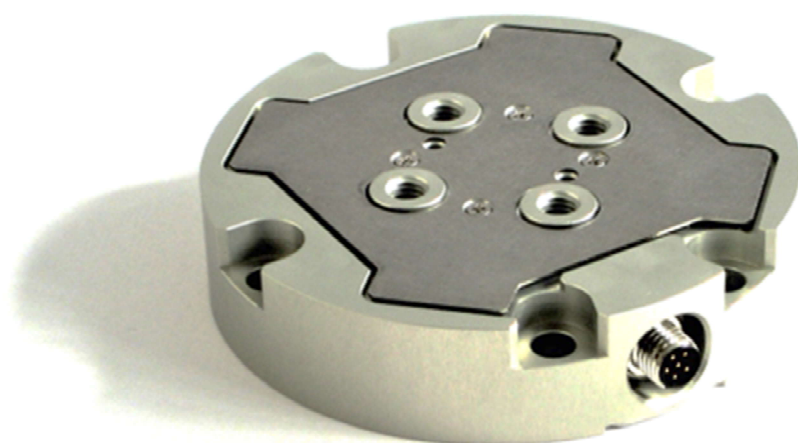




Force Torque Sensor

# User's Manual Rev. 1.03

FH-300-20



Please read this manual before using this product.  
Please keep it in a safe place for future reference.

## Introduction

This manual provides the information on the hardware of the Force Torque Sensor and the basic operating procedures. To make full use of the performance and functions of the Force Torque Sensor, please read this manual carefully and understand fully before operation.  
Furthermore, please keep this manual in a safe place for future reference.

## Conventions

The following conventions are used in this manual.

### **WARNING**

Obey the instructions under this heading to avoid death or serious injury due to fire or electrical shock.

### **CAUTION**

Obey the instructions under this heading to avoid injury or damage to the equipment.

## Safety Precautions

### General Points to Note

- When starting or operating the equipment, confirm that the performance and functions of the equipment are working properly.
- In case the equipment malfunctions, take safety measures to avoid various damages.
- If the equipment is used outside the described specifications or altered, the performance cannot be guaranteed.

#### **WARNING**

- Do not use this equipment in a place where inflammable or explosive gas or steam is present.
- Never use this equipment with any power source other than one that can supply the correct rated voltage.
- Never perform installation, operation, maintenance, or equipment checks with wet hands.
- Never attempt to disassemble or modify the equipment.
- Never drop the equipment and never subject the equipment to shock or vibration.
- If abnormal symptoms occur, immediately turn off the equipment.

#### **CAUTION**

- When connecting or removing the cable, turn off the equipment and the devices connected to the equipment.
- If the equipment is located near noise sources, use a noise filter, wire the cables, insulate it, etc.

- To use the equipment properly and safely, do not locate the equipment in:  
Places with high temperature such as those exposed to direct sunlight, and places with corrosive or flammable gas.  
Places subject to splashes of chemical liquids, and places subject to static electricity.

## Cautions for Use

### CAUTION

- After powering on, wait for 30 minutes before use. Failure to observe this caution may cause drift for measurement values.  
Also, heat generated by external devices such as end effectors or robots attached to the equipment may cause drift for measurement values.  
Warm up all external devices thoroughly prior to use.
- Although the sensor has a temperature compensation function, the compensation function may not function sufficiently if a sudden temperature change occurs to the force torque sensor main unit. Using the equipment in a stable temperature and humidity environment is recommended.
- Insert the dedicated cable firmly before use. Otherwise, IP performance will not be achieved.
- Fix the dedicated cable so that no tension is applied to the force torque sensor main unit. The output value may vary depending on the tension of the cable.
- Malfunctions may occur depending on the located state of the equipment.  
Confirm that the equipment is fixed with the specified torque and the specified number of screws, and that the fixing surface of the equipment satisfies the specified flatness.
- Be sure to use the product in the specified temperature and humidity environment. Failure to do so may result in malfunction.
- Use the equipment in such a way that it is not overloaded.
- In addition to outputting the measurement value, the presence or absence of errors is simultaneously output. Since measurement values during errors are not reliable, take safety measures such as stopping the operation of your application before use.

## Product Safety

### USA



#### FCC

This device complies with Part 15 of the FCC Rules. 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.

Do not make any changes or modifications to the equipment unless otherwise specified in the manual. If such changes or modifications should be made, you could be required to stop operation of the equipment.

## Japan

VCCI

この装置は、クラスA 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。  
この場合には使用者が適切な対策を講ずるよう要求されることがあります。

VCCI-A

## EU, UK



EMC

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.

## 韓国



A 급 기기

(업무용 정보통신기기)

이 기기는 업무용으로 전자파적합등록을 한 기기이오니 판매자 또는 사용자는 이 점을  
주의하시기 바라며, 만약 잘못판매 또는 구입하였을 때에는 가정용으로 교환하시기  
바랍니다.

## Italia

Per l'Italia, Etichettatura ambientale: per il corretto riciclo degli imballaggi dei nostri prodotti e  
articoli, visita il sito

<https://www.canon-europe.com/sustainability/approach/packaging>

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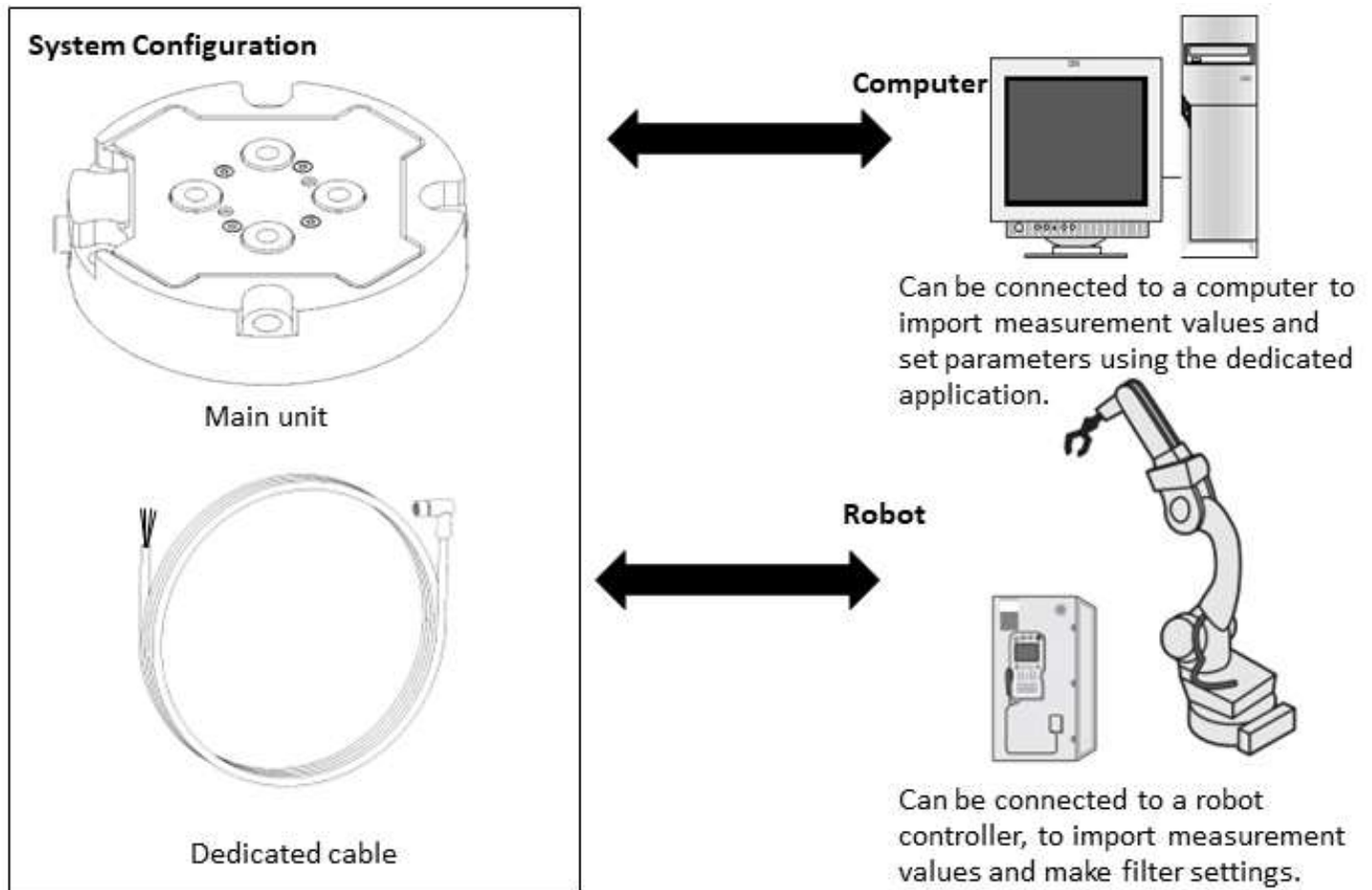
## 1 . Before Use

This chapter explains the configuration of the Force Torque Sensor, precautions, and preparation required before use.

Please read this chapter before operation.

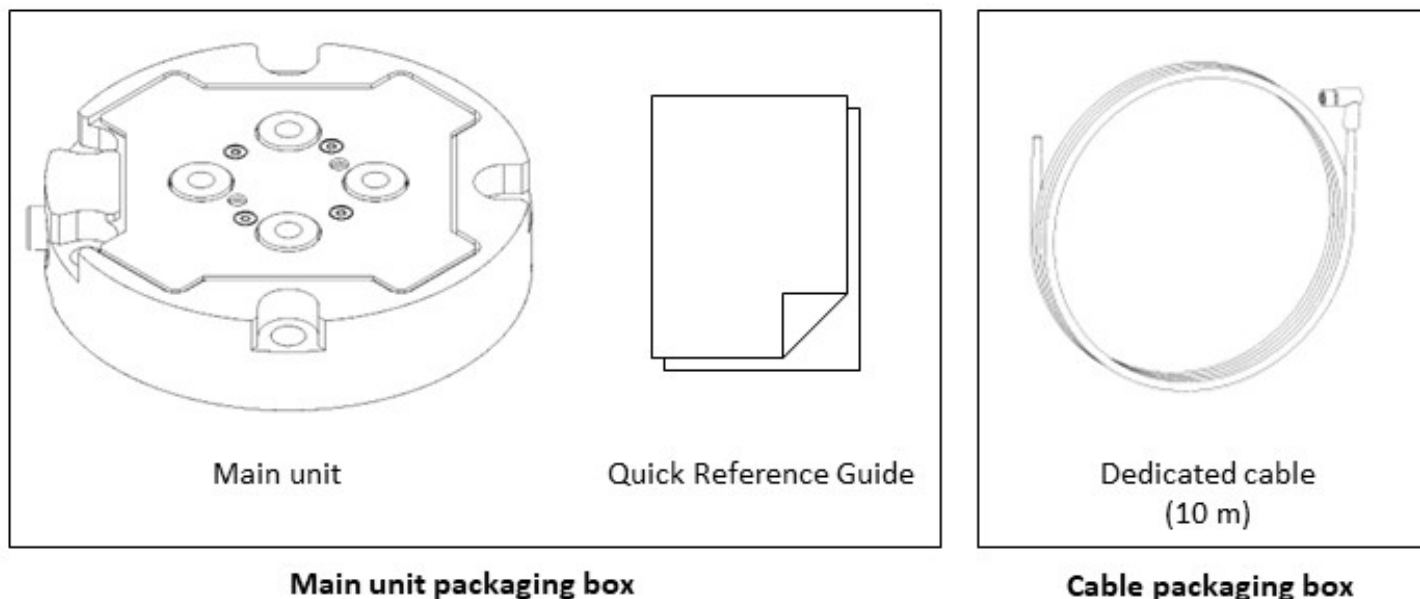
### 1 - 1 . System Configuration

The equipment can be used with commercially available devices for various purposes.



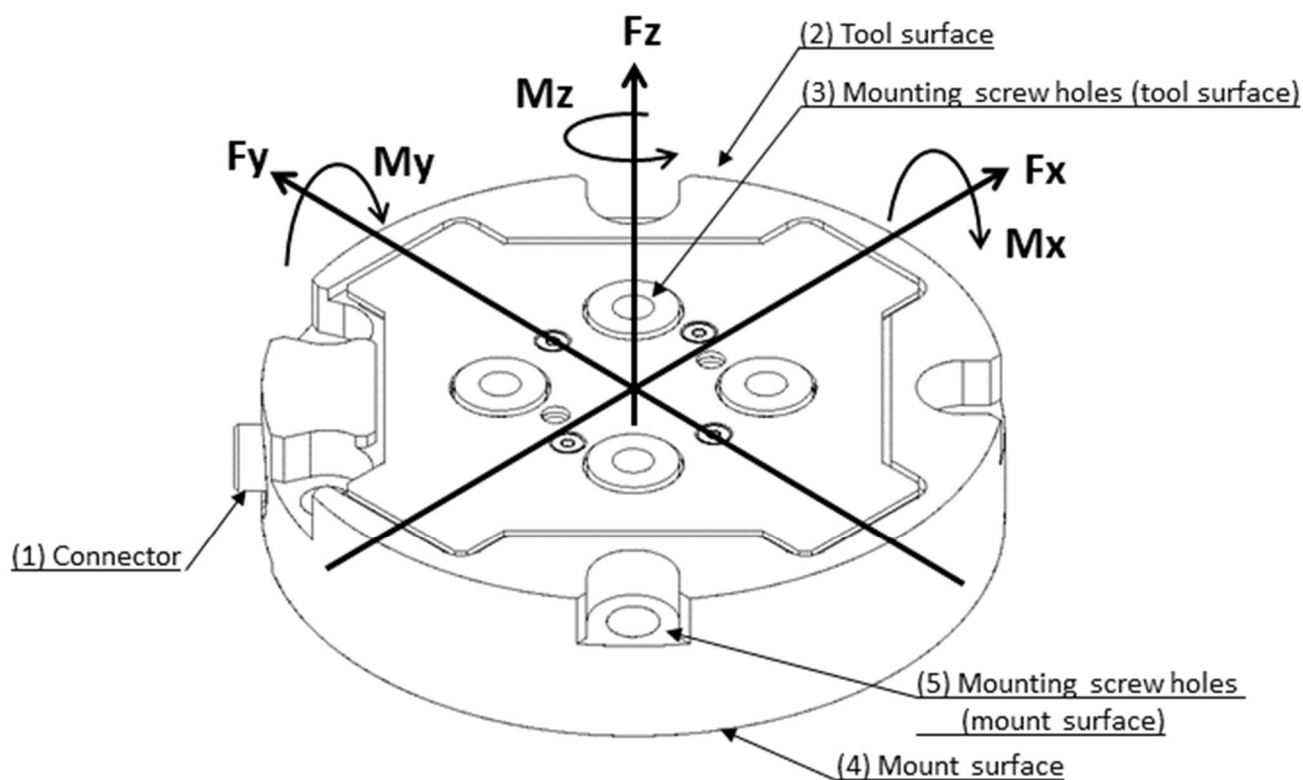
## 1 - 2 . Package Contents

The following shows the standard configuration. Before use, please confirm that all the following items are included.



## 1 - 3 . Product Outline

This sensor detects six components of force and moment ( $F_x$ ,  $F_y$ ,  $F_z$ ,  $M_x$ ,  $M_y$ ,  $M_z$ : directions are defined in the diagram below) and outputs measurement data according to the detection results.



① Connector

Connect to an external device such as a robot controller or computer using a dedicated cable. The dedicated cable is used for communication and supplying power. Detailed connection instructions are provided in the Dedicated Cable chapter.

② Tool surface

Attach the part (such as a EOAT(End Of Arm Tooling)) to which the force to be detected is applied.

③ Mounting screw holes (tool surface)

Four M6 tapped holes are provided for mounting. When fixing the tool, be sure to use all four M6 screw holes. Failure to do so may damage the sensor, making it impossible to accurately detect the applied force.

④ Mount surface

Attach on the side to be fixed to receive applied force, such as a robot flange.

⑤ Mounting screw holes (mount surface)

Five M6 through holes are provided for mounting. When fixing the sensor, be sure to use five M6 screws. Failure to do so may damage the sensor, making it impossible to accurately detect the applied force.



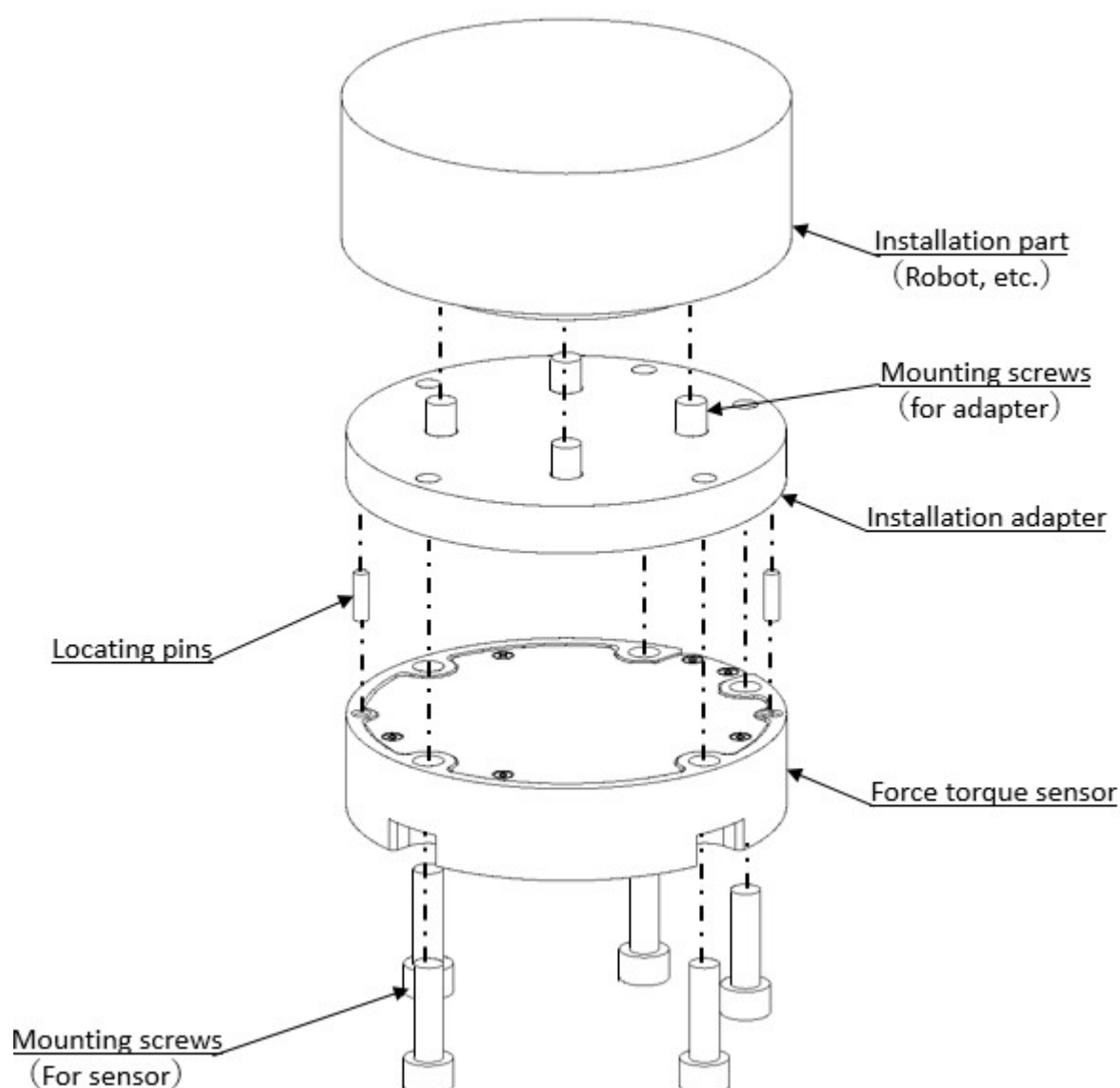
## 2. Installation/Connection

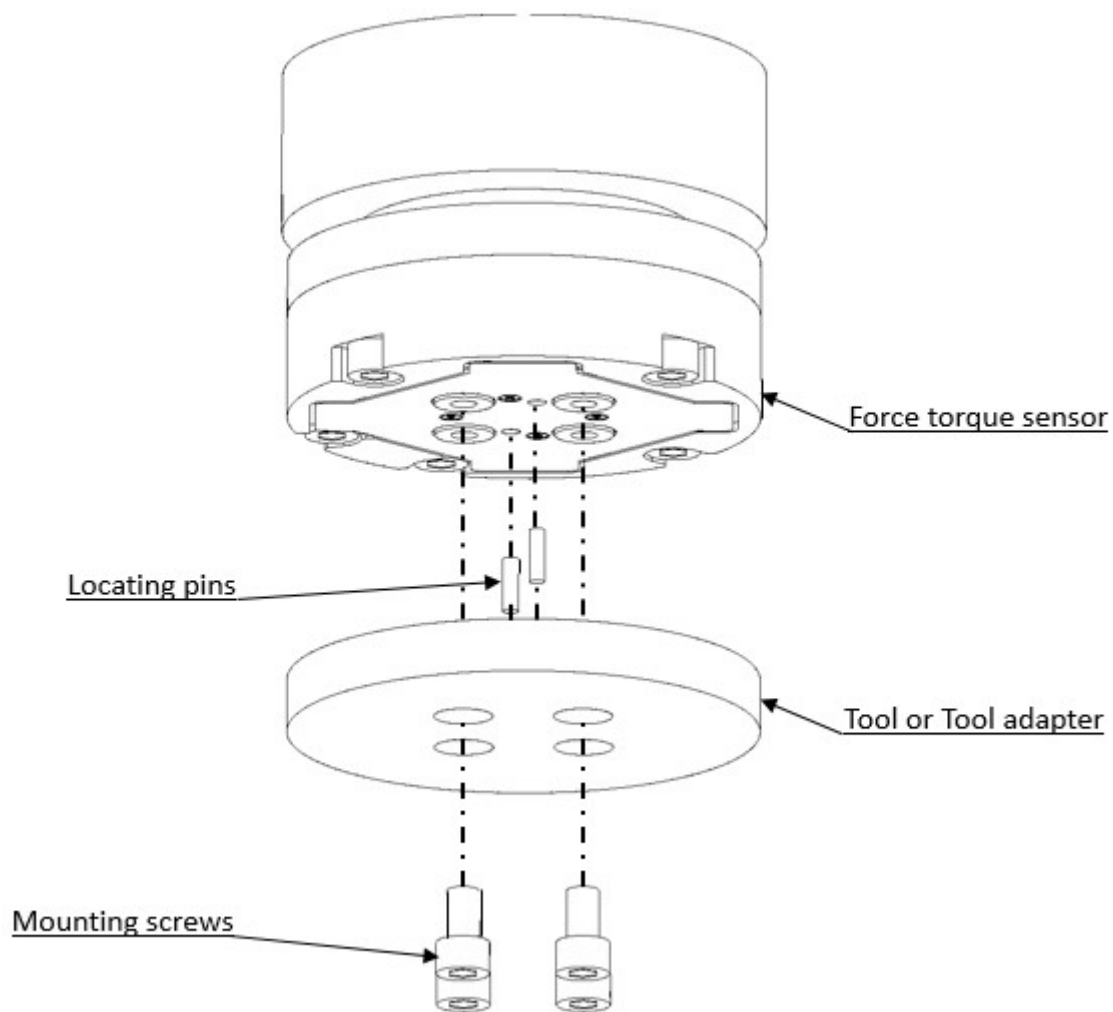
### 2-1. Installation Method

The standard installation procedure for the force torque sensor is shown in the diagrams below. Refer to the external dimensions drawing for detailed dimensions and tightening torques.

- ① Attach the installation adapter (provided by the customer) to the installation area where the force torque sensor is to be installed.
- ② Attach the force torque sensor with five M6 screws. Holes for locating pins to determine orientation are provided for the force torque sensor. Use locating pins (recommended diameter of  $\phi 3g6$ ) if necessary.
- ③ Attach the tool or tool adapter to the force torque sensor with four M6 screws.

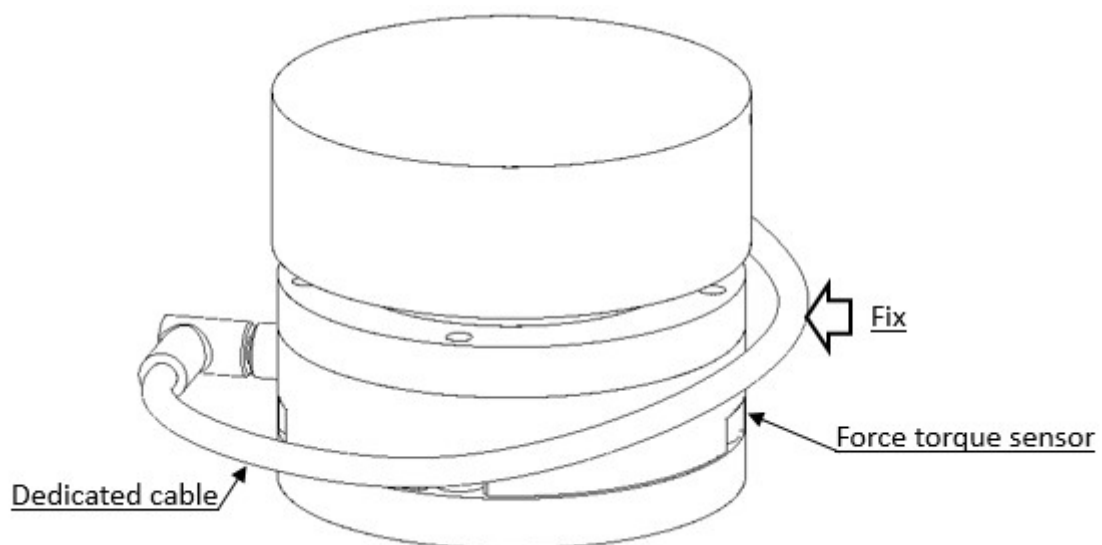
**⚠ CAUTION** The surface in contact with the force torque sensor should have a flatness of 0.05 mm or less. Fixing the sensor to a surface that is not flat may deform the sensor, resulting in deteriorated reliability of the sensor output and possible failure.





## 2 - 2 . Fix the Cable

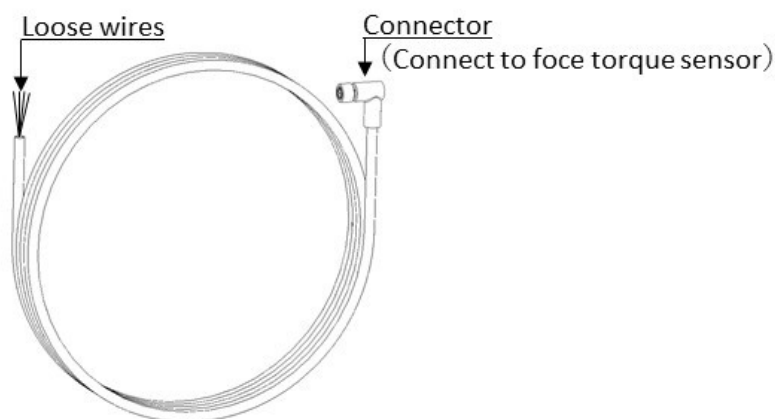
When routing the cable, fix the cable firmly to the installation adapter or other equipment with cable clips or the like. During operation of a robot or other devices, tension from the cable may cause an error in the detected value.



## 2-3. Dedicated Cable

### 2-3-1. Outline

Use a dedicated cable to connect to the force torque sensor. As shown in the diagrams below, connection on the force torque sensor side is a connector and connection to external devices is with loose wires. Refer to the table below for what the wires connect to.

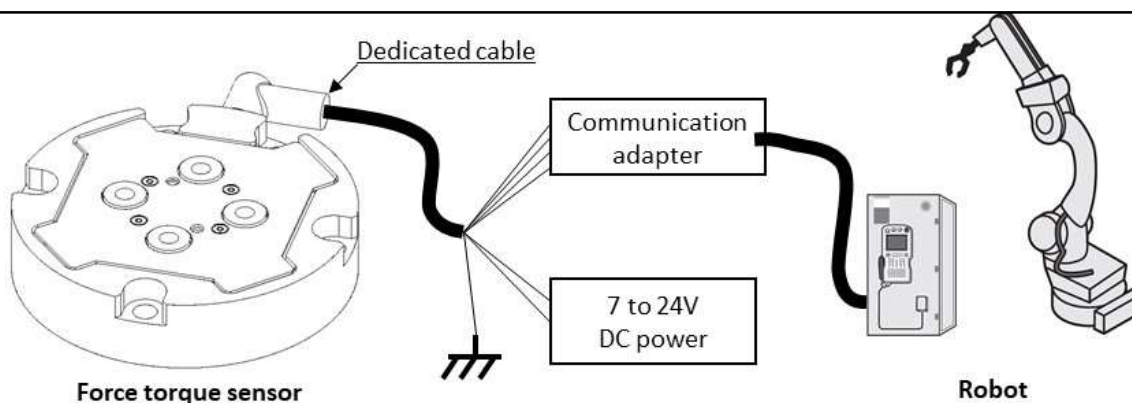


Wire color	Signal name	Connection	
Red	VIN	Power 7 to 24V DC ( $\pm 5\%$ )	
Blue	GND	Power GND	
White	TXD+	RS422 communication	RXD+
Yellow	TXD-		RXD-
Green	RXD+		TXD+
Orange	RXD-		TXD-
Black: thick	FG	Frame ground	

### 2-3-2. Connection Example

The dedicated cable consists of power and communication cables. Connect the power cable to a power supply of 7 to 24V DC ( $\pm 5\%$ ). The communication cable is RS422 communication with loose wires, so use communication adapters (communication converters, connectors, etc.) as necessary to connect to a robot or other control system. When extending the cable by connecting it to a terminal block, a drop in voltage may occur, so adjust the power supply output so that 7 to 24V DC is supplied at the voltage input section of the dedicated cable. For a power source, using a UPS power supply to avoid unintended shutdowns is recommended.

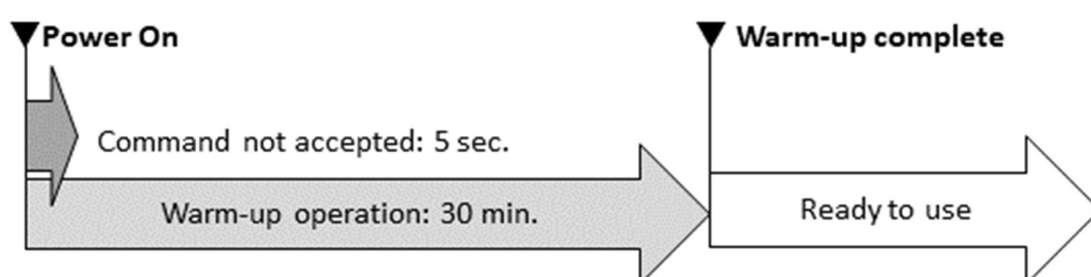
**⚠ CAUTION** Confirm with the robot manufacturer in advance whether RS422 can be used and what preparations are necessary.



## 3. How to Use

### 3-1. Startup

Be sure to turn on the power with the dedicated cable connected to the force torque sensor when starting up. Do not unplug or plug in the dedicated cable while the power is on, as this may cause a malfunction. This section explains the operation of the force torque sensor. Do not enter commands for the first five seconds after startup. If a command is entered, it will not operate normally, either not accepting the command or returning an unreliable output value. Warm-up operation is recommended for 30 minutes after startup because of drift in output values. However, if there is a heat source near the force torque sensor, confirm that the drift is within the customer's required drift amount, as it will be affected by the heat source.



### 3-2. Application Software

The main unit can also be connected to a computer for measurement using force torque sensor application software. Force torque sensor application software can primarily perform the following operations. For details, see the force torque sensor's application software user's manual.

- ① Force and moment measurement  
Force [N] and moment [Nm] measurement results can be displayed in real time.
- ② Save measurement results  
Measurement results can be saved to a CSV file.
- ③ Parameter settings
- ④ Log output
- ⑤ Version upgrade

### 3-3. Parameter Settings

The filter cutoff frequency can be set for the output value. Refer to the list of input commands for detailed settings.

Cutoff frequency [Hz]	5000	1000	500	100 Default	50	10	5	1
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### 3-4. Overload

Applying more than the specified force (overload) to a force torque sensor may shorten the life of the

sensor, reduce the reliability of the output value, or otherwise prevent the sensor from performing as it should. Use the sensor under the loads (1) to (5) specified below.

$$\frac{\sqrt{Fx^2 + Fy^2}}{300} < 1 \quad (1)$$

$$\frac{|Fz|}{300} < 1 \quad (2)$$

$$\frac{\sqrt{Mx^2 + My^2}}{20} < 1 \quad (3)$$

$$\frac{|Mz|}{20} < 1 \quad (4)$$

$$0.2 \frac{\sqrt{Fx^2 + Fy^2}}{300} + 0.2 \frac{|Fz|}{300} + 0.95 \frac{\sqrt{Mx^2 + My^2}}{20} + 0.5 \frac{|Mz|}{20} < 1 \quad (5)$$

$Fx, Fy, Fz[N]$  : Force applied to the force torque sensor

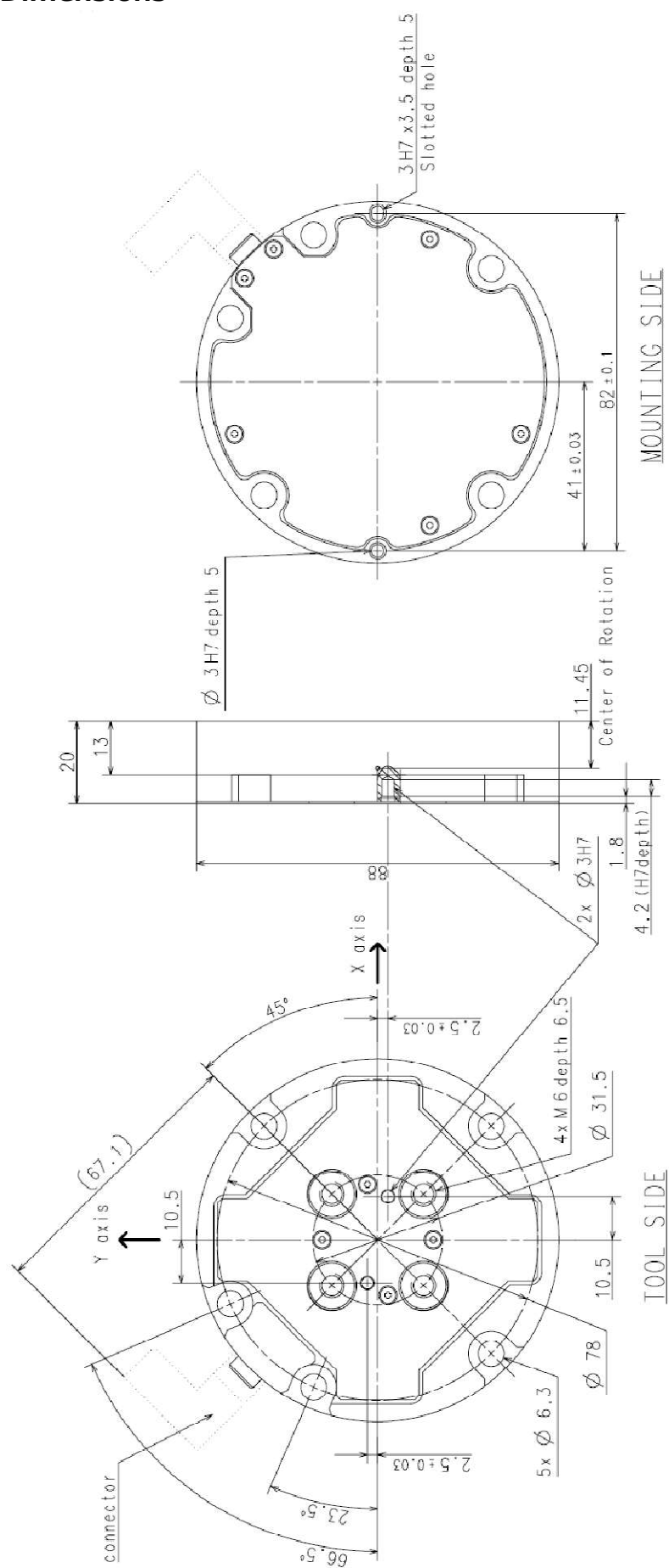
$Mx, My, Mz[Nm]$  : Moment applied to the force torque sensor

## 4. Product Specifications

### 4 - 1 . Basic Specifications

Model		FH-300-20
External dimensions [mm]		Φ88 x t20
Weight [g]		250
Rated value	Force [N]	±300
	Moment [Nm]	±20
Allowable load	Force ratio [%]	500
	Moment ratio [%]	300
Resolution*1	Force [N]	≒0.001
	Moment [Nm]	≒0.0001
Precision	Linearity [%F.S.]	3
	Hysteresis [%F.S.]	3
	Temperature stability [%F.S./°C]	0.2
	Cross-axis sensitivity [%F.S.]	5
Durability*2		20 million times
Operating environment	Temperature [°C]	0 to 50
	Humidity [%RH]	Less than 95 with no condensation
Storage environment	Temperature [°C]	-30 to 60
	Humidity [%RH]	Less than 95 with no condensation
Dustproof and waterproof performance		IP65
Communication output		RS-422
Voltage [V DC]		7 to 24
Maximum current consumption [mA]		300
*1 In the case of Canon's standard output format.		
*2 No sensor damage when repeatedly applying rated force and moment.		

4 - 2 . External Dimensions



Screw for Tool Side: 4 x M6 (Torque 5.2Nm)  
Screw for Mounting Side: 5 x M6 (Torque 5.2Nm)  
Locating Pin: Ø3 g6 (recommended)

### 4-3. Communication Specifications

Force torque sensors communicate via RS-422. Communication specifications are shown in the table below.

Communication item	Specifications
Interface	RS-422
Baud rate※	921600/115200/57600 bps
Data bits	8-bit
Stop bits	1-bit
Parity	None
Flow control	None

※ It is changeable using force torque sensor application software.  
921600bps is set by the initial setting.

### 4-4. Data Output Format

There are two output formats available: binary and ASCII. Use according to your application. In addition to outputting the measurement value, the presence or absence of errors is simultaneously output. Since measurement values during errors are not reliable, take safety measures such as stopping the operation of your application before use.

#### 4-4-1. Standard Binary Output

A total of 21 bytes are output for each output.

Item	HD	Fx	Fy	Fz	Mx	My	Mz	Status	SUM
Output [byte]	1	3	3	3	3	3	3	1	1

**HD (header)** An index of 0 to 9 indicating the order of output data is added to the beginning of the data by 1 byte.

Each time data is output, it is incremented by 1, and after 9, it returns to 0.

**Fx, Fy, Fz, Mx, My, Mz** The output is in the range of 00 00 00 to 0F FF FF (hexadecimal) with 3 bytes for each axis.

Data median value is 08 00 00 (hexadecimal).

Each item is transferred (HD→Fx→Fy→...→SUM), and within a single item, the data is sent starting from the least significant byte.

Output example: 02 45 23 01 45 23 01 45 23 01 CD AB 00 CD AB 00 CD AB 00 02 A7

HD	Fx	Fy	Fz	Mx	My	Mz	Status	SUM
02	012345	012345	012345	00ABCD	00ABCD	00ABCD	02	A7

**Status** Normal: 0, Warning: 1, Error: 2

**SUM (checksum)** Returns the value added in byte units from HD to Status.



#### 4-4-2. Simple Binary Output

A total of 15 bytes are output for each output.

Item	HD	Fx	Fy	Fz	Mx	My	Mz	Status	SUM
Output [byte]	1	2	2	2	2	2	2	1	1

**HD (header)** An index of 0 to 9 indicating the order of output data is added to the beginning of the data by 1 byte.

Each time data is output, it is incremented by 1, and after 9, it returns to 0.

**Fx, Fy, Fz, Mx, My, Mz** The output is in the range of 00 00 to FF FF (hexadecimal) with 2 bytes for each axis.

Data median value is 08 00 (hexadecimal).

Each item is transferred (HD→Fx→Fy→...→SUM), and within a single item, the data is sent starting from the least significant byte.

Output example: 00 01 20 FF 1F FD 1F FE 1F FF 1F FB 1F 00 B0

HD	Fx	Fy	Fz	Mx	My	Mz	Status	SUM
00	2001	1FFF	1FFD	1FFE	1FFF	1FFB	00	B0

**Status** Normal: 0, Warning: 1, Error: 2

**SUM (checksum)** Returns the value added in byte units from HD to Status.

#### 4-4-3. Standard ASCII Output

A total of 36 bytes are output for each output.

Item	HD	Fx	Fy	Fz	Mx	My	Mz	Status	SUM	CRLF
Output [byte]	1	5	5	5	5	5	5	1	2	2

**HD (header)** An index of 0 to 9 indicating the order of output data is added to the beginning of the data by 1 byte.

Each time data is output, it is incremented by 1, and after 9, it returns to 0.

**Fx, Fy, Fz, Mx, My, Mz** The output is in the range of 00000 to FFFFF (hexadecimal) with 5 bytes for each axis.

Data median value is 80000 (hexadecimal).

**Status** Normal: 0, Warning: 1, Error: 2

**SUM (checksum)** Returns the value added in byte units from HD to Status.

**CRLF** A 2-byte line feed code is appended to the end of the data.

#### 4-4-4. Simple ASCII Output

A total of 30 bytes are output for each output.

Item	HD	Fx	Fy	Fz	Mx	My	Mz	Status	SUM	CRLF
Output [byte]	1	4	4	4	4	4	4	1	2	2

HD (header)	An index of 0 to 9 indicating the order of output data is added to the beginning of the data by 1 byte. Each time data is output, it is incremented by 1, and after 9, it returns to 0.
Fx, Fy, Fz, Mx, My, Mz	The output is in the range of 0000 to 3FFF (hexadecimal) with 4 bytes for each axis. Data median value is 2000 (hexadecimal).
Status	Normal: 0, Warning: 1, Error: 2
SUM (checksum)	Returns the value added in byte units from HD to Status.
CRLF	A 2-byte line feed code is appended to the end of the data.

## 4 - 5 . Output Value Conversion

### 4 - 5 - 1. Standard Output Conversion

The table below shows the corresponding table for converting from standard binary output and standard ASCII output values to force and moment. Output is between 00000 and FFFFFF (hexadecimal) including outside of the rated range based on the detection result inside the sensor, but should not be used in an overloaded state. Doing so may result in a decrease in reliability of output values or other malfunctions.

Output value		Force [N]	Moment [Nm]
Hexadecimal	Decimal		
C0000	786432	300 (rated)	20 (rated)
80000	524288	0	0
40000	262144	-300 (rated)	-20 (rated)

Example: Output conversion of force

If the output value of Fx is "A1234 (hexadecimal)", the calculation is as follows.

$$F_x[N] = \frac{A1234(\text{hexadecimal}) - 80000(\text{hexadecimal})}{40000(\text{hexadecimal})} \times 300 = \frac{660020 - 524288}{262144} \times 300 \approx 155.33[N]$$

Example: Output conversion of moment

If the output value of Mx is "4321A (hexadecimal)", the calculation is as follows.

$$M_x[Nm] = \frac{4321A(\text{hexadecimal}) - 80000(\text{hexadecimal})}{40000(\text{hexadecimal})} \times 20 = \frac{274970 - 524288}{262144} \times 20 \approx 19.02[Nm]$$

### 4 - 5 - 2. Simple Output Conversion

The table below shows the corresponding table for converting from simple binary output and simple ASCII output values to force and moment. Output is between 0000 and 3FFF (hexadecimal) including outside of the rated range based on the detection result inside the sensor, but should not be used in an overloaded state. Doing so may result in a decrease in reliability of output values or other malfunctions.

Output value		Force [N]	Moment [Nm]
Hexadecimal	Decimal		
3999	14745	300 (rated)	20 (rated)
2000	8192	0	0
667	1639	-300 (rated)	-20 (rated)

## 4 - 6 . Input Command List

Command	Description	Output example (data sent from sensor)
P	One output of standard ASCII output	080024800367FFEC7FFF77FFFB7FFF4072
Q	2kHz continuous output of standard ASCII output*1	080024800367FFEC7FFF77FFFB7FFF4072 180010800187FFF67FFF8800008000A0DC 280039800577FFB97FFF580000800170DE ...
R	One output of simple ASCII output	020031FFE1FFE1FFF1FFF1FFF032
S	2kHz continuous output of simple ASCII output*1	020031FFE1FFE1FFF1FFF1FFF032 120021FFE1FFE1FFF20001FFD0EF 220001FFF1FFD1FFF1FFF1FFD02F ...
A	One output of standard binary output	00 06 00 08 DC FF 07 CC FF 07 E9 FF 07 EF FF 07 C6 FF 07 00 72
B	2kHz continuous output of standard binary output*1	00 06 00 08 DC FF 07 CC FF 07 E9 FF 07 EF FF 07 C6 FF 07 00 72 01 49 00 08 12 00 08 D2 FF 07 DE FF 07 F0 FF 07 B3 FF 07 00 D7 02 44 00 08 2B 00 08 D8 FF 07 D8 FF 07 F8 FF 07 D5 FF 07 00 16 ...
C	One output of simple binary output	00 01 20 FF 1F FD 1F FE 1F FF 1F FB 1F 00 B0
D	2kHz continuous output of simple binary output*1	00 01 20 FF 1F FD 1F FE 1F FF 1F FB 1F 00 B0 01 01 20 00 20 FC 1F FE 1F FF 1F FD 1F 00 B4 02 00 20 01 20 FC 1F FE 1F FF 1F FD 1F 00 B5 ...
E	Stop continuous output	(No output)
K	Status (4 bytes) output	0000,EC 「,EC」 : SUM(checksum)
T	Temperature output*2	512,C4 「,C4」 : SUM(checksum)

F	Read the current filter settings	Cutoff frequency: 500 Hz,56 「,56」 : SUM(checksum)
0	Filter setting Fc = 5000Hz	(No output)
1	Filter setting Fc = 1000Hz	
2	Filter setting Fc = 500Hz	
3	Filter setting Fc = 100Hz (default)	
4	Filter setting Fc = 50Hz	
5	Filter setting Fc = 10Hz	
6	Filter setting Fc = 5Hz	
7	Filter setting Fc = 1Hz	
0	The current position is the origin. Zero reset	(No output)
V	Output product information	FH-300-20, V1.0.0.0,abcdefghi,jklmnopqr,99 (Product model number), (firmware version), (product serial number), (board serial number) 「,99」 : SUM(checksum)

\*1 A continuous output cycle changes according to a baud rate.

921600 bps : 2kHz, 115200bps : 250Hz, 57600bps : 125Hz.

\*2 The temperature output value is divided by 16 to obtain the temperature [°C].

Example: If output is 512: Temperature [°C] = 512/16 ≈ 32.0 [°C].

## 4 - 7 . Status Codes

Status	Status code (hexadecimal)	Item	Contents	Action
Normal	0000	Normal	-	-
Error	0001	System	There is a problem with the internal processing of the force torque sensor.	If restarting the force torque sensor does not solve the problem, please contact our sales representatives.
Warning	0010	Temperature	The temperature is approaching the lower limit of operation of the force torque sensor.	Use with caution in ambient temperatures. Raise the operating ambient temperature if possible.
Error	0020		The temperature is below the lower limit of operation of the force torque sensor.	Raise the operating ambient temperature.
Warning	0040		The temperature is approaching the upper limit of operation of the force torque sensor.	Use with caution in ambient temperatures. Lower the operating ambient temperature if possible.
Error	0080		The temperature is above the upper limit of operation of the force torque sensor.	Lower the operating ambient temperature.
Warning	0100	Hardware	There may be a problem with the force torque sensor's internal hardware.	If there are multiple occurrences in a short period of time, please contact our sales representatives.
Error	0200		There is a problem with the force torque sensor's internal hardware.	If restarting the force torque sensor does not solve the problem, please contact our sales representatives.
Warning	4000	Warning	A warning is occurring in either or both temperature and hardware.	Check the status code and respond according to the warning content.
Error	8000	Error	An error is occurring in either or all of the system, temperature, and hardware.	Check the status code and respond according to the error content.

## 5. Guarantee and Service

The guarantee period for this unit is one year from the date of purchase.

If trouble for which Canon is responsible should occur during this period, it will be repaired free of charge.

For repairs and questions on usage, contact one of the offices below.

### Warranty

1. If the product should become faulty within one year of purchase despite normal use according to the instruction manual, it shall be repaired or replaced free of charge upon taking or sending it to the customer support section or the maintenance section mentioned at the end of this document. The user shall bear such expenses for transportation and sending.

2. Even during the period of warranty, product repairs or replacement shall be charged for in the following cases:

- (1) Fault or damage attributable to careless handling or incorrect use
- (2) Fault or damage attributable to repairs, alteration, or disassembling and cleaning not by Canon
- (3) Fault or damage caused by water, oil, mud, or sand, drop, or shock
- (4) Fault or damage caused by fire, earthquake, lightning, or any other act of God, environmental contamination, or abnormal voltage
- (5) Fault or damage of this product attributable to the use of a part not made by Canon
- (6) Fault attributable to inappropriate storage (e.g. storage in a place of high temperature and humidity or with naphthalene or camphor) or inappropriate maintenance
- (7) Product serial number (labeled on the product) unknown
- (8) Fault attributable to other equipment connected

3. Canon will take no responsibility for direct or indirect damage caused by a fault or use of this product or incidental damage (e.g. loss of profit by the use of this product).

### \* Note

This warranty assures repairs free of charge and does not limit the user's legal rights on Canon and other companies.

## 6. Appendix

### 6 - 1 . Troubleshooting

Symptom	Check	Action
Communication is not possible.	Is the power turned on?	Turn on the power.
	Is the power supply part of the dedicated cable properly connected?	Connect it to a 7 to 24V DC power supply correctly.
	Is the communication part of the dedicated cable properly connected?	Connect the communication part correctly according to the specifications.
	Are the RS422 communication specifications set correctly?	Check the specifications and make the settings.
	If a communication converter is used, has the driver for the converter been installed?	Install the driver according to the manual of your converter.
	Is the FG of the dedicated cable properly connected?	Communication errors may be caused by noise. Connect the FG correctly.
An error has occurred.	—	Check the error and take action according to the error description.
A warning has occurred.	—	Check the warning and take action according to the warning description.
The measurement value seems wrong.	Is the output axis direction of the sensor installed correctly?	Check the definition of output axis direction.
	Did you tighten the screws with the specified torque?	Tighten the screws with the specified torque.
	Are you using outside of the rated range?	Use within the specification range.
	Are there any unsteady heat sources in the surrounding area?	The output of the force torque sensor drifts when there is a sudden change in temperature. Use in a stable environment.
	Have you fixed the dedicated cable?	The cable tension may be affecting the measured value. Use cable ties or other means to fix the cable.
	Is there condensation?	It cannot be used stably in an environment subject to condensation.
	Is the ambient temperature above the specification range?	Use within the operating temperature range of the specifications.



The contents of this manual are current as of March 2024.

- The contents of this manual are subject to change without notice. We appreciate your understanding in advance.
- Please contact us if you have any questions, errors or omissions in this document.



## **Sales/Service Contact**

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