

ENCODER GATEWAY SAFETY PRECAUTIONS

(Type): JEPMC-GW2000-E□□□

Upon receipt of the product and prior to initial operation, read these instructions thoroughly and retain for future reference.

Part Number: 158405-1CD

Revision: 1

1 INTRODUCTION

This safety precautions manual describes the Encoder Gateway GW2000. To properly use the Encoder Gateway GW2000, read this safety precautions manual thoroughly, and retain for easy reference for inspections and maintenance etc. Make sure that this manual reaches the end user.

2 GENERAL PRECAUTIONS

The following describes general precautions. Note the following to ensure safe application.

- The drawings presented in this manual are sometimes shown without covers or protective guards. Always replace the cover or protective guard as specified first, and then operate the products in accordance with this manual.
- The drawings presented in this manual are typical examples and may not match the product you received.
- This manual is subject to change due to product improvement, specific modification, and manual improvement. When this manual is revised, the manual code is updated and the new manual is published as a next edition. The edition number appears on the front and back covers.
- If the manual must be ordered due to loss or damage, inform your nearest Yaskawa representative or one of the offices listed on the back of this manual.
- Yaskawa will not take responsibility for the results of unauthorized modifications of this product. Yaskawa shall not be liable for any damages or troubles resulting from unauthorized modification.

3 SAFETY INFORMATION

The following conventions are used to indicate precautions in this manual. Failure to heed precautions provided in this manual can result in serious or possibly even fatal injury or damage to the products or to related equipment and systems.




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




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

In some situations, the precautions indicated could have serious consequences if not heeded.



Indicates prohibited actions that must not be performed. For example, this symbol would be used to indicate that fire is prohibited as follows: 



Indicates compulsory actions that must be performed. For example, this symbol would be used to indicate that grounding is compulsory as follows: 

4 NOTES FOR SAFE OPERATION

Read this manual thoroughly before checking products on delivery, storage and transportation, installation, wiring, maintenance and inspection, and disposal of the Encoder Gateway.

WARNING

- Before starting operation with a machine connected, make sure that an emergency stop can be applied at any time.
Failure to observe this warning may result in injury.
- Never touch the inside of the unit.
Failure to observe this warning may result in electric shock.
- Do not remove the front cover while the power is ON.
Failure to observe this warning may result in electric shock.
- Follow the procedures and instructions for trial operation precisely as noted in this manual.
Malfunctions that occur after the servomotor is connected to the equipment not only damage the equipment, but may also cause an accident resulting in death or injury.
- Do not remove the front cover, cables, connectors, or optional items while the power is ON.
Failure to observe this warning may result in electric shock.
- Do not damage, press, exert excessive force or place heavy objects on the cables.
Failure to observe this warning may result in electric shock, stopping operation of the product, or burning.
- Do not modify the product.
Failure to observe this warning may result in injury or damage to the product.
- Do not come close to the machine immediately after resetting momentary power loss to avoid an unexpected restart. Take appropriate measures to ensure safety against an unexpected restart.
Failure to observe this warning may result in injury.
- Installation, disassembly, or repair must be performed only by authorized personnel.
Failure to observe this warning may result in electric shock or injury.



■ STORAGE AND TRANSPORTATION

CAUTION

- Do not store or install the product in the following places.
 - Locations subject to direct sunlight.
 - Locations subject to temperatures outside the range specified in the storage/installation temperature conditions.
 - Locations subject to humidity outside the range specified in the storage/installation humidity conditions.
 - Locations subject to condensation as the result of extreme changes in temperature.
 - Locations subject to corrosive or flammable gases.
 - Locations subject to dust, salts, or iron dust.
 - Locations subject to exposure to water, oil, or chemicals.
 - Locations subject to shock or vibration.Failure to observe this caution may result in fire, electric shock, or damage to the product.
- Do not place any load exceeding the limit.
Failure to observe this caution may result in injury or malfunction.
- If disinfectants or insecticides must be used to treat packing materials such as wooden frames, pallets, or plywood, the packing materials must be treated before the product is packaged, and methods other than fumigation must be used.
Example: Heat treatment, where materials are kiln-dried to a core temperature of 56°C for 30 minutes or more.
If the electronic products, which include stand-alone products and products installed in machines, are packed with fumigated wooden materials, the electrical components may be greatly damaged by the gases or fumes resulting from the fumigation process. In particular, disinfectants containing halogen, which includes chlorine, fluorine, bromine, or iodine can contribute to the erosion of the capacitors.

■ INSTALLATION

CAUTION

- Never use the products in an environment subject to water, corrosive gases, inflammable gases, or combustibles.
Failure to observe this caution may result in electric shock or fire.
- Do not step on or place a heavy object on the product.
Failure to observe this caution may result in injury.
- Do not cover the inlet or outlet ports and prevent any foreign objects from entering the product.
Failure to observe this caution may cause internal elements to deteriorate resulting in malfunction or fire.
- Be sure to install the product in the correct direction.
Failure to observe this caution may result in malfunction.
- Provide the specified clearances between the unit and the control panel or with other devices.
Failure to observe this caution may result in fire or malfunction.
- Do not apply any strong impact.
Failure to observe this caution may result in malfunction.

■ WIRING

 CAUTION

- Be sure to wire correctly and securely.
Failure to observe this caution may result in motor overrun, injury, or malfunction.
- Always use the specified power supply voltage.
An incorrect voltage may result in burning.
- Take appropriate measures to ensure that the input power supply is supplied within the specified voltage fluctuation range. Be particularly careful in places where the power supply is unstable.
An incorrect power supply may result in damage to the product.
- Install external breakers or other safety devices against short-circuiting in external wiring.
Failure to observe this caution may result in fire.
- Take appropriate and sufficient countermeasures for each when installing systems in the following locations.
 - Locations subject to static electricity or other forms of noise.
 - Locations subject to strong electromagnetic fields and magnetic fields.
 - Locations subject to possible exposure to radioactivity.
 - Locations close to power supplies.Failure to observe this caution may result in damage to the product.
- Do not reverse the polarity of the battery when connecting it.
Failure to observe this caution may damage the battery or cause it to explode

■ OPERATION

CAUTION

- A 24-VDC power supply must be provided by the customer.
Turn ON the 24-VDC power supply to this product at the same time or before turning ON the power supply to the SERVOPACK.
Turning ON the power supply to this product after turning ON the power supply to the SERVOPACK may result in malfunction of the product.
- Note that the 0 V signal of CN4, and GND signal of CN2 and CN3 are not insulated.
Failure to observe this caution may result in damage to the product.
- Do not use the power supply of this product together with a noise influenced power supply such as the 24-V brake power supply.
Failure to observe this caution may cause malfunction of the product.
- Install a 1.5 to 2.5 A fuse for the 24-V power supply.
Short-circuit may result in burning.
- Use this product in combination with a compatible servomotor model. Check the product nameplate for the applicable servomotor model. (When using this product for a robot controller, there is no restriction regarding the servomotor model.)
The servomotor parameters are stored in the EEPROM inside the product. For this reason, the product may malfunction if a servomotor other than the specified model is connected.
- Do not set multiturn limits.
This product does not support the multiturn limit function.

■ MAINTENANCE AND INSPECTION

CAUTION

- Do not disassemble the unit.
Failure to observe this caution may result in electric shock or injury.
- Do not attempt to change the wiring while the power is ON.
Failure to observe this caution may result in electric shock or injury.
- When replacing the Encoder Gateway, always install the same model as the one being replaced.
Failure to observe this caution may result in damage to the product.

■ DISPOSAL

CAUTION

- When disposing of the products, treat them as ordinary industrial waste.

5 Checking Products on Delivery

The following procedure is used to check the Encoder Gateway GW2000 upon delivery.

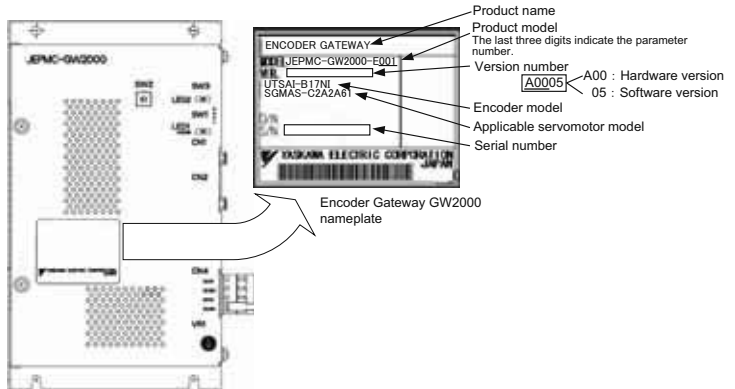
Check the following items when the Encoder Gateway GW2000 is delivered.

Check Items	Remarks
Are the delivered products the ones that were ordered?	Check the model numbers marked on the nameplates of the Encoder Gateways.
Is there any damage?	Check the overall appearance, and check for damage or scratches that may have occurred during shipping.
Are there any loose screws?	Use a screwdriver to check screws for looseness.

If any of the above items are faulty or incorrect, contact your Yaskawa sales representative or the dealer from whom you purchased the products.

6 Nameplate

The following illustration shows the Encoder Gateway nameplate and its position.



7 GENERAL SPECIFICATIONS

The following table lists the Encoder Gateway GW2000 general specifications.

Item		Specifications	
Environment Conditions	Ambient Operating Temperature		0°C to +60°C
	Ambient Storage Temperature		-25°C to +85°C
	Humidity		30% to 95%RH (with no condensation)
	Corrosion Resistance		No corrosive gas
	Operating Altitude		Less than 2,000 m above sea level
Mechanical Operating Conditions	Vibration Resistance		0.5 G
	Shock Resistance		2.0 G
Electrical Operating Conditions	Noise Resistance	Ground noise (Impulse noise) Radiation noise (Impulse noise) Radiation noise (FT noise) Static electricity noise (Air discharge method)	1 kV for ten minutes 1 kV for ten minutes 1 kV for one minute Ten times of 4 kV
Installation Requirements	Grounding		Ground to 100 Ω or less
	Orientation		Vertical or horizontal (with the nameplate facing up)

8 PRODUCT SPECIFICATIONS

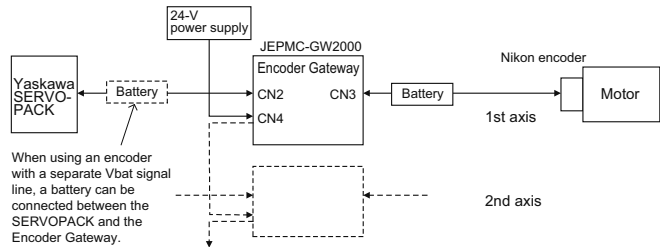
8.1 Product Specifications

The following table lists the Encoder Gateway GW2000 product specifications.

Item	Specifications
External Dimensions in mm	200(H) × 33.5(W) × 88.5(D)
Approx. Mass	570 g
Applicable Encoder	A-format 17-bit absolute encoder manufactured by Sendai Nikon Corporation (hereinafter referred to as Nikon encoder) Model: MAR-M32 and MAR-M35A 1 (Encoder Gateway): 1 (encoder) connection Signal line numbers: 4 signal lines for encoder with one combined Vcc/Vbat signal line, 6 signal lines for encoder with a separate Vbat signal line.
Applicable SERVOPACK	17-bit absolute serial encoder applicable to Σ-III series SGDS and Σ-V series SGD V SERVOPACK manufactured by Yaskawa Electric Corporation (hereinafter referred to as Yaskawa SERVOPACK)
Baud Rate	Between Encoder Gateway and Nikon encoder: 4 Mbps (2.5 Mbps is not supported) Between Encoder Gateway and Yaskawa SERVOPACK: 4 Mbps
Position Data Refreshing Cycle	62.5 μs (The host receives position data with a delay of 62.5 μs.)
Indicators	LED1 (green): Indicates power supply status. LED2 (green): Indicates operation status.
Power Supply	24 VDC ± 20%, non-insulated Current consumption: 150 mA max.
Power Supply to Encoder	5.25 V (factory setting), 200 mA max. Turned ON/OFF by turning ON/OFF the servo encoder power supply from the SERVOPACK.

8.2 System Configuration

The following diagram illustrates the basic system configuration.



Basic System Configuration

8.3 Switches, LED Indicators, and Connectors

■ Locations



	Name	Remarks
SW3	Reset switch	–
SW2	Rotary switch	Located on the side panel. Do not change the setting from the factory setting: 1 for SGDS and SGDV SERVOPACK, 0 for NX100 robot controller
SW1	4-pin DIP switch	Set all four pins to OFF.
LED2	Operating status indicator lamp	Refer to 10.2 <i>Status and Error Indications with LED1 and LED2 Lamps</i> for details.
LED1	Power supply status indicator lamp	Lit when the 24-VDC and encoder power supply are turned ON.
CN1	Serial communications port	For the final test before shipment
CN2	Connector for the Yaskawa SERVOPACK	–
CN3	Connector for the Nikon encoder	–
CN4	24-VDC power input connector	Screwless terminal block
VR1	Encoder voltage adjustment knob	Standard adjustment range: 5.1 V to 5.7 V
FG	Frame ground	An M3 screw must be provided by the customer. Ground to 100Ω or less.

Encoder Gateway Front Panel

■ Connector Pin Arrangement

CN2: Connector for the Yaskawa SERVOPACK

Model: 17LE-13090-27 (D3CC) manufactured by DDK Ltd.

Mating connector model: 17JE-23090-02 (D8C)

Recommended cable model: JZSP-CLP70-01, -03, and -05

Pin No.	Signal	I/O	Remarks	Pin No.	Signal	I/O	Remarks
1	A5V	I	5V IN	6	S–	–	Send/receive data
2	S+	I/O	Send/receive data	7	NC	–	
3	NC	–		8	BAT+	–	Battery (+)
4	NC	–		9	BAT–	–	Battery (–)
5	GND	–	GND				

CN3: Connector for the Nikon encoder

Model: 53984-0671 manufactured by Molex Japan Co., Ltd.

Mating connector model: 551000-0670 (Connector kit model: JZSP-CMP9-1)

Pin No.	Signal	I/O	Remarks	Pin No.	Signal	I/O	Remarks
1	E5V	O	5 V OUT	2	GND	–	GND
3	BAT+	–	Battery (+)	4	BAT–	–	Battery (–)
5	SD+	I/O	Send/receive data	6	SD–	I/O	Send/receive data

CN4: 24-VDC power input connector

Model: 231-464/001-000 manufactured by WAGO Japan Corporation

Mating connector model: 231-104 (included in the accessories.)

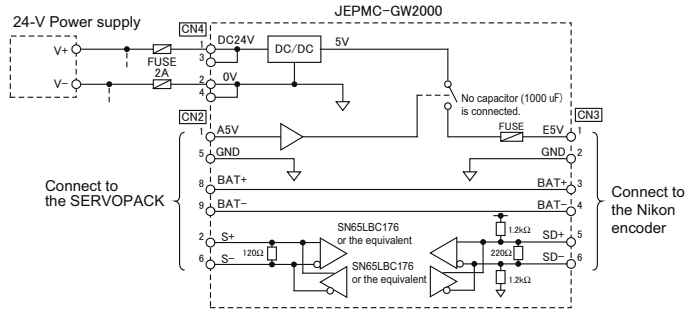
Pin No.	Signal	I/O	Remarks
1	DC24 V	I	24 V
2	0 V	–	GND
3	DC24 V	I	24 V
4	0 V	–	GND

Use a cable of size between AWG24 and AWG20 (0.2 mm² and 0.51 mm²).

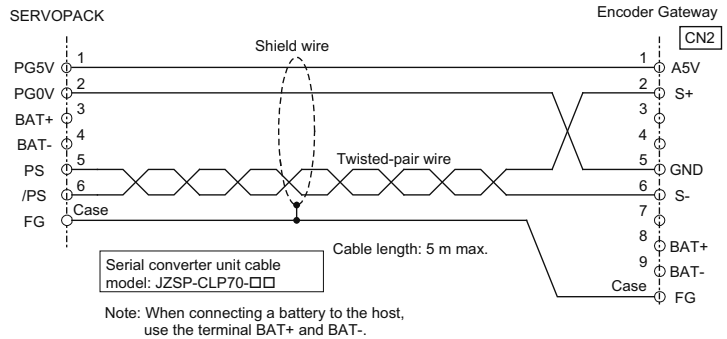
Pins 1 and 3, and pins 2 and 4 are internally connected. Connect wires to either 1 or 3, and either 2 or 4.

9.2 Connections

Internal Block Diagram

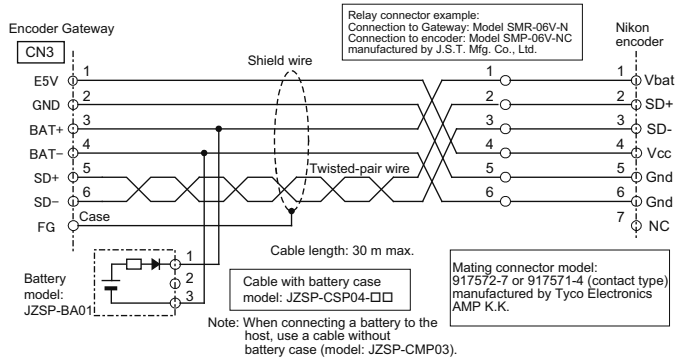


Connection between SERVOPACK and Encoder Gateway



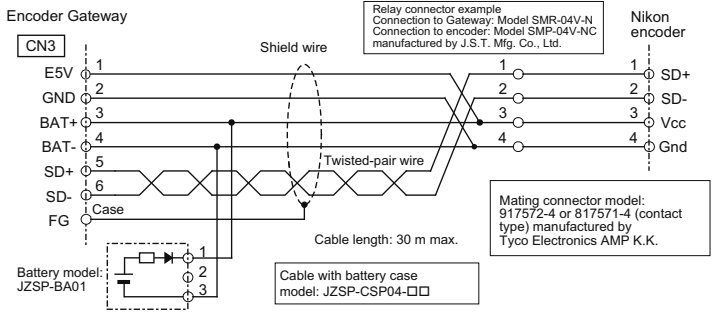
Connection between Encoder Gateway and Encoder

When using an encoder with a separate Vbat signal line

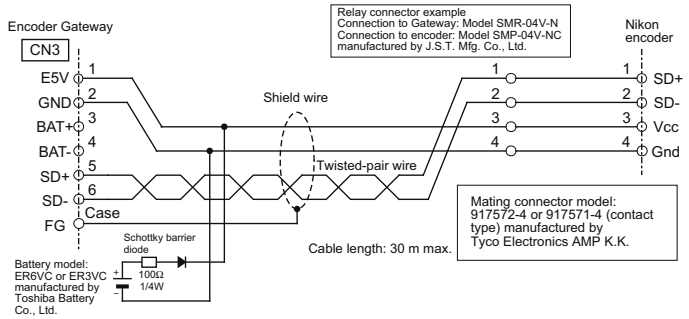


When using an encoder with one combined Vcc/Vbat signal line

- Connection example 1



- Connection example 2



10 Troubleshooting

10.1 Encoder Related Alarms

The Encoder Gateway converts Nikon encoder status flags to Yaskawa encoder alarm codes and reports the alarms to the connected SERVOPACK. There will be some differences between the actual status flags and the displayed alarm codes.

Alarm Display

Nikon Encoder Status Flag	Yaskawa Encoder Alarm Name	Meaning	Corrective Actions
PS Error ST Error	Encoder Data Error (A.840)	The positioning data in the encoder do not match. Position data may be incorrect.	Turn the SERVOPACK power supply OFF and then ON again. Encoder initialization is recommended.
Overspeed Alarm	Encoder Overspeed (A.850)	The motor speed exceeds the encoder max. rotation speed. MAR-M35A encoder max. rotation speed: 6600 min ⁻¹ while power is being supplied, 10000 min ⁻¹ while power is not supplied.	Turn the SERVOPACK power supply OFF and then ON again.
Battery Alarm	Absolute Encoder Battery Error (A.830)	The battery voltage has dropped to 3.0 V or less. When using an encoder with one combined Vcc/Vbat signal line, this alarm is detected when the power supply is not supplied.	Check the battery, and replace it if necessary. When using an encoder with one combined Vcc/Vbat signal line, initialize the encoder.
MT Error	Encoder Backup Error (A.810)	The position data may be lost because of lowered voltage.	Initialize the absolute encoder (Fn008)
MEM Error	Encoder Checksum Error (A.820)	EEPROM error in the encoder	Turn the SERVOPACK power supply OFF and then ON again.
Temperature Sensor Alarm	Encoder Overheat (A.860)	The encoder temperature exceeds 95°C.	Wait until the motor has cooled to an allowable temperature.

10.2 Status and Error Indications with LED1 and LED2 Lamps

The LED1 indicator lamp reveals the power supply status of the Encoder Gateway. The LED2 indicator lamp communicates self-diagnosis errors and errors in the Encoder Gateway's communications with the SERVOPACK and Nikon encoder.

LED1 Power Supply Status Indication

LED1 Status	Meaning	Corrective Actions
Lit	Power is being supplied to the Encoder Gateway.	
Not lit	Power is not being supplied to the Encoder Gateway, or the power supply is faulty.	Confirm the following items: <ul style="list-style-type: none"> • The voltage is 24 V. • The 24-V power supply and 0-V power supply are connected correctly. • The encoder power supply is being supplied from the SERVOPACK.

LED2 Error Indication

LED2 Status	Meaning	Corrective Actions
Lit	Normal operation	
Blinks once	No communications with the Yaskawa SERVOPACK. (Idle status)	Check the SERVOPACK to confirm that it is operating properly. Check the cable connection between the SERVOPACK and the Encoder Gateway.
Blinks twice	Cannot communicate with the Nikon encoder.	Check the cable connection between the Encoder Gateway and the encoder. The encoder may be faulty.
Blinks five times	EEPROM checksum error	Replace the Encoder Gateway.
Blinks six times	RAM check error	Replace the Encoder Gateway.
Blinks seven times	ROM checksum error	Replace the Encoder Gateway.
Blinks fifteen times	Watchdog error	Correct the operating conditions including noise interference and temperature.
Not lit	CPU initialization fault, or CPU is not operating.	Check the switch settings.

* The blinking interval of the LED2 lamp is 0.5 second. The LED2 lamp blinks the specified number of times, then remains unlit for two seconds before blinking again in the same pattern.
 For example, when an EEPROM checksum error occurs, the LED2 lamp blinks once every 0.5 second for a total of five times, and then remains unlit for two seconds before blinking again in the same pattern.

DX100 OPTIONS INSTRUCTIONS

FOR INFORM LANGUAGE

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