Minebea

DIGITAL TRANSMITTER
OPT-563B

Instruction Manual

EN294-1596F

FOREWORD

Thank you very much for your purchasing the digital transmitter OPT-563B for flange type torque transducer TMHS series by optical transmission method.

This manual is provided to explain installation procedures and checkpoints in operation. We would like you to read through this instruction manual with much care for the best use of our product to avoid malfunctions.

We also would like you to deliver the manual to end user surely to keep it at hand.

Marks and references described in this manual

The following marks are placed for the matters that indicate ‘Do not do this’, ‘Caution’, and ‘For reference’. Please be sure to read following descriptions with marks.

Warning

This is the description in the case of a malfunction occurred, the possibility of lethal accidents or serious injury to operators. To prevent possible hazard, please avoid operations described here.

Caution

Descriptions that may cause injury or physical damage to operators and such as occurrences of physical damage

When you are operating the instrument, you have to pay cautions or restrictions related with this description.
Be sure to read to prevent from malfunction.

For safe operation

Be sure to read this manual before operation.

1. Location of installation

⚠ Caution

Use the Instrument under the following conditions

- Environmental temperature : -10 ℃ ~ 50 ℃
- Environmental humidity : Less than 85 % R.H. (Non condensing)

⚠ Warning

Do not install the Instrument in following places. It may cause a damage to the Instrument

(1) Do not install in the following environment.

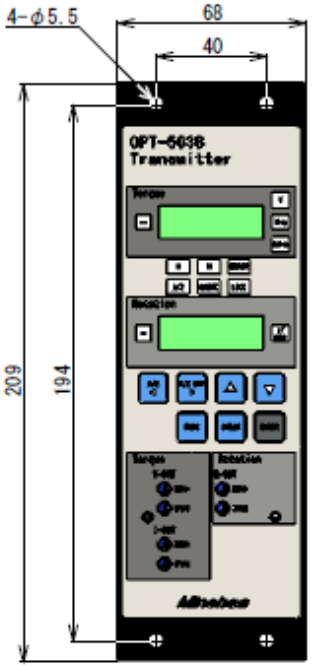
- Place exposed to direct sunshine, and where the temperature / humidity exceed the range of the specification.
- Where the main body is directly affected by vibrations or shocks.
- Dusty places.
- Places containing the large quantities of salt and the corrosive gas.
- Places with rapid change in temperature and/or humidity.
- Places near the devices which generate magnetism or electromagnetic waves.
- Places vulnerable to radioactivity or radioactivity rays.
- Where chemical reaction may take place such as a laboratory.

(2) Installing the Instrument

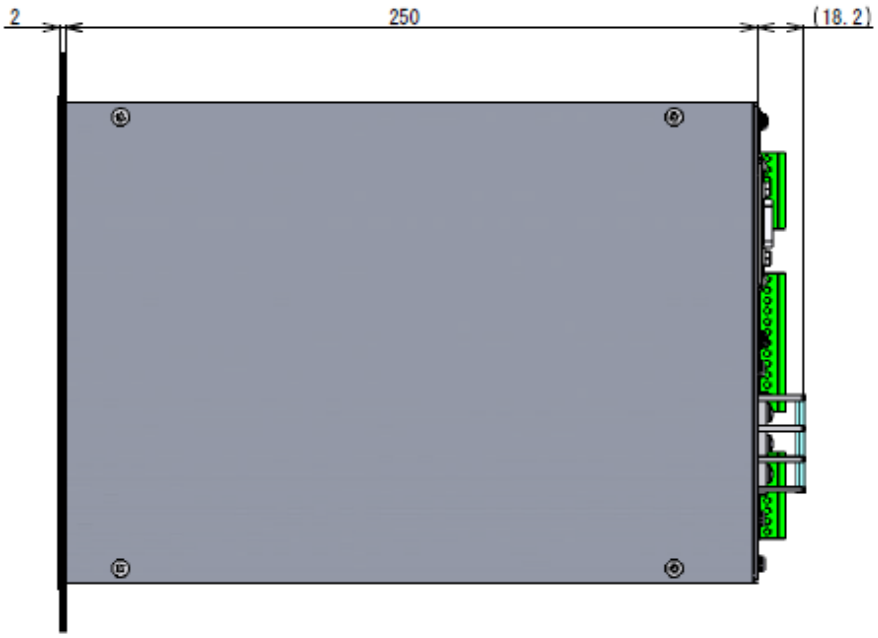
Caution

When you install the Instrument, refer to the following dimensions and secure enough space around the Instrument and putting it in order also.

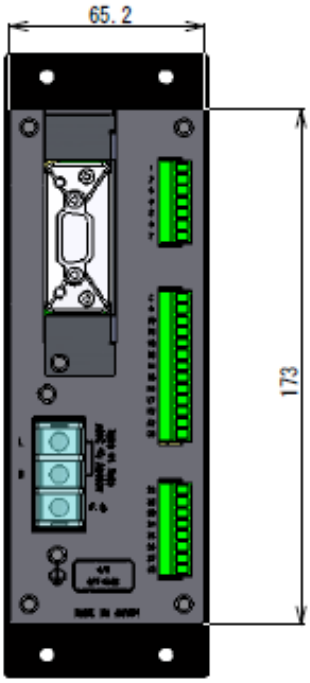
Followings are the dimensions of the Instrument and for environmental spaces required:



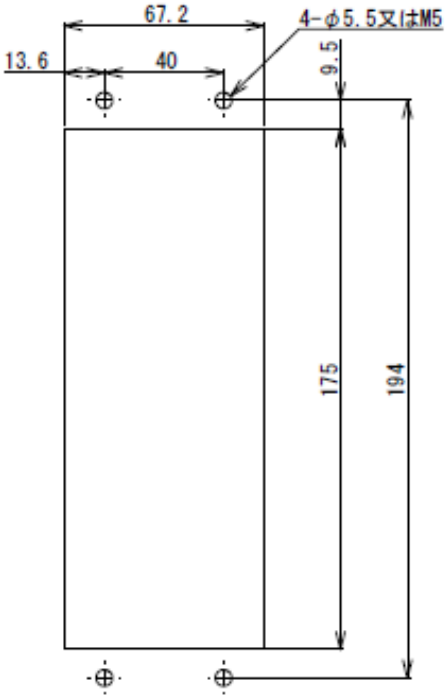
Front



Side



Rear



Panel cut

Unit: mm

2. Power supply

Warning

Be sure to check that power supply is OFF when installing each cable. If an operator works with power ON, he/she may have an electric shock or the instrument may be destroyed.

Warning

Before supplying power, check the indication of power voltage/specifications to be identical with supplied power. If they are not identical, contact with us. Without checking the above, operation may cause damage to the instrument or electric shock.

Caution

Be sure to ground a grounding wire. If a grounding wire is not grounded, it may cause malfunction of the instrument or an electric shock to an operator.

3. Instructions for use

Caution

Before using a new instrument, or when exchanging a torque transducer for a new one, be sure to make calibration. If neglected, it may cause incorrect results in measuring or malfunction in the instrument and moreover may cause damage to peripheral equipments. When similar trouble occurs after calibration, be sure to make calibration again, even if calibration has completed.

Caution

When using the instrument, check that wires are connected properly. If neglected, correct measuring cannot be obtained and it may cause malfunction in the instrument or cause damage to peripheral devices or a critical accident.

Caution

Improper change of setting during operation may cause incorrect measuring or malfunction, or cause damage to peripheral equipments.

Caution

Do not give the instrument such a shock as throwing something at it. It may cause damage or destroy electrical circuits and even have loose resistance to environment or operability.

Divisional history

Date	Manual No.	Revision reason(content)
2013/05	DRW. NO.EN294-1596	First edition
2013/07	DRW. NO.EN294-1596A	Due to ECN No.FN13-02106A - Correction- 10-8-1. Model:OPT563B-TI → OPT-563B-T2, OPT-563B-T3 10-9-1. Model:OPT563B-TF → OPT-563B-T4 10-10-1. Model:OPT563B-RV → OPT563B-R1 10-11-1. Model:OPT563B-RI → OPT563B-R2, OPT563B-R3 10-12-1. Model:OPT563B-RF → OPT563B-R4 - Deletion - 10-8. Delete (option) 10-8-2. Delete the setteing of current output 10-9. Delete (option) 10-10. Delete (option) 10-11. Delete (option) 10-12. Delete (option) 13-2. Delete (option) Cover. Change to non statement corporate logo -Addition- 10-11-2. Add [Setting of current output]
2014/03	DRW. NO.EN294-1596B	Due to ECN No.FN14-02018 - Correction- Change from [sequencer] to [PLC]. 2-1. Terminal board screw tightening torque: Change from [0.6N･m] to [0.25N･m] 9-2-3. Change from [analog output value in span point] to [the maximum value of analog output]. Change from [analog output value in zero point] to [the minimum value of analog output]. -Addition- 2-4. (2), 5-1-2 *Various errors mean [12-2.Error display] and [Indication of luminous energy decrease]. 13-1. Add [Frequency response range], [Sampling rate] and [Indication of luminous energy decrease]. ROM Ver.1.400 or later Due to ECN No.FN14-02032 - Addition - 9-3. Add frequency conversion value of zero / span calibration data of 1~4 to F-66~68, F-76~78, F-86~88 and F-96~98. Move calibration prohibition item of F-97 to F-55. Add frequency data to F-31. 11-3-1. Add frequency data to command number.
2015/06	DRW. NO.EN294-1596C	Due to ECN No. FN15-02039 2-2. Add the cable color. 2-5. Add the table indicating the analog output condition for torque by each model. 2-6. Add the table indicating the analog output condition for rotation speed by each model. 4-1. (5) Add the selection of calibration data 4-4-7. Correct the error. 4-6-1., 4-7-1., 9-2-6. Add the note. 9-3. Change the set value in F-99.

Date	Manual No.	Revision reason(content)
2015/06	DRW. NO.EN294-1596C	9-2-8, 9-2-9., 9-2-10. Add “Only the calibration data that has been selected is cleared. 10-13. Add “The standard ~ are required.” Add the note “As for ~ ground terminal.” 10-13-2. Change the drawing. Add the note “As for ~ terminal.” 10-13-3. Change the drawing. Move the note to 10-13. 10-14. Add “The standard ~ required.” 16-3. Change the set value in F-99.
2016/06	DRW. NO.EN294-1596D	Due to ECN No, FN16-02057 Delete 'Minebea Co., Ltd. Measuring Components Business Unit' from the front cover.
2016/12	DRW. NO.EN294-1596E	Due to ECN No, FN16-02179 - Correction- 9-2-6. Select calibration data: [Function F-21 analog output maximum display value] → [Function F-21 maximum display value of analog output for torque] -Addition- 9-2-6. Select calibration data: [Function F-22 maximum display value of analog output for rotation speed]
2017/08	DRW. NO.EN294-1596F	Due to ECN FN17-02017 ・Delete the company name in the contents.

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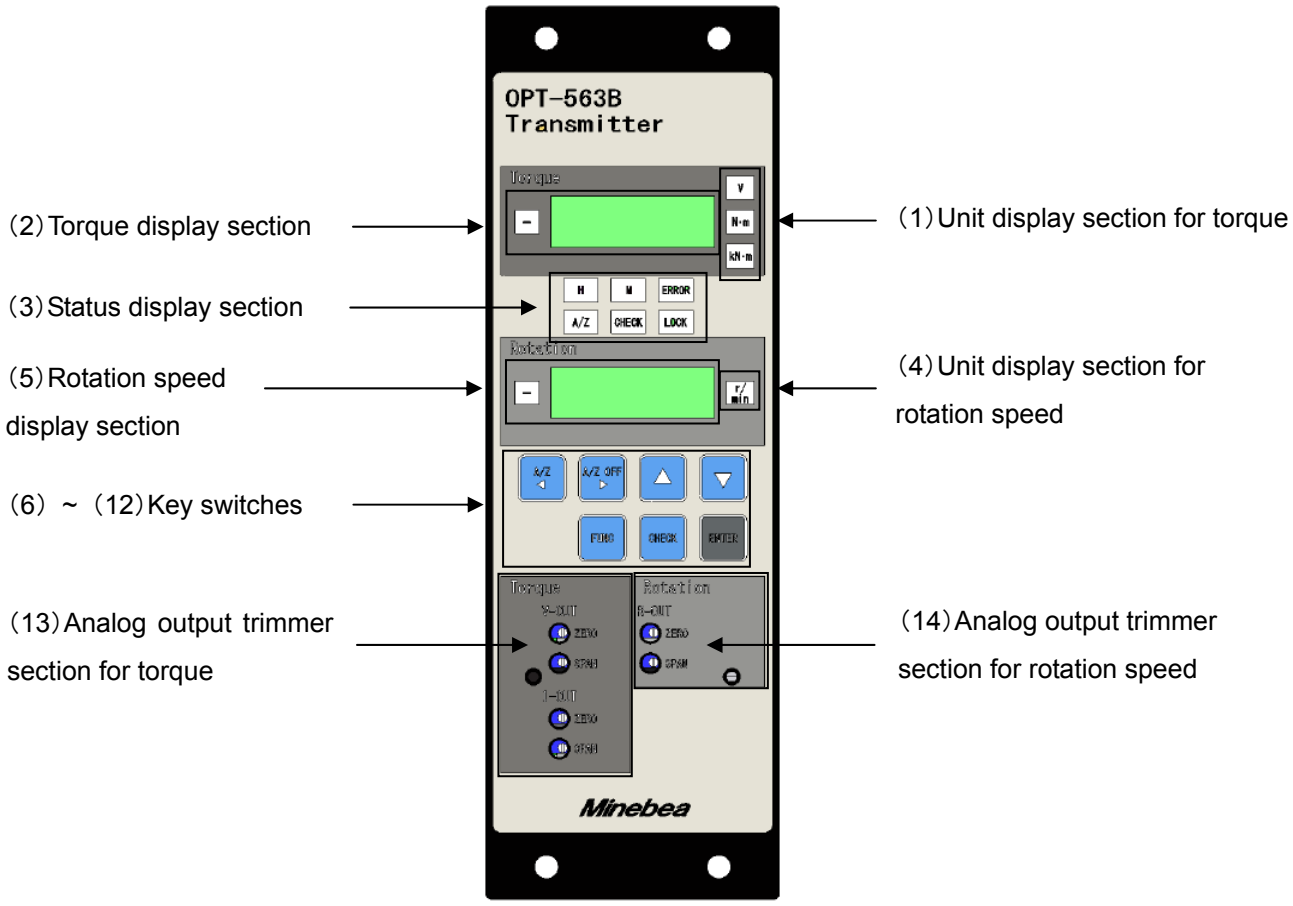
1. Name and function of each part

1-1. Front panel



(1) Unit display section for torque
Display setting the unit of torque.

(2) Torque display section
Torque value and OL (Over) is displayed.

(3) Status display section

Status of OPT-563B is displayed.

H : It lights when luminous energy of torque transducer is over the reference value.

M : It lights when luminous energy of torque transducer is under the reference value. However, [M] dosen't light when OPT-563B and the power supply box DBX-001 are combined and used.

A/Z : It lights when A/Z function is active.

CHECK : It lights when press CHECK to enter the check mode.
LOCK : It lights when shorting between external control output LOCK and COM1.
ERROR : It lights when output error signal.

(4) Unit display section for rotation speed
Display setting the unit of rotation speed.

(5) Rotation speed display section
Rotation speed value and OS (Over) is displayed.

(6) A/Z key
ON the A/Z function or move the digit of set value up.

(7) A/Z OFF ▶ key
OFF the A/Z function or move the digit of set value down.

(8) ▲ key
Move the selected digit value up at set the value.

(9) ▼ key
Move the selected digit value down at set the value.

(10) FUNC key
Use for shift to the function mode and return to measuring mode without influenced setting at various setting.
Press for more than 2 seconds, shift to the function mode.

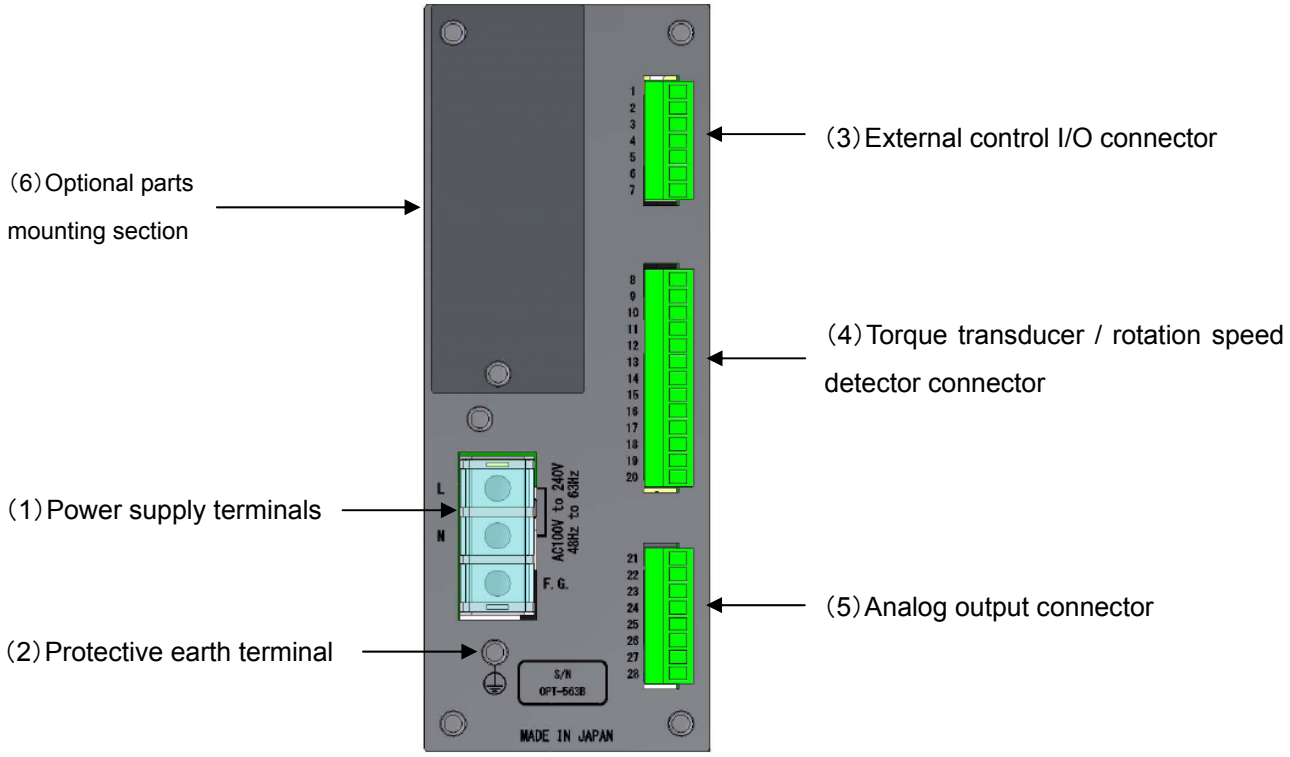
(11) CHECK key
Use for ON/OFF the CHECK value.
Press for more than 2 seconds, CHECK value ON.

(12) ENTER key
Use for register the set value of various setting.

(13) Analog output trimmer section for torque
Zero point of analog output of the torque (VOUT, IOUT) and trimmer adjustment section (fine adjustment) of span point.

(14) Analog output trimmer section for rotation speed
Zero point of analog output of the rotation speed (ROUT) and trimmer adjustment section (fine adjustment) of span point.

1-2. Rear Panel



(1) Power supply terminals
Connect with power supply and ground.

(2) Protective earth terminal
Grounding wire should be connected to prevent the influence of noise such as static electricity.
Do not connect it other than the grounding.
F.G. of the power supply terminals is common internally.

(3) External control I/O connector
Use for connecting with the external control unit.

(4) Torque transducer / rotation speed detector connector
Connect torque transducer / rotation speed detector (MP-9820) and signal wire.

(5) Analog output connector
Connect analog input instrument and signal wire.

(6) Optional parts mounting section
Option (either one from RS-232C, RS-422/485, PROFIBUS or CANopen) is installed.

2. Connecting wires

2-1. Notes for connecting wires

- Please connect wires after turning off the power.
- Do not turn on the AC power before completing the installation. There is no switch that changes ON/OFF of power supply in the main body.
- Do not drop the instrument or give a strong impact.
- Be sure to install and use an acrylic cover of the attachment for the terminal board.
- The tightening torque of terminal screws on the terminal board is as shown in the table below.

Terminal board	Terminal board screw tightening torque
Power supply terminal board	1.4 N·m
Connector	0.25 N·m

- An applicable solderless terminal for this instrument is shown as follows:

Terminal board	Width of solderless terminal	Applicable solderless terminal
Power supply terminal board	Less than 9.0 mm	O type 1.25-4, 2-4 or Y type 1.25-4, 2-4
Connector	Less than 2.0 mm	Flat type 1.25-AF2.3B

- The cable connected with the main body should be away from the noise source such as control I/O line or power supply line as far as possible.
- The conduit wiring should be the type for exclusive use. Avoid sharing it with other lines.
- Be sure to connect a grounding wire. The grounding should be D-type single ground. Do not share it with other groundings for power supply.
- The shield cable line is used for the connection of the external control I/O, and the shield with F.G terminal of the power supply terminals.

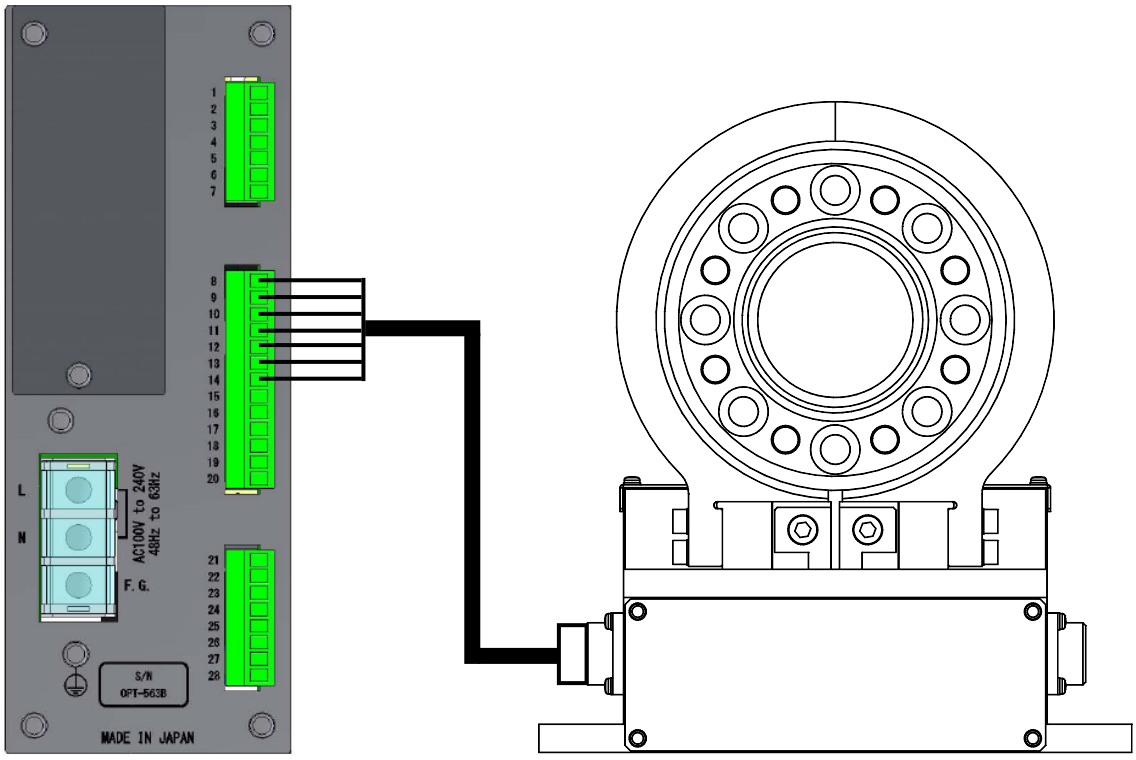
2-2. Connection with torque transducer

The instrument can connect with our torque transducer for optical transmission flange type.

(1) Connector layout

PIN No.	Cable color	Signal name	Operation
8	Red and Red/White	Output +24V	Exclusive power supply for optical transmission system flange type torque transducer. Do not use other instrument.
9	Green/White	Input ALARM-IN1	It is input terminal of ALARM-IN1 signal (luminous energy decrease signal). Constantly inputting LOW from torque transducer.
10	Yellow	Input ALARM-IN2	It is input terminal of ALARM-IN2 signal (luminous energy decrease signal). It will input LOW from torque transducer if luminous energy is decreasing.
11	Yellow/White	Input ALARM-IN3	It is input terminal of ALARM-IN3 signal (luminous energy decrease signal). LOW signal is input from the torque transducer if luminous energy is decreasing and it cannot support the performance.
12	Brown	Torque differential signal (+)	Input torque differential signal (+)
13	Brown/White	Torque differential signal (-)	Input torque differential signal (-)
14	Black and Green	GND	GND of torque transducer

(2) Connecting with torque transducer



Connector plug P/N

OPT-563B : MC_1.5/13-ST_3.81

TMHS : NJW-2012-PM12 (UL)

- **Power supply box [DBX-001] is necessary if you connect the optical transmission method torque transducer (TMHF, TMHFB, TMOFB, or TMOS) with OPT-563B.**
- **Use the attached cable for connecting with torque transducer.**
  Do not use the terminal block for extending the cable. As a result, it may cause the influence of the exogenous noise to be received and the accuracy decrease. If attached standard cable length is not enough, inquire to our sales office or agency.

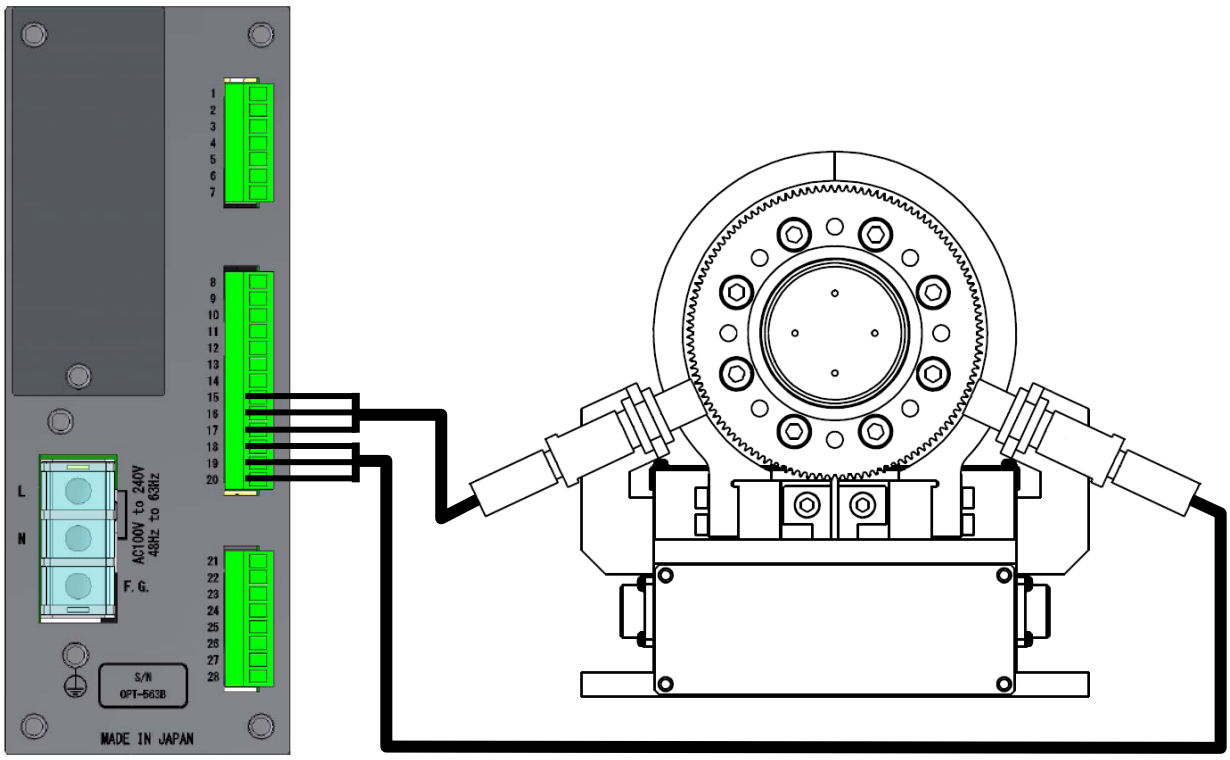
2-3. Connection with rotation detector

Connection when the rotation detecting function is used.

(1) Configuration of connector pin

PIN No.	Signal name	Operation
15	Rotation IN A Output +12V	Exclusive power supply for rotation speed detector A (MP-9820). Do not use for the other instrument.
16	Rotation IN A Signal of rotation speed	Input signal of rotation speed detector A.
17	Rotation IN A GND	GND of rotation speed detector A.
18	Rotation IN B Output +12V	Exclusive power supply for rotation speed detector B (MP-9820). Do not use for the other instrument.
19	Rotation IN B Signal of rotation speed	Input signal of rotation speed detector B.
20	Rotation IN B GND	GND of rotation speed detector B.

(2) Connecting with rotation detector



Connector plug P/N
OPT-563B : MC_1.5/13-ST_3.81
MP-9820 : MX-71** (** means the cable length)

- **Use the attached special cable for connecting with rotation speed detector (MP-9820).**
- **Connect the shield of the cable with the protective earth terminal.**

2-4. Connection of external control I/O

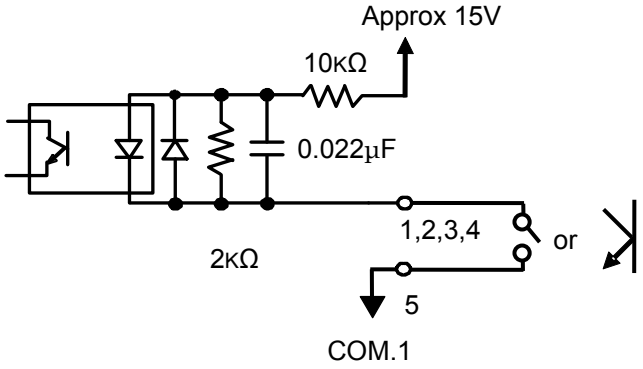
The function of this unit can be controlled from the outside with the external control I/O connector on the rear panel.

The external control input is executed by shortening each input and COM.1 with a contact point or open collector after wiring the connector.

The external control output is executed by open collector output.
(Open collector rated: V_{CE} = DC35 V, I_C = DC40 mA at MAX.)

Connector plug P/N : MC_1.5/7-ST-3.81

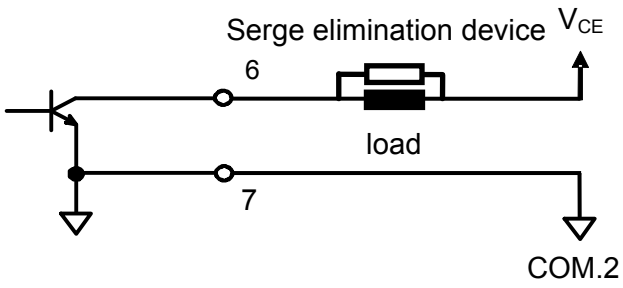
(1) Connection for input



PIN No.	Signal name	Operation
1	A/Z (pulse)	This command is able to operate when the torque display value is within 10 % of the maximum display value. By auto zero function, torque display value becomes [0] and [A/Z] of condition display section lights. (same as key operation of 3-2) Refer to 5-4 paragraph as for details.
2	A/Z OFF (pulse)	Cancel the auto zero function. Torque display value becomes the current value and [A/Z] of condition display section lights off.
3	LOCK (level)	All key input will be locked. [LOCK] in status display section lights.
4	Rotation POL.	Measured in one rotation speed detector, Detected by the external input signal direction of rotation, It is effective when you set F-24. Direction of rotation is reversed this signal being input.
5	COM.1	Common of input terminal (terminal No. 1 ~ 4)

- **There are a pulse input and a level input in the recognition of the external control input signal depending on setting items.**
- **The Inputs of A/Z and A/Z OFF are executed only once after the short for approximately over 100 ms.**
- **LOCK input is valid while inputting after the short of approximately 100 ms or more.**
- **A/Z function is held in case of power supply of OPT-563B is reclosing.**

(2) Connection for output



Open collector rated: V_{CE} = DC35 V, I_C = DC40 mA at maximum.

PIN No.	Signal name	Operation
6	ERROR	ON at various error occurred.
7	COM.2	Common of output terminal (terminal No.6).

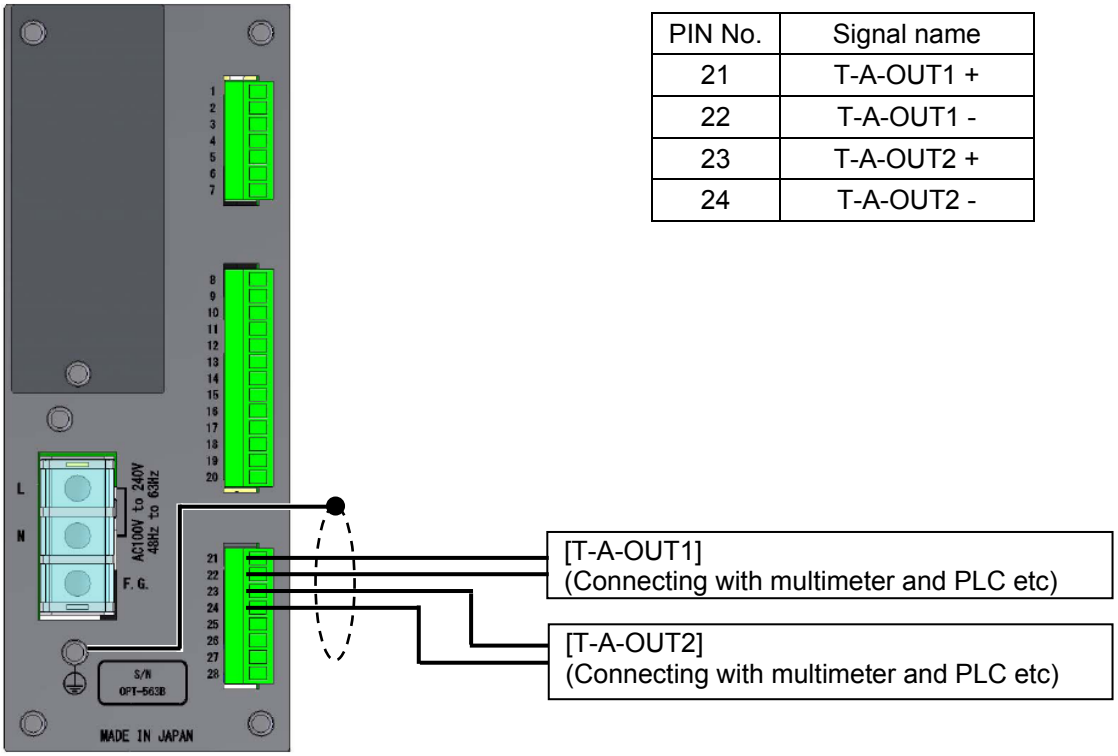
* Various errors mean [12-2.Error display] and [Indication of luminous energy decrease].

- **The common of the external control output is insulated from the other commons.**
- **Connect a suitable serge elimination device for load to protect the external control output.**
- **COM.1 (PIN No.5) and COM.2 (PIN No. 7) are isolated.**

2-5. Connection of analog output for torque

The analog signal for torque is out put from the connector for the analog output in a rear panel.
The analog output for torque is selectable up to two points from the voltage output, the current output and the frequency output. The standard model has only the voltage output from [T-A-OUT1].
Please specify when you buy this if the current output and the frequency output are required.
Refer the paragraph 10 for the details.

PIN No.	Signal name
21	T-A-OUT1 +
22	T-A-OUT1 -
23	T-A-OUT2 +
24	T-A-OUT2 -



Connector plug P/N : MC1.5/8-ST-3.81

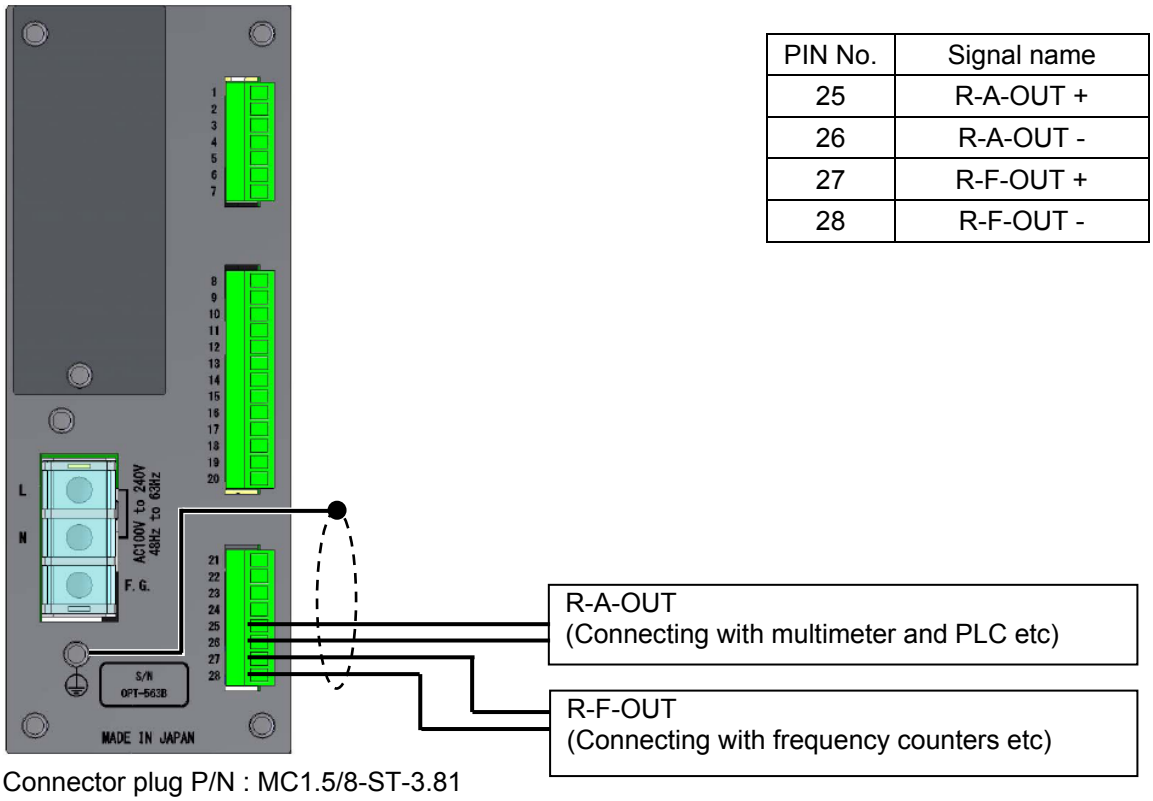
Use the shielded cable for the connection of analog output, and connect the shield with the protective ground terminal.

Model No. of analog output for torque

Model No.	[T-A-OUT1]	[T-A-OUT2]
OPT-563B	Voltage output	-
OPT-563B-T2	Voltage output	Current output (Torque zero to + Rated torque)
OPT-563B-T3	Voltage output	Current output (- Rated torque to + Rated torque)
OPT-563B-T4	Voltage output	Frequency output
OPT-563B-T24	Current output (Torque zero to + Rated torque)	Frequency output
OPT-563B-T34	Current output (- Rated torque to + Rated torque)	Frequency output

2-6. Connection of analog output for rotation speed

The analog signal for rotaion speed is out put from the connector for the analog output in a rear panel.
As for the analog output for the rotational speed, either the voltage output or the current output and presence of the frequency output can be selected.
The standard model does not have the analog output for rotational speed.
Please spcify when you buy this if the analog output for rotational speed is required.
Refer the paragraph 10 for the details.



PIN No.	Signal name
25	R-A-OUT +
26	R-A-OUT -
27	R-F-OUT +
28	R-F-OUT -

Connector plug P/N : MC1.5/8-ST-3.81

Use the shielded cable for the connection of analog output, and connect the shield with the protective ground terminal.

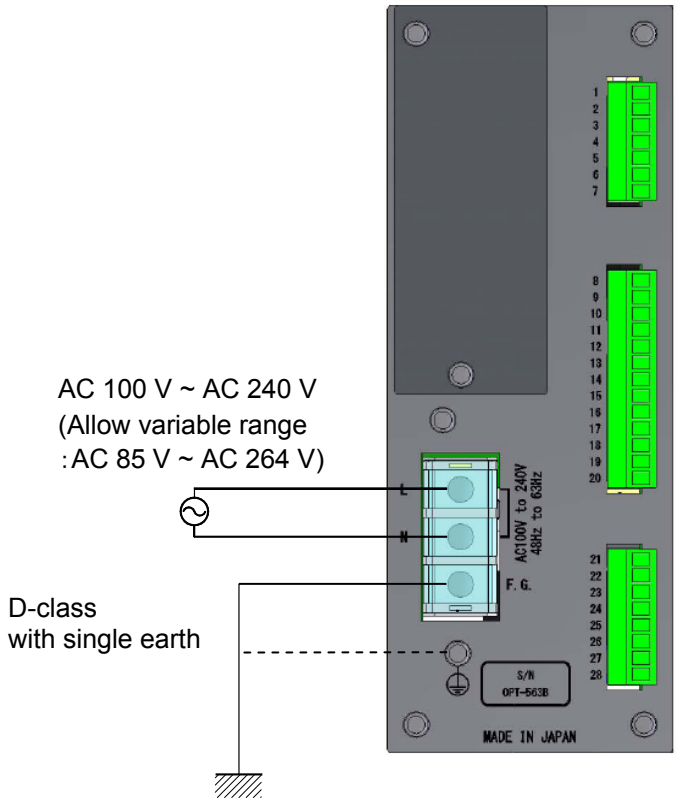
Model No. of analog output for rotation speed

Model No.	[R-A-OUT]	[R-F-OUT]
OPT-563B	-	-
OPT-563B-R1	Voltage output	-
OPT-563B-R2	Current output (Rotation speed zero to + Rated rotation speed)	-
OPT-563B-R3	- Current output (- Rated rotation speed to + Rated rotation speed)	-
OPT-563B-R4	-	Frequency output
OPT-563B-R14	Voltage output	Frequency output
OPT-563B-R24	Current output (Rotation speed zero to + Rated rotation speed)	Frequency output
OPT-563B-R34	Current output (- Rated rotation speed to + Rated rotation speed)	Frequency output

2-7. Connection with power supply and ground

Connect the power supply with the terminal board on the rear panel in this instrument shown as below figure then grounding.

Grounding should be the D class with the single earth.



Warning

Connection with the power supply and grounding should be made surely according to the figures, and also within the specified power supply condition.

The grounding of the instrument should be the D-class with single earth.
It may cause an unexpected malfunction due to the effects of noise from other equipments

3. Operations

Explain about operation by each key at front panel.

⚠ Warning

AT executing each key operation, measuring must be interrupted. It may cause an unexpected malfunction if you operate during measuring

Key operation is valid to press a key about one second at measuring mode.

3-1. FUNC key

3-1-1. In case of operation at measuring mode

Display FUnC in function mode. After this condition, it is possible to change the function setting or the other mode.

3-2. A/Z key

3-2-1. In case of operation at measuring mode

Torque display value displays [0] and lights [A/Z] of status display section when the torque display value is within 10% for maximum display value.

3-2-2. In case of operation the other mode

The flickering digit of set value up 10^1, 10^2, 10^3, 10^4 in order if press A/Z while displaying various set value. (however digit of set value range is different depend on the figure length of set value or there are signs or not.)

3-3. A/Z OFF key

3-3-1. In case of operation at measuring mode

Lights off the [A/Z] of stasus display section by working auto zero cancel function.

3-3-2. In case of operation the other mode

The flickering digit of set value down 10^4, 10^3, 10^2, 10^1 in order if press A/Z OFF while displaying various set value. (however digit of set value range is different depend on the figure length of set value or there are signs or not.)

3-4. ▲ key

3-4-1. In case of operation at measuring mode

No function

3-4-2. In case of operation the other mode

(1) Increment of set value

Set value is increment one count each in order 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 and 0 again when press ▲ key at display each various set value.

(2) Increment of fine adjustment

Subject value is increment when press ▲ key at fine adjustment of zero point, span point, liniearize cancellation and analog output.

3-5. ▼ key

3-5-1. In case of operation at measuring mode

No function

3-5-2. In case of operation the other mode

(1) Decrement of set value

Set value is decrement one count each in order 0, 9, 8, 7, 6, 5, 4, 3, 2, 1 and 0 again when press ▲ key at display each various set value.

(2) Decrement at fine adjustment

Subject value is decrement when press ▼ key at fine adjustment of zero point, span point, liniearize cancellation and analog output.

3-6. CHECK key

3-6-1. In case of operation at measuring mode

Lights [CHECK] in the condition display section and output the numerical value which set in function mode F-20 from analog output for torque (V-OUT, I-OUT). Refer to paragraph 9-2 for the detail.

3-6-2. In case of operation the other mode

No function

3-7. ENTER key

Register the changed setting value in inside the instrument when press ENTER key.

4. Calibration

In order to display the digital signals from the torque transducer as accurate torque value, the operation that can match the torque that torque on the torque transducer with the display on the instrument.
It is called as calibration.

For instance, this is the adjustment when the torque of 1000 N･m is applied on the torque transducer the display of the instrument is to become a display of 1000.0 N･m accurately.

4-1. Set items required the calibration

(1) MIN. SCALE DIVISION

This is the minimum unit of measuring value. The setting values are [1], [2], [5] or [10].
The value of {Span value / Min. scale division} is the display resolution.

(2) SPAN value

This is the maximum torque value that can be measured in the torque transducer.

(3) ZERO calibration

This is the item to calibrate that the torque value becomes zero point of the scale when no torque is applied (Initial torque condition) on the torque transducer.

There are two methods of [Torque value (Initial torque condition)] and [Numeric input of torque transducer output voltage] for the calibration methods.

(4) SPAN calibration

This is the item of calibrating torque value correctly when put torque on torque transducer.

There are two methods of [Torque value (span torque condition)] and [Numeric input of torque transducer output voltage] for the calibration methods.

(5) Selection of calibration data

4 calibration data can be stored in this unit. (F-59) Please select the stored place from either of 1 to 4 before the calibration. When the combined calibration is executed, the calibration data is stored in [Calibration data-1]

4-2. Necessary set items after the calibration

(1) Symmetry correction

It is the function that correct the span error of clockwise torsion and anti-clockwise torsion.
Refer to [4-6. Function of symmetry correction]

(2) Digital linearize

It is the function to reduce the measuring error by correcting 5 points at maximum except zero and span.Refer to [4-7. Digital linearize]

(3) Change polarity

It is the function that changeover the output of torque transducer.
Refer to [4-8. Function of change polarity]

(4) Position of decimal point

Set the decimal point on the display value.
Refer to [4-9. Setting of decimal point]

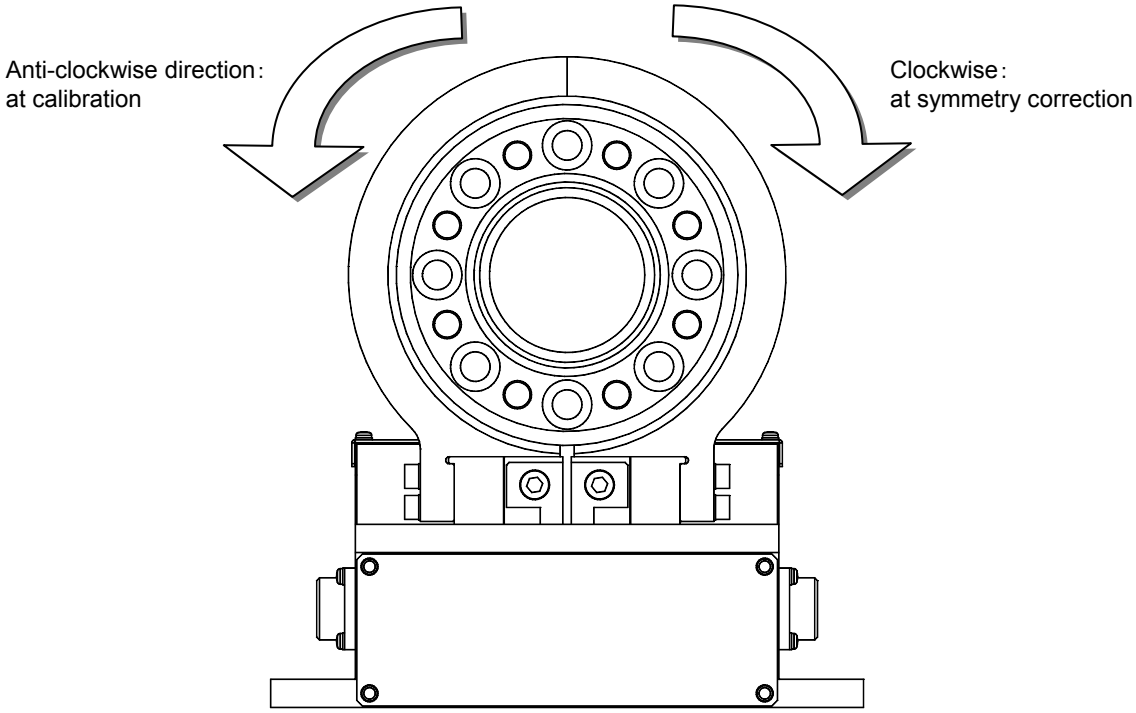
(5) Unit

Set the unit of this torque display.
Refer to [4-10. Unit setting]

- **Please execute the calibration if necessary when the measuring place is changed.**
- **The display resolution that the performance becomes effective is 10 000 or less.**
- **When the span calibration is executed, use the weight of 2/3 or more of the measuring capacity to reduce the calibration error.**

4-3. Torsion direction of torque transducer at calibration

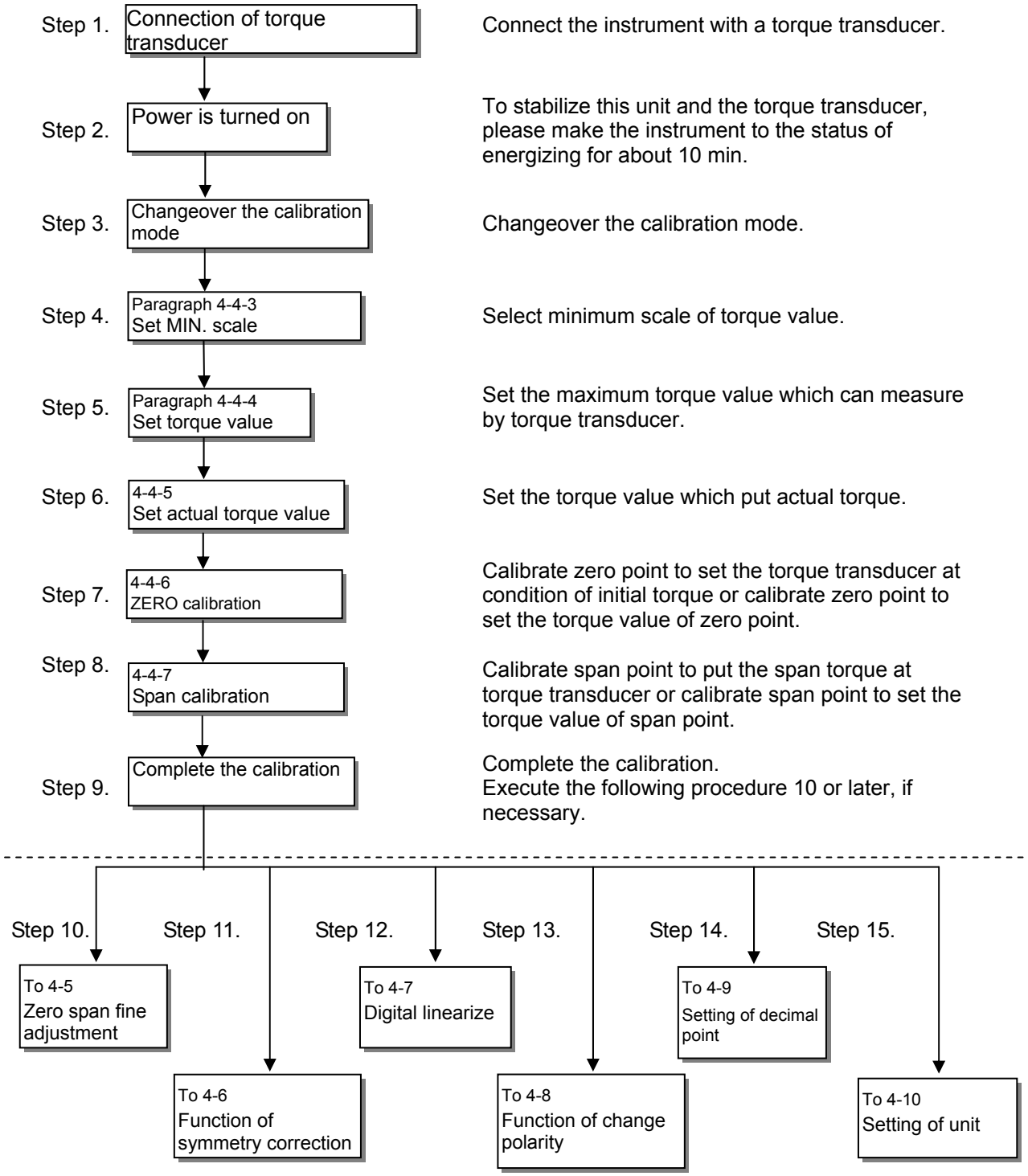
In case of calibrate this instrument and torque transducer combination, must be put torque on the anti-clockwise. In addition, put torque on the clockwise direction in case of executing symmetry correction described in 4-6 paragraph.



In case of execute calibration or adjustment without put torque on the right direction, it may cause malfunction to the Instrument.

4-4. Calibration procedure

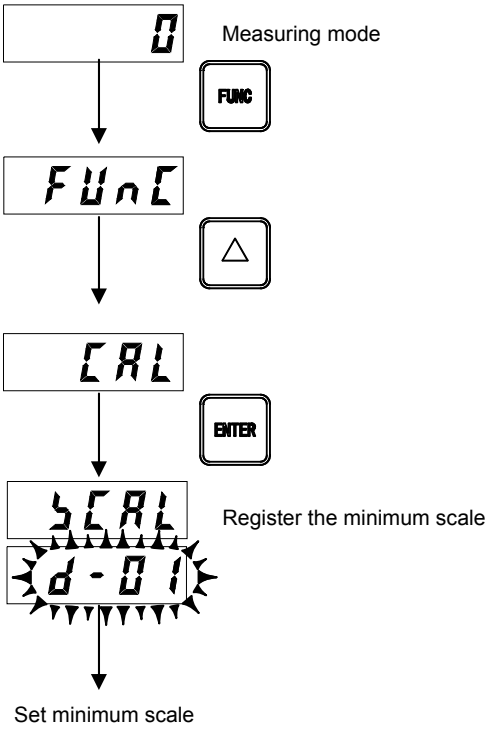
4-4-1. Flow of calibration



- **Step 4 ~ Step 9 is sequential action. If these procedures does not complete, the calibration result is not reflected.**
- **A/Z function is released if complete the calibration (complete Step 9).**
- **A/Z function is released if execute Step 10, 11, 12.**

4-4-2. Changeover to the calubration mode

Changeover to the calibration mode from measuring mode by following operation.



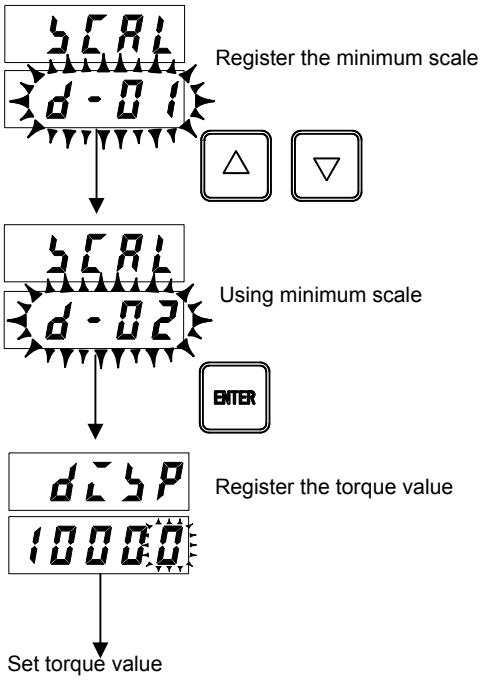
Display FUnC on the upper display if press the FUNC key about two seconds.

Display CAL on upper display if press ▲ key.

Display flickering bCAL on upper display and display d-01 lower display then enter the calibration mode if press ENTER key. (Display minimum scale which registered at that time if calibrated before.)

4-4-3. Set of the minimum scale

Set the minimum scale of torque value.



Change the lower display into required minimum scale using ▲ or ▼ key.
Select from [1], [2], [5] and [10].

▲ ▼: Select minimum scale.

FUNC: Return to the measuring mode to interrupt setting.

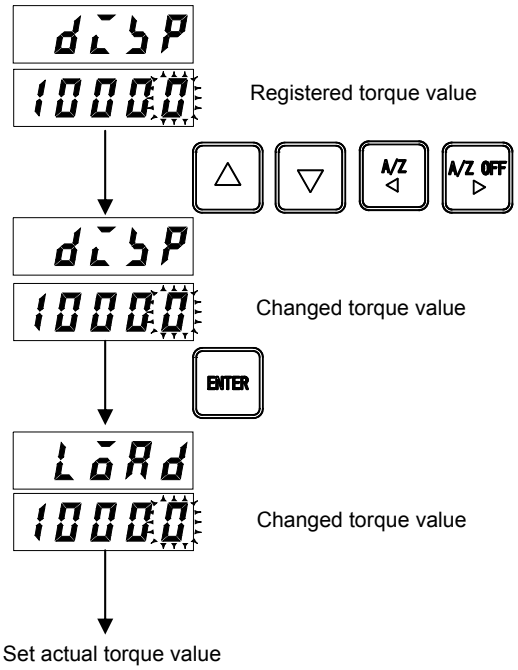
ENTER: Register displaying value then go to the next step.

After setting, press ENTER key. (Display the registered torque value if calibrated previously.)

The display resolution that the performance becomes effective is 10 000 or less.

4-4-4. Set of torque value

Setting displayed maximum torque value.



Change the lower display into required torque value using ▲ ▼ A/Z A/Z OFF

▲ ▼ : Change the value of place.

A/Z A/Z OFF : Select the value of digit.

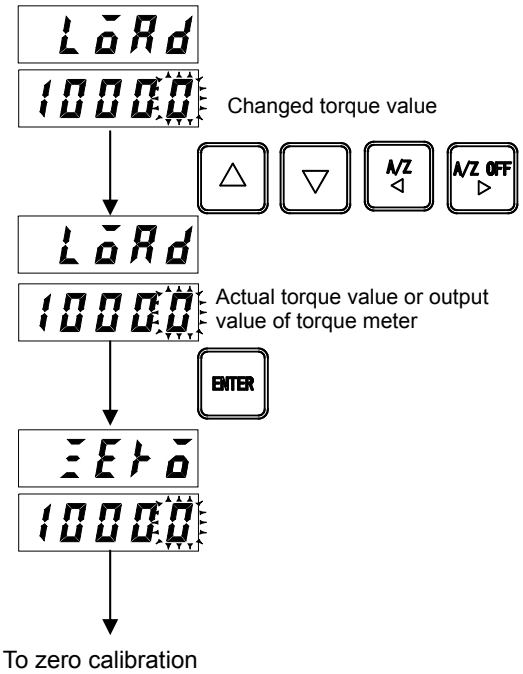
FUNC : Return to the measuring mode to interrupt setting.

ENTER : Register displaying value then go to the next step.

After setting, press ENTER key.

4-4-5. Set of actual torque value

Set the torque value (or output value of torque transducer) which put on the torque transuducer currently.



Change the lower display into required torque value using ▲ ▼ A/Z A/Z OFF

▲ ▼ : Change the value of digit.

A/Z A/Z OFF : Select the changing digit.

FUNC : Return to the measuring mode to interrupt setting.

ENTER : Register displaying value then go to the next step.

After setting, press ENTER key.

4-4-6. Zero calibration

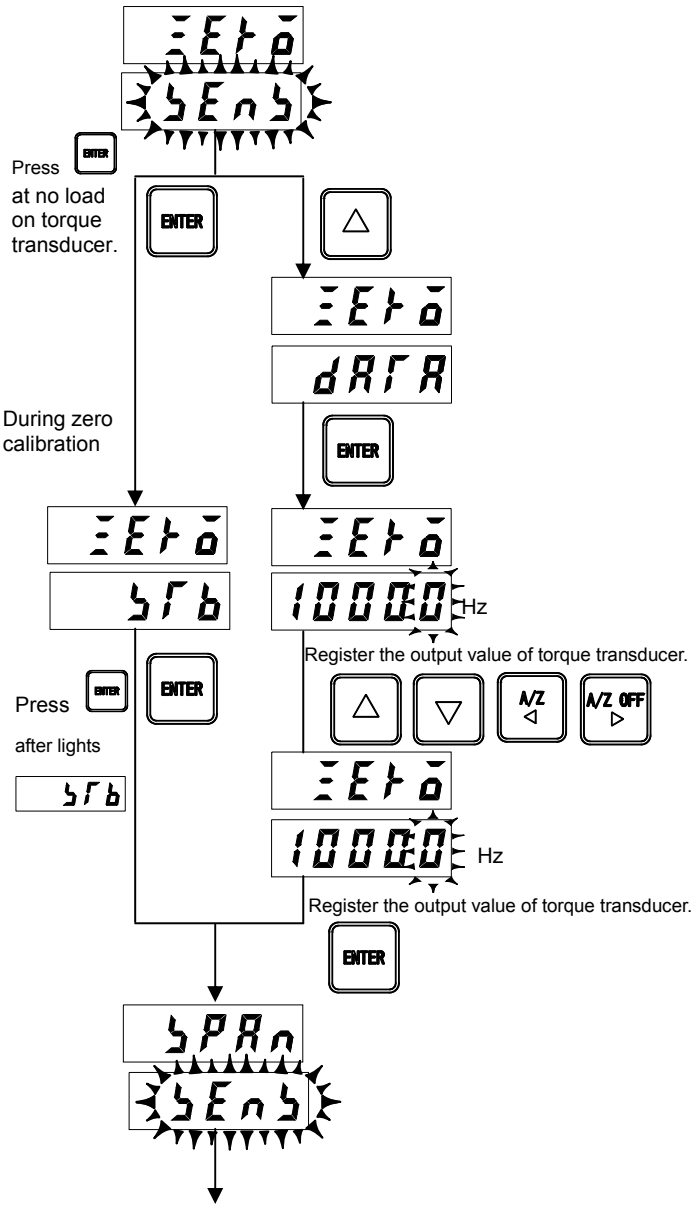
Excute register on zero point. Select zero calibration method.

(1) Method by torque value (initial torque condition)

→ Press [ENTER] key. Execute the control of below a).
Torque transducer executes zero calibration at condition of initial torque.

(2) Method by input numeric value in torque transducer

→ Press [▲] key then press [ENTER] key. Execute the control of below b).
Execute zero calibration to input zero point torque value (frequency) in torque transducer.



a) Method by torque value (initial torque condition)

Set the torque transducer condition to initial torque.

Press [ENTER] key when light SRb on the lower display. Register zero point and display SPAn.

b) Method by numeric torque value input of torque transducer

Display numerical value if press [▲] key to display DATA at lower display then continuously press [ENTER] key.

Displayed numerical value is output frequency of initial torque which registered in torque transducer before.

Set the torque value (frequency) by counting 1Hz unit which corresponding zero point.

[▲] [▼]: Change the value of digit.

[A/Z] [A/Z OFF]: Select the changing digit.

[FUNC] : Return to the measuring mode

[ENTER] : Register displayed value and go to the next step.

Press [ENTER] key after setting.

Error display of zero calibration

rE-L	: It is flickering for about 2 sec. when the output frequency of torque transducer is lower than 9 500 Hz or input value is lower than 9 500 Hz.
rE-H	: It is flickering for about 2 sec. when the output frequency of torque transducer is lower than 10 500 Hz or input value is lower than 10 500 Hz.

4-4-7. Span calibration

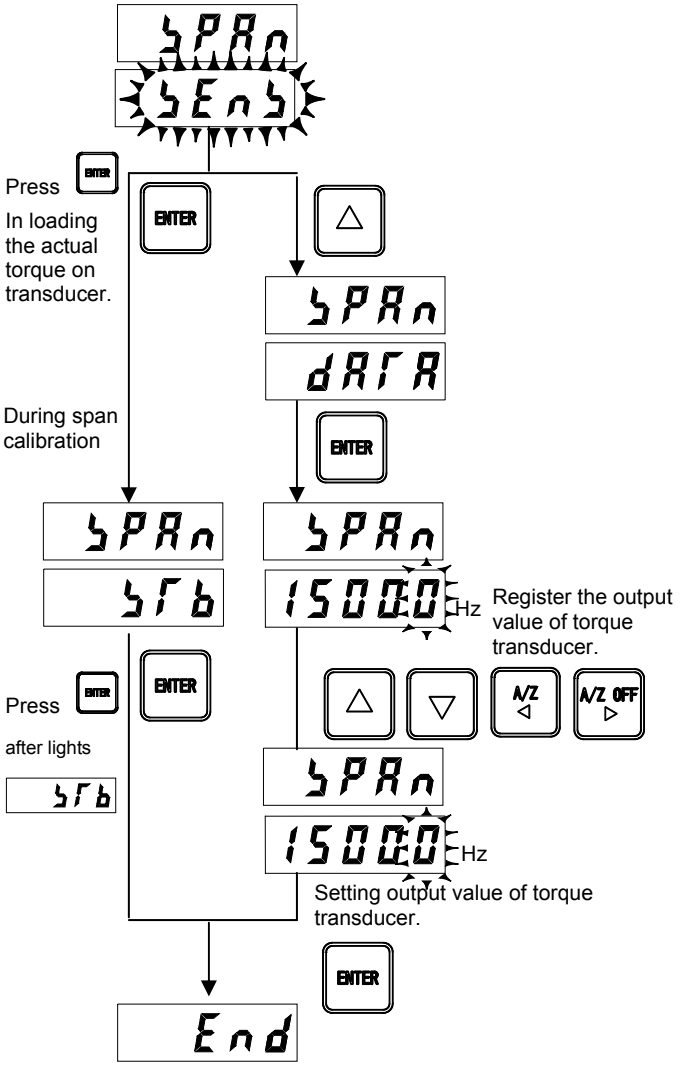
Excute register on span point. Select span calibration method.

(1) Method by actual torque value

→ Press ENTER key. Execute the control of below a).
Execute span calibration to put the actual torque on torque transducer.

(2) Method by input numeric value in torque transducer

→ Press ▲ key then press ENTER key. Execute the control of below b).
Execute span calibration to input span point torque value (frequency) in torque transducer.



a) Method by actual torque value

Put the torque value which set in '4-4-5 Setting of actual torque value'

Press ENTER key when light SrG on the lower display. Register span point and display End

b) Method by numeric value in torque transducer

Press ▲ key to display dATA at lower display, then continuously press ENTER key to display 10000.

Displayed numerical value is output frequency of span point which registered in torque transducer before.

Set the torque value (frequency) by counting 1Hz unit which corresponding zero point.

▲ ▼ : Change the value of digit.

A/Z A/Z OFF : Select the changing digit.

FUNC : Return to the measuring mode.

ENTER : Register displayed value and go to the next step.

Press ENTER key after setting.

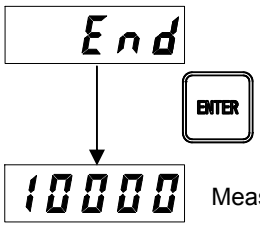
Error display of span calibration

SP-L : It is flickering for about 2 sec. when ([the output frequency of span point or the numeric value of span point] – [the output frequency of zero point or input torque transducer numeric value of zero point]) ≦0 and output frequency of torque transducer is lower than 14 500 Hz or input value is lower than 14 500 Hz.

SP-H : It is flickering for about 2 sec. when the output frequency of torque transducer is lower than 15 500 Hz or input value is lower than 15 500 Hz.

Use torque value at span calibration should be over 2/3 of display torque value in order to reduce calibration error.

4-4-8. Finish calibration



Measuring mode

Display End after complete span calibration.

Press ENTER key to finish calibration mode.

Switched measuring mode and registered setting data.

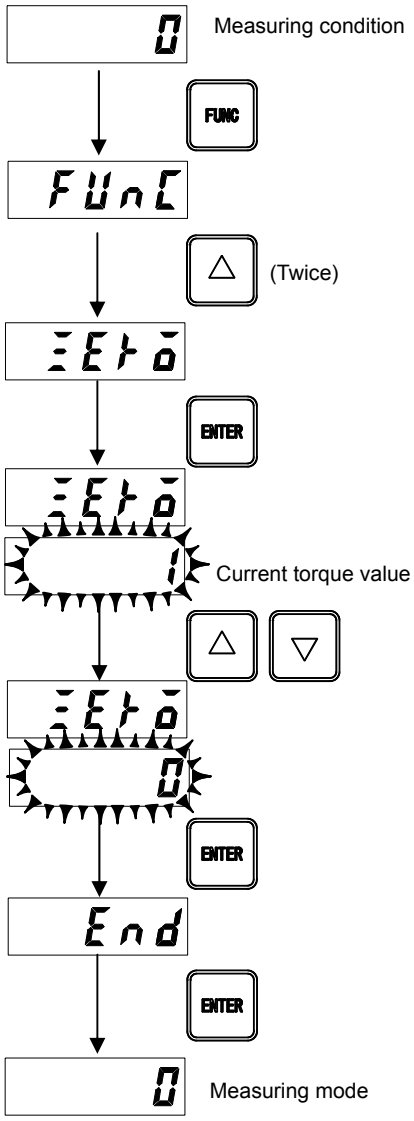
- **If you do not exceed the operation, calibration value (zero and span point) is not set.**
- **The calibration can use only torsion for anti-clockwise direction. Refer to the Paragraph 4-3.**
- **A/Z function is released if complete the calibration.**

4-5. Zero and span fine adjustment function

This is function that fine adjustment of zero point and span point if the actual torque value and display value has errors.

4-5-1. Changeover to the zero point fine adjustment mode

Changeover to the zero point fine adjustment mode from measuring mode by following operation.



Display FUnC on the upper display if press FUNC key about two seconds from measuring condition.

Press ▲ key twice to display ZEro on the upper display.

Enter the zero point fine adjustment mode when press ENTER key to display ZEro on the upper display and flicking numeric value on the lower display.

Lower display is corresponding to torque value of current input.

Set the torque transducer condition initial torque and adjust the display [Zero]

▲ : Increase torque value.
Increase continuously if keep pressing.

▼: Decrease torque value.
Decrease continuously if keep pressing.

FUNC : Interrupt the setting and return to measuring mode

ENTER : Register displaying value and go to the next step.

Press ENTER key after setting.

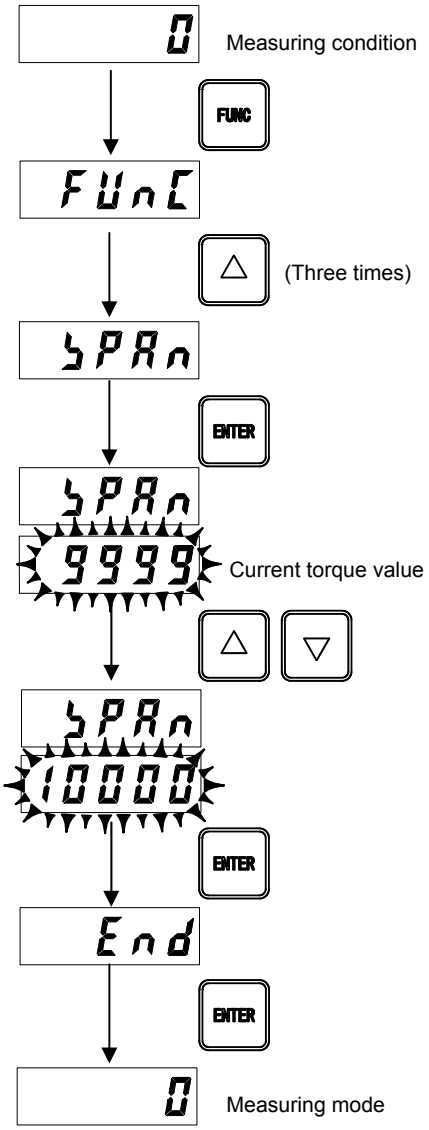
Display End after zero point fine adjustment.

Press ENTER to finish zero point fine adjustment.

To enter the measuring mode and register the setting.

4-5-2. Changeover to the span point fine adjustment mode

Changeover to the span point fine adjustment mode from measuring mode by following operation.



Display FUnC on the upper display if press FUNC key about two seconds from measuring condition.

Press ▲ key three times to display SPAn on the upper display.

Enter the span point fine adjustment mode when press ENTER key to display SPAn on the upper display and flicking numeric value on the lower display.

Lower display is corresponding to torque value of current input.

Set the torque transducer condition actual torque and adjust the display 'actual torque value'

▲ : Increase torque value.

Increase continuously if keep pressing.

▼ : Decrease torque value.

Decrease continuously if keep pressing.

FUNC : Interrupt setting and return to measuring mode.

ENTER : Register displaying value and go to the next step.

Press ENTER key after setting.

Display End after span point fine adjustment.

Press ENTER to finish span point fine adjustment.

To enter the measuring mode and register the setting.

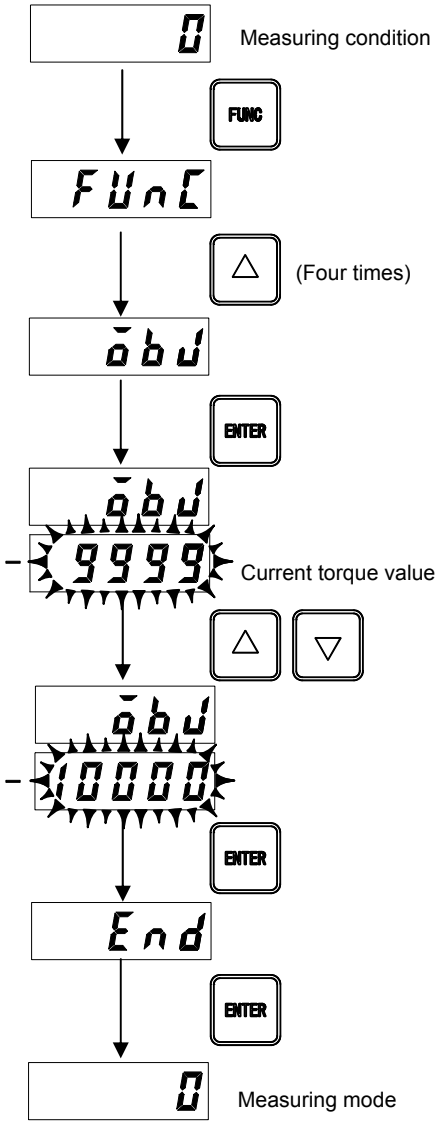
- **Setting of change polarity is canceled for a moment at zero and span fine adjustment (Return after cancel).**
- **A/Z function is released if complete the zero and span fine adjustment functions.**

4-6. Function of symmetry correction

This is the function the fine adjustment if torque value of clockwise and anti-clockwise direction has an error.

4-6-1. Changeover to the symmetry correction mode

Changeover to the symmetry correction mode from measuring mode by following operation.



Display FUnC on the upper display if press FUNC key about two seconds from measuring condition.

Press ▲ key four times to display ābJ on the upper display.

Enter the symmetry correction mode when press ENTER key to display ābJ on the upper display and flicking numeric value on the lower display.

Lower display is corresponding to torque value of current input.

Set the torque transducer condition to actual torque of clockwise direction and adjust the display 'actual torque value of clockwise direction'

For example, set the actual torque value [10 000] at calibration, target value of adjustment is [-10 000] at this point.

▲ : Increase torque value.

Increase continuously if keep pressing.

▼ : Decrease torque value.

Decrease continuously if keep pressing.

FUNC : Interrupt the setting and return to measuring mode

ENTER : Register displaying value and go to the next step.

Press ENTER key after setting.

Display End after span point fine adjustment.

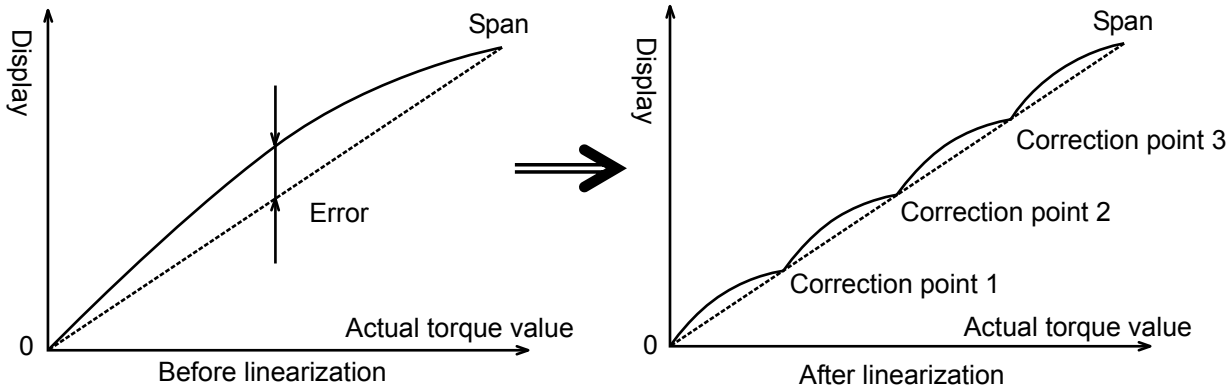
Press ENTER to finish span point fine adjustment.

To enter the measuring mode and register the setting.

- **Make sure putting actual torque on clockwise direction at symmetry correction.**
- **Setting of change polarity is canceled for a moment at symmetry correction (Return after cancel).**
- **Reset the setting value of clockwise direction linearize correction if execute symmetry correction.**
- **A/Z function is released if complete the symmetry correction.**
- **The set value by symmetry correcting function is stored in the calibration data from 1 to 4 respectively.**

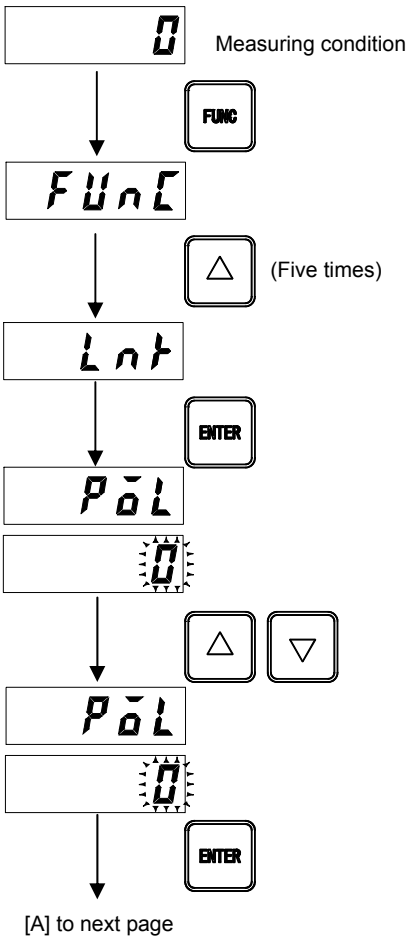
4-7. Digital linearize

After calibration, torque value errors between the zero and span (torque value) might occur due to the influence of coupling.
The Digital linearize function is a function to correct five maximum points (each five point of clockwise and anti-clockwise direction) to reduce the measuring error.



4-7-1. Changeover to the digital linearize mode

Changeover to the digital linearize mode from measuring mode by following operation.



Display FUnC on the upper display if press FUNC key about two seconds from measuring condition.

Press ▲ key five times to display LnE on the upper display.

Enter the digital linearize mode when press ENTER key to display PoL on the upper display and display 0 flicking on the lower display.

Change the value on lower display to use ▲ or ▼ key.

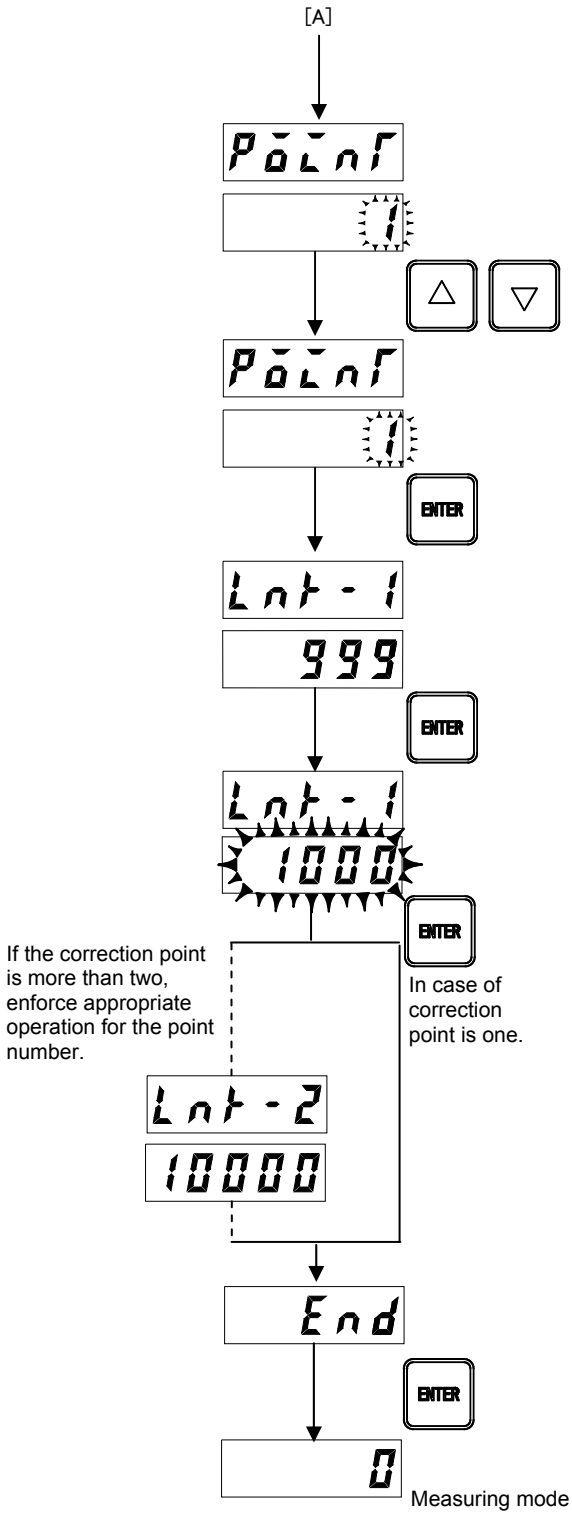
0: Anti-clockwise direction

1: Clockwise direction

▲ ▼ : Change the value of digit.

FUNC : Interrupt the setting and return to measuring mode

ENTER : Register displaying value and go to the next step.



Press ENTER key after setting.

Upper display will become PoInt and lower display will become 1.

Change the point number which you want to correct using ▲ or ▼ key on the lower display. (It is able to set maximum five point)

0 ~ 5 : Digital linearize correction point number

Upper display will Lnt-1 and lower display will be numeric value and display corresponding torque value which input currently.

Set the torque transducer condition to put actual torque which you want to correct. Press ENTER key to lower display flickering and adjust the display 'actual torque value which you want to correct'

For example, if putting torque value on torque transducer is [1000], adjust lower display same as [1000].

▲: Increase torque value

Increase continuously if keep pressing.

▼: Decrease torque value.

Decrease continuously if keep pressing.

FUNC : Interrupt the setting and return to measuring mode

ENTER : Register displaying value and go to the next step.

Press ENTER key after setting.

In case of correction point is more than two point, upper display is Lnt-2

Display End after compensation the linearity.

Press ENTER to finish digital linearize.

To enter the measuring mode and register the setting data.

- **Setting of change polarity is canceled for a moment at symmetry correction (Return after cancel).**
- **Set the digital linearize from near zero point.**
- **Execute the linearity compensation in clockwise direction after compensating the symmetry. (The set value of clockwise linearity compensation is reset if the symmetry compensation is made.)**
- **A/Z function is released if the linearity compensating function is completed.**
- **The set data by linearity compensation is stored in the calibration data from 1 to 4 respectively.**

4-8. Function of change polarity

This is the function that changeover the output polarity of torque transducer.

Default is set as [+] torque for anti-clockwise direction of torque transducer and [-] torque for clockwise direction of torque transducer.

It is possible to change [-] for anti-clockwise direction to torque transducer and [+] for clockwise direction by charge setting of function mode F-19.

About operating method, refer to paragraph 9 function mode.

Setting of change polarity is canceled for a moment at calibration, execute zero and span fine adjustment, symmetry correction and digital linearize (Return after cancel).

4-9. Setting of decimal point

Set the decimal point position.

It is possible to select the position of decimal point from [none], [1.0000], [10.000], [100.00] and [1000.0].

Default is set as [none]. About operating method, refer to paragraph 9. function mode.

4-10. Unit setting

Set the unit of torque value.

It is possible to select the unit from [N･m], [kN･m] and [V].

Default is set as [N･m]. About operating method, refer to paragraph 9 function mode.

5. Function and movement

5-1. External control input signal, error output signal and Indication of luminous energy decrease.

This instrument is able to external control by various setting.

5-1-1. External control input signal

Function if shorted COM.1 (terminal No. 5)

Terminal No.	Signal name	Movement
1	A/Z(pulse)	This command is able to operate when the torque display value is within 10 % of the maximum display value. By auto zero function, torque display value becomes [0] and [A/Z] of condition display section lights. (same as key operation of 3-2) Refer to 5-4 paragraph as for details.
2	A/Z OFF(pulse)	Cancel the auto zero function. Torque display value becomes the current value and [A/Z] of condition display section lights off.
3	LOCK(level)	All key input will be locked. [LOCK] in status display section lights.
4	Rotation POL	This signal is effective when the set value with F-24 is selected by 2 [Measurement by one rotation detector]. The rotating direction id detected by an external input signal. The rotating direction reverses while this signal is inputting.
5	COM.1	Common of input terminal (terminal No.1 ~ 4).

5-1-2. Error output signal

Terminal No.	Signal name	Movement
6	ERROR	ON at various error occurred.
7	COM.2	Common of output terminal (terminal No.6)

* Various errors mean [12-2.Error display] and [Indication of luminous energy decrease].

- **This operation is executed after A/Z and A/Z OFF input is shorted approximately 100 ms or more. (only once)**
- **LOCK input is valid during inputting after shorted approximately 100ms or more.**
- **COM.1 (terminal no. 5) and COM.2 (terminal no. 7) is isolated.**
- **In case of the power supply of OPT-563B is reentered, A/Z function is kept the status.**

5-1-3. Indication of luminous energy decrease

Change the LED condition on display section depends on the condition of torque transducer's luminous energy.

- **Optical transmission system flange type torque transducer is transmitting torque signal by ray. For that reason, there is possibility of not transmitting precise torque signal if light reception and light emitting part is abstracted by dirt due to using the instrument in environment which a lot of oil mist or dust. Based on this expression please clean light reception and light emitting part regularly.**
- **For the detail, refer to the instruction of optical transmission system for flange type torque transducer.**

Display	Name	Movement
H	Luminous condition H	Condition which enough luminous energy charging.
M	Luminous condition M	Luminous energy is less than reference value. Torque value is normal. However, clean the light reception and the light emitting part.
ERROR	Luminous condition abnormal	Flickering torque display section. ON the error output signal (refer to the 5-1-2). There is some possibility of abnormal torque value. Clean the light reception and the light emitting part.

Light up 'ERROR' on condition display section at occurring error besides luminous condition abnormal.

5-2. Filter setting

This instrument has two filter settings which analog filter by programming low pass filter in analog circuit and digital filter which stabilize installed torque signal or rotation signal by arithmetic processing.

⚠ Warning

- **Digital filter affects both digital output and analog output.**
- **Analog filter affects only analog output.**
- **If filter setting is not adequate, it does not execute accurate measuring and it may cause of unexpected accident.**

5-2-1. Analog filter for torque

Analog filter for torque is the function that changing responsiveness of analog output (voltage output,and current output).

This instrument is able to chageover the passband of analog filter from 1 Hz, 10 Hz, 30 Hz, 50 Hz, 100 Hz, 300 Hz, 500 Hz and 1 kHz of seven levels.

It is possible to set in F-05 function mode.

Default is set as '1 kHz'. About operating method, refer to pharagraph 9 function mode.

Tendency of quality for frequency is as follows:

Frequency	1 Hz	100 Hz	1 kHz
Noise durability	Stable ⟷		Sharp
Response speed	Slow ⟷		Quick

5-2-2. Digital filter for torque

Digital filter for torque is the function that stabilize input torque value by moving average.

This digital filter is able to set [00] to [88].

Average moving time of digital filter is fixed by set value.

It is possible to set in F-06 function mode.

Default is set as [00]. About operating method, refer to pharagraph 9 function mode.

Relation of setting and average time is roughly expressing the formula below.

(average time) = 2^m+2^n m: set value of 10^1

n: set value of 10^0

For example, set number is '55', average time is roughly expressing the formula below.

(average time) = 2^5+2^5

=64 times

Tendency of quality for average time is as follows:

Average moving time	Much	Little
Noise durability	Stable ⟷	Sharp
Response speed	Slow ⟷	Quick

5-2-3. Analog filter for rotation speed

Analog filter for rotation speed is the function that changing responsiveness of analog output (voltage output, and current output).

This instrument is able to changeover the passband of analog filter from 1 Hz and 10 Hz of two levels.

It is possible to set in F-07 function mode.

Default is set as [1 kHz]. About operating method, refer to pharagraph 9 function mode.

Tendency of quality for frequency is as follows:

Frequency	1 Hz	10 Hz
Noise durability	Stable ⇐	⇒ Sharp
Response speed	Slow ⇐	⇒ Quick

5-2-4. Digital filter for rotation speed

Digital filter is for rotation speed the function that stabilize input torque value by moving average.

This digital filter is able to set [00] to [88].

Average moving time of digital filter is fixed by set value.

It is possible to set in F-08 function mode.

Default is set as [00]. About operating method, refer to pharagraph 9 function mode.

Relation of setting and average time is roughly expressing the formula below.

(average time) = 2^m+2^n m: set value of 10^1

n: set value of 10^0

For example, set number is [55], average time is roughly expressing the formula below.

(average time) = 2^5+2^5

=64 times

Tendency of quality for average time is as follows:

Average moving time	Much	Little
Noise durability	Stable ⇐	⇒ Sharp
Response speed	Slow ⇐	⇒ Quick

5-3. Various setting about display

5-3-1. Display frequency

Display frequency of this instrument is able to select from [4 times/s] and [20 times/s].

It is possible to set in F-04 function mode.

Default is set as [20 times/s]. About operating method, refer to pharagraph 9 function mode.

5-3-2. Torque display range

Torque display range of this instrument is set in -110 % ~ 110 % of maximum display value at calibration.

The display becomes [-OL] when falling bellow this range, and [OL] when rising up over this range.

5-3-3. Rotation speed display range

Rotation speed display range of this instrument is set in -27 500 ~ 27 500.

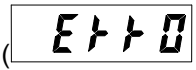
The display becomes [-OS] when falling bellow this range, and [OS] when rising up over this range.

5-4. Auto zero

This instrument is equipped auto zero function.

It is able to retake zero point in case of zero point is shifted by mounting/dismounting of sample without influenced to span point.

Torque value is set as '0' compulsory at press [A/Z] to operate auto zero function. However, it refuses auto zero function if already execute correction of total ±10 % by auto zero.

( display is flickering on torque display section)

[A/Z] of external control input signal moves in a same way.

5-5. Key lock

Key lock is a function that limit key operation for prevent malfunction of various key on the front panel.

Key lock OFF by setting of various digit = 0 and key lock ON by setting of various digit = 1 at function mode F-18.

Default is set as all key lock OFF. About operating method, refer to paragraph 9. function mode.

Target key of key lock and set digit is corresponding below.

Setting range: 0000 ~ 1111 0: Key lock OFF 1: Key lock ON

10^0 digit: [CHECK] key

10^1 digit: [A/Z] key

10^2 digit: [A/Z OFF] key

10^3 digit: [FUNC] key

In case of lock the [FUNC] key, pressing [ENTER] key and press [FUNC] key about over three seconds [FUNC] key lock is canceled only once.

Key which ON the key lock does not react if operated it.

6. Stored place of the setting data

In this instrumentt, each data is stored in EEPROM as follws:

The data in EEPROM can be stored almost permanent due to nonvolatile.

In addition, RAM is not backed up type, so RAM data will disappear at power OFF.

6-1. Data stored in the EEPROM

- Calibration data
- Function data

6-2. Data stored in the RAM

- A/Z data (the stored place is changeable to EEPROM by the setting in F-26.)

7. Check mode

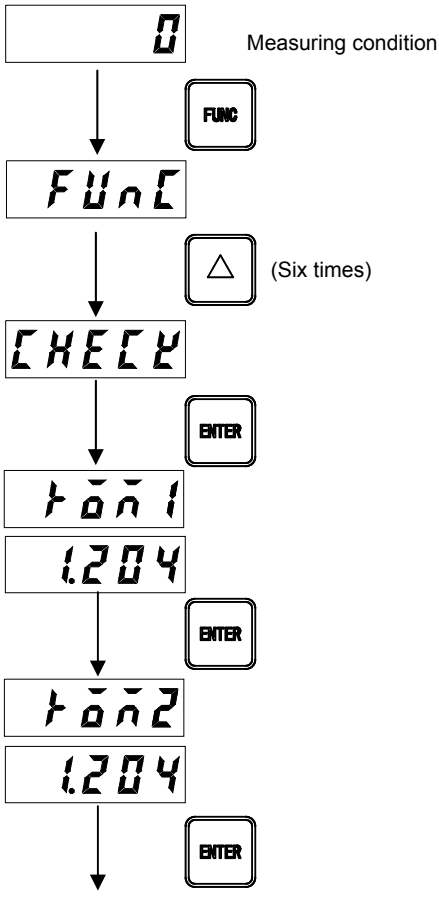
In check mode, you can check the information below.

- Check the ROM version
- Check the option
- Check the analog output
- Check the digital output
- Check the display

- **At check mode, it can return to the measuring mode by press.** FUNC
- **You can change the stored place of A/Z data to RAM, one of the EEPROM by setting of F-26**

7-1. Changeover to the check mode

Changeover to the check mode from measuring mode by following operation.



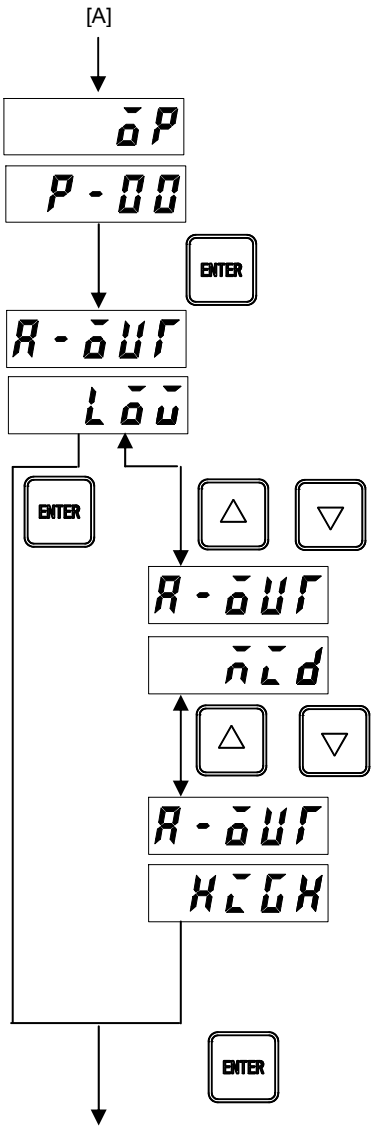
[A] to next page

Press FUNC key about two seconds from measuring condition, display FUnC on upper display.

Displays CHECY on upper display at press ▲ key six times.

Display ton1 on upper display and ROM version of DSP on lower display at press ENTER key.

Display ton2 on upper display and ROM version of DSP on lower display at press ENTER key.



[A] to next page

Press ENTER key to display oP on upper display and P-00 on lower display then shows optional circuit board which connected to this instrument.

P-00: No optional circuit board

P-70: PROFIBUS

P-71: CANopen

P-74: RS-232C

P-76: RS-422/485

It is able to check the analog output at press ENTER key to display A-oUT on the upper and display Lou on the lower.

At this time, output the corresponding value on lower display from analog output.

Current output changes outputting value depending on output setting of zero torque.

Refer to 10-8-2 Setting of current output.

Lou :DC -10 V or DC - (4 mA)

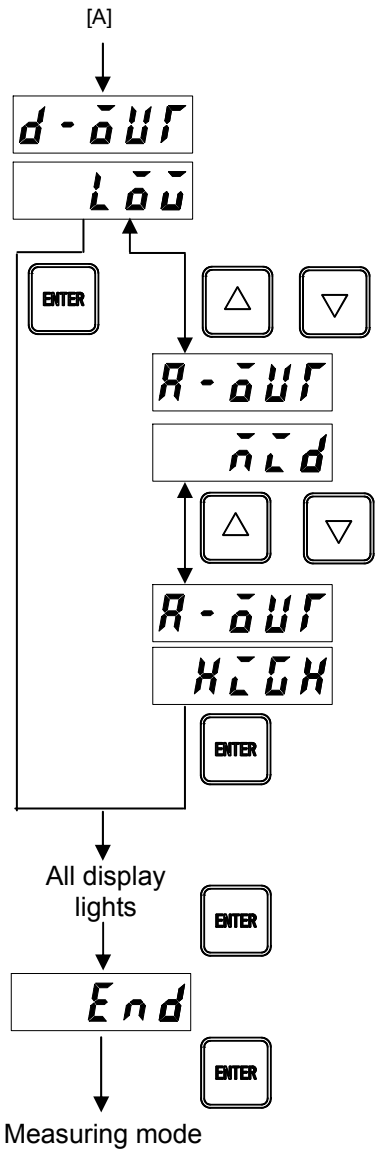
nLd :DC 0 V or DC 4 mA (12 mA)

HIGH :DC 10 V or DC 20 mA

▲ : Change the lower display Lou → nLd → HIGH in order.

▼ : Change the lower display Lou → HIGH → nLd in order.

FUNC : Interrupt the setting and return to measuring mode.



Press ENTER key to display d-oUT on upper display and Lou on lower display then it is able to check the digital output.

Lou : Torque value which corresponding to minus span point.

nLd : Torque value which corresponding to zero point.

HLGH : Torque value which corresponding to span point.

▲: Change the lower display Lou → nLd → HLGH in order.

▼: Change the lower display Lou → HLGH → nLd in order.

FUNC: Interrupt the setting and return to measuring mode.

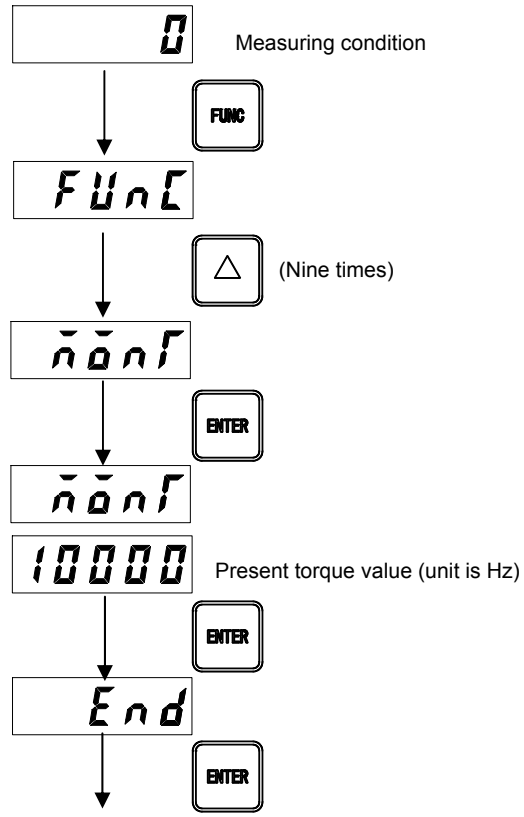
Display all lights include status condition if press ENTER key.

Press ENTER key to display End on upper display.

Press ENTER key to finish check mode and return to measuring mode.

8. Monitor mode

In monitor mode it is displaying present torque value which outputting from torque transducer by frequency.
Changeover to the monitor mode from measuring mode by following operation.



Display FUnC on the upper at press FUNC key about two seconds from measuring condition.

Press ▲ key nine times then display nonr on upper display.

Press ENTER key to display nonr on the upper and display numeric value on the lower.

Displaying numeric value is frequency which converted from torque value outputting from torque transducer currently.

For the detail, refer to the inspection report of torque transducer.

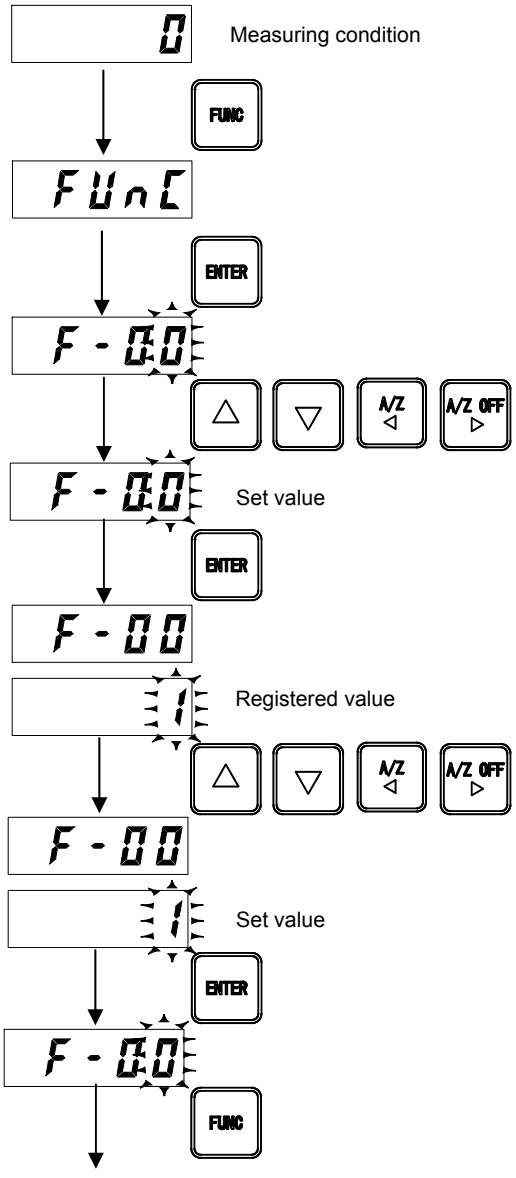
Press ENTER key to display End on upper display.

Press ENTER key to finish monitor mode and return to measuring mode.

9. Function mode

9-1. Changeover to the function mode

Changeover to the function mode from measuring mode by following operation.



Display FUnC on the upper at press FUNC key about two seconds from measuring condition.

Press ENTER key then display F - 00 on the upper display.

Using ▲ ▼ A/Z A/Z OFF keys for change to required function number.

▲ ▼ : Change the value of digit.

A/Z A/Z OFF : Select the changing digit.

FUNC : Interrupt the setting and return to measuring mode.

ENTER : Go to the next step.

Press ENTER key after setting.

The lower display will change which corresponding to the contents of function.

Change the lower display to required function number by using ▲ ▼ A/Z A/Z OFF key.

Press ENTER key to display F - 00 on the upper display then complete the register of function.

Press FUNC key to finish function mode and return to measuring mode.

9-2. Function of the function data

This is the explanation of the main function that can be set in the function mode.

9-2-1. Stablization filter for torque

This is the function that make digital filter effects strongly if torque value is within the setting value and keep the value over prescribed time.

Default of time range setting (F-10) is set as [000] so stabilized filter is set as OFF.

a) Average time (F-09)

Execute the setting of average time by function F-09.

Setting value	0	1	2	3	4	5	6	7	8
Average time	1	2	4	8	10	12	14	16	32

Default is set as [14 times].

b) Time width setting (F-10)

Execute time range setting in function F-10.

Set range: 000 ~ 999 Unit: 10ms 000: OFF

Default is set as [000] (OFF).

c) Data width setting (F-11)

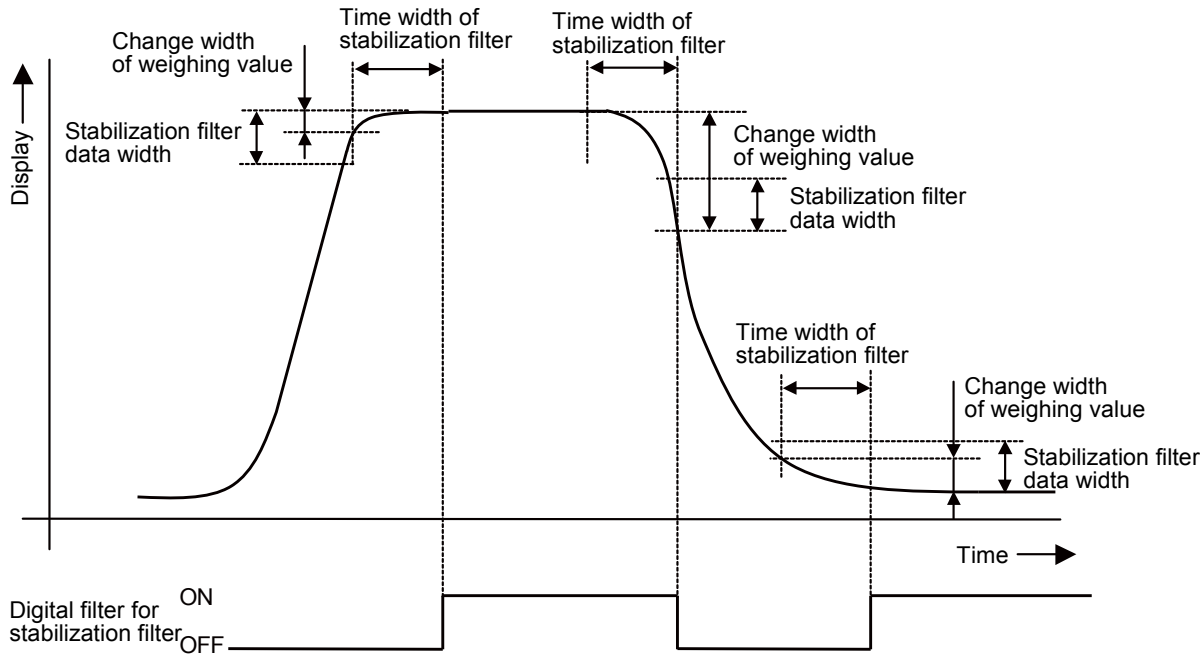
Execute data range setting in function F-11.

Set range: 00 ~ 99 Unit: 1 DIGIT

DIGIT indicates display scale. 1 DIGIT is [00001].

Default is set as [20].

When the change width of the torque is within the value set by function F-11 and when the condition continues for the time for function F-10 or more ,the stabilization filter set by function F-09 becomes effective.



9-2-2. Stablization filter for rotation speed

This is the function that make digital filter effects strongly if rotation speed value is within the setting value and keep the value over prescribed time.

Default of time range setting (F-16) is set as [000] so stabilized filter is set as OFF.

d) Average time (F-15)

Execute the setting of average time by function F-15.

Setting value	0	1	2	3	4	5	6	7	8
Average time	1	2	4	8	10	12	14	16	32

Default is set as [14 times].

e) Time width setting (F-16)

Execute time range setting in function F-16.

Set range: 000 ~ 999 Unit: 10ms 000: OFF

Default is set as [000] (OFF).

f) Data width setting (F-17)

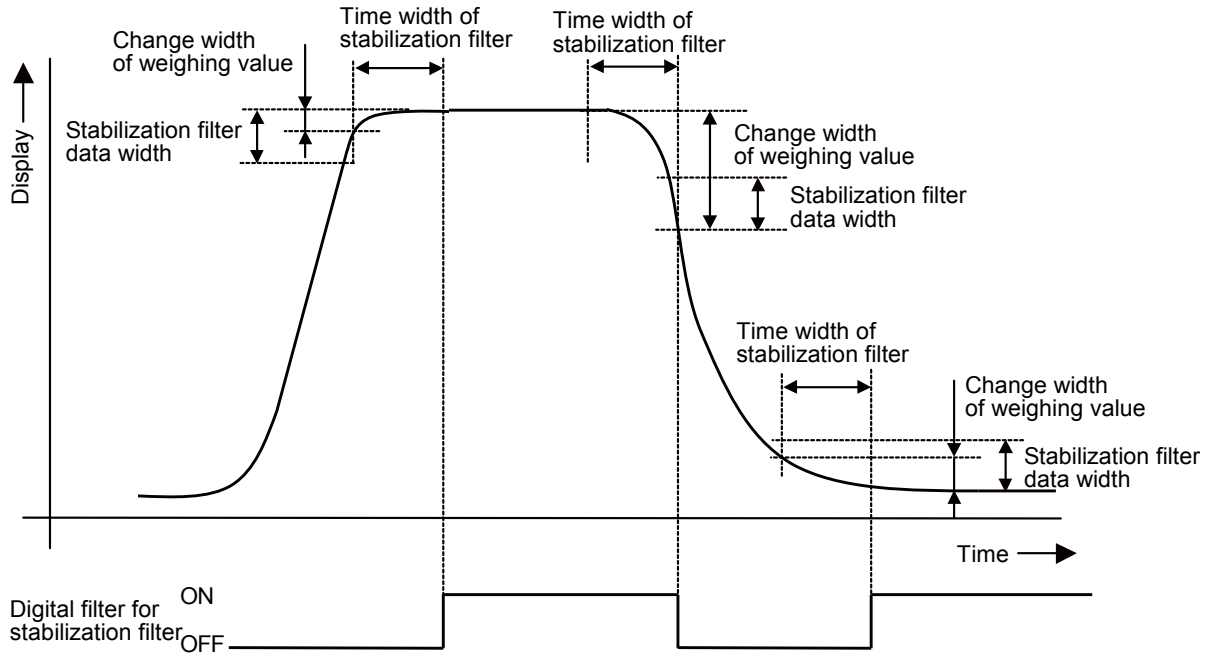
Execute data range setting in function F-17.

Set range: 00 ~ 99 Unit: 1 DIGIT

DIGIT indicates display scale. 1 DIGIT is [00001].

Default is set as [20].

When the change width of the rotation speed is within the value set by function F-17 and when the condition continues for the time for function F-16 or more ,the stabilization filter set by function F-15 becomes effective.



9-2-3. CHECK value

It is able to set the value of analog output at press CHECK key.

Setting range :0 ~ 20

Output value :(The maximum value of analog output – the minimum value of analog output) /20 × set value

For example, The maximum value of analog output is 10V, the minimum value of analog output is 0V and set value is 20, analog output is (10 V - 0 V) / 20 × 20 = 10 V at press CHECK key.

Default is set as [16].

9-2-4. Form of rotation detection signal input

The rotation detection becomes possible by connecting the rotation detector (MP-9820).

The detecting method of rotation speed by rotation detedtor is set.

Setting range :0 ~ 3

0 : OFF
The rotation detection is not executed.

1 : Measure with 2 rotation detectors
Detected by the input signal of two rotation detectors.
The direction of rotation is detected by the phase difference of the signal.

2 : Measure with 1 rotation detector.The direction of rotation is detected by the external input signal.
Detected by the input signal of one rotation detector.
The direction of rotation is detected by the external input signal.

3 : Measure with 1 rotation detector. Impossible to detect the direction of rotation.
Detected by the input signal of one rotation detector.
The direction of rotation cannot be detected.

Default is set as [0].

9-2-5. Number of gears for rotation detection

This instrument is able to select the number of gears for rotation detection.

Setting range :0 ~ 2

0 : Gear of 120

1 : Gear of 240

2 : Gear of 360

Default id set as [0].

When it comes to use, please set above by the number of gears combined.

The standard number of gears for our torque meter and rotation detector is 120.

9-2-6. Select calibration data

This instrument is able to preserve four calibration data. (F-59)

Set range :0 ~ 3

0 : Calibration data 1

1 : Calibration data 2

2 : Calibration data 3

3 : Calibration data 4

For example if you have two torque transducer TMHS, It saves you lavor of calibration at exchanging torque transducer if preserve the first instrument of calibration data to calibration 0 and the second instrument of the data to calibration 1.

Default is set as ‘calibration data 0’

[Function F-21 maximum display value of analog output for torque], [Function F-22 maximum display value of analog output for rotation speed], [Set value of symmetry correction] and [Set value of linearize correction] is stored from 1 to 4 of calibration data respectively.

9-2-7. Prohibition of calibration

The instrument prepares the setting for prohibition of calibration to prevent from excessive calibrations.

It is able to lock the various calibration data setting in function F-59 not to calibrate by accident.

Default is set as all permit. Corresponding to the target prohibition of calibration and setting value digit is as follows:

Setting range :0000 ~ 1111 0 :permit 1 :prohibit

10^0 digit :calibration data 1

10^1 digit : calibration data 2

10^2 digit : calibration data 3

10^3 digit : calibration data 4

9-2-8. Symmetry correction clear

It is able to clear the corrected data in function of symmetry correction. (F-56)

Only the calibration data that has been selected at present is cleared.

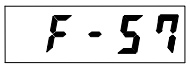
Press ENTER key during display F-56 then it will be flickering display of CLr.

Press FUNC if you want to cancel the symmetry correction clear at this point. Symmetry correction clear is not executed and return to the measuring mode.

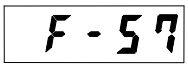
Press ENTER key to display F-56 at flickering CLr display then complete the movement of symmetry correction clear.

9-2-9. Digital linearize of anti-clockwise direction clear

The corrected data of anti-clockwise direction side in digital linearize can be cleared. (F-57)
Only the calibration data that has been selected at present is cleared.

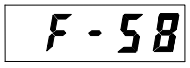
Press ENTER key during display  then it will be flickering display of .

Press FUNC if you want to cancel the digital linearize of anti-clockwise direction clear at this point.
Digital linearize of anti-clockwise direction clear is not executed and return to the measuring mode.

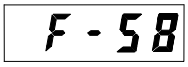
Press ENTER key to display  at flickering display then complete the digital linearize of anti-clockwise direction clear.

9-2-10. Digital linearize of clockwise direction clear

The corrected data of clockwise direction side in digital linearize can be cleared. (F-58)
Only the calibration data that has been selected at present is cleared.

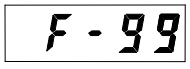
Press ENTER key during display  then it will be flickering display of .

Press FUNC if you want to cancel the digital linearize of clockwise direction clear at this point.
Digital linearize of clockwise direction clear is not executed and return to the measuring mode.

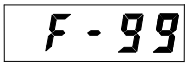
Press ENTER key to display  at flickering display then complete the digital linearize of clockwise direction clear.

9-2-11. Memory clear

It is able to return the function to the default setting which changed in the function setting. (F-99)

Press ENTER key during display  then it will be flickering display of .

Press FUNC if you want to cancel the memory clear at this point. Memory clear is not executed and return to the measuring mode.

Press ENTER key to display  at flickering display then complete the memory clear.

9-3. Function list

Function No.	Item	Setting value	Contents
F-01	Position of decimal point	●0	No decimal point
		1	1000.0
		2	100.00
		3	10.000
		4	1.0000
F-02	Torque display unit	●0	N･m
		1	kN･m
		2	V
F-04	Display times	0	4 times/s
		●1	20 times/s
F-05	Analog filter for torque	0	1 Hz
		1	10 Hz
		2	30 Hz
		3	50 Hz
		4	100 Hz
		5	300 Hz
		6	500 Hz
		●7	1 kHz
F-06	Digital filter for torque	00 ~ 88	Moving average time = $2^m + 2^n$ m: Set value of 10^1 and n: Set value of 10^0
		●00	
F-07	Analog filter for rotation speed	0	1 Hz
		●1	10 Hz
F-08	Digital filter for rotation speed	00 ~ 88	Moving average time = $2^m + 2^n$ m: Set value of 10^1 and n: Set value of 10^0
		●00	
F-09	Stabilization filter for torque Average time	0	Moving average time: Once
		1	Moving average time: Twice
		2	Moving average time: 4 times
		3	Moving average time: 8 times
		4	Moving average time: 10 times
		5	Moving average time: 12 times
		●6	Moving average time: 14 times
		7	Moving average time: 16 times
		8	Moving average time: 32 times
F-10	Stabilization filter for torque Setting of time width	000 ~ 999	Unit : 10 ms 000 : Stabilization filter OFF
		●000	
F-11	Stabilization filter for torque Setting of data width	00 ~ 99	Unit : DIGIT 00 : Stabilization filter OFF
		●20	

Function No.	Item	Setting value	Contents
F-15	Setting of Stabilization filter average time for rotation speed	0	Moving average time: Once
		1	Moving average time: Twice
		2	Moving average time: 4 times
		3	Moving average time: 8 times
		4	Moving average time: 10 times
		5	Moving average time: 12 times
		●6	Moving average time: 14 times
		7	Moving average time: 16 times
		8	Moving average time: 32 times
F-16	Setting of stabilization filter time width for rotation speed	000 ~ 999	Unit : 10 ms 000 : Stabilization filter OFF
		●000	
F-17	Setting of stabilization filter data width for rotation speed	00 ~ 99	Unit : DIGIT 00 : Stabilization filter OFF
		●20	
F-18	Key lock	0000 ~ 1111 ●0000	0 : OFF 1 : ON 10^0 digit: CHECK 10^1 digit: A/Z 10^2 digit: A/Z OFF 10^3 digit: FUNC
F-19	Change polarity	●0	+ for anti-clockwise direction
		1	+ for clockwise direction
F-20	Check value	0 ~ 20	Refer to 9-2-3
		●16	
F-21	Maximum display value of analog output for torque	1 ~ 99 999	Unit : DIGIT
		●10000	
F-22	Maximum display value of analog output for rotation speed	1 ~ 27 500	Unit : DIGIT
		●25000	
F-23	Polarity of the rotation direction	●0	+
		1	-
F-24	Form of rotation detection signal input	●0	OFF
		1	Measure with 2 rotation detectors.
		2	Measure with 1 rotation detector. The direction of rotation is detected by the external input signal.
		3	Measure with 1 rotation detector. Impossible to detect the direction of rotation.
F-25	Number of gears for rotation detection	●0	120
		1	240
		2	360

Function No.	Item	Setting value	Contents
F-26	Change the stored place of A/Z data	●0	RAM
		1	EEPROM
F-30	RS-232C/RS-422/RS-485 Operation mode	●0	Command mode
		1	Stream mode
F-31	RS-232C/RS-422/RS-485 Target stream output	●0	Display section of torque data
		1	Input torque value A/D data
		2	Display section of rotation speed data
		3	Frequency data
F-32	RS-232C/RS-422/RS-485 Baud rate	0	1 200 bps
		1	2 400 bps
		2	4 800 bps
		●3	9 600 bps
		4	19 200 bps
		5	38 400 bps
		6	57 600 bps
		7	115 200 bps
F-33	RS-232C/RS-422/RS-485 Data bit length	●0	7 bit
		1	8 bit
F-34	RS-232C/RS-422/RS-485 Parity bit	0	Nothing
		●1	Odd number
		2	Even number
F-35	RS-232C/RS-422/RS-485 Stop bit	●0	1 bit
		1	2 bit
F-36	RS-232C/RS-422/RS-485 Terminator	0	CR
		●1	CR+LF
F-37	RS-232C/RS-422/RS-485 Addition of decimal point	●0	None
		1	Exist
F-38	RS-422/485 address	00 ~ 31	
		●00	
F-39	Change RS-422/485	●0	RS-422
		1	RS-485
F-40	RS-485 Data delay time	000 ~ 999	Unit :10 msec It is able to set from 0 ~ 9.99 s
		●001	
F-41	PROFIBUS Station No.	000 ~ 125	
		●000	
F-42	CANopen Node ID	001 ~ 127	
		●001	

Function No.	Item	Setting value	Contents
F-43	CANopen Baud rate	0	10 kbps
		1	20 kbps
		2	50 kbps
		3	100 kbps
		4	125 kbps
		5	250 kbps
		6	500 kbps
		7	800 kbps
		●8	1 Mbps
F-45	CANopen PDO output cycles	0 ~ 100	0:OFF Unit : 1 msec
		●100	
F-50	Maintenance 1	00000	0 ~ 99 999 (Do not use)
F-51	Maintenance 2	00000	0 ~ 99 999 (Do not use)
F-55	Prohibition of calibration	0000	0: Calibration practical 1: Calibration prohibiting 10^0 digit: Calibration data 1 10^1 digit: Calibration data 2 10^2 digit: Calibration data 3 10^3 digit: Calibration data 4
F-56	Symmetry correction clear	0	Clear the corrected data in function of symmetry correction.
F-57	Digital linearize anti-clockwise direction clear	0	Clear the corrected data in digital linearize (anti-clockwise direction)
F-58	Digital linearize clockwise direction clear	0	Clear the corrected data in digital linearize (clockwise direction)
F-59	Select calibration data	●0	Calibration data 1
		1	Calibration data 2
		2	Calibration data 3
		3	Calibration data 4
F-60	Calibration 1 increment value	1	Reference value (initial value)
F-61	Calibration 1 maximum display value	10000	Reference value (initial value)
F-62	Calibration 1 actual torque value	10000	Reference value (initial value)
F-63	Calibration 1 ZERO A/D	0x1FFFF	Reference value (initial value)
F-64	Calibration 1 +SPAN A/D	0x3AAAA	Reference value (initial value)
F-65	Calibration 1 -SPAN A/D	0x5555	Reference value (initial value)
F-66	Calibration 1 Frequency conversion value of ZERO	10000	Reference value (initial value)
F-67	Calibration 1 Frequency conversion value of +SPAN	15000	Reference value (initial value)
F-68	Calibration 1 Frequency conversion value of -SPAN	5000	Reference value (initial value)

Function No.	Item	Setting value	Contents
F-70	Calibration 2 increment value	1	Reference value (initial value)
F-71	Calibration 2 maximum display value	10000	Reference value (initial value)
F-72	Calibration 2 actual torque value	10000	Reference value (initial value)
F-73	Calibration 2 ZERO A/D	0x1FFFF	Reference value (initial value)
F-74	Calibration 2 +SPAN A/D	0x3AAAA	Reference value (initial value)
F-75	Calibration 2 -SPAN A/D	0x5555	Reference value (initial value)
F-76	Calibration 2 Frequency conversion value of ZERO	10000	Reference value (initial value)
F-77	Calibration 2 Frequency conversion value of +SPAN	15000	Reference value (initial value)
F-78	Calibration 2 Frequency conversion value of -SPAN	5000	Reference value (initial value)
F-80	Calibration 3 increment value	1	Reference value (initial value)
F-81	Calibration 3 maximum display value	10000	Reference value (initial value)
F-82	Calibration 3 actual torque value	10000	Reference value (initial value)
F-83	Calibration 3 ZERO A/D	0x1FFFF	Reference value (initial value)
F-84	Calibration 3 +SPAN A/D	0x3AAAA	Reference value (initial value)
F-85	Calibration 3 -SPAN A/D	0x5555	Reference value (initial value)
F-86	Calibration 3 Frequency conversion value of ZERO	10000	Reference value (initial value)
F-87	Calibration 3 Frequency conversion value of +SPAN	15000	Reference value (initial value)
F-88	Calibration 3 Frequency conversion value of -SPAN	5000	Reference value (initial value)
F-90	Calibration 4 increment value	1	Reference value (initial value)
F-91	Calibration 4 maximum display value	10000	Reference value (initial value)
F-92	Calibration 4 actual torque value	10000	Reference value (initial value)
F-93	Calibration 4 ZERO A/D	0x1FFFF	Reference value (initial value)
F-94	Calibration 4 +SPAN A/D	0x3AAAA	Reference value (initial value)
F-95	Calibration 4 -SPAN A/D	0x5555	Reference value (initial value)
F-96	Calibration 4 Frequency conversion value of ZERO	10000	Reference value (initial value)
F-97	Calibration 4 Frequency conversion value of +SPAN	15000	Reference value (initial value)
F-98	Calibration 4 Frequency conversion value of -SPAN	5000	Reference value (initial value)
F-99	Memory clear	-	Set the function content is returned to setting default.

10. Analog output

Warning

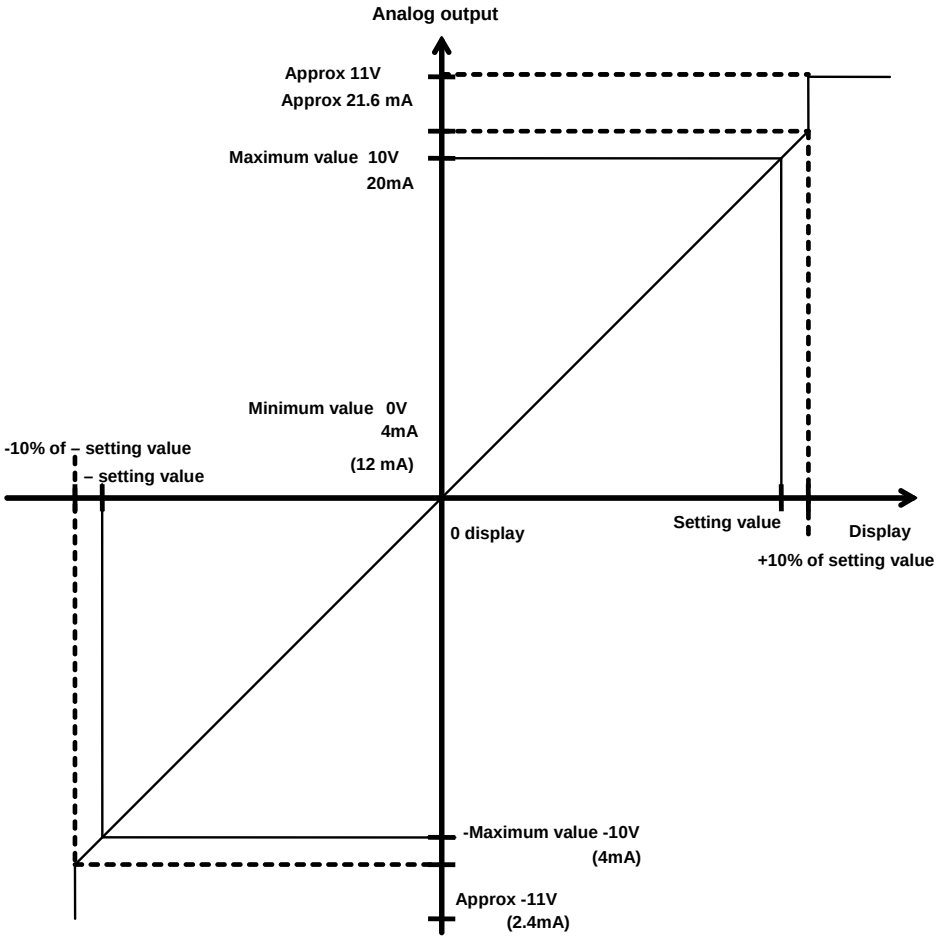
- **Analog output is set for each calibration data of 4 pattern changed by F-59.**
- **Execute function every calibration data setting of [analog output for torque maximum display value] (F-21) or [analog output for rotation speed maximum display value] (F-22) and [fine adjustment of analog output].**

- **Analog output type of this instrument is [voltage output (standard)], [current output (option)], [frequency output (option)], [voltage output (option)], [current output (option)] and [frequency output (option)] of six kinds.**
- **Execute current output after adjust voltage output.**
- **Analog output changes an output at turning on the power. Use it after an hour of throwing power supply for stable use.**
- **Frequency output has no scaling function. Output the value from torque transducer without change.**

10-1. Scaling of analog output for torque

Analog output of standard specification is set as torque value 0 ~ 10 000 of minimum value to maximum value.

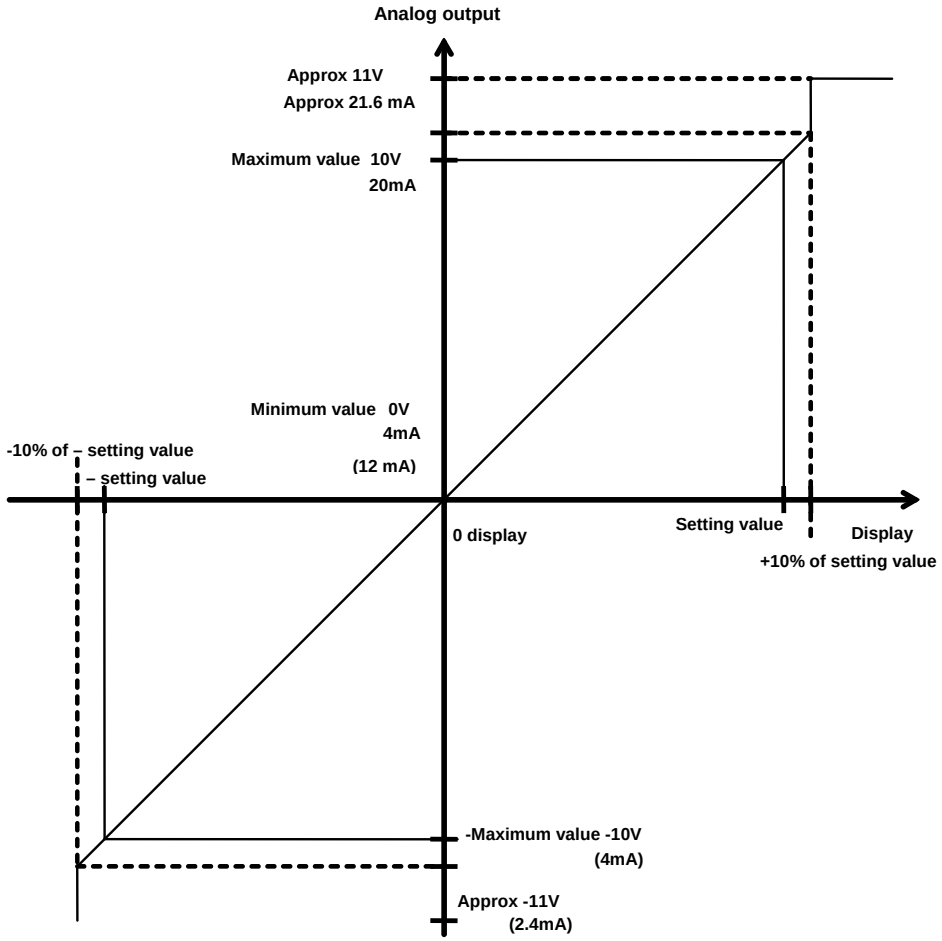
It is able to set the maximum value by change setting of F-21.



Do not exceed the maximum display value of function mode F-21 setting which set in 4-4-4.
If neglected, it is possibility of not scaling properly.

10-2. Scaling of analog output for rotation speed

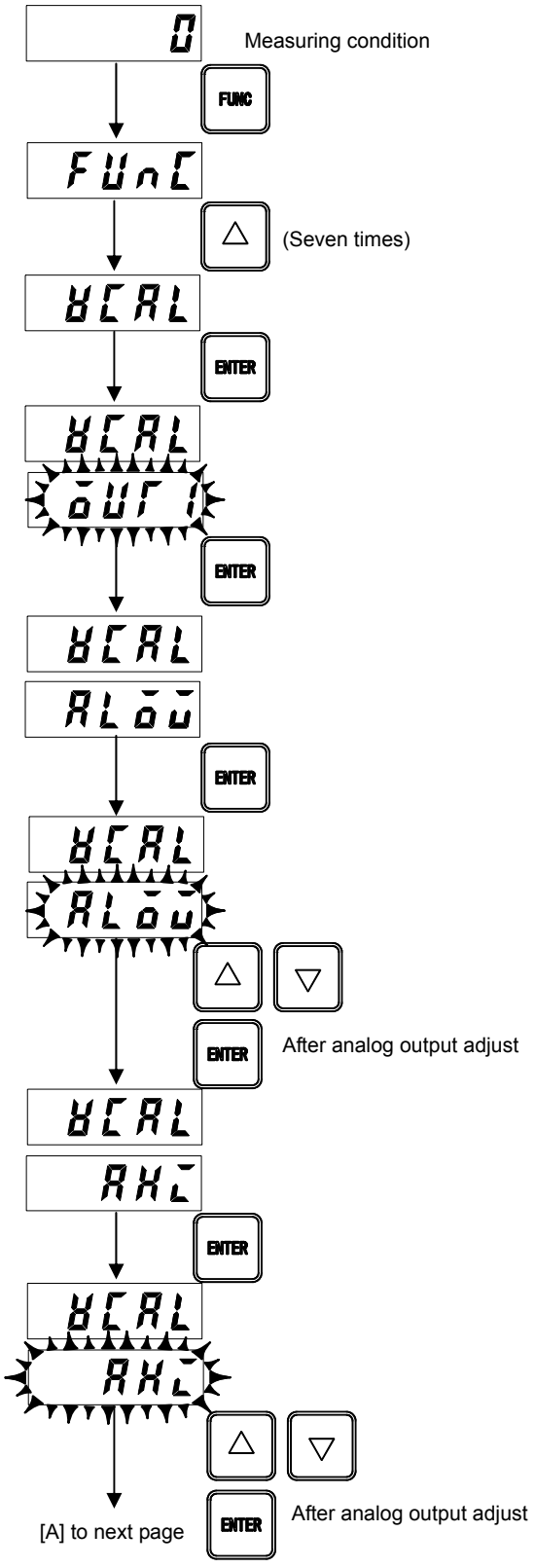
Analog output of rotation speed is set as torque value 0 ~ 25 000 of minimum value to maximum value.



10-3. Function of analog output electricity fine adjustment for torque (VCAL)

This is the function that adjusting analog output without put actual torque.

Changeover to the analog output electricity fine adjustment mode for torque from measuring mode by following operation.



Display FUnC on the upper at press FUNC key about two seconds from measuring condition.

Press ▲ key seven times to display VCAL on the upper.

Press ENTER key to display VCAL on the upper and oUT 1 on the lower displays are flickering.

Press ENTER key to display ALoU on the lower.

Press ENTER key again to display ALoU flickering and output analog output of zero point. Adjust the analog output while monitoring.

▲: Increase the analog output. Increase continuously if keep pressing the key.

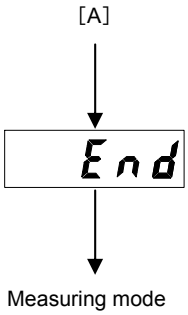
▼: Decrease the analog output. Decrease continuously if keep pressing the key.

FUNC: Interrupt the setting and return to measuring mode.

ENTER: Register the display value and go to the next step.

Press ENTER key after setting.

Press ENTER key to display AHC on the lower display and press same key again then AHC will be flickering and output the analog output of span point. Adjust the analog output while monitoring.



Press ENTER key to display End on the upper display.

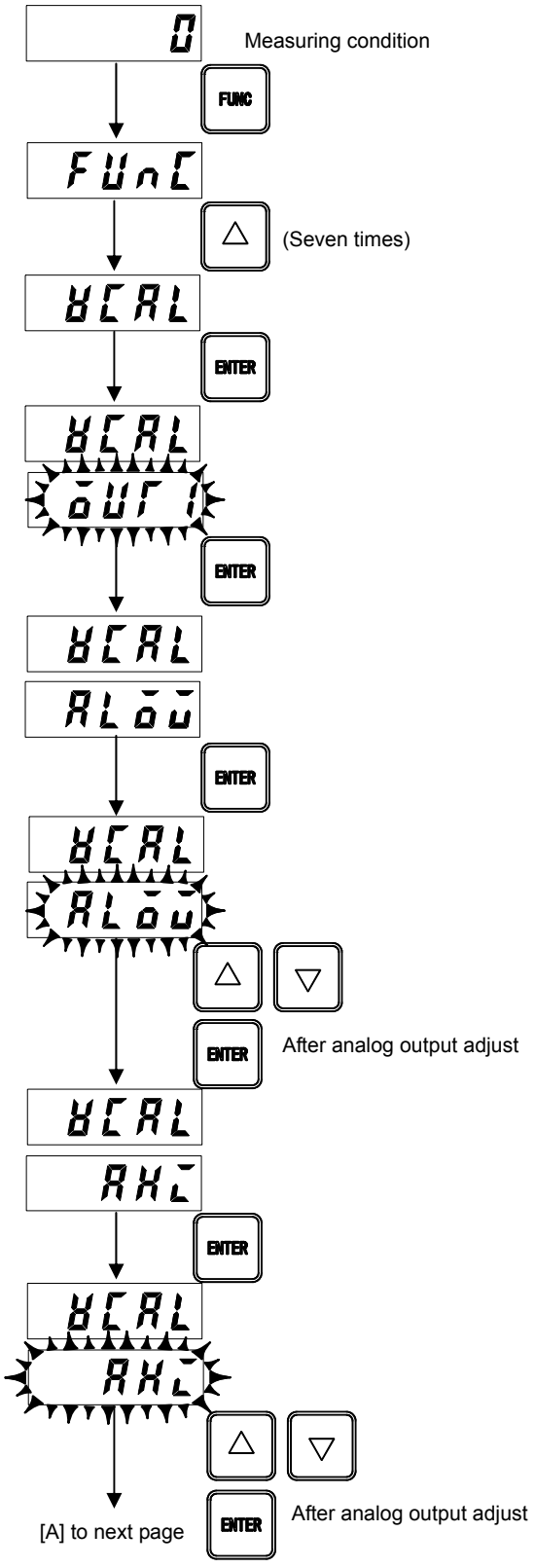
Press ENTER key to finish analog output electric fine adjustment mode for torque and return to measuring mode.

If you do not exceed the operation, analog output (minimum value and maximum value) is not set.

10-4. Function of analog output electricity fine adjustment for rotation speed (VCAL)

This is the function that adjusting analog output without put actual rotation speed.

Changeover to the analog output electricity fine adjustment mode for rotation speed from measuring mode by following operation.



Display FUnC on the upper at press FUNC key about two seconds from measuring condition.

Press ▲ key seven times to display VCAL on the upper.

Press ENTER key to display VCAL on the upper and ōUT 1 on the lower displays are flickering.

By pressing ▲ key and ▼ key while ōUT 1 blinks, the display becomes ōUT 1 and ōUT 2.

Please select ōUT 2 and press ENTER key.

Press ENTER key to display RLōU on the lower.

Press ENTER key again to display RLōU flickering and output analog output of zero point. Adjust the analog output while monitoring.

▲: Increase the analog output. Increase continuously if keep pressing the key.

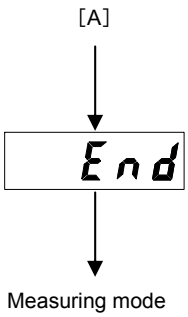
▼: Decrease the analog output. Decrease continuously if keep pressing the key.

FUNC: Interrupt the setting and return to measuring mode.

ENTER: Register the display value and go to the next step.

Press ENTER key after setting.

Press ENTER key to display AHŌ on the lower display and press same key again then AHŌ will be flickering and output the analog output of span point. Adjust the analog output while monitoring.



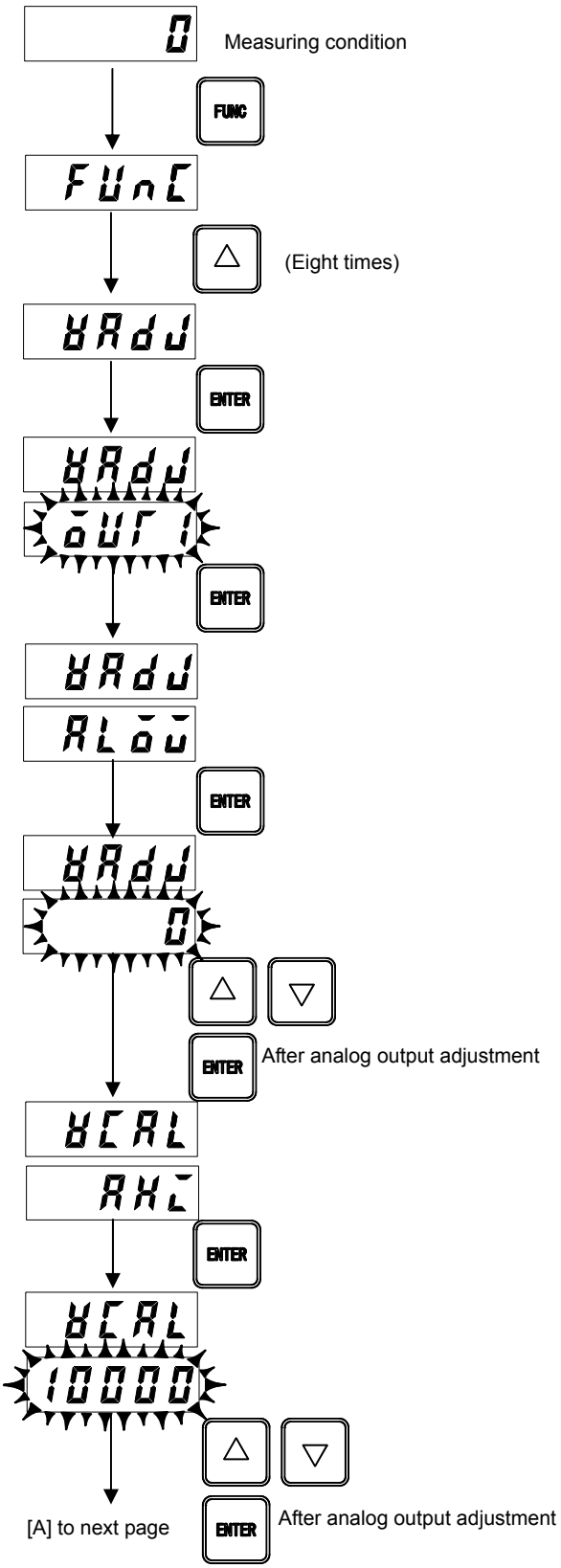
Press ENTER key to display End on the upper display.

Press ENTER key to finish analog output electric fine adjustment mode for rotation speed and return to measuring mode.

If you do not exceed the operation, analog output (minimum value and maximum value) is not set.

10-5. Function of analog output actual torque fine adjustment (VADJ)

This is the function which adjusting analog output by put the actual torque on torque transducer. Changeover to the analog output actual torque fine adjustment mode from measuring mode by following operation.



Display FUnC on the upper at press FUNC key about two seconds from measuring condition.

Press ▲ key eight times to display VRdJ on the upper.

Press ENTER key to VRdJ on the upper and oUT 1 on the lower displays are flickering.

Press ENTER key to display ALou on the lower.

Press ENTER key again to display flickering torque value which input currently. Set torque transducer condition into initial torque and adjust the analog output while monitoring.

▲: Increase the analog output. Increase continuously if keep pressing the key.

▼: Decrease the analog output. Decrease continuously if keep pressing the key.

FUNC: Interrupt the setting and return to measuring mode.

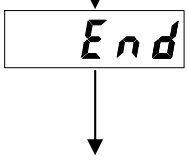
ENTER: Register the display value and go to the next step.

Press ENTER key after setting.

Press ENTER key to display AHC on the lower display.

Press ENTER key again to display flicking torque value which input currently. Adjust the analog output while monitoring.

[A]



Measuring mode

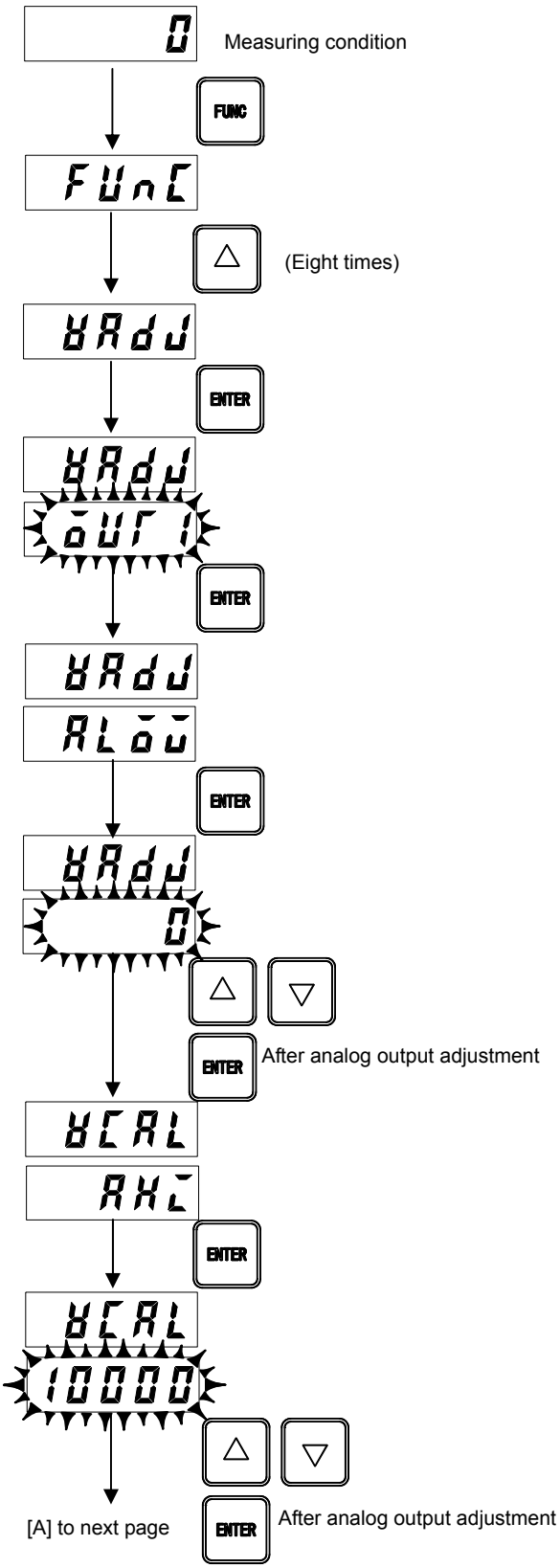
Press ENTER key to display End on the upper display.

Press ENTER key to finish analog output actual torque fine adjustment mode and return to measuring mode.

If you do not exceed the operation, analog output (minimum value and maximum value) is not set.

10-6. Function of analog output actual rotation speed fine adjustment (VADJ)

This is the function which adjusting analog output by put the actual rotation speed on torque transducer. Changeover to the analog output actual rotation speed fine adjustment mode from measuring mode by following operation.



Display FUnC on the upper at press FUNC key about two seconds from measuring condition.

Press ▲ key eight times to display VAdJ on the upper.

Press ENTER key to VAdJ on the upper and oUT 1 on the lower displays are flickering.

By pressing ▲ key and ▼ key while oUT 1 blinks, the display becomes oUT 1 and oUT 2.

Please select oUT 2 and press ENTER key.

Press ENTER key to display ALou on the lower.

Press ENTER key again to display flickering torque value which input currently. Set torque transducer condition into initial torque and adjust the analog output while monitoring.

▲: Increase the analog output. Increase continuously if keep pressing the key.

▼: Decrease the analog output. Decrease continuously if keep pressing the key.

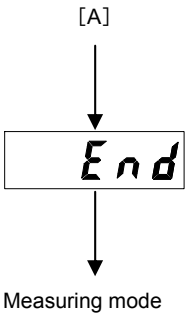
FUNC: Interrupt the setting and return to measuring mode.

ENTER: Register the display value and go to the next step.

Press ENTER key after setting.

Press ENTER key to display AHC on the lower display.

Press ENTER key again to display flicking torque value which input currently. Adjust the analog output while monitoring.



Press ENTER key to display End on the upper display.

Press ENTER key to finish analog output actual rotation speed fine adjustment mode and return to measuring mode.

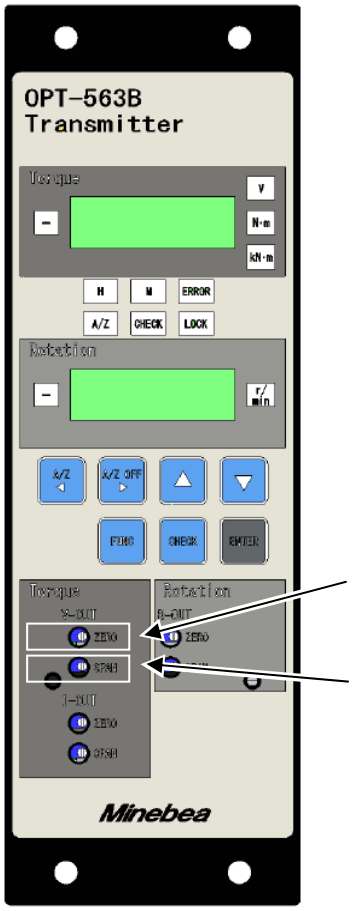
If you do not exceed the operation, analog output (minimum value and maximum value) is not set.

10-7. Voltage output for torque

10-7-1. Specifications of voltage output

Specifications	Contents
Output	DC -10 V ~ DC 10 V
Non-linearity	Within 0.01 %F.S.
Resolution	Approx. 1/12 000 or more
Over range	Approx. DC-11 V, at [-OL] display. Approx. DC11 V, at [-OL] display.
Output time	Approx. 10 000 times/s

10-7-2. Fine adjustment of voltage output



Trimmer for zero point adjustment

Trimmer for span point adjustment

The fine adjustment by front trimmer is possible.

Range of fine adjustment is:

ZERO : Approx. 2 % against the full scale.

SPAN : Approx. 7 % against the full scale.

10-7-3. Electrical requirement of voltage output

Load resistance Over 2 kΩ

Load capacity Less than 0.1 μF

10-8. Current output for torque

10-8-1. Current output specifications (model: OPT563B-T2, OPT563B-T3)

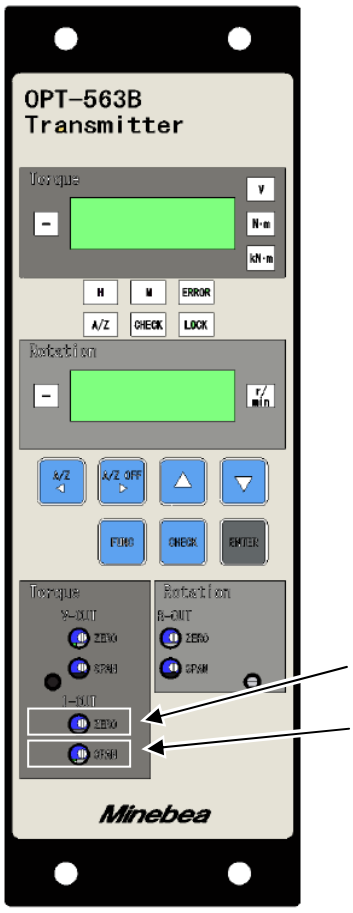
Specifications	Contents
Output	DC 4 mA ~ DC 20 mA
Non-linearity	Within 0.05 %R.O.
Resolution	Approx. 1/12 000 or more
Over range	Approx. DC 2.4 mA, at [-OL] display. Approx. DC 21.6 mA, at [OL] display.
Output time	Approx. 10 000 times/s

10-8-2. Setting of current output

Current output of this instrument is selectable from the following settings at the time of an order.

Model	At - rated torque	At zero torque	At + rated torque
OPT563B-T2	-	4 mA	20 mA
OPT563B-T3	4 mA	12 mA	20 mA

10-8-3. Fine adjustment of current output



Trimmer for zero point adjustment

Trimmer for span point adjustment

The fine adjustment by front trimmer is possible.

Range of fine adjustment is:

ZERO : Approx. 1.5 % against the full scale.

SPAN : Approx. 7 % against the full scale.

10-8-4. Electrical requirement of current output

Load resistance Less than 510 Ω

10-9. Frequency output for torque

This function outputs the torque signal (frequency) input in torque transducer after converting to 0 – 5 V of the logic wave.

10-9-1. Frequency output specifications (model:OPT563B-T4)

Specifications	Contents
Output range	5 kHz ~ 15 kHz
Output voltage	0 ~ 5 V
Non-linearity	Within 0.01 %R.O.
Resolution	Approx. 0.5 Hz or more
Over range	4 kHz, [-OL] displayed 16 kHz, [OL] displayed
Output time	Approx. 10 000 times/s

10-9-2. Adjustment of output frequency

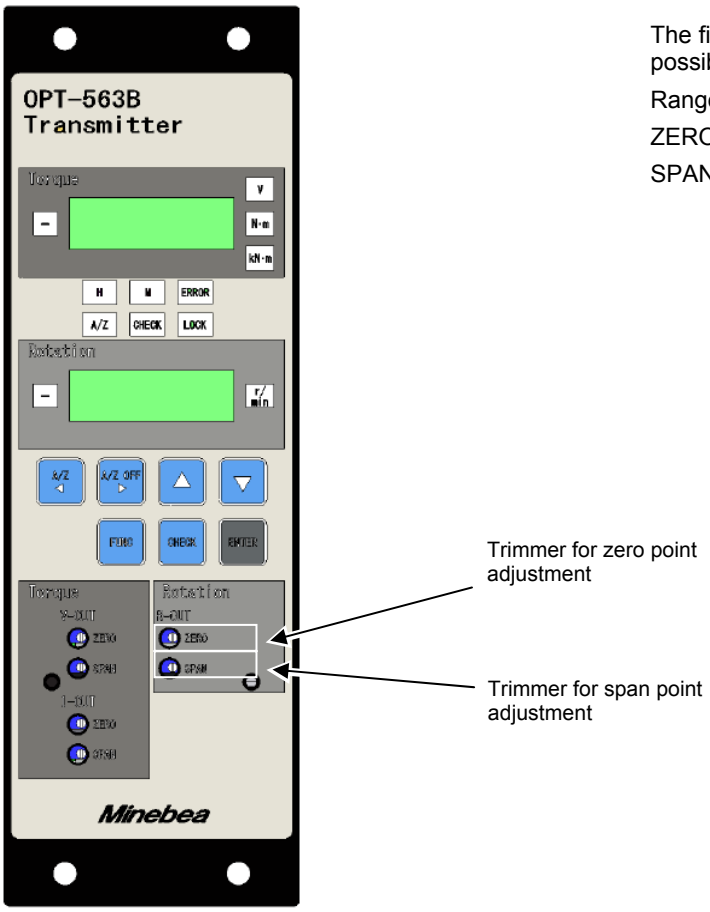
Frequency output has not function of adjusting zero and span point. Please adjust on your apparatus.

10-10. Voltage output for rotation speed

10-10-1. Voltage output specifications (model: OPT563B-R1)

Specifications	Contents
Output	DC -10 V ~ DC 10 V
Non-linearity	Within 0.05 %F.S.
Resolution	Approx. 1/12 000 or more
Over range	Approx. DC-11 V, at [-OS] display. Approx. DC11 V, at [OS] display.
Output time	Approx. 10 000 times/s

10-10-2. Fine adjustment of voltage output



The fine adjustment by front trimmer is possible.

Range of fine adjustment is:

ZERO : Approx. 4 % against the full scale.

SPAN : Approx. 8 % against the full scale.

10-10-3. Electrical requirement of voltage output

Load resistance Over 2 kΩ

Load capacity Less than 0.1 μF

10-11. Current output for rotation speed

10-11-1. Current output specifications (model: OPT563B-R2, OPT563B-R3)

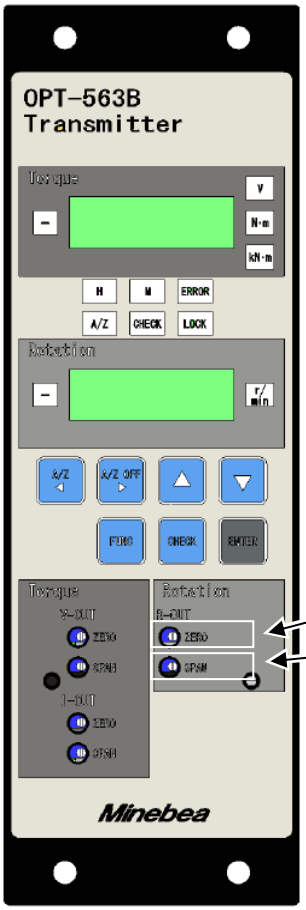
Specifications	Contents
Output	DC 4 mA ~ DC 20 mA
Non-linearity	Within 0.05 %R.O.
Resolution	Approx. 1/12 000 or more.
Over range	Approx. DC 2.4 mA, at [-OS] display. Approx. DC 21.6 mA, at [OS] display.
Output time	Approx. 10 000 times/s

10-11-2. Setting of current output

Current output of this instrument is selectable from the following settings at the time of an order.

Model	At - rated rotation speed	At rotation speed zero	At + rated rotation speed
OPT563B-R2	—	4 mA	20 mA
OPT563B-R3	4 mA	12 mA	20 mA

10-11-3. Fine adjustment of current output



The fine adjustment by front trimmer is possible.

Range of fine adjustment is:

ZERO : Approx. 4 % against the full scale.

SPAN : Approx. 10 % against the full scale.

Trimmer for zero point adjustment

Trimmer for span point adjustment

10-11-4. Electrical requirement of current output

Load resistance Less than 510 Ω

10-12. Frequency output for rotation speed

This option outputs the input signal from a rotation detector directly.

10-12-1. Frequency output specifications (model: OPT563B-R4)

Specifications	Contents
Output range	50 000 Hz (At 25 000 rpm)
Non-linearity	Within 0.01 %R.O.

10-12-2. Adjustment of output frequency

There is no adjusting function for zero and span in the frequency output.
Please adjust them with on your apparatus.

10-13. Connection of analog output for torque

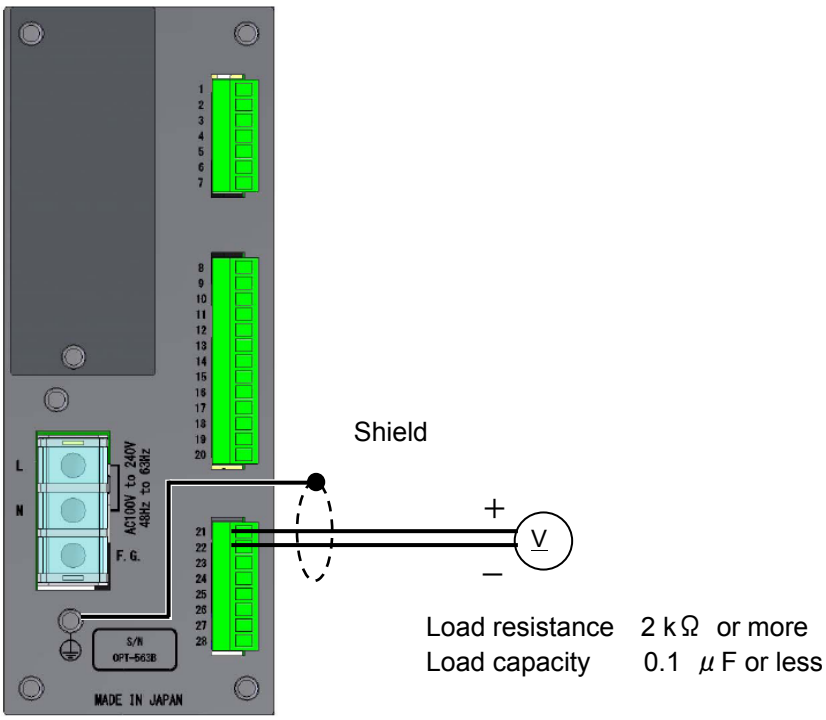
Explain the connecting method of each analog output.

The standard model has only the voltage output from T-A-OUT1.

Please specify when you buy this unit if the current output and the frequency output are required.

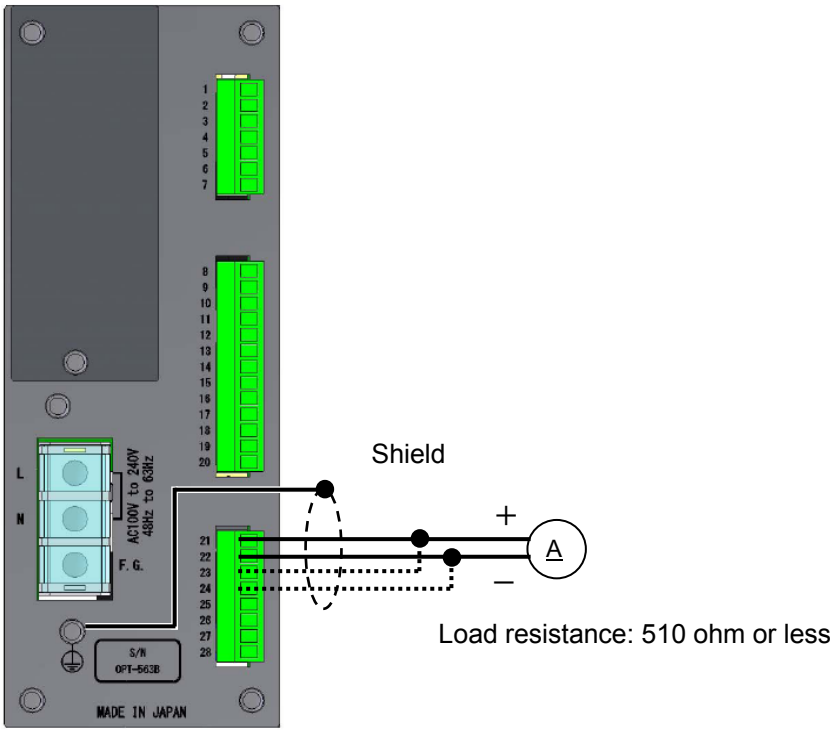
As for the connection of the analog output, use the shielded cable and connect the shield to the protective ground terminal.

10-13-1. Voltage output



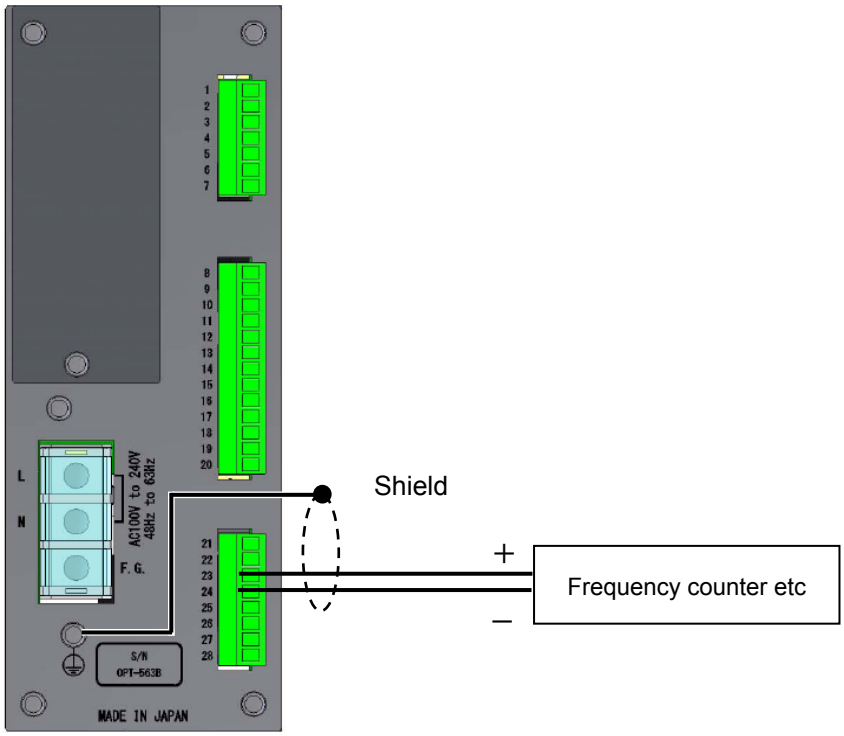
Load resistance 2 kΩ or more
Load capacity 0.1 μF or less

10-13-2. Current output



The connecting destination of the current output is different in each type. Refer to the table of 2-5.
The above connection is a case with OPT-563B-T24/-T34.

10-13-3. Output frequency

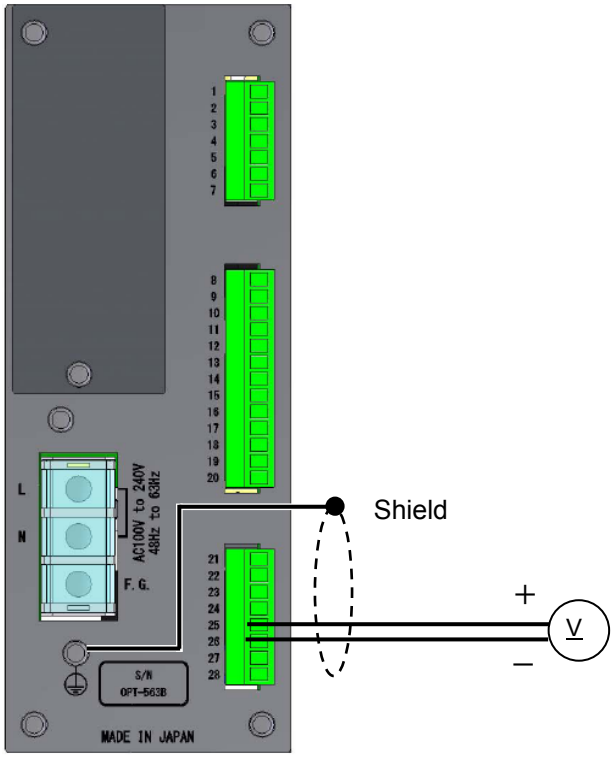


10-14. Connection of analog output for rotation speed

This is the explanation of the connecting method of each analog output.

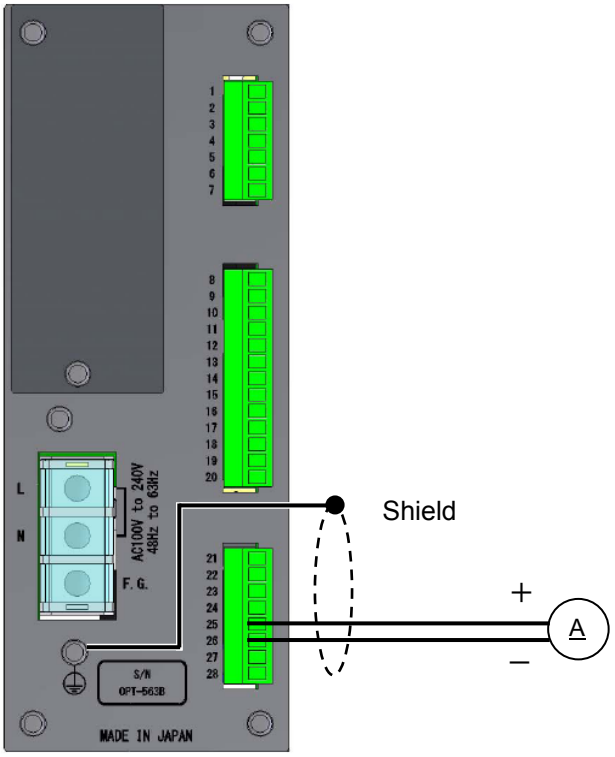
The standard model does not have the analog output for the rotational speed.
Please specify when you buy this unit if the analog output for rotational speed is required.

10-14-1. Voltage output



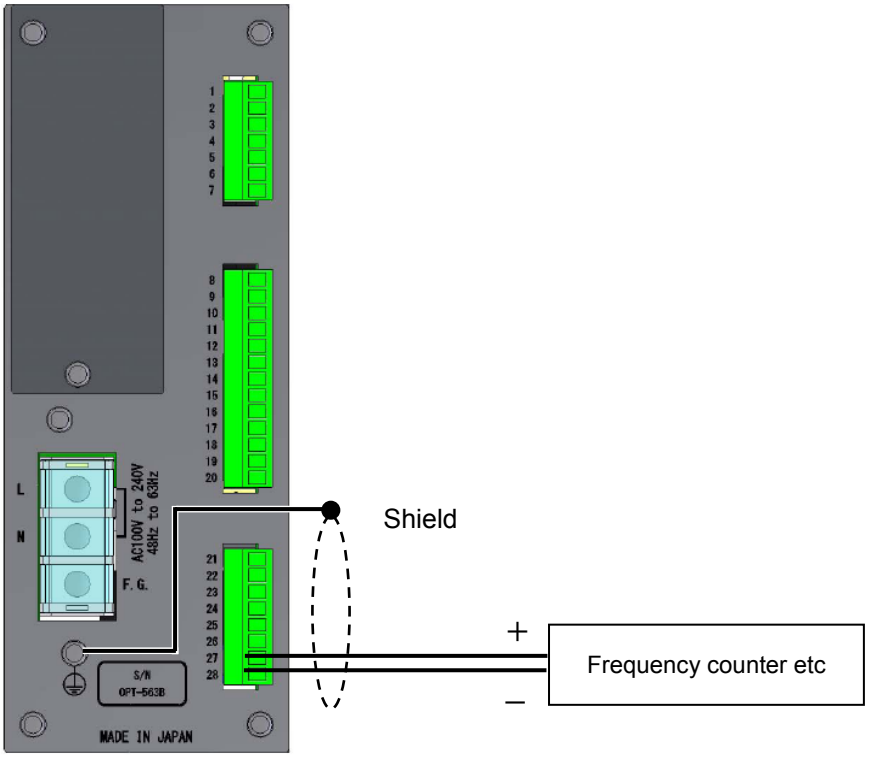
Load resistance 2 kΩ or more
Load capacity 0.1 μF or less

10-14-2. Current output



Load resistance 510 Ω or less

10-14-3. Output frequency



For the connection with the analog output, use the shielded cable and connect the shield with F.G. terminal.

11. Optional circuit board

11-1. RS-232C communication

11-1-1. RS-232C interface specifications (model: OPT563B-P74)

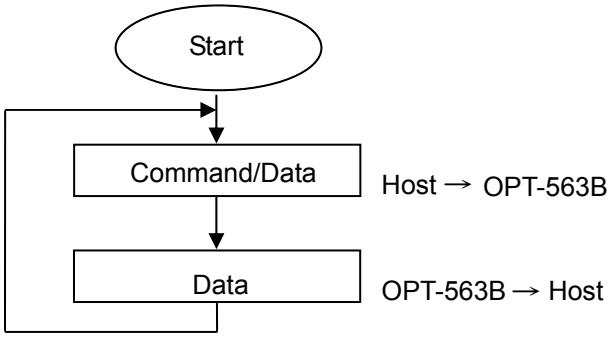
Specification	Contents
Communication method	Half duplex
Synchronous method	Start-stop synchronous method.
Baud rate	Selectable from 1 200 bps, 2 400 bps, 4 800 bps, 9 600 bps, 19 200 bps, 38 400 bps, 57 600 bps or 115 200 bps.
Data bit length	Selectable from 7 bit or 8 bit.
Parity bit	Selectable from No-parity, even parity or odd parity.
Stop bit	Selectable from 1 bit or 2 bit.
Terminator	Selectable from CR + LF or CR.
Transmission data	ASCII code
Cable length	Within 15 m.
Input/ output monitor	With LED (TXD and RXD)

11-1-2. RS-232C communication Setting

RS-232C communication setting is set by function.

11-1-3. Operation mode of RS-232C

(1) Command mode
By sending the fixed command/data with the Host (personal computer or PLC, etc.) to OPT-563B, the data corresponding to the command/data will be sent back to the Host side from the OPT-563B.
Please communicate according to the following procedure.



(2) Stream mode
It keeps outputting the latest data set with the target of output.
However, the output times changes depending on the setting of baud rate.

11-1-4. Item of RS-232C communication setting

(1) Operating mode (F-30)
Operating mode of RS-232C communication is selectable from [command mode] or [stream mode].
Default is set to [Command mode].

(2) Stream output target (F-31)
Output data of stream mode is selectable from [display of torque section], [A/D data] or [display of rotation speed section].
Default is set to [display of torque section].

(3) Baud rate (F-32)
The baud rate is selectable from [1 200 bps], [2 400 bps], [4 800 bps], [9 600 bps], [19 200 bps], [38 400 bps], [57 600 bps] or [115 200 bps].
Default is set to [9 600 bps].

(4) Data bit length (F-33)
The bit length of output data is selectable from [7 bit] or [8 bit].
Default is set to [7 bit].

(5) Parity (F-34)
The setting of parity bit is selectable from [No-parity], [even parity] or [odd parity].
Default is set to [odd parity].

(6) Stop bit (F-35)
The setting of stop bit is selectable from [1 bit] or [2 bit].
Default is set to [1 bit].

(7) Terminator (F-36)
The setting of terminator is selectable from [CR] or [CR+LF].
Default is set to [CR+LF].

(8) Decimal point addition (F-37)
The decimal point addition for the output data can be selected from [none] or [exist].
Default is set to [none].

- **As for the communication operation, it is used for the measuring mode only. The error command is sent in other modes.**
- **The flow control has not made in OPT-563B.**
- **The CTS/RTS signal is not used.**
- **X flow control will not be executed.**
- **The communication operation is an interactive mode.**
- **To reflect the change of the set value, turning on the power supply again is necessary.**

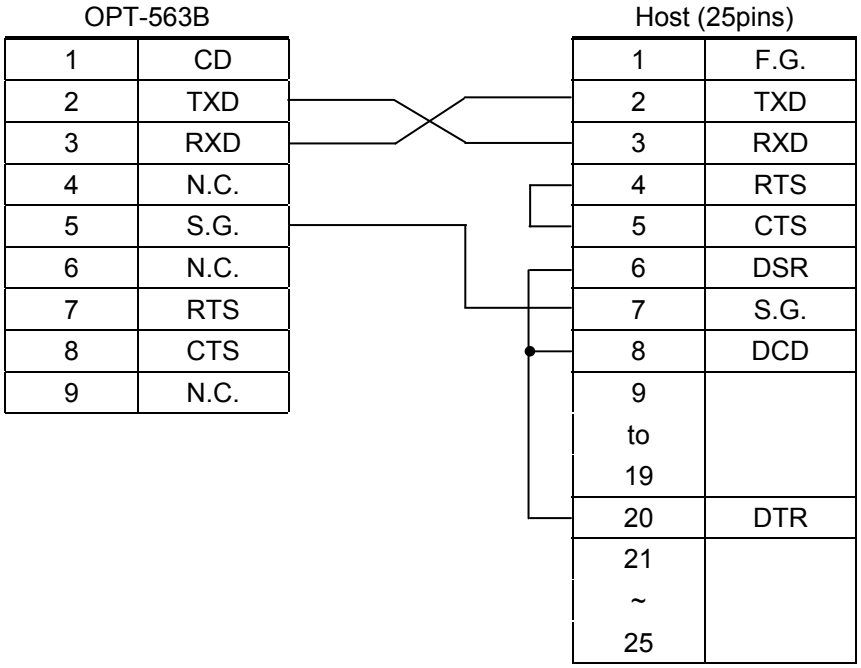
11-1-5. Pin configuration of RS-232C connector

Pin No.	Signal Name
1	CD
2	TXD
3	RXD
4	N.C.
5	S.G.
6	N.C.
7	RTS
8	CTS
9	N.C.

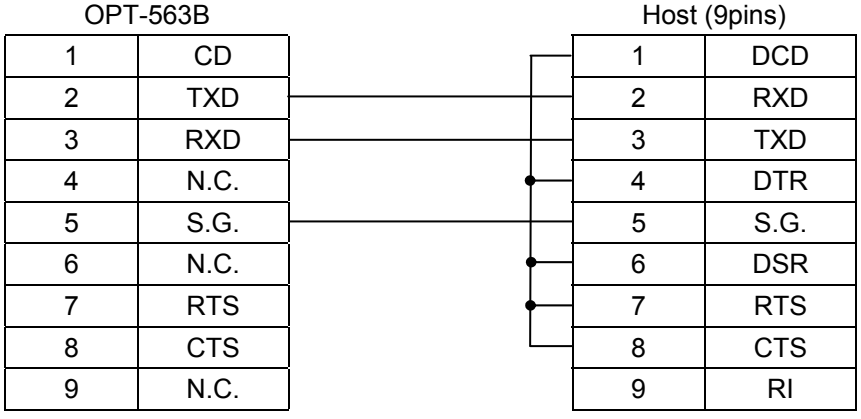
Suitable plug: DE-9S-NR by JAE. ※Not attached.

- **The screws for the fixing base of plug at the connector of RS-232C interface is inch type thread.**
- **Do not connect with the N.C. pin.**
- **The internal circuit and photo-oupler are insulated.**

(1) Wiring of RS-232C No.1



(2) Wiring of RS-232C No.2



11-2. RS-422/485 communication

11-2-1. RS-422/485 interface specifications (model: OPT563B-P76)

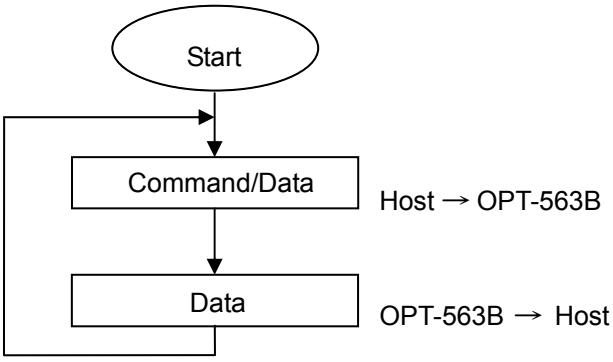
Specification	Contents
Communication method	Half duplex
Synchronous method	Start-stop synchronous method
Baud rate	Selectable from 1 200 bps, 2 400 bps, 4 800 bps, 9 600 bps, 19 200 bps, 38 400 bps, 57 600 bps or 115 200 bps.
Data bit length	Selectable from 7 bit or 8 bit
Parity bit	Selectable from No-parity, even parity or odd parity.
Stop bit	Selectable from 1 bit or 2 bit
Terminator	Selectable from CR＋LF or CR
Transmission data	ASCII code
Cable length	Approx. 1 km
Address	Select one from 0 to 31
No. of connectable unit	32 units at maximum (RS-422 : 10 units)
Termination resistance	Built-in (Yes/No can be selectable by the connection of terminal boards.)
Input/Output monitor	With LED
Changeover RS-422/485	Select in changeover setting of RS-422/485.

11-2-2. Changeover of RS-422/485 communication setting display

RS-422/485 communication setting is set by function.

11-2-3. Operation of RS-422/485

(1) Command mode
By sending the fixed command/data with the Host (personal computer, PLC, etc.) to OPT-563B, the data corresponding to the command/data will be sent back to the Host side from the OPT-563B. Please communicate according to the following procedure.



11-2-4. Item of RS-422/485 communication setting

(1) Baud rate (F-32)
The baud rate is selectable from [1 200 bps], [2 400 bps], [4 800 bps], [9 600 bps], [19 200 bps], [38 400 bps], [57 600 bps] or [115 200 bps].
Default is set to [9 600 bps].

(2) Data bit length (F-33)
The bit length of output data is selectable from [7 bit] or [8 bit].
Default is set to [7 bit].

(3) Parity (F-34)
The setting of parity bit is selectable from [No-parity], [even parity] or [odd parity].
Default is set to [odd parity].

(4) Stop bit (F-35)
The setting of stop bit is selectable from [1 bit] or [2 bit].
Default is set to [1 bit].

(5) Terminator (F-36)
The setting of terminator is selectable from [CR] or [CR+LF].
Default is set to [CR+LF].

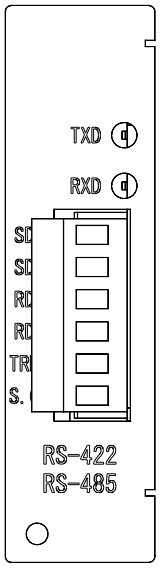
(6) Decimal point addition (F-37)
The decimal point addition for the output data can be selected from [none] or [exist].
Default is set to [none].

(7) Address (F-38)
Set the address to make communication.
Set the range [0] to [31] by increment of [1].
Default is set to [0].

(8) Changeover of the RS-422/485(F-39)
The communication method can be selected from [RS-422] or [RS-485].
Default is set to [RS-422].

(9) RS-485 data delay time (F-40)
The data delay time while communicating with RS-485 should be set.
After sending is over from the host side, and the sending terminal becomes low impedance at the host side, you can delay the return data at the side of OPT-563B.
The setting range is from, [000] to [999] with input in every [10ms].
Default is set to [001].

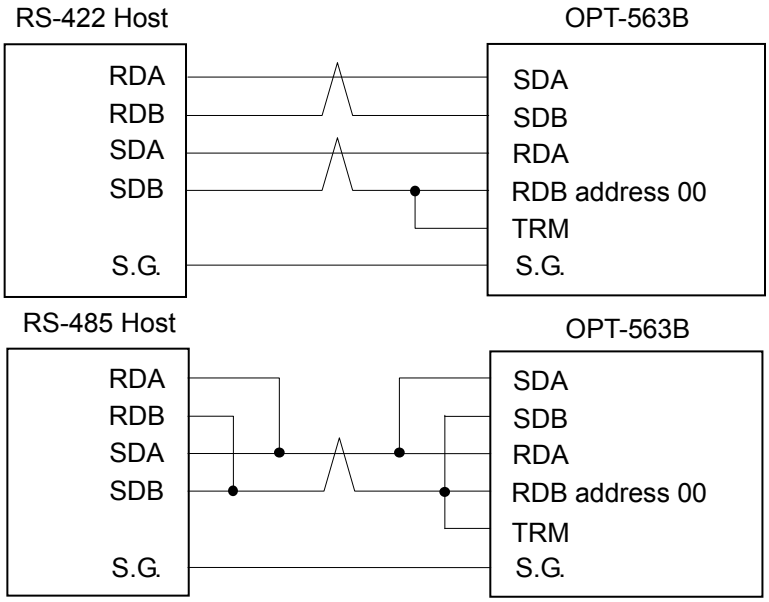
11-2-5. Pin configuration of RS-422/485 terminals



SDA	Difference output(+)
SDB	Difference output(-)
RDA	Difference input(+)
RDB	Difference input(-)
TRM	Termination resistance
S.G.	Signal ground

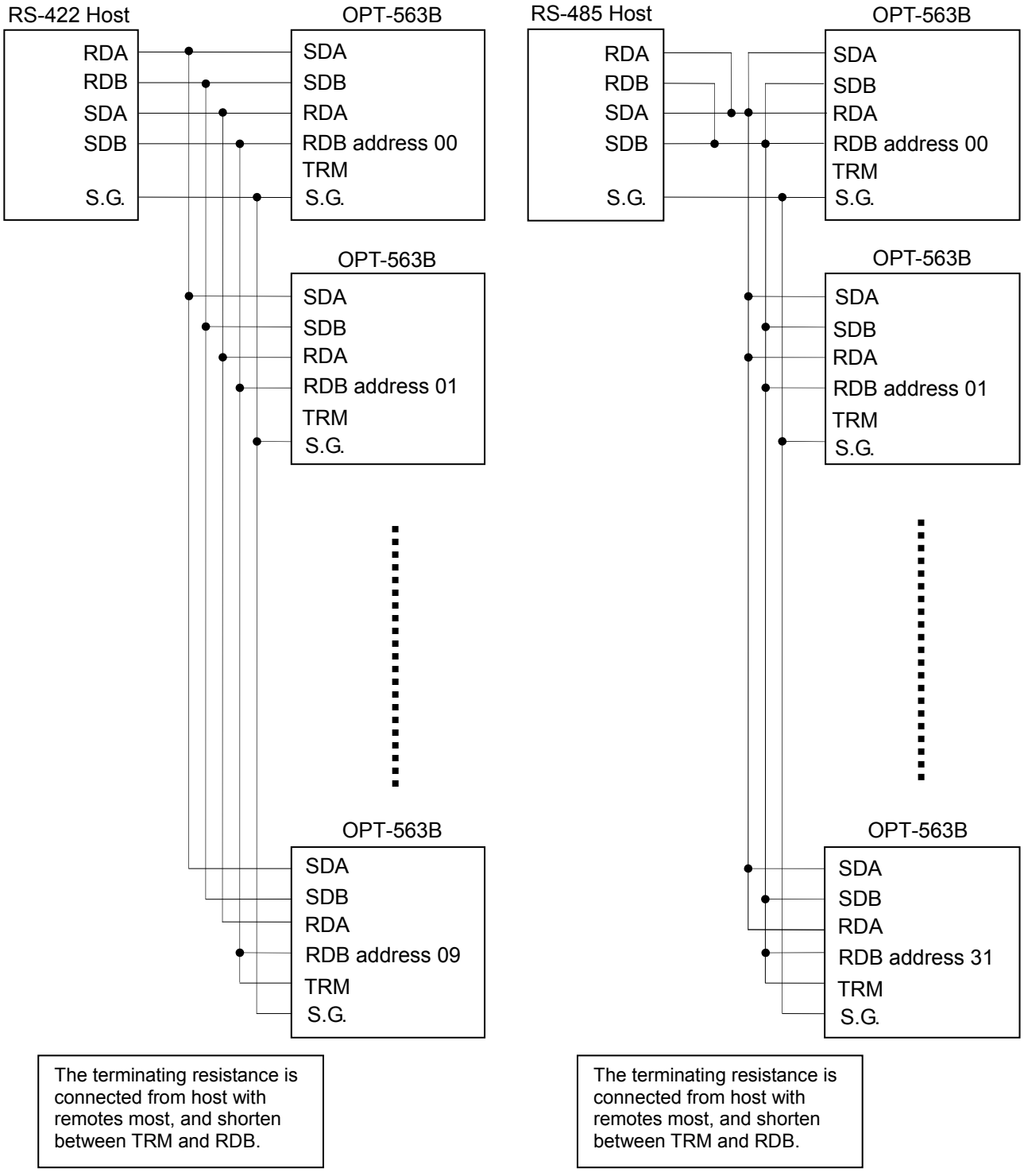
- **Looking from the host side (personal computer and PLC, etc.), make short between the TRM terminal and RDB terminal located at the furthest place from the host. And connect the build-in terminal resistance.**
- **The twisted pair wires are recommended for the connection.**
- **The internal circuit and the photo-coupler are insulated.**

(1) Wiring of 1 to 1



- **As for the communication operation, it is used for the measuring mode only. The error command is sent in other modes.**
- **The flow control has not made in OPT-563B.**
- **The CTS/RTS signal is not used.**
- **X flow control will not be executed.**

(2) Wiring of 1 to n



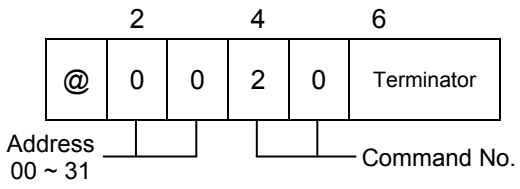
- **The polarity of the signal of the host computer may have an opposite case depending on the instrument.**
- **Depending on the instrument at the side of host, there may have the case of no S.G. terminal.**

11-3. RS-232C/422/485 communication data format

11-3-1. Data format of command mode

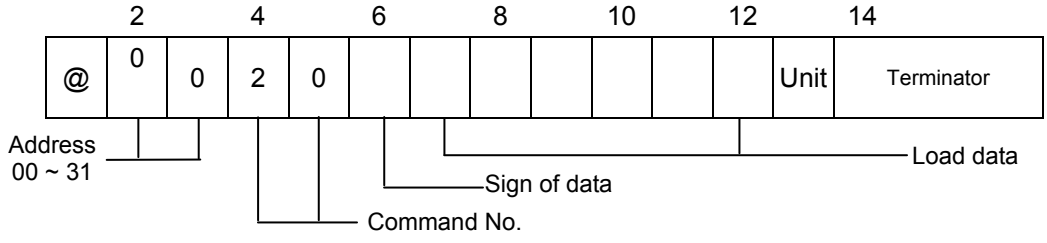
- **The address will be [00] as fixed for the application of RS-232C interface.**
- **The load data shall be entered right-aliened.**
- **The sign enters + for positive and - sign for negative.**
- **The load data makes the zero suppression.**
- **Displays [OL] in the case of torque value overload. Displays [OS] in the case of rotation speed value overload.**
- **The blank parts are all spaces.**
- **When the addition of decimal point is set as [Yes] and the decimal point is specified on the calibration screen, the decimal point is added to the specified position.**
- **Value of unit section is set by function no. F-02. [0] → N･m, [1] → kN･m, [2] → V.**
- **Unit of the command 21 is fixed to [0]. Unit of the command 22 is fixed to [space].**

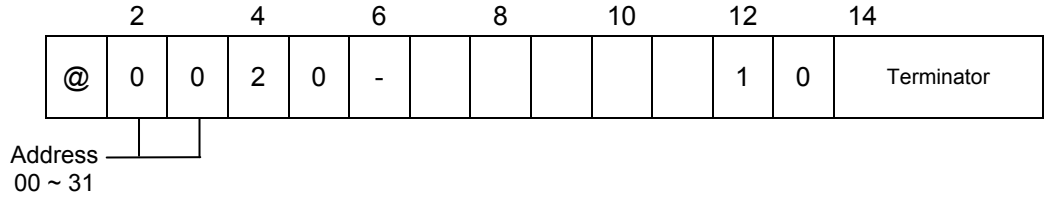
(1) Reads out the load data (Host → OPT-563B)
At command number 20,21,22

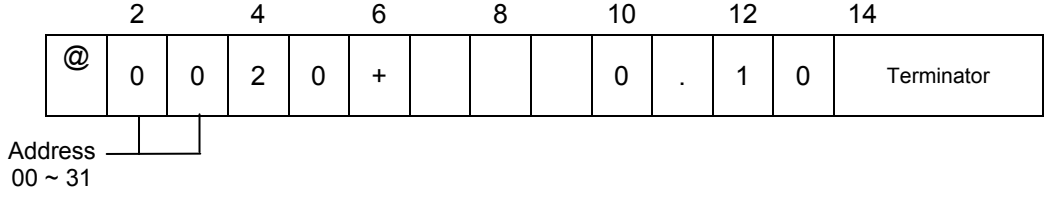


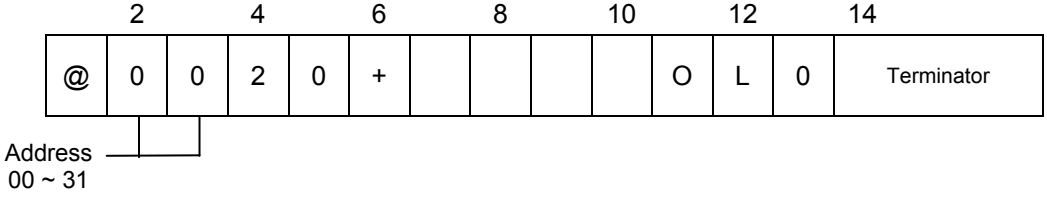
Command No.	Operation
20	Reads out the torque value
21	Reads out the roration speed value
22	Reads out A/D data
23	Reads out frequency data

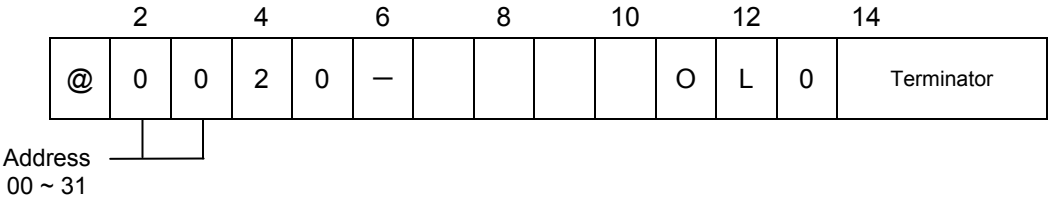
Return (OPT-563B → Host)



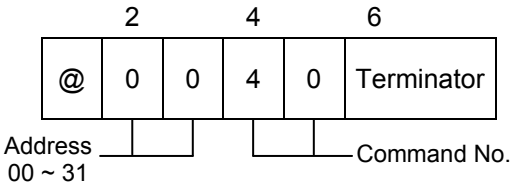




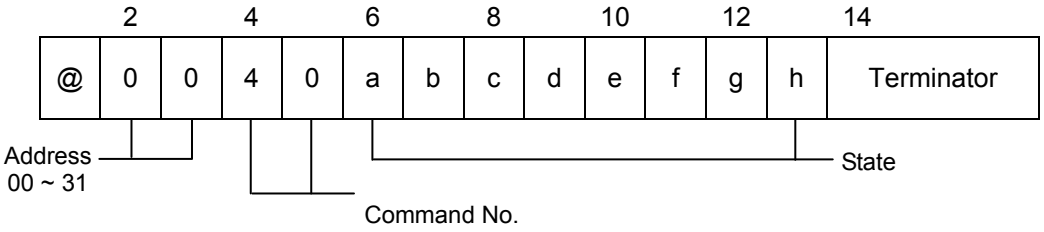




(2) Condition reading 1(Host → OPT-563B)

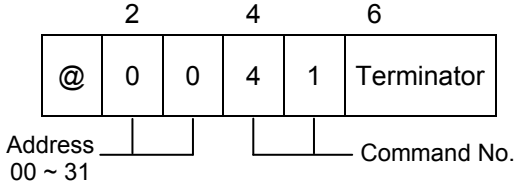


Return (OPT-563B → Host)

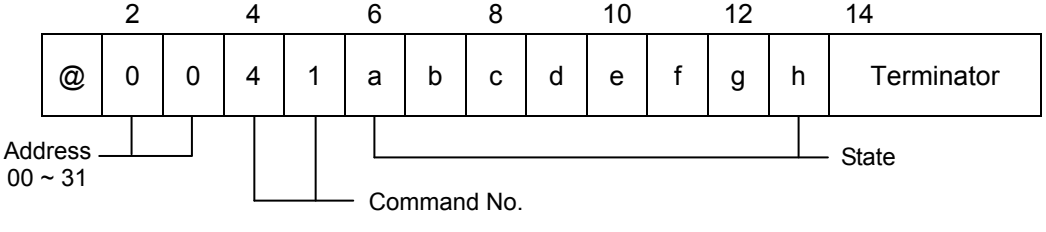


a: Display of torque value +OL
b: Display of torque value -OL
c: Display of rotation speed value +OS
d: Display of rotation speed value -OS
e: A/Z error
f: Display value error
g: 0 (fixed value)
h: 0 (fixed value)
[1]=ON, [0]=OFF

(3) Condition reading 2 (Host → OPT-563B)

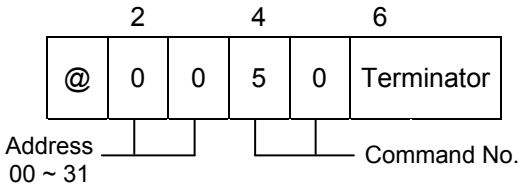


Return (OPT-563B → Host)



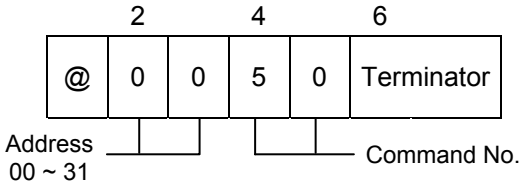
a: A/Z
b: CHECK
c: LOCK
d: ERROR
e: 0 (fixed value)
f: 0 (fixed value)
g: 0 (fixed value)
h: 0 (fixed value)
[1]=ON, [0]=OFF

(4) Change of condition (Host → OPT-563B)

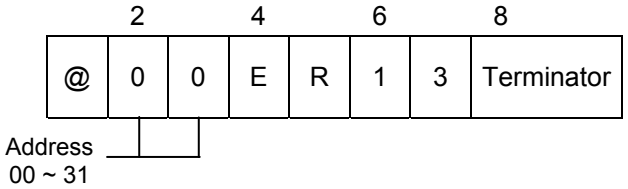


Command No.	Operation
50	Execute A/Z
51	Execute A/ZOFF
52	Execute CHECK
53	Transition to measuring mode

Returns in normal operation (OPT-563B → Host)

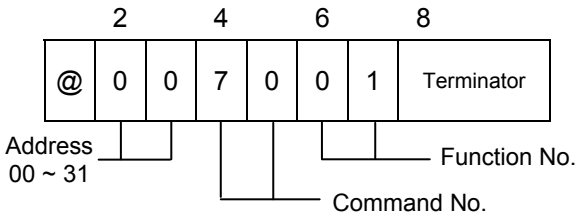


Returns in abnormal operation (OPT-563B → host)

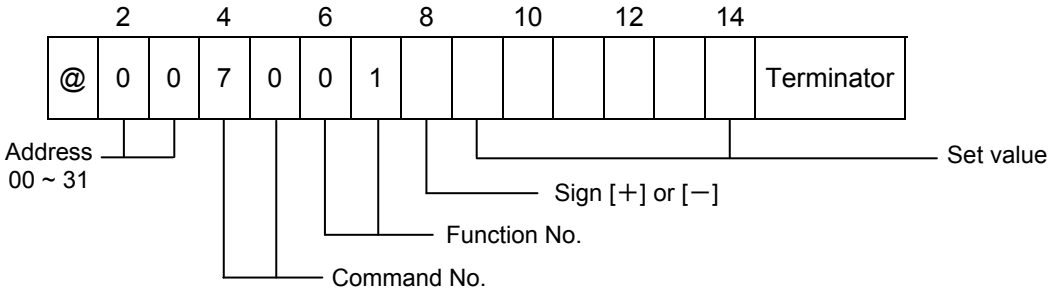


- **The condition of the error transmission shall be as follows:**
- **When you couldn't execute A/Z because the condition is outside an effective range of A/Z in executing A/Z by command No.50.**

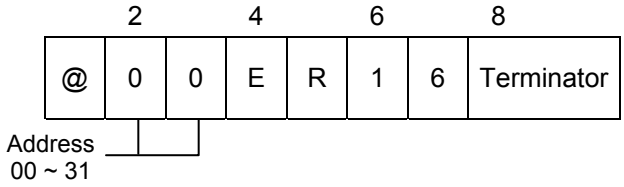
(5) Reads out the function content (Host → OPT-563B)



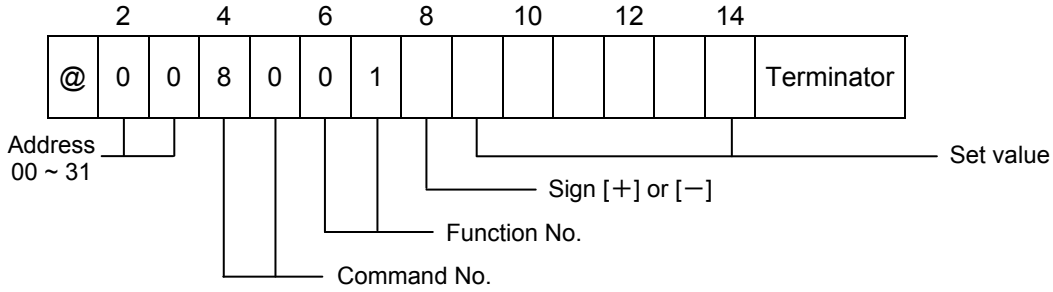
Return when normal operation (OPT-563B → Host)



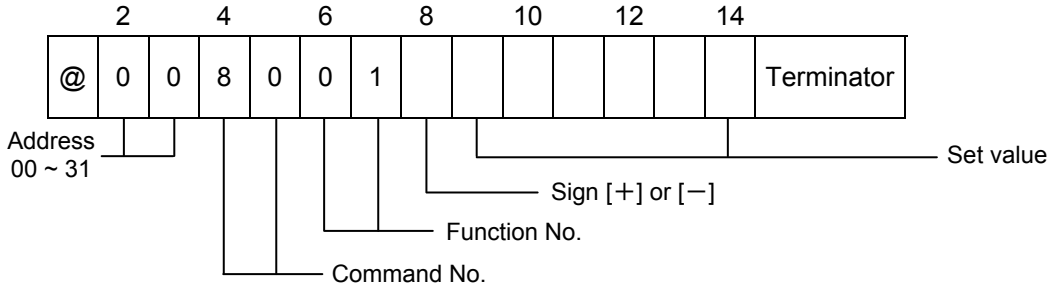
Return in abnormal conditions（In case of corresponding number is not exist）(OPT-563B → Host)



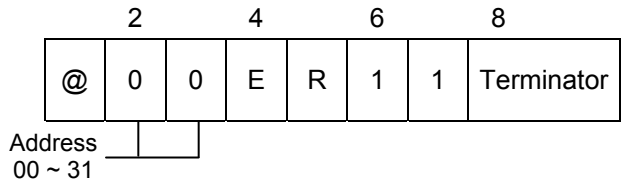
(6) Writing set value (Host → OPT-563B)



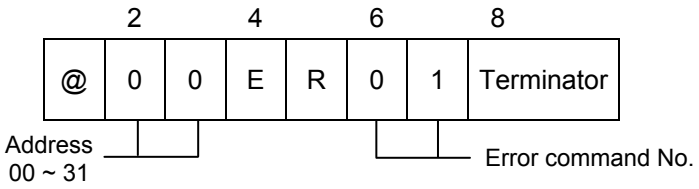
Return when normal operation (OPT-563B → Host)



Return in abnormal conditions (In case of set value range is different) (OPT-563B → Host)



(7) Error command



Command number	Name	Content
10	Execute error	Error when receive impracticable command at current condition.
11	Set error	Abnormal set value.
12	Command No. error	Process when there is no appropriate command number.
13	A/Z error	Error when A/Z is executed.
14	Header error	Error when command heeder is not [@].
15	Reads out the data error	Error when read out the data which cannot set the size to the transmit parameter.
16	No appropriate function	Process when there is no appropriate function number.

- **The error command will not be returned when the address and the end code (terminator) cannot be detected.**
- **Consider some measure on the host side when the communication error command is returned from the main instrument.**

- **Set the set values right-aligned.**

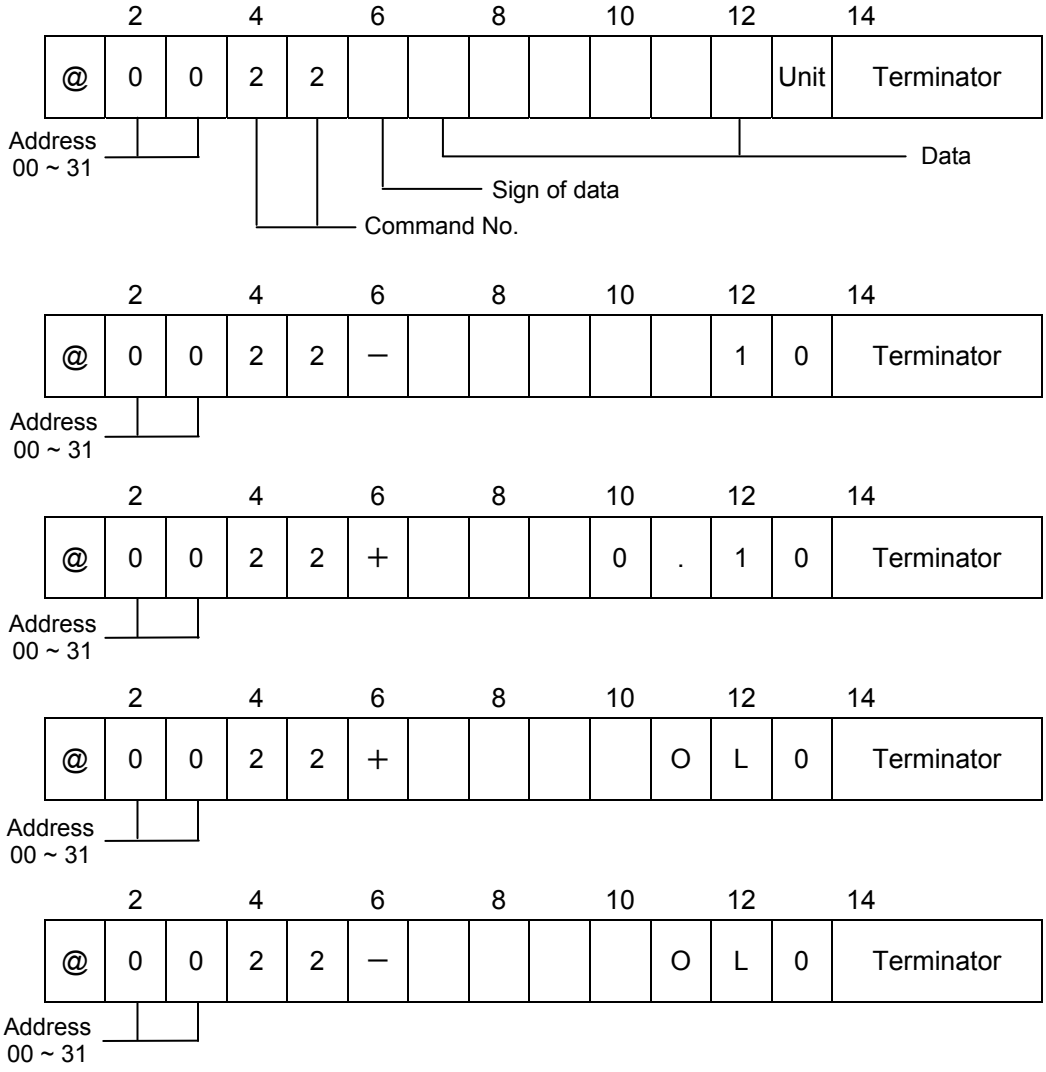
- **The condition of sending Error will become as follows:**

(1) When there is a disagreement in the value of scale interval.
(2) When setting is made on the sign section other than +/- .

11-3-2. Stream mode

- **The load data enters in right-aligned.**
- **[+] enters to positive number and [-] enters to negative number.**
- **The load data is applied zero suppression.**
- **When the addition of decimal point is set and the decimal point is specified on the Calibration screen, the decimal point will be added to the specified position.**
- **In the case of torque value overload, displays [OL]. In the case of rotation speed value overload, displays [OS]**
- **The blank parts are all spaces.**
- **Value of unit section is set by function no. F-02. [0] → N･m, [1] → kN･m, [2] → V.**
- **Unit part of rotation speed display is fixed to [0]. Unit part of the input torque value AD data is fixed to [space].**

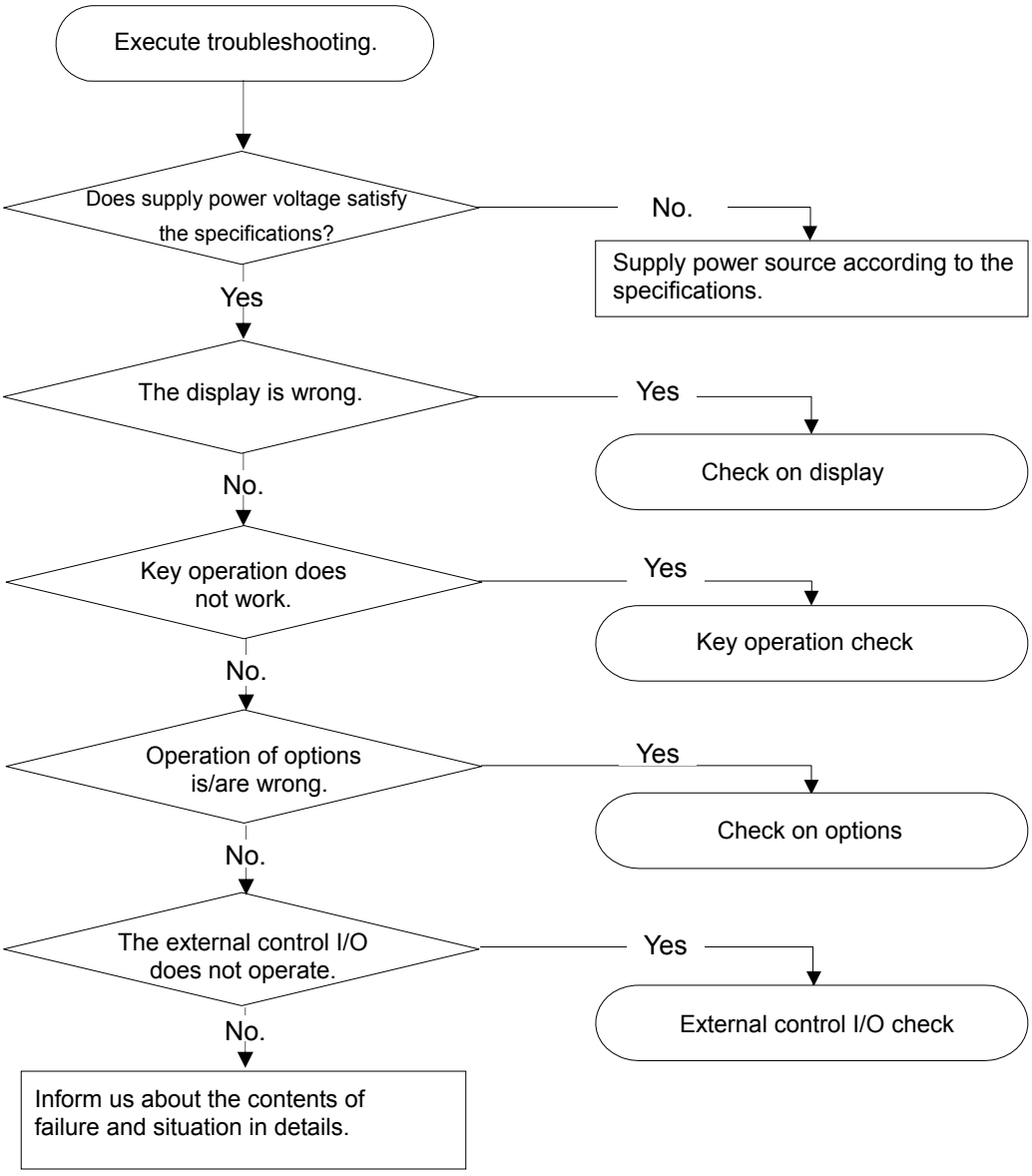
Return (OPT-563B → Host)

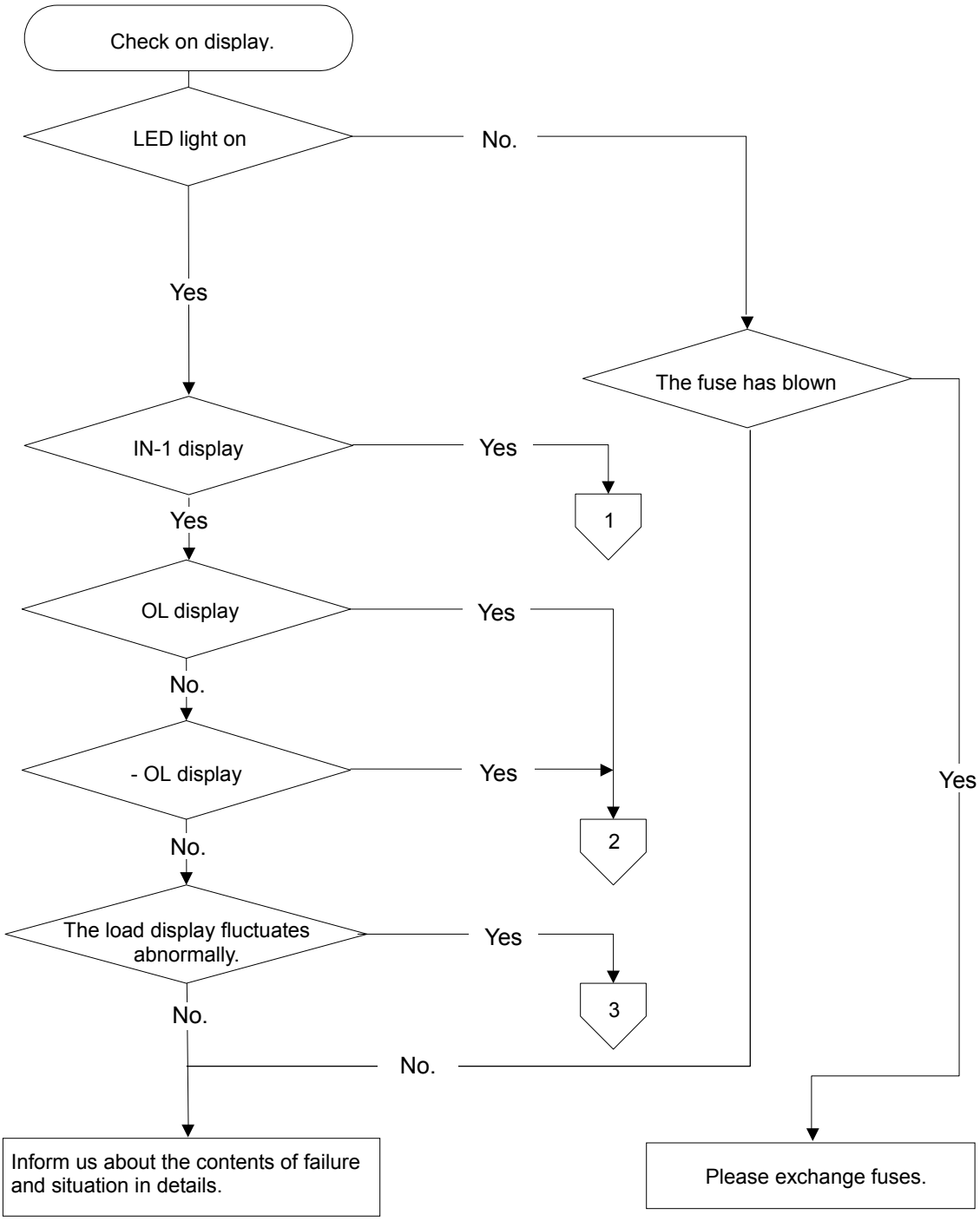


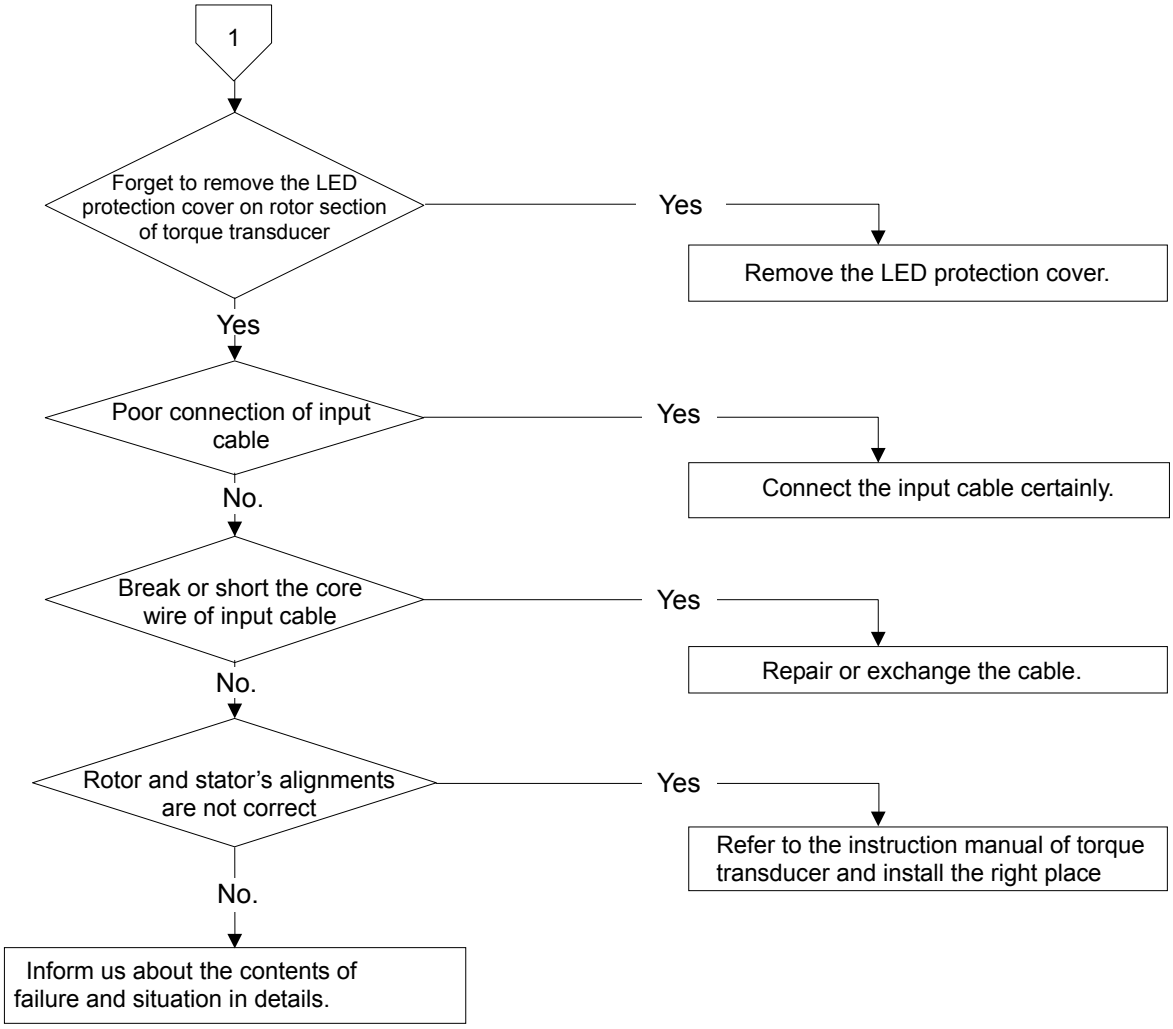
12. Troubleshooting

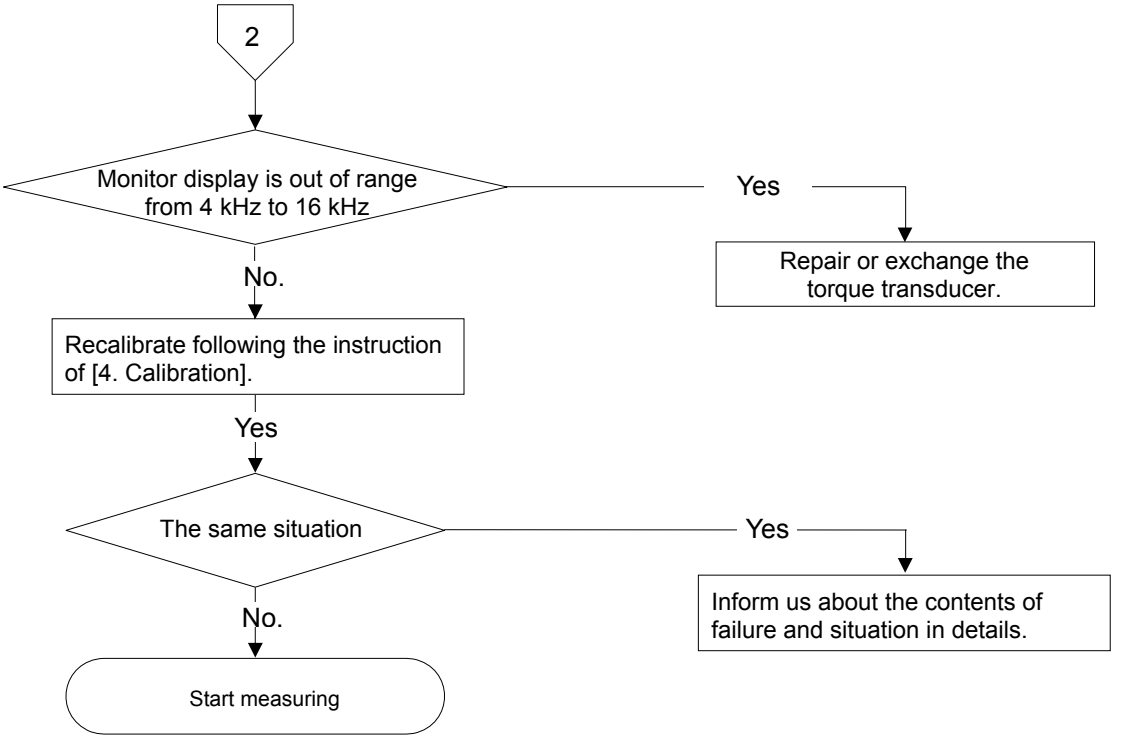
When abnormal point(s) is/are found during the operation of the instrument, check by the following procedures. Moreover, when you cannot find applicable item or solve the symptom of trouble even after you have taken some measures, contact with us.

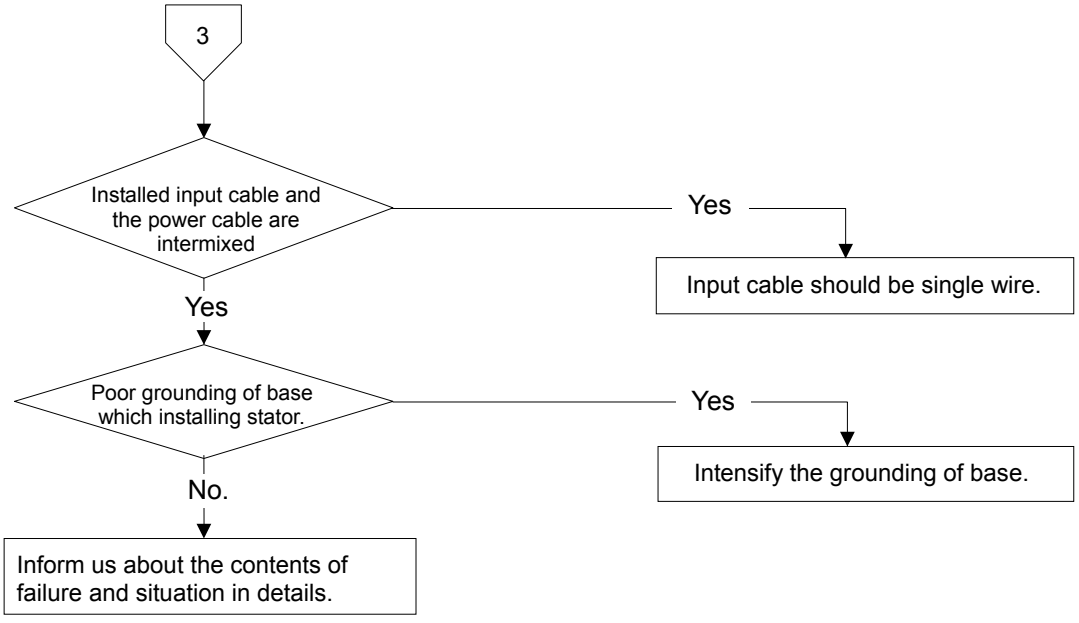
12-1. Execute troubleshooting

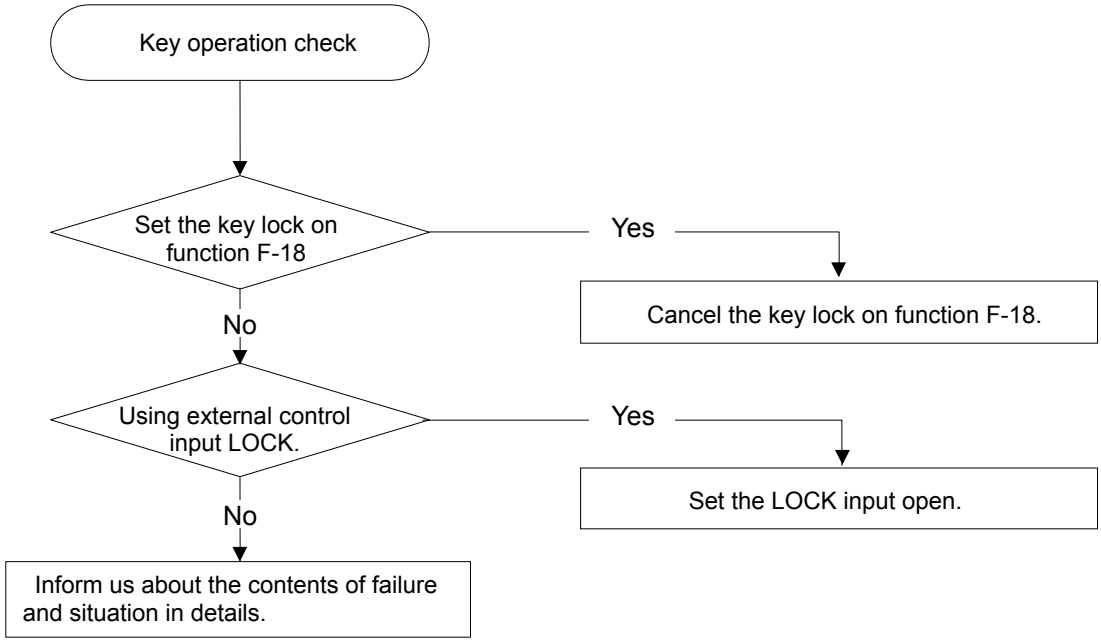


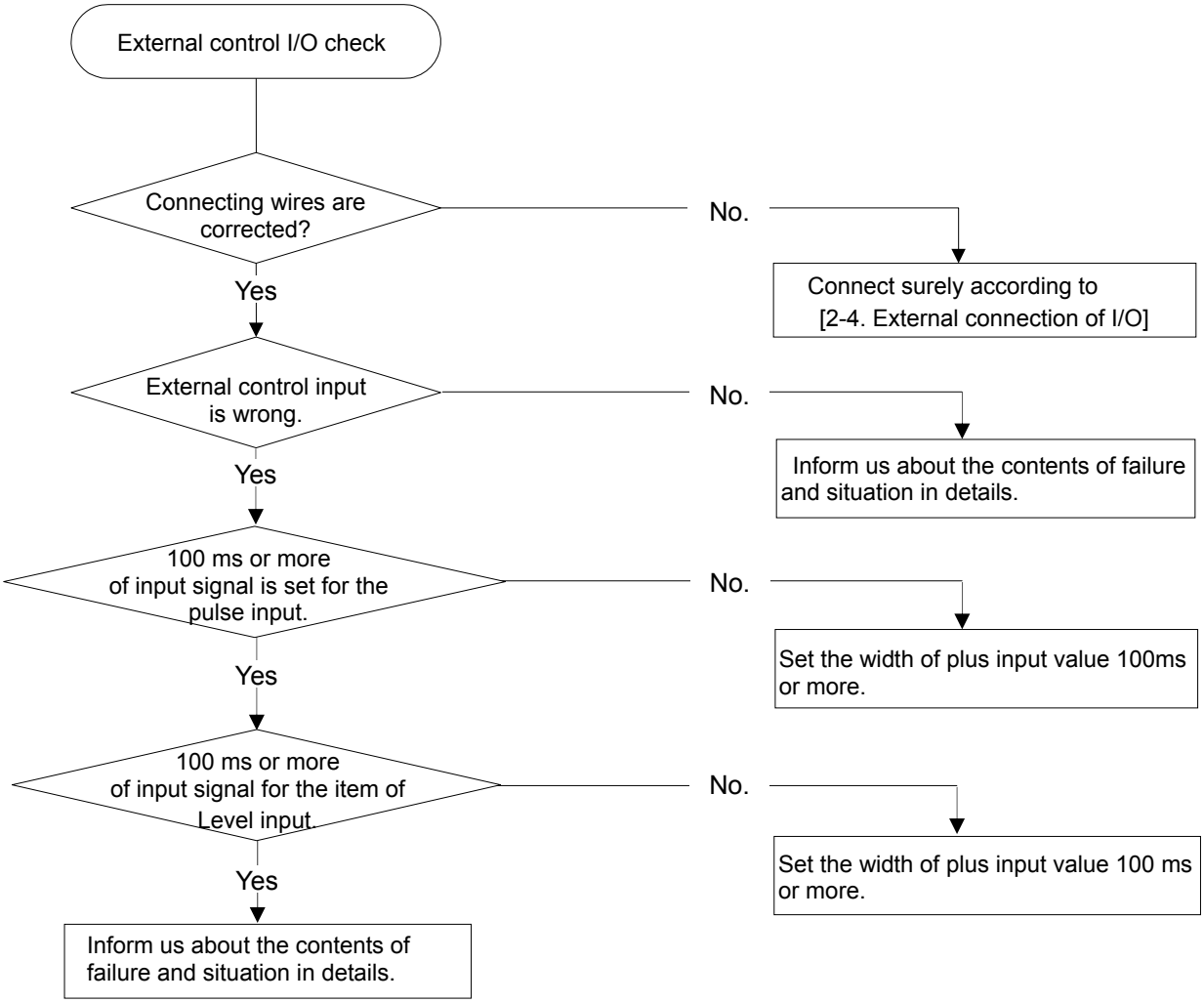

Check on display.
LED light on
No.
Yes
The fuse has blown
IN-1 display
Yes
1
Yes
OL display
Yes
No.
- OL display
Yes
2
No.
The load display fluctuates abnormally.
Yes
3
No.
No.
Yes
Inform us about the contents of failure and situation in details.
Please exchange fuses.

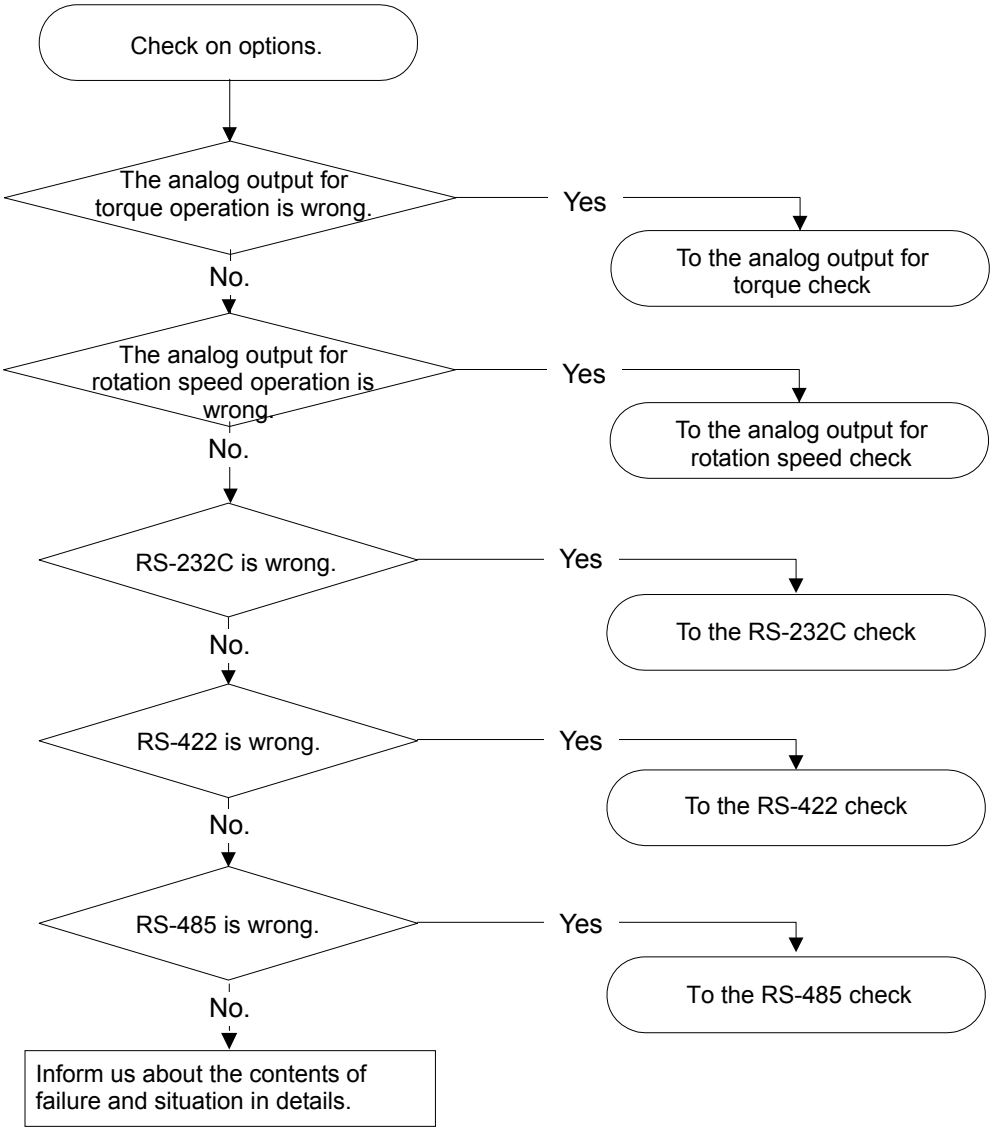

1
Forget to remove the LED protection cover on rotor section of torque transducer
Yes
Remove the LED protection cover.
Yes
Poor connection of input cable
Yes
Connect the input cable certainly.
No.
Break or short the core wire of input cable
Yes
Repair or exchange the cable.
No.
Rotor and stator's alignments are not correct
Yes
Refer to the instruction manual of torque transducer and install the right place
No.
Inform us about the contents of failure and situation in details.

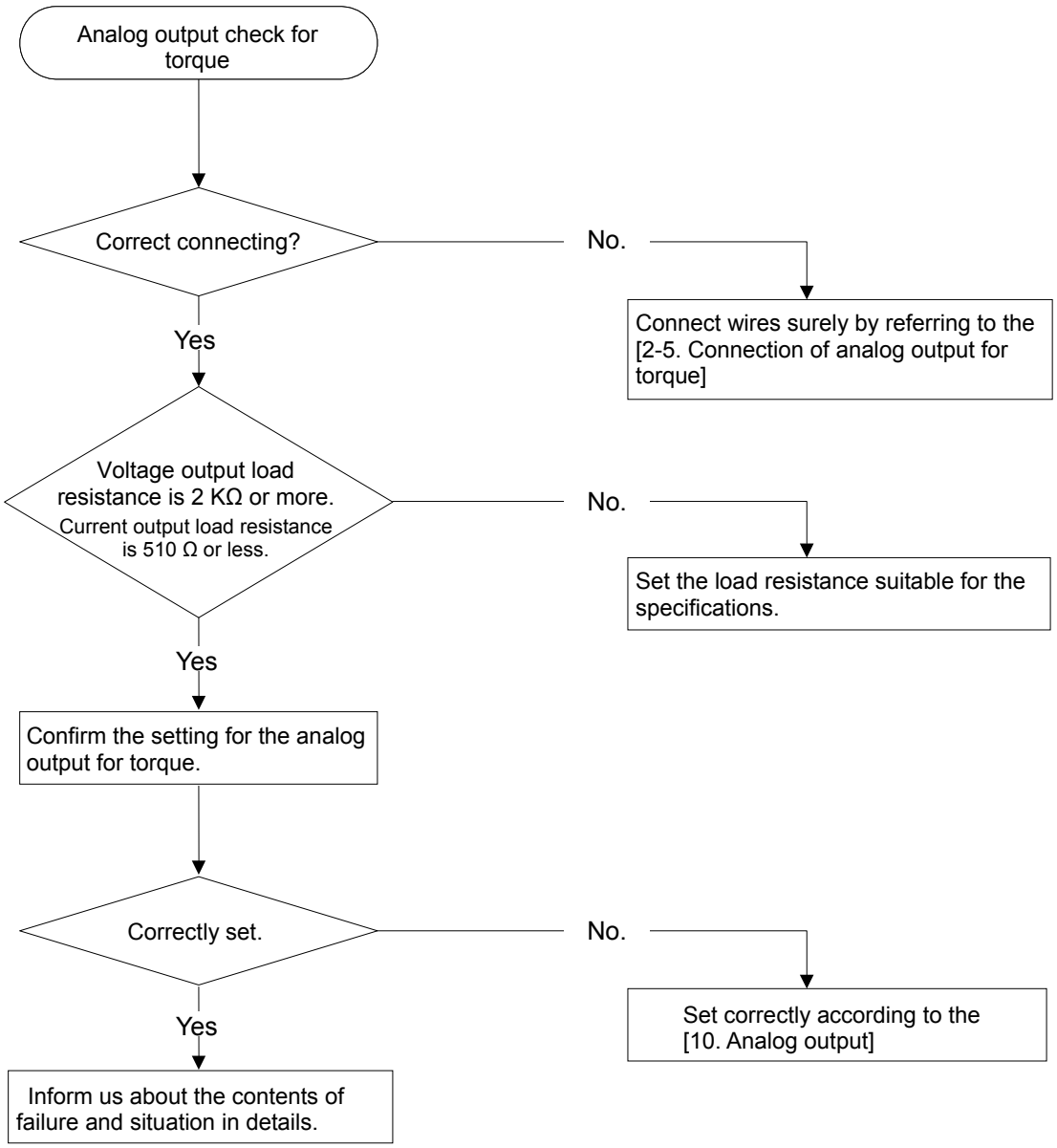

2
Monitor display is out of range from 4 kHz to 16 kHz
Yes
Repair or exchange the torque transducer.
No.
Recalibrate following the instruction of [4. Calibration].
Yes
The same situation
Yes
Inform us about the contents of failure and situation in details.
No.
Start measuring

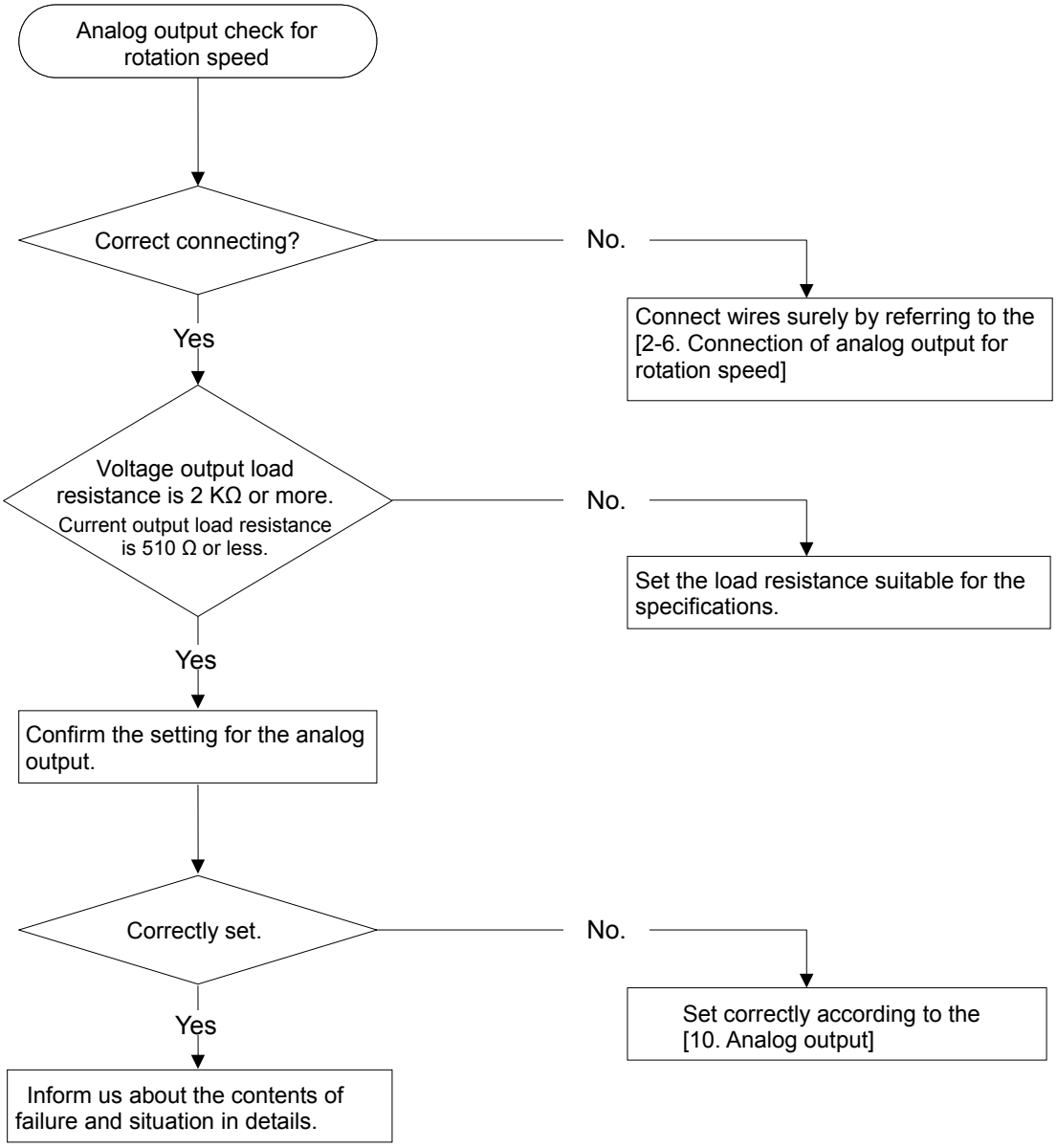

3
Installed input cable and the power cable are intermixed
Yes
Input cable should be single wire.
Yes
Poor grounding of base which installing stator.
Yes
Intensify the grounding of base.
No.
Inform us about the contents of failure and situation in details.

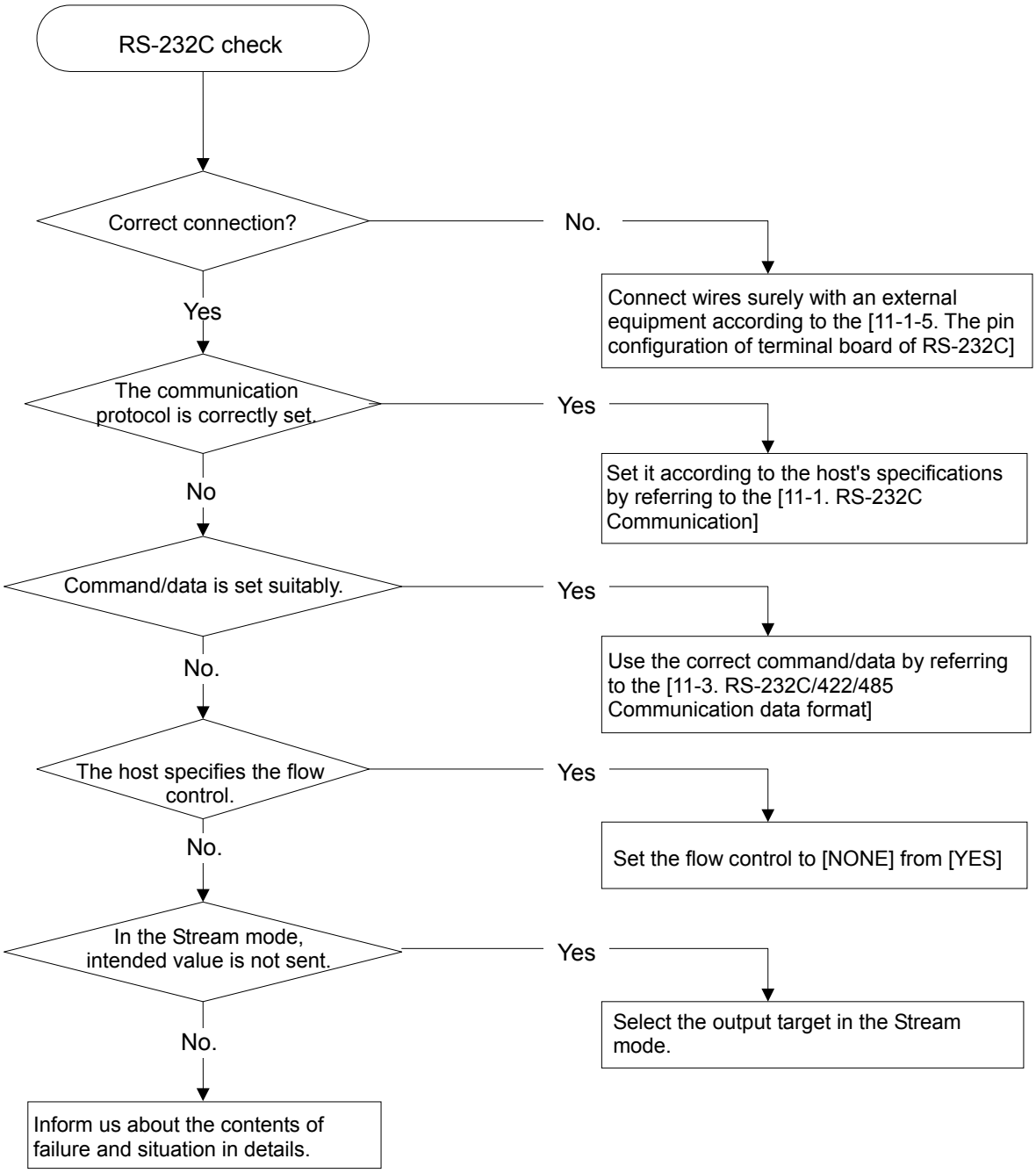

Key operation check
Set the key lock on function F-18
Yes
Cancel the key lock on function F-18.
No
Using external control input LOCK.
Yes
Set the LOCK input open.
No
Inform us about the contents of failure and situation in details.

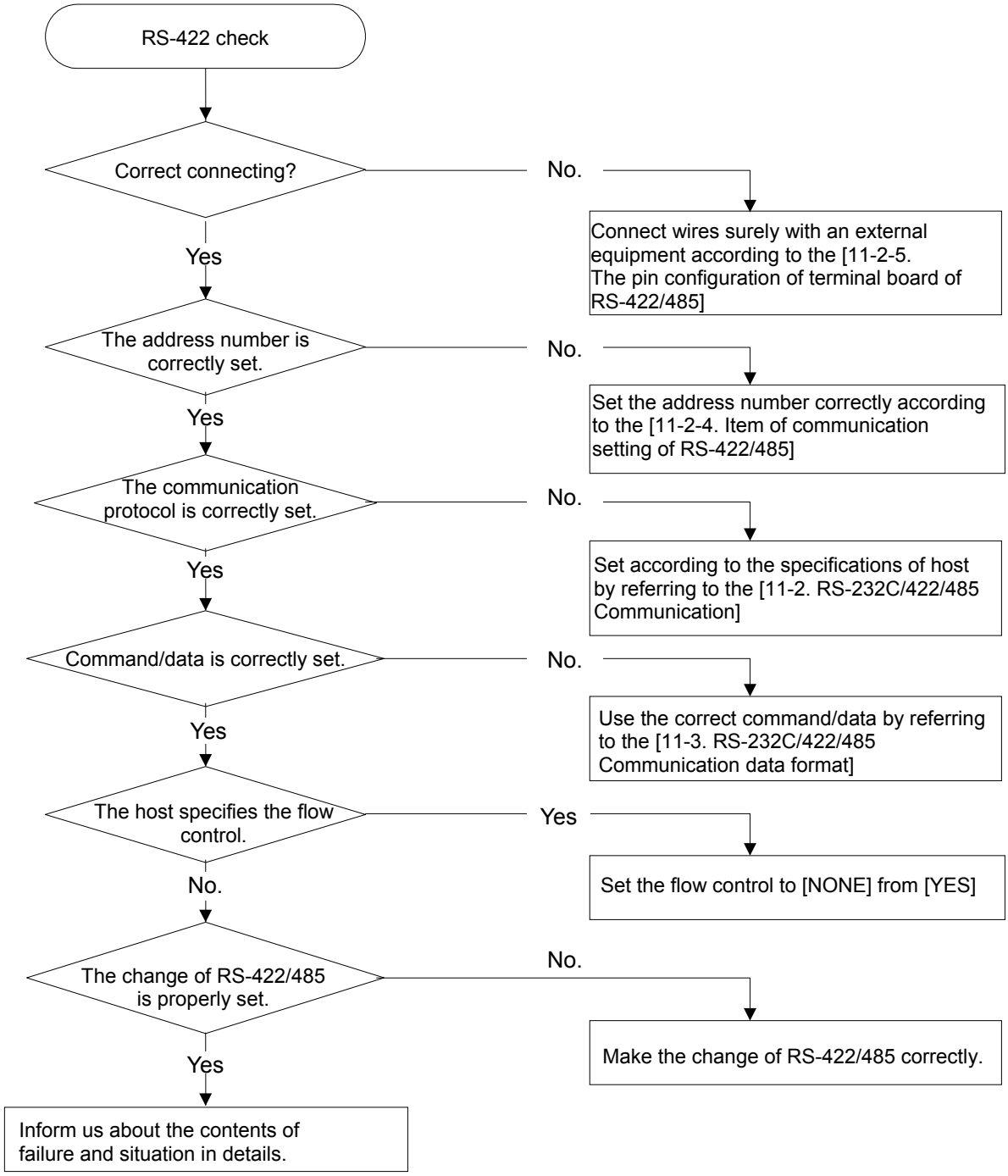

External control I/O check
Connecting wires are corrected?
No.
Connect surely according to [2-4. External connection of I/O]
Yes
External control input is wrong.
No.
Inform us about the contents of failure and situation in details.
Yes
100 ms or more of input signal is set for the pulse input.
No.
Set the width of plus input value 100ms or more.
Yes
100 ms or more of input signal for the item of Level input.
No.
Set the width of plus input value 100 ms or more.
Yes
Inform us about the contents of failure and situation in details.

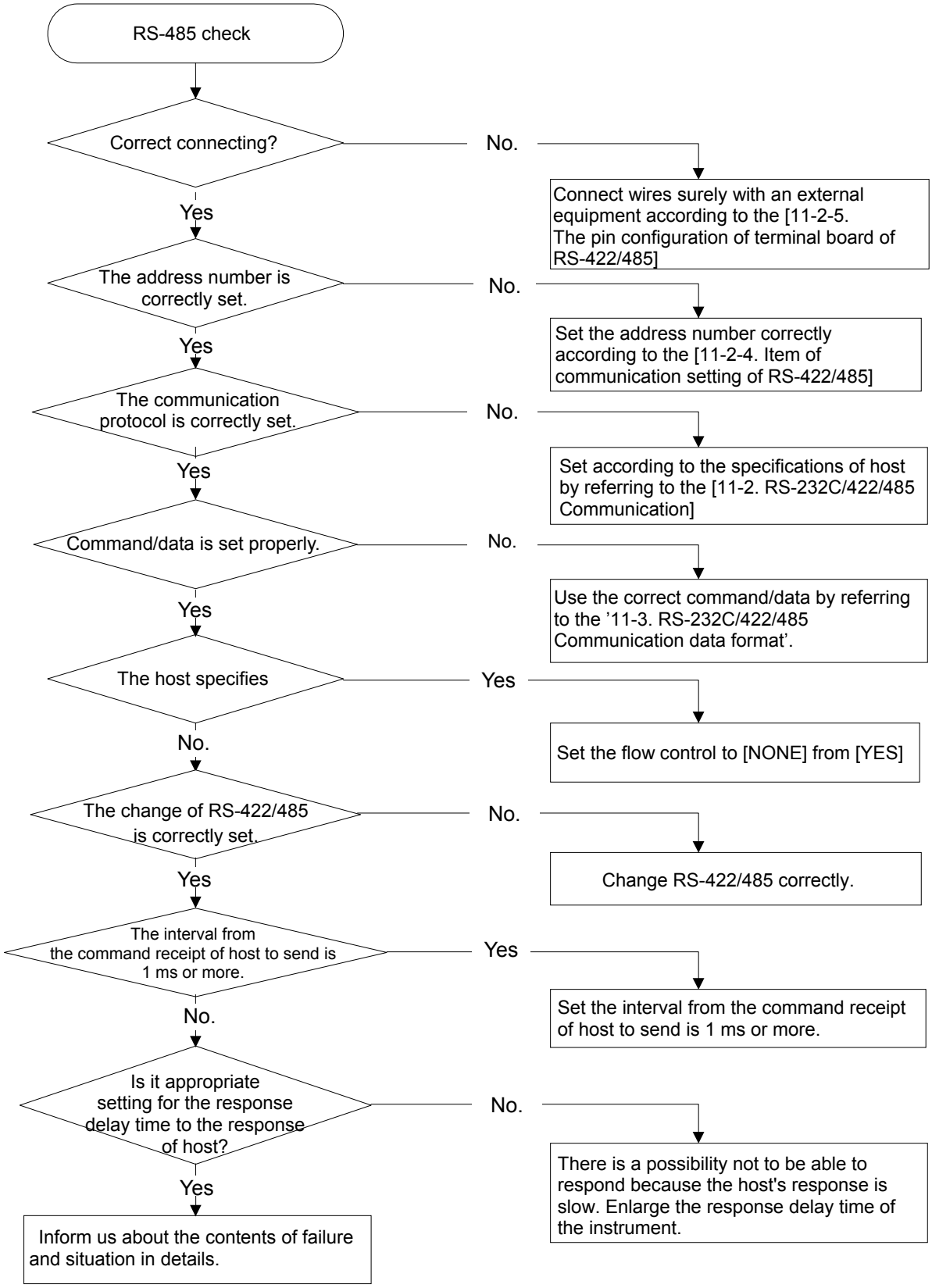

Check on options.
The analog output for torque operation is wrong.
Yes
To the analog output for torque check
No.
The analog output for rotation speed operation is wrong.
Yes
To the analog output for rotation speed check
No.
RS-232C is wrong.
Yes
To the RS-232C check
No.
RS-422 is wrong.
Yes
To the RS-422 check
No.
RS-485 is wrong.
Yes
To the RS-485 check
No.
Inform us about the contents of failure and situation in details.


Analog output check for torque
Correct connecting?
No.
Connect wires surely by referring to the [2-5. Connection of analog output for torque]
Yes
Voltage output load resistance is 2 KΩ or more.
Current output load resistance is 510 Ω or less.
No.
Set the load resistance suitable for the specifications.
Yes
Confirm the setting for the analog output for torque.
Correctly set.
No.
Set correctly according to the [10. Analog output]
Yes
Inform us about the contents of failure and situation in details.


Analog output check for rotation speed
Correct connecting?
No.
Connect wires surely by referring to the [2-6. Connection of analog output for rotation speed]
Yes
Voltage output load resistance is 2 KΩ or more.
Current output load resistance is 510 Ω or less.
No.
Set the load resistance suitable for the specifications.
Yes
Confirm the setting for the analog output.
Correctly set.
No.
Set correctly according to the [10. Analog output]
Yes
Inform us about the contents of failure and situation in details.

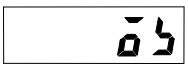

RS-232C check
Correct connection?
No.
Connect wires surely with an external equipment according to the [11-1-5. The pin configuration of terminal board of RS-232C]
Yes
The communication protocol is correctly set.
Yes
Set it according to the host's specifications by referring to the [11-1. RS-232C Communication]
No
Command/data is set suitably.
Yes
Use the correct command/data by referring to the [11-3. RS-232C/422/485 Communication data format]
No.
The host specifies the flow control.
Yes
Set the flow control to [NONE] from [YES]
No.
In the Stream mode, intended value is not sent.
Yes
Select the output target in the Stream mode.
No.
Inform us about the contents of failure and situation in details.


RS-422 check
Correct connecting?
No.
Connect wires surely with an external equipment according to the [11-2-5. The pin configuration of terminal board of RS-422/485]
Yes
The address number is correctly set.
No.
Set the address number correctly according to the [11-2-4. Item of communication setting of RS-422/485]
Yes
The communication protocol is correctly set.
No.
Set according to the specifications of host by referring to the [11-2. RS-232C/422/485 Communication]
Yes
Command/data is correctly set.
No.
Use the correct command/data by referring to the [11-3. RS-232C/422/485 Communication data format]
Yes
The host specifies the flow control.
Yes
Set the flow control to [NONE] from [YES]
No.
The change of RS-422/485 is properly set.
No.
Make the change of RS-422/485 correctly.
Yes
Inform us about the contents of failure and situation in details.


RS-485 check
Correct connecting?
No.
Connect wires surely with an external equipment according to the [11-2-5. The pin configuration of terminal board of RS-422/485]
Yes
The address number is correctly set.
No.
Set the address number correctly according to the [11-2-4. Item of communication setting of RS-422/485]
Yes
The communication protocol is correctly set.
No.
Set according to the specifications of host by referring to the [11-2. RS-232C/422/485 Communication]
Yes
Command/data is set properly.
No.
Use the correct command/data by referring to the '11-3. RS-232C/422/485 Communication data format'.
Yes
The host specifies
Yes
Set the flow control to [NONE] from [YES]
No.
The change of RS-422/485 is correctly set.
No.
Change RS-422/485 correctly.
Yes
The interval from the command receipt of host to send is 1 ms or more.
Yes
Set the interval from the command receipt of host to send is 1 ms or more.
No.
Is it appropriate setting for the response delay time to the response of host?
No.
There is a possibility not to be able to respond because the host's response is slow. Enlarge the response delay time of the instrument.
Yes
Inform us about the contents of failure and situation in details.

12-2. Error display

Err0	A/Z error. It is flickering for about 2 seconds when input auto zero signal which out of auto zero (over ±10% of maximum display value) or input A/Z.
Err1	Setting error. It is flickering for about 2 seconds when you set the function number which can not be set in function mode.
Err2	Torque value setting error. It is flickering for about 2 seconds when you set the actual torque value is over displaying torque setting value.
Err3	Writing access error of EEPROM. Please contact us.
Err4	Reading access error of EEPROM. Please contact us.
Err5	Symmetry correction range error. It is flickering for about 2 seconds when press ▲ or ▼ key in symmetry input torque value is anti-clockwise direction at symmetry correction.
Err6	Calibration prohibiting error. It is flickering for about 2 seconds when adjusting calibration, zero span fine adjustment and analog output while setting of prohibition of calibration (F-97).
rE-L	It is flickering for about 2 sec. when the output frequency of torque transducer is lower than 9 500Hz or input value is lower than 9 500Hz.
rE-H	It is flickering for about 2 sec. when the output frequency of torque transducer is lower than 10 500Hz or input value is lower than 10 500Hz.
SP-L	It is flickering for about 2 sec. when ([the output frequency of span point or the numeric value of span point] – [the output frequency of zero point or input torque transducer numeric value of zero point]) ≦0 and output frequency of torque transducer is lower than 14500Hz or input value is lower than 14500Hz.
SP-H	It is flickering for about 2 sec. when the output frequency of torque transducer is lower than 15500Hz or input value is lower than 15500Hz.
ob-L	It is flickering for about 2 seconds when exceed [-110 % of maximum displaying value] at symmetry correction.
ob-H	It is flickering for about 2 seconds when exceed [-90 % of maximum displaying value] at symmetry correction.
Ln-L	It is flickering for about 2 seconds at several conditions below; Input the torque value lower than torque value which set before at setting the linearization of + side. Inputting the torque value which lower than maximum display value of - side at setting the linearization of - side.
Ln-H	It is flickering for about 2 seconds at several conditions below; Input the torque value which higher than maximum display value of + side at setting the linearization of + side. Input the torque value higher than torque value which set before at setting the linearization of - side.
oHF	It lights when inputting torque value is more than 16 kHz at monitor mode.
- oHF	It lights when inputting torque value is less than 4 kHz at monitor mode.
oL	It lights when inputting torque value is over [+110 % of maximum display value] or more than 16 kHz at measuring mode or monitor mode.
- oL	It lights when inputting torque value is under [-110 % of maximum display value] or less than 4 kHz at measuring mode or monitor mode.

		It lights when rotation speed is more than 27 500 at the measuring mode.
-		It lights when rotation speed is less than -27 500 at the measuring mode.
		It lights when torque signal is not input the measuring mode or the monitor mode.

13. Specifications

13-1. Specifications

Transducer power supply		DC24 V ±2 V 2 A
Applicable transducer		Optical transmission system type torque transmitter
Input signal	Torque signal	5 kHz ~ 15 kHz (based on signal RS-485)
	Rotation speed signal	0 Hz ~ 50 000 Hz
Zero point adjust range		± 2 %R.O.
Digital cancellation	Asymmetry	± 10 % R.O.
	Linearize	Maximum 10 points (0 ~ 5 point by + rated value, 0 ~ 5 point by – rated value)
	Twist direction reversing	The direction of the twist and the output signal are reversed.
Non-linearity		0.01 % F.S.
Frequency response range		DC ~ 1 kHz (Changeable to 1 Hz,10Hz,30Hz,50Hz,100Hz,300Hz,500Hz or 1 kHz)
Sampling rate		10 000 times/s
Display of torque	Output	± 99 999 digital display (green LED)
	Over	[-OL] at minus over, [OL] at plus over
	Display type	Analog voltage, Torque
	Decimal point	No display, 10^1, 10^2, 10^3, 10^4
	Condition	A/Z,LOCK,CHECK,H,M,ERROR
	Unit	V, N・m, kN・m
	Display time	Approx. 20 times/s (Changeable to 4 times/s)
Display of rotation speed	Output	± 27 500 digital display (green LED)
	Over	[-OS] at minus over, [OS] at plus over
	Display type	Rotation speed
	Condition	LOCK
	Unit	r/min
	Display time	Approx. 20 times/s (Changeable to 4 times/s)
Front panel sheet key switch function		The digit of set value up or A/Z ON.
		The digit of set value down or A/Z OFF.
		Increment setting value
		Decrement setting value
		CHECK value
		Changeover to the function mode
		Entry key
External control input	A/Z	Same as A/Z key (valid once at pulse input pulse width is 100 ms or more.
	A/Z OFF	Same as A/Z OFF key (valid once at pulse input pulse width is 100 ms or more.
	LOCK	Prohibition of key operation (valid while inputting level input short of 100 ms or more.)
External control output	ERROR	Open corrector ON at various errors has occurred.

Various function	Digital filter	Stabilized the data by arithmetic processing in CPU.
	Sheet key lock	Prohibition of key operation.
	Changeover the calibration data	Register the 4 kinds of calibration data and these can be selected in function.
	Indication of luminous energy decrease	LED in the condition display section lights depending on the status of luminous energy in torque transducer.

13-2. Interface

RS-232C (Option)	Baud rate : Selectable from 1 200, 2 400, 4 800, 9 600, 19 200, 38 400, 57 600, or 115 200 bps. Data bit length: Select from 7 bit or 8 bit. Parity bit : Selectable from none, even or odd. Stop bit : Selectable from 1 bit or 2 bit. Terminator : Select from CR+LF or CR. Communication method : Half duplex. Synchronization method : Start stop synchronous method. Communication data : ASCII code.
RS-422/485 (Option)	Baud rate : Selectable from 1 200, 2 400, 4 800, 9 600, 19 200, 38 400, 57 600, or 115 200 bps. Data bit length: Select from 7 bit or 8 bit. Parity bit : Selectable from none, even or odd. Stop bit : Selectable from 1 bit or 2 bit. Terminator : Select from CR+LF or CR. Communication method: Half-duplex. Synchronous method: Start stop synchronous method. Address : Select one from 0 to 31. Transmission data : ASCII code. Cable length : Approx. 1 km. Connectable unit : 32 units at the maximum. (RS-422 : 10 units) Termination resistance : Built-in (Selects the presence by the connection of terminal board.) Equipped with the LED for I/O monitor. Changeover of RS-422 and RS-485: Set by function.
Voltage output for torque(Standard)	Output: DC-10 V ~ 10 V. Load resistance: 2 kΩ or more, Resolution: Approx. 1/12 000 or more, Non-linearity: Within 0.01 %F.S. Over range: Approx. -11 V at [- OL] display. Approx. 11V at [OL] display. Output times: Approx. 10 000 times/s. * The internal circuit and the photo-coupler are insulated.
Current output for torque	Output: DC4 mA ~ 20 mA. Load resistance: 510 Ω or less, Resolution: Approx. 1/12 000 or more. Non-linearity: within 0.05%F.S. Over range: Approx. DC2.4 mA at [-OL] display. Approx. DC21.6 mA at [OL] display. Output times: Approx. 10 000 times/s. * The internal circuit and the photo-coupler are insulated.
Frequency output for torque	Output range: 5 kHz ~ 15 kHz Output voltage: 0 ~ 5V Non-linearity: 0.01 % R.O. Resolution: 0.5 Hz or more Over range: 4 kHz at [-OL] display. 16 kHz at [OL] display. Output times: Approx. 10 000 times/s

Voltage output for rotation speed	Output: DC-10 V ~ 10 V. Load resistance: 2 kΩ or more, Resolution: Approx. 1/12 000 or more, Non-linearity: Within 0.01 %F.S. Over range: Approx. -11 V at [- OS] display. Approx. 11 V at [OS] display. Output times: Approx. 10 000 times/s. * The internal circuit and the photo-coupler are insulated.
Current output for rotation speed	Output: DC4 mA ~ 20 mA. Load resistance: 510 Ω or less, Resolution: Approx. 1/12 000 or more. Non-linearity: within 0.05%F.S. Over range: Approx. DC2.4 mA at [-OS] display. Approx. DC21.6 mA at [OS] display. Output times: Approx. 10 000 times/s. * The internal circuit and the photo-coupler are insulated.
Frequency output for rotation speed	Output range: 50 000 Hz (at 25 000 rpm) Non-linearity: 0.01 %R.O.

13-3. General specifications

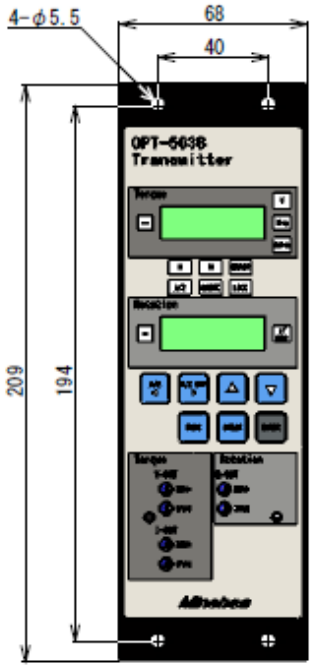
Operating temp. range	Temperature	-10 ℃ ~ 50 ℃
	Humidity	85 %RH or less (None condensing.)
Storage temperature range		-20 ℃ ~ 60 ℃
Power supply	Power-supply voltage	AC100 V ~ AC240 V (Allowable variable ranges AC85 V ~ AC264 V)
	Power supply frequency	50 / 60 Hz
	Power consumption	Approx. 49 VA (No options, disconnected rotation detector at AC100 V.) Approx. 51 VA (No options, connected rotation detector at AC100 V.) Approx. 52 VA (With options attached, disconnected rotation detector at AC100 V.) Approx. 53 VA (With options attached, connected rotation detector at AC100 V.)
Outline dimensions (W×H×D)	68 mm × 209 mm × 252 mm (Excludes protrusion parts.)	
Weight	Approx. 2.0 kg (Exclude options.)	

13-4. Accessories

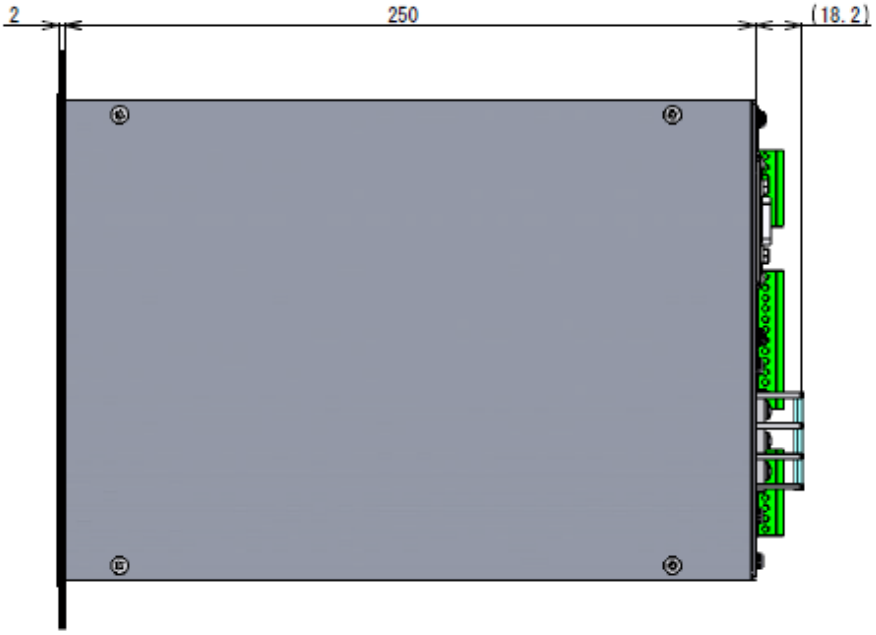
Instruction manual	1 piece
Time lag fuse (5A)	1 piece
External control input plug	1 piece
Torque transducer input plug	1 piece
Analog output plug	1 piece
Minus screwdriver	1 piece

13-5. Outline dimensions

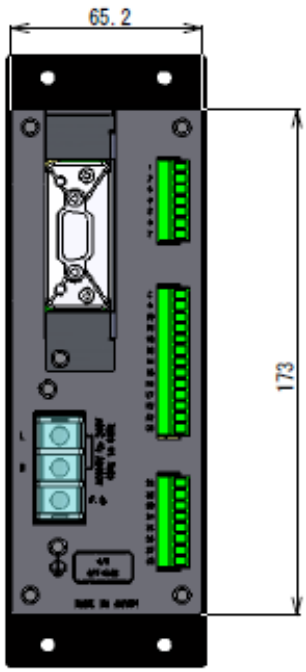
Size of each section is as follows:



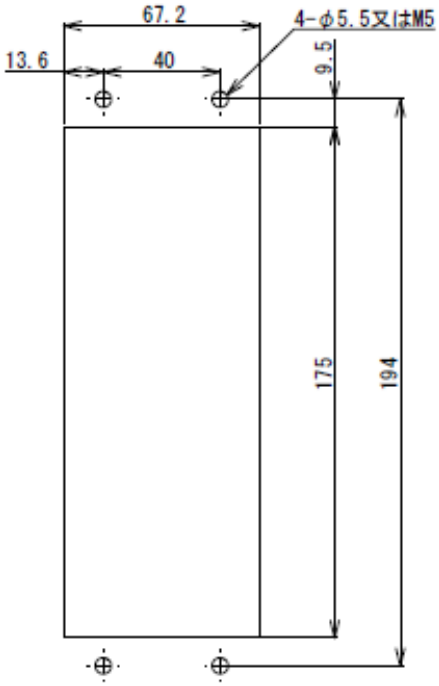
Front



Side



Rear



Panel cut

Unit :mm

14. Warranty

14-1. Warranty

The instrument is covered by a warranty for a period of one year from the date of delivery.
As for repairs and/or after service is required during the period of warranty, contact with our sales office or sales agent from which you have purchased.

14-2. Repair

Before asking repairs, check once again that the connection, setting and adjustment for the instrument have finished properly.
Especially, check whether the connections of torque transducers are disconnected or cut off. As a result
of checking, still there may have some defects in the instrument, contact with our sales office or sales agency from which you have purchased.

15. Lifetime of used parts

The parts used in the instrument will have lifetime. It may deffer depending to application method and environmental conditions,the rough standard of lifetime of each shall be as follows:

Name of Parts	Application	Rough standard of lifetime
EEPROM	Record of set data	Write to EEPROM.One million times.

15-1. EEPROM

When writing is made to EEPROM more than the time of lifetime,you cannot write to the data any more, so exchange shall be required.

16. Appendix

16-1. Exchange procedure of fuse

16-1-1. In case of no optional circuit board

(1) Set OFF the power supply for the instrument.

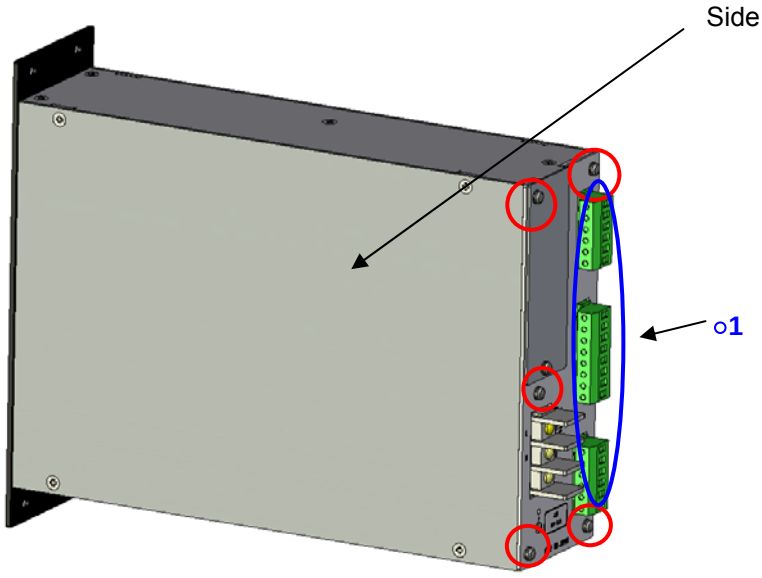
(2) Remove the 5 pieces of screws [M3 × 8 pan head screw attached SPW] on the rear panel. (point ○)

(3) Remove the all I/O connector. (○ 1)

(4) Remove the rear panel and exchange the fuse. (Fuse is on nearby upper terminal board)

(5) After exchanged fuse, install the rear panel.

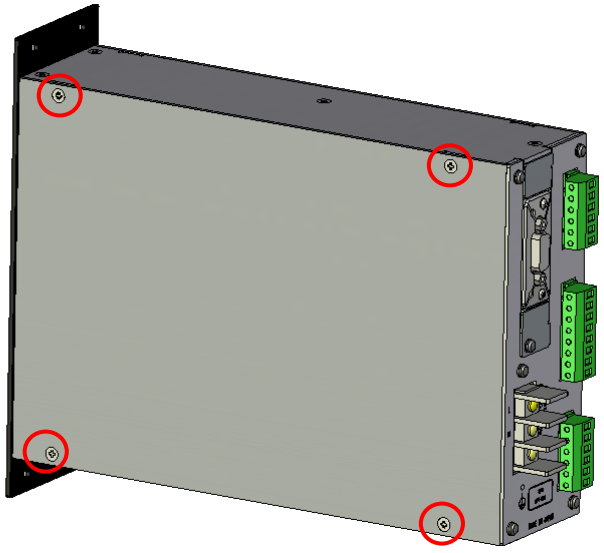
(6) Install the 5 pieces of screws on the rear panel.



16-1-2. In case of optinal circuit board

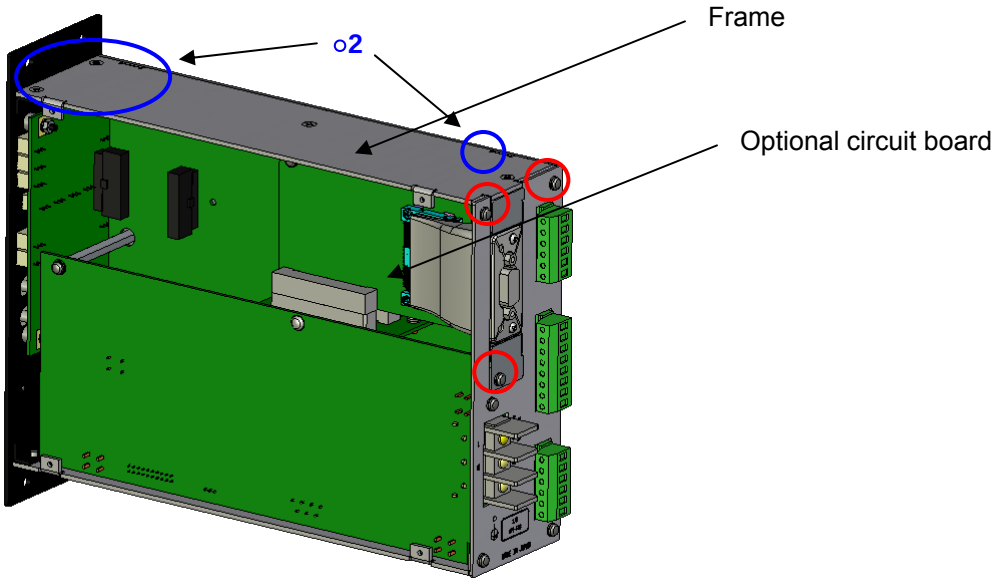
(1) Set OFF the power supply for the instrument.

(2) Remove the 4 pieces of screws [M3 × 4 flat screw head] then take off the side panel. (point ○)

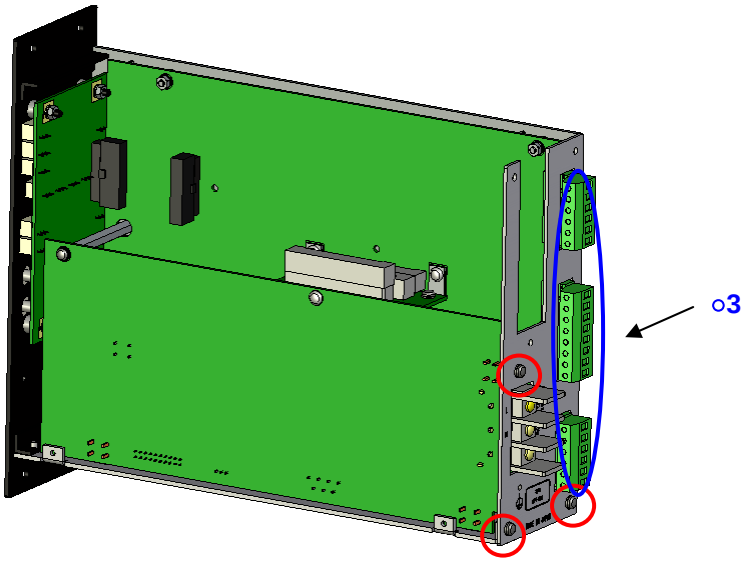


(3) Remove the 2 pieces of screws for frame install [M3 × 6 flat screw head] and 2 pieces of locking screw for side panel [M3 × 6 flat screw head] (○ 2)

(4) Remove the 2 pieces of screws [M3 × 8 pan head screw attached SPW] on the rear panel and 1 piece of screw [M3 × 8 pan head screw attached SPW] for optional circuit board, then remove the frame and optional circuit board. (point ○)



(5) Remove the 3 pieces of screws [M3 × 8 pan head screw attached SPW] on the rear panel. (point ○)



(6) Remove all I/O connector. (○3)

(7) Take of the rear panel and exchange fuse.

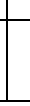
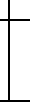
(8) Install rear panel and screw up the 3 pieces of screws [M3 × 8 pan head screw attached SPW] on rear panel.

(9) Install frame and option circuit board then screw up the 2 pieces of screws for frame install [M3 × 6 flat head screw], the 2 pieces of locking screws for side panel [M3 × 6 flat head screw], the 2 pieces of screws [M3 × 8 pan head screw attached SPW] on rear panel and 1 piece of screw [M3 × 8 pan head screw attached SPW] for optional circuit board.

(10) Install side panel and screw up the 4 pieces of screws for side panel [M3 × 6 flat head screw].

16-2. Display character pattern

The display pattern in seven segments indicator of this instrument is shown in the table below.

0		D		Q	
1		E		R	
2		F		S	
3		G		T	
4		H		U	
5		I		V	
6		J		W	
7		K		X	
8		L		Y	
9		M		Z	
A		N		?	
B		O		!	
C		P		-	

16-3. Setting table for function

Please use the table below if you change the setting of the function.

Function No.	Initial value	Customer setting value	Function No.	Initial value	Customer setting value
F-01	0		F-57	0	
F-02	0		F-58	0	
F-04	1		F-59	0	
F-05	7		F-60	1	
F-06	00		F-61	10000	
F-07	1		F-62	10000	
F-08	00		F-63	0X1FFFF	
F-09	6		F-64	0X3AAAA	
F-10	000		F-65	0X5555	
F-11	20		F-66	10000	
F-15	6		F-67	15000	
F-16	000		F-68	5000	
F-17	20		F-70	1	
F-18	0000		F-71	10000	
F-19	0		F-72	10000	
F-20	16		F-73	0X1FFFF	
F-21	10000		F-74	0X3AAAA	
F-22	25000		F-75	0X5555	
F-23	0		F-76	10000	
F-24	0		F-77	15000	
F-25	0		F-78	5000	
F-26	0		F-80	1	
F-30	0		F-81	10000	
F-31	0		F-82	10000	
F-32	3		F-83	0X1FFFF	
F-33	0		F-84	0X3AAAA	
F-34	1		F-85	0X5555	
F-35	0		F-86	10000	
F-36	0		F-87	15000	
F-37	0		F-88	5000	
F-38	00		F-90	1	
F-39	0		F-91	10000	
F-40	000		F-92	10000	
F-41	000		F-93	0X1FFFF	
F-42	001		F-94	0X3AAAA	
F-43	8		F-95	0X5555	
F-45	100		F-96	10000	
F-50	00000		F-97	15000	
F-51	00000		F-98	5000	
F-55	0000		F-99	-	
F-56	0				

●The contents of this manual may subject to change without notice.

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