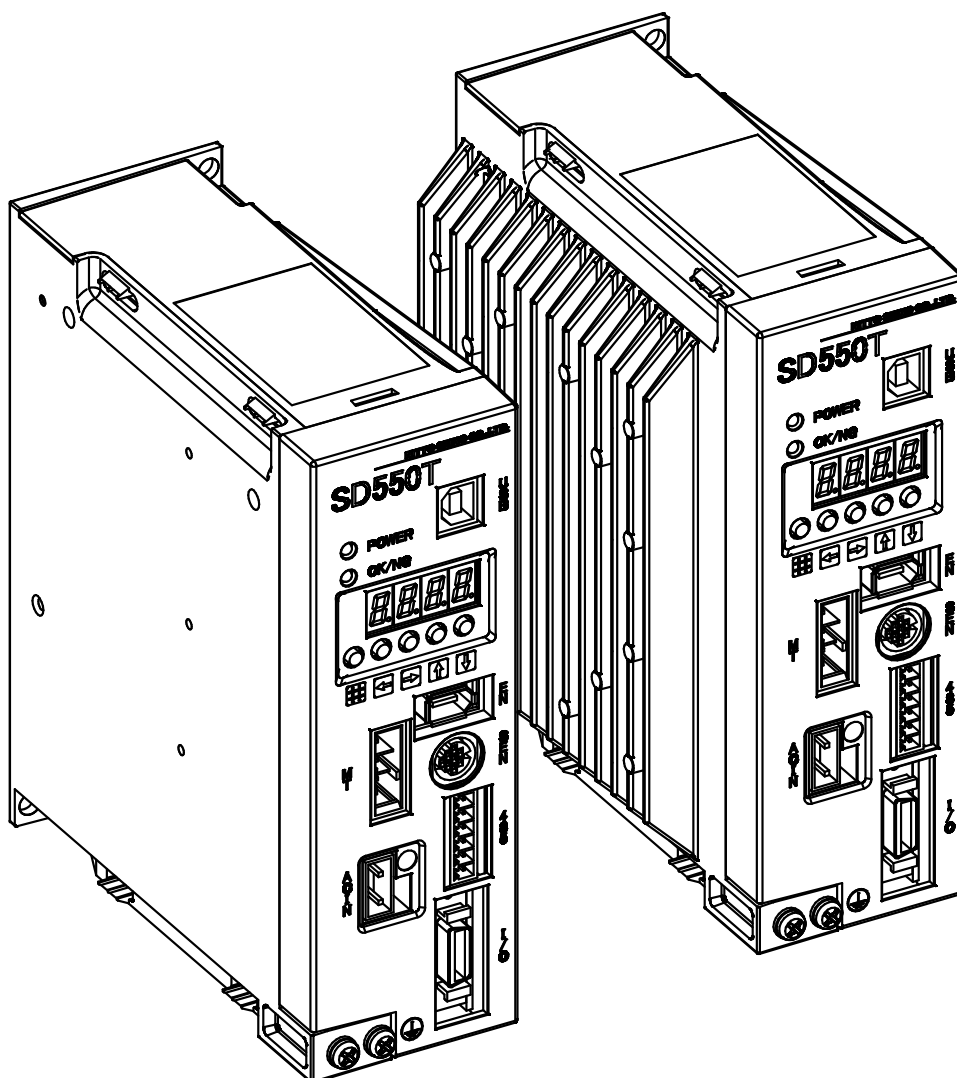


**NX (T2) series**

# ***Driver controller*** ***SD550T***

(System Ver.1.15 & Standard PRG Ver.4.50)

**Instruction manual Ver1.21**



**NITTO SEIKO CO.,LTD.**



## **Introduction**

Thank you for purchasing our driver controller, “SD550T” (hereafter referred to simply as the “controller”).

The controller works as a screw fastening driver that uses an AC servo motor, and this high performance controller flexibly carries out duties by creating programs to various screw fastening operations. For general screw fastening, the controller uses its standard tightening program so that the user may simply perform screw fastening of high accuracy only by entering the values of tightening conditions.

Be sure to read this instruction manual before using the controller in a proper manner to ensure effective use of this product for a long time.

After reading the instruction manual, carefully store it together with the “Results of NX Driver Torque Sensor Inspection”.

### **Please observe the following:**

- The cover or guard may be omitted in the illustrations for a clearer explanation of the details inside. Please make sure to install the correct cover or guard and to observe the instructions when operating this system.
- Typical examples are shown in the illustrations and may differ from the system delivered to the customer.
- The instruction manual is subject to change. Changes may result due to improvements to the system or for better understanding of the manual itself.
- Please contact our agent or our closest branch if an additional copy of this instruction manual is needed.
- Any modifications to this system by the customer voids the warranty.

### **The instructions for use.**

- The value of final fastening torque might be changed to depend on an inertia of joint attached to a output shaft and the rotation speed of motor. Set adequate values for torque and revolution speed of tool unit output shaft according to the instruction manual.
- The each type of the NX Driver may have a parameter individually. So please make sure to set up the parameter properly to observe the instruction manual whenever it connect the NX Driver with the controller (SD550T). Setting of improper values may damage the tool unit or the controller.
- Avoid using the controller in such a manner as to restrain (or stall) the output shaft of tool unit as much as possible. Doing this may damage the tool unit or the controller or shortens the life of the product.

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## For safe usage

When using this product (for installation, operation, maintenance, and inspection), be sure to understand the meaning of the following precautions and handle it correctly with much care for safety.

It is difficult to state clearly all items regarding safety in this manual. Therefore, be aware that accurate judgment about safety by persons handling this product is very important to avoid a risk.

 **DANGER** Indicates that incorrect handling may lead to an imminent injury accident (death or serious injury).

 **WARNING** Indicates that incorrect handling may lead an injury accident (death or serious injury).


 **CAUTION** Indicates that incorrect handling may lead to injury, physical damage, or machine operation failure.

Even the following items covered by “CAUTION” may lead to a serious accident. All the items are important. Be sure to follow the precautions:


**Meanings of signs**  
(Example of sign)



		 
<b>INDICATES WHAT <u>SHOULD</u> BE TAKEN CARE OF.</b>	<b>INDICATES WHAT <u>MUST</u> NOT BE DONE.</b>	<b>INDICATES WHAT <u>MUST</u> BE DONE.</b>

### **DANGER**

- **Be sure to establish a ground.**  
Make sure to connect the earth terminal to an external ground. Otherwise, an electric shock or fire may occur. 

### **WARNING**

- **Don't touch rotating part.**  
During operation, don't touch rotating part of a driver. Otherwise, you may be injured. 

- **Turn off power when an abnormal symptom is exhibited.**  
When an abnormal symptom is exhibited, such as smoke emission or bad smell, turn off the power and contact our agent or sales office to ask for repair. If the product is used without repair, a fire or electric shock accident may occur.  

**WARNING**

- **Don't use a voltage other than specified.**

Don't use the driver with a voltage other than specified. Otherwise, a fire, electric shock, or failure occurs.



- **Don't touch a part inside the controller.**

Don't touch a part inside the controller. Otherwise, an electric shock or failure may occur.



- **Don't use the product in a place with much humidity, greasy fumes, or dust.**

Don't use the product in a place where water is splashed, in a flammable gas atmosphere, and near a flammable substance. Otherwise, a fire, electric shock, or failure may occur.



- **Don't damage a cable.**

Don't place a heavy object on, pull forcefully, or twist a cable. Otherwise, a cable may be broken, causing a fire, electric shock, accident, or failure.



- **Don't disassemble or modify the product.**

Otherwise, a fire, electric shock, accident, or failure may occur.

**CAUTION**

- **Use a tool with a specified setting.**

Since a parameter setting of a controller may vary depending on a tool unit, use the controller after configuring settings as specified. Otherwise, a fire or failure may occur.



- **Don't obstruct the ventilation hole of the controller.**

Otherwise, heat is kept inside, and a fire or failure may occur.



- **Don't change wiring while power is turned on.**

Otherwise, an electric shock or failure may occur.



- **Fix each unit securely.**

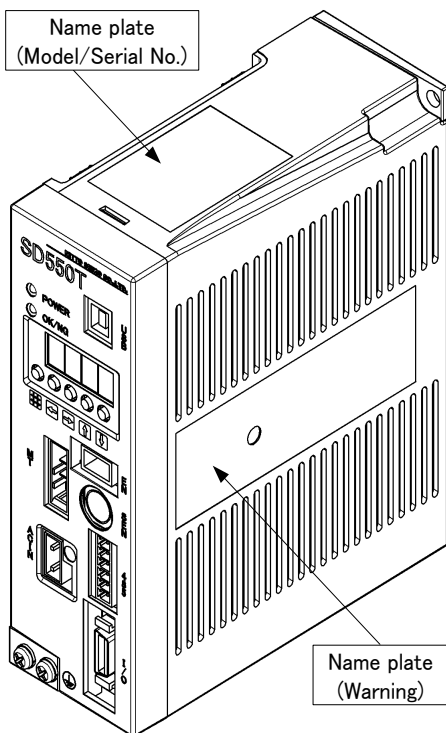
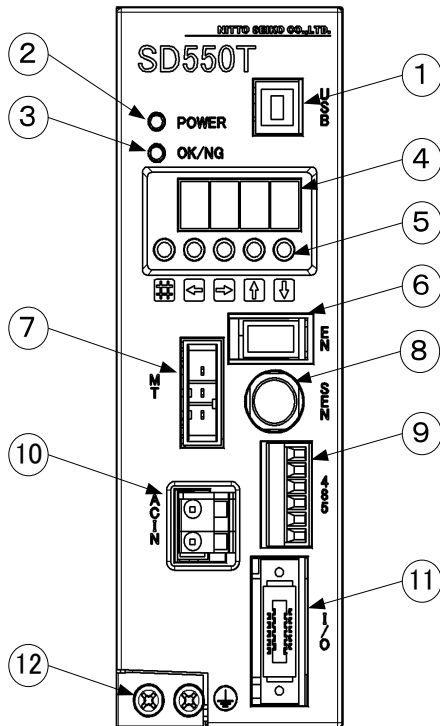
Fix a tool and controller securely before using. Otherwise, injury or failure may occur.



# Preparation of “SD550T series”

## 1. Part names

### 1-1. Panel



- [1] **Communication connector (USB)**  
Communication with a PC can be performed using communication software (Optional).
- [2] **Power lamp**  
Lights up while power is turned on.  
When the power is turned off, it remains lit until the internal capacitor is discharged.
- [3] **OK/NG lamp**  
Lights up green (OK) when fastening is completed, and red (NG) when an interrupt or timeout occurs.
- [4] **Display**  
Indicates a controller status and setting values.
- [5] **Operation key**  
Enters setting values.
- [6] **Encoder connector (EN)**  
Connects to an encoder cable.
- [7] **Motor power connector (MT)**  
Connects to a motor cable.
- [8] **Sensor connector (SEN)**  
Connects to a sensor cable.
- [9] **Network connector (485)**<sup>[Note 1]</sup>  
Connects to a network cable.
- [10] **Power connector (ACIN)**<sup>[Note 1]</sup>  
Connects to an AC input power cable.
- [11] **External I/O connector (I/O)**<sup>[Note 1]</sup>  
Connects to an external I/O cable for I/O signal to an external control device.
- [12] **Ground terminal**  
Connects a ground wire and motor cable earth terminal.

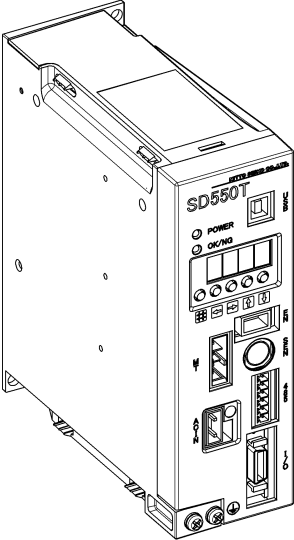
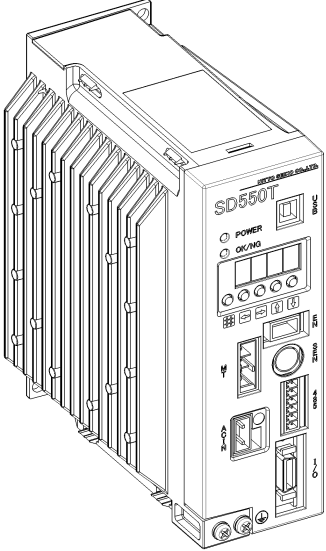
[Note 1] The cable is optional. Only the connector is attached.



**1-2. Model**

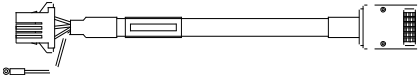

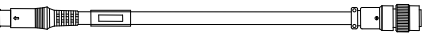

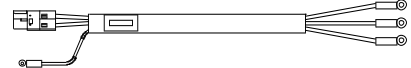
The table below describes the driver controller.

(For the tool units supported, refer to “Specification” on page 43.)

Appearance of controller	Type	Model
	<p>SD550T</p>	<p style="text-align: center;">SD550T03 – 2020</p> <div style="margin-left: 150px;"> <p>Output voltage 20:200VAC</p> <p>Input voltage 20:200VAC</p> </div>
	<p>SD550T</p>	<p style="text-align: center;">SD550T10 – 2020</p> <div style="margin-left: 150px;"> <p>Output voltage 20:200VAC</p> <p>Input voltage 20:200VAC</p> </div>

### 1-3. Names and models of connection cables

The following 5 types of dedicated connection cables are available for “SD550T series”.

Cable name	Model
<p><b>[1] Motor cable</b> A cable connecting a tool unit to the controller<sup>[Note 1]</sup></p> 	<p><b>SD-MC7-050-EG</b></p> <p>Cable length 050:5m 075:7.5m</p> <hr/> <p><b>SD-MC7-050-EH</b></p> <p>Cable length 050:5m 075:7.5m</p>
<p><b>[2] Encoder cable</b> A cable connecting a tool unit to the controller</p> 	<p><b>SD-EC3-050-CD</b></p> <p>Cable length 050:5m 075:7.5m</p>
<p><b>[3] Sensor cable</b> A cable connecting a tool unit to the controller</p> 	<p><b>SD-SC1-050-CC</b></p> <p>Cable length 050:5m 075:7.5m</p>
<p><b>[4] External I/O cable</b> A cable connecting an external device to the controller<sup>[Note 2]</sup></p> 	<p><b>SD-IC3-040-D</b></p> <p>Cable length 040:4m 070:7m</p>
<p><b>[5] AC input power cable</b> A cable connecting a power supply to the controller<sup>[Note 2]</sup></p> 	<p><b>SD-AC5-040-D</b></p> <p>Cable length 040:4m 070:7m</p>

[Note 1] Please use the cable corresponding to the tool unit. The correspondence of a tool unit and a motor cable is as follows.

SD-MC7-050-EG : NX020T2, NX050T2, NX100T2

SD-MC7-050-EH : NX180T2, NX250T2, NX500T2, NX800T2

[Note 2] Optional

## 2. Inspection and Delivery

When you receive a NX driver series product, perform a check and inspection as follows:

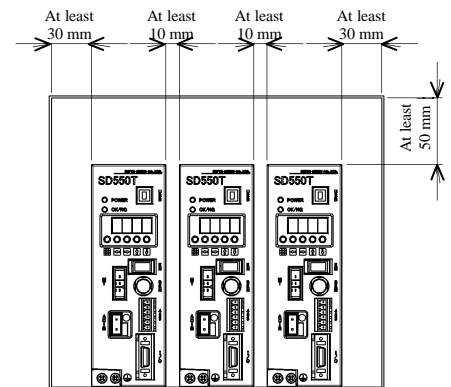
Check/inspection item	Remark
[1] Is the product what you have ordered?	Check it with the “Model” shown on the name plate. (Refer to the table of previous clause.)
[2] Are connectors all included?	Check if 3 types of connectors: power connector, network connector, and I/O connector are included.
[3] Is there any broken part?	Check for any damage caused during transportation etc. by viewing its appearance.
[4] Is there any tightened part, such as a screw, that comes loose?	Make a check with a tool, such as a screwdriver, as necessary.

If you find any problem with the following items, contact our agent you purchased from or our sales office immediately.

## 3. Handling precautions

- (1) Don't place a heavy object on, pull forcefully, or twist a cable (motor cable, encoder cable, sensor cable, external I/O cable, or AC power cable). Otherwise, it may be broken.
- (2) Since the controller is cooled by natural convection, leave adequate clearance around it for cooling. Environmental condition is as follows:

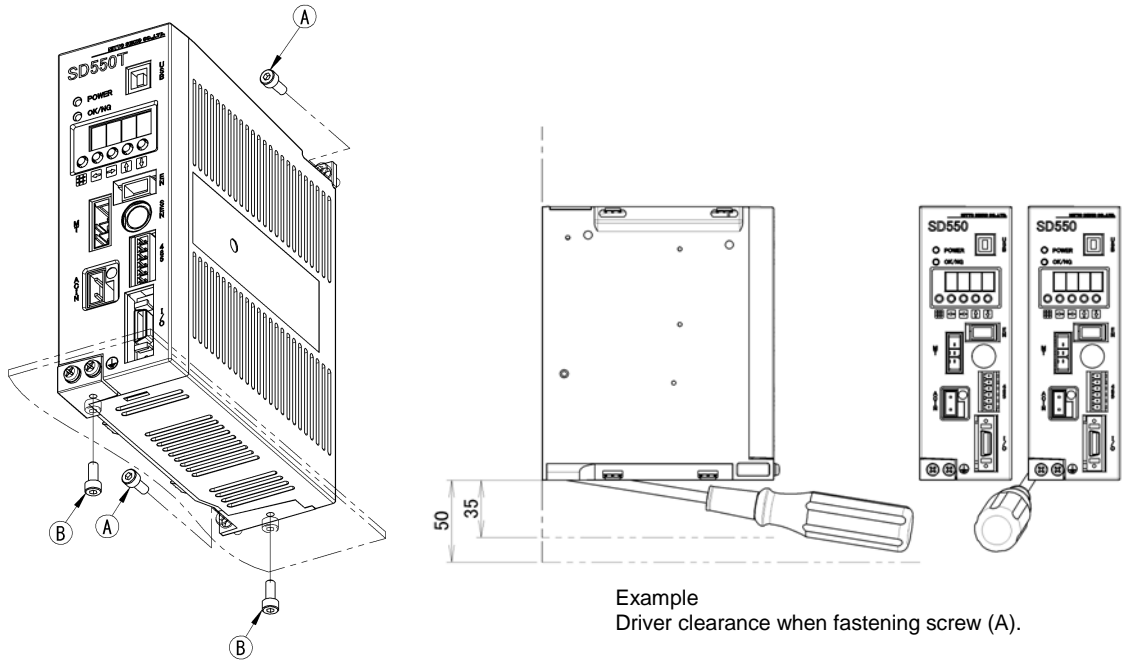
- Ambient working temperature : 0–50°C
- Ambient working humidity: 90%RH at maximum
- Protect from freezing and condensation.



- (3) General precautions in installation are as follows:

Case	Precautions
[1] When installed inside control panel	Design the size of the controller panel and cooling method so that the temperature around the controller does not exceed “50°C”.
[2] When installed near a heating element.	Restrict the temperature around the controller to “50°C” by reducing radiation heat from the heating element and convection.
[3] When installed near a vibration source.	Install the controller through vibration isolating equipment to prevent the vibration from being transmitted to the controller.
[4] When installed in corrosive or explosive gas.	Try to find a preventive method. Otherwise, a failure of a part inside the controller or a fire may occur.
[5] Others	Avoid a place with a high temperature and humidity, and in an atmosphere with much dust, iron powder, and greasy fumes.

(4) Pay attention to the following points when installing the controller.



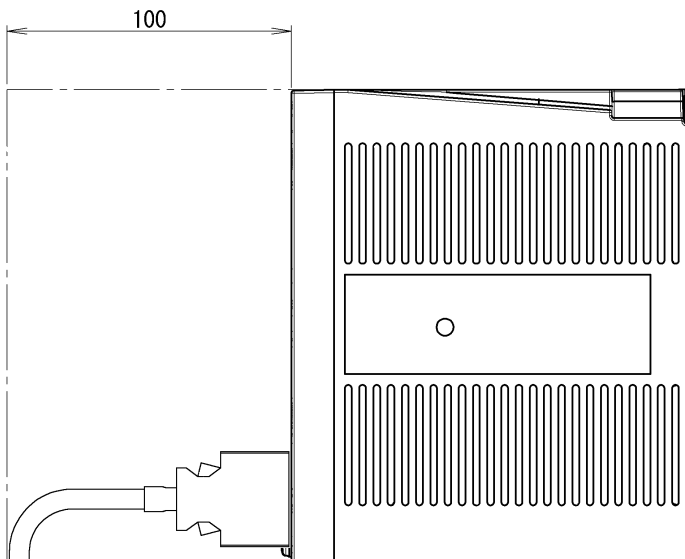
A: When installed on the rear surface  
 B: When installed on the bottom surface

Fix it securely with M4×2.

\* For installation on the bottom surface (B), the screw-in length to the controller should be not longer than 6mm.

(5) Pay attention to the following points regarding wiring.

Range of required wiring  
 (When our optional cables are used)



## 4. Cable and peripheral connection

Cables are connected to the controller as shown in the figure below:

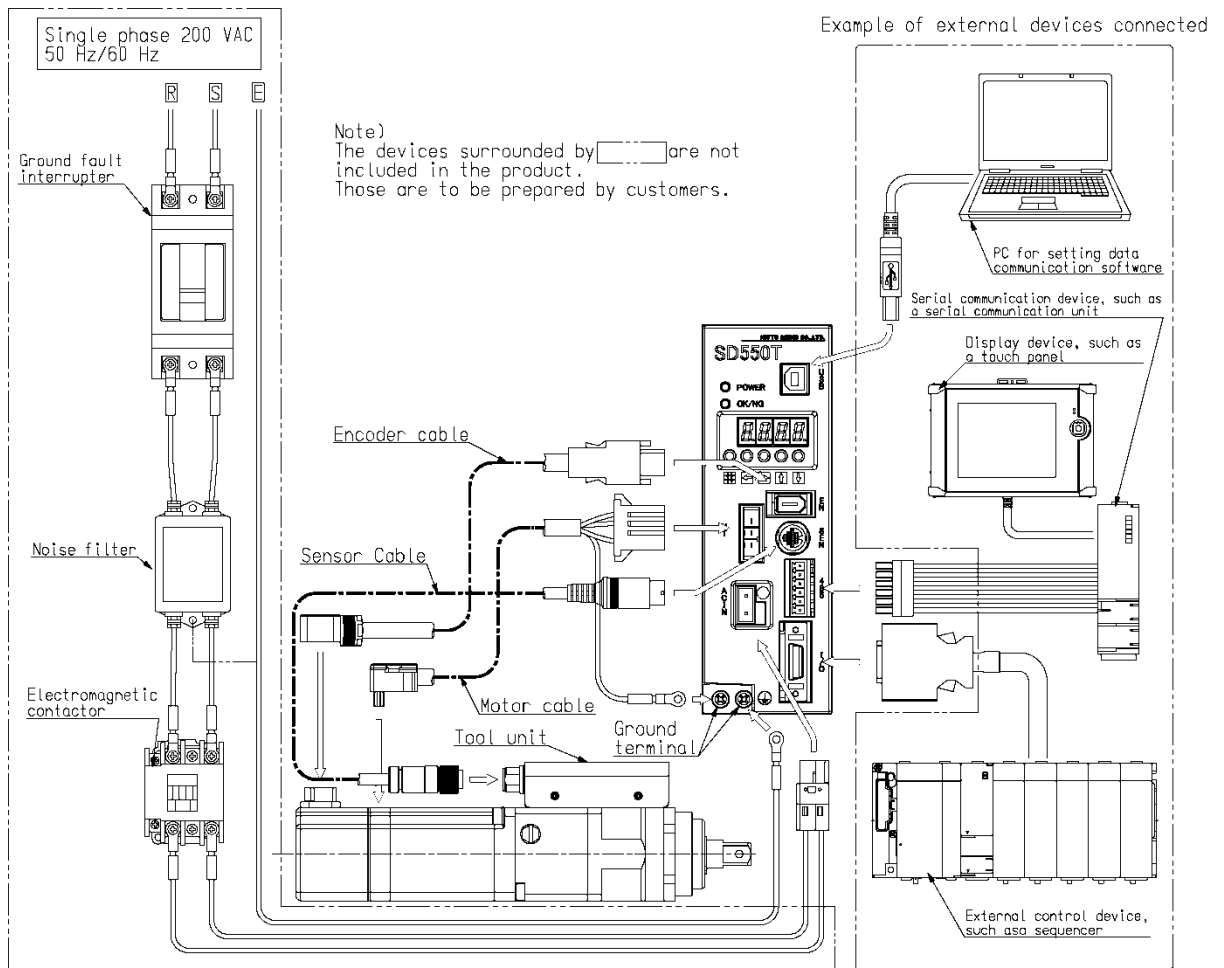
Make sure that the connectors are inserted securely and locked.

Ground wire must be connected using the attached screw.

The ground wire of the motor cable must also be connected to the ground terminal.

(For connection at tool unit side, refer to pages 7 of a separate document “Instruction Manual for NX(T2) series (for SD550T) NX Driver”.)

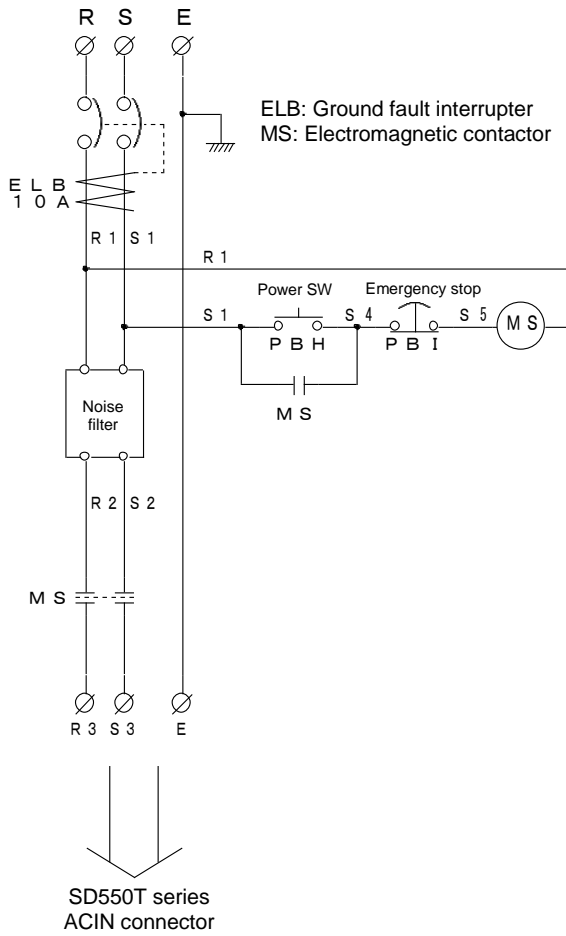
### (1) General connection diagram



**(2) Typical example of wiring**

A typical example of circuit diagrams is shown below.

Single phase, 200 VAC, 50 Hz/60 Hz

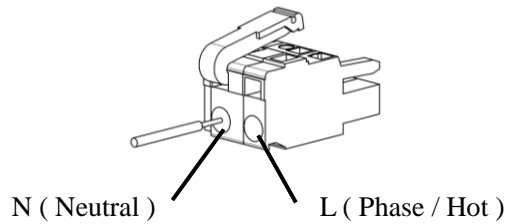


Recommended devices

Device name	Manufacturer	Model	Device notation
Ground fault interrupter	Mitsubishi Electric Corporation	NV30-FAU (10A,30mA)	ELB
Electromagnetic contactor	Fuji Electric FA Components & System Co., Ltd.	SC-03 series	MS
Noise filter	TDK Lambda Corporation	RSHN-2010 (250VAC,10A)	Filter

**(3) Power connector connection**

The power connector is connected to single-phase 200VAC–230VAC±10% 50/60Hz.  
Connector wiring and connection should be made by users.



\* Use a wire of the following size.

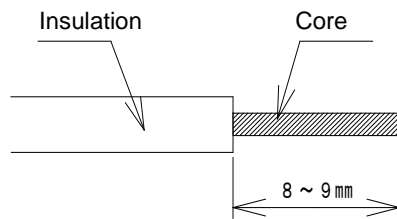
- AWG16–AWG12(1.25–3.5sq)

Maximum outer diameter of insulation:  $\phi 4.1\text{mm}$

Specification of the power connector (Accessory)

Connector plug	Manufacturer
231-202/026-000	Wago Company of Japan, Ltd.

1. Remove the insulation of a wire to be used.



Single core cable: Can be used as it is.

Stranded wire cable: Connect the wire without twisted.

Don't coat solder plating.

2. Open a wire hole in the terminal block using a tool.

The following 2 methods can be used to open the hole.

Fig. 1: Method for opening a hole by catching the operation lever.

Open the spring using the 231-131 (detachable) made by Wago Japan Co.

Fig. 2: Method for opening a hole using a slotted screwdriver

Insert a slotted screwdriver (blade thickness up to 3.5mm), or the 210-120J made by Wago Japan Co. or equivalent, into the operation slot to open the spring.

3. Insert a cable core into the opening. And then, release the operation lever or the slotted screwdriver.

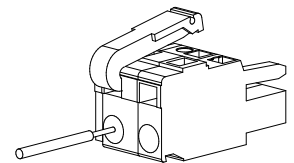


Fig. 1

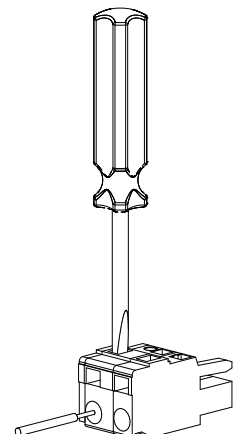


Fig. 2

**(4) I/O connector connection**

The I/O connector is connected to the signals to/from upper control equipment. The connector is of soldering type. Wiring and connection should be performed by users.

\* Use a wire of the following size.

- AWG24–AWG30 (0.2–0.05sq)

Specification of I/O connector (Accessory)

Connector plug	Shell	Manufacturer
10120-3000PE	10320-52F0-008	Sumitomo 3M Limited

I/O connector pin layout

			1	COM IN	Common input				11	IN 6	Sync tightening start Continuation start
2	COM IN	Common input	3	COM OUT	Common output	12	IN 7	Not used	13	OUT 0	Ready to receive start
4	COM OUT	Common output	5	IN 0	Start signal (Continuous)	14	OUT 1	OK judgment, Completed	15	OUT 2	NG judgment, Discontinuation , Time-out
6	IN 1	Channel number selection CH1	7	IN 2	Channel number selection CH2	16	OUT 3	System alarm	17	OUT 4	Screw floatation judgment OK
8	IN 3	Channel number selection CH4	9	IN 4	Channel number selection CH8	18	OUT 5	Ready to receive sync tightening start, Channel operation completed	19	OUT 6	Angle judgment OK
10	IN 5	External sensor input				20	OUT 7	Not used			



**(5) Network connector connection**

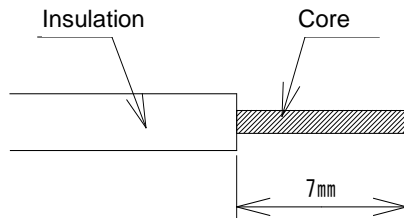
The network connector is connected to the signal to/from upper control equipment. Connector wiring and connection should be made by users.

- \* Use a wire of the following size.
- AWG22–AWG28(0.3–0.08sq)

Specification of network connector (Accessory)

Connector terminal block	Manufacturer
XW4B-06B1-H1	OMRON Corporation

1. Remove the insulation of a wire to be used.



2. Loosen the screw of the terminal with a slotted screwdriver.  
Loosen the terminal screw using a dedicated slotted screwdriver, OMRON XW4Z-00B. Insert the wire and tighten the terminal screw.

  - Terminal wire fastening torque: 0.22 N·m–0.25 N·m

## 5. How to turn on and off power

### (1) How to turn on power

Turn on the “SD550T series” controller in the following procedure.

#### [1]: Check that cables are connected correctly.

- Check power supply circuit wiring.
- Check motor wiring.
- Check encoder wiring.
- Check sensor wiring.
- Check I/O connector wiring.

#### [2]: Turn on the switch of the user equipment.

Power lamp (Green lamp on the front face of the unit) lights up, and “0.00”<sup>[Note 1]</sup> appears on the display.

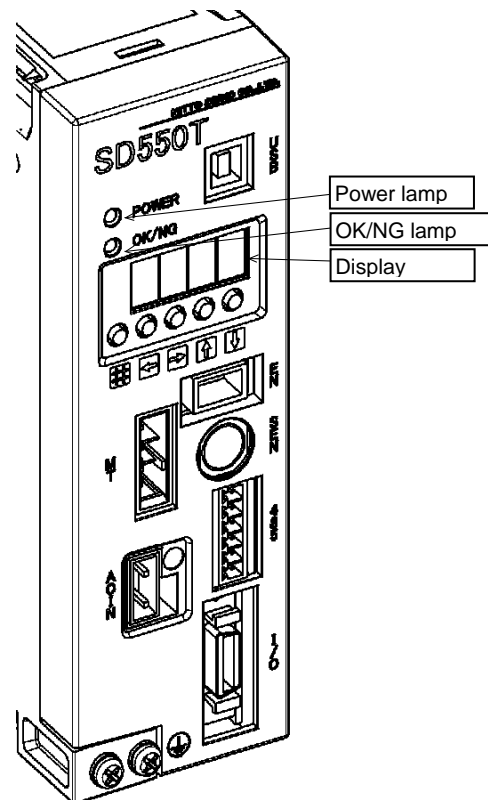
[Note 1] The indications on the display depend on the tool models.

### (2) Precautions when turning off power

If the input power to the controller is shut off, an alarm number “A.002” is displayed until the internal capacitors have been discharged. This does not indicate a system error or controller error.

Wait for at least 5 seconds after the displayed alarm number disappears if you turn on the power again after turning it off.

Don’t repeat turning on and off the controller in succession in a short time. Otherwise, the product life is decreased seriously and an error may occur. (An alarm number other than “A.002” may be displayed rarely.)



## 6. Fastening result display

The OK/NG lamp always lights up when fastening is completed.

The lamp color indicates the result of fastening.

### (1) When green lamp is lit (fastening OK)

Fastening is completed correctly.

### (2) When red lamp is lit (NG)

Fastening NG has occurred.

If the display shows “A\*\*\*”, refer to Item 1 “Error in the system” in the section of “Typical problems and troubleshooting”. This means the controller system involves some abnormality.

If the display shows “ 0.00”, refer to Item 3 “Cause of controller NG and corrective measure” of “Typical problems and troubleshooting”.






# Operation Instructions

## 1. Before starting operation

The following briefly explains controller functions and terminologies.  
Read the above before operating the controller.

### 1-1. Operation key function

The following table shows the function of each key.

Key	Name	Function
	Left key	<ul style="list-style-type: none"> <li>Moves cursor to left.</li> <li>Registers settings.</li> </ul>
	Right key	<ul style="list-style-type: none"> <li>Moves cursor to right.</li> </ul>
	Up key	<ul style="list-style-type: none"> <li>Changes the numeric value at cursor position. (0 → 1 → 2 → ... → 9 → 0)</li> <li>Changes the mode. (in combination with #)</li> <li>Deletes a program step.</li> </ul>
	Down key	<ul style="list-style-type: none"> <li>Changes the numeric value at cursor position. (0 → 9 → 8 → ... → 1 → 0)</li> <li>Changes the mode. (in combination with #)</li> <li>Inserts a program step.</li> </ul>
	# key	<ul style="list-style-type: none"> <li>Changes the mode.</li> </ul>

Note: Cursor denotes a blinking portion on the display.

### 1-2. Memory sheet

The “Memory sheet” is an area where setting values (values representing operation conditions used in a program) are stored. The “Memory sheet” is written in the EEPROM of the controller. So, the contents of the “Memory sheet” are held even if the power is turned off.

### 1-3. Program

The “Program” is a statement describing a series of operation that a controller should perform from its “Start to End”. The program is written in the EEPROM of a controller. In the program, commands representing operation are arranged in the order of operation. The sequence of the operation is called “Step”.

## 2. Mode and display indication

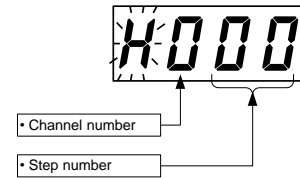
The mode denotes a controller operation status. You can execute a program or exit settings by changing the mode. The controller has the following 6 modes.

(The figure to the right shows a display indication. Note that the indication is an example.)

### 2-1. Trace mode

This mode is used to display a number of a program step being executed. (This is a factory default mode when the power is turned on.)

The 2nd digit from the left represents a channel number, and the 3rd and 4th digits represent a step number. (You can display a command code by pushing the Right key to move the cursor.)



### 2-2. Memory mode

This mode is used to register or change the setting values stored in the memory.

**Note:** No program can be executed in this mode.



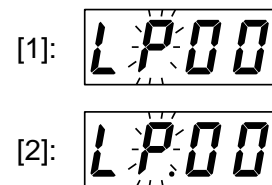
### 2-3. Parameter mode

This mode is used to register or change parameter setting values.

[1] (LP\*\*) denotes a parameter number 0-99.

[2] (LP.\*\*\*) denotes a parameter number 100-199.

**Note:** No program can be executed in this mode.

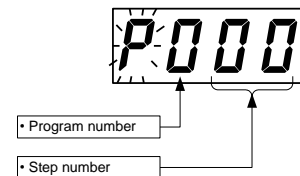


### 2-4. Program mode

This mode is used to edit a program.

The 2nd digit from the left represents a program number, and the 3rd and 4th digits represent a step number.

**Note:** No program can be executed in this mode.



### 2-5. Monitor mode

This mode can indicate revolution speed, torque value, etc. of tool unit in real time. Monitor code numbers and monitor values are listed in the format shown below.

-155: Criterion for torque of tool unit (N·m)

(The setting on factory shipping uses the mode just after turning on the power supply.)



### 2-6. Safe mode

This mode is an emergency start-up mode that is entered upon power-on if a parameter setting error occurs. A parameter number entered incorrectly is displayed for correction.

### 3. How to edit memory sheet

You can change the operation, rotation speed, and output torque etc. of a tool unit by editing the “Memory sheets”. There are 2 types of memory sheets: the one is for “Memory sheet (0)” in which general settings common to all channels are specified; and the other is for “Memory sheet (1)” and “Memory sheet (2)” in which the settings of operation, rotation speed, and output torque etc. for each channel are specified individually. The values written on the sheets are used as operation conditions in a fastening program.

#### 3-1. Structure of memory sheet (0)

The “Memory sheet (0)” has the following structure:  
 (\*The unit of torque value varies with the tool units.)

**Memory sheet (0)**

Data No.	Set contents		Address No.
0	Channel number to confirm operation		0000 (L490)
1	Revolving speed for sensing of initial revolution	rpm	(L491)
2	Torque for sensing of initial revolution	0. 01N·m	(L492)
3			(L493)
4			(L494)
5			(L495)
6			(L496)
7			(L497)
8			(L498)
9			(L499)

**①: Data area for each item**

Represents a horizontal line (row) of a memory sheet. The data (setting value) corresponding to each setting item is stored in a row.

**②: The definition of each item**

Represents the data number, name, and unit of a setting value input to each row.

**③: Address number**

Represents a location of each square (cell) in which a setting value is entered. The cell is used when a setting value is changed or entered.

### 3-2. Structure of memory sheet (1) and memory sheet (2)

“Memory sheet (1)” and “Memory sheet (2)” have the following structure.

(\* The unit of torque value varies with the tool units.)

①: Data area of setup item      ③: Address No.

## Memory sheet

Data No.	Channel No.		0	1	15
	Torque Setup item	Target	N·m	N·m	N·m
	Operation sequence number		(L980)	(L981)	(L995)
0	Revolving speed during initial rundown	rpm	(L500)	(L530)	(L950)
1	Torque during initial rundown	0.01N·m	(L501)	(L531)	(L951)
2	Revolving speed for final fastening	rpm	(L502)	(L532)	(L952)
3	Torque for final fastening	0.01N·m	(L503)	(L533)	(L953)
4	Final fastening angle	0.1deg.	(L504)	(L534)	(L954)
5	Torque data transmission frequency	Times	(L505)	(L535)	(L955)
6	Upper limit/ Torque criterion	0.01N·m	(L506)	(L536)	(L956)
7	Lower limit/ Torque criterion	0.01N·m	(L507)	(L537)	(L957)
8	Stall time	0.01sec	(L508)	(L538)	(L958)
9	Cycle time	sec.	(L509)	(L539)	(L959)
10	Speed for tapping	rpm	(L510)	(L540)	(L960)
11	Torque for tapping	0.01N·m	(L511)	(L541)	(L961)
12	Torque for changeover to angle during tapping	0.01N·m	(L512)	(L542)	(L962)
13	Revolving angle during tapping	deg.	(L513)	(L543)	(L963)
14	Revolving speed for thread fitting	rpm	(L514)	(L544)	(L964)
15	Torque for thread fitting	0.01N·m	(L515)	(L545)	(L965)
16	Time period for thread fitting	0.01sec	(L516)	(L546)	(L966)
17	Torque for release-socket-bite	0.01N·m	(L517)	(L547)	(L967)
18	Reverse revolving angle for release-socket-bite	0.1deg.	(L518)	(L548)	(L968)
19	Time period for release-socket-bite	0.01sec	(L519)	(L549)	(L969)
20	Screw height detection 1	10 deg.	(L520)	(L550)	(L970)
21	Screw height detection 2	10 deg.	(L521)	(L551)	(L971)
22	Upper limit/Final fastening angle detection	deg.	(L522)	(L552)	(L972)
23	Lower limit/Final fastening angle detection	deg.	(L523)	(L553)	(L973)
24	Step completion signal output time period	0.01sec	(L524)	(L554)	(L974)
25	Channel number to follow sequentially		(L525)	(L555)	(L975)
26	Revolving speed in single direction	rpm	(L526)	(L556)	(L976)
27	Torque at rotation in single direction	0.01N·m	(L527)	(L557)	(L977)
28	Lower digits/revolving angle in single direction	0.1deg.	(L528)	(L558)	(L978)
29	Upper digits/revolving angle in single direction	1000deg.	(L529)	(L559)	(L979)

②: Details of setup      ④: Channel data area

#### ④: Data area for a channel

Represents a vertical line (column) of a memory sheet. The data (operation and setting values) used in each channel is input in a column.

### 3-3. Meanings of the settings on memory sheets

The following describes briefly the setting items on the memory sheet (0), memory sheet (1), and memory sheet (2).

**(1) Channel number to confirm operation (Address No: L490)**

A setting item for checking the operation etc. of a channel (1-15) irrespective of external channel signal. If a value from “0001” (Channel 1) to “0015” (Channel 15) is specified, the operation of the specified channel operation is performed when the start signal is turned “ON”. **Do not set it normally.**(Initial setting value is “0000”.)

**(2) Revolving speed for sensing of initial revolution(Address No: L491)**

Indicates the rotation speed of the output shaft of a tool unit immediately after the start signal is turned on. This value is used for checking if the output shaft of the tool unit is rotating (if the tool unit is broken). This setting is invalid when refastening operation is performed or when the tool unit output shaft rotates only forward or backward individually.

Since a proper factory default value is specified for this setting, use the default setting normally. (If you change the setting value, specify a value not larger than the “Initial rundown rotation speed”.)

**(3) Torque for sensing of initial revolution (Address number: L492)**

It indicates the output torque of the tool unit output shaft immediately after the start signal is in the “ON” status, and whether the tool unit output shaft can be rotated or not (whether the tool unit is damaged or not) can be checked. It is invalid when retightening is carried out or the tool unit output shaft is rotated in single direction only, clockwise or counterclockwise.

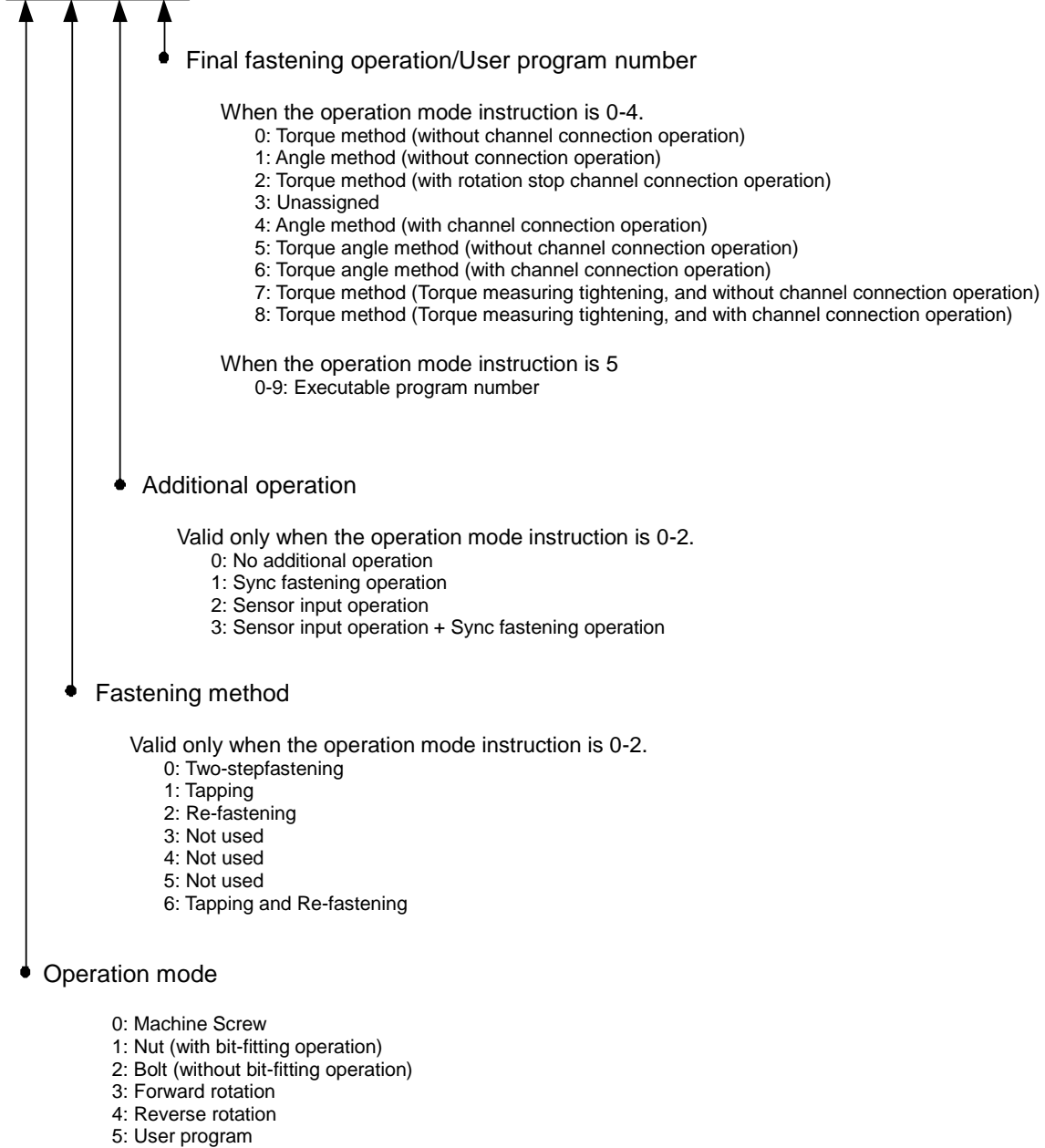
Appropriate setup was carried out before shipment. **DO NOT** tamper it for normal use. (When altering the set value, select set values not more than the “torque at initial tightening”.)

**(4) Operation sequence number (Address No: L980-L995)**

Indicates the operation (a combination of standard programs) of a tool unit. The number is a 4-digit numeric value. The controller controls the operation of a tool unit by reading the value of the setting item corresponding to the operation sequence number.

A numeric number that can be specified for each digit and its meaning are shown on next page.

(For operation sequence numbers and corresponding setting items, refer to the “List of setting items by operation sequence number” on pages 48-53.)



\* For screw height detection and final fastening angle detection, operation is added depending on whether or not the setting values are entered.



**[1] Operation mode (1st digit)**

Represents applicable screw types or operation.

Instruction No.	Name	Types and operation of screws used mainly
0	Machine screw	Machine screws
1	Nut (With bit-fitting operation <sup>[Note 1]</sup> )	Nuts (With bit-releasing operation)
2	Bolt (Without bit-fitting operation <sup>[Note 1]</sup> )	Bolts (With bit-releasing operation)
3	Forward rotation	Forward rotation operation
4	Reverse rotation	Reverse rotation operation
5	User program <sup>[Note 2]</sup>	User program operation

[Note 1] Bit-fitting operation: Operation of reversing rotation of the output shaft so that the bit can be fit on the hexagonal part of a nut or a bolt securely.

[Note 2] If operation mode is “5”, the operation of a selected program (0-9) is performed.

**[2] Fastening method (2nd digit)**

Represents a method of fastening screws.

Instruction No.	Name	Fastening method used
0	Two-stepfastening	Normal fastening of screws
1	Tapping	fastening of tapping screw etc. <sup>[Note 3]</sup>
2	Re-fastening	Re-fastening of screws etc.
3	Not used	
4	Not used	
5	Not used	
6	Tapping and Re-fastening	Re-fastening of tapping screws etc. <sup>[Note 3]</sup>

[Note 3] The tapping screw is valid only when it penetrates a fastener.

**[3] Additional operation (3rd digit)**

Represents how to proceed with each process in fastening screws

Instruction No.	Name	How fastening proceeds to next process
0	No additional operation	Proceeds to the final process upon a start signal.
1	Sync fastening operation	The motor stops after the completion of initial rundownprocess and waits for an external signal.
2	Sensor input operation	Proceeds to the initial rundownprocess upon a sensor signal. (Valid only when the operation mode is forward rotation and reverse rotation, or the fastening method is “Tapping”.)
3	Sensor input operation + Sync fastening operation	Both sensor input operation and sync fastening operation is performed. (Valid only when fastening method is “Tapping”.)

**[4] Final fastening operation/User program number (4th digit)**

Represents a control method in the final fastening process or a user program<sup>[Note 1]</sup>.

Instruction No.	Name	Fastening method (final fastening) in the final process
0	Torque method <sup>[Note 2]</sup> (Without channel connection operation)	Operation stops if the current value reaches a preset value.
1	Angle method (Without channel connection operation)	If the rotation angle with reference to that at the completion of initial rundownreaches a preset value, operation stops.
2	Torque method <sup>[Note 2]</sup> (With a rotation stop channel)	If the current value reaches a preset value, the motor stops after the operation stops, and the operation shown in Fig.- A is performed.
3	Not used	
4	Angle method (With channel connection operation)	If the rotation angle with reference to that at the completion of initial rundownreaches a preset value, operation stops and the operation shown in Fig.- A is performed.
5	Torque angle method (Without channel connection operation)	If the current value or the rotation speed with reference to that at the completion of initial rundownreaches a preset value, operation stops. (Invalid if operation mode is forward rotation or reverse rotation.)
6	Torque angle method (With channel connection operation)	If the current value or the rotation speed with reference to that at the completion of initial rundown reaches a preset value, operation stops and then the operation shown in Fig.- A is performed. (Invalid if operation mode is forward rotation or reverse rotation.)
7	Torque method <sup>[Note 3]</sup> (Torque measuring tightening, and without channel connection operation)	Operation stops if the current value reaches a preset value.
8	Torque method <sup>[Note 4]</sup> (Torque measuring tightening, and with channel connection operation)	Operation stops if the current value reaches a preset value. The motor stops and the operation shown in Fig.- A is performed.

[Note 1] When you choose “5” as 1st digit, 4th digit means “User program number”.

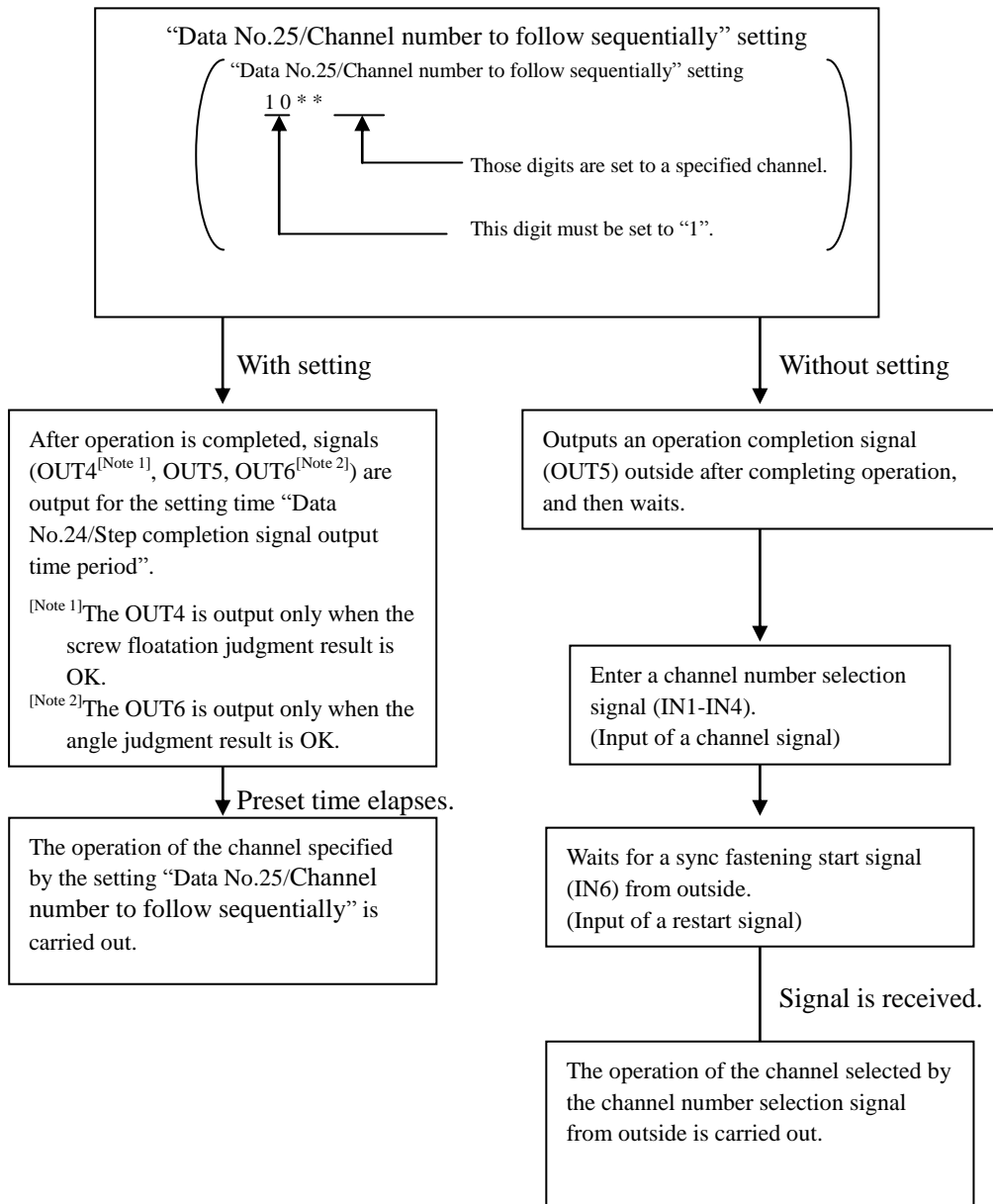
[Note 2] Torque method: Torque method means “Torque control tightening<sup>[Note 3]</sup>” unless stated.

[Note 3]Torque control tightening: Tightening method with torque control by torque feedback. With which the driver operates tightening with required torque by torque control.

[Note 4] Torque measuring tightening: Tightening method without torque feedback. The driver operates tightening until the torque reaches to required value by torque measuring. If stalling time value were input the driver keep rotating through that period after reaching to target torque.

**[5] Channel connection operation**

The channel connection operation varies depending on the setting values entered for “Data No.24/Step completion signal output time period” and “Data No.25/Channel number to follow sequentially”. If a fasteningerror occurs in the connection channel, operation is terminated without channel connection performed.



**Fig.- A**

**(5) Revolving speed during initial rundown (Data No. 00)**

Indicates a rotation speed of the output shaft of a tool unit until a screw has been seated (while a screw is being tightened).

(Set to a value with consideration given to an impact torque.)

**(6) Torque during initial rundown (Data No.01)**

This value indicates the torque for determining that the screw has reached the intended position (for setting, select a value taking into consideration the impact torque).

**(7) Revolving speed for final fastening (Data No. 02)**

Indicates a rotation speed of the output shaft of a tool unit during a period from “Initial rundown completion” to “Fastening completion” of a screw. (Normally, specify a value not higher than 100rpm.)

**(8) Torque for final fastening (Data No.03)**

This indicates the value for setting a target fastening torque.

**(9) Final fastening angle (Data No. 04)**

Indicates a rotation angle (in forward direction) of the output shaft of a tool unit during a period from “Initial rundown completion” to “Fastening completion” of a screw. The setting is valid only when the final fastening operation is of angle method or torque angle method. (To max 999.9°in increments of 0.1°)

**(10) Torquedata transmission frequency (Data No. 05)**

This setting is configured when current value data is transmitted externally from the serial port. The setting value indicates that how many times the current value data will be transmitted. Up to 10 times can be specified. If “1” is added at the highest-order digit to make a value “10\*\*”, a character string is transmitted when fastening is started.

**(11) Upper limit/ Torque criterion (Data No.06)**

This value indicates the upper limit for torque judgment.

**(12) Lower limit/ Torque criterion (Data No.07)**

This value indicates the lower limit for torque judgment.

**(13) Stall time (Data No. 08)**

Indicates a time while a shaft output torque should be maintained during a period from when the torque of the output shaft of a tool unit reaches a preset fastening torque (Final fastening current value) to when fastening is completed. This setting is invalid when final fastening operation is of angle method and torque angle method, or when operation mode is individual operation with forward or reverse rotation only. (Don't specify a too large value; otherwise, tool units and controllers may be damaged or their product life spans may be shortened.)

**(14) Cycle time (Data No. 09)**

Indicates a cycle time of each fastening process. If the setting value is exceeded, fastening is NG.

**(15) Speed for tapping (Data No. 10)**

Indicates a rotation speed of the output shaft of a tool unit when a screw, such as a tapping screw, is tapping a material.

**(16) Torque for tapping (Data No.11)**

This item indicates the output torque of the tool unit output shaft when a self tapping screw is tapped

**(17) Torque for changeover to angle during tapping (Data No.12)**

This indicates the value of torque of switching to angle-method fastening when the tapping screw or other screws is tapping. When the fastening torque reaches the value set here, the tool unit output shaft will revolve by the angle set in the after-mentioned “Revolving angle during tapping”.

(Note that an excessive value may cause stripping of threads.)

**(18) Revolving angle of tapping (Data No. 13)**

Indicates by which angle is the output shaft of a tool unit rotated during a period from when the above-mentioned changeover to the angle method occurs with the tapping angle changeover current or when the sensor is turned on (when “With sensor input” is selected for additional operation) to when initial rundown is started. (To max 9999°in increments of 1°)

**(19) Revolving speed for thread fitting (Data No. 14)**

Indicates a rotation speed when the output shaft of a tool unit is fit on a bolt/nut.  
(The tool unit output shaft rotates in reverse direction.)

**(20) Torque for thread fitting (Data No.15)**

This value indicates the output torque of tool unit output shaft when engaging nuts or other similar works with the bit. (Note that the tool unit output shaft revolves in the reverse direction during this operation.)

**(21) Time period for thread fitting (Data No. 16)**

Indicates a time required for the output shaft of a tool is rotated to fit on a bolt/nut.  
(The tool unit output shaft rotates in reverse direction.)

**(22) Torque for release-socket-bite (Data No.17)**

After fastening a hex head bolt, slight reverse revolution of the output shaft is sometimes necessary to release the bolt head from the hex socket. This value indicates the output torque of tool unit output shaft when the output shaft is revolved in the reverse direction.  
(Note that an excessive value may loosen bolts and nuts.)

**(23) Revolving angle for release-socket-bite (Data No. 18)**

After a screw etc. is tightened, the rotation of the output shaft is reversed to release the bit from being stuck to the screw etc. The setting value indicates an angle by which the tool unit motor is rotated for this purpose.  
(If the setting value is too large, bolts and nuts may become loose.)

**(24) Time period for release-socket-bite (Data No. 19)**

After a screw etc. is tightened, the rotation of the output shaft is reversed to release the bit from being stuck to the screw etc. The setting value indicates a time for rotating the tool unit output shaft for this purpose.  
(If the setting value is too large, bolts and nuts may become loose.)

**(25) Upper limit/screw height detection 1 (Data No. 20)**

This item is specified if screw floatation judgment is performed using an external sensor when fastening is completed (at torque up). The setting value indicates by which angle the output shaft of a tool unit rotates (in forward direction) during a period from when an external sensor signal is turned on. The value specified here should satisfy the following condition. If “0000” is specified, the judgment is invalid.

You can monitor a screw floatation judgment value (in increments of 10°) with a monitor number “-159”.

**Conditional expression:**

Upper limit/ Lower limit/  
screw height detection1≤Correct value≤screw height detection2

**(26) Lower limit/screw height detection 2 (Data No.21)**

Like the above (24), this item is specified if judgment is made whether or not screw floatation exist.

The value specified here should satisfy the following condition.

If “0000” is specified, the judgment is invalid.

You can monitor a screw floatation judgment value (in increments of 10°) with a monitor number “-159”.

**Conditional expression:**

$$\begin{array}{cc} \text{Upper limit/} & \text{Lower limit/} \\ \text{screw height detection1} \leq \text{Correct value} \leq \text{screw height detection2} & \end{array}$$

**(27) Upper criterion for final fastening angle (Data No.22)**

Indicates an upper limit for judging rotation angle (in forward direction) of the output shaft of a tool unit at final fastening during a period from “Initial rundown completion” to “Fastening completion” of a screw. This setting item is valid when final fastening is other than angle method. However, if “0000” is specified, the judgment is invalid.

You can monitor a final fastening angle judgment value (in increments of 1°) with a monitor number “-158”.

**(28) Lower criterion for final fastening angle(Data No.23)**

Indicates a lower limit for judging rotation angle (in forward direction) of the output shaft of a tool unit at final fastening during a period from “Initial rundown completion” to “Fastening completion” of a screw. This setting item is valid when final fastening is other than angle method. However, if “0000” is specified, the judgment is invalid.

You can monitor a final fastening angle judgment value (in increments of 1°) with a monitor number “-158”.

**(29) Signal output time (Data No.24)**

This item is specified if channel connection operation (operation in which operation of more than 1 channel is performed in succession) is performed. The setting value indicates a time for outputting an operation completion signal of a channel when the operation of the channel is completed. For more information on channel connection operation, refer to “[5] Channel connection operation” on page 25.

**(30) Connection channel number (Data No.25)**

This item is specified if channel connection operation (operation in which operation of more than 1 channel is performed in succession) is performed. If any of the values from “1000” (0th channel) to “1015” (15th channel) is specified here, the operation of the channel corresponding to a setting value is performed in succession.

For more information on channel connection operation, refer to “[5] Channel connection operation” on page 25.

**(31) Revolving speed for free revolution(Data No.26)**

Indicates a rotation speed of the output shaft of a tool unit when only forward or reverse rotation is performed individually. This setting is valid when the operation mode is set to forward or reverse rotation.

**(32) Torque at rotation in single direction (Data No.27)**

This value specifies the torque value to be applied to the tool unit motor when performing independent operation consisting only of regular revolution or reverse revolution. This function is enabled if the operation mode has been set to regular revolution or reverse revolution.

**(33) Lower digits/revolving angle for free revolution (Data No.28)**

Indicates a rotation angle of the output shaft of a tool unit when only forward or reverse rotation is performed individually. This setting is valid when the operation mode is set to forward or reverse rotation. (Up to 999.9° can be specified in increments of 0.1°. The setting value is used in combination with the “Upper digits/revolving angle for free revolution” below.)

**(34) Upper digits/revolving angle for free revolution (Data No.29)**

Indicates a rotation angle of the output shaft of a tool unit when only forward or reverse rotation is performed individually. This setting is valid when the operation mode is set to forward or reverse rotation. (Up to 9999000° can be specified in increments of 1000°. The setting value is used in combination with the “Lower digits /revolving angle for free revolution” above.)

**Example of setting values:**

If data No.29 is set to 1234, and data No.28 is set to 5678, rotation angle is 1234567.8°.

**3-4. Set up the torque value**

For SD550T controller minimum setting torque varies depending on tool unit type. Minimum setting torque for each tool unit as below.


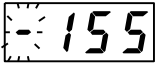











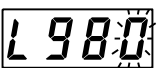





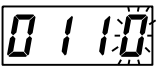

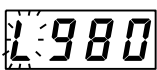

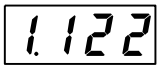



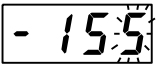


Tool Unit Type	NX020T2-07	NX050T2-07	NX100T2-07
Setting torque range (N·m)	0.5 – 2.0	1.0 – 5.0	2.5 – 9.0
Minimum setting torque (N·m)	0.001	0.001	0.01

Tool Unit Type	NX180T2-05	NX250T2-07	NX500T2-07	NX800T2-07
Setting torque range (N·m)	5-18	8-24	15-45	30-80
Minimum setting torque (N·m)	0.01	0.01	0.01	0.1

### 3-5. How to edit cells

Edit cells in the following way. This example shows how to change the setting value of address number 980 (L980).

(Examples of indications on controller)

- ① Push  key so that the cursor (figure blinking) is located at the most significant digit. 
- ② Push either  key or  key while pushing  key so that the figure indicated by the cursor changes to "L". 
- ③ Push  key. The cursor moves to the right. 
- ④ Push  key to move the cursor to the digit of setting, and then push  key or  key to change the value to the address number of the cell for setting alteration.   
Alter these 3 figures
- ⑤ Push  key so that the cursor moves to the least significant digit (fourth digit). 
- ⑥ A further push on  key will show the setting value of the present address number. 
- ⑦ Push  key so that the cursor moves to the figure to be altered. Then, push either  key or  key to alter the figures to the desired value. 
- ⑧ When the user setting has been entered, push  key necessary times to move the cursor to the leftmost digit (indication of "L"). 
- ⑨ Then, keep pushing  key until a list of figures is displayed. (The display returns to the previous one when you take your finger off the key.) 
- ⑩ The above steps have completed entry of necessary setting data in the controller. To alter the settings of other cells, repeat the steps of ① to ⑨. 
- ⑪ When alteration of values in the cell is finished, push either  key or  key so that the figure indicated by the cursor changes to "-" to return to the trace mode. Next, repeat the cycle of Steps (3) to (5) to make a monitor code number, "-155". 
- ⑫ Further push  key, and the present peak torque will appear. The above steps conclude the cell editing, and the system returns to the monitor mode. 



### 3-6. Example of editing the memory sheet

#### ① Editing the memory sheet for “two-step fastening: Torque measuring tightening”

The target torque for model NX050T2 is 2.5 N·m (fastening torque range: 2 to 3N·m).

“Two-stage fastening” means a screw fastening method consisting of two processes of “initial fastening” and “final fastening”, which is a basic method of screw fastening conducted by SD550T.

The values of fastening torque in this screw fastening method are plotted against the time, and the resulting temporal response graph is shown in the diagram below.

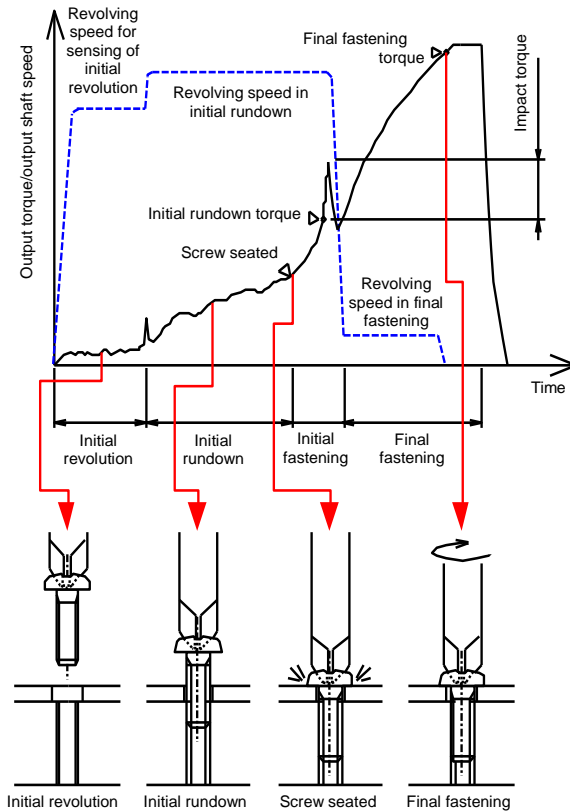


Fig. 1

The impact torque increases as output shaft speed increases. This means that selection of unnecessarily high revolution speed will allow the actual shaft torque to exceed the final fastening torque due to the impact torque during the initial fastening process, failing to execute proper fastening.

Therefore, setting values should be decided referring to the graphs given on pages 15 to 18 in the “Instruction Manual for NX(T2) series (for SD550T) NX Driver ” so that the following expressions will be satisfied:

**“Impact torque (Initial rundowntorque)”**  
**< “Final fastening torque”**

When defining the setting values, select the “Final fastening torque” at first, and then, select the “Initial rundown torque” and “Revolving speed in initial fastening”, referring to the graphs described above.

Setting values should be entered in the following procedure (when setting to CH0):

- (1) Set the cell of address number “**L980**” to “**0007**” (value of “Operation sequence number”).  
(Refer to pages 21 to 29 and 48 to 53 for the operation sequence number in detail.)
- (2) Set the cell of address number “**L491**” to “**0370**” (value of “Revolving speed for sensing of initial revolution”).  
(A proper value has been set before shipping.)
- (3) Set the cell of address number “**L492**” to “**0500**” (value of “Torque for sensing of initial revolution”).  
(A proper value has been set before shipping.)
- (4) Set the cell of address number “**L500**” to “**0370**” (value of “Revolving speed during initial rundown”).  
(Please decide “Revolving speed during initial rundown” according to the graph for NX020T2 in page 14 of additional volume “Instruction Manual for NX(T2) series (for SD550T) NX Driver”)

- (5) Set the cell of address number “L501” to “1000” (value of “Torque during initial rundown”).  
(The value should be set to the necessary lowest one in order to suppress the impact torque.)
- (6) Set the cell of address number “L502” to “0010” (value of “Revolving speed for final fastening”).  
(Please set up “Revolving speed in final fastening” for Torque measuring tightening within 5~10 rpm and for Torque control tightening within 30~50 rpm.)
- (7) Set the cell of address number “L503” to “2500” (value of “Torque for final fastening”).  
(Set the value of final fastening torque to the target fastening torque.)
- (8) Set the cell of address number “L506” to “3000” (value of “Upper limit/ Torque criterion”).  
(Decide the upper criterion for torque value from the target fastening torque range.)
- (9) Set the cell of address number “L507” to “2000” (value of “Lower limit/ Torque criterion”).  
(Decide the lower criterion for torque value from the target fastening torque range.)
- (10) Set the cell of address number “L508” to “0005” (value of “Stall time”).  
(Please set up default configuration of stall time value for Torque measuring tightening as 50ms and for Torque control tightening as 300ms.)
- (11) Set the cell of address number “L509” to “0003” (value of “Cycle time”).  
(Determine the cycle time as “the longest cycle time for each process” plus 1. When set to “0”, there will be no over cycle time)

The above steps conclude the setting. Fig. 3 shows memory sheets that contain entered settings.

Further, a program having settings of this memory sheet will flow as shown in the flowchart of Fig. 2. (The user does not need to enter any values in those cells that have not setting value in the memory sheet.)

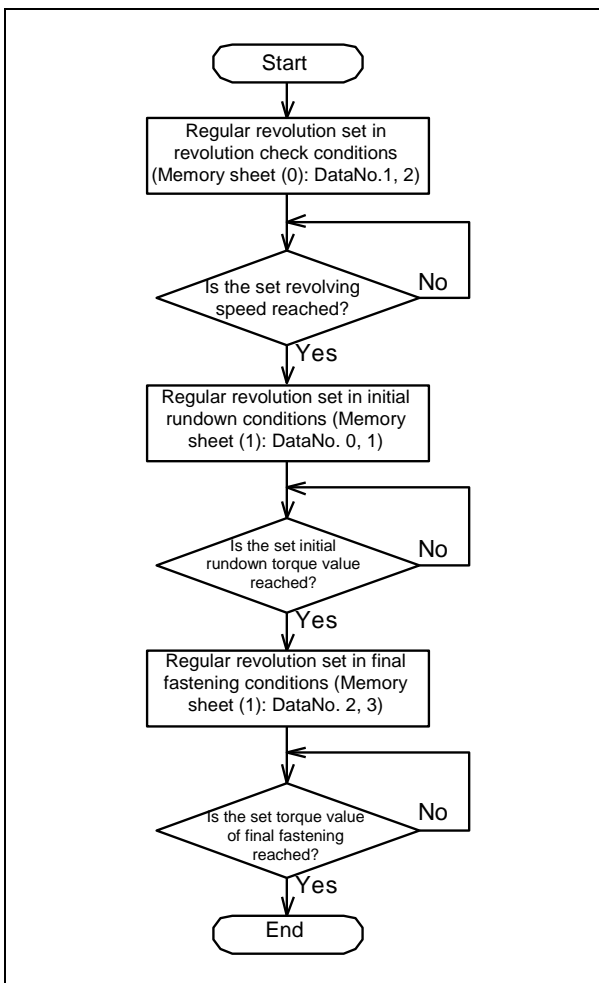


Fig. 2

## Memory sheet (0)

Data No.	Contents		
0	Channel number to confirm operation		(L490)
1	Revolving speed for sensing of initial revolution	rpm	0370 (L491)
2	Torque for sensing of initial revolution	0.001 N·m	0500 (L492)
3			(L493)
4			(L494)
5			(L495)
6			(L496)
7			(L497)
8			(L498)
9			(L499)

## Memory sheet (1) (2)

Data No.	Used under channel #		0		1	15
	torqueContents	Target	2.5	N·m	N·m	N·m
	Operation sequence number		0007	(L980)	(L981)	(L995)
0	Revolving speed during initial rundown	rpn	0370	(L500)	(L530)	(L950)
1	Torque during initial rundown	0.001 N·m	1000	(L501)	(L531)	(L951)
2	Revolving speed for final fastening	rpm	0010	(L502)	(L532)	(L952)
3	Torque for final fastening	0.001 N·m	2500	(L503)	(L533)	(L953)
4	Final fastening angle	0.1 deg.		(L504)	(L534)	(L954)
5	Torque data transmission frequency	times		(L505)	(L535)	(L955)
6	Upper limit/ Torque criterion	0.001 N·m	3000	(L506)	(L536)	(L956)
7	Lower limit/ Torque criterion	0.001 N·m	2000	(L507)	(L537)	(L957)
8	Stall time	0.01sec.	0005	(L508)	(L538)	(L958)
9	Cycle time	sec.	0003	(L509)	(L539)	(L959)
10	Speed for tapping	rpm		(L510)	(L540)	(L960)
11	Torque for tapping	0.001 N·m		(L511)	(L541)	(L961)
12	Torque for changeover to angle during tapping	0.001 N·m		(L512)	(L542)	(L962)
13	Revolving angle during tapping	deg.		(L513)	(L543)	(L963)
14	Revolving speed for thread fitting	rpm		(L514)	(L544)	(L964)
15	Torque for thread fitting	0.001 N·m		(L515)	(L545)	(L965)
16	Time period for thread fitting	0.01sec.		(L516)	(L546)	(L966)
17	Torque for release-socket-bite	0.001 N·m		(L517)	(L547)	(L967)
18	Reverse revolving angle for release-socket-bite	0.1deg.		(L518)	(L548)	(L968)
19	Time period for release-socket-bite	0.01sec.		(L519)	(L549)	(L969)
20	Screw height detection 1	10 deg.		(L520)	(L550)	(L970)
21	Screw height detection 2	10 deg.		(L521)	(L551)	(L971)
22	Upper limit/ angle detection for final fastening	deg.		(L522)	(L552)	(L972)
23	Lower limit/ angle detection for final fastening	deg.		(L523)	(L553)	(L973)
24	Step completion signal output time period	0.01sec.		(L524)	(L554)	(L974)
25	Channel number to follow sequentially			(L525)	(L555)	(L975)
26	Revolving speed in single direction	rpm		(L526)	(L556)	(L976)
27	Torque in single direction	0.001 N·m		(L527)	(L557)	(L977)
28	Lower digits/revolving angle in single direction	0.1deg.		(L528)	(L558)	(L978)
29	Upper digits/revolving angle in single direction	-		(L529)	(L559)	(L979)

Fig. 3

## 4. How to specify parameters

Each parameter has been set to a proper value before the shipment from the factory. If any change to a parameter is required, set the parameter in the following procedure.

### 4-1. Parameters






















The parameters are setting values configuring the whole system (characteristics of the controller and a connected tool unit etc.). The parameters vary depending on each unit and system configuration.

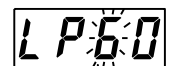
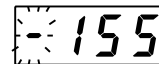
### 4-2. Setting method

Set parameters in the following procedure:

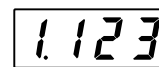
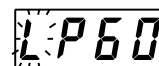
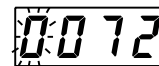
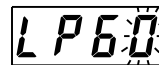
(For more information on each parameter, refer to a separate document “Parameter list”).

(Examples of indications on controller)

- ① Push  key so that the cursor (figure blinking) is located at the most significant digit.
- ② Push either  key or  key while pushing  key so that the figure indicated by the cursor changes to “L”.
- ③ Push  key. The cursor moves to the right.
- ④ Push either  key or  key while pushing  key so that the figure changes to “P”.  
(To select values for parameter numbers 100 to 199, push  key and  key at the same time while pushing  key so that an indication of “P.” will appear in the digit.)
- ⑤ Push  key until the cursor is located on the right most figure. Then, push   key to alter the figure to the parameter number desired.
- ⑥ Push  key so that the cursor is located at the least significant digit (fourth digit).
- ⑦ By pushing  key again, the currently set value of the parameter is displayed. Then, push  key and   keys to alter the displayed value.
- ⑧ When the set value of the parameter is altered, push  key so that the cursor is located at the most significant digit (displayed as “L”).
- ⑨ Then, keep pushing  key until a list of figures is displayed.  
(The display returns to the previous one when you take your finger off the key.)



Change those two digits



- ⑩ The above steps have completed entry of necessary setting data in the controller. Repeat the above steps from ① to ⑨, to alter the values of the other parameters.



When all changes have been completed, turn off the power supply for the moment and turn on the power again after confirming that indications are gone on the display.

## 5. Other operations

### 5-1. Scaling function

By scaling function you can correct actual torque output against indicated value and setting value.

#### ◆ How to set up

Change the value of parameter Pa67 when you use scaling function.

Default value of the parameter “Pa67” is “\*100”.

[Note] The value of “\*” (significant digits of decimal point) varies depending on tool unit type.

When you change the value of the area “100” to smaller digit output torque will be reduced and reverse to increase.

Ex.

Measured torque of actual tightening being low like 0.9Nm against display value of controller is 1.0Nm.

$$0.9/1.0 = 0.9 = 90\%$$

Set value to be “\*090”.

Please refer to “4. How to specify parameters” on page 34 for how to change parameter.

### 5-2. Operation Condition Alarm Function

Alarm when number of tightening times exceeds the predetermined number.

OK/NG lamp will blink in orange color as alarm when number of tightening times exceeds the recommended value in periodical check of tool unit (refer to page 19 in the “Instruction Manual for NX(T2) series (for SD550T) NX Driver”).

Alarm will blink when power on and when about 30 seconds passed after tightening completed.

Present setting number of tightening times can be checked by “Monitor mode”. Present setting number of tightening times can be checked by “Monitor mode”.


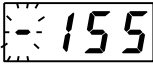









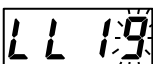







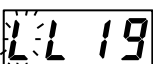

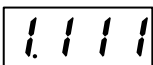
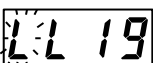
“-054” Tightening times low-order 4 digits (per once)

“-055” High-order 4 digits (per 10,000 times)

Please reset operation settings of tool unit against next alarm when tool unit is replaced or overhauled.

◆ How to reset operation settings

(Examples of indications on controller)

- |   |   |
|---|---|
| <p>① Push  key so that the cursor (figure blinking) is located at the most significant digit.</p>  |    |
| <p>② Push either  key or  key while pushing  key so that the figure indicated by the cursor changes to “L”.</p>          |    |
| <p>③ Push  key. The cursor moves to the right and changes to “L” as mentioned in ②.</p>  |    |
| <p>④ Push  key. Push either  key or  key to alter the figure to “LL19”</p>   |    |
| <p>⑤ 4 digits value will be displayed if you further push  key.</p>  |    |
| <p>⑥ Push  key until the cursor is located on the right most figure. Then, push   key to alter the figure to “9101”.</p> |    |
| <p>⑦ When the set value of the parameter is altered, push  key so that the cursor is located at the most significant digit (displayed as “L”).</p>  |   |
| <p>⑧ Then, keep pushing  key until a list of figures is displayed.<br/>(The display returns to the previous one when you take your finger off the key.)</p>  |  |
| <p>⑨ With procedure above operation settings of tool unit will be reset.</p>  |  |
| <p>⑩ Turn off the power supply for the moment and turn on the power again after confirming that indications are gone on the display.</p>  |   |

## Maintenance and inspection

Since the controller uses highly reliable parts, daily inspection can be performed easily. Perform an inspection following the items in the table below. The “Inspection cycle” in the table is a rough standard. Increase or decrease the inspection cycle according to use status/environment. Note that turn off the power before starting maintenance and inspection unless otherwise instructed.

No.	Inspection cycle	Inspection item	Inspection/repair instruction	Remark
1	Everyday [Note 1]	Inspection on connectors	Perform a visual and tactile inspection.	Free from looseness, removal, and contamination
2	Everyday [Note 1]	Inspection on cables	Perform a visual and tactile inspection.	Free from damages, such as scratches and gouge
3	Every year	Looseness of screws	Retighten	

[Note 1] Perform an inspection before starting operation.

## Typical Problems and Troubleshooting

This chapter describes the causes of typical troubles and corrective measures. For troubles of tool unit, refer to a separate Instruction manual for “NX(T2) series (for SD550T) NX Driver”.

### 1. Error in the system

If an error occurs in the controller system, it stops and an alarm number is shown on the display. Identify the error by comparing the alarm number with the table below and take appropriate action.

(The alarm can be reset by turning off the power. <sup>[Note 1]</sup>)

Alarm number	Name	Meanings	Cause	Corrective measure
A001	Watchdog timer	Occurrence of system error	.....	Replace the controller.
A002	Power-down	Occurrence of power supply shut down or voltage drop	Momentary power error or voltage drop of primary power	Review primary power.
A003	NMI	Occurrence of system error	.....	Replace the controller.
A004	Incorrect exception handling	Occurrence of system error	.....	Replace the controller.
A005	EEPROM write error	Occurrence of EEPROM error	.....	Replace the controller.
A006	Memory error	Occurrence of system error	.....	Replace the controller.
A007	Tool communication error	Communication error of tool unit	<ul style="list-style-type: none"> <li>• Connector connection error</li> <li>• Encoder cable break</li> <li>• Damage to the tool unit [Note 3]</li> </ul>	<ul style="list-style-type: none"> <li>• Connect each connector again.</li> <li>• Replace the encoder.</li> <li>• Replace the tool unit.</li> </ul>
A008	Data error of tool unit	Data error of tool unit	Differences between controller and tool unit version	<ul style="list-style-type: none"> <li>• Replace the tool unit or the controller.</li> </ul>
A009	EEPROM read error	Occurrence of EEPROM error	.....	Replace the controller.

Alarm number	Name	Meanings	Cause	Corrective measure
A010	Motor overload (Current)	Occurrence of overload	Load on the tool unit is too large for a workpiece [Note 2]	<ul style="list-style-type: none"> <li>• Lengthen downtime.</li> <li>• Replace the tool unit with the next higher model.</li> </ul>
A011	Motor overload (Voltage)	Occurrence of overload		
A014	Machine type faulty	Mismatch of tool unit type	Unsupported tool unit is connected to the controller	<ul style="list-style-type: none"> <li>• Replace the controller.</li> <li>• Replace the tool unit.</li> </ul>
A015	IPM F0	Power module error	<ul style="list-style-type: none"> <li>• Damage to the tool unit</li> <li>• Damage to the controller</li> <li>• Motor cable short-circuit</li> </ul>	<ul style="list-style-type: none"> <li>• Replace the tool unit.</li> <li>• Replace the controller.</li> <li>• Replace the motor or cable.</li> </ul>
A021	Z-phase verification error	Encoder error	<ul style="list-style-type: none"> <li>• The output shaft has not rotated two turns or more since the power was turned on.</li> <li>• Encoder cable break</li> <li>• Damage to the tool unit [Note 3]</li> </ul>	<ul style="list-style-type: none"> <li>• Turn the output shaft two turns or more.</li> <li>• Replace the motor cable.</li> <li>• Replace the tool unit.</li> </ul>
A027	Position error	Encoder error	Damage to the tool unit	Replace the motor or cable.
A028	Encoder error			
A029	Encoder communication error		<ul style="list-style-type: none"> <li>• Connector connection error</li> <li>• Encoder cable break</li> <li>• Damage to the tool unit [Note 3]</li> </ul>	<ul style="list-style-type: none"> <li>• Connect each connector again.</li> <li>• Replace the encoder cable.</li> <li>• Replace the tool unit.</li> </ul>
A030	U-phase current sensor zero error	U-phase current sensor error	<ul style="list-style-type: none"> <li>• Parameter setting error</li> <li>• Current sensor error [Note 4]</li> </ul>	<ul style="list-style-type: none"> <li>• Set parameters.</li> <li>• Replace the controller.</li> </ul>
A031	V-phase current sensor zero error	V-phase current sensor error		
A032	Torque sensor zero error	Error of torque sensor	<ul style="list-style-type: none"> <li>• Improper setting of parameters</li> <li>• Poor connection of connector</li> <li>• Broken sensor cable</li> <li>• Broken tool unit [Note 5]</li> </ul>	<ul style="list-style-type: none"> <li>• Reset the parameters.</li> <li>• Re-connect connectors.</li> <li>• Replace the tool unit or cable.</li> <li>• Replace the controller.</li> </ul>

[Note 1] If the input power to the controller is shut off, an alarm number “A.002” is displayed until the internal capacitors have been discharged. This does not indicate a system error or controller error.  
Don’t repeat turning on and off the controller in succession in a short time. Otherwise, the product life is decreased seriously and an error may occur. (An alarm number other than “A.002” may be displayed rarely.)

[Note 2] Motor overload (Overload error) occurs when a load factor of a motor reaches 100%. This alarm occurs when it takes long time to increase the torque of a driver, or when fastening cycle is excessively short.  
When motor overload occurs, specify a setting value “-240” (when alarm number is “A.010”) or “-241” (when alarm number is “A.011”) in monitor mode. While monitoring the load factor, lengthen the fastening cycle so that the monitor value of the load factor becomes “0000” during from “Fastening completion” to “Start”.

[Note 3] A motor encoder error occurs when the driver motor does not rotate or the communication with the encoder is improper. Check if the connector is inserted and locked securely or if the cable is broken.



- [Note 4] In a controller, the zero point of the current sensor is specified by the parameter. A current sensor error may occur when the zero point position is remarkably different from the setting value. Set the parameter to a correct value in the following procedure.
- [1] When alarm number is "A.030"  
Specify a setting value "-220" in monitor mode and read a monitor value. Set the parameter number "Pa110" to the value read.
- [2] When alarm number is "A.031"  
Specify a setting value "-221" in monitor mode and read a monitor value. Set the parameter number "Pa112" to the value read.  
(Since the monitor value displayed fluctuates within a certain range, read and set an intermediate value.)
- [Note 5] A torque sensor error occurs when any parameter is set to an improper value or a signal from the torque sensor is abnormal. Check if the right parameter has been set, whether the connector is securely plugged and locked and whether the cable is broken or not.

## 2. Other errors

Trouble	Cause	Check item	Troubleshooting
<b>1. Corrective measure</b>	Setting value input error	Memory sheet channel number input signal	Input the setting value again.
	Wire break or connector breakage	Tool unit and Motor cable	Replace the tool unit or cable.
	Connection error	Connector	Connect the connector again.
	Channel number input error (External I/O signal processing error)	Output signal (Channel number input signal) from external control equipment External I/O cable	Input the setting value in a cell of the memory sheet corresponding to the channel number input signal. Review assignment of the output from external control equipment Review or replace the cable.
	Start signal input error (External I/O signal processing error)	Output signal (Input signal for start) from external control equipment External I/O cable	Input a start signal. Review assignment of the output from external control equipment Review or replace the cable.
	Motor error	.....	Review or replace the tool unit.
<b>2. Can't be powered up.</b>	Wire break or connector breakage	AC input power cable	Review or replace the cable.
	Breakage of controller	.....	Replace the controller.
	Power is not supplied.	.....	Review the main power.
<b>3. When the controller is turned on, "LP**" or "LP.**" appears on the display.</b>	Parameter setting error (Start up in safe mode)	Parameter	Correct the parameter setting value.
<b>4. Controller display shows "99.99" or "999.9"</b>	Abnormal impact torque is occurring when in screw fastening (during initial fastening)	Memory sheet	Adjust set values in "Revolution speed for initial fastening" and "Value of initial fastening torque".
<b>5. Controller display shows "99.98" or "999.8"</b>	Abnormal torque is occurring when in screw fastening (during final fastening)	Memory sheet [Note 1]	<ul style="list-style-type: none"> <li>Adjust the set value of "final fastening revolution speed".</li> <li>Alter the "operation code number".</li> </ul>
<b>6. Controller display shows "88.88" or "888.8"</b>	The screw has reached its seat before initial fastening for tapping fastening	Memory sheet	Adjust the "Absolute tapping revolution angle" or the position of the sensor for speed switching.

[Note 1] When the user is using the "Torque method, Torque control tightening" for final fastening operation, if this error persists to occur however the user tries to adjust the "Final fastening revolution speed", then change the method to the "Torque method, Torque measuring tightening" for final fastening operation.

### 3. Cause of controller NG and corrective measure


The following explains typical causes and corrective measures **when the OK/NG lamp lights up red (NG occurs)** during fastening using the standard program of a controller. **(The following does not apply when the OK/NG lamp lights green.)**

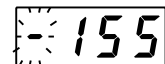
For the causes and corrective measures regarding fastening NG other than those described below, contact us using the “Inquiry form/Repair request form” at the end of this manual.



Switch the controller from monitor mode to trace mode in the following procedure for taking proper measures.

◆ Method of changing controller monitor mode

(Examples of indications on controller)

- ① Push the left  key several times to move the cursor (the blinking digit) to the leftmost digit.



- ② Push the down  key or up  key to change the cursor-staying digit to “H”.



Status of controller	Cause	Remedial method
1. Screw fastening NG with indication of “H* 65” or “H* 27” on display	Invalid operation code number has been set	Correct the set value for operation code number.
2. Screw fastening NG with indication of “H* 76” on display	Necessary setting is not entered.	Enter values for “Upper limit/ Torque criterion” and “Lower limit/ Torque criterion” for setting.
	A channel is selected in which no setting has been entered	Enter a value in the selected channel for setting or correct the channel selection.
3-1. 3. Screw fastening NG with indication of “H* 23” on display	The setting of “absolute tapping revolution angle” is not adequate	Adjust the setting of “Revolving angle during tapping”.
	Setting of “value of tapping torque” is not adequate	Adjust the setting of “Torque for tapping”.
3-2. 4. Screw fastening NG with indication of “H* 61” on display	Broken bit shank that is mounted on the tool unit or other defects	Replace or clean the bit shank.
	Setting of “rpm for checking initial revolution” or “torque value for checking initial revolution” is not adequate	Adjust the setting of “Revolving speed for sensing of initial revolution” or “Torque for sensing of initial revolution”.
3-3. 5. Screw fastening NG with indication of “H* 17” on display	Setting of “Value of tapping angle switching torque” is not adequate	Adjust the setting of “Torque for changeover to angle during tapping”.
3-4. 6. Driver not running with the indication being “H* 20” or “H* 63” on display	External sensor signals (IN5) has not been entered	Check or replace the wiring of external I/O cable. Supply an external sensor signal (check the sequence of external control equipment).
3-5. 7. Screw fastening NG with indication of “H* 81” on display	Initial fastening torque was not reached within the set cycle time	Adjust the setting of “Torque during initial rundown” (or “Revolving speed during initial rundown”)

8. Driver not running with the indication being “H* 23” or “H* 74” on display	The synchronous fastening start signal (IN6) or the channel continuance start signal (IN6) has not been supplied	Check or replace the wiring of external I/O cable. Supply a synchronous fastening start signal or channel continuance start signal (check the sequence of external control equipment).
<b>Status of controller</b>	<b>Cause</b>	<b>Remedial method</b>
9. Screw fastening NG with indication being “H* 52” on display	Final fastening torque not reached within the set cycle time	Adjust the setting of “Torque for final fastening”.
10. Screw fastening NG with indication of “H* 08” or “H* 30” on display	Setting of “Angle for final fastening” is not adequate	Adjust the setting of “Final fastening angle”.
	Setting of “Value of final fastening torque” is not adequate	Adjust the setting of “Torque for final fastening”.
11. Screw fastening NG with indication being “H* 44” or “H* 92” on display	Set fastening torque not reached within the set cycle time	Adjust the setting of “Torque in single direction”.
12. Screw fastening NG with indication being “H* 22” or “H* 24” on display	Setting of “Simple direction angle” is not adequate	Adjust the setting of “Lower digits/revolving angle in single direction” or “Upper digits/revolving angle in single direction”.
	Setting of “Value of simple direction torque” is not adequate	Adjust the setting of “Torque in single direction”.
13. Screw fastening NG with indication being “H* 98” on display	Fastening torque is not within the set torque range from “Lower criterion for torque value” to “Upper criterion for torque value”	Adjust the setting of “Torque during initial rundown” (or “Revolving speed during initial rundown”). Adjust the setting of “Upper limit/Torque criterion” or “Lower limit/ Torque criterion”.
14. Screw fastening NG with indication being “H* 92” on display	Screw reached the seat before initial fastening for tapping fastening	Adjust the “Revolving angle during tapping” or the position of speed switching sensor.
15. Screw fastening NG with indication being “H* 65” on display	Abnormal impact torque occurred when during screw fastening process	Adjust the setting of “Revolving speed during initial rundown” and “Torque during initial rundown”.
16. Screw fastening NG with indication being “H* 57” on display	Abnormal impact torque occurred when during screw fastening process	Adjust the setting of “Revolving speed for final fastening”
17. Screw fastening NG with indication being “H* 02” on display	NG occurred, When the channel changed for channel connection operation.	Adjust the setting of “Torque criterion”, “Angle detection for final fastening” or “Screw height detection”

Note: The same number shown on the display may indicate multiple statuses different from each other. Select a corrective measure according to use condition.

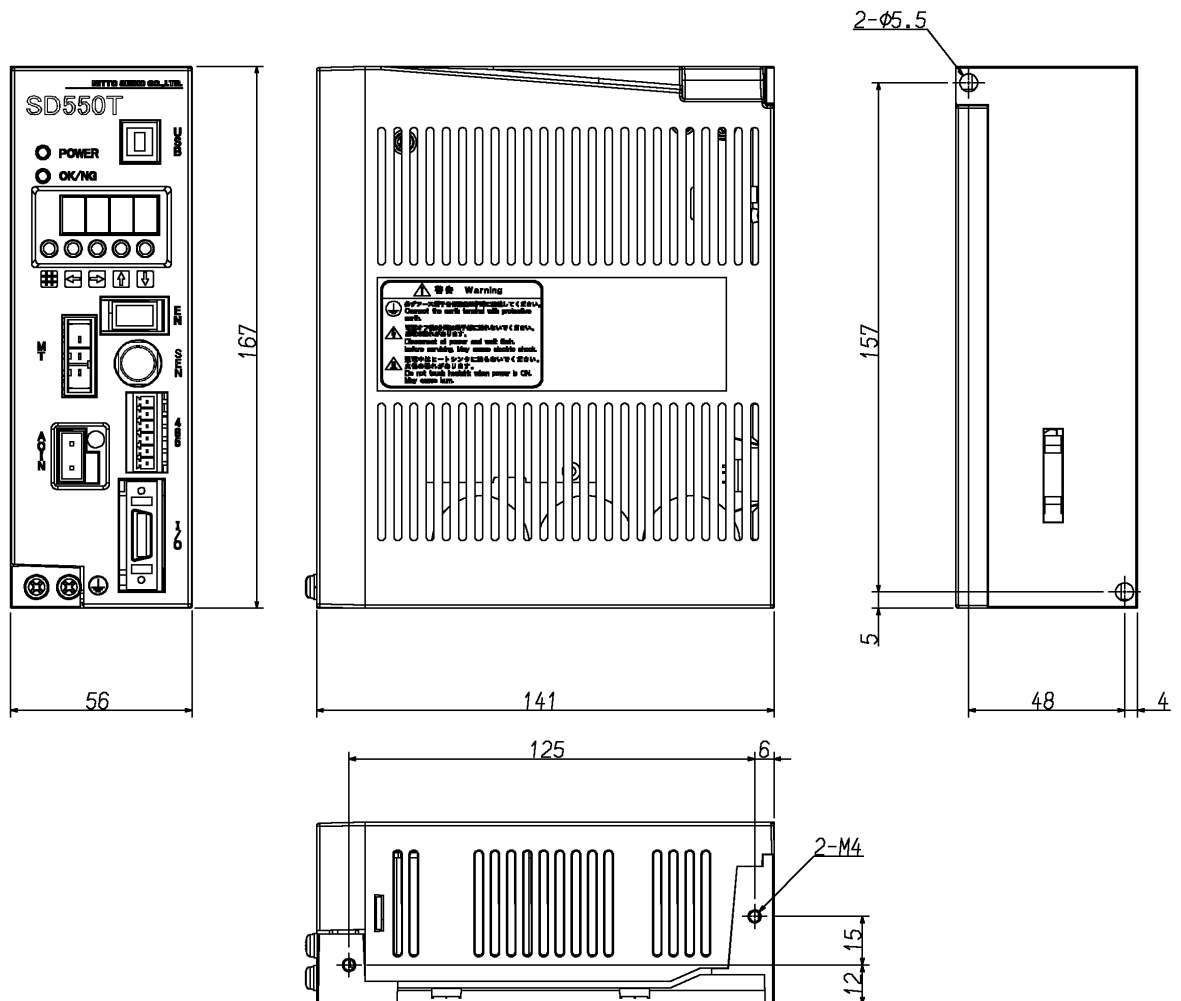
# Appendix

## 1. Specification

Controller model	SD550T03-2020	SD550T05-2020	SD550T10-2020
Fastening method	Torque method / Angle method		
Number of programs	16 programs (from 0 to 15)		
Number of external I/O's	Input	8 (System: 5 I/O's are occupied.)	
	Output	8 (System: 4 I/O's are occupied.)	
Storage memory	EEPROM		
Self diagnostic function	Error No. is displayed and an external signal is outputted if a system error occurs.		
Input power voltage	Single phase, 200 VAC to 230 VAC $\pm 10\%$ , 50/60 Hz		
Maximum power capacity	600 VA		1.2 kVA
Mass of controller	750 g		950 g
Applicable tool unit model	NX020T2, NX050T2	NX100T2	NX180T2, NX250T2, NX500T2, NX800N2

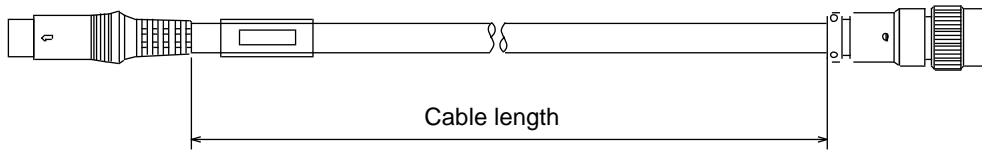
## 2. Outer dimensions

(1) Controller [SD550T03-2020, SD550T05-2020]

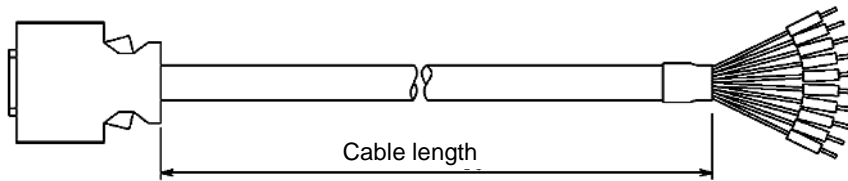




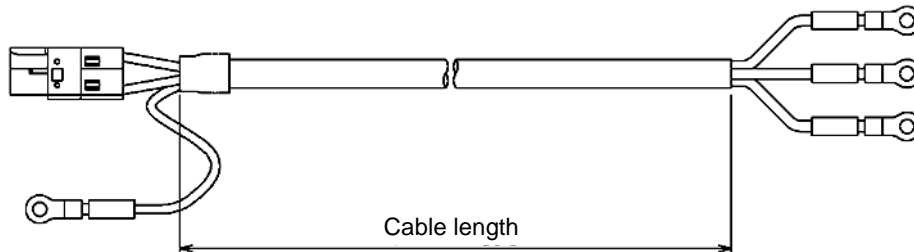
- (5) Sensor cable [SD-SC1-□□□-CC]  
 External cable diameter 5.5 mm, Minimum bend radius 50mm



- (6) External I/O cable[SD-IC3-□□□-D]  
 External cable diameter 9.3 mm, Minimum bend radius 60mm  
 Don't use this cable for cable carrier or robot arm, in which the cable is slid or bent continuously.



- (7) AC input cable[SD-AC5-□□□-D]  
 External cable diameter 7.8 mm, Minimum bend radius 50mm  
 Don't use this cable for cable carrier or robot arm, in which the cable is slid or bent continuously.



### 3. Pin assignment of external I/O connector

Pin number	Signal	Type	Signal description
1	COMIN	Input	Common for input signal
2	COMIN	Input	Common for input signal
3	COMOUT	Input	Common for output signal
4	COMOUT	Input	Common for output signal
5	IN 0	Input	Start (Continuous signal) [Note 1]
6	IN 1	Input	Channel number selection CH 1
7	IN 2	Input	Channel number selection CH 2
8	IN 3	Input	Channel number selection CH 4
9	IN 4	Input	Channel number selection CH 8
10	IN 5	Input	External sensor signal
11	IN 6	Input	Sync fastening start/Continuation start
12	IN 7	Input	Not used
13	OUT 0	Output	Ready to receive start
14	OUT 1	Output	OK judgment, Completion
15	OUT 2	Output	NG judgment, Discontinuation, Time-out [Note 4]
16	OUT 3	Output	System alarm [Note 5]
17	OUT 4	Output	Detection of screw height OK
18	OUT 5	Output	Ready to receive sync fastening start, Channel operation completed
19	OUT 6	Output	Angle determined OK
20	OUT 7	Output	Not used

[Note 1] Pulse signal can also be input by changing parameter setting.

[Note 2] Channel number can be selected as shown in the table below:

Channel number	O: ON x: OFF															
	No.0	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10	No. 11	No. 12	No. 13	No. 14	No. 15
CH 1	x	O	x	O	x	O	x	O	x	O	x	O	x	O	x	O
CH 2	x	x	O	O	x	x	O	O	x	x	O	O	x	x	O	O
CH 4	x	x	x	x	O	O	O	O	x	x	x	x	O	O	O	O
CH 8	x	x	x	x	x	x	x	x	O	O	O	O	O	O	O	O

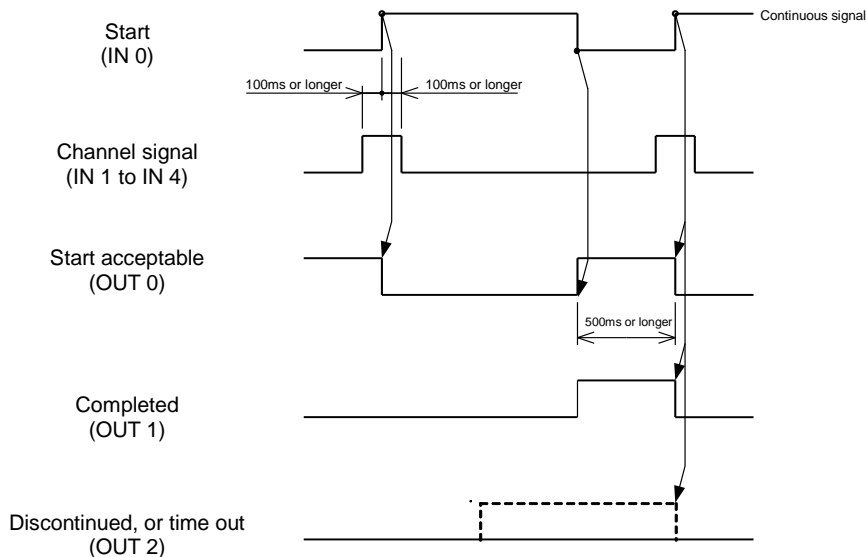
[Note 3] This I/O port is used only when the standard program is used.

[Note 4] Output when a start signal (continuous signal) is turned off before a completion signal is output, or operation (program) is not completed within a preset cycle time. Since this signal is reset automatically by the next start signal, reset signal is not input.

[Note 5] Output when a controller system error occurs and remains output until the power is turned off. To reset a system error, turn off and on the controller again. (When the display indication disappears, turn on the controller.)

### 4. Timing chart of the signals

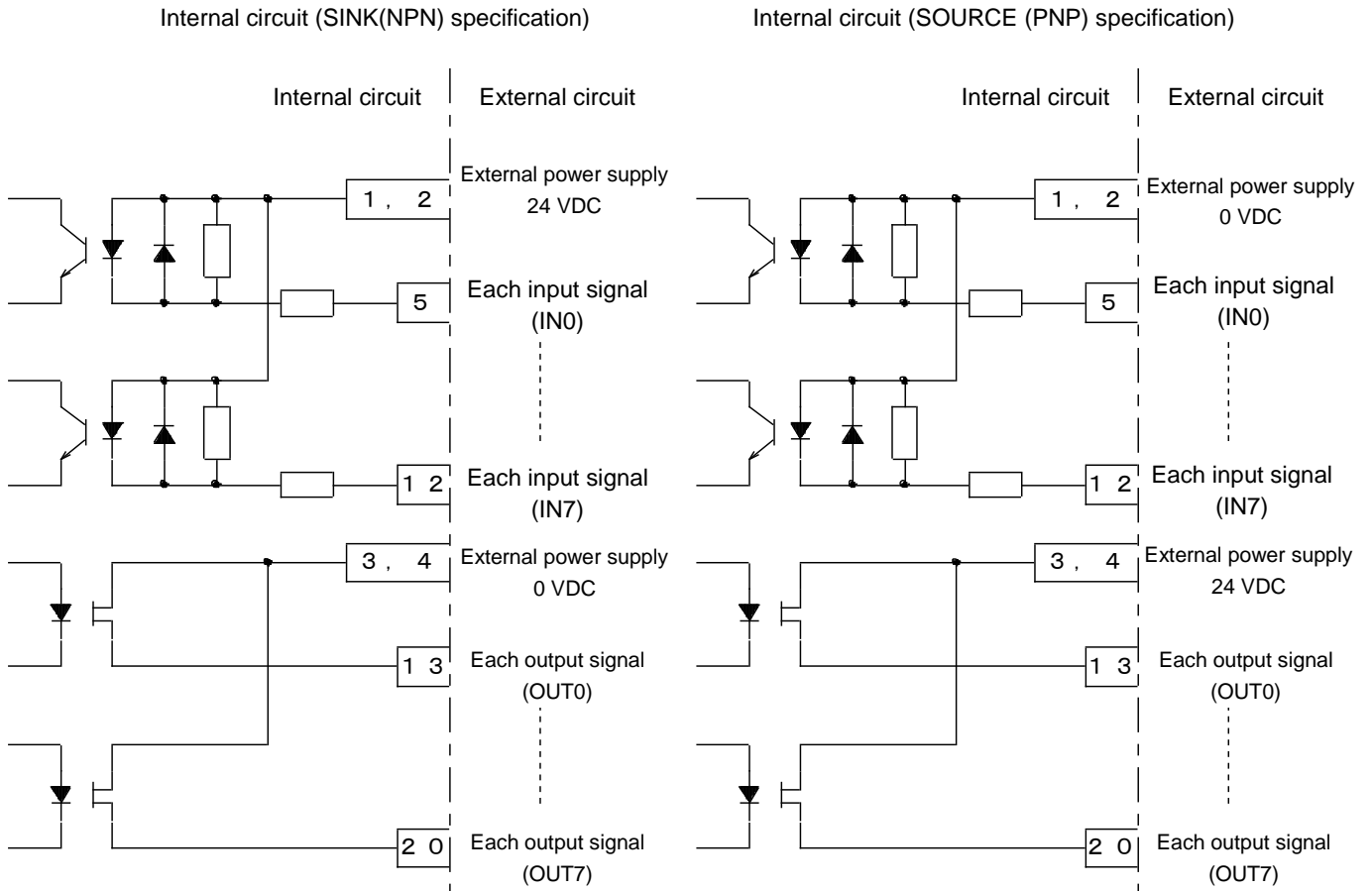
The following figure shows a timing chart of the signals.





## 5. I/O port electrical specification

- (1) Input: Photocoupler-isolated  
Input current 10 mA/24VDC
- (2) Output: Photo MOS output  
Maximum output current: 50 mA/24VDC (Resistance load)

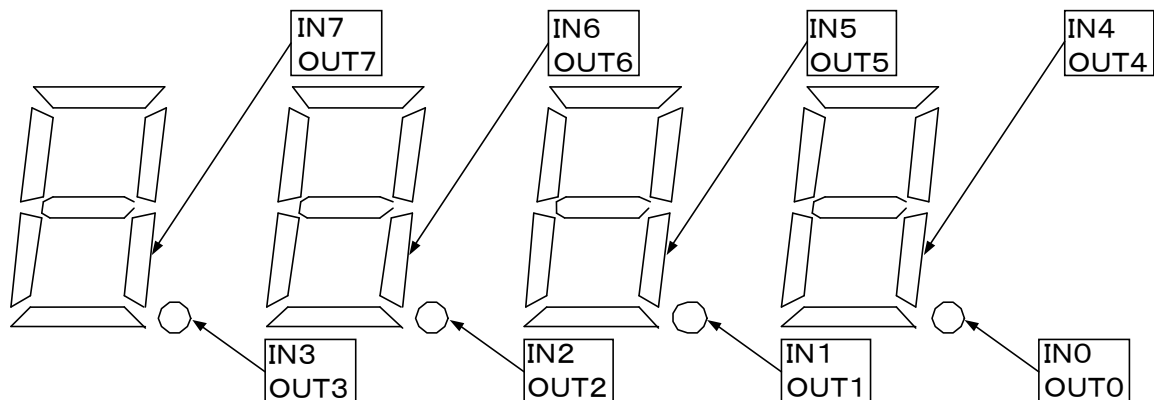


## 6. I/O port monitor

I/O signal status of I/O port is indicated on 7-segment display in monitor mode.

Monitor value when input status is checked: -595

Monitor value when output status is checked: -596





**List of setting items by operation sequence number**  
(Operation mode: Machine screw)

User setting value must be input for the data No. marked with ○.  
△... Operation varies depending on whether or not data is written.

Operation sequence number	Memory sheet (0) Data No.			Memory sheet (1), Memory sheet (2) Data No.																										Remarks									
	00	01	02	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25		26	27	28	29					
0600				○	○	○	○	△	○	○	○	○	○	○	○	○									△	△	△	△											
0601				○	○	○	○	△	○	○		○	○	○	○	○									△	△	△	△											
0602				○	○	○	○	△	○	○	○	○	○	○	○	○									△	△	△	△	△	△									
0604				○	○	○	○	△	○	○		○	○	○	○	○									△	△	△	△	△	△									
0605				○	○	○	○	△	○	○		○	○	○	○	○									△	△	△	△	△	△									
0606				○	○	○	○	△	○	○		○	○	○	○	○									△	△	△	△	△	△									
0607				○	○	○	○	△	○	○	△	○	○	○	○	○									△	△	△	△	△	△									
0608				○	○	○	○	△	○	○	△	○	○	○	○	○									△	△	△	△	△	△									
0610				○	○	○	○	△	○	○	○	○	○	○	○	○									△	△	△	△											
0611				○	○	○	○	△	○	○		○	○	○	○	○									△	△	△	△											
0612				○	○	○	○	△	○	○	○	○	○	○	○	○									△	△	△	△	△	△									
0614				○	○	○	○	△	○	○		○	○	○	○	○									△	△	△	△	△	△									
0615				○	○	○	○	△	○	○		○	○	○	○	○									△	△	△	△	△										
0616				○	○	○	○	△	○	○		○	○	○	○	○									△	△	△	△	△	△									
0617				○	○	○	○	△	○	○	△	○	○	○	○	○									△	△	△	△	△	△									
0618				○	○	○	○	△	○	○	△	○	○	○	○	○									△	△	△	△	△	△									
0620				○	○	○	○	△	○	○	○	○	○	○	○	△									△	△	△	△											
0621				○	○	○	○	△	○	○		○	○	○	○	△									△	△	△	△											
0622				○	○	○	○	△	○	○		○	○	○	○	△									△	△	△	△	△	△									
0624				○	○	○	○	△	○	○		○	○	○	○	△									△	△	△	△	△	△									
0625				○	○	○	○	△	○	○		○	○	○	○	△									△	△	△	△	△										
0626				○	○	○	○	△	○	○		○	○	○	○	△									△	△	△	△	△	△									
0627				○	○	○	○	△	○	○	△	○	○	○	○	△									△	△	△	△	△	△									
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0630				○	○	○	○	△	○	○	○	○	○	○	○	△									△	△	△	△											
0631				○	○	○	○	△	○	○		○	○	○	○	△									△	△	△	△											
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0636				○	○	○	○	△	○	○		○	○	○	○	△									△	△	△	△	△	△									
0637				○	○	○	○	△	○	○	△	○	○	○	○	△									△	△	△	△	△	△									
0638				○	○	○	○	△	○	○	△	○	○	○	○	△									△	△	△	△	△	△									



**List of setting items by operation sequence number**  
 (Operation mode: bolts and nuts)

User setting value must be input for the data No. marked with ○.  
 △... Operation varies depending on whether or not data is written.

Operation sequence number	Memory sheet (0) Data No.			Memory sheet (1), Memory sheet (2) Data No.																										Remarks						
	00	01	02	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25		26	27	28	29		
1600				○	○	○	○	○	△	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	△	△	△	△							
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1608				○	○	○	○	○	△	○	○	△	○	○	○	○	○	○	○	○	○	○	○	○	△	△	△	△	△	△						
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1622				○	○	○	○	○	△	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	△	△	△	△	△	△						
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1625				○	○	○	○	○	△	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	△	△	△	△	△							
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1636				○	○	○	○	○	△	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	△	△	△	△	△	△						
1637				○	○	○	○	○	△	○	○	△	○	○	○	○	○	○	○	○	○	○	○	○	△	△	△	△	△	△						
1638				○	○	○	○	○	△	○	○	△	○	○	○	○	○	○	○	○	○	○	○	○	△	△	△	△	△	△						



**List of setting items by operation sequence number**  
(Operation mode: bolts and nuts)

User setting value must be input for the data No. marked with ○.  
△... Operation varies depending on whether or not data is written.

Operation number	Memory sheet (0) Data No.			Memory sheet (1), Memory sheet (2) Data No.																										Remarks					
	00	01	02	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25		26	27	28	29	
2600				○	○	○	○	△	○	○	○	○	○	○	○	○	○					○	○	○	△	△	△	△							
2601				○	○	○	○	△	○	○	○	○	○	○	○	○	○					○	○	○	△	△	△	△							
2602				○	○	○	○	△	○	○	○	○	○	○	○	○	○					○	○	○	△	△	△	△	△	△	△	△	△	△	
2604				○	○	○	○	△	○	○	○	○	○	○	○	○	○					○	○	○	△	△	△	△	△	△	△	△	△	△	
2605				○	○	○	○	△	○	○	○	○	○	○	○	○	○					○	○	○	△	△	△	△	△	△	△	△	△	△	
2606				○	○	○	○	△	○	○	○	○	○	○	○	○	○					○	○	○	△	△	△	△	△	△	△	△	△	△	
2607				○	○	○	○	△	○	○	○	△	○	○	○	○	○					○	○	○	△	△	△	△	△	△	△	△	△	△	
2608				○	○	○	○	△	○	○	○	△	○	○	○	○	○					○	○	○	△	△	△	△	△	△	△	△	△	△	
2610				○	○	○	○	△	○	○	○	○	○	○	○	○	○					○	○	○	△	△	△	△	△	△	△	△	△	△	
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2614				○	○	○	○	△	○	○	○	○	○	○	○	○	○					○	○	○	△	△	△	△	△	△	△	△	△	△	
2615				○	○	○	○	△	○	○	○	○	○	○	○	○	○					○	○	○	△	△	△	△	△	△	△	△	△	△	
2616				○	○	○	○	△	○	○	○	○	○	○	○	○	○					○	○	○	△	△	△	△	△	△	△	△	△	△	
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2632				○	○	○	○	△	○	○	○	○	○	○	○	○	○					○	○	○	△	△	△	△	△	△	△	△	△	△	
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2637				○	○	○	○	△	○	○	○	△	○	○	○	○	○					○	○	○	△	△	△	△	△	△	△	△	△	△	
2638				○	○	○	○	△	○	○	△	○	○	○	○	○	○					○	○	○	△	△	△	△	△	△	△	△	△	△	

(Operation mode: Forward rotation)

Operation number	Memory sheet (0) Data No.			Memory sheet (1), Memory sheet (2) Data No.																										Remarks							
	00	01	02	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25		26	27	28	29			
3000										○	○		○																								
3001										○	○		○																								
3002										○	○		○																								
3004										○	○		○																								
3020										○	○		○																								
3021										○	○		○																								
3022										○	○		○																								
3024										○	○		○																								

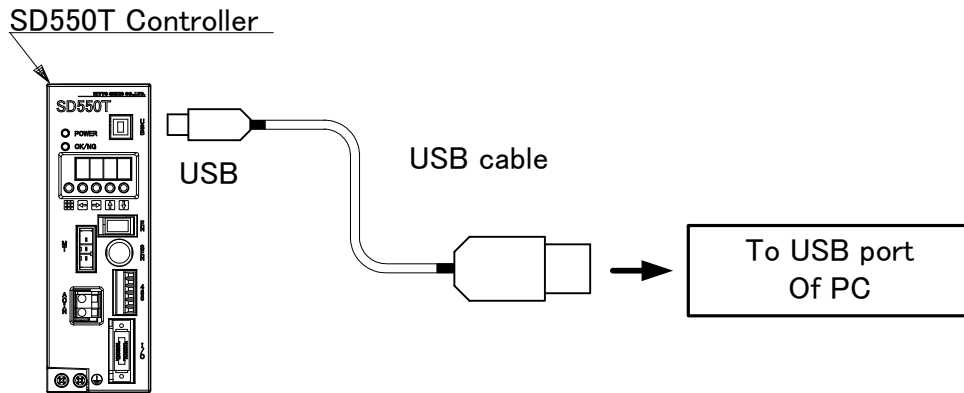
(Operation mode: Reverse rotation)

Operation number	Memory sheet (0) Data No.			Memory sheet (1), Memory sheet (2) Data No.																										Remarks							
	00	01	02	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25		26	27	28	29			
4000										○	○		○																								
4001										○	○		○																								
4002										○	○		○																								
4004										○	○		○																								
4020										○	○		○																								
4021										○	○		○																								
4022										○	○		○																								
4024										○	○		○																								

## 8. Specifications of communication data

### 8-1. Connection method 1: USB

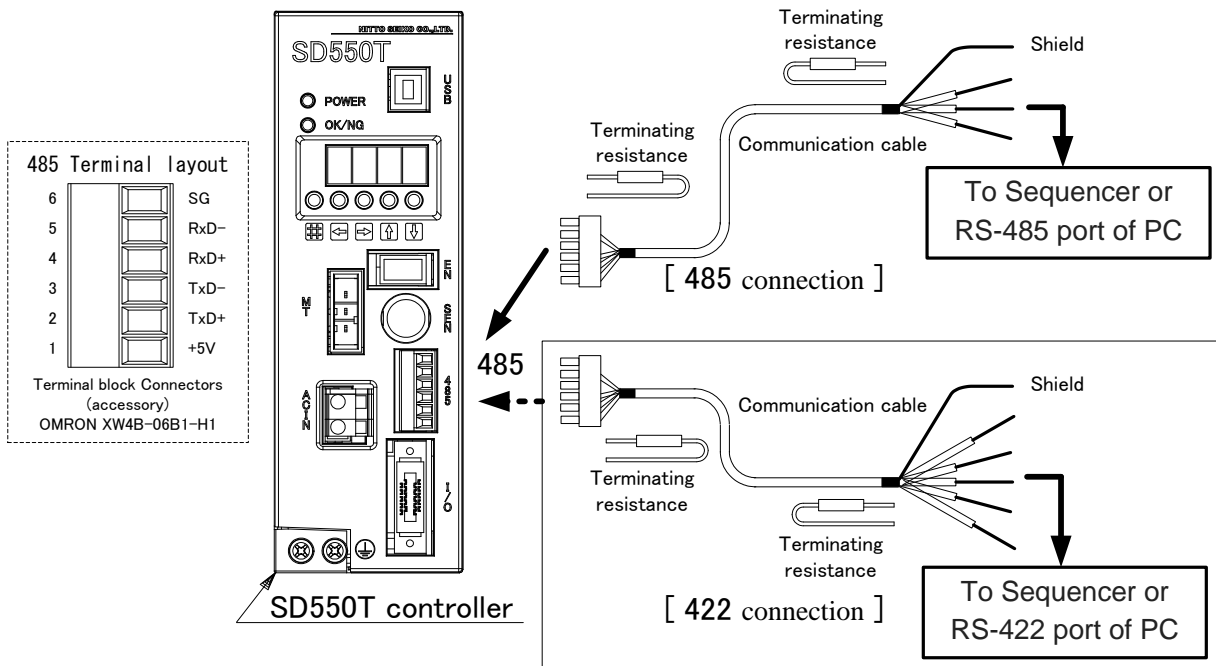
When using the output of this form, the receiving device can be used only PC. Software on the receiving side, please be prepared by the customer. Please use a commercially available USB cable.



Setting of communication port: 38400 bps, 8 bits, stop bit 1, no parity

### 8-2. Connection method 2 : RS422

In the case of connection by RS422, please connect controller and external control devices (such as a PLC) with 1 to 1.



Setting of communication port: 9600 bps, 8 bits, stop bit 1, no parity

**Caution!** Connect 110~130 Ω termination resistors to **both ends** of communication cable.



In case of QJ71C24  
(Serial communication unit  
by Mitsubishi Electric co.)

\* Connect communication cable shield to earth or GND only by  
one side per each cable. Do not connect earth terminals each other.

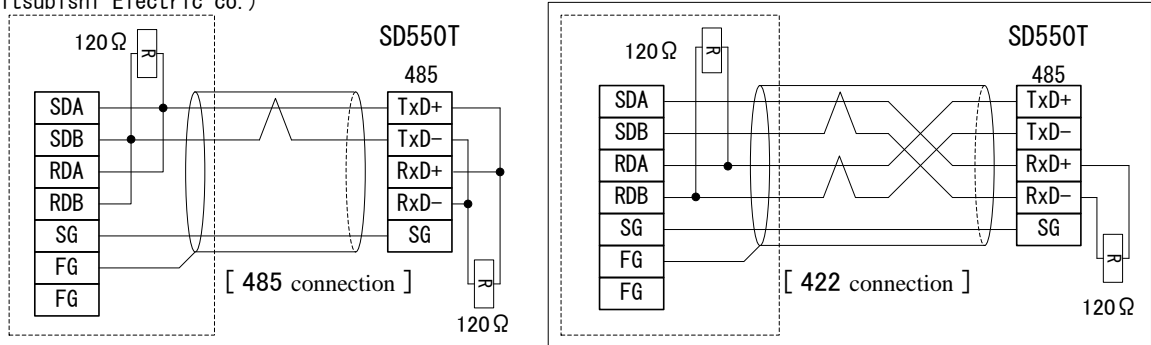


Fig. Connection example with QJ71C24

### 8-3. Data structure

There are three kinds of data structure for transmission data depending on types of fastening operation. In addition, fastening operation varies with the set values, and therefore refer to the data structure that correspond to the setting in the “Table: Relationship between set values and data structure”.

Note: If the set value of fastening operation shown below is altered, the data structure may be changed although the data structure is not changed even when the operation code number is altered.

Be sure to confirm the data structure remains the same after alteration of setting.

### 8-4. Fastening operation and setting items

Fastening operation and setting items that are related to the data structure are as follows.

#### (1) Torque data transmission frequency

Please set “Data No. 05: Torque data transmission frequency” on the memory sheet to set the number of data transmission times and set whether transmit start signal.

#### (2) Detection of screw height

If due values are set in “Data No.20: Upper limit/screw height detection 1” and “Data No.21: Lower limit/screw height detection 2”, then the system will conduct screw height detection.

#### (3) Detection of final fastening angle

If due values are set in “Data No.22: Upper criterion for final fastening angle” and “Data No.23: Lower criterion for final fastening angle”, then the system will conduct final fastening angle detection.

Table: Relationship between set values and data structure

Fastening operation (setting items)	Setting value <sup>[note1]</sup>					
	*001~*005		0000	1***		
Torque data transmission frequency(data No.5)	×	○	×	○	—	—
Screw height detection (data Nos. 20, 21)	×	×	○	○	—	—
Final fastening angle detection (data Nos. 22, 23)	(1)	(2)	(3)	[note2]	(4)	

[note1]: "\*" means an arbitrary numerical value.

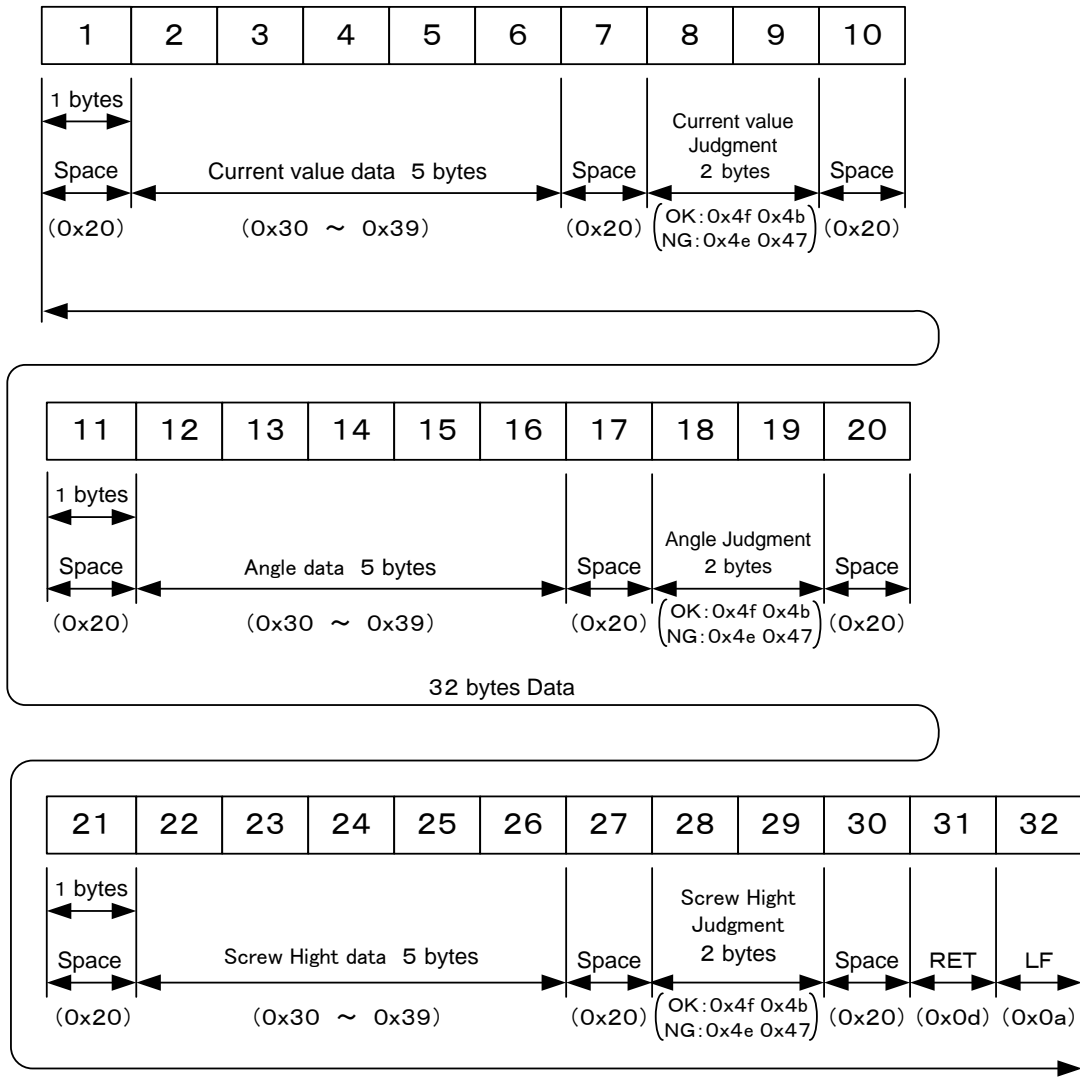
"o" means a certain value having been set, and "x" means the value not having been set.

[note2]: The data are not transmitted.



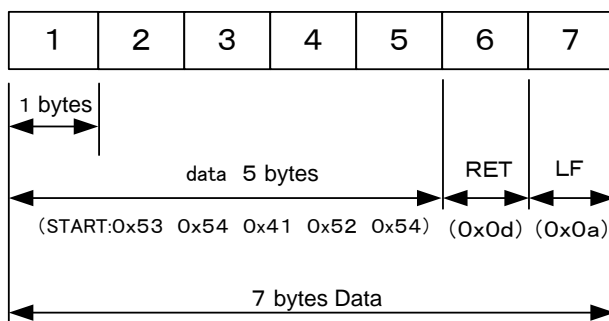
Data configuration

(3) When fastening operation with angle detection and screw height detection



- Data transmission example : `__00100__OK__00150__OK__00300__OK__`

(4) Sent data on cycle start



- Data transmission example : `START`

※Need to enter the setup of “Torque data transmission frequency”

### 9. Trouble check sheet

If you have any question regarding controller “SD550T series”, send a copy of this page with necessary items filled. (Circle “Question” or “Repair request”.)

### Question/Repair request

Reception No.: \_\_\_\_\_

Date of sending: (yyyy) (mm) (dd)

Those cells must be filled	Name of company			
	Address	Postal code		
	Phone	( )	Fax	( )
	Affiliation			
	Responsible staff			
NX driver	Machine number			
	Model of tool unit		NX No.	
	Model of controller		Serial number	
	Date of purchase	(yyyy) (mm) (dd)		
	Communication software	Available ( ); N/A		
Working environment	Major control device	Manufacturer: Type of machine:		
	Work	Name:		
		Material:	Fastening torque	N·m
Type of screw		Screw size	(φ) ×	
Description	Date of development	(yyyy) (mm) (dd)		
	Frequency of events			
	Time of event occurrence			
	State of OK/NG lamps	red, green, others, unlit		
	Indication on display		(Instruction code number)	
	Channel number used		Operation code number	
	Setting of memory sheet			
	Describe in detail the situation of the occurred abnormality (including symptoms, measures taken or tried to solve the problem and other related matters)			

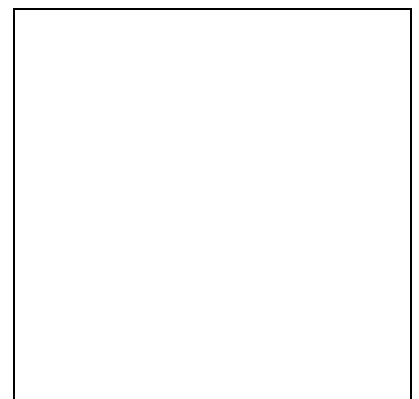
Use separate sheet(s) if this form does not suffice your description.





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- For improvement in performance, specifications may be modified without notice.