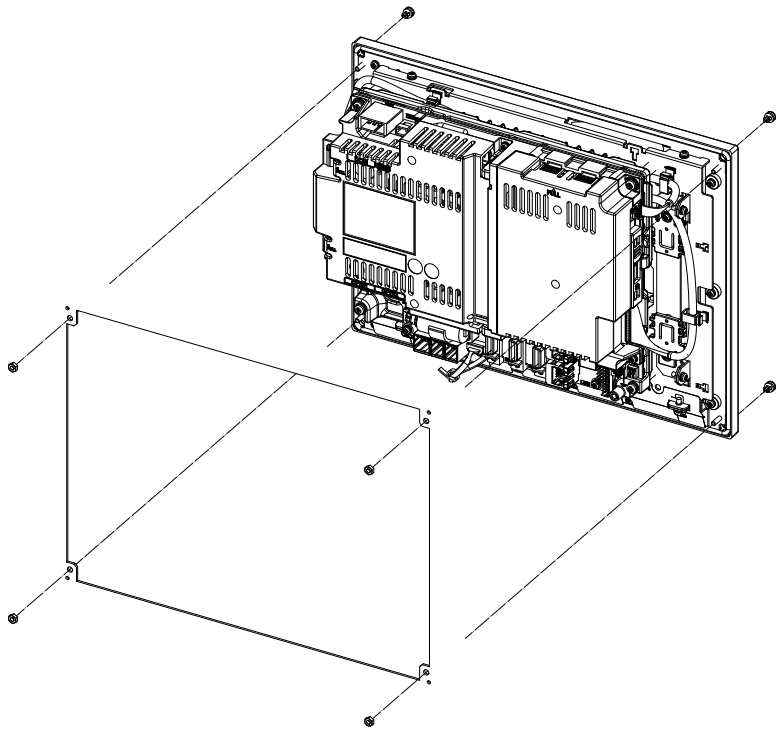
[FCU8-DU141 (10.4-type display unit)]

- Fixed on the front side



Fixing screw: Cheese head screw M3 x 4 pcs.
(Fixing screws are provided with the unit.)

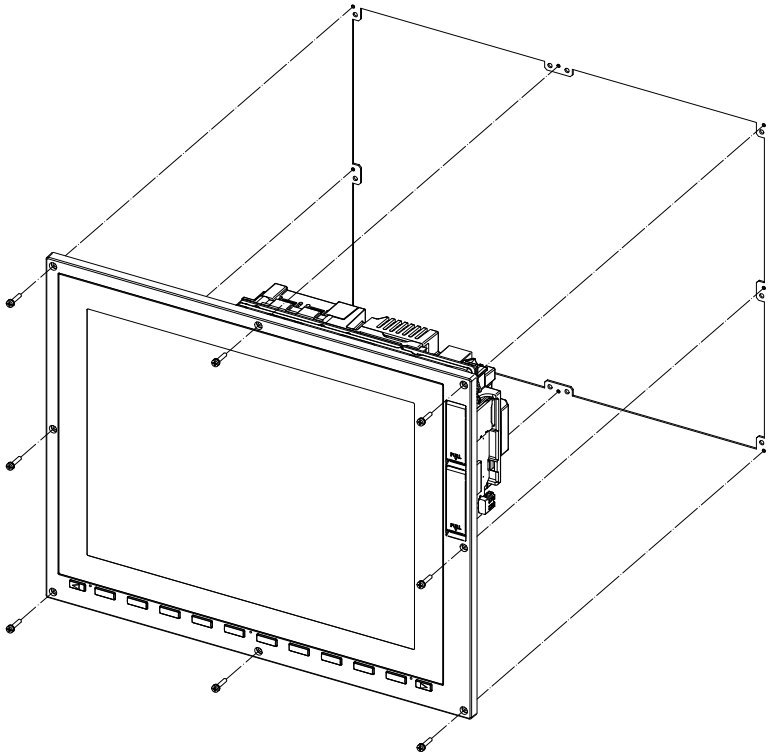
- Fixed on the back side



Fixture: M3 nut x 4 pcs.
(Screw cap x 4 pcs. are provided with the unit.)

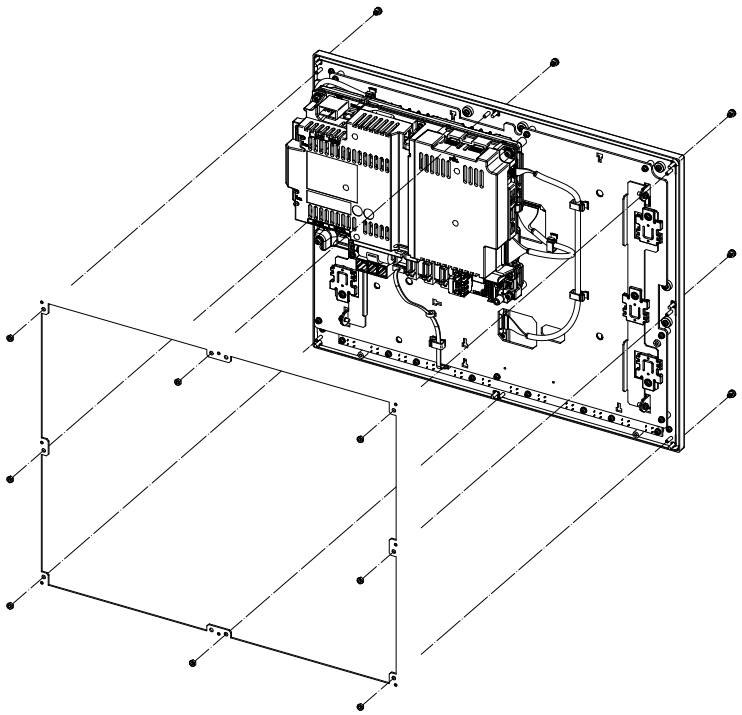
[FCU8-DU181 (15-type display unit)]

- Fixed on the front side



Fixing screw: Cheese head screw M3 x 8 pcs.
(Fixing screws are provided with the unit.)

- Fixed on the back side



Fixture: M3 nut x 8 pcs.
(Screw cap x 8 pcs. are provided with the unit.)

5.3 Personal Computer Unit

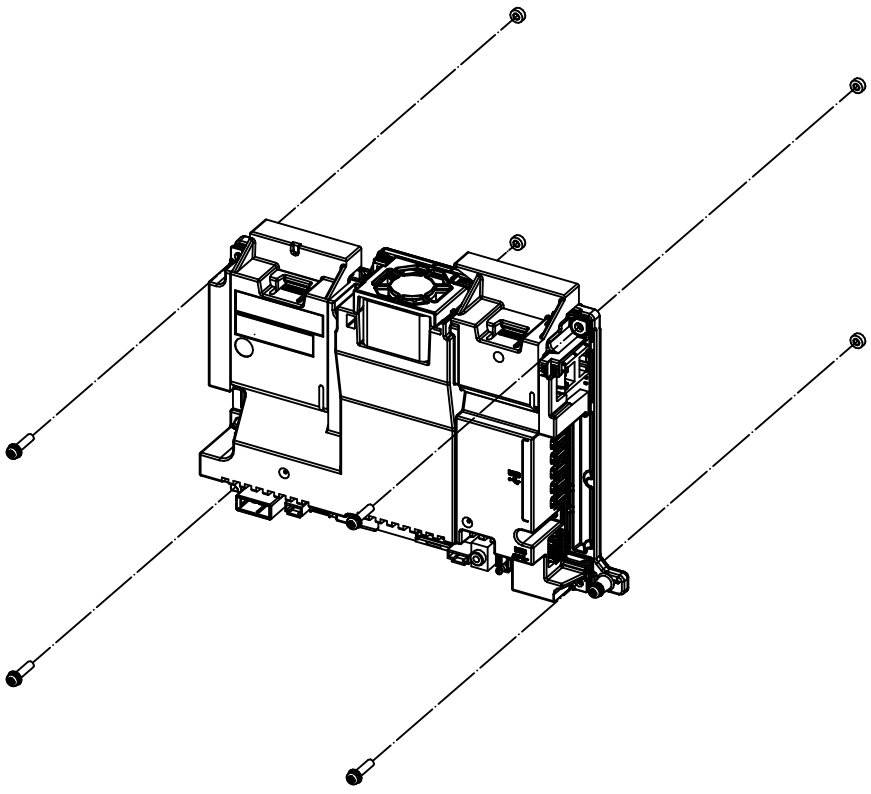
[Replacement procedures]

Always replace the personal computer unit with the control unit (machine) power turned OFF.

(1) Check that the machine power is turned OFF. (If the power is not OFF, turn it OFF.)
(2) Open the electric cabinet door.
(3) Disconnect all the cables connected to the personal computer unit.
(4) Remove the screws fixing the personal computer unit and take the personal computer unit off.
(5) Install a new personal computer unit with fixing screws.
(6) Connect all the cables connected to the personal computer unit. (Always connect the cables to the designated connectors.)
(7) Confirm that all the cables are correctly connected and close the electric cabinet door.

> ⚠ **CAUTION**
>
> **1. Incorrect connections could cause devices to damage. Connect the cables to designated connectors.**
>
> **2. Do not replace the personal computer unit while the power is ON.**
>
> **3. Do not connect or disconnect the cables between units while the power is ON.**

[FCU8-PC231] (M800W)



Mounting screw size: M4

5.4 Keyboard Unit

[Replacement procedures]

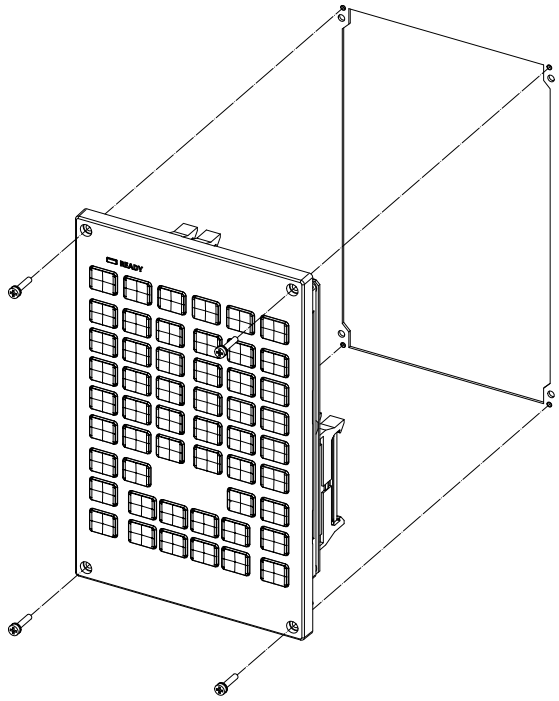
Always replace the keyboard unit with the control unit (machine) power turned OFF.

(1) Check that the machine power is turned OFF. (If the power is not OFF, turn it OFF.)
(2) Open the electric cabinet door.
(3) Disconnect all the cables connected to the keyboard unit.
(4) Remove the screws fixing the keyboard unit and take the keyboard unit off.
(5) Install a new keyboard unit with fixing screws.
(6) Connect all the cables connected to the keyboard unit. (Always connect the cables to the designated connectors.)
(7) Confirm that all the cables are correctly connected and close the electric cabinet door.

> ⚠ **CAUTION**
>
> **1. Incorrect connections could cause devices to damage. Connect the cables to designated connectors.**
>
> **2. Do not replace the keyboard unit while the power is ON.**
>
> **3. Do not connect or disconnect the cables between units while the power is ON.**

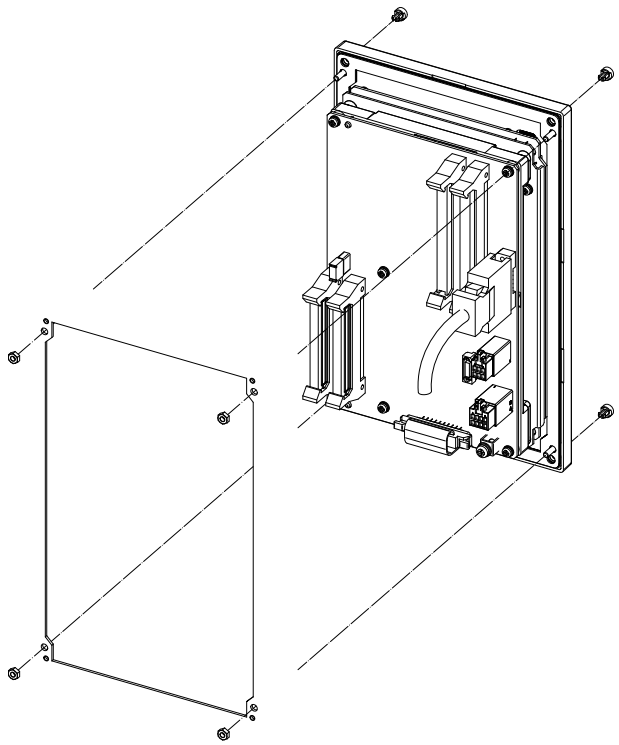
[FCU8-KB046]

- Fixed on the front side



Fixing screw: Cheese head screw M3 x 4 pcs.
(Fixing screws are provided with the unit.)

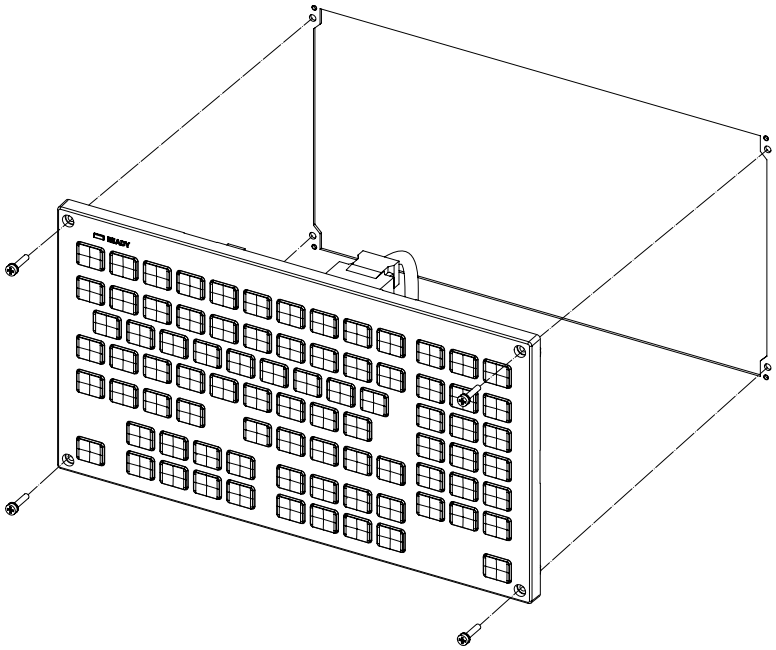
- Fixed on the back side



Fixture: M3 nut x 4 pcs.
(Screw cap x 4 pcs. are provided with the unit.)

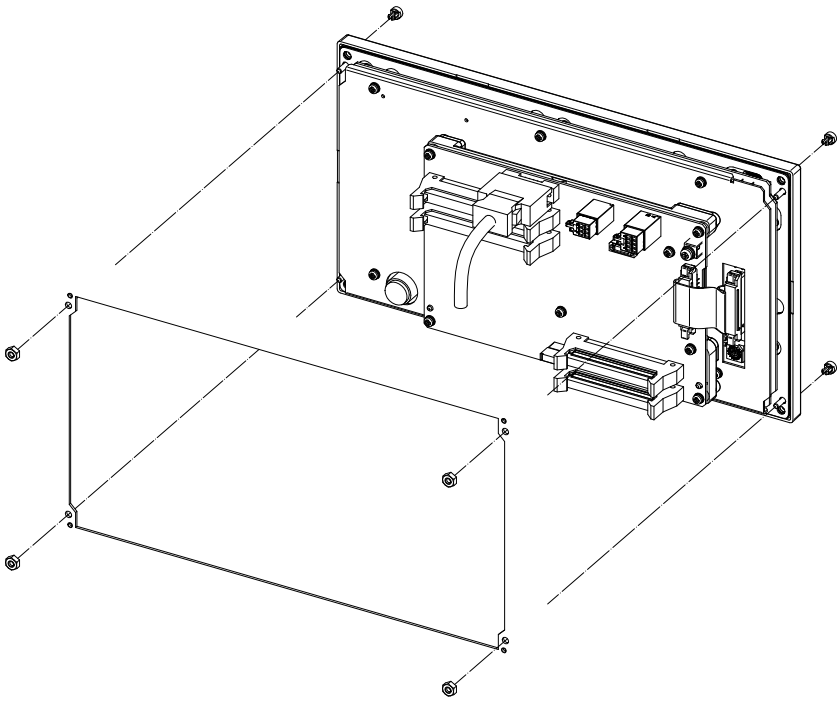
[FCU8-KB047]

- Fixed on the front side



Fixing screw: Cheese head screw M3 x 4 pcs.
(Fixing screws are provided with the unit.)

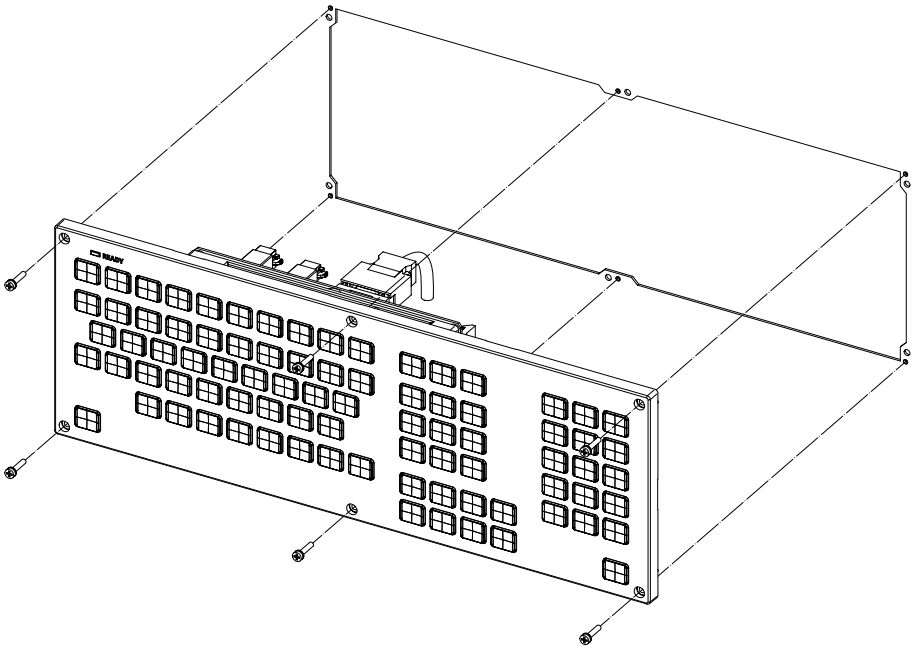
- Fixed on the back side



Fixture: M3 nut x 4 pcs.
(Screw cap x 4 pcs. are provided with the unit.)

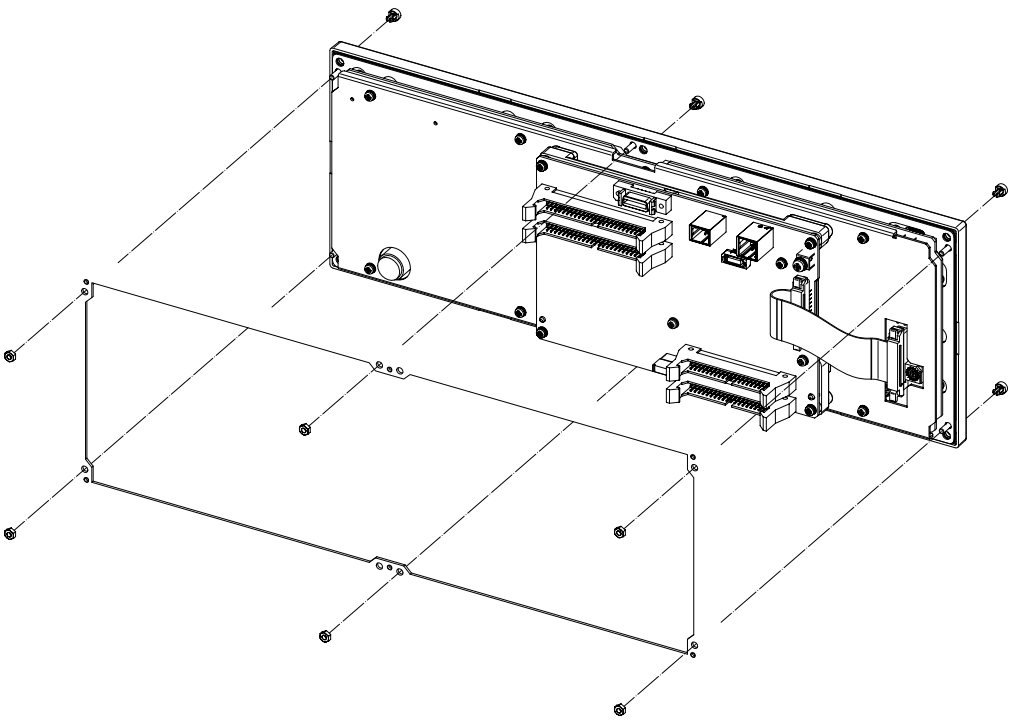
[FCU8-KB081]

- Fixed on the front side



Fixing screw: Cheese head screw M3 x 6 pcs.
(Fixing screws are provided with the unit.)

- Fixed on the back side



Fixture: M3 nut x 6 pcs.
(Screw cap x 6 pcs. are provided with the unit.)

5.5 Operation Panel I/O Unit

[For M800W]

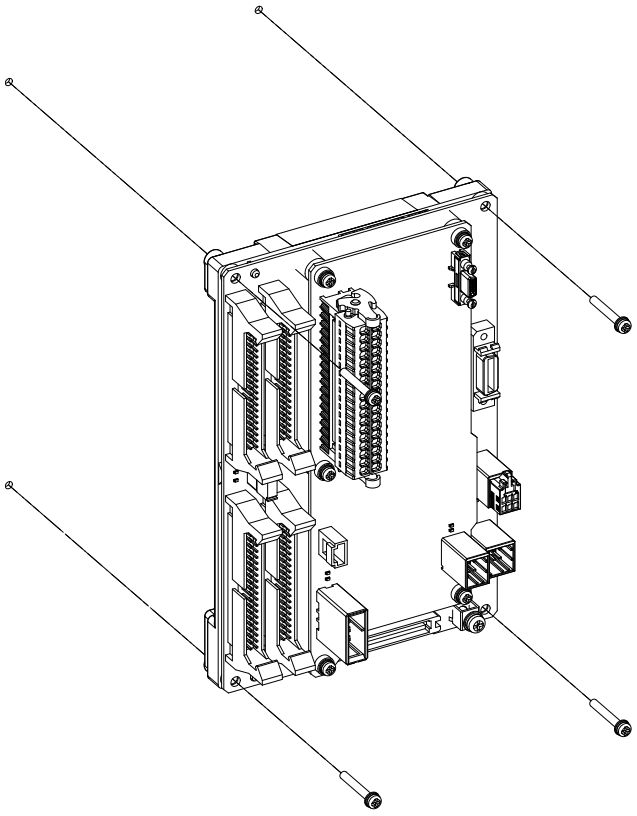
[Replacement procedures]

Always replace the operation panel I/O unit with the control unit (machine) power turned OFF.

(1) Check that the machine power is turned OFF. (If the power is not OFF, turn it OFF.)
(2) Open the electric cabinet door.
(3) Disconnect all the cables connected to the operation panel I/O unit.
(4) Remove the screws fixing the operation panel I/O unit, and take the unit off.
(5) Install a new operation panel I/O unit with fixing screws. (Fix so that the operation panel I/O unit connector slot is placed at the lower part.)
(6) Connect all the cables back to the operation panel I/O unit. (Always connect the cables to the designated connectors.)
(7) Confirm that all the cables are correctly connected and close the electric cabinet door.

> **⚠ CAUTION**
>
> **1. Incorrect connections could cause devices to damage. Connect the cables to designated connectors.**
>
> **2. Do not replace the operation panel I/O unit while the power is ON.**
>
> **3. Do not connect or disconnect the cables between units while the power is ON.**

[FCU8-DX830 / FCU8-DX837] (M800W)



Mounting screw size: M3

[For M800S/M80]

[Replacement procedures]

Always replace the operation panel I/O unit with the control unit (machine) power turned OFF.

(1) Check that the machine power is turned OFF. (If the power is not OFF, turn it OFF.)
(2) Open the electric cabinet door.
(3) Disconnect all the cables connected to the operation panel I/O unit.
(4) Remove the screws fixing the operation panel I/O unit, and take the unit off.
(5) Install a new operation panel I/O unit with fixing screws. (Fix so that the NCKB connector slot is placed at the bottom for the horizontally arranged keyboard and at the right for the vertically arranged keyboard.)
(6) Connect all the cables back to the operation panel I/O unit. (Always connect the cables to the designated connectors.)
Insert NCKB cable by fitting Δ1st pin position with the connector.
(7) Confirm that all the cables are correctly connected and close the electric cabinet door.

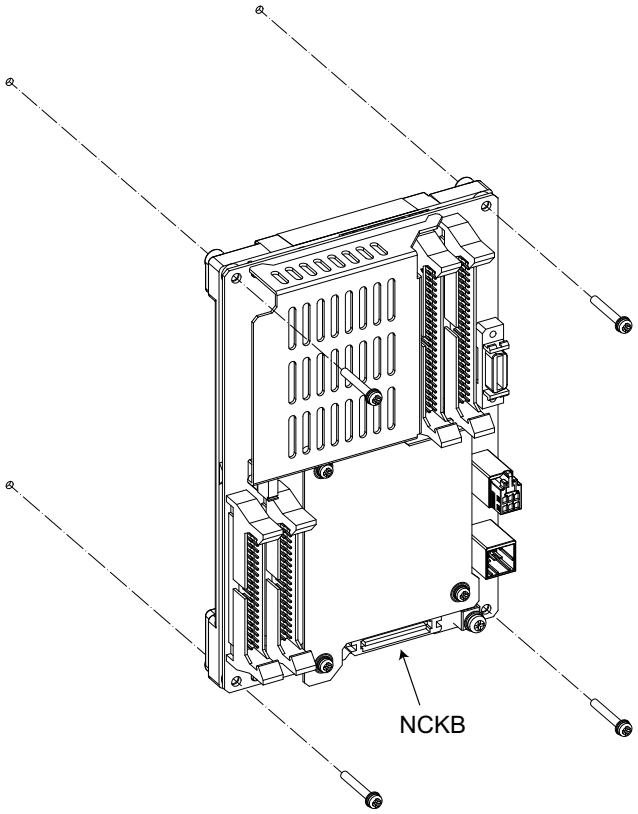
⚠ CAUTION

1. Incorrect connections could cause devices to damage. Connect the cables to designated connectors.

2. Do not replace the operation panel I/O unit while the power is ON.

3. Do not connect or disconnect the cables between units while the power is ON.

[FCU8-DX750] (M800S/M80)



Mounting screw size: M3

5.6 Remote I/O Unit

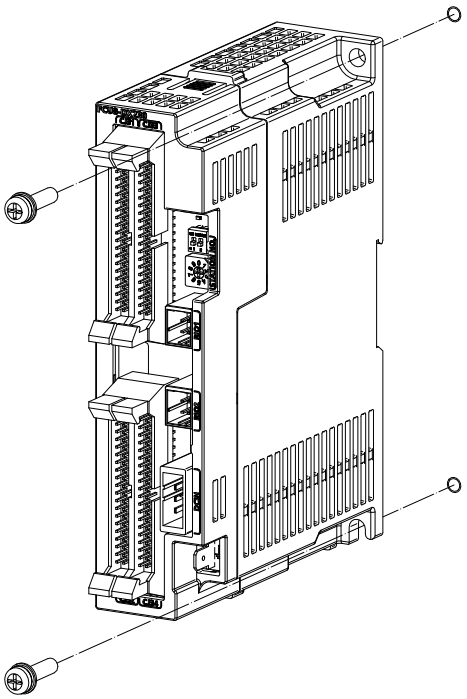
[Replacement procedures]

Always replace the remote I/O unit with the machine power turned OFF.

(1) Check that the machine power is turned OFF. (If the power is not OFF, turn it OFF.)
(2) Open the electric cabinet door.
(3) Disconnect all the cables connected to the remote I/O unit.
(4) Remove the screws fixing the remote I/O unit and take the remote I/O unit off.
Or, release the lock by pulling down the slide bar of the remote I/O unit fixed to DIN rail, and then take the remote I/O unit off.
(5) Install a new remote I/O unit with fixing screws.
Or, install a new remote I/O unit to DIN rail and lock it by pulling up the slide bar of the remote I/O unit.
(6) Connect all the cables back to the remote I/O unit.
(7) Confirm that all the cables are correctly connected and close the electric cabinet door.

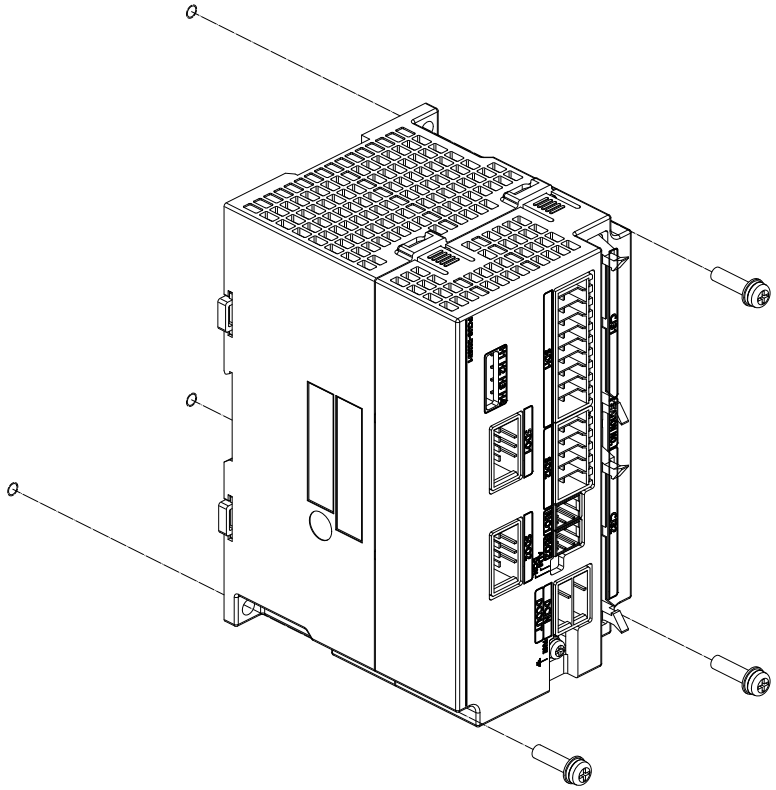
> ⚠ **CAUTION**
>
> **1. Incorrect connections could cause devices to damage. Connect the cables to designated connectors.**
>
> **2. Do not replace the remote I/O unit while the power is ON.**
>
> **3. Do not connect or disconnect the cables between units while the power is ON.**

[FCU8-DX220 / FCU8-DX230 / FCU8-DX231 / FCU8-DX213 / FCU8-DX654]



Mounting screw size: M5

[FCU8-DX651]



Mounting screw size: M5

5.7 Expansion Unit/Card

[For M800W]

[Installation procedures]

Always install the CC-Link expansion unit (FCU-EX561) with the machine power turned OFF.

(1) Check that the machine power is turned OFF. (If the power is not OFF, turn it OFF.)
(2) Open the electric cabinet door.
(3) Push the tabs at the top and bottom of the cover attached to the expansion slot of the control unit.
(4) Remove the cover of the expansion slot.
(5) Insert the CC-Link expansion unit into the expansion slot.
(6) Push the CC-Link expansion unit firmly until it is fixed with the tabs.
(7) Connect the CC-Link cable to the CC-Link expansion unit.
(8) Confirm that the cable is correctly connected and close the electric cabinet door.

[Removal procedures]

(1) Check that the machine power is turned OFF. (If the power is not OFF, turn it OFF.)
(2) Open the electric cabinet door.
(3) Disconnect the CC-Link cable from the CC-Link expansion unit.
(4) Press the tabs on the top and bottom of the CC-Link expansion unit.
(5) Remove the CC-Link expansion unit by pulling it frontward.
(6) Install the cover to the expansion slot.
(7) Close the electric cabinet door.

> ⚠ **CAUTION**
>
> **1. Incorrect connections could cause devices to damage. Connect the cables to designated connectors.**
>
> **2. Do not replace the expansion unit/card while the power is ON.**
>
> **3. Do not connect or disconnect the cables between units while the power is ON.**

[For M800S/M80]

[Installation procedures]

Always install the CC-Link expansion unit (FCU-EX561) with the machine power turned OFF.

(1) Check that the machine power is turned OFF. (If the power is not OFF, turn it OFF.)
(2) Open the electric cabinet door.
(3) Disconnect the LAN cable and SIO cable of control unit to facilitate the installation.
(4) Remove the back cover of the control unit.
(5) Insert the CC-Link expansion unit into the option relay unit (FCU8-EX702).
(6) Fix the CC-Link expansion unit to the control unit with three screws of M3 x 25.
(7) Connect the CC-Link cable to the CC-Link expansion unit.
(8) Connect the LAN cable and SIO cable to the control unit.
(9) Confirm that all the cables are correctly connected and close the electric cabinet door.

[Removal procedures]

(1) Check that the machine power is turned OFF. (If the power is not OFF, turn it OFF.)
(2) Open the electric cabinet door.
(3) Disconnect the LAN cable and SIO cable of control unit to facilitate the removal.
(4) Disconnect the CC-Link cable from the CC-Link expansion unit.
(5) Remove three screws fixing the CC-Link expansion unit to the control unit.
(6) Install the back cover of the control unit.
(7) Connect the LAN cable and SIO cable to the control unit.
(8) Confirm that all the cables are correctly connected and close the electric cabinet door.

⚠ CAUTION

1. Incorrect connections could cause devices to damage. Connect the cables to designated connectors.

2. Do not replace the expansion unit/card while the power is ON.

3. Do not connect or disconnect the cables between units while the power is ON.

5.8 Built-in Disk of the Display Unit

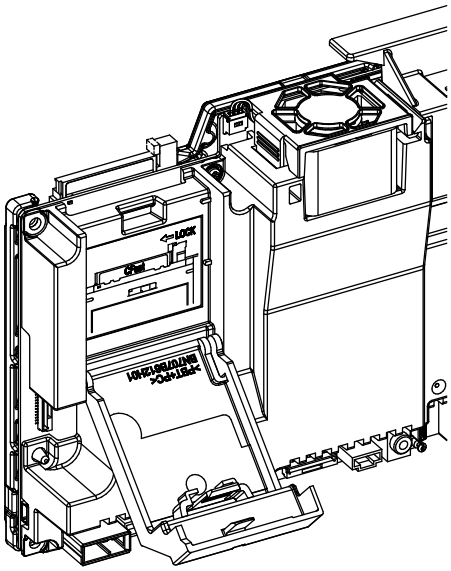
[Replacement procedures]

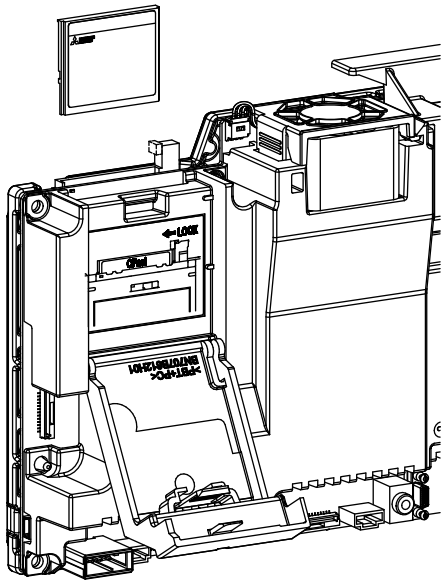
Always replace the built-in disk of the display unit with the control unit (machine) power turned OFF.

(1) Check that the machine power is turned OFF. (If the power is not OFF, turn it OFF.)
(2) Open the electric cabinet door.
(3) Open the personal computer unit back cover.
(4) Press the eject lever of the built-in disk of the display unit to eject the built-in disk of the display unit.
(5) Insert a new built-in disk of the display unit.
(Insert it so that the nameplate sticker of the built-in disk of the display unit faces to the PCB.)
(6) Close the back cover of the personal computer unit.
(7) Close the electric cabinet door.

> ⚠ **CAUTION**
>
> **1. Incorrect connections could cause devices to damage. Connect the cables to designated connectors.**
>
> **2. Do not replace the built-in disk of the display unit while the power is ON.**
>
> **3. Do not connect or disconnect the cables between units while the power is ON.**

(M800W)

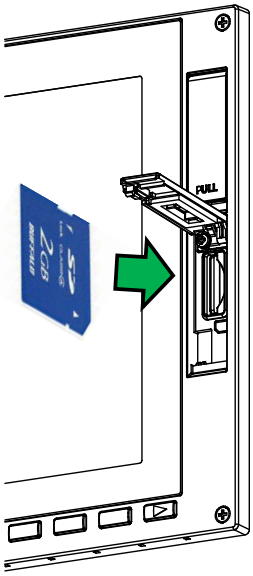




5.9 SD Card

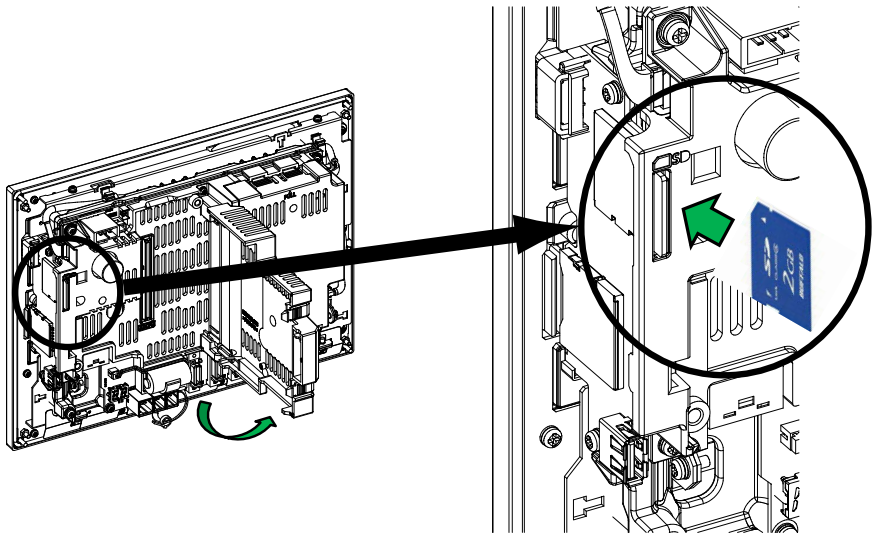
[Replacement of front-side SD card]

(1) Open the lower cover on the display unit right end.
(2) Insert/eject the CD card. (Insert it so that the top surface faces to the observer's right side.)



[Replacement of back-side SD card]

Always replace the back-side SD card with the machine power turned OFF.
(1) Check that the machine power is turned OFF.
(2) Open the electric cabinet door.
(3) Open the cover on the back side of the control unit.
(4) Insert/eject the SD card. (Insert it so that the top surface faces to the observer's right side.)
(5) Close the back cover.
(6) Close the electric cabinet door.

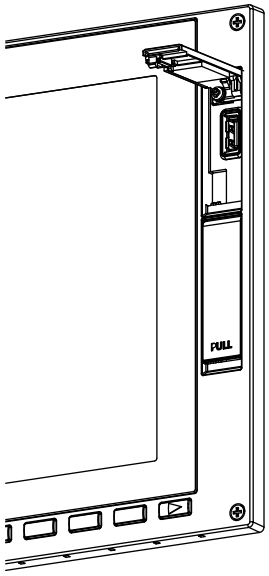


(Note 1) Do not eject an SD card during the data reading/writing.
(Note 2) MITSUBISHI is unable to guarantee the machine operation when a commercially available SD card is used. In that case, performance check must be made carefully by machine tool builder.

5.10 USB Memory

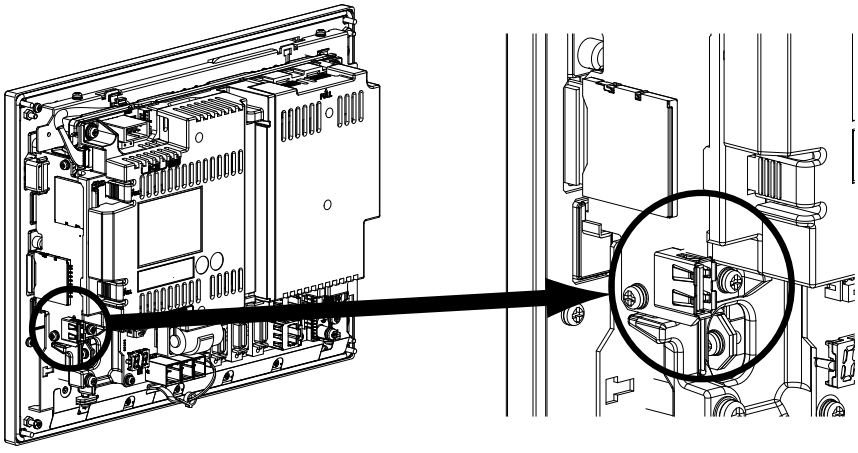
[Replacement of front-side USB memory]

(1) Open the upper cover on the display unit right end.
(2) Insert/remove the USB memory.



[Replacement of back-side USB memory]

Always replace the back-side USB memory with the machine power turned OFF.
(1) Check that the machine power is turned OFF.
(2) Open the electric cabinet door.
(3) Insert/remove the USB memory.
(4) Close the electric cabinet door.



(Note 1) Do not remove a USB memory during the data reading/writing.
(Note 2) Do not connect devices other than USB memories. When using a commercially available USB memory, performance check must be made by machine tool builder.

Revision History

Date of revision	Manual No.	Revision details
May. 2015	IB(NA)1501273-A	First edition created.

M800/M80 Series Manual List

These contents are described in the presupposition that all functions of M8 Series are available.
Some functions or screens may not be available depending on the machine or specifications set by MTB. (Confirm the specifications before use.)
The manuals issued by MTB take precedence over these manuals.

Manual	IB No.	Purpose and Contents
M800/M80 Series Instruction Manual	IB-1501274	- Operation guide for NC - Explanation for screen operation, etc.
M800/M80 Series Programming Manual (Lathe System) (1/2)	IB-1501275	- G code programming for lathe system - Basic functions, etc.
M800/M80 Series Programming Manual (Lathe System) (2/2)	IB-1501276	- G code programming for lathe system - Functions for multi-part system, high-accuracy function, etc.
M800/M80 Series Programming Manual (Machining Center System) (1/2)	IB-1501277	- G code programming for machining center system - Basic functions, etc.
M800/M80 Series Programming Manual (Machining Center System) (2/2)	IB-1501278	- G code programming for machining center system - Functions for multi-part system, high-accuracy function, etc.
M800/M80 Series Alarm/Parameter Manual	IB-1501279	- Alarms - Parameters

Manuals for MTBs (NC)

Manual	IB No.	Purpose and Contents
M800/M80 Series Specifications Manual	IB-1501267	- Model selection - Specifications of hardware unit - Outline of various functions
M800W Series Connection and Setup Manual	IB-1501268	- Detailed specifications of hardware unit - Installation, connection, wiring, setup (startup/adjustment)
M800S/M80 Series Connection and Setup Manual	IB-1501269	- Detailed specifications of hardware unit - Installation, connection, wiring, setup (startup/adjustment)
M800/M80 Series PLC Development Manual	IB-1501270	- Electrical design - I/O relation (assignment, setting, connection), field network - Development environment (PLC on-board, peripheral development environment), etc.
M800/M80 Series PLC Programming Manual	IB-1501271	- Electrical design - Sequence programming - PLC support functions, etc.
M800/M80 Series PLC Interface Manual	IB-1501272	- Electrical design - Interface signals between NC and PLC

Manuals for MTBs (drive section)

Manual	IB No.	Contents
MDS-E/EH Series Specifications Manual	IB-1501226	- Specifications for power supply regeneration type
MDS-E/EH Series Instruction Manual	IB-1501229	- Instruction for power supply regeneration type
MDS-EJ/EJH Series Specifications Manual	IB-1501232	- Specifications for regenerative resistor type
MDS-EJ/EJH Series Instruction Manual	IB-1501235	- Instruction for regenerative resistor type
MDS-EM Series Specifications Manual	IB-1501238	- Specifications for multi-hybrid, power supply regeneration type
MDS-EM Series Instruction Manual	IB-1501241	- Instruction for multi-hybrid, power supply regeneration type
DATA BOOK	IB-1501252	- Specifications of servo drive unit, spindle drive unit, motor, etc.

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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.

MITSUBISHI CNC

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