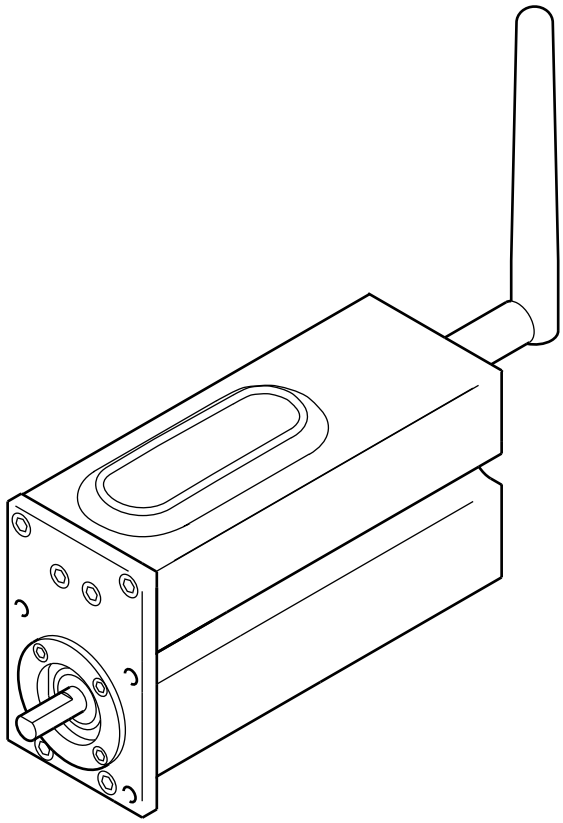
Wireless Positioning Units

EPU-100-W5-R60

・Lock Adapter (EPL-48-D6-D6) (Option)

Instruction Manual



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Couplings, Screws, Clampers

Introduction

Thank you very much for purchasing this **Wireless Positioning Unit (EPU-100-W5-R60)** from Nabeya Bi-tech Kaisha.

Read the "Wireless Positioning Unit (EPU-100-W5-R60) Simple Guide" or the "Wireless Positioning Unit (EPU-100-W5-R60) Instruction Manual" for this product carefully prior to use. Only use once the correct usage method of this product is understood.
The contents of **"1 Cautionary Notes Regarding Safety"** in particular, must be read and understood prior to use.
This manual should be stored in a manner that enables it to be viewed whenever a user may require it.

■About Applications of this Product

This product is designed for general industrial applications, such as feed screw drives.
Do not use in applications where incorrect operation or failure may lead to death or personal injury, or in applications where failure could cause serious social damage or adverse impact.

- **Contact us when considering use for special applications.**
- **Always install the fail-safe function if using for applications involving equipment that may cause serious accident or loss.**

■About Disposal

When disposing this product, follow the rules and regulations of each local government and dispose of it as industrial waste.

Due to product improvements, some of the specifications described in this document are subject to change without notice.

Contents

1 Cautionary Notes Regarding Safety

Take care to understand the following precautions before using the product in order to ensure safe operation.
Improper handling or use may cause an unexpected accident or shorten the life of the product.
We do not take any responsibility in the case of failure due to improper use, modification, of for not following the precautions.

In this manual, safety precautions are classified as either a "Warning" or "Caution".

■Description of Markers

The specific contents will be indicated in sentences near the Warning/Caution marker.

 Warning	This indicates a situation where improper handling could result in a dangerous situation that could cause death or serious injury.
 Caution	This indicates that incorrect handling may cause minor injury or damage to the product and surrounding equipment.

■Explanation of Figure Marker

The specific contents will be indicated in sentences near the figure marker.

Figure Marker	Description
	Indicates something is prohibited. Never perform any prohibited work.
	Indicates something is mandatory. Always perform any mandatory work as instructed.

1.1 Cautionary Notes Regarding Installation and Wiring

Warning

- Be sure to perform wiring after installation is complete. **Not doing so may result in an electric shock.**
- Wiring should be done in a place that is free from dust and water or oil. **This may result in an electric shock, fire, or a fault.**

- Do not allow conductive foreign matter, such as screws and metal pieces, or flammable foreign substances, such as oil, to enter the internals. **This may result in an electric shock, fire, or a fault.**
- Be sure to install the unit in such a way that fire or personal injury does not occur during an earthquake.
- Insulate the power supply terminals connections. **Not doing so may result in an electric shock.**

Warning

- Do not wire or operate with wet hands. **It may result in electric shock or failure.**
- Do not use this product near water, corrosive atmosphere, flammable gas or harmful gas, or near combustible materials. **Not doing so may result in an electric shock, fire, or a fault.**

- Do not damage, apply excessive stress, place heavy objects on, pinch, or bend the cables repeatedly. **This may result in an electric shock, fire, or a fault.**
- Do not use in locations subject to severe vibration or impacts. **This may result in an electric shock, injury, fire, or a fault.**

- Perform wiring correctly and securely. **Not doing so may result in an electric shock, fire, or a fault.**
- Install according to the specified mounting method and mounting direction. **Not doing so may result in injury or a fault.**
- Consider each of the specifications, such as the main unit weight and rated output, when installing and install in an appropriate environment. **Not doing so may result in injury or a fault.**
- Install the unit where the ambient temperature is -5˚C to 55˚C (non-freezing) and the ambient humidity is 20%RH to 85%RH (non-condensing). **Not doing so may result in a fire or a fault.**
- Take measures regarding peripheral devices that are affected by noise as noise may be generated by the PWM switching control. Also consider the installation environment as the unit itself may be affected by external noise.
- Adjust the alignment between the output shaft and the partner device accurately. **Not doing so may result in a fault.**
- When installing the unit vertically, install the unit with the output shaft facing down, as failing to do so may result in grease flowing into the unit. **This may result in a fault.**
- Check and adjust each setting before operation to avoid unexpected operation. **This may result in injury or a fault.**

- Do not apply any voltage other than the specified voltage. **This may result in a fault.**
- Do not stack the units. **This may result in a fault.**
- Do not hold the cables or output shaft during transportation. **This may result in a fault.**
- Do not step on the unit or place heavy objects on it. **This may result in a fault.**
- Do not subject the unit to strong impacts such as those caused by dropping or falling from something. **This may result in a fault.**
- Do not use outdoors or under exposure to direct sunlight. **This may result in a fire or a fault.**
- Do not use in places where static electricity is generated. **This may result in a fire or a fault.**
- Do not subject the output shaft to strong impacts. **This may result in a fault.**
- Do not subject the output shaft to loads in excess of the allowable load. **This may result in a fault.**
- Do not connect directly to AC power. **This may result in a fire or a fault.**

1.2 Cautionary Notes Regarding Operation and Maintenance

Warning

- Wiring, maintenance and inspection should be performed by a specialized technician. **This may result in an electric shock, injury, or a fault.**
- If an error occurs, stop operation immediately and install an external emergency stop circuit so that the power can be shut off. **Not doing so may result in an electric shock, injury, fire, or a fault.**

Warning

- Do not move, connect wiring, or inspect while the power is on. **It may result in electric shock or failure.**
- In case of a fault, shut off the power immediately at the power supply and do not reapply power. **This may result in a fire or a fault.**
- Do not touch the unit while the power is on or for a while after the power is turned off, as it may be hot. **This may result in burns.**
- Never touch the output shaft during operation. **This may result in injury.**
- Do not disassemble, repair or modify. **This may result in an electric shock, injury, fire, or a fault.**

Caution

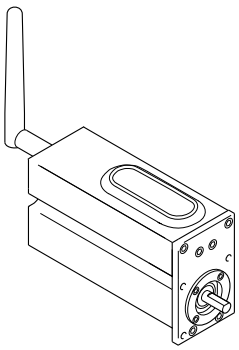
- Securely fix to the device so that it will not come loose during operation. **Not doing so may result in injury or a fault.**
- If a dangerous situation may occur while stopped or if the product fails, install an external holding brake. **Not doing so may result in injury or a fault.**
- If an error occurs, fix the cause and ensure safety before restarting operation. **Not doing so may result in a fault.**
- Turn off the power if not using the product for extended periods of time. **Not doing so may result in a fault.**

Caution

- Do not use a unit while damaged. **This may result in injury, fire, or a fault.**
- Do not make extreme adjustments or changes. **Such changes may cause unstable operation.**
- After power is restored in the event of a power outage, do not approach the equipment because operation may restart all of a sudden. **This may result in injury.**
- Do not turn the power on or off excessively frequently. **This may result in a fire or a fault.**
- Do not perform continuous operation for extended periods of time. **This may result in a fire or a fault.**

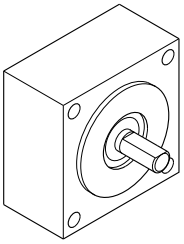
2 Overview

2.1 Product Overview



Wireless Positioning Unit (EPU-100-W5-R60)

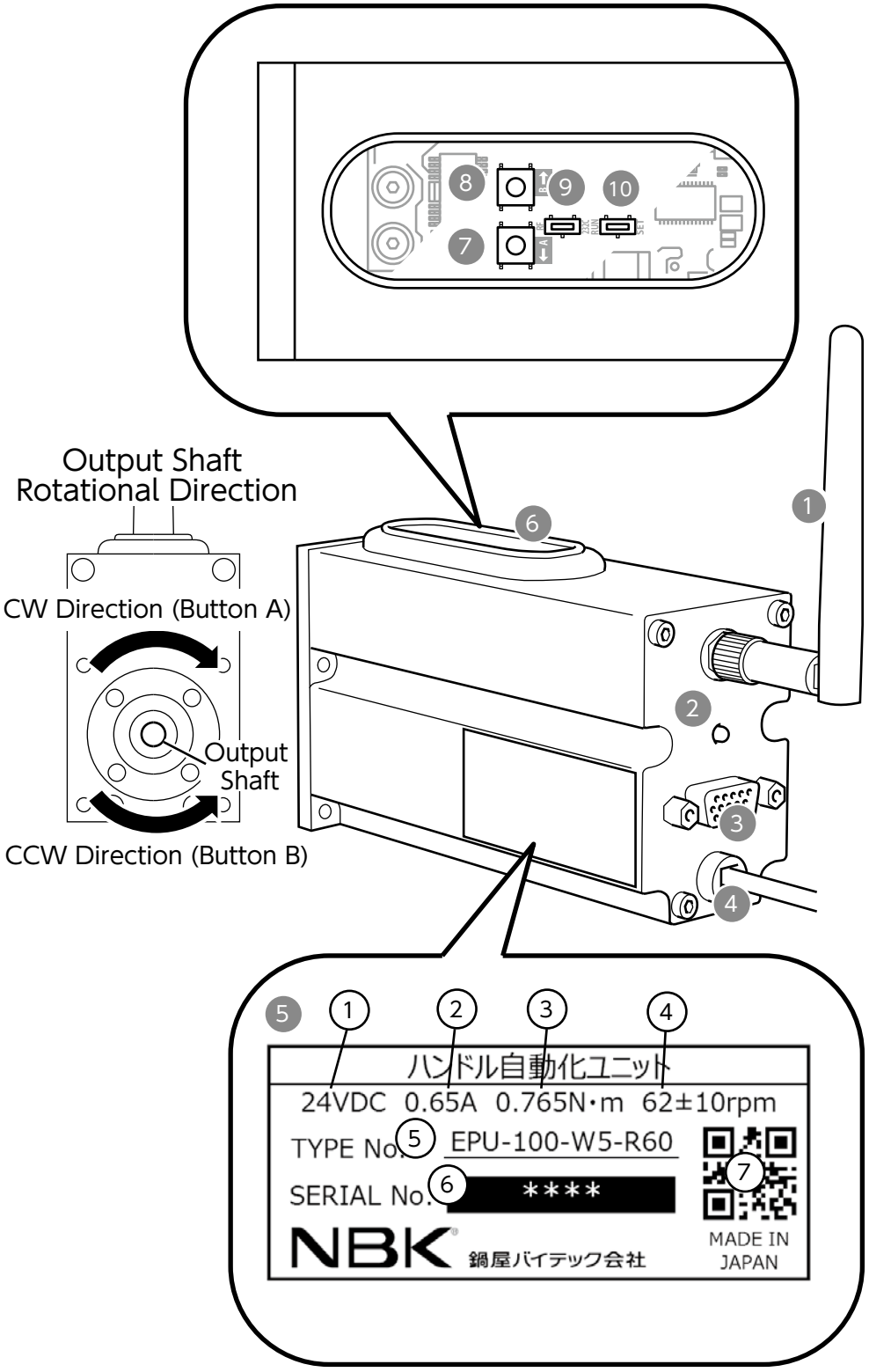
- These units automate positioning mechanisms with a feed screw. By replacing the feed screw operating handle with this unit, equipment and device positioning mechanisms can be automated.



Lock Adapter (EPL-48-D6-D6)(Option)

- Position retention (locking) components are parts used in combination with Wireless Positioning Units.
- The torque from the input side (unit side) is transmitted to the output side, but the torque load from the output side is not transmitted to the input side.

2.2 Part Names and Functions



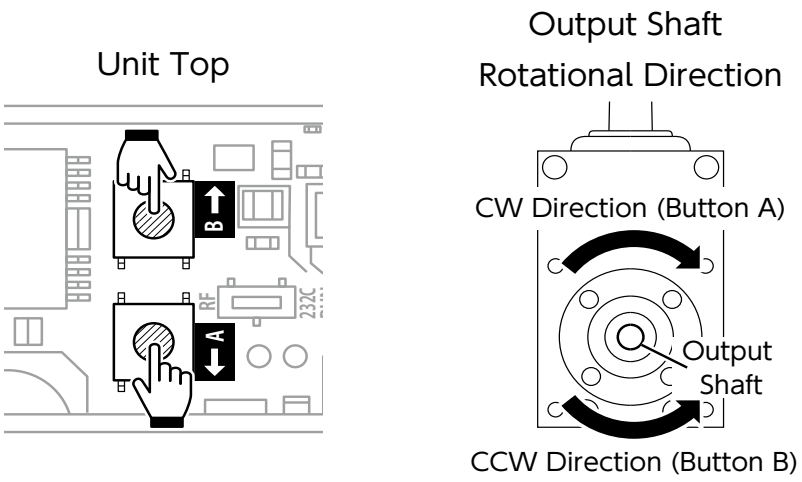
No.	Name	Function		Reference
1	Antenna	Antenna for wireless communication.		> P.16
2	Display LED	Regular: Green (Standby: Illuminated, Moving: Blinking)		-
		Error: Red (Error occurred: Illuminated, Fault: Blinking)		
		Setting: Orange (Network settings: Illuminated)		
3	External I/F connector	High-density D-sub 15-pin male connector. Used for wired communication, limit sensor connection, or for connecting a forced travel switch.		> P.22
4	Power Cable	Cable for making connections to power. 24 V (Wiring color: Red), 0 V (Wiring color: Black)		> P.21
5	Nameplate	① Rated Voltage	⑤ Part No.	-
		② Rated Current	⑥ Serial No.	
		③ Rated Torque	⑦ QR Code	
		④ Rated Rotational Frequency	-	
6	Rubber cover	Remove to access the buttons and switches on the PCB.		-
7	A button (CW)	Output shaft rotates clockwise as seen from the output shaft side.		> P.10
8	B button (CCW)	Output shaft rotates counter-clockwise as seen from the output shaft side.		
9	RF/232C Switch	RF: Controls the unit via wireless communication. 232C: Controls the unit via wired communication.		> P.11
10	RUN/SET Switch	RUN: Puts the unit into regular operation mode, enabling operation. The switch should be switched to regular mode. SET: Puts the unit into wireless unit search standby state for wireless unit registration mode. Contact us if communication or operation is interrupted after changing the network settings.		

2.3 Button and Switch Operation

Remove the rubber cover on the top of the unit and operate using the buttons and switches on the board to rotate the output shaft, switch between wired and wireless communication, and make other network settings.

■A button (CW), B button (CCW) operation

The output shaft will rotate while the button is pressed.



Warning

Do not wire or operate with wet hands. **It may result in electric shock or failure.**

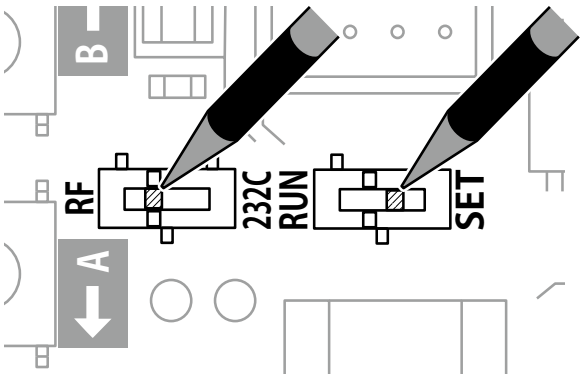
Caution

- Never touch the other components on the PCB. **This may result in a fault.**
- Do not use in places where static electricity is generated. **This may result in a fire or a fault.**

■RF/232C Switch, RUN/SET Switch Operation

Use the switches on the board to switch between wired and wireless communication, and make other network settings. Use a thin screwdriver, such as a precision screwdriver or a ballpoint pen, to perform the switching.

Unit Top



RF/232C Switch	**RF:** Controls the unit via wireless communication.
	232C: Controls the unit via wired communication.
RUN/ SET Switch	**RUN:** Puts the unit into regular operation mode, enabling operation. The switch should be switched to regular mode.
	SET: Puts the unit into wireless unit search standby state for wireless unit registration mode. Contact us if communication or operation is interrupted after changing the network settings.

※ Change the switches prior to applying power. The signal indicating the new switch status is sent only when the unit is started.

※ Default factory settings are "RF" and "SET".

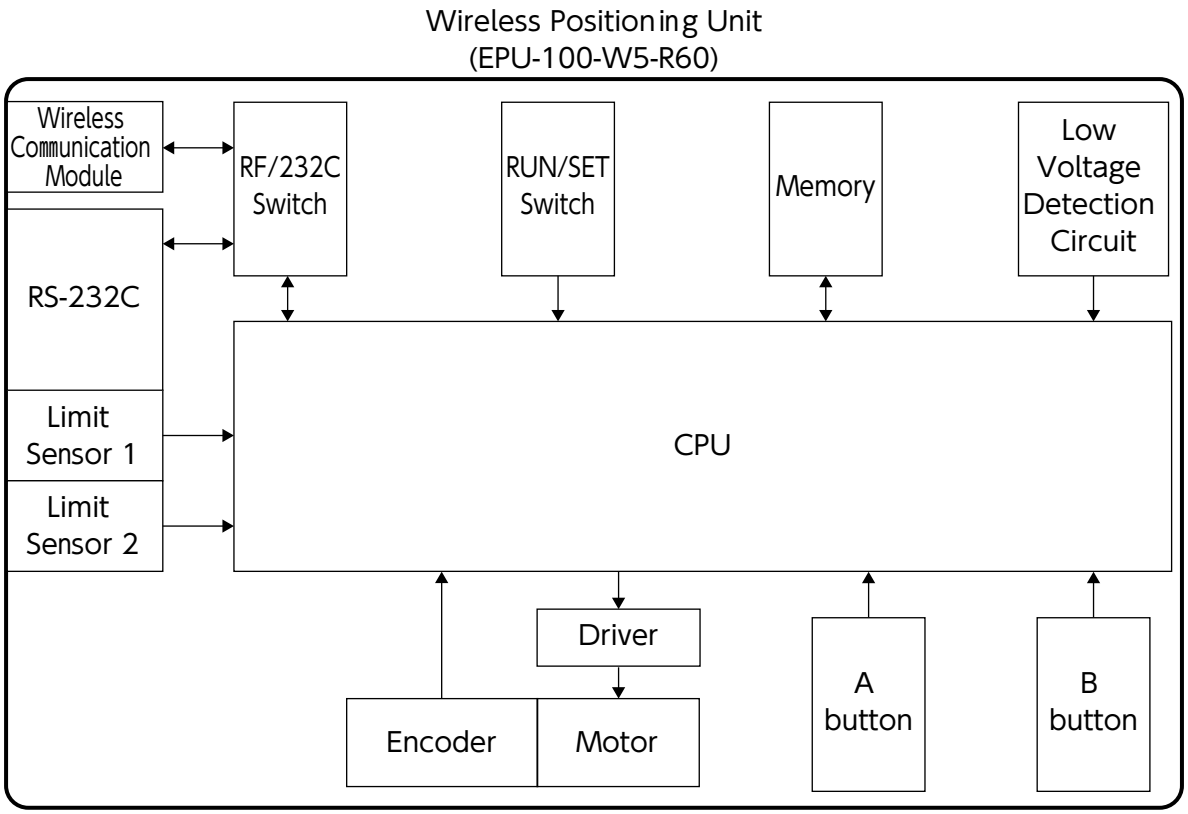
Warning

Do not wire or operate with wet hands. **It may result in electric shock or failure.**

Caution

- Never touch the other components on the PCB. **This may result in a fault.**
- Do not use in places where static electricity is generated. **This may result in a fire or a fault.**

2.4 Block Diagram



3 Specifications

■Wireless Positioning Unit (EPU-100-W5-R60)

Power Source Voltage		24 VDC ± 10%
Current Consumption	**Standby**	20 mA
	Rated	0.65 A
	Maximum	1 A
Rated Output		4.98 W
Rated Rotational Frequency		62 ±10 rpm
Rated Torque		0.765 N·m[*1]
Max. Allowable Load	**Radial Load**	29.4 N
	Thrust Load	24.5 N
Stop Accuracy		±5°[*2]
Input	**Wireless Communication**	2.4 GHz Band Wireless Communication
	Wired Communication	RS-232C (3-wire type)
	Input Circuit	2ch[*3]
Wireless Reach Distance (Reference Value)	**Indoors**	60 m
	Outdoors	1200 m
External Size (Output Shaft/Power Cable) /Not including antenna)		42 mm x 70 mm x 115 mm
Weight		520 g

*1: When attaching the lock adapter the output torque is 0.715 N·m.

*2: When attaching the lock adapter, about 10° of backlash is generated.
To compensate for the backlash, refer to the Dedicated Software (EPU-COM) Instruction Manual.

*3: For limit sensor detection

■Lock Adapter (EPL-48-D6-D6)(Option)

Retention Torque *1	5 N·m
Loss Torque *2	0.05 N·m
Reduction Ratio	Constant Velocity (1:1)
External Size (Excluding Output Shaft)	42 mm x 42 mm x 23 mm
Weight	135 g

*1 Load torque from output side which the lock adapter can hold
*2 Torque lost when torque is transmitted from input side to output side

■Operating Environment

Operating Environment	**Temperature**	-5˚C to 55˚C (non-freezing)
	Humidity	20%RH to 85%RH (non-condensing)

4 Installation and Connection

4.1 Installation

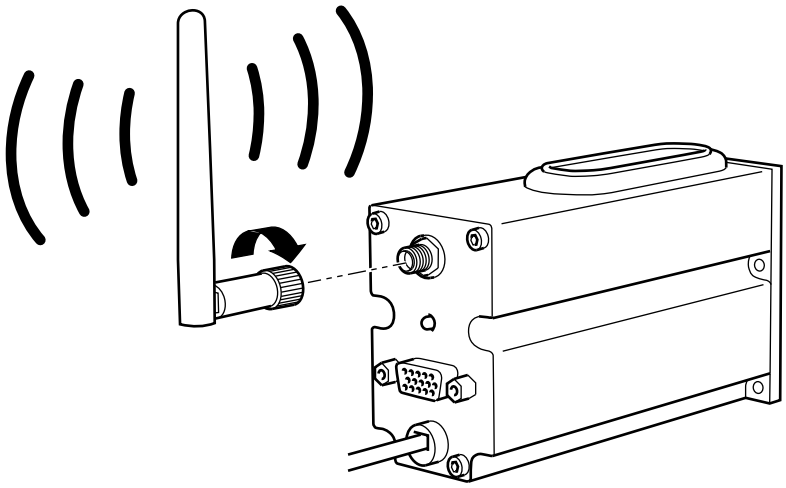
The following environmental conditions are required for installation. Install in an appropriate environment.

- **Install indoors.**
- **Install in a place that is not exposed to direct sunlight.**
- **Install where there is no continuous vibration.**
- **Install in a place that is free from dust and water or oil.**
- **Install in an environment where heat is easily dissipated.**
- **Install in a place where inspection and cleaning are easy.**
- **Install the unit where the ambient temperature is -5˚C to 55˚C (non-freezing) and the ambient humidity is 20%RH to 85%RH (non-condensing).**
- **Be sure to install the unit in such a way that fire or personal injury does not occur during an earthquake.**
- **Do not install this product near water, corrosive atmosphere, flammable gas or harmful gas, or near combustible materials.**
- **Take measures regarding peripheral devices that are affected by noise as noise may be generated by the PWM switching control. Also consider the installation environment as the unit itself may be affected by external noise.**

※ **Contact us individually if installing in a special environment.**
＞P.28

■Unit Installation

1. **Connect the antenna.**
   Radio waves are radiated vertically from the antenna axis as shown below. After connecting the antenna, adjust the angle of the antenna while considering the directivity of the radio waves.



Wireless communication distance varies depending on the installation / connection conditions.
The communication distance may be shorter under the following conditions, and should be considered when determining the installation location and connection method.

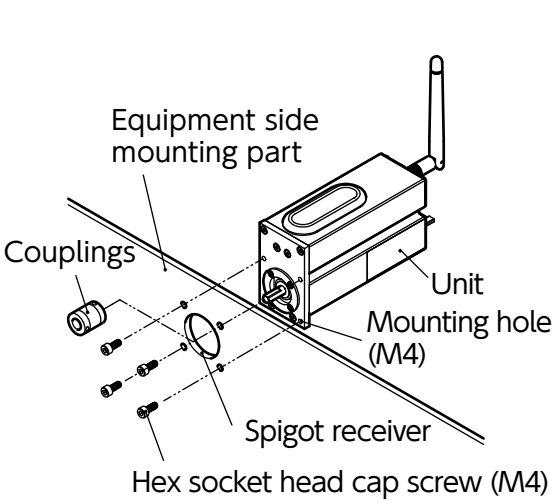
- **There is an obstacle in the transmission path. (Rebar, reinforced concrete, etc.)**
- **There is a height difference in the transmission path.**
- **The installed position is close to the ground.**
- **There is metal around.**
- **There is a lot of radio noise in the vicinity.**

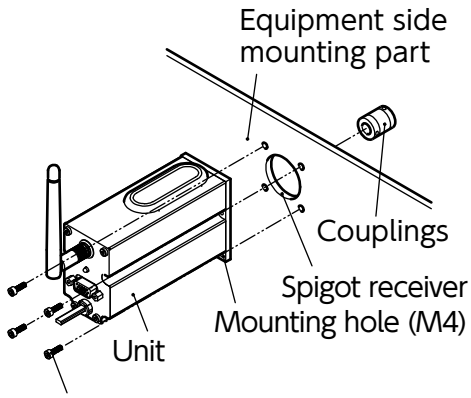
※ Antenna connection is not necessary for wired communication.

2. Mount at the install location.

Use the spigot to align the unit with the mating device and secure it using a hex socket head cap screw.

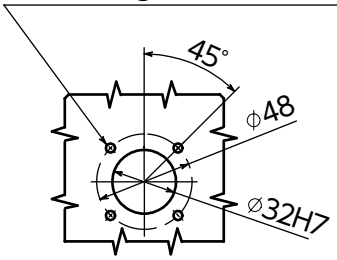
※ Hex socket head cap screws and couplings are not provided.





<Equipment side mounting part recommended machining dimensions>

When fixing from equipment side: 4×Φ4.5
When fixing from the unit side: 4×M3



3. After tightening the screws, make sure that there is no gap between the unit and the partner device.

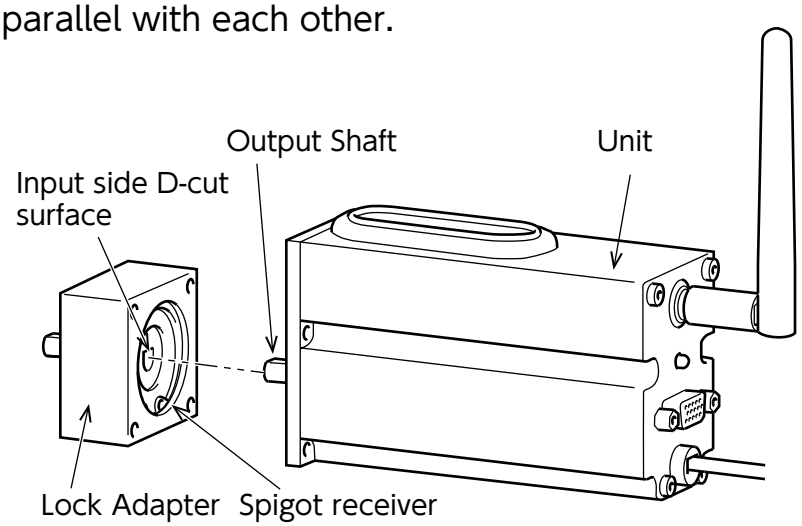
Caution

- Do not hold the cables or output shaft during transportation. **This may result in a fault.**
- Do not subject the output shaft to strong impacts. **This may result in a fault.**
- When installing the unit vertically, install the unit with the output shaft facing down, as failing to do so may result in grease flowing into the unit. **This may result in a fault.**

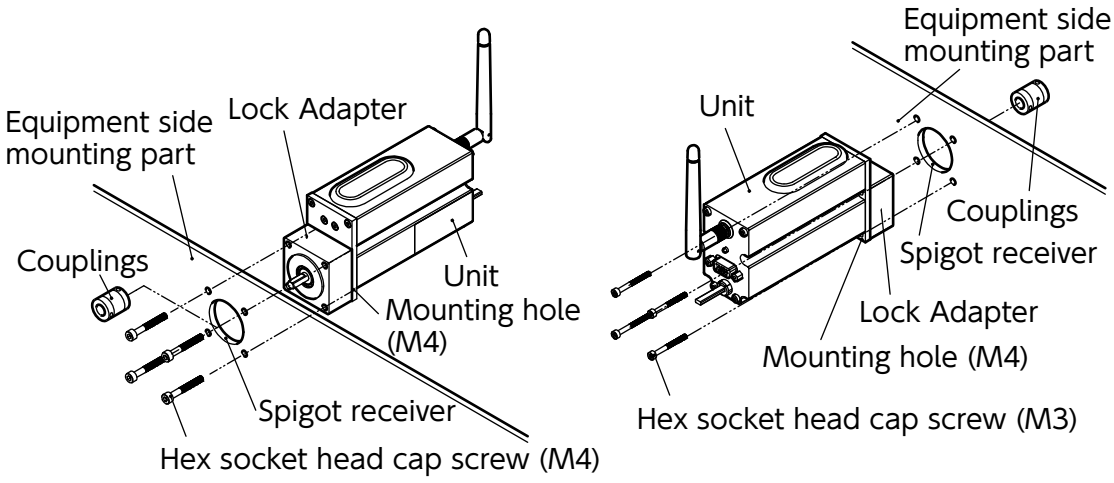
■If installing the unit-using the lock adapter (optional)

Assemble the unit with a lock adapter enables positioning misalignment due to equipment vibration, external force, or dead weight in vertical use to be prevented.

1. **Connect the antenna.** > P.16
2. **Mount the lock adapter to the unit.**
   Align the output shaft of the unit with phase of the D-cut surface hole on the input side of the lock adapter and insert. Match each spigot part and assembly the unit and lock adapter in parallel with each other.

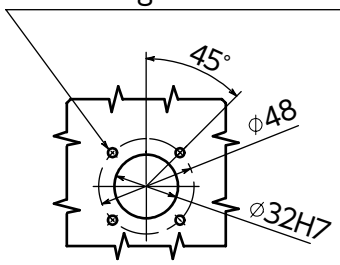


3. **Mount at the install location.**
   Hold the unit with the lock adapter in place and secure the unit to the partner device using hex socket head bolts.
   ※ Hex socket head cap screws and couplings are not provided.



<Equipment side mounting part recommended machining dimensions>

When fixing from equipment side: 4×Φ4.5
When fixing from the unit side: 4×M3



4. **After tightening the screws, make sure that there is no gap between the unit and the lock adapter, or the lock adapter and the partner device.**
   ※ When attaching the lock adapter, about 10° of backlash is generated.
   To compensate for the backlash, refer to the Dedicated Software (EPU-COM) Instruction Manual.

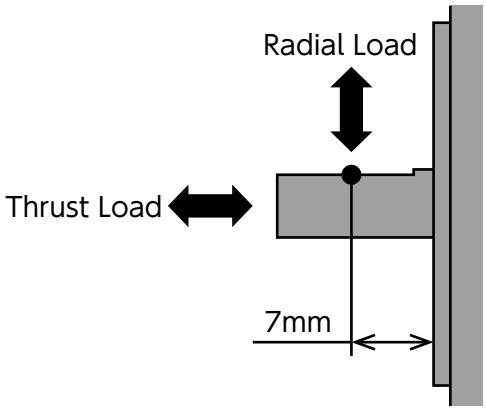
Caution

- Do not forcibly assemble the unit and the lock adapter. **This may result in a fault.**
- Make sure that no foreign objects, such as metal fragments, enter the lock adapter. **This may result in a fault.**
- Do not hold the cables or output shaft during transportation. **This may result in a fault.**
- Do not subject the output shaft to strong impacts. **This may result in a fault.**
- When installing the unit vertically, install the unit with the output shaft facing down, as failing to do so may result in grease flowing into the unit. **This may result in a fault.**

■Max. Allowable Load

Make adjustments such that no excessive load is applied to the output shaft.

Allowable Load:
Radial Load: 29.4 N
Thrust Load: 24.5 N



Caution

- Do not hold the cables or output shaft during transportation. **This may result in a fault.**
- Do not subject the output shaft to strong impacts. **This may result in a fault.**
- Adjust the alignment between the output shaft and the partner device accurately. **This may result in a fault.**
- Do not apply excessive radial or thrust loads to the output shaft as this may damage the bearing.

4.2 Connection

■Unit Connection

Connect the power supply.

A power supply with an appropriate current capacity should be prepared by the customer.

Operating current per unit:

Power Source Voltage:
24 VDC±10%
Rated Current: 0.65 A
Maximum Current: 1 A

Power cable:

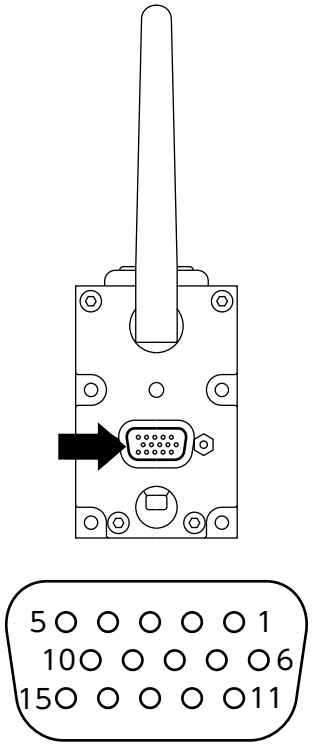
Wire Used: H-VFF 0.5SQ
Cable Length: 1 m
Wire Color: Red (+24 V)/
Black (0 V)
Cable Termination:
Stranded Wire

Do not connect directly to AC power. **This may result in a fire or a fault.**

■External I/F Connector Connection

With the use of an high-density D-sub 15-pin connector, wired communication, limit sensor connection, or forced travel switch connection is possible.

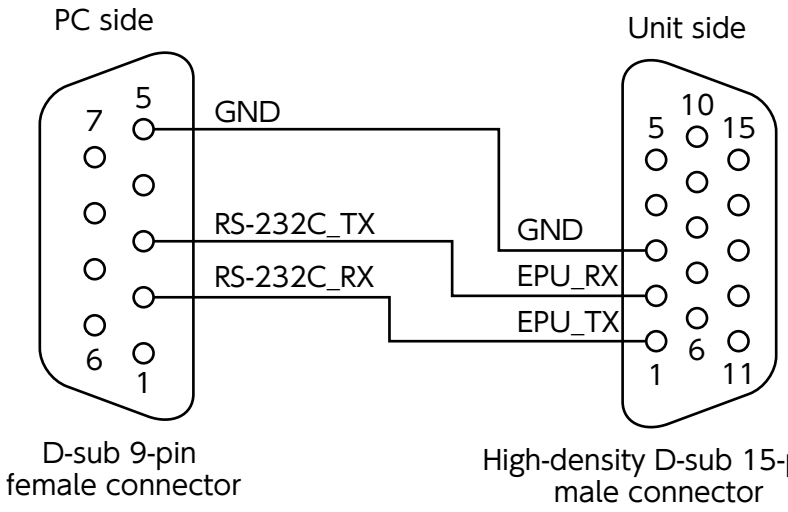
External I/F Connector Function List



High-density
D-sub 15-pin
female connector

No.	Pin Name	Function
1	EPU_TX	RS-232C Transmit
2	EPU_RX	RS-232C Receive
3	GND	RS-232CGND
4	Reserve	Do not connect
5	Reserve	Do not connect
6	Lim1_V+	Limit Sensor 1
7	Lim1_GND	Limit Sensor 1 GND
8	Lim2_V+	Limit Sensor 2
9	Lim2_GND	Limit Sensor 2 GND
10	Reserve	Do not connect
11	Reserve	Do not connect
12	Reserve	Do not connect
13	SW_CW	Forced Travel (CW)
14	SW_CCW	Forced Travel (CCW)
15	SW_GND	Forced Travel GND

●RS-232C and Unit Wiring Connection Diagram



No.	Pin Name
1	EPU_TX
2	EPU_RX
3	GND

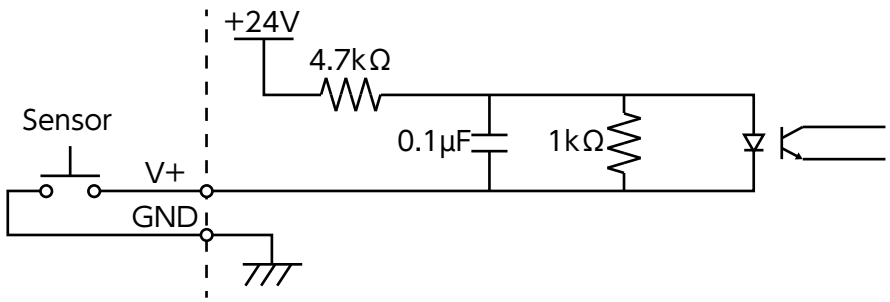
The cable for connecting to a PC should be prepared by the customer.
Refer to ＞P.22 for the external I/F connector specifications.

●Limit Sensor Connection

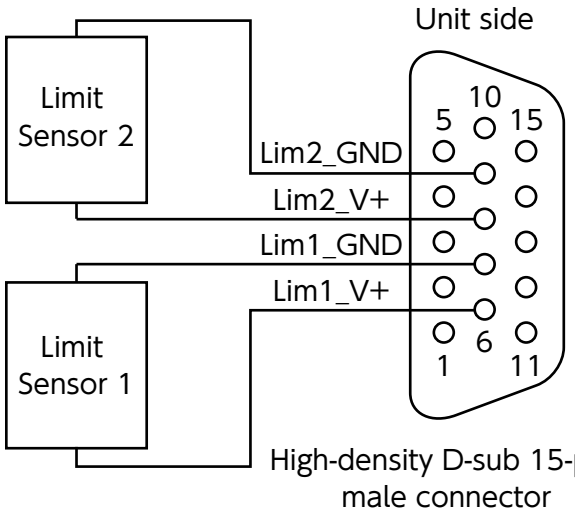
Connect the limit sensor if required.
Connecting a limit sensor enables the movable range of the workpiece to be mechanically limited.
If the range of the limit sensor input to the external I/F connector is exceeded, the workpiece will automatically stop and retreat to be within the range.
At the same time, an error code is displayed. Reset the error to resume operation.
The movable range can be limited programmatically by changing settings with the dedicated software (EPU-COM).

※ For details, refer to the Dedicated Software (EPU-COM) Instruction Manual.

<Limit Sensor Circuit Diagram>



<Limit Sensor Wiring Diagram>

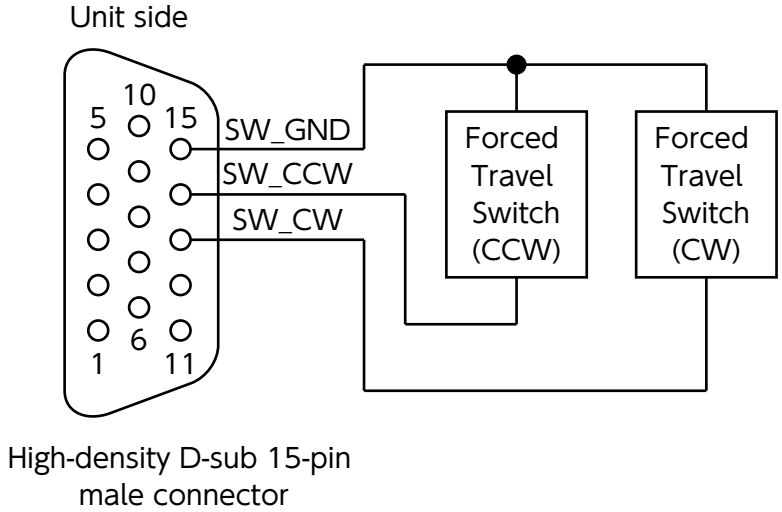


No.	Pin Name
6	Lim1_V+
7	Lim1_GND
8	Lim2_V+
9	Lim2_GND

●Forced Travel Switch Connection

The same operation as pressing button A (CW) / button B (CCW) (> P.10) can be performed by connecting a switch to the external I/F connector.
Forced travel is possible by connecting SW_CW or SW_CCW of the external I/F connector to SW_GND.

<Forced Travel Switch Wiring Diagram>



No.	Pin Name
13	SW_CW
14	SW_CCW
15	SW_GND

5 Maintenance

Perform maintenance periodically in order to ensure safe use.
If any abnormality is found, stop using the unit immediately and take measures to eliminate the root cause of the abnormality.

5.1 Requests for Inspections

- **The technicians must turn on and off the power themselves.**
- **Do not touch the unit during operation or immediately after operation stops as the unit is hot.**
- **Be sure to carry out inspections regularly to prevent accidents.**
- **The standard lifetime of the unit is 300 hours of actual operation. Although this varies depending on the environmental conditions and operating conditions, if an error occurs after the standard life time has already elapsed, replace then unit immediately.**

5.2 Inspection Items

- **Is the power supply voltage within the specified values?**
- **Is the operating environment within the specified values?**
- **Is there any abnormal noise or abnormal vibration?**
- **Is there any dust, debris, or foreign matter in the surrounding area?**
- **Are there any loose or misaligned fasteners or joints?**
- **Are any of the cables damaged or stressed?**
- **Are the terminals damaged?**

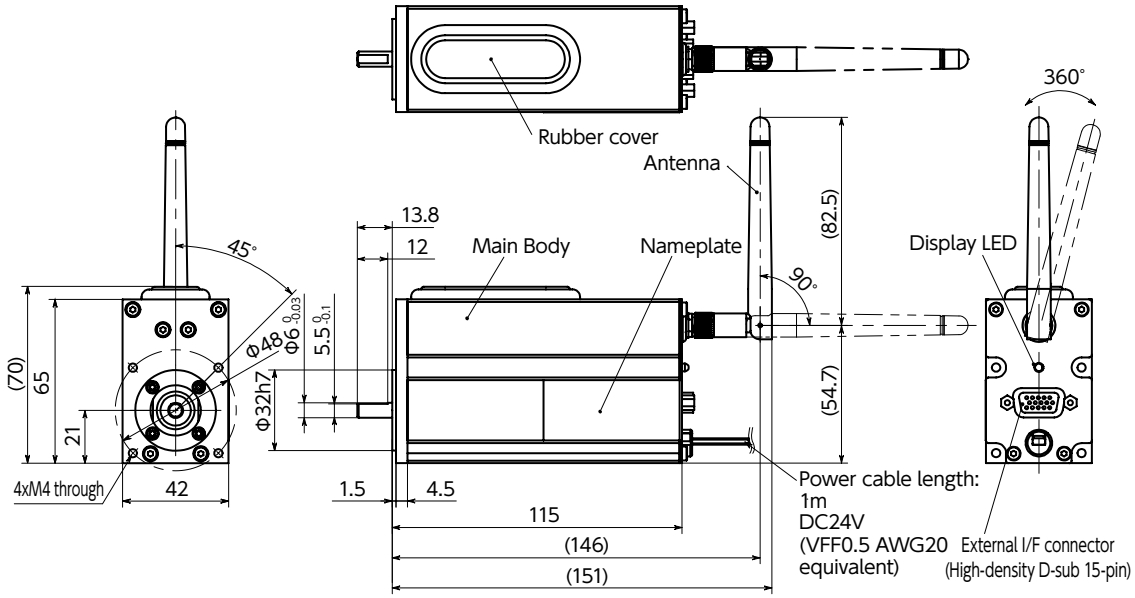
6 Troubleshooting

Symptom	Verification	Countermeasure	Explanation Page
Display LED not turning ON	Is the power supply voltage correct?	Make sure the voltage level is within 24 V ± 10%	> P.21
	Is the power supply cable connected correctly?	Make sure the red power cable is 24 V and the black power cable is 0 V	
Display LED regular: Does not turn green	Is the RUN/SET switch of the module set correctly?	When the power is turned on while the "RUN/SET" switch is set to "SET", the unit will start up in "SET" mode The setting is checked only when starting up. Turn the power off and on again with the switch set to "RUN"	> P.11
Errors frequently occur with wireless communication	Are the transceiver and the unit's antenna correctly installed and connected?	Correctly install/connect the antenna	> P.16

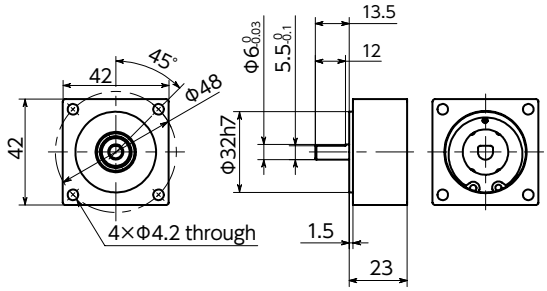
7 Dimension Figure

■EPU-100-W5-R60

Unit: mm



■EPL-48-D6-D6



8 Warranty

Warranty period: 300 hours of operation or one year, whichever is shorter.

Warranty contents: If a failure occurs during the warranty period under normal operating conditions as per this instruction manual, repair or replacement will be performed free of charge.

However, there may be a charge in the following cases even within the warranty period.

(1) If the unit is used incorrectly, has been repaired improperly, or modified.
(2) If the problem is caused by dropping the unit after purchase or due to damage during transportation.
(3) When the cause is a result of using the product outside of the specification range.
(4) Fire, earthquake, lightning, storm and flood damage, salt damage, abnormal voltages, or natural disasters.
(5) When the cause is intrusion of water, oil, metal chips, or other foreign matter.

The warranty covers only the product itself. Damage resulting from failure of the product will not be compensated.

■Contact

Customer Service Business Hours: 8:00 to 17:00 on weekdays, Eastern Standard Time
Phone: +1 (484) 685-7500
Fax: +1 (484) 685-7600
https://www.nbk1560.com/en-US/
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9 Notes About Electromagnetic Radiation

Contains FCC ID : MCQ-S2CTH / IC : 1846A-S2CTH

The wireless module built into the Wireless Positioning Unit (EPU-100-W5-R60) uses frequencies in the 2.4 GHz band.
For this reason, read the following precautions regarding electromagnetic radiation carefully as use correctly.

We shall not be liable for any improper use, faults caused during use, malfunctions, and damages caused by use of this machine by our customers or third parties, unless legal liability is determined.

■Notes About Electromagnetic Radiation

- This device complies with part 15 of FCC Rules and Industry Canada’ s licence-exempt RSSs. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
- This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.
- This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.
- Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Revision History

Date	Identification Number	Revision Contents
February 2020	UM-EPU100-SU-03E	Initial Release

NBK®

Couplings, Screws, Clampers

Version 3 February 2020

UM-EPU100-SU-03E