Think solution. NITTO SEIKO

Controller for Single spindle screw driving unit

NITOMAN SD75

User's Manual
Ver1.13

NITTO SEIKO CO.,LTD.

【Notes】

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(2) By provision of operating manual recorded on CD-ROM, you shall be deemed to have agreed to the Terms and Conditions written in “readme.txt” on it.

(3) Contents of this manual are subject to update without notice according to specification change of the products.

(4) Unique nouns like the product name indicated in this brochure are registered or not registered trademark of each company.

Safety precautions

Before using this machine, fully read the safety precautions shown below for correct use.

- To secure safety of the robot, refer to JIS B 8433 (Manipulating industrial robots-Safety).
- This machine is designed and manufactured for the purpose of use for general industrial machinery.
- Installation of the robot and setup of the system must be carried out by technicians only.
- When moving or selling this machine, have the owner to be fully read this manual for correct use.

To prevent hazards to operators or other persons and damages to properties, be sure to observe the instructions in this operation manual shown below.

Marks indicating possible hazards and damages

	WARNING	Noncompliance with the instructions adjacent to this mark may lead to a loss of life or serious injury.
	CAUTION	Noncompliance with the instructions adjacent to this mark may lead to injury or physical damages.

Marks showing points to be observed

	This mark is accompanied with acts to be prohibited.
	This mark is accompanied with acts to be performed.

⚠ WARNING

[Installation]

Be sure to provide grounding cables.

Otherwise, you may suffer electric shocks.

DO NOT use this machine where the robot and the controller may be splashed with water or oil.

Otherwise, malfunctions, fires, or electric shocks may occur.

DO NOT use this machine where screw driving unit and the controller may be splashed with water or oil.

Otherwise, malfunctions, fires, or electric shocks may occur.

DO NOT modify screw driving unit and the controller. NEVER connect the controller to the robot other than of the specified type.

Otherwise, the controller may be damaged, or the robot may malfunction, causing fires or serious accidents.

DO NOT install screw driving unit and the controller to the locations where are unstable or subjected to vibrations.

Otherwise, screw driving unit may be moved or tipped, leading to accidents or breakage.

⚠ WARNING

[Installation]

Install the safety guard to the outside of motion areas.

Otherwise, you may suffer serious injury. For safety, be sure to provide the interlock switch for the door of the safety guard. Secure working space to carry out works related to teaching, maintenance, and check safely.

Correctly carry out wiring, referring to "User's Manual".

Be sure to connect cables and connectors securely to prevent any looseness or disconnection. Otherwise, malfunctions or fires may occur.

DO NOT damage cables.

NEVER damage, forcibly bend or pull, wind, pinch them, nor put heavy objects on them. Otherwise, fires, electric shocks, or malfunctions due to earth leakage or disconnection may be caused.

Always provide the emergency stop switch for a location convenient for operation.

Otherwise, you cannot deal with unexpected troubles quickly, causing serious injury.

⚠ WARNING

[Operation]

When you find any heating, fume, or odor, immediately turn off the power switch, and disconnect the power plug.

Otherwise, the machine may be damaged, or fires may occur.

Make sure that the machine is in the "SERVO OFF" mode (in an emergency stop) before operating the moving parts of screw driving unit by hand.

Otherwise, you may suffer injury.

NEVER use the robot or the controller if they have been dropped or immersed in water.

Otherwise, malfunctions or electric shocks due to faults or damages may occur.

[Maintenance and check]

Turn off the power switch, disconnect the power plug to shut off the power completely, and wait for ten minutes or longer before moving, wiring, or checks. Wiring must be provided by electrical technicians only.

Provision of these measures helps prevention of electric shocks.

Be sure to read operation manual before maintenance and check.

Otherwise, accidents may occur in case of mis-operation.

Never connect or disconnect the connector with power on.

Otherwise, malfunctions or electric shocks due to faults or damages may occur.

⚠ CAUTION

[Installation]

Completely provide electric shielding measures before using this machine in the locations shown below. Otherwise, malfunctions may occur.

1. Where there are high tension current or great magnetic field
2. Where welding is being performed and arc discharge may occur
3. Where noises due to static electricity are generated
4. Where exposure to radioactivity may occur

DO NOT hold moving parts or cables when installing the machine.

Otherwise, you may suffer injuries.

NEVER block the vent of the controller.

Otherwise, heat is trapped in the machine, leading to fires or malfunctions.

DO NOT use this machine outdoors exposed to direct sunlight.

Otherwise, malfunctions or faults may occur.

⚠ CAUTION

[Operation]

Be sure to use this machine in locations where ambient temperature is within the range between 0°C and 40°C, humidity is within the range between 30% and 80%, free from dew condensation.

Otherwise, malfunctions, fires, or electric shocks may occur.

DO NOT use this machine with the power supply and under the voltage other than specified.

Otherwise, malfunctions, fires, or electric shocks may occur.

Do not connect any device other than the operating pendent to the teaching pendent

Otherwise, malfunctions or faults may occur.

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1. Preface

Thank you for your purchase of our product.
Fully read this manual for correct use.
After reading it, keep it for later reference by users. Be sure to hand it to the end user.

1.1 Outline of this product

SD 75 is the controller for cylinder liftng type devices, such as FM513V automatic screw tightening machine feed mat. Screw tightening can be easily controlled by connecting the operating pendant (optional) having functions of operating panel and pendant.

(Major features)

- Low-cost machine pursuing cost performance
- Small-size controller: 110 (W) × 210 (H) × 270 (D) mm
- The operation pendant (optional) is equipped with a touch panel, enabling easy operations.
- The operation pendant (optional) supports two languages (Japanese and English). (Languages can be switched over with the parameter.)
- Storing program and data into the PLC-incorporating ROM enables operating without a battery.
- Number of external general-purpose inputs and outputs: 2 inputs and 4 outputs
- This controller is equipped with a general-purpose PLC as the main control device, which can flexibly cope with various control patterns required for general tightening work.

For detailed description on the PLC (FX3GC-32-D□□, MITSUBISHI ELECTRIC), and handy display (GT2103-PMBLS, MITSUBISHI ELECTRIC) , refer to the User's Manual for each product.

1.2 Product structure

Our model number of the controller should be indicated as shown below.

Model

SD75 – *2 – *3 *4

*2 Type	
T1	FM513V
T2	FM530C (Drill screw diriving unit)

*3 Primary power source	
No sign	AC100V 50/60Hz
2	AC200V 50/60Hz

*4 NPN/PNP	
No sign	NPN
P	PNP

Accessories

AC cable FF503H-AC30AL (3m) ・・・・・・・・・・・・・・・・・・ 1 pce.
Feeder power supply cable CBFED-P1-030 (3m) ・・・・・・・・・・・・ 1 pce.
Feeder control cable CBFED-S1-030 (3m) ・・・・・・・・・・・・・・ 1 pce.
Driver power supply cable CBDR-P1040 (4m) ・・・・・・・・・・・・ 1 pce.
Driver control cable SD550-IO-040 (4m) ・・・・・・・・・・・・・・・ 1 pce.

・One complete set of the items shown above is provided for our standard type machine.

Optional items

Operation pendant SD75-TP ・・・・・・・・・・・・・・・・・・・・・ 1 pce.
EXE. IO cable CBEX3-A1-030 (3m) ・・・・・・・・・・・・・・・・・・ 1 pce.

・Specify the models of optional items when purchasing them.

Related manual

・FX3GC Series Micro PLC
User's Manual [Hardware manual] (MITSUBISHI ELECTRIC)
・FX3G, FX3U, FX3UC Series Micro PLC
Programming Manual [Description on basic/application commands] (MITSUBISHI ELECTRIC)
・User's Manual for GT10 Display

1.3 Guarantee period and coverage

1) Guaranteed coverage

If any malfunction occurs to our products during the guarantee period due to faults in materials or workmanship responsible for us, we will repair them free of charge.

2) Guarantee period

The guarantee period is either of the following periods, whichever is shorter:

i. Within one year
ii. Within 2500 hours
iii. Three million shots or less from the date of acceptance (screw tightening driver only)

3) Limitations

Note that faults shown below are out of our guarantee.

i. Faults caused by inappropriate storage or handling by customers
ii. Faults caused by unauthorized modifications to products by customers
iii. Faults caused by external factors such as fires and abnormal voltage, or acts of God such as earthquakes, thunderbolts, typhoons, and floods

4) Items out of guarantee

Products of which guarantee periods were ended and faults described in the 3) above are out of our guarantee. All the required repairs to them will be charged. Investigation of causes of faults made upon customers' request will be also charged.

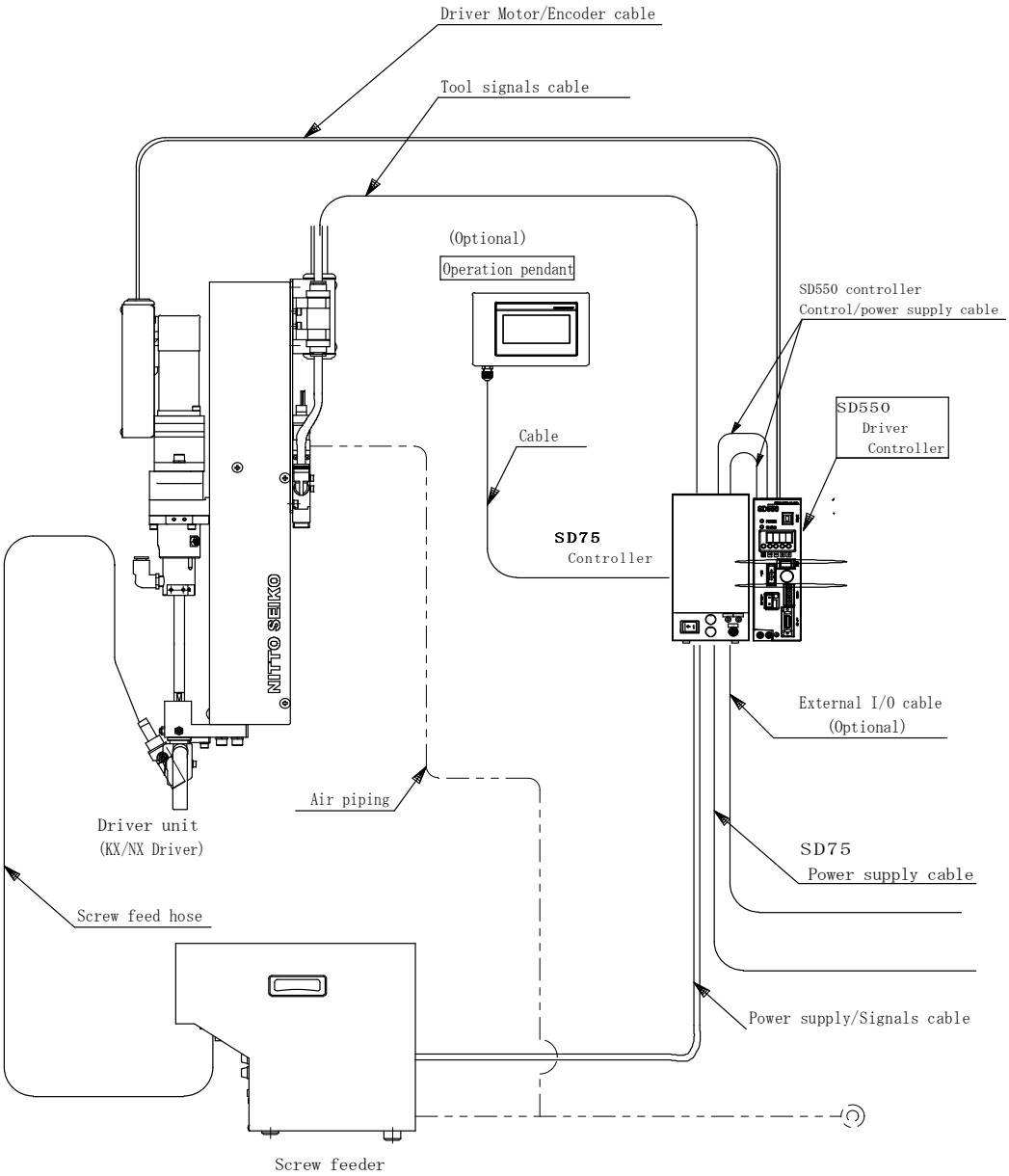
5) Expiration of charged repair period after discontinuance of production

Charged repair period will be ended seven years after the discontinuance of production.

2. Configuration of system

2.1 Connections between SD75 and screw driving unit

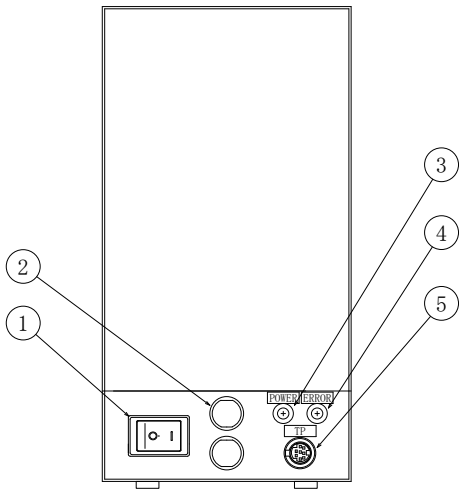
1) System configuration diagram



Distance between standard units	
Tool unit → SD75 controller	3m
SD75 controller → Feeder	3m
Feeder → Tool unit	3m

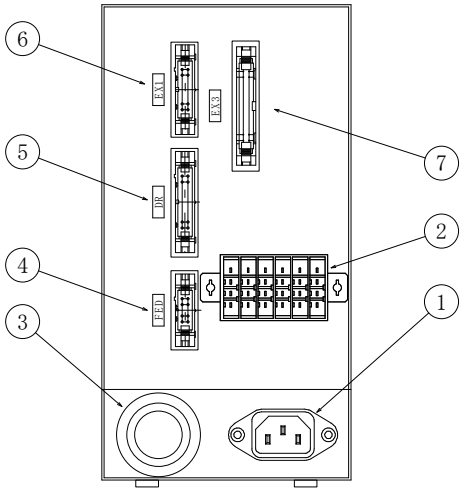
2.2 Names and functions of components

1) SD75 front view



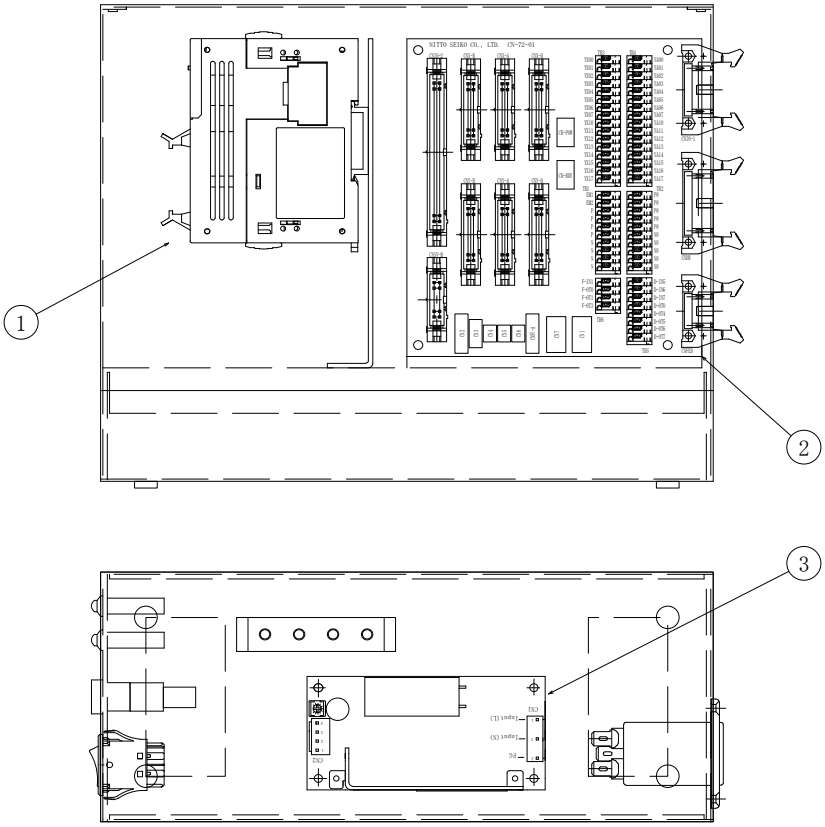
①	Power supply switch	Power supply switch for the controller. Pressing [|] turns ON the power supply. Pressing [○] turns OFF the power supply.
②	Fuse holder	Type FGMB 250V 10A
③	POWER lamp (green)	While power is supplied to the controller, this lamp is lit.
④	ERROR lamp (red)	When a fault occurs, this lamp lights up, or blinks. Lit: The machine immediately stops at occurrence of the fault. Blinking (1 sec.): The machine stops after cycle end, or outputs warning.
⑤	TP connector	Connect the SD75-TP operation pendant to this connector.

2) SD75 back view



①	AC power supply inlet	Connect the AC input power supply cable specified by NITTO SEIKO. Two types of power supply voltages (200 VAC or 100 VAC) are available. Before turning ON the power supply, be sure to check the controller input voltage. 200 VAC type: FF503H-AC30AL 100 VAC type: FF503H-AC30P
②	POW connector	6 P power connector for peripheral equipment of tightening machine · For connector AC power supply · For power supply to feeder (CBFED-P1-□□□connection) · For power supply to driver controller (CBDR-P1-□□□connection) Type of connector on controller side : Dynamic D3200 series Plug housing 4P (TE) (Note 1) Connector insertion place is not specified. (Note 2) Do not connect any equipment not to be controlled by the controller.
③	Cable through hole ϕ 28	Cable through hole to insert a cable into the controller.
④	FED connector	Connect the FEEDER (standard model: FF503H) control cable CBFED-S1-□□□. Type of connector on controller side : MIL-SPEC male connector 10P
⑤	DR connector	Connect the driver (standard model: SD550) control cable SD550-IO-□□□. Type of connector on controller side : MIL-SPEC male connector 20P
⑥	EX1 connector	Connect the tightening tool unit control cable CBEX1-A1-□□□. Type of connector on controller side : MIL-SPEC male connector 16P
⑦	EX3 connector	Connect the external I/O control cable CBEX3-A1-□□□. Type of connector on controller side : MIL-SPEC male connector 26P

3) SD75 internal view



①	PLC	NPN : FX3GC-32MT-D (MITSUBISHI ELECTRIC) PNP : FX3GC-32MT-DSS (MITSUBISHI ELECTRIC)
②	I/O conversion Main board	CN-73-01 (NITTO SEIKO) For detailed description, see the next section.
③	Power supply	IN: 100□200 VAC multi input OUT: 24 VDC 30W

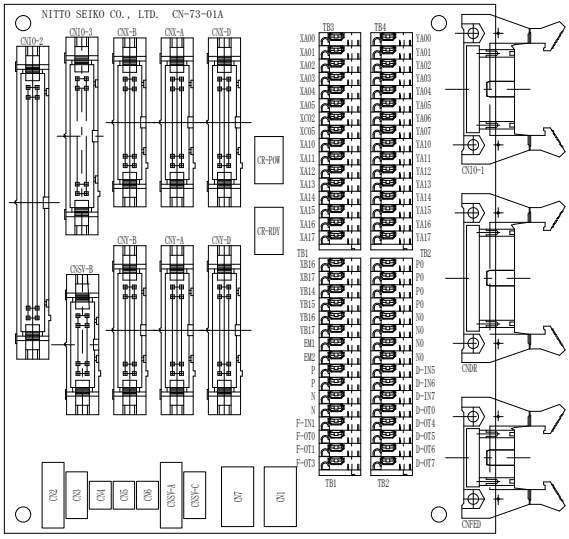
To use the CC-Link function (option), add the following unit to the PLC ①

	Network modules for CC-Link	CC-Link communications module: 2N-32CCL (MITSUBISHI ELECTRIC) Interface adapter: FX2NC-CNV-IF (MITSUBISHI ELECTRIC)

To use the SD550 communication function (option), add the following unit to the PLC ①

	Communications module	Communications module: FX3U-485ADP (MITSUBISHI ELECTRIC)

4) SD75 internal I/O conversion MAIN board



[Terminal block assignment]

TB3 (16P)

No.	Cable code	Signal name
1	XA00	Operation power ON confirm
2	XA01	TP deadman switch
3	XA02	DR tightening completion
4	XA03	DR tightening brake, alarm
5	XA04	DR system alarm
6	XA05	FED screw shortage
7	XA06	EX1
8	XA07	EX1
9	XA10	EX1 driver returned
10	XA11	EX1 vacuum shutoff
11	XA12	EX1 screw height detection
12	XA13	EX1
13	XA14	EXE reset
14	XA15	EXE start
15	XA16	EXE
16	XA17	EXE

TB4 (16P)

No.	Cable code	Signal name
1	YA00	EXE driver origin
2	YA01	EXE cycle completion
3	YA02	EXE alarm
4	YA03	EXE screw shortage
5	YA04	Operation power ON
6	YA05	ERROR pilot lamp
7	YA06	DR tightening start
8	YA07	DR channel select CH.1
9	YA10	DR channel select CH.2
10	YA11	DR channel select CH.4
11	YA12	DR channel select CH.8
12	YA13	FED screw feed
13	YA14	EX1 vacuum
14	YA15	EX1 driver advance
15	YA16	EX1
16	YA17	EX1

TB1 (16P)

No.	Cable code	Signal name
1	XB16	(Reserve)
2	XB17	(Reserve)
3	YB14	(Reserve)
4	YB15	(Reserve)
5	YB16	(Reserve)
6	YB17	(Reserve)
7	EM1	Emergency stop contact
8	EM2	Emergency stop contact
9	P	24VDC+
10	P	24VDC+
11	N	24VDC GND
12	N	24VDC GND
13	F-IN1	Operation enable (Taking-out type)
14	F-OT0	FED spera
15	F-OT1	(Reserve)
16	F-OT3	Takeing-out enable

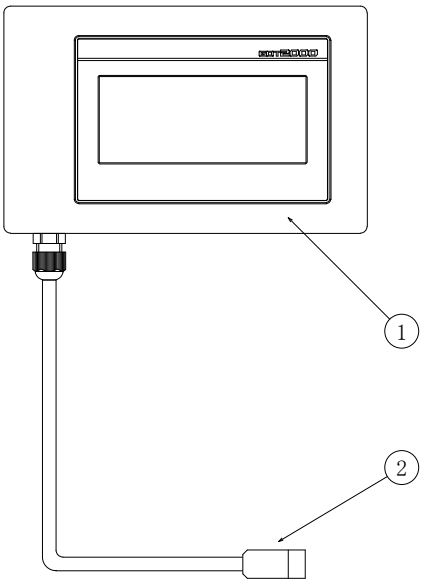
TB2 (16P)

No.	Cable code	Signal name
1	P0	24VDC+
2	P0	24VDC+
3	P0	24VDC+
4	P0	24VDC+
5	N0	24VDC GND
6	N0	24VDC GND
7	N0	24VDC GND
8	N0	24VDC GND
9	D-IN5	DR external sensor signal
10	D-IN6	DR sync fastening start
11	D-IN7	DR (reserved)
12	D-OT0	DR ready to receive start
13	D-OT4	DR detection of screw height OK
14	D-OT5	DR ready to receive sync start
15	D-OT6	DR spare
16	D-OT7	DR spare

[Short-circuit pin assignment]

No.	1-2 short-circuited (Default setting)	2-3 short-circuited
SP1	24 VDC (+) is not supplied between R-P0 of the external I/O signal cable (EX3).	24 VDC (+) is supplied between R-P0 of the external I/O signal cable (EX3).
SP2	24 VDC (+) is not supplied between R-P of the external I/O signal cable (EX3).	24 VDC (+) is supplied between R-P of the external I/O signal cable (EX3).
SP3	Output to YB14 of external I/O signal EX2 cable	Not output to YB14 of external I/O signal EX2 cable
SP4	Output to YB15 of external I/O signal EX2 cable	Not output to YB15 of external I/O signal EX2 cable
SP5	Output to YB16 of external I/O signal EX2 cable	Not output to YB16 of external I/O signal EX2 cable
SP6	Output to YB17 of external I/O signal EX2 cable	Not output to YB17 of external I/O signal EX2 cable
SP7	24VDC Sink type (NPN) I/O	24VDC Source type (PNP) I/O
SP8	24VDC Sink type (NPN) I/O	24VDC Source type (PNP) I/O
SP9	YA00 Sink type (NPN) I/O	YA00 Source type (PNP) I/O
SP10	YA01 Sink type (NPN) I/O	YA01 Source type (PNP) I/O
SP11	YA02 Sink type (NPN) I/O	YA02 Source type (PNP) I/O
SP12	YA03 Sink type (NPN) I/O	YA03 Source type (PNP) I/O
SP13	YA04 Sink type (NPN) I/O	YA04 Source type (PNP) I/O
SP14	YA05 Sink type (NPN) I/O	YA05 Source type (PNP) I/O
SP15	YA07～D-IN1 short circuit	YA07～D-IN1 opening circuit
SP16	YA10～D-IN2 short circuit	YA10～D-IN2 opening circuit
SP17	YA11～D-IN3 short circuit	YA11～D-IN3 opening circuit
SP18	YA12～D-IN4 short circuit	YA12～D-IN4 opening circuit

5) SD75-TP operation pendant (option)



①	LCD panel with touch switch	The display panel is a liquid crystal device with touch switches. You can execute various operations and monitoring by touching the display panel. Model : GT2103-PMBLS (MITSUBISHI ELECTRIC)
②	PLC / TP communication connector plug	Connector plug for PLC/TP communication. When this plug is disconnected, a communication cable can be connected to the RS-232 connector at the back of the GT1020. A commercially available cable (manufactured by MITSUBISHI ELECTRIC) can be used for the communication cable. ・RS-232 connection on PC side: GT01-C30R2-6P (3m) ・USB connection on PC side: GT10-RS2TUSB-5S + GT09-C30USB-5P (3m)

3. Specifications

3.1 Specifications of controller

1) SD75 controller main unit

Model SD75	Standard specifications	Option
Power supply voltage	Single phase, 200～230VAC 50/60Hz	Single phase, 100～115VAC 50/60Hz
Number of axes to be controlled	Single axis	
Serial port	RS-422 (For operation pendant)	
Memory	EEPROM	
External input	Standard user port, 2-pos.	I/O addition possible
External output	Standard user port, 4-pos.	I/O addition possible
Field network		CC-Link、Ethernet
Sequence program	25K steps (including 5K steps used for the system)	
Outside dimensions WxHxD	110×210×270mm	
Weight	Approximately 3.0 kg	
Operation pendant		Handy type touch panel
PC software		Provided

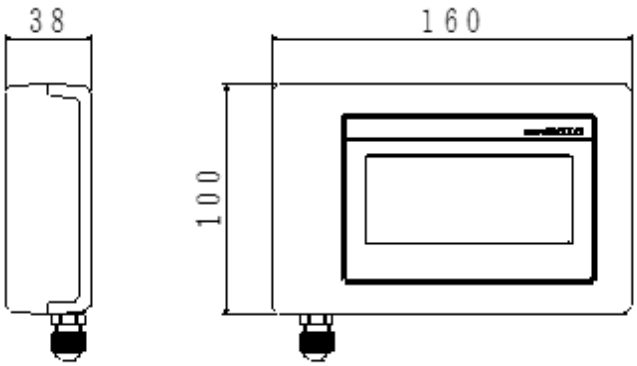
Note) For the purpose of performance improvement, the above specifications are subject to change without prior notice.

3.2 Outside dimensions

1) SD75 controller main unit Unit [mm]

(Note 1) To connect the cable, at least 100 mm space is required behind the controller body.
(Note 2) During operation, do not block the heat-radiating openings on the right and left sides.

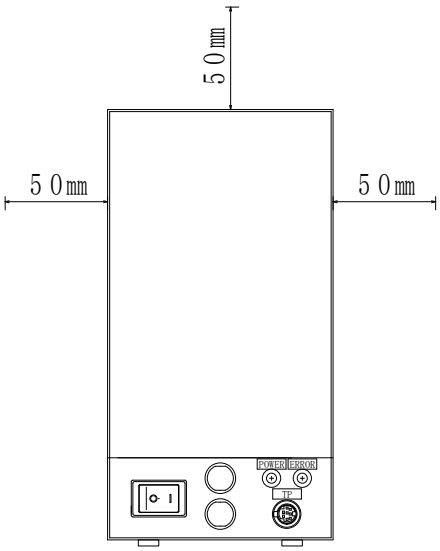
2) SD75-TP (optional) Unit [mm]



3.3 Installation

1) SD75 controller main unit

[Installation condition]

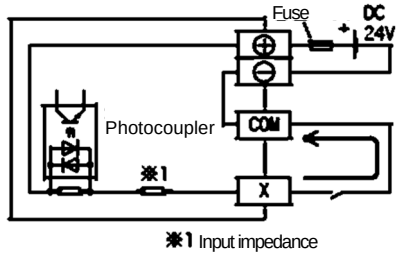
maxOperating ambient temperature	0～40℃
Operating ambient humidity	90%RH (relative humidity) max.
Vibration	0.5G (4.9m/s²) max.
Freezing/Condensation	No freezing, No condensation
Surrounding space	Provide an enough space around the controller body to ensure natural convection. 

3.4 Specifications of external I/O

1) External general-purpose signal inputs

Items	Specifications
Number of input points	Standard user port: Internal 16 ports External I/O cable: 4 inputs
Input voltage	24 VDC + 20%-15% Ripple (p-p): within 5%
Input current	5mA/24VDC
Response time	Approx. 10 ms
Connection method	Photocoupler

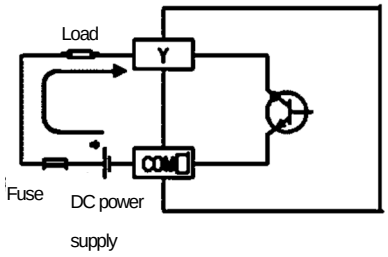
Internal circuit configuration



2) External general-purpose signal outputs

Items	Specifications
Number of output points	Standard user port: Internal 16 ports External I/O cable: 4 outputs
Rated load voltage	24VDC
Max. load current	0.1A/ input
Connection method	Photocoupler

Internal circuit configuration



⚠ CAUTION

From the R-P0 and R-P terminals of the external I/O connector, +24 V power in the robot controller is output.
DO NOT provide external power supply to the R-P0 and R-P terminals.

3.5 External input/output signals

The input and output signals to external equipment should be connected with the external I/O cable (EX3). For specifications of the external inputs and outputs, refer to the previous section.

The following external input and output signals have been assigned as the standard:

[External input]

PLC I/O	Signal name	Description
XA14	RESET	Resets errors after they are reported. Multiple errors will be reset simultaneously. However, there may be cases in which errors cannot be reset if the causes have not been eliminated.
XA15	CYCLE START	Performs an automatic single cycle operation. If the Origin signal (YA00) is not ON at the start, then an automatic single cycle operation will start after an automatic origin return is complete.

[External output]

PLC I/O	Signal name	Description
YA00	DRIVER ORIGIN	This signal is output when the tool is at the origin.
YA01	CYCLE COMPLETION	This signal is output upon completion of an automatic single cycle operation and it is turned OFF when the next Cycle Start (XA15) is turned ON.
YA02	ALARM	This signal is output when an error occurs. It is turned OFF by Turning ON the external reset input (XA14) or by resetting all errors from the operation panel.
YA03	SCREW SHORTAGE	While FF503H is used, this signal is output with the FF503H Screw Shortage signal ON. The FF503H Screw Shortage signal will turn ON if a screw is not detected at the position of a photo sensor on the chute rail within the time. set to the FF503H parameter no.83 (chute rail screw shortage signal output delay setting).

[Other]

・R-EM1/R-EM2 Emergency Stop Input

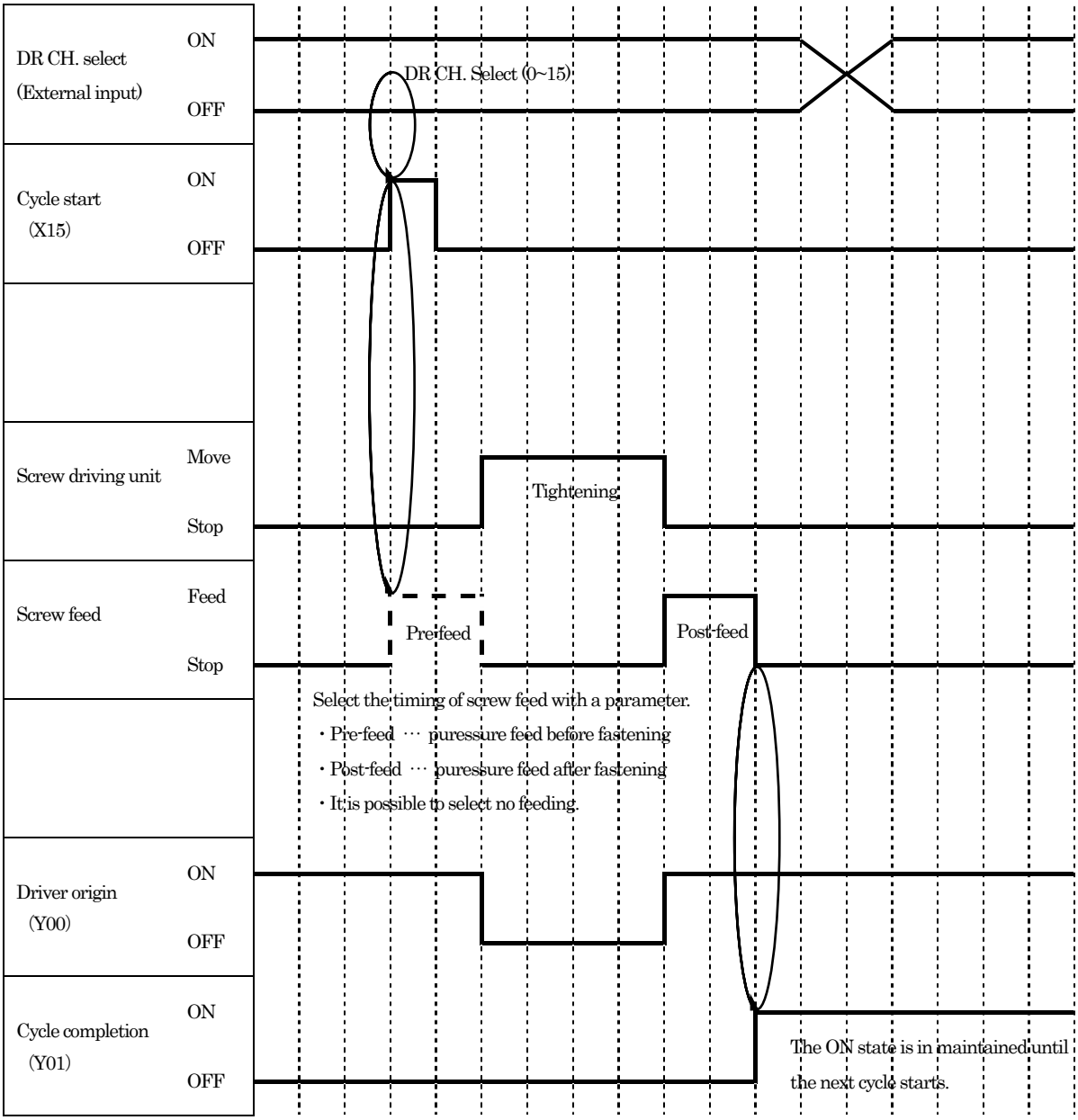
Connect an NC relay contact. Opening the contact means an emergency stop.

The system is delivered with the R-EM1/R-EM2 lines of external I/O cable short-circuited.

[Timing chart]

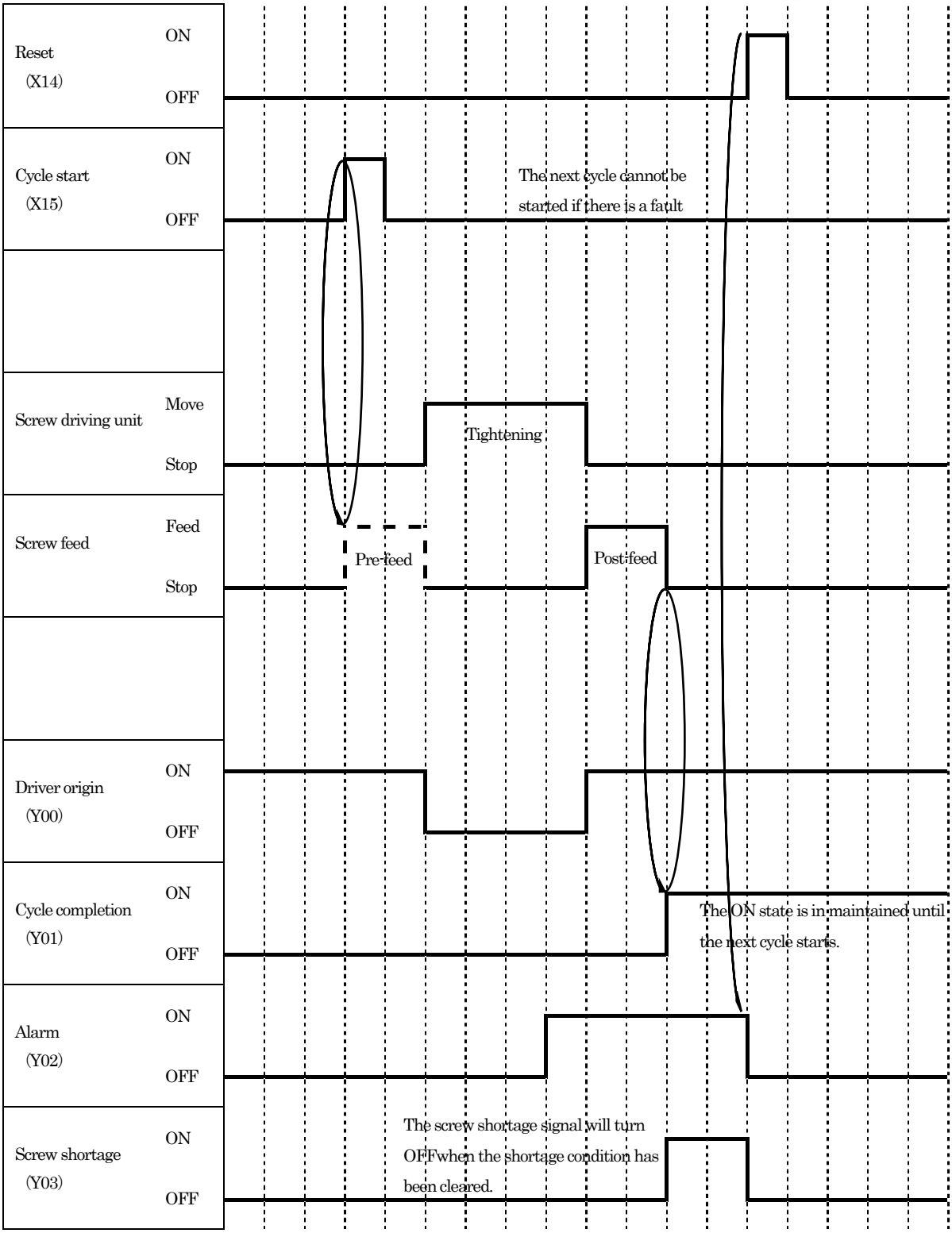
1. Automatic Operation

By starting a cycle, fastening operation.



2. Fastening Error

When a fastening error is reported, the tool will return to the origin instead of stopping at the spot.
The fastening error will be reset with the reset signal (X14) ON after the cycle has stopped.

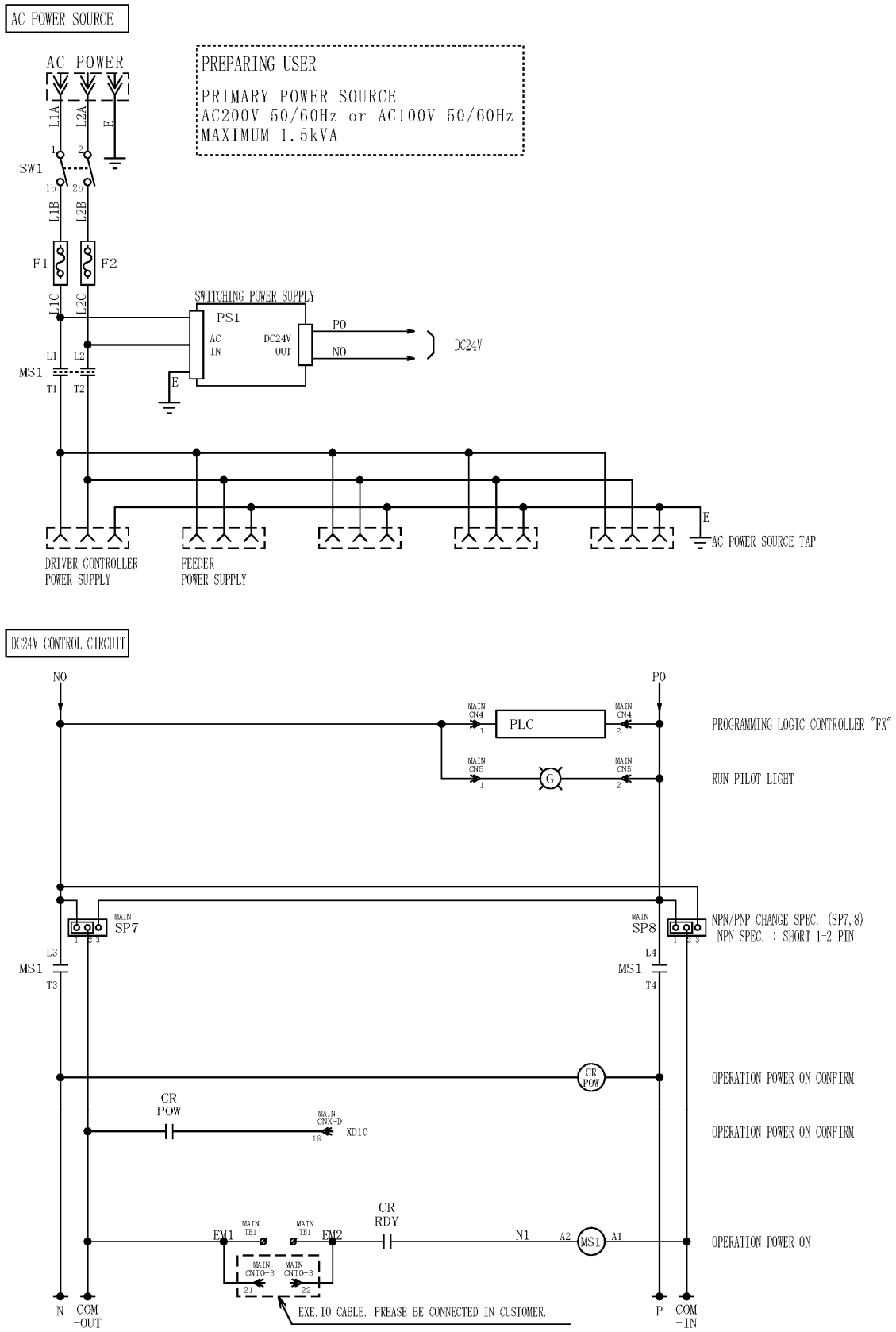


4. Wiring

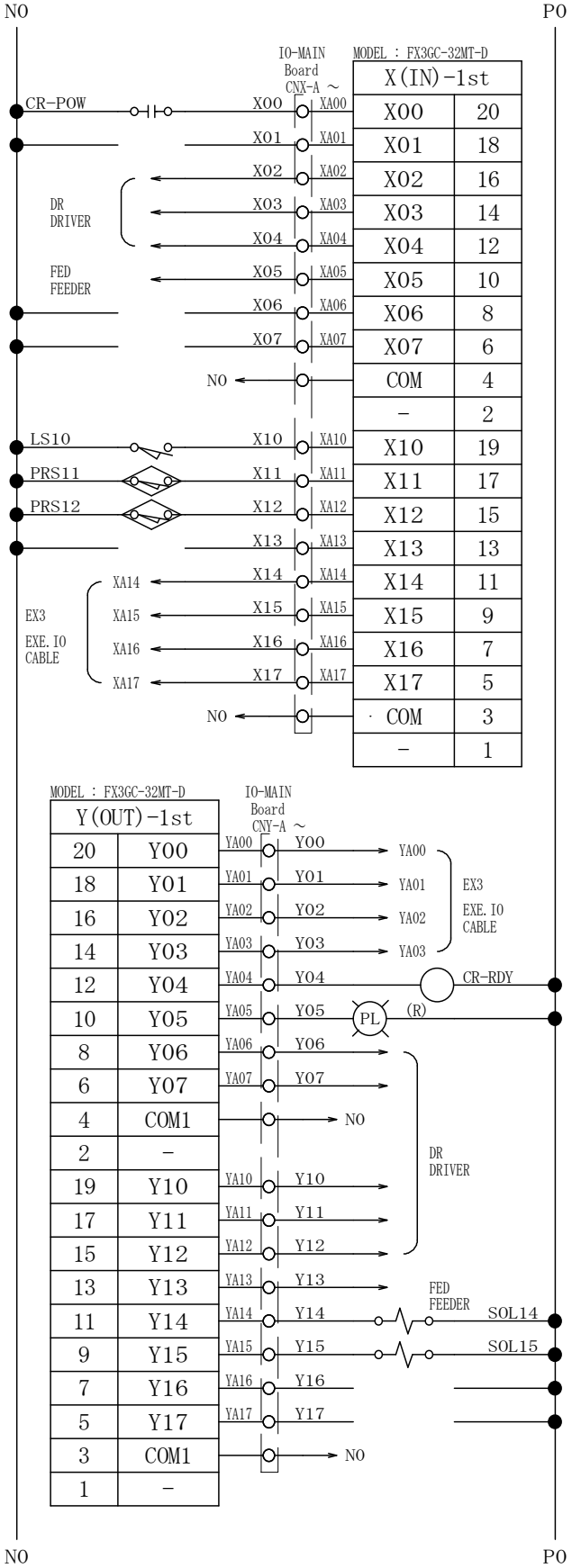
4.1 Development connection diagram

4.1.1 Development connection diagram SD75-T1

1) SD75-T1 Development connection diagram

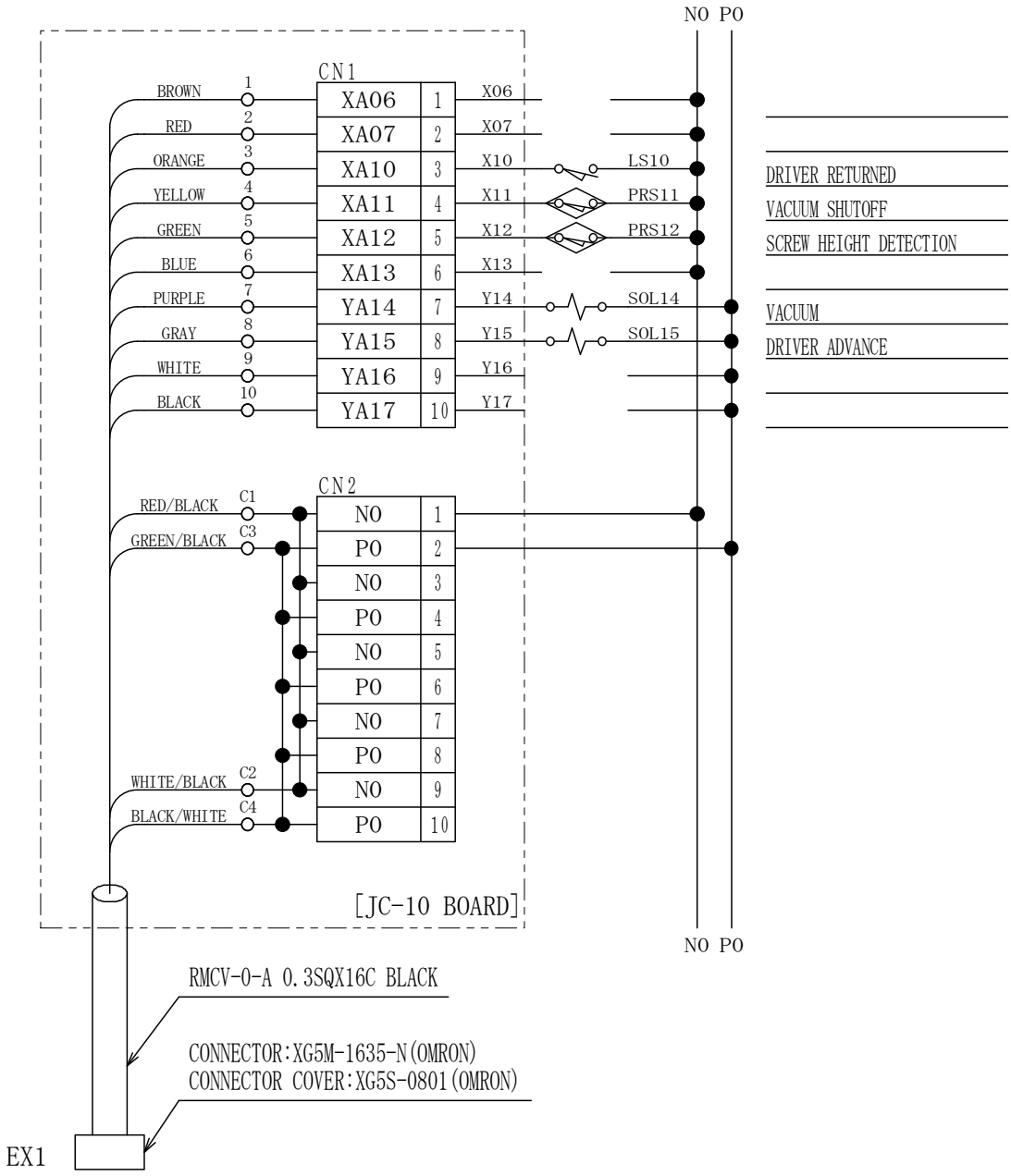


2) SD75-T1 PLC I/O diagram

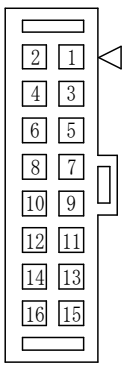


X(IN)-1st			
X00	20		OPERATION POWER ON CONFIRM
X01	18		
X02	16		DR TIGHTENING COMPLETION
X03	14		DR TIGHTENING BREAK ALARM
X04	12		DR SYSTEM ALARM
X05	10		FED SCREW SHORTAGE
X06	8		EX1
X07	6		EX1
COM	4		
-	2		
X10	19		EX1 DRIVER RETURNED
X11	17		EX1 VACUUM SHUTOFF
X12	15		EX1 SCREW HEIGHT DETECTION
X13	13		EX1
X14	11		EXE RESET
X15	9		EXE CYCLE START
X16	7		EXE
X17	5		EXE
COM	3		
-	1		
Y(OUT)-1st			
Y00	20		EXE DRIVER ORIGIN
Y01	18		EXE CYCLE COMPLETION
Y02	16		EXE ALARM
Y03	14		EXE SCREW SHORTAGE
Y04	12		OPERATION POWER ON
Y05	10		ERROR PILOT LIGHT
Y06	8		DR TIGHTENING START
Y07	6		DR CHANNEL SELECT CH.1
COM1	4		
-	2		
Y10	19		DR CHANNEL SELECT CH.2
Y11	17		DR CHANNEL SELECT CH.4
Y12	15		DR CHANNEL SELECT CH.8
Y13	13		FED SCREW FEED
Y14	11		EX1 VACUUM
Y15	9		EX1 DRIVER ADVANCE
Y16	7		EX1
Y17	5		EX1
COM1	3		
-	1		

3) SD75-T1 tip tool I/O diagram



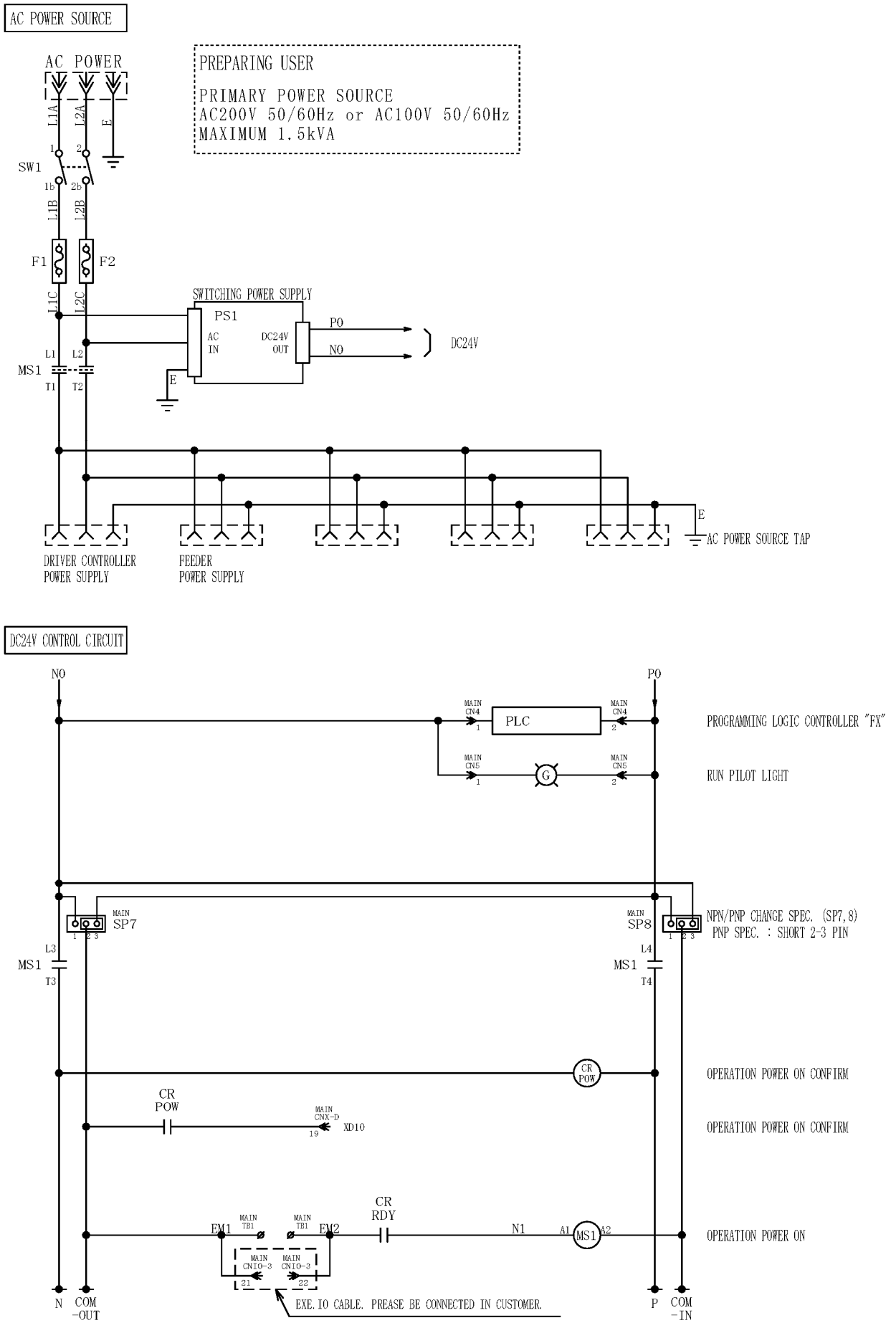
CONNECTOR PIN ASSIGNMENT



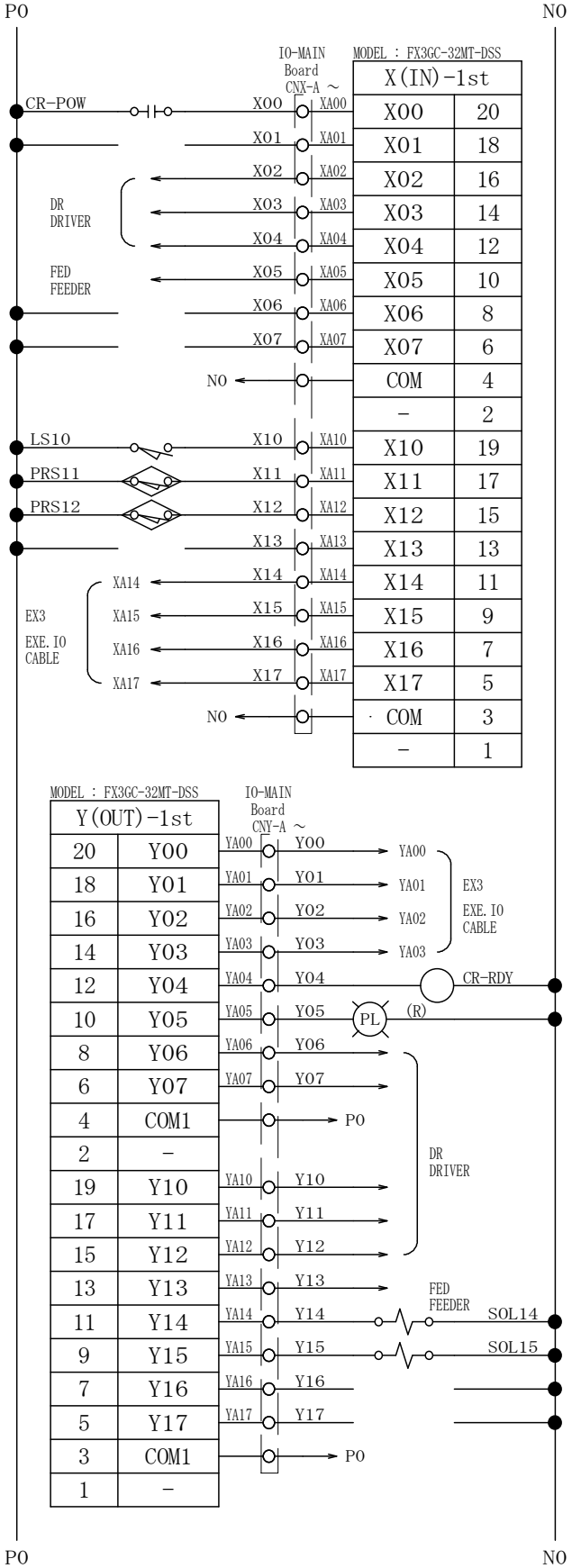
PIN No.	WIRE No.	PIN No.	WIRE No.
1	PO	9	XA10
2	PO	10	YA16
3	NO	11	XA11
4	NO	12	YA17
5	XA06	13	XA12
6	YA14	14	-
7	XA07	15	XA13
8	YA15	16	-

4.1.2 Development connection diagram SD75-T1-P

1) SD75-T1-P Development connection diagram

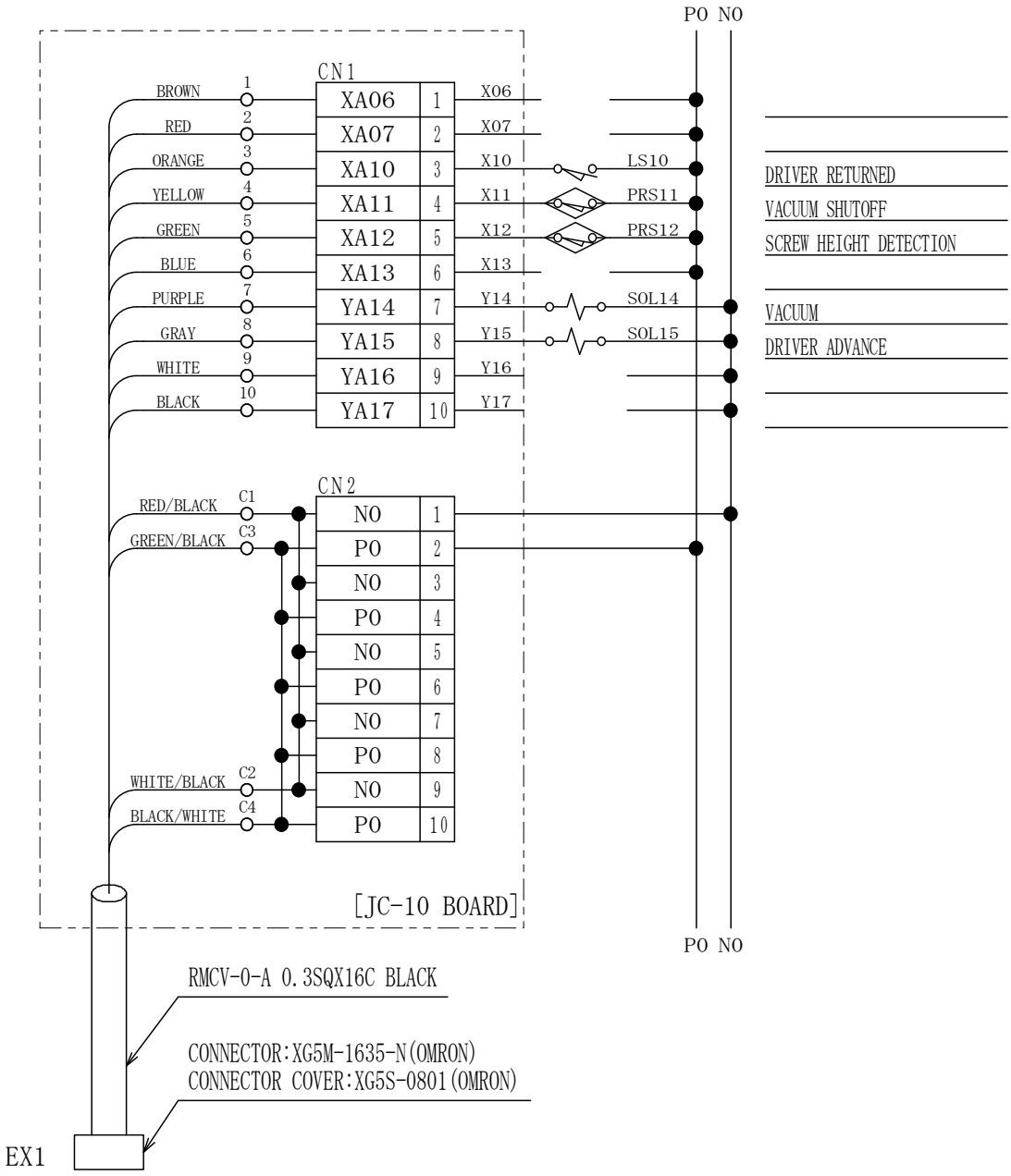


2) SD75-T1-P PLC I/O diagram

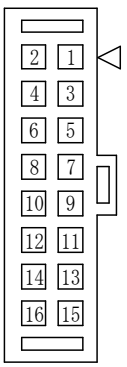


X(IN)-1st			
X00	20		OPERATION POWER ON CONFIRM
X01	18		
X02	16		DR TIGHTENING COMPLETION
X03	14		DR TIGHTENING BREAK ALARM
X04	12		DR SYSTEM ALARM
X05	10		FED SCREW SHORTAGE
X06	8		EX1
X07	6		EX1
COM	4		
－	2		
X10	19		EX1 DRIVER RETURNED
X11	17		EX1 VACUUM SHUTOFF
X12	15		EX1 SCREW HEIGHT DETECTION
X13	13		EX1
X14	11		EXE RESET
X15	9		EXE CYCLE START
X16	7		EXE
X17	5		EXE
COM	3		
－	1		
Y(OUT)-1st			
Y00	20		EXE DRIVER ORIGIN
Y01	18		EXE CYCLE COMPLETION
Y02	16		EXE ALARM
Y03	14		EXE SCREW SHORTAGE
Y04	12		OPERATION POWER ON
Y05	10		ERROR PILOT LIGHT
Y06	8		DR TIGHTENING START
Y07	6		DR CHANNEL SELECT CH.1
COM1	4		
－	2		
Y10	19		DR CHANNEL SELECT CH.2
Y11	17		DR CHANNEL SELECT CH.4
Y12	15		DR CHANNEL SELECT CH.8
Y13	13		FED SCREW FEED
Y14	11		EX1 VACUUM
Y15	9		EX1 DRIVER ADVANCE
Y16	7		EX1
Y17	5		EX1
COM1	3		
－	1		

3) SD75-T1-P tip tool I/O diagram



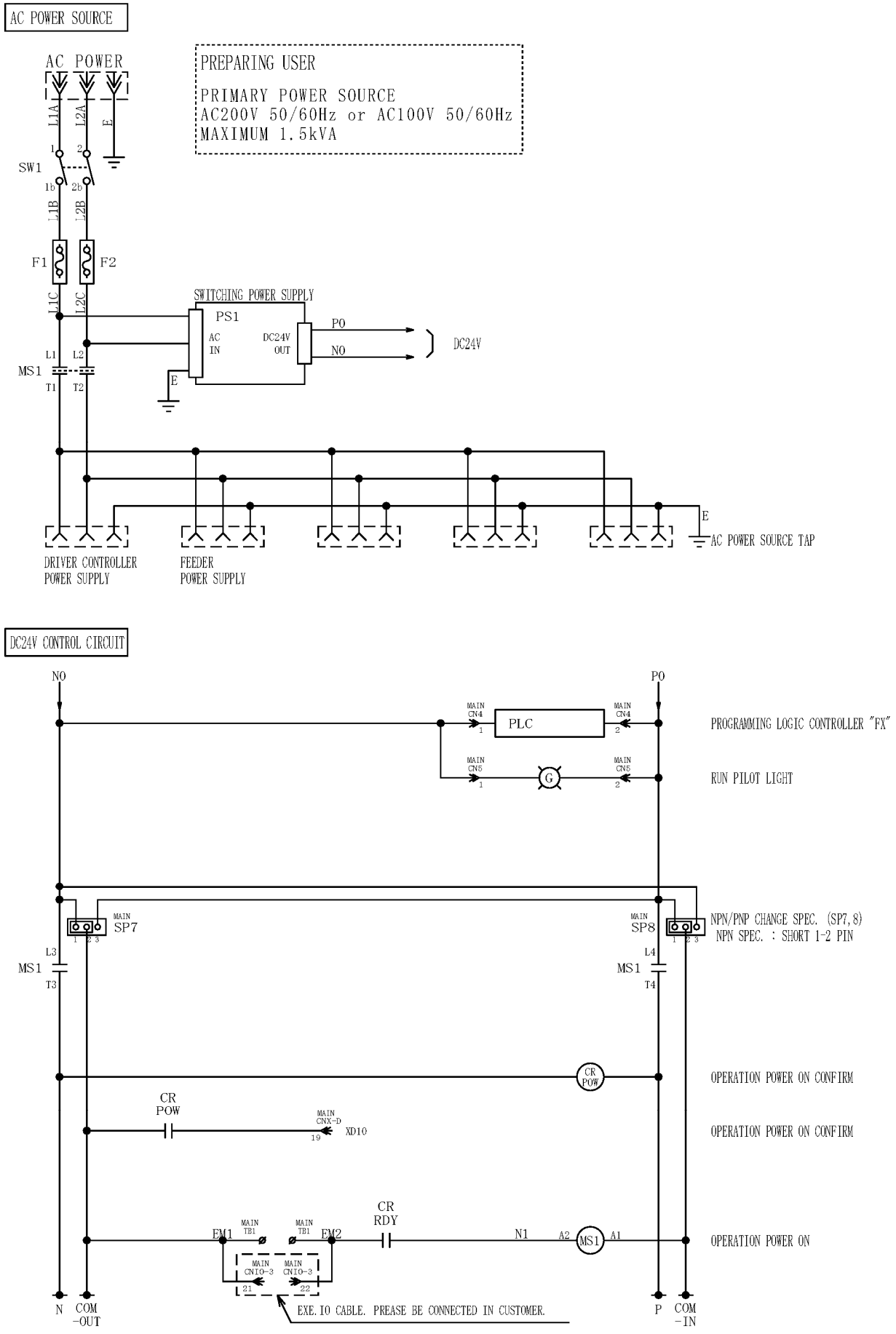
CONNECTOR PIN ASSIGNMENT



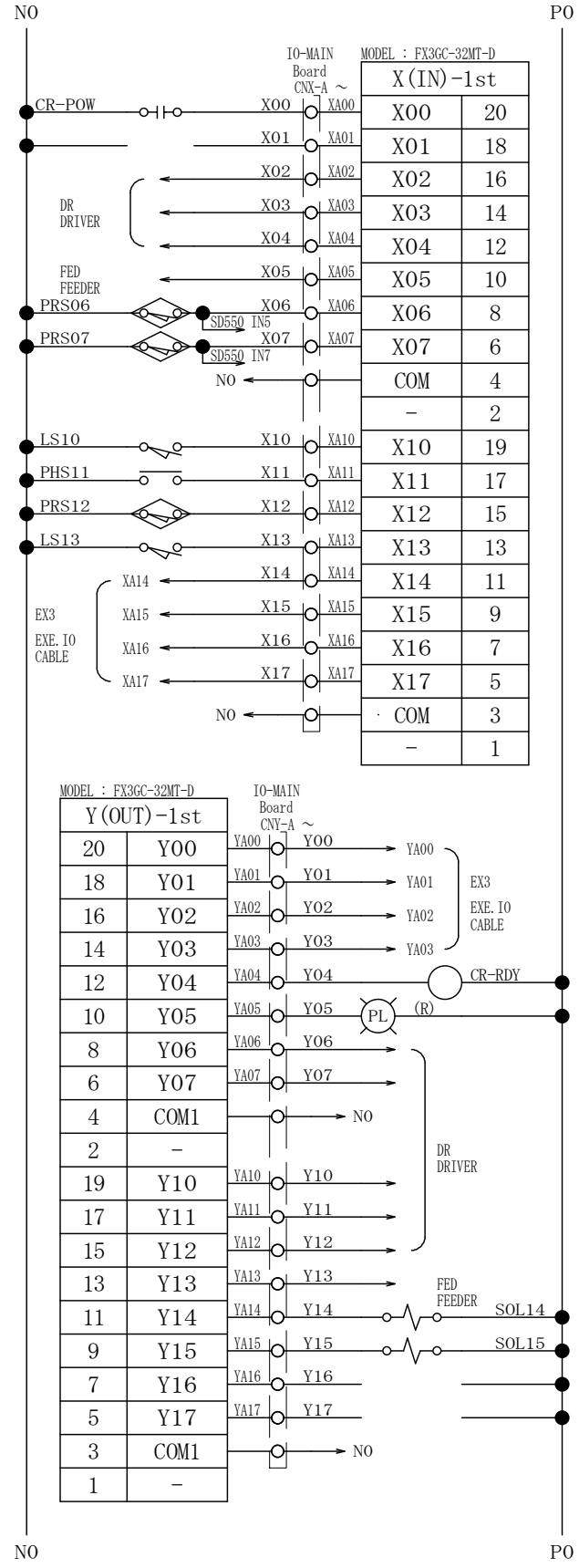
PIN No.	WIRE No.	PIN No.	WIRE No.
1	P0	9	XA10
2	P0	10	YA16
3	N0	11	XA11
4	N0	12	YA17
5	XA06	13	XA12
6	YA14	14	-
7	XA07	15	XA13
8	YA15	16	-

4.1.3 Development connection diagram SD75-T2

1) SD75-T2 Development connection diagram



2) SD75-T2 PLC I/O diagram

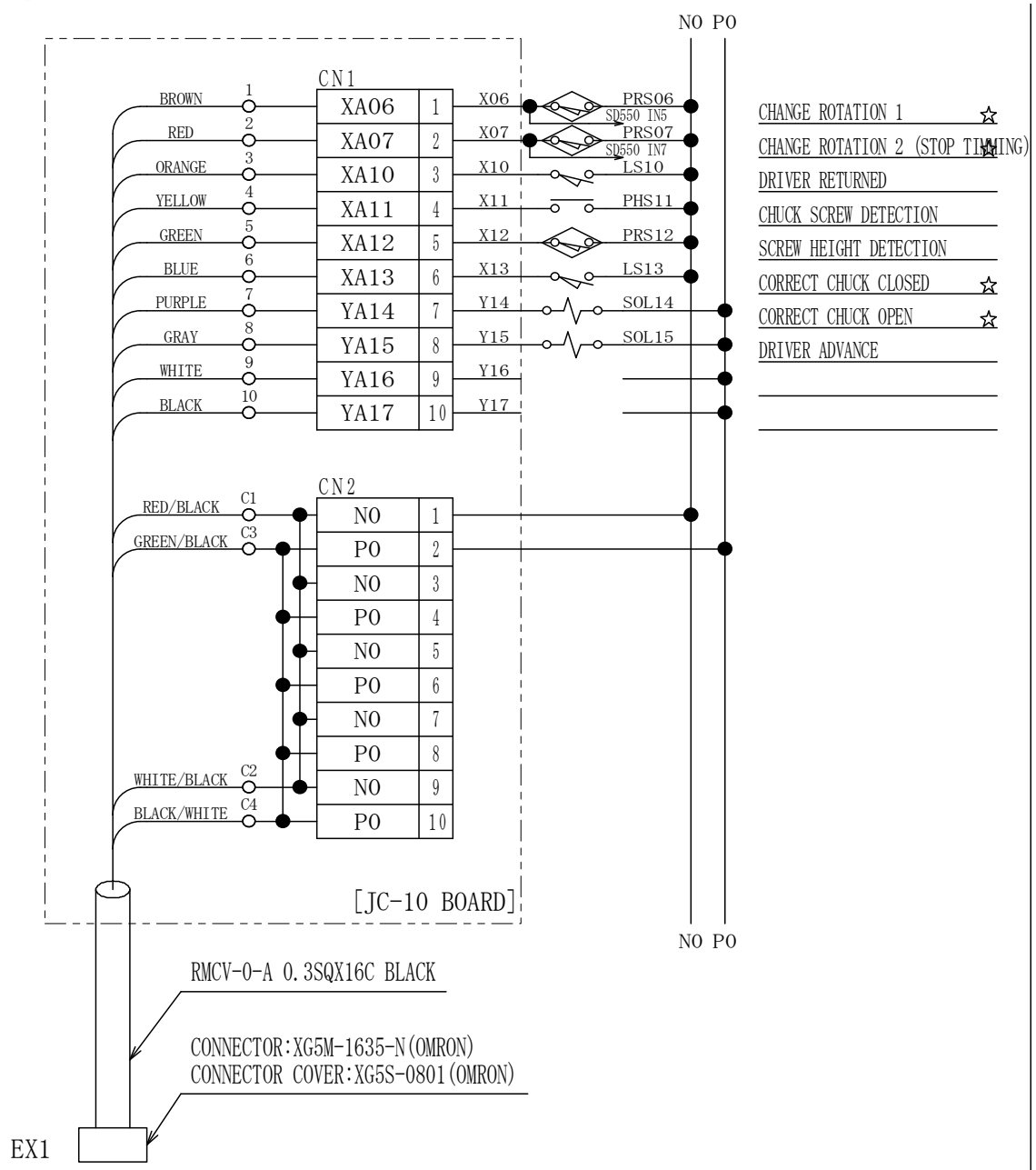


X00	20	OPERATION POWER ON CONFIRM
X01	18	
X02	16	DR TIGHTENING COMPLETION
X03	14	DR TIGHTENING BREAK ALARM
X04	12	DR SYSTEM ALARM
X05	10	FED SCREW SHORTAGE
X06	8	EX1 CHANGE ROTATION 1 ☆
X07	6	EX1 CHANGE ROTATION 2 (STOP TIMMING) ☆
COM	4	
-	2	
X10	19	EX1 DRIVER RETURNED
X11	17	EX1 CHUCK SCREW DETECTION ☆
X12	15	EX1 SCREW HEIGHT DETECTION
X13	13	EX1 CORRECT CHUCK CLOSED ☆
X14	11	EXE RESET
X15	9	EXE CYCLE START
X16	7	EXE
X17	5	EXE
COM	3	
-	1	

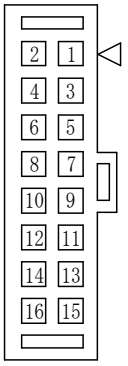
Y00	20	EXE DRIVER ORIGIN
Y01	18	EXE CYCLE COMPLETION
Y02	16	EXE ALARM
Y03	14	EXE SCREW SHORTAGE
Y04	12	OPERATION POWER ON
Y05	10	ERROR PILOT LIGHT
Y06	8	DR TIGHTENING START
Y07	6	DR CHANNEL SELECT CH.1
COM1	4	
-	2	
Y10	19	DR CHANNEL SELECT CH.2
Y11	17	DR CHANNEL SELECT CH.4
Y12	15	DR CHANNEL SELECT CH.8
Y13	13	FED SCREW FEED
Y14	11	EX1 CORRECT CHUCK OPEN ☆
Y15	9	EX1 DRIVER ADVANCE
Y16	7	EX1
Y17	5	EX1
COM1	3	
-	1	

☆ Addition from standard IO.

3) SD75-T2 tip tool I/O diagram



CONNECTOR PIN ASSIGNMENT

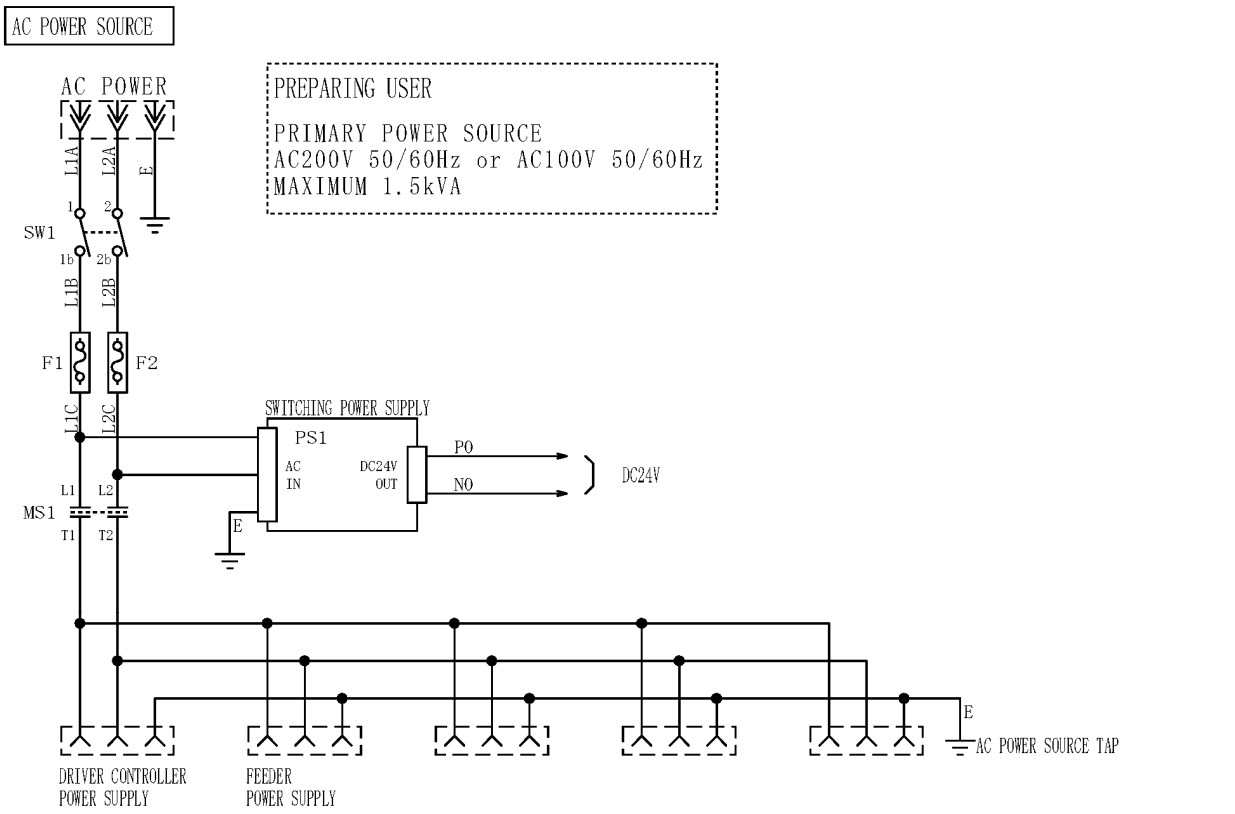


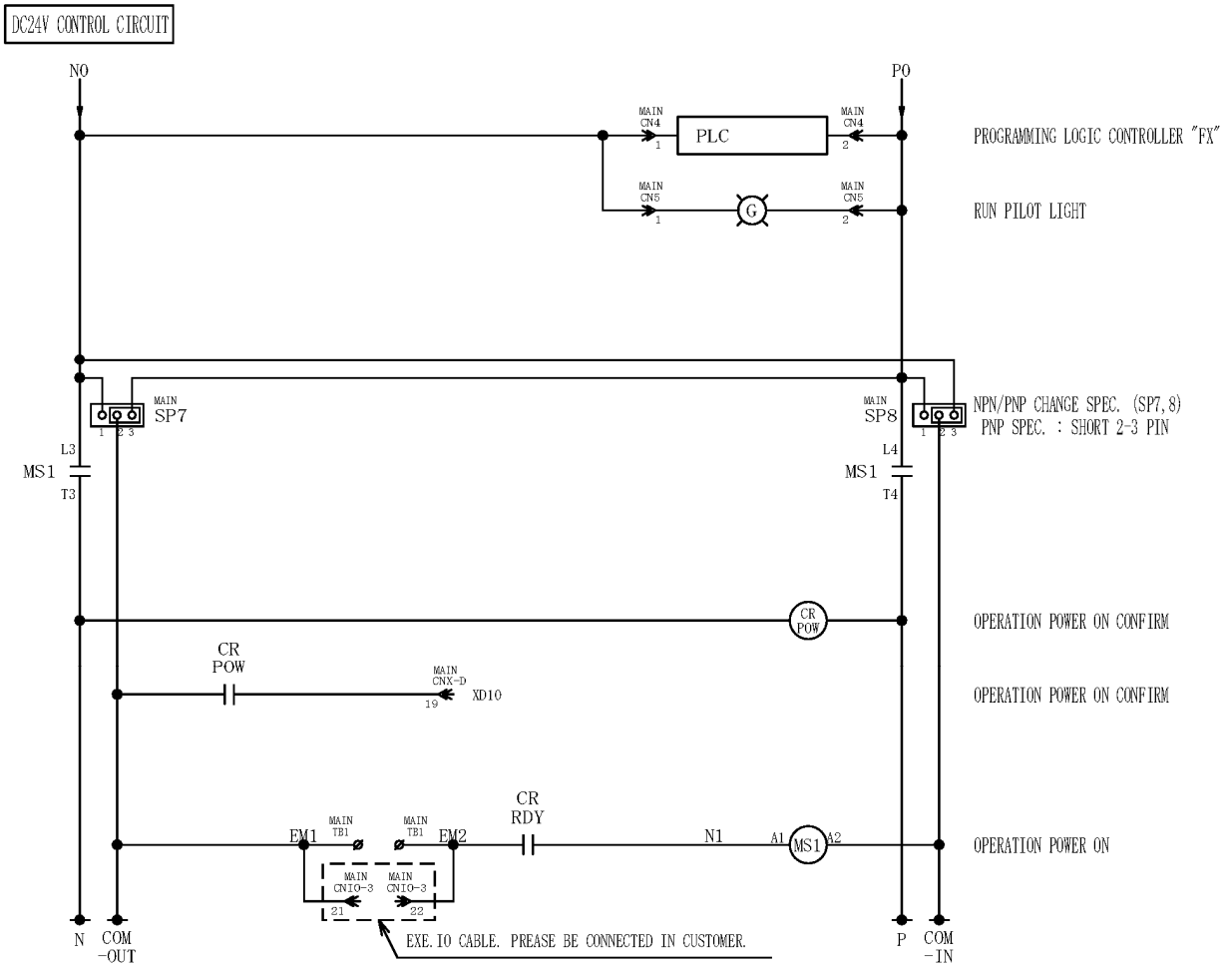
PIN No.	WIRE No.	PIN No.	WIRE No.
1	PO	9	XA10
2	PO	10	YA16
3	NO	11	XA11
4	NO	12	YA17
5	XA06	13	XA12
6	YA14	14	-
7	XA07	15	XA13
8	YA15	16	-

☆ Addition from standard IO.

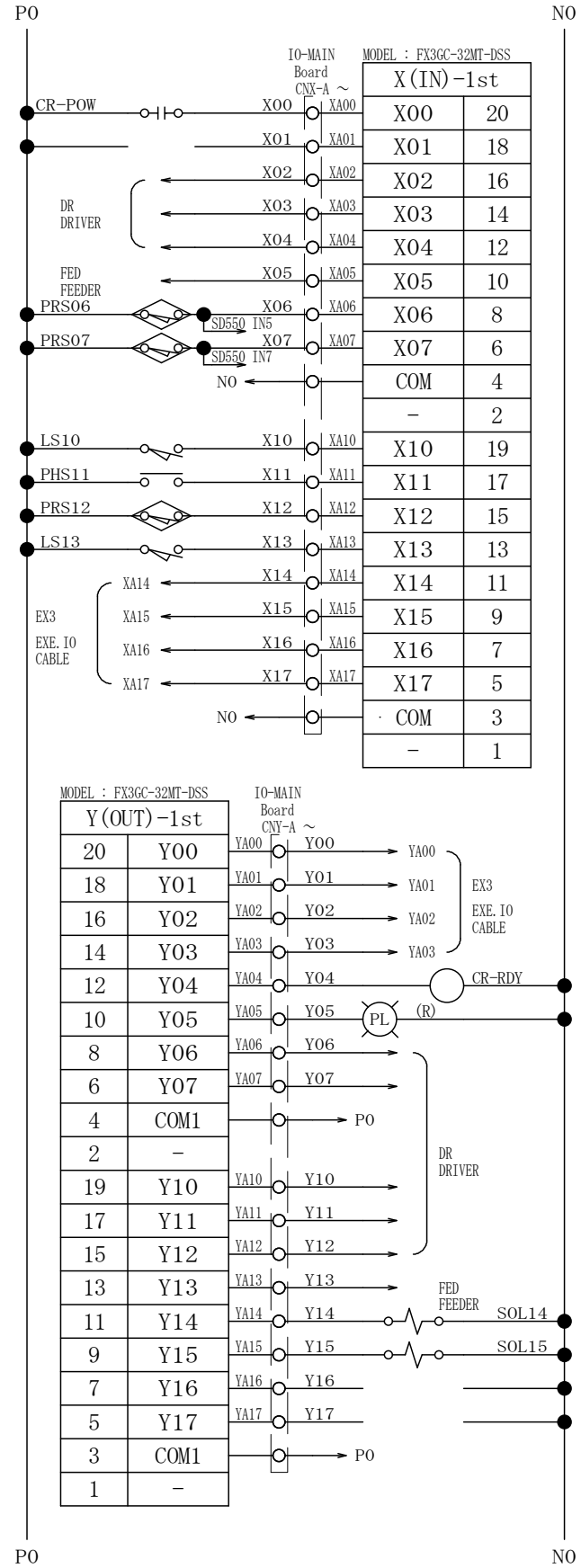
4.1.4 Development connection diagram SD75-T2-P

1) SD75-T2-P Development connection diagram





2) SD75-T2-P PLC I/O diagram

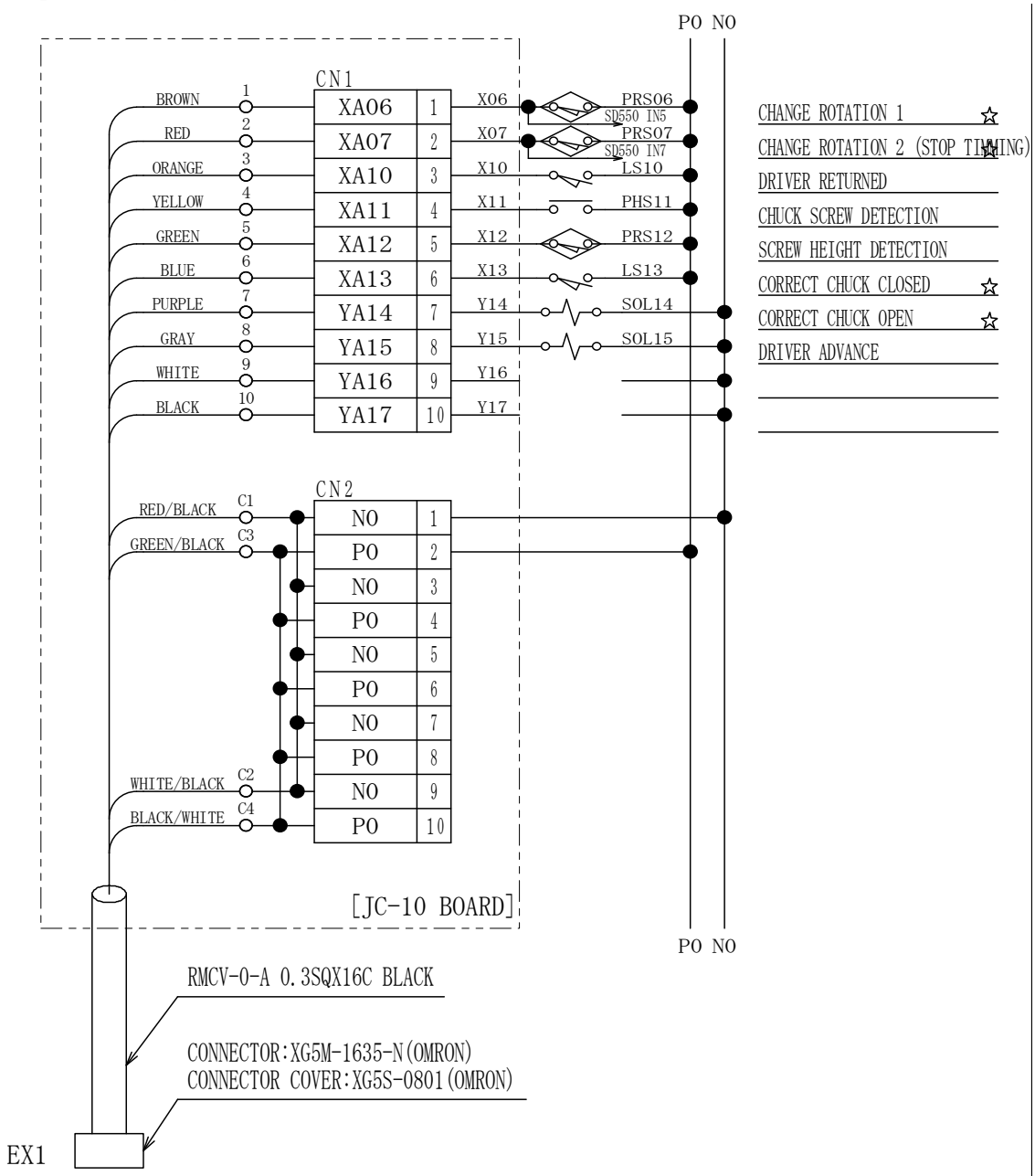


X(IN)-1st		
X00	20	OPERATION POWER ON CONFIRM
X01	18	
X02	16	DR TIGHTENING COMPLETION
X03	14	DR TIGHTENING BREAK ALARM
X04	12	DR SYSTEM ALARM
X05	10	FED SCREW SHORTAGE
X06	8	EX1 CHANGE ROTATION 1 ☆
X07	6	EX1 CHANGE ROTATION 2 (STOP TIMMING) ☆
COM	4	
-	2	
X10	19	EX1 DRIVER RETURNED
X11	17	EX1 CHUCK SCREW DETECTION
X12	15	EX1 SCREW HEIGHT DETECTION
X13	13	EX1 CORRECT CHUCK CLOSED ☆
X14	11	EXE RESET
X15	9	EXE CYCLE START
X16	7	EXE
X17	5	EXE
COM	3	
-	1	

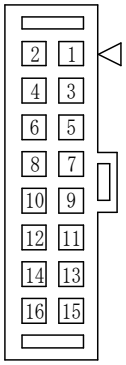
Y(OUT)-1st		
20	Y00	EXE DRIVER ORIGIN
18	Y01	EXE CYCLE COMPLETION
16	Y02	EXE ALARM
14	Y03	EXE SCREW SHORTAGE
12	Y04	OPERATION POWER ON
10	Y05	ERROR PILOT LIGHT
8	Y06	DR TIGHTENING START
6	Y07	DR CHANNEL SELECT CH.1
4	COM1	
2	-	
19	Y10	DR CHANNEL SELECT CH.2
17	Y11	DR CHANNEL SELECT CH.4
15	Y12	DR CHANNEL SELECT CH.8
13	Y13	FED SCREW FEED
11	Y14	EX1 CORRECT CHUCK OPEN ☆
9	Y15	EX1 DRIVER ADVANCE
7	Y16	EX1
5	Y17	EX1
3	COM1	
1	-	

☆ Addition from standard I0.

3) SD75-T2-P tip tool I/O diagram



CONNECTOR PIN ASSIGNMENT



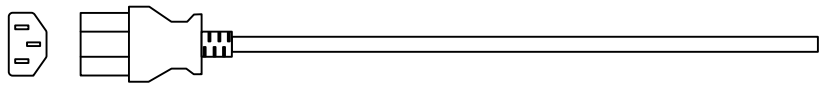
PIN No.	WIRE No.	PIN No.	WIRE No.
1	P0	9	XA10
2	P0	10	YA16
3	N0	11	XA11
4	N0	12	YA17
5	XA06	13	XA12
6	YA14	14	-
7	XA07	15	XA13
8	YA15	16	-

☆ Addition from standard I0.

4.2 External cable diagram

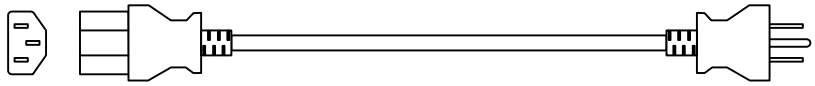
1) AC power supply cable

・FF503H-AC30AL : 200 VAC type



Pin No.	Cable code	Cable	Signal
	L1	Brown	AC power supply
W	L2	Light blue	AC power supply
G	E	Green/yellow	Ground

・FF503H-AC30P : 100 VAC type (optional)

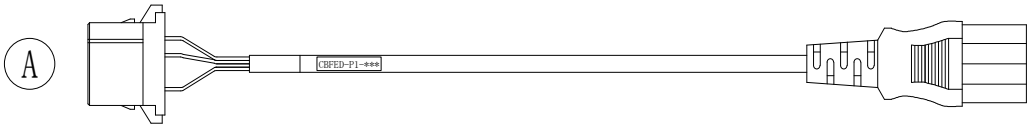


2) Feeder power supply cable

・CBFED-P1-□□□ : For FF503H

Connector A … 1-178128-4 (TE), For connection to connector POW(4P×6) at the back of the controller.

Cable … Delivery specification S-2011:4J9A-040(FF503H-AC30AL) 3m



Pin No. A	Cable code	Cable	Signal
1	L1D	Brown	AC power supply
2	L2D	Light blue	AC power supply
3			
4	E	Green/yellow	Ground

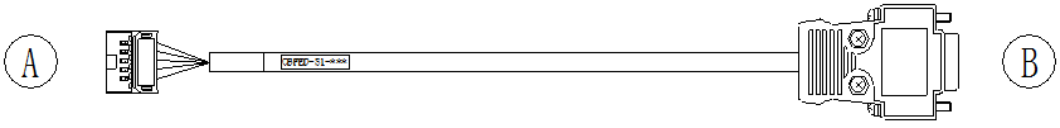
3) Feeder control cable

・CBFED-S1-□□□ : For FF503H

Connector A … XG5M-1035-N(OMRON) , For connection to connector FED at the back of the controller.

Connector B … XM3D-0921(OMRON) , For connection to connector CNIO at the back of the FF503H

Cable … UL2464-1007/2A Black #22×4P (TAIYO CABLE)



Pin No. A	Cable code	Cable	Pin No. B	Signal
1	P0	Orange(1 red)	9	DC24V
2	N0	Orange(1 black)	1	0V
3	F-IN0	Gray(1 red)	7	Screw feeding
4	F-IN1	Gray (1 black)	8	Operation enable (Screw taking-out type)
5	F-OT0	White(1 red)	5	Lack of screw in basket
6	F-OT1	White (1 black)	4	Spera
7	F-OT2	Yellow(1 red)	3	Lack of screw on track
8	F-OT3	Yellow (1 black)	2	Takeing-out enable (Screw taking-out type)
9			6	
10				

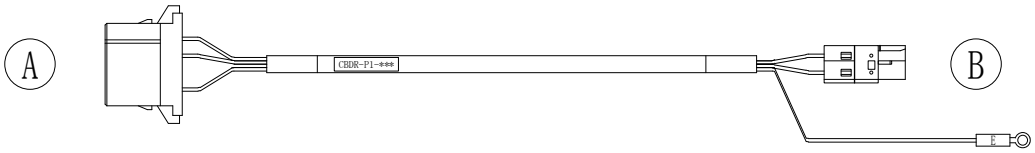
4) Driver power supply cable

・CBDR-P1-□□□ : For driver SD550

Connector A… 1-178128-4 (TE), For connection to connector POW(4P×6) at the back of the controller.

Connector B … 231-202/026-000 (WAGO), For connection to driver SD550

Cable … HRNVV-SB-A#16×3P SP01-188 (DYDEN)



Pin No. A	Cable code	Cable	Pin No. B	Signal
1	L1D	Black	1	AC power supply
2	L2D	White	2	AC power supply
3				
4	E	Green/yellow		Ground

5) Driver control cable

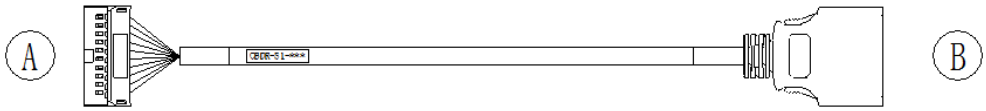
・SD550-IO-□□□ : For driver SD550

Connector A … XG5M-2035-N(OMRON) , For connection to connector DR at the back of the controller

Connector B … Shell : 10320-52F0-008 (3M)

Plug : 10120-3000PE (3M) , For connection to driver SD550

Cable … ORM #0284 (OKI)



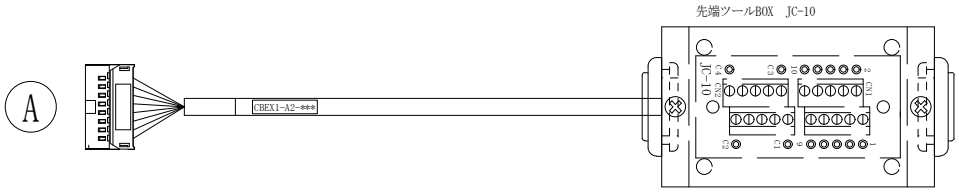
Pin No. A	Cable code	Pin No. B	Signal
1	COM IN	1	Common for input signal
2	COM IN	2	Common for input signal
3	COM OUT	3	Common for output signal
4	COM OUT	4	Common for output signal
5	D-IN0	5	Start
6	D-IN1	6	Channel number selection CH1
7	D-IN2	7	Channel number selection CH2
8	D-IN3	8	Channel number selection CH4
9	D-IN4	9	Channel number selection CH8
10	D-IN5	10	External sensor signal
11	D-IN6	11	Sync fastening start
12	D-IN7	12	
13	D-OT0	13	Ready to receive start
14	D-OT1	14	Completion
15	D-OT2	15	Disconrinuation、Time-out
16	D-OT3	16	System alarm
17	D-OT4	17	Detection of screw height OK
18	D-OT5	18	Ready to receive sync fastening start
19	D-OT6	19	
20	D-OT7	20	

6) EXT1 signal cable

・CBEX1-A2-□□□ : For tip tool JC10 junction BOX

Connector A … XG5M-1635-N(OMRON), For connection to connector EX1 at the back of the controller

Cable … RMCV-0-A 0.3SQX16C (DYDEN)



Assignment of standard input/output signals

Pin No. A	Cable code	Cable	JC-10	Signal
1	P0	Green/Black	C3	DC24V
2	P0	Black/White	C4	DC24V
3	N0	Red/Black	C1	0V
4	N0	White/Black	C2	0V
5	XA06	Brown	1	
6	YA14	Purple	7	Vacuum
7	XA07	Red	2	
8	YA15	Gray	8	
9	XA10	Orange	3	
10	YA16	White	9	
11	XA11	Yellow	4	
12	YA17	Black	10	
13	XA12	Green	5	
14	SP14			
15	XA13	Blue	6	
16	SP16			

7) EXT3 signal cable

・CNEX3-CBO-□□□ : For external I/O

Connector A … XG5M-2635-N(OMRON), For connection to connector EX3 at the back of the controller

Cable … 7/0.127 13P HRV-SV (OKI ELECTRIC CABLE)

Assignment of standard input/output signals

Pin No. A	Cable code	Cable	Signal
1	P0	Orange(1 red)	24VDC
2	P0	Orange (1 black)	24VDC
3	N0	Gray(1 red)	0V
4	N0	Gray (1 black)	0V
5	XA14	White(1 red)	EXE input Reset
6	YA00	White (1 black)	EXE output Driver origin
7	XA15	Yellow(1 red)	EXE input Cycle start
8	YA01	Yellow (1 black)	EXE output Cycle completion
9	XA16	Pink(1 red)	EXE input reserved
10	YA02	Pink (1 black)	EXE output Alarm
11	XA17	Orange(2 red)	EXE input reserved
12	YA03	Orange (2 black)	EXE output Screw shortage
13	D-IN1	Gray(2 red)	EXE input DRcannel selection CH.1 (IO convet MAIN board : SP3 2-3 short circuit)
14	SP14	Gray (2 black)	
15	D-IN2	White(2 red)	EXE input DRcannel selection CH.2 (IO convet MAIN board : SP4 2-3 short circuit)
16	SP16	White (2 black)	
17	D-IN3	Yellow(2 red)	EXE input DRcannel selection CH.4 (IO convet MAIN board : SP5 2-3 short circuit)
18	SP18	Yellow (2 black)	
19	D-IN4	Pink(2 red)	EXE input DRcannel selection CH.8 (IO convet MAIN board : SP6 2-3 short circuit)
20	SP20	Pink (2 black)	
21	EM1	Orange(3 red)	Emergency stop relay contact (b contact)
22	EM2	Orange (3 black)	Emergency stop relay contact (b contact)
23	P	Gray(3 red)	24VDC (Emergency stopON : Open circuit)
24	P	Gray (3 black)	24VDC (Emergency stopON : Open circuit)
25	N	White(3 red)	0V (Emergency stopON : Open circuit)
26	N	White (3 black)	0V (Emergency stopON : Open circuit)

4.3 Connections between controller and external cable

The cables for the SD75 controller and the tightening tool are not connected at the time of shipment. Before using the controller, connect necessary cables to the SD75 controller.

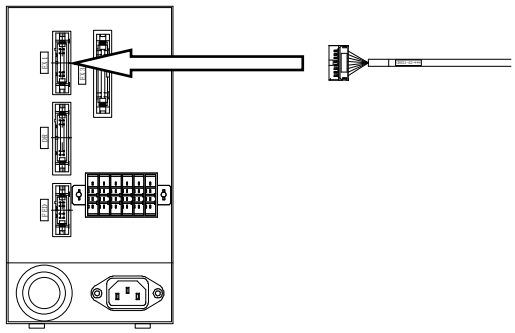
Before cable connection and wiring work, be sure to turn OFF the power supply

Failure to observe this instruction may result in electric shock and damage to the product.

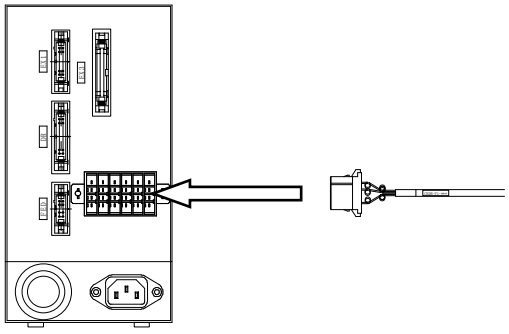
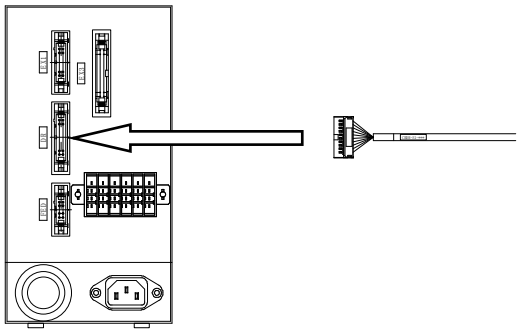
Connect the cables according to the procedure described in this manual.

Failure to observe this instruction may result in damage to the product.

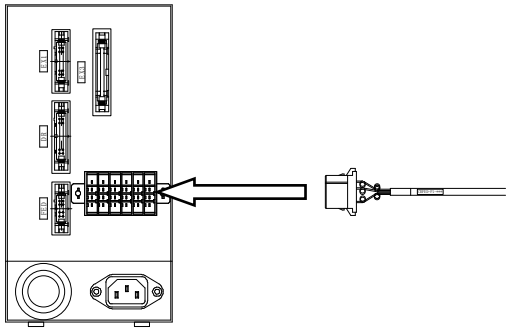
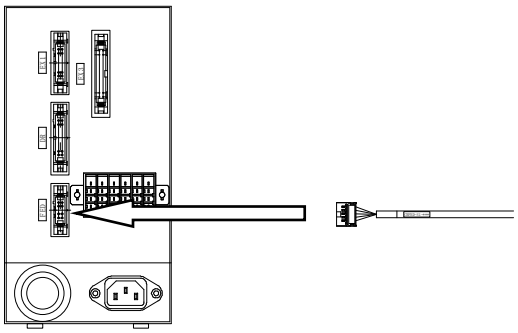
1) Connecting the screw driver tool signal cable

Procedure		
1	Connect the screw driver tool signal connector to the EX1 connector at the back of the controller.	

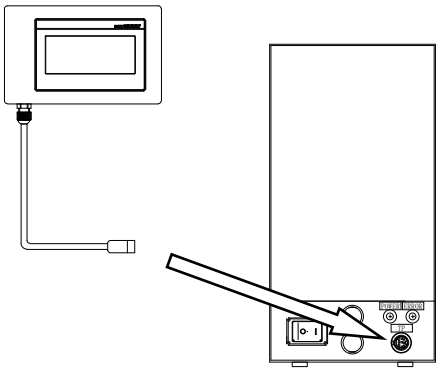
2) Connecting the driver cable (for NITTO SEIKO KX/NX series driver)

Procedure		
1	Connect the driver power supply cable connector to the pawer supply tap (6P) connector at the back of the controller.	
2	Connect the driver control cable connector to the DR connector at the back of the controller.	

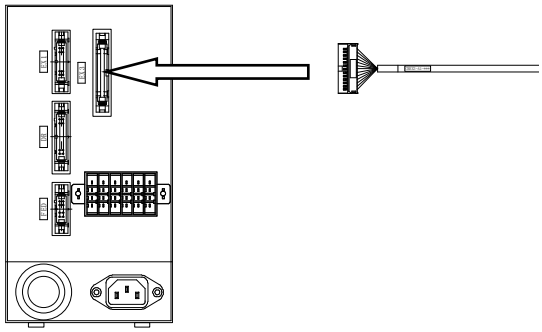
3) Connecting the feeder cable (for NITTO SEIKO FF503H feeder)

Procedure		
1	Connect the feeder power supply cable connector to the pawer supply tap (6P) connector at the back of the controller.	
2	Connect the feeder control cable connector to the DR connector at the back of the controller.	

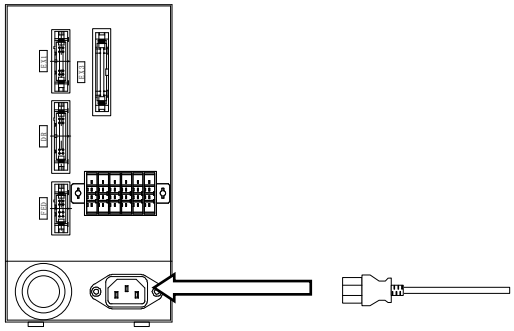
4) Connecting the operation pendant cable (optional)

Procedure		
1	Connect the operation pendant cable connector to the TP connector at the front of the controller.	

5) Connecting the external I/O cable (optional)

Procedure		
1	Connect the external I/O connector to the EX3 connector at the back of the controller.	

6) Connecting the AC power supply cable

Procedure		
1	Connect the AC power supply connector to the AC inlet at the back of the controlle **(Caution)** **Before turning ON the power supply, check the power supply rating of controller.**	

5. Maintenance and Inspection

5.1 Maintenance and inspection

Be sure to disconnect the power cable of the robot controller before maintenance and inspection.

1) Check points

・Check the voltage supplied to the controller. → Should be within the specified range, or
200 VAC type: 200 VAC to 230 VAC
100 VAC type: 100 VAC to 115 VAC

・Check the connectors. → Check for looseness or gap.

・Check the cables. → Check for disconnection or damages.

2) Inspection intervals

Every six months

3) Consumables

It is recommended to keep spare consumables at your hand.

・Cables

5.2 Battery

1) PLC (FX3GC-32MT-D□□, MITSUBISHI ELECTRIC)

The controller can operate without battery replacement.

Since PLC programs, parameters and data settings can be stored in the flash ROM, the controller can operate even if the backup battery voltage lowers. However, counter, operation log, and fault log data are stored in the RAM area of the PLC, the counter, operation log, and fault log functions may not normally work when the backup battery voltage lowers.

2) Touch panel (GT2103-PMBLS, MITSUBISHI ELECTRIC)

Battery replacement is required. However, it does not affect operation.

The screen data are stored in the flash ROM, and the touch panel does not use a battery for backup during power failure. The battery backup function stores clock data, alarm log, and recipe data.Screen data will be lost when the battery voltage becomes low, but it does not affect operation. (Battery replacement interval: 5 years as standard)

6. Functions of the Pendant

6.1 Outline of functions

SD75-TP uses a graphic operation terminal (GT2103-PMBLS, MITSUBISHI ELECTRIC) as an operation panel, and incorporates the screen software dedicated to tightening tool control. RC71-TS provides both operation panel functions and teaching pendant functions, thus enabling easy operations and positioning control of the screw tightening tool.

1) SD75-TS provides operation panel functions required for automatic operation and manual operation.
2) SD75-TS provides functions specific to a screw tightening machine, such as screw tightening parameter setup, machine cycle time monitor, I/O monitor and screw tightening fault monitor.

Through development of the dedicated software, SD75-TS enables easy operations of the above functions.

6.1.1 Graphic operation terminal

This system uses the graphic operation terminal (GT2103-PMBLS, MITSUBISHI ELECTRIC) as an operation panel. The graphic operation terminal (hereinafter, referred to as "operation panel") provides switch function, lamp function, character display and screen switching function, ensuring simplified easy-to-see operation environment based on an interactive method.

[Major function]
1) Compact operation panel that enables operations of all necessary functions
2) Simplified easy-to-see operation environment based on an interactive method

The operation panel provides hierarchical menu structure. You can change over the operations screens to execute various operations and monitors by selecting necessary functions from the menu list.
The menu consists of the following four modes: "AUTO mode", "FAULT mode", "MANUAL mode", and "SETUP mode".

[Operation mode list]

Mode		Major function
Main menu	AUTO mode	・Automatic cycle operation ・Various information monitors (Cycle time, Counter, Tigthening log, PLC I/O)
	FAULT mode	・Occurrence of fault or fault log display ・Fault reset
	MANUAL mode	・Manual operations (Tightening, Screw feed, Driver advance/retraction, Driver rotation, Vacuum,)
	SETUP mode	・Operation parameter registration ・System parameter registration ・Clock setup ・PLC I/O test ・Operating for driver SD550memory sheets (Option)

6.1.2 Authorizing function

This system enables all operations with the operation panel. However, for some operations, password input is required. The system identifies an operator with the password to limit authorization for operations.

With this system, the operator authorization by password is classified into the following three levels:

LEVEL 1 … Ordinary operations
No password is required. Automatic operations, manual operations and fault monitors are allowed.

LEVEL 2 … Teaching enabled
Input of the LEVEL 2 password is required.
In addition to the operations authorized for LEVEL 1, setup operations are allowed.

LEVEL 3 … System administrator
Input of the LEVEL 3 password is required.
In addition to the operations authorized for LEVEL 2, setup operations are allowed.

Each password is a fixed value using the touch panel security password, and it cannot be changed by the user. (The password can be changed by using the touch panel edit software. If a password change is required, contact NITTO SEIKO.

[Factory-set passwords]

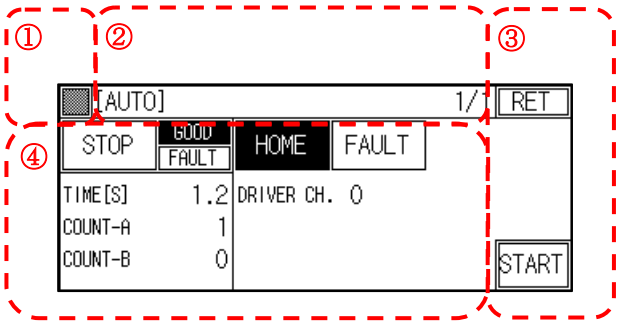
LEVEL 2 password	9
LEVEL 3 password	2 1 0

6.2 Basic operations

6.2.1 Basic operations on the operation panel

1) Basic screen layout

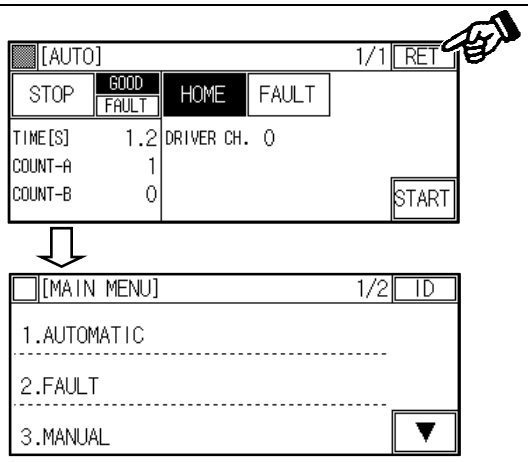
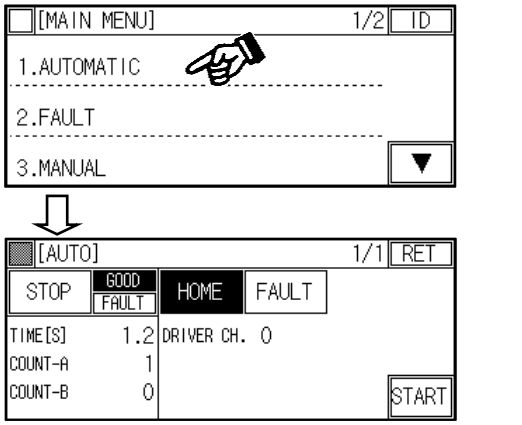
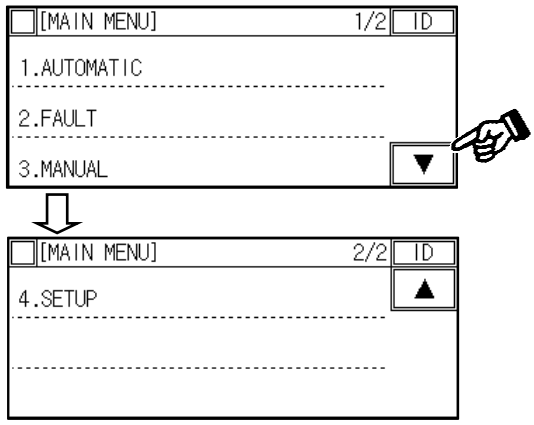
This section describes the basic screen layout.

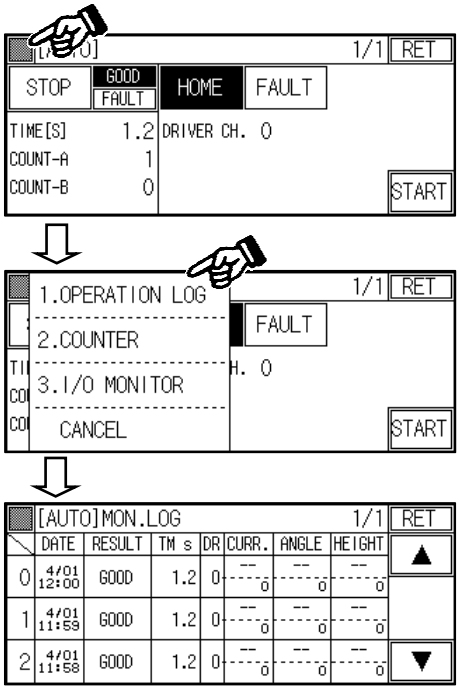


①	Indicates whether a sub menu is provided or not. ・ ▩ Indicator ⋯ Sub menu is provided. ・ □ Indicator ⋯ No sub menu is provided.
②	Displays a screen name (mode).
③	・Screen change Screens can be changed over with the RET 、 ▼ and ▲ switches. ・In addition to the above, other switches are assigned to some screens.
④	Displays main menu items for the currently displayed screen (screen selection, information, registration, etc.)

2) Screen change operations

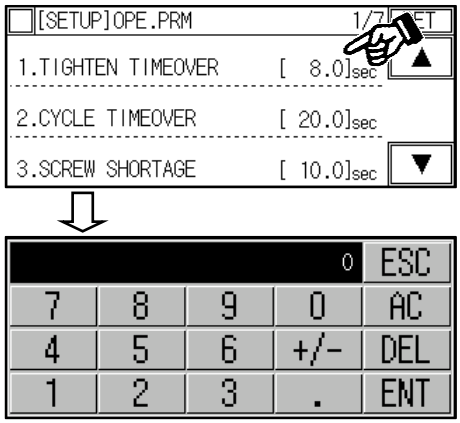
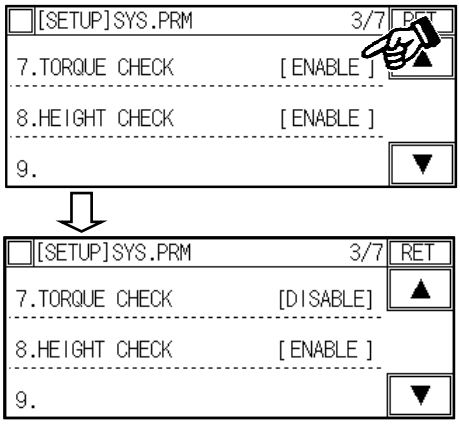
Change over the screen, conduct the following A to D steps:

A	If you press the [RET] switch, the screen changes to the upper hierarchical layer.	
B	If you press the name display field on the second to forth lines on the screen ([1.AUTOMATIC] , [2.FAULT] , etc.) screen will change to the lower hierarchical layer. Note: When the first line shows several information items such as a combination of "name" and "set value", the screen will not change, even if you press the name display field on the second to forth lines. With the [AUTO] screen shown on the right, the second to forth lines are not for indication of a name only. Therefore, the screen will not change even if you press [1. RUN].	
C	If you press the [▼] or [▲] switch, the screen can be changed in the current hierarchical layer.	

D	If the indicator at the upper left corner of the screen is ■, pressing the ■ indicator displays a sub menu. The screen can be changed by pressing the first to third lines in the sub menu. If the indicator at the upper left corner of the screen is □, no sub menu is provided.	

3) Registering a set value

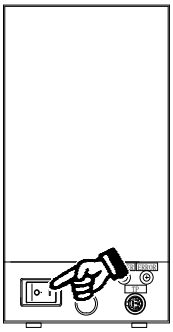
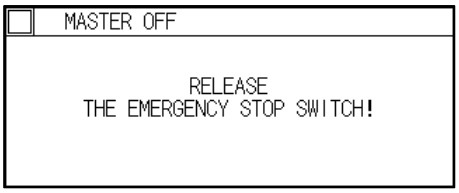
Set value registration procedure is described below.

A	A value in [ ] (brackets) can be changed. ・[When a numerical value is displayed in [ ] (brackets), touching the filed in [ ] displays numeric keys, enabling you to change the value. ・When a character string is displayed in [ ] (brackets), touching the filed in [ ] changes the character string.	・Numerical value  ・Character string 

6.2.2 Home return

Before starting automatic operation, Home return operation is required. Home return is the operation to set the machine at the reference position (Home Position). Every time the power supply is turned ON, Home return operation is required.

Home return operation can be executed with the external input signal. However, this section describes the home return procedure using the operation pendant.

	Operating procedure	Display/Status
1	Turn ON the power switch at the front of the controller. Pressing [|] of the power switch turns ON the power supply, and lights the RUN lamp.	
2	When the operation pendant screen displays the message as shown on the right, the machine is in emergency stop status. Check if the emergency stop switch has been pressed. After the emergency stop switch is reset, the initial screen for the MANUAL mode appears.	

(Note)

Automatic operation is disabled unless the machine is not at the home position.

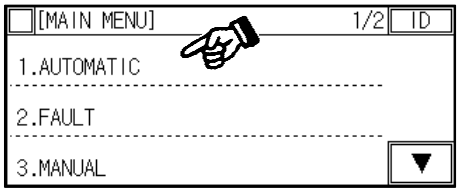
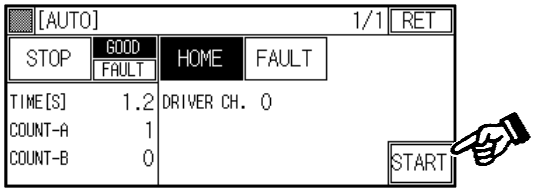
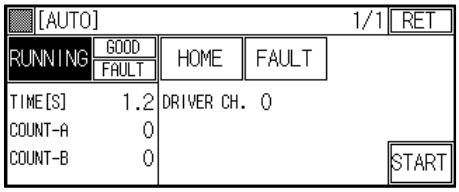
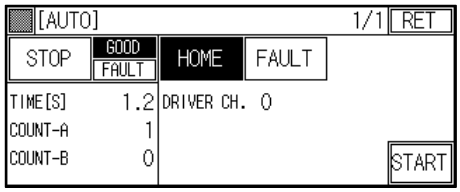
If it is not at the home position, return it to the home position, and then, start automatic operation.

6.2.3 Automatic cycle operation

Automatic cycle operation can be executed with the external input signal. However, this section describes the automatic cycle operation procedure using the operation pendant.

・Change to the AUTO mode (Figure below, Step 1)

・Automatic cycle operation start (Figure below, Steps 2～4)

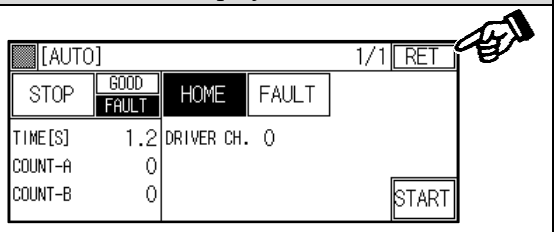
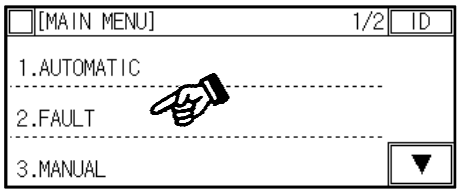
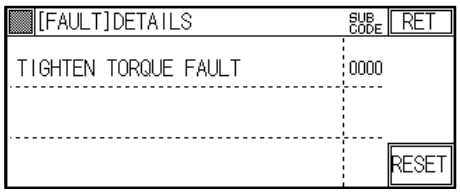
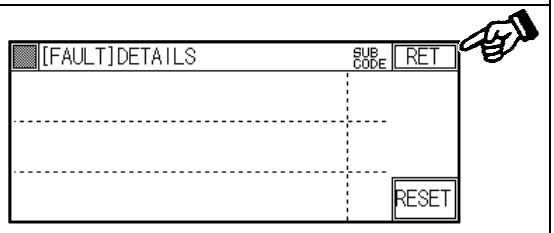
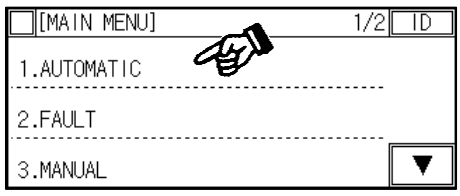
	Operating procedure	Display/Status
1	Press 1.AUTOMATIC . The operation mode changes to the AUTO mode.	
2	Press the START switch. Note) Ensure that the tightening tool is at the origin.→ HOME lamp ON	
3	The unit starts automatic cycle operation.	
4	After the automatic cycle is completed, a judgment result is displayed in the bottom line.	

Subsequently, automatic cycle operation can be executed by repeating Steps 2 to 4.

6.2.4 Operation at occurrence of tightening fault

If a tightening fault occurs during automatic cycle operation, fault reset operation is required.

A tightening fault can be reset with the external input signal. However, this section describes the fault reset procedure using the operation pendant.

	Operating procedure	Display/Status
1	Occurrence of a tightening fault during automatic cycle operation The screen backlight turns pink to indicate occurrence of a fault. Press the RET swith. The screen changes to the FAULT screen.	
2	Press the 2.FAULT swith.	
3	Identify the fault condition, and press the RESET switch at the right bottom of the screen.	
4	Press the RET swith. The screen changes to main screen of the AUTO mode.	
5	Press the 1.AUTOMATIC swith.	

7. Pendant AUTO Mode

This chapter describes the mode to execute automatic operation. Functions of the automatic operation mode of this machine are described below.

7.1 Outline of functions

This system provides the automatic operation mode. As the conditions required to enable the automatic operation mode, teaching must be completed in the TEACH mode, and proper setup must be completed in the SETUP mode.

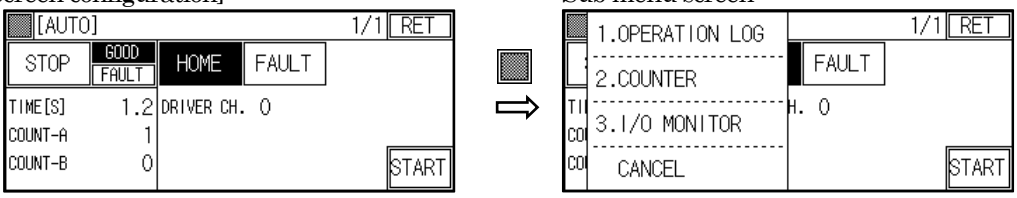
[Major functions]

- Automatic cycle start
- Variety of information monitor (cycle time, counter, running operation log, PLC I/O)

7.2 AUTO mode main screen

This screen is the basic screen for the AUTO mode, enabling you to start automatic operation. Also, you can operate various functions such as counter setup/display and various monitors on this AUTO mode main screen.

[Screen configuration]



[Description on screen]

Home indicator	HOME : Not at the home position HOME : At the home position
Fault indicator	FAULT : Fault is not occurring FAULT : Fault is occurring
Operation indicator	STOP : Automatic cycle operation is stopped. RUNNING : Automatic cycle operation is in progress.
Result indicator	GOOD : Automatic cycle is normally completed. FAULT : Automatic cycle is abnormally completed.
DRIVER CH.	Driver controller operation channel
TIME	Automatic 1-cycle operation time (Real time during operation)
COUNT-A	Displays a COUNT-A total value. *MAIN MENU → 4SETUP → 1.OPERATION PARA → 9.COUNT-A
COUNT-B	Displays a COUNT-B total value. *MAIN MENU → 4SETUP → 1.OPERATION PARA → 10.COUNT-B
START	Starts an automatic cycle.

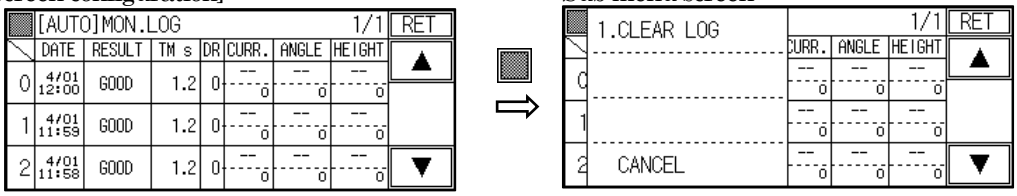
[Description on sub menu]

1.OPERATION LOG	Changes to the Operation log screen.
2.COUNTER	Changes to the Counter screen.
3.I/OMONITOR	Changes to the I/O monitor screen.
CANCEL	Closes sub menu display window.

7.2.1 Operation log monitor

You can monitor automatic cycle logs for up to 40 events.

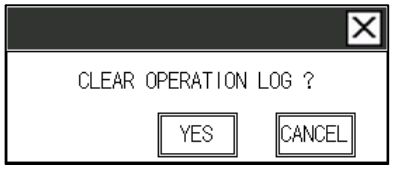
[Screen configuration]



[Description on screen]

Log display	DATE	Displays date/time of automatic cycle end in the format of "MM/DD HH:MM".
	RESULT	Displays a judgment result. Contents of display are as follows: ・GOOD : Normal completion ・TORQUE : Tightening torque fault ・HEIGHT : Tightening height fault ・FEED : Screw feed fault ・FAULT-4 : (Not used) ・ANGLE : SD550 tigthning angle fault (optional) ・FAULT-6 : (Not used) ・FAULT-7 : (Not used) ・FAULT-8 : (Not used) ・FAULT-9 : (Not used) ・FAULT-A : (Not used) ・FAULT-B : (Not used) ・FAULT-C : (Not used) ・FAULT-D : (Not used) ・FAULT-E : (Not used) ・FAULT-F : (Not used) ・FAULT-X : (未使用)
	TIME sec	Displays an automatic cycle operation time ([sec]).
	DRIVER CH	Displays operated driver channel.
	DRV CUR	Displays history only when the SD550 communication function (option) is used. Driver judgment result (SD550: current value, SD550T: torque) and judgment value are displayed.
	DRV ANG	Displays history only when the SD550 communication function (option) is used. Driver angle judgment result and angle judgment value are displayed.
	DRV HEI	Displays history only when the SD550 communication function (option) is used. Driver's screw tightening height (loose fitting) judgment result and
	LOG	Log Nos. 1 to 40 are displayed.
▲ ▼		Scrolls the screen. (Log Nos. 1 to 40)

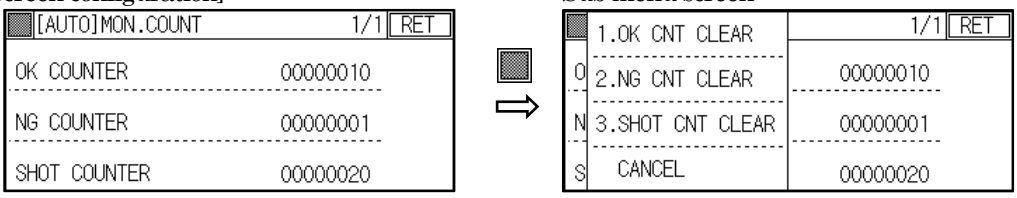
[Description on sub menu]

1.CLEAR LOG	Clears log data. To clear log data, press YES . 
CANCEL	Closes sub menu display window.

7.2.2 Counter monitor

You can monitor and clear the counters.

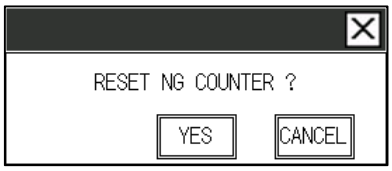
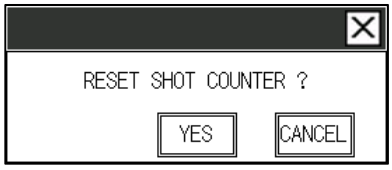
[Screen configuration]



[Description on screen]

OK COUNTER	This counter counts when operation cycle is complete without tightening fault.
NG COUNTER	This counter counts when operation cycle is complete with tightening fault.
SHOT COUNTER	This counter counts when tightening is started (only when automatic operation is performed). It can be used as a guide for replacement of a bit.

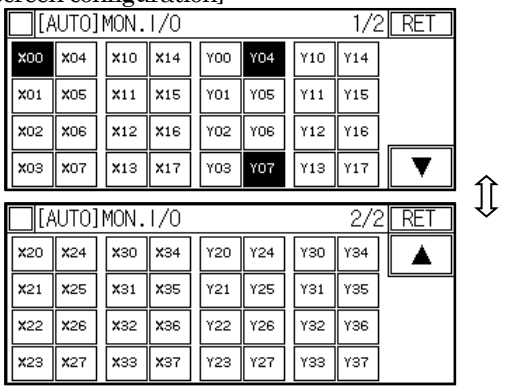
[Description on sub menu]

1.OK CNT CLEAR	The OK counter can be cleared. Press the Yes switch. 
2.NG CNT CLEAR	The NG counter can be cleared. Press the Yes switch. 
3.SHOT CNT CLR	The shot counter can be cleared. Press the Yes switch. 
CANCEL	Closes sub menu display window.

7.2.3 I/O monitor

You can monitor I/O status of the PLC in the controller.

[Screen configuration]



[Description on screen]

X**	Displays status of 32 inputs (X00 to X37). X00 : OFF X00 : ON
Y**	Displays status of 32 outputs (Y00 to Y37). Y00 : OFF Y00 : ON

8. FAULT Mode of the Pendant

This chapter describes fault display functions.

8.1 Outline of functions

This system provides fault display functions. At occurrence of a trouble, you can take appropriate actions by confirming fault conditions. In the FAULT mode, names of faults that have occurred, and up to 100 fault records are displayed.

Generally, faults can be classified into the following three categories:

- Warning fault
- Running fault (Cycle stop)
- System fault (Urgent stop)

Characteristics of fault conditions are described below:

1) Warning fault

At occurrence of a fault, the touch panel backlight color turns pink. This condition indicates a warning only. The machine does not stop operation, and automatic operation can be started during occurrence of the warning fault.

2) Running fault (Cycle stop)

At occurrence of a fault, the touch panel backlight color turns pink. The machine does not stop operation, but automatic operation cannot be started during occurrence of the running fault.

3) System fault (Urgent stop)

At occurrence of a fault, the touch panel backlight color turns pink. If the fault occurs while the machine is in operation, the machine immediately stops. During occurrence of the system fault, automatic operation cannot be started.

When several faults occur, up to three items are displayed at once, according to the following priority. Pressing RESET on the fault details screen resets the displayed faults.

- Fault display priority: System fault (Urgent stop) > Running fault (Cycle stop) > Warning fault

8.2 Warning fault

At occurrence of a fault, the touch panel backlight color turns pink. However, this condition indicates a warning only. The machine does not stop operation, and automatic operation can be started during occurrence of the warning fault.

[Warning fault list]

Name of fault	Memory	Description
(WARNING 1)	M801	
(WARNING 2)	M802	
(WARNING 3)	M803	
(WARNING 4)	M804	
(WARNING 5)	M805	
(WARNING 6)	M806	
(WARNING 7)	M807	
(WARNING 8)	M808	
(WARNING 9)	M809	
CPU ERROR	M810	An error is detected in the controller's internal PLC.
LOW BATTERY	M811	The battery voltage in the controller's internal PLC has dropped. When battery voltage has dropped, counter, operation log and fault log cannot be normally stored.
(WARNING 12)	M812	
(WARNING 13)	M813	
(WARNING 14)	M814	
LOW SCREW	M815	When the "Screw shortage" input (X05) ON duration exceeds the time specified in the "Screw shortage" operation prameter, this fault is output. When the "Screw shortage" put (X05) is turned OFF, this fault will be automatically reset.

8.3 Running fault

At occurrence of a fault, the touch panel backlight color turns pink. The machine does not stop operation, but automatic operation cannot be started during occurrence of the running fault.

[Running fault list]

Name of fault	Memory	Description
(RUNNING FAULT 1)	M816	
(RUNNING FAULT 2)	M817	
(RUNNING FAULT 3)	M818	
(RUNNING FAULT 4)	M819	
(RUNNING FAULT 5)	M820	
(RUNNING FAULT 6)	M821	
(RUNNING FAULT 7)	M822	
(RUNNING FAULT 8)	M823	
(RUNNING FAULT 9)	M824	
(RUNNING FAULT 10)	M825	
(RUNNING FAULT 11)	M826	
(RUNNING FAULT 12)	M827	
ANGLE FAULT	M828	It is valid for SD550 communication type (optional). This fault occurs when the angle judgment result of SD550 is faulty. When the system parameter setting item 12.SD550 COMM. is set to [Valid], the result is judged to be faulty/
(RUNNING FAULT 14)	M829	
TIGHTEN TORQUE FAULT	M830	When tightening is not completed with proper tightening torque, this fault occurs. The following two causes are possible: ・Driver fault or alarm However, when the torque judgment parameter 7.TORQUE CHECK is set to [DISABLE] , this fault will not be detected. ・Tightening time-over Tightening time exceeded the 1.TIGHTEN TIMEOVER set value of the operation parameter.
SCREW HEIGHT FAULT	M831	When tightening operation is not completed with proper tightening height, this fault occurs. However, when the screw loose fitting judgment parameter 8.HEIGHT CHECK is set to [DISABLE] , this fault will not be detected.
(RUNNING FAULT 17)	M832	
(RUNNING FAULT 18)	M833	
(RUNNING FAULT 19)	M834	
SCREW FEED FAULT	M835	When screw feed operation is not completed in a proper screw feed condition, this fault occurs. (For feeder FF503H) To detect a screw feed fault, the screw feed check sensor (optional) is required. When the screw feed parameter 1.SCREW FEED DETECT is set to [DISABLE] , this fault will not be detected.
(RUNNING FAULT 21)	M836	
(RUNNING FAULT 22)	M837	
(RUNNING FAULT 23)	M838	

8.4 System fault

At occurrence of a fault, the touch panel backlight color turns pink. If the fault occurs while the machine is in operation, the machine immediately stops. During occurrence of the system fault, automatic operation cannot be started.

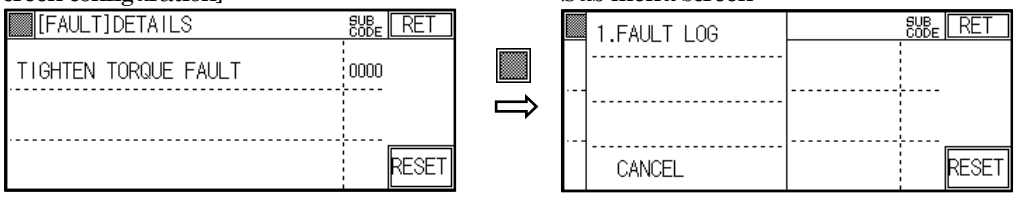
[System fault list]

Name of fault	Memory	Description
CYCLE TIMEOVER	M840	When a 1-cycle operation time exceeds the 2.CYCLE TIMEOVER set value of the operation parameter, this fault is indicated.
DRIVER COMM. FAULT	M841	If a communication error occurs when the SD550 communication function (option) is used, this fault is output.
DRIVER ROTATE FAULT	M842	This fault occurs when rotation of the driver cannot be confirmed at the startup of tightening.
DRIVER UP/DOWN FAULT	M843	This fault occurs when completion of lowering of the lifting axis cannot be confirmed after the tightening startup command is output.
CHUCK DETECT SENSOR FAULT (applicable to SD75-T2 only)	M844	This fault occurs when the chuck detection sensor detects the presence of screw at the time of return of the driver after tightening is complete.
(SYSTEM FAULT 6)	M845	
(SYSTEM FAULT 7)	M846	
(SYSTEM FAULT 8)	M847	
(SYSTEM FAULT 9)	M848	
(SYSTEM FAULT 10)	M849	
CC-LINK COMM	M850	If communication with the master station cannot be normally executed when the CC-Link function (option) is used, this fault is output. The cause of this fault may be attributable to the master station, as well as the slave station.
CC-LINK SETUP	M851	If the current setting is not normal when the CC-Linkfunction (option) is used, this fault is output.
(SYSTEM FAULT 13)	M852	
(SYSTEM FAULT 14)	M853	
(SYSTEM FAULT 15)	M854	
(SYSTEM FAULT 16)	M855	
(SYSTEM FAULT 17)	M856	
(SYSTEM FAULT 18)	M857	
(SYSTEM FAULT 19)	M858	
(SYSTEM FAULT 20)	M859	
DRIVER ALARM	M860	When the driver controller's system alarm detection output is detected, this fault is indicated. If this fault occurs, the machine will automatically execute emergency stop peration during reset processing, and reset the fault. However, depending on the condition of a fault, it may not be reset. For details, refer to the User's Manual for the driver controller. When our KX/NX driver is used, alarm code "A***" is indicated on the driver controller's display screen at occurrence of a driver alarm.
(SYSTEM FAULT 22)	M861	
(SYSTEM FAULT 23)	M862	
(SYSTEM FAULT 24)	M863	

8.5 Fault details screen

This screen displays faults that currently occur.

[Screen configuration]



[Description on screen]

Fault display	Displays up to three faults that currently occur. If several faults (more than three events) have occurred, three top events are displayed according to the following priority: ・Fault display priority: System fault > Running fault > Warning fault (In the order of PLC memory size) SUB CODE Sub code is enabled when the SD550 communication function (option) is used.A code indicating fault details is added at occurrence of any of the following faults: ・TIGHTEN TORQUE FAULT ・DRIVER COMM. FAULT ・DRIVER ALARM For details, refer to "SD550 Communication (Option)" in a separate section.
RESET	Resets faults that currently occur. Through fault reset operation, the fault display is cleared. The touch panel backlight color returns from pink to white.

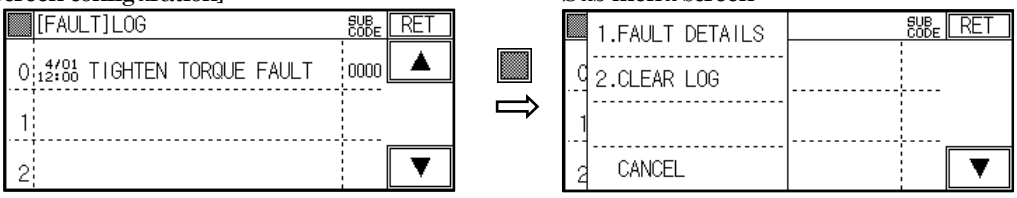
[Description on sub menu]

1.FAULT LOG	Changes to the fault log screen.
CANCEL	Closes sub menu display window.

8.6 Fault log screen

You can monitor up to 25 fault logs.

[Screen configuration]



[Description on screen]

Log display	DATE	Displays fault occurrence date/time in the format of "MM/DD HH:MM".
	Name of fault	Displays a name of fault. SUB CODE Sub code is enabled when the SD550 communication function (option) is used.A code indicating fault details is added at occurrence of any of the following faults: ・TIGHTEN TORQUE FAULT ・DRIVER COMM. FAULT ・DRIVER ALARM For details, refer to "SD550 Communication (Option)" in a separate section.
	LOG	Log No. are displayed.
▲ ▼		Scrolls the screen. (Log Nos. 1 to 25)

[Description on sub menu]

1.FAULT DETAILS	Changes to the fault details screen.
2.CLEAR LOG	Clears log data. To clear log data, press YES . 
CANCEL	Closes sub menu display window.

9. MANUAL Mode of the Pendant

This chapter describes functions to execute manual operations of the machine.

9.1 Outline of functions

This system provides the manual operation mode. As the conditions required to enable the manual operation mode, and proper setup must be completed in the SETUP mode.

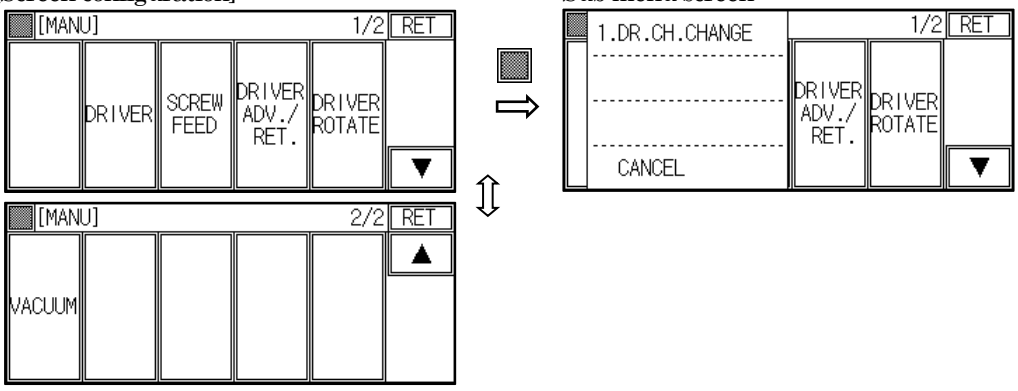
[Major functions]

- Tightening operation
- Screw feed operation
- Driver forward/return operation
- Driver rotating operation
- Vacuum operation

9.2 Manual screen

You can execute various manual operations.

[Screen configuration]

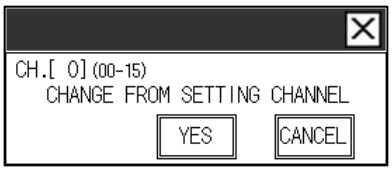


・Sub menu screen

[Description on screen]

DRIVER	This switch is used to execute tightening operation.
SCREW FEED	This switch is used to start the screw feeder. When the tightening tool is in the down stroke, screw feed is disabled.
DRIVER ADV./RET.	This switch is used to execute driver up/down (tightening tool forward/return) operation.
DRIVER ROTATE	This switch is used to start or stop the tightening tool. If you press this switch while the tip tool is stopped, the tool will start up. If you press this switch while the tip tool is in operation, the tool will stop. (Every time this switch is pressed, start and stop functions are changed over.)
VACUUM	This switch is used to turn ON/OFF the vacuum. If you press this switch while vacuum is stopped, vacuum will be turned ON. If you press this switch while vacuum is in operation, vacuum will be turned OFF. (Every time this switch is pressed, start and stop functions are changed over.) CAUTION) When a screw is held with the tip chuck under vacuum, the screw may fall through manual vacuum OFF operation. To execute this operation, use thorough caution.

[Description on sub menu]

1.DR.CH.CHANGE	Changes the operating channel of the driver. Enter your desired value with the numerical keys which appear when the [**] area is touched. Press YES to confirm the entry at last. 
CANCEL	Closes sub menu display window.

10. SETUP Mode of the Pendant

This chapter describes the SETUP mode.

10.1 Outline of functions

This system allows you to set up basic conditions required for screw tightening operations and various parameters for the tightening unit.

[Major function]

- Operation parameter setup
- System parameter setup
- Clock setup
- I/O test operation
- SD550 memory sheet edition (optional)
- Running test operation
- Version information check

CAUTION

Before operating the SETUP mode, be sure to read this User's Manual.
An erroneous operation in the SETUP mode may result in an accident or malfunction of the system.

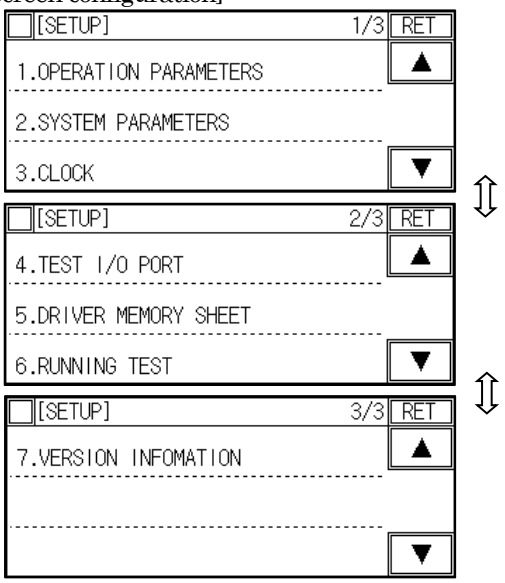
CAUTION

The SETUP (operation setup) mode can be accessed only by entering a password for LEVEL 2 or higher authorization level.

10.2 SETUP mode menu screen

This screen displays the menus for the SETUP mode. Select an item to be set up, or to be changed.

[Screen configuration]



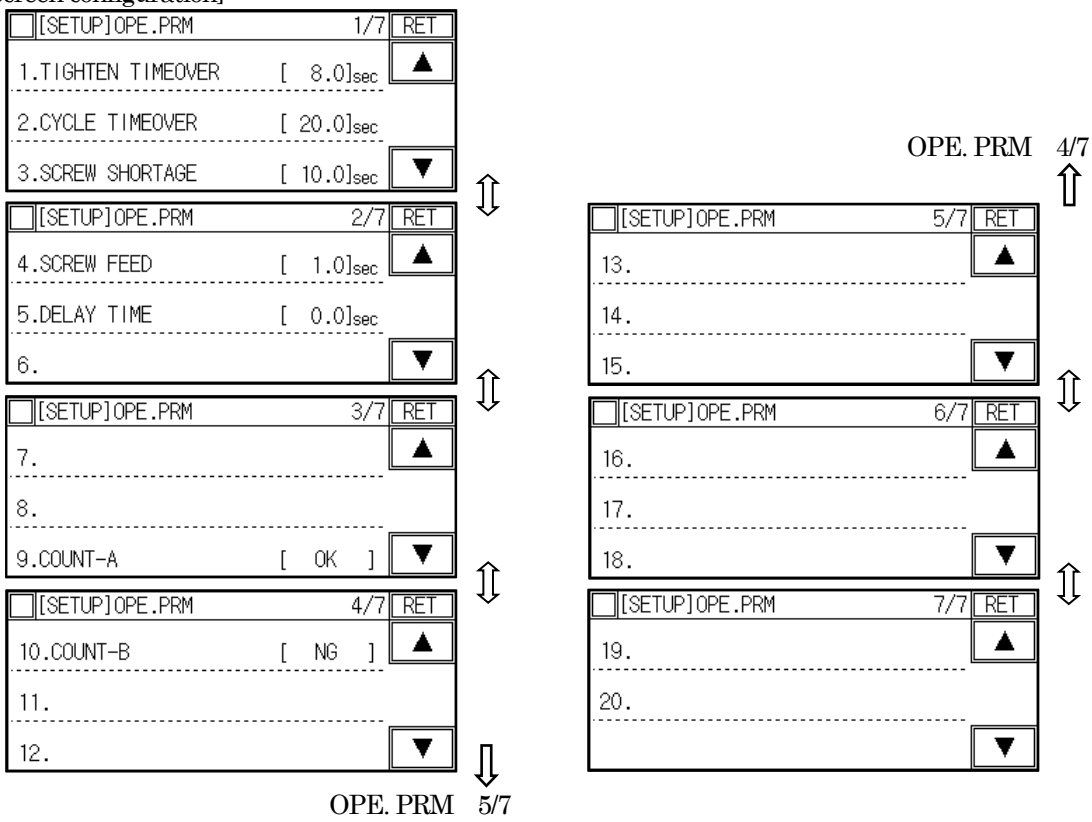
[Description on screen]

1.OPERATION PARA	Changes to the operation parameter setup screen.
2.SYSTEM PARA	Changes to the system parameter setup screen.
3.CLOCK	Changes to the clock setup screen.
4.TEST I/O	Changes to the PLC I/O test screen.
5.DRIVER MEMORY	Changes to the SD550 memory sheet edition screen. (optional)
6.RUNNING TEST	Changes to the running test screen.
7.VERSION	Changes to the version information display screen.

10.3 Operation parameter setup screen

You can execute operation parameter setup, and check the settings.

[Screen configuration]



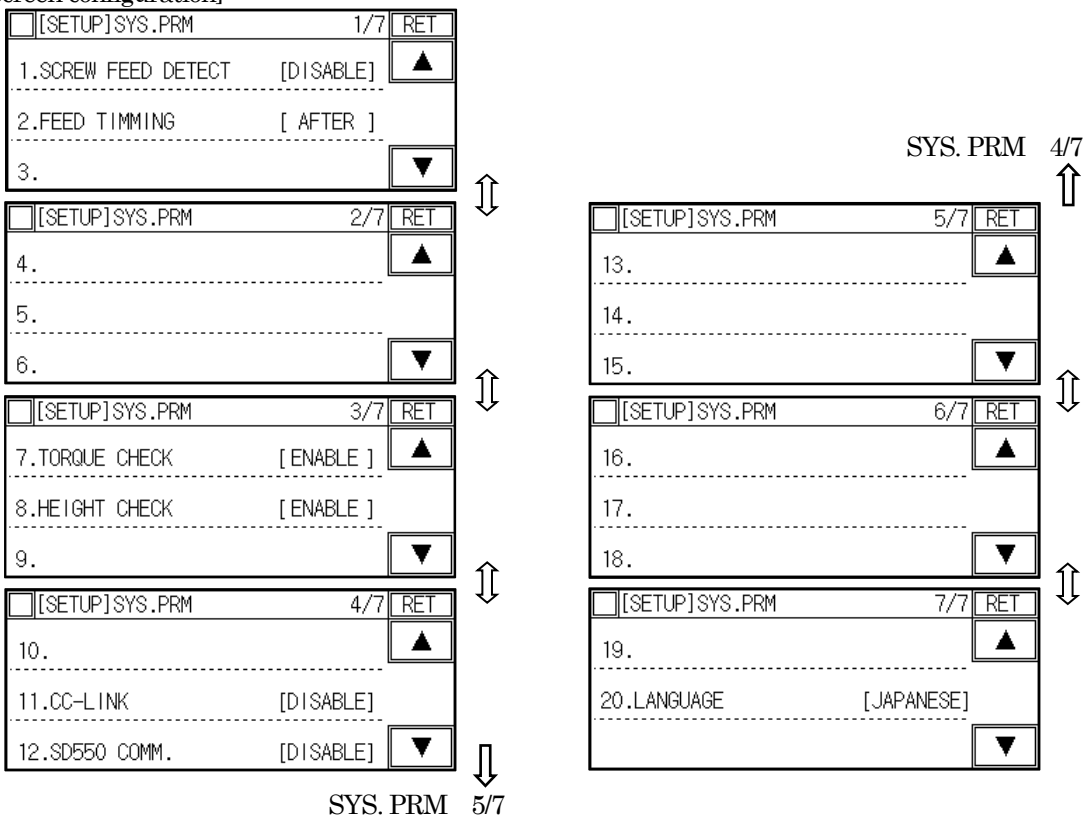
[Description on screen]

1. TIGHTEN TIMEOVER	Sets a time to activate the "tightening torque fault" output when tightening operation time exceeds a preset time. Setting range : 0.0～999.9 [sec]
2. CYCLE TIMEOVER	Sets a time to activate the "cycle timeover fault" output when longer than a specified time elapses in 1-cycle operation Setting range : 0.0～999.9 [sec] 0.0 … CYCLE TIMEOVER fault output is disabled.
3. SCREW SHORTAGE	Sets a time to activate the "screw shortage fault" output when screw shortage occurs. Setting range : 0.0～999.9 [sec]
4. SCREW FEED	Sets a screw feed time. (When NITTO SEIKO FF503H pressure feeder is used) Setting range : 0.0～999.9 [sec]
5. DELAY TIME	Delays the time of starting driver rotation for retightening. Setting range : 0.0～999.9[sec]
9.COUNT-A 10.COUNT-B	Allows selection between the counters A and B displayed on the automatic screen. OK : The value increases if no tightening fault is stored after a cycle completed. NG : The value increases if any tightening fault is stored after a cycle is completed. SHOT : The value increases when tightening is started.

10.4 System parameter setup screen

You can execute system parameter setup, and check the settings.

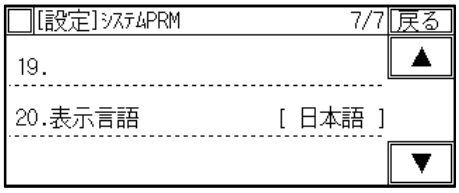
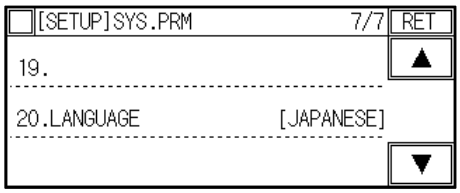
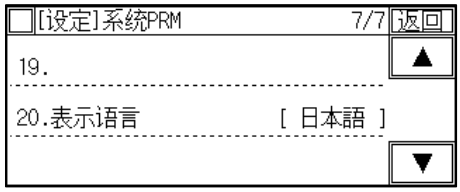
[Screen configuration]



[Description on screen]

1. SCREW FEED DETECT	Allows selection between execution and non-execution of screw feed detection. (When NITTO SEIKO pressure feeder FF503 is used) DISABLE : Select when the screw feed detecting function is not used. ENABLE : Select when using the screw feed detecting function. The screw feed detection sensor (optional) is required for screw feed detection. If the sensor is not provided, select DISABLE . Screw pressure-feed status can be checked by using the screw feed detecting function. If the screw feed detection sensor is not actuated at the time of pressure-feed, "Screw feed fault" occurs.
2. FEED TIMMING	Selects screw pressure-feed timing. (When NITTO SEIKO pressure feeder FF503 is used) BEFORE :Screw pressure-feed is executed before completion of tightening. AFTER : Screw pressure-feed is executed after completion of tightening. HI-SPD : Allows execution of screw pressure-feed during tightening. DISABLE : Disables screw pressure-feed. Note that the screw feed mechanism must be appropriate for the respective feed timings depending on the cases. Consult with your manager or sales staff of NITTO SEIKO CO.,LTD. before changing the setting.

[Description on screen]

7. TORQUE CHECK	Selects tightening depth judgment enable or disable setting. DISABLE : Tightening depth judgment is disabled at completion of tightening. ENABLE : Tightening depth judgment is enabled at completion of tightening. Tightening torque can be controlled and high-quality tightening can be provided by selecting ENABLE.
8. HEIGHT CHECK	Selects screw loose fitting judgment enable or disable setting. DISABLE : Screw loose fitting judgment is disabled at completion of tightening. ENABLE : Screw loose fitting judgment is enabled at completion of tightening. The screw loose fitting detection sensor (optional) should be provided to use the screw loose fitting judgment function. If the sensor is not provided, select DISABLE. Tightening fault due to screw loose fitting can be detected and high-quality tightening can be provided by selecting ENABLE .
11.CC-LINK	Specifies whether to use the CC-Link function when this function (option) is provided. DISABLE : CC-Link is not used. ENABLE : CC-Link is used. If ENABLE is selected when the CC-Link function (option) is not provided, it results in "CPU ERROR".
12. SD550 COMM.	Specifies whether to use the SD550 communication function when this function (option) is provided. DISABLE : The SD550 communication function is not used. ENABLE : The SD550 communication function is used. If ENABLE is selected when the SD550 function (option) is not provided, it results in "DRIVER COMM. FAULT". This function is optional. Select DISABLE if it is not provided.
20. LANGUAGE	Selects the display language on the operation pendant. JAPANESE : The pendant screen is displayed in Japanese.  ENGLISH : The pendant screen is displayed in English.  CHINESE : The pendant screen is displayed in Chinese. 

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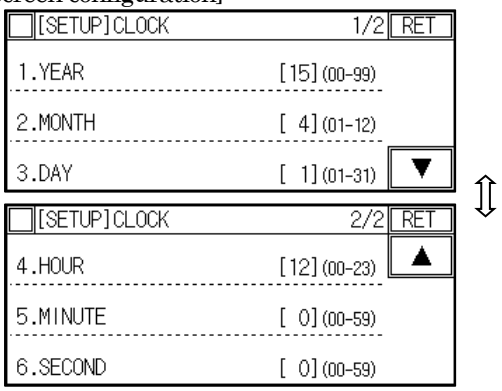
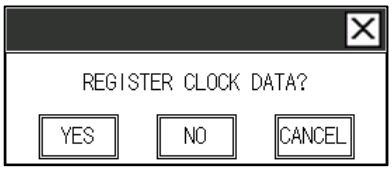
10.5 Clock data setup screen

You can execute clock data setup, and check the settings.
The registered clock data are used as date/time in operation logs and fault logs.

[Screen configuration]



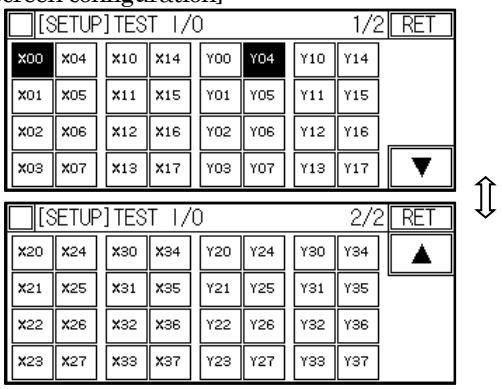
[Description on screen]

1.YEAR (Dominical year)	Sets a year (Two low-order digits of the dominical year) Setting range : 00～99
2.MONTH	Sets a month. Setting range : 01～12
3.DAY	Sets a day. Setting range : 01～31
4.HOUR	Sets an hour. Setting range : 00～23
5.MINITE	Sets a minute. Setting range : 00～59
6.SECOND	Sets a second. Setting range : 00～59
RET	Used to register the date and time that have been set. To register the change, press YES . If you do not register it, press NO . 

10.6 I/O test screen

Forced output from I/O of the PLC in the controller is allowed.

[Screen configuration]



[Description on screen]

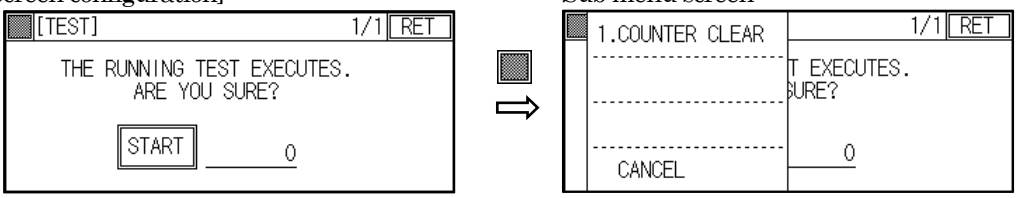
X**	Displays status of 32 inputs (X00 to X37). X00 : OFF X00 : ON
Y**	Displays status of 32 outputs (Y00 to Y37) Forced turning ON/OFF of output is allowed by touching the respective address displayed areas. Y00 : OFF Y00 : ON Note 1) Y04 is the output for turning operation power ON/OFF. Thus, it cannot be turned ON/OFF forcibly. Note 2) Forced output ON status can be cancelled by transiting from the IO test screen. Note 3) Prior to shifting to the forced output ON status, fully ensure safety and check the status of the machine.

10.7 Running test screen

Allows execution of running test.

CAUTION
Running test is applicable only for the standard type model. It may not be applicable for some special type models.

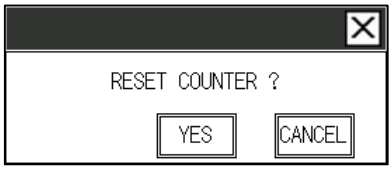
[Screen configuration]



[Description on screen]

COUNT	Counts the number of times of running test executed.
START	Starts running. Cycle of running can be finished by pressing START again or transiting from the running test screen.

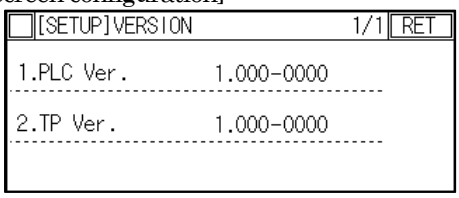
[Description on sub menu]

1.COUNTER CLEAR	Clears the running test counter. Press the YES switch. 
CANCEL	Closes sub menu display window.

10.8 Version information display screen

You can check system version information.

[Screen configuration]



[Description on screen]

1.PLC Ver.	Displays version information of the SD75 controller's internal PLC. Display format: Version No. □ Derivative No.
2.TP Ver.	Displays touch panel version information of the operation pendant. Display format: Version No. □ Derivative No.

11. CC-Link (Option)

When the CC-Link function (option) is used, the SD75 controller can be connected to a user's host control equipment via CC-Link, enabling transmission and receiving of a large volume of data with less wiring in IO parallel connections.

11.1 Specifications and connections of CC-Link

1) Specifications

Item	Specifications
Station No.	Setting range: 01 to 64 (rotary switch "STATION NO.") 01～64 : Station No. (Standard setting : 01) 00、65～99 : Setting error
Number of stations	Setting range: 0 to 3 (rotary switch "OCCUPY STATION NO.") 0 : 1 station (Standard setting) 1 : 2 station 2 : 3 station 3 : 4 station 4～9 : Setting error
Transmission speed	Setting range: 0 to 4 (rotary switch "B.RATE") 0 : 156 kbps (Standard setting) 1 : 625 Mbps 2 : 2.5 Mbps 3 : 5 Mbps 4 : 10 Mbps 5～9 : Setting error
Communications standards	CC-Link Ver1.00 conform
Station type	Remote device station

Notes

- During wiring, remove the SD75 controller cover, and directly connect the cable to CC-Link interface block Model FX2N-32CCL inside the cover.
- Station number and transmission speed settings shall be conducted by the user.
- You can change the number of available remote I/O points by changing the setting for the number of stations. (See the table below.)

Number of stations	Remote Input (PLC -> Remote)	Remote Output (PLC <- Remote)	Remote register for write	Remote register for read
1	RX00~0F (16 points)	RY00~0F (16 points)	RWr0~3 (4 points)	RWw0~3 (4 points)
2	RX00~2F (48 points)	RY00~2F (48 points)	RWr0~7 (8 points)	RWw0~7 (8 points)
3	RX00~4F (80 points)	RY00~4F (80 points)	RWr0~B (12 points)	RWw0~B (12 points)
4	RX00~6F (112 points)	RY00~6F (112 points)	RWr0~F (16 points)	RWw0~F (16 points)

Notes

・With the standard specifications, remote outputs RY00 to RY0F are assigned to external input signals M2100 to M2115, and external output signals M2300 to M2315 are assigned to remote input signals RX00 to RX0D.

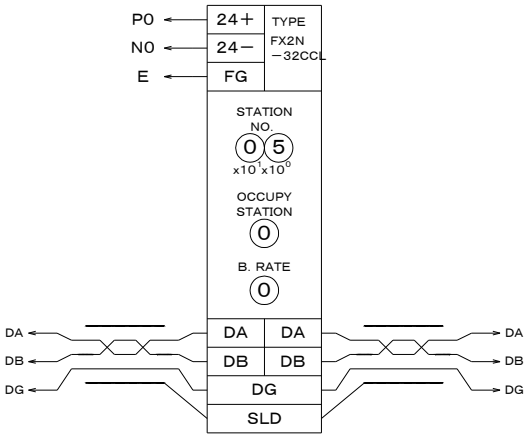
PLC Device	CC-Link	Signal
M2100	RY00	EXE input RESET
M2101	RY01	EXE input CYCLE START
M2102	RY02	EXE input reserve
M2103	RY03	EXE input reserve
M2104	RY04	EXE input reserve
M2105	RY05	EXE input reserve
M2106	RY06	EXE input reserve
M2107	RY07	EXE input reserve
M2108	RY08	EXE input reserve
M2109	RY09	EXE input reserve
M2110	RY0A	EXE input reserve
M2111	RY0B	EXE input reserve
M2112	RY0C	EXE input reserve
M2113	RY0D	EXE input reserve
M2114	RY0E	EXE input reserve
M2115	RY0F	EXE input reserve
M2300	RX00	EXE output DRIVER ORIGIN
M2301	RX01	EXE output CYCLE COMPLETION
M2302	RX02	EXE output ALARM
M2303	RX03	EXE output SCREW SHORTAGE
M2304	RX04	EXE output reserve
M2305	RX05	EXE output reserve
M2306	RX06	EXE output reserve
M2307	RX07	EXE output reserve
M2308	RX08	EXE output reserve
M2309	RX09	EXE output reserve
M2310	RX0A	EXE output reserve
M2311	RX0B	EXE output reserve
M2312	RX0C	EXE output reserve
M2313	RX0D	EXE output reserve

2) Settings

Set the switches of CC-Link interface block Model FX2N-32CCL in the SD75 controller.

(Example) Remote device station

The following figure shows the settings of "STATION NO.: 5, OCCUPY STATION NO.: 1, B. RATE: 156 kbps".



In addition to the above settings, change the setting of the SD75 operation parameter [11.CC-Link] to [ENABLE] .

3) Remote IO - PLC address assignment table

The remote I/O addresses for CC-Link can be assigned in the PLC internal memory. When remote I/Os are added, the PLC addresses can be automatically converted to CC-Link remote addresses via the PLC program internal memory.

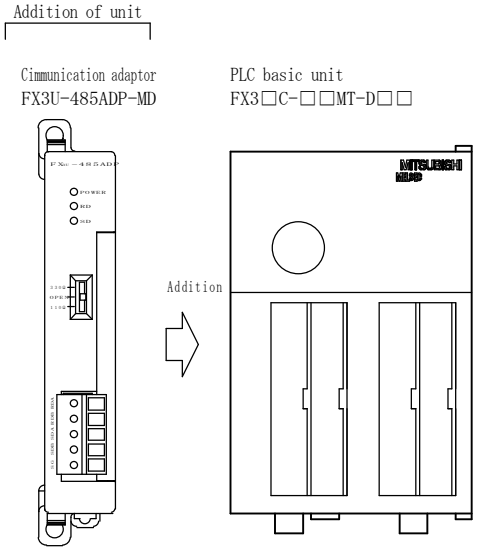
Number of stations	Remote address	PLC address
Remote Input (PLC -> Remote)	RX00~6F (112 points)	M2300~2411 (112 points)
Remote Output (PLC <- Remote)	RY00~6F (112 points)	M2100~2211 (112 points)
Remote register for write	RWr0~F (16 points)	D7930~7945 (16 points)
Remote register for read	RWw0~F (16 points)	D7910~7925 (16 points)

12. SD550 Communication Support (Option)

When the SD550 communication function (option) is used, the tightening result monitor, driver fault details view, driver memory sheet setting/edit functions are available with the SD75 operation pendant.

12.1 Connection with the SD550 controller

To use the SD550 communication function, add the RS485 communication unit to the PLC in the SD75 controller. To enable communication, connect the added communication unit to the RS485 interface port of the SD550 controller.



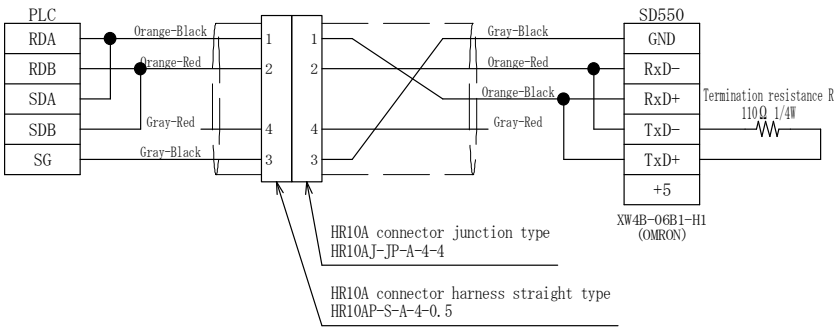
[Setting]

・Termination resistance selector switch.

330Ω / OPEN / (110Ω)

[Connection diagram]

・Connection with SD550-485 connector

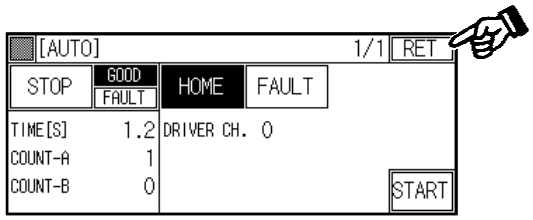
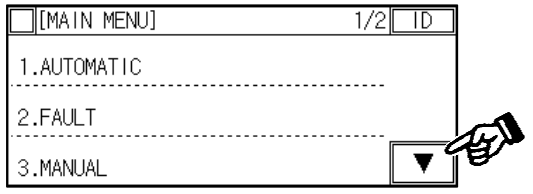
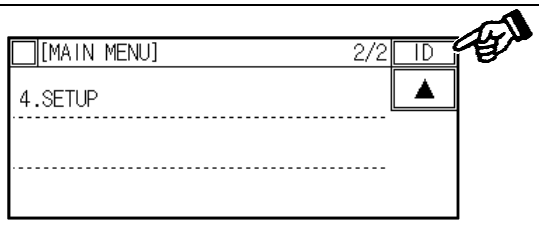
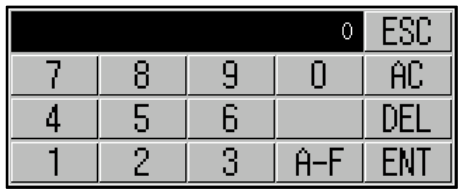
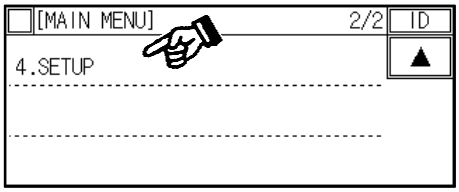
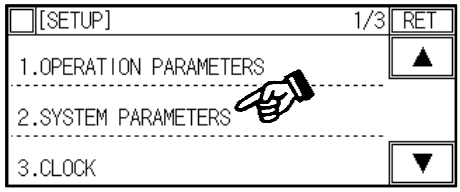


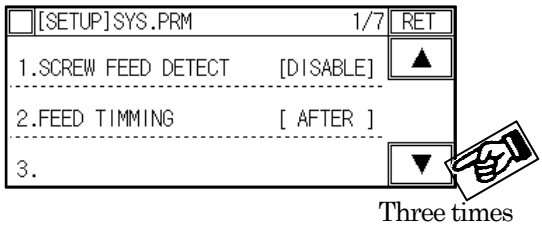
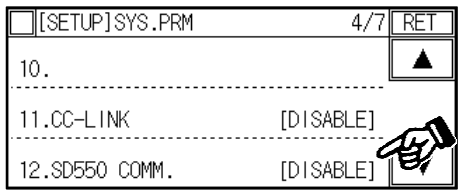
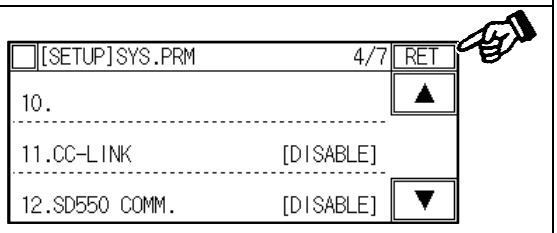
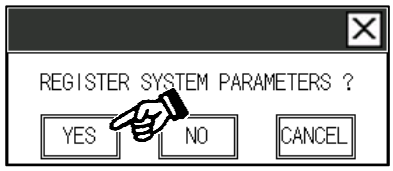
(Note)
The connector pin names are those viewed from the front of the unit.

12.2 Operation for enabling SD550 communication

12.2.1 Setting procedure for enabling the SD550 communication function

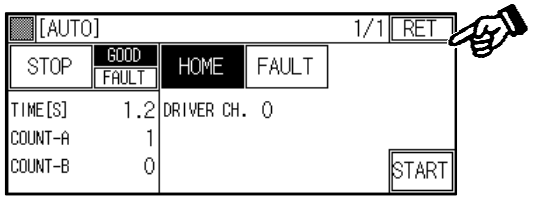
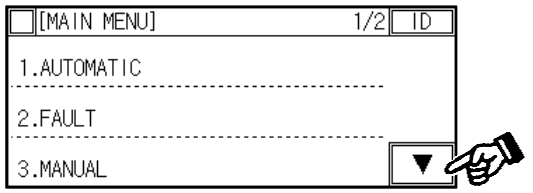
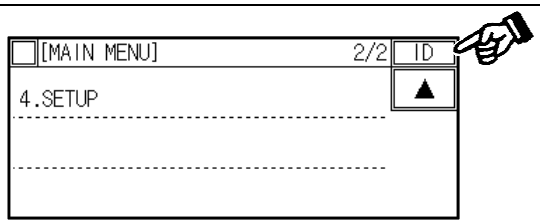
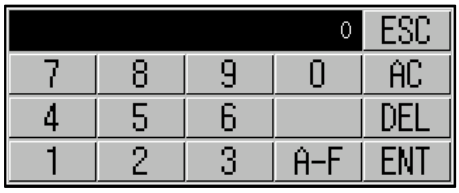
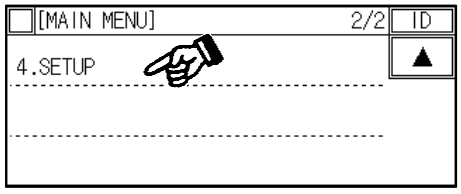
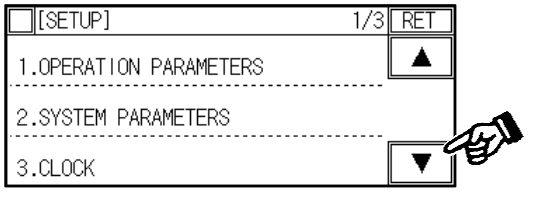
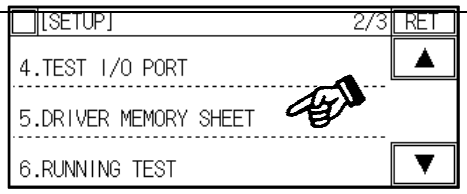
To use the SD550 communication function, it is necessary to enable the SD550 communication function through operation of the RC71 teaching pendant, in addition to connection of the above equipment.

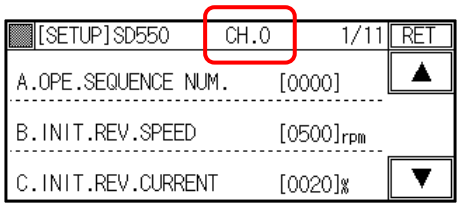
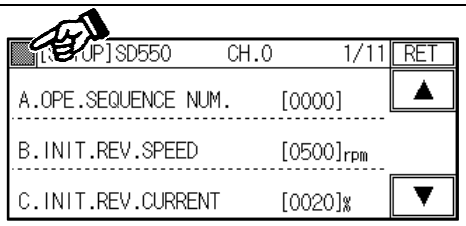
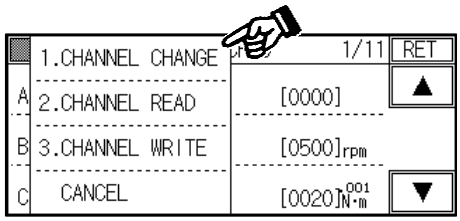
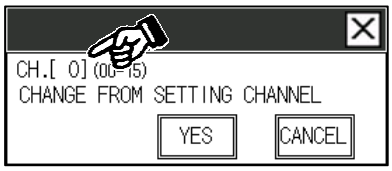
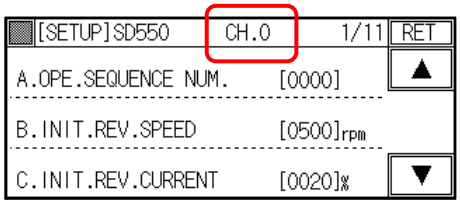
	Operating procedure	Display/Status
1	Press the RET switch.	
2	Press the ▼ switch.	
3	Press the ID switch. To execute teaching operation, the password for LEVEL 3 or higher authorized level is required.	
4	Enter the password for LEVEL 3 or higher authorized level with the displayed numeric keys, and press ENT switch.	
5	Press 4.SETUP . The screen changes to the SETUP mode.	
6	Press 2.SYSTEM PARAMETERS . The screen changes to the SYSTEM PARAMETER SETUP mode.	

	Operating procedure	Display/Status
7	Press the ▼ switch three times.	 Three times
8	You can change the current setting by pressing the [ ] field in the "12. SD550 COMM" information line to be changed. DISABLE ··· The SD550 communication function is not used. 550 ··· The SD550 communication function is used. (Select this item when the SD550 driver is used.) 550T ···The SD550 communication function is used. (Select this item when the SD550T driver is used.) Note) The displayed value of the parameter in the driver memory sheet should be changed depending on whether the driver being used is "550" or "550T".	
9	Press the RET switch.	
10	Press the YES swith in the displayed window.	

12.2.2 Reading data from the memory sheet

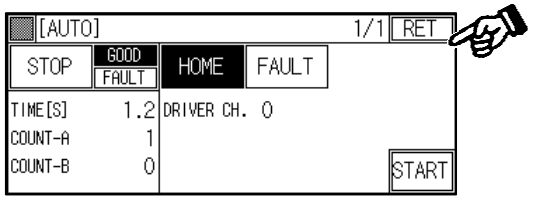
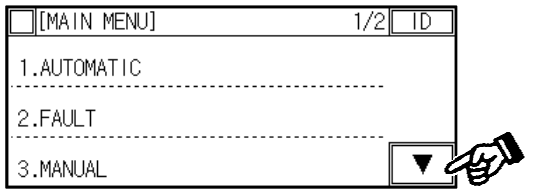
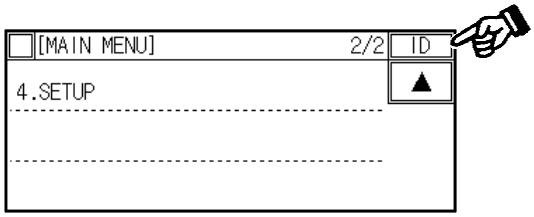
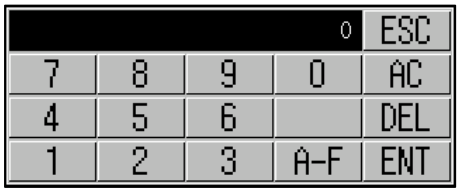
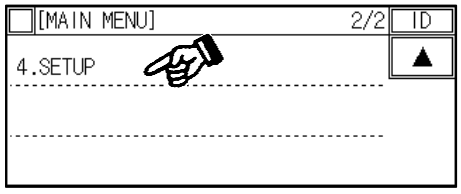
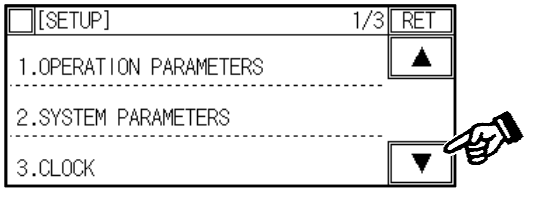
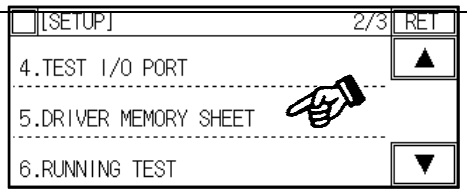
When the SD550 communication function is set to "ENABLE", 5.DRIVER MEMORY is displayed in the SETUP menu, enabling edition of the driver memory sheet through operation of the SD75 operation pendant.

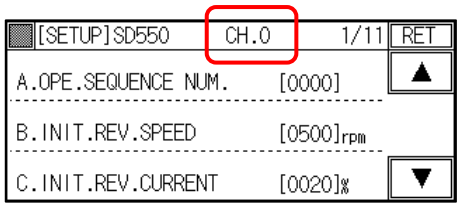
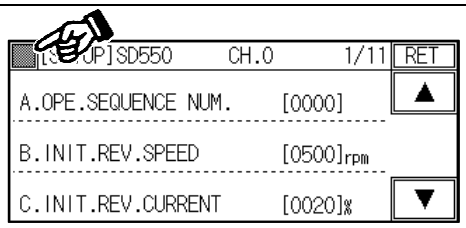
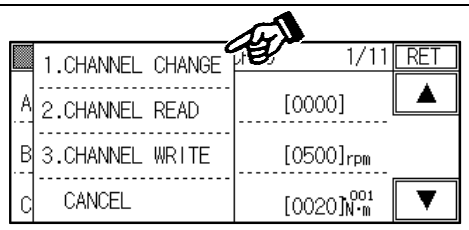
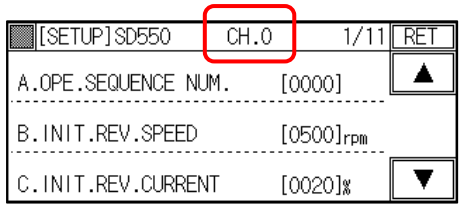
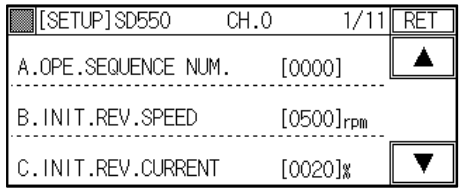
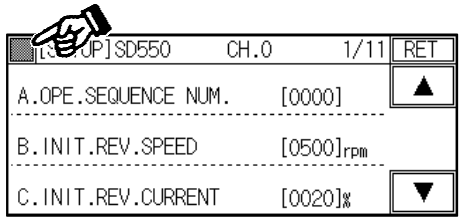
	Operating procedure	Display/Status
1	Press the RET switch.	
2	Press the ▼ switch.	
3	Press the ID switch. To execute teaching operation, the password for LEVEL 3 or higher authorized level is required.	
4	Enter the password for LEVEL 3 or higher authorized level with the displayed numeric keys, and press ENT switch.	
5	Press 4.SETUP . The screen changes to the SETUP mode.	
6	Press the ▼ switch.	
7	Press 5.DRIVER MEMORY SHEET . The display will change to the driver memory sheet edit screen.	

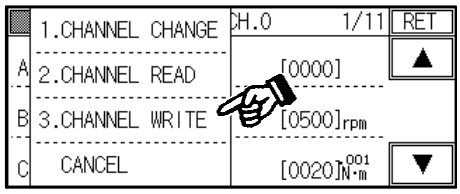
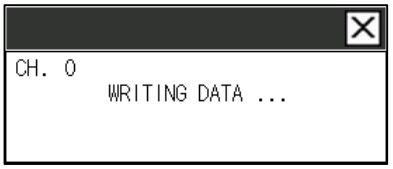
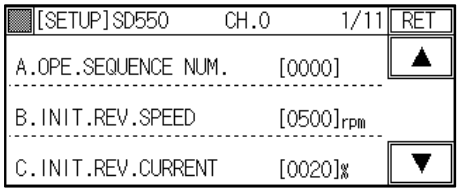
	Operating procedure	Display/Status
8	When the display is changed to the driver memory sheet edit screen, data on the currently selected driver channel (indicated in the red frame) is automatically read.	
9	If you intend to read data on a different driver channel, press the ▩ button at the left top of the screen.	
10	Press 1.CHANNEL CHANGE in the displayed window.	
11	Press the area in [ ] (brackets) for [CH.] in the displayed window. Enter a desired driver channel No. by using the displayed numeric keys, and press ENT switch. Last, press the YES switch.	
12	Data on the changed driver channel (indicated in the red frame) is automatically read and displayed.	

12.2.3 Writing data into the memory sheet

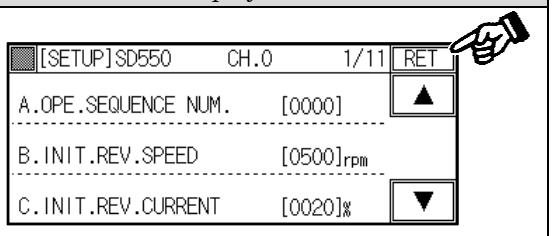
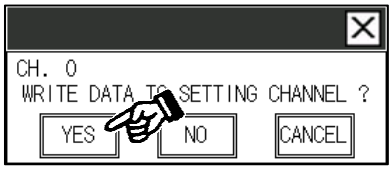
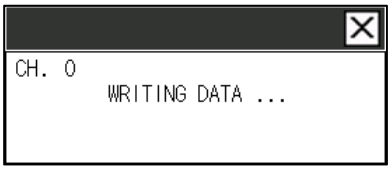
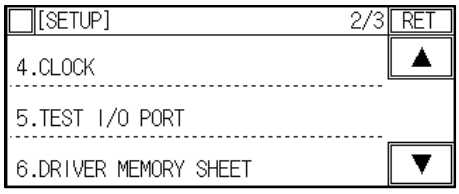
When the SD550 communication function is set to "ENABLE", 5.DRIVER MEMORY is displayed in the SETUP menu, enabling edition of the driver memory sheet through operation of the SD75 operation pendant.

	Operating procedure	Display/Status
1	Press the RET switch.	
2	Press the ▼ switch.	
3	Press the ID switch. To execute teaching operation, the password for LEVEL 3 or higher authorized level is required.	
4	Enter the password for LEVEL 3 or higher authorized level with the displayed numeric keys, and press ENT switch.	
5	Press 4.SETUP . The screen changes to the SETUP mode.	
6	Press the ▼ switch.	
7	Press 5.DRIVER MEMORY SHEET . The display will change to the driver memory sheet edit screen.	

	Operating procedure	Display/Status
8	When the display is changed to the driver memory sheet edit screen, data on the currently selected driver channel (indicated in the red frame) is automatically read.	
9	If you intend to read data on a different driver channel, press the ■ button at the left top of the screen.	
10	Press 1.CHANNEL CHANGE in the displayed window.	
11	Press the area in [ ] (brackets) for [CH.] in the displayed window. Enter a desired driver channel No. by using the displayed numeric keys, and press ENT switch. Last, press the YES switch.	
12	Data on the changed driver channel (indicated in the red frame) is automatically read and displayed.	
13	Edit the memory sheet for the relevant driver channel.	
14	After edition is completed, press ■ the button at the left top of the screen.	

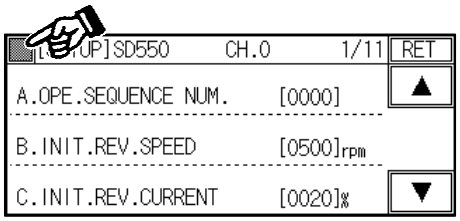
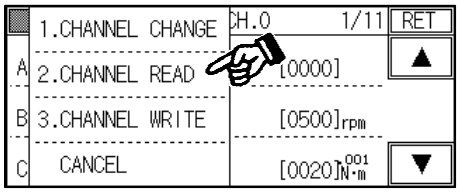
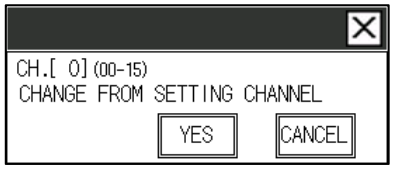
	Operating procedure	Display/Status
15	Press 3.CHANNEL WRITE in the displayed window.	
16	Press the YES swith in the displayed window.	
17	The edited data is written in the driver.	
18	When the "WRITING DATA" window disappears, writing data into the driver is completed.	

You can proceed to the channel data writing operation by pressing the RET switch, even if you do not select 3.CHANNEL WRITE in the sub menu.

	Operating procedure	Display/Status
1	Press the RET switch.	
2	Press the YES swith in the displayed window.	
3	The edited data is written in the driver.	
4	When the "WRITING DATA" window disappears, writing data into the driver is completed.	

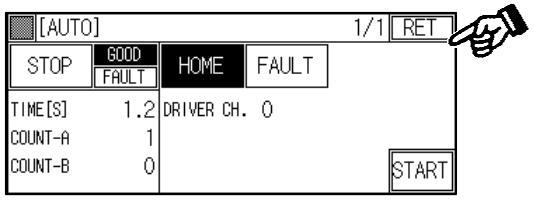
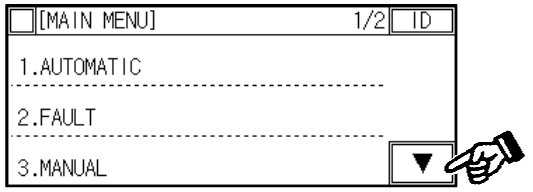
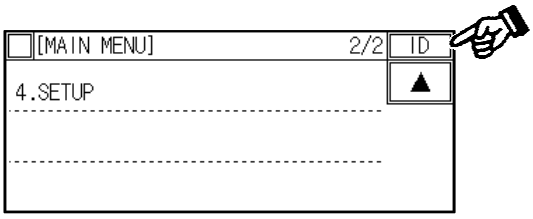
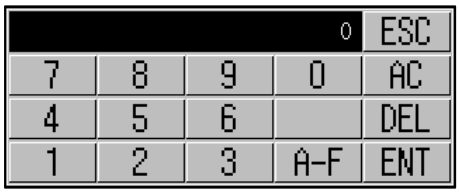
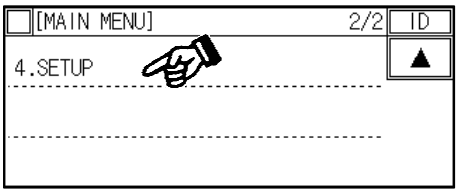
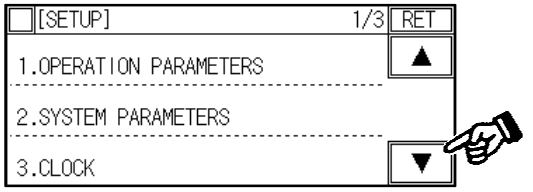
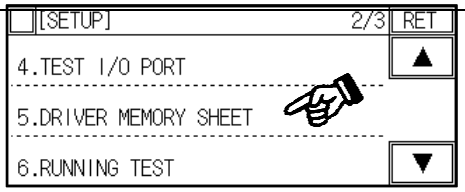
12.2.4 Copying the memory sheet

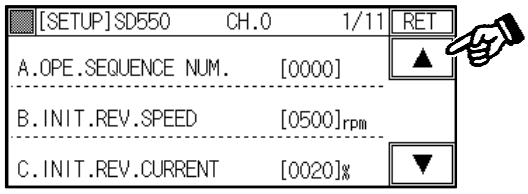
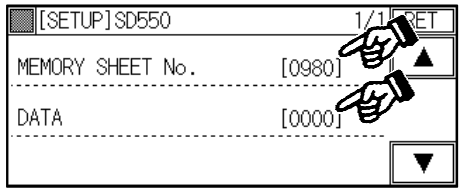
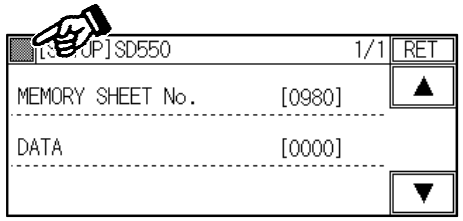
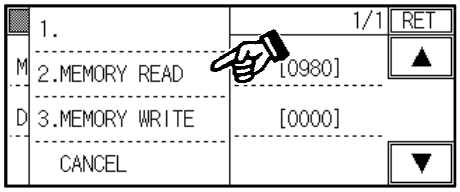
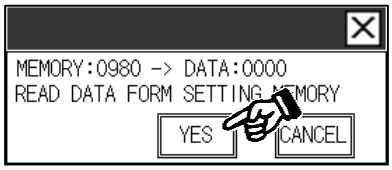
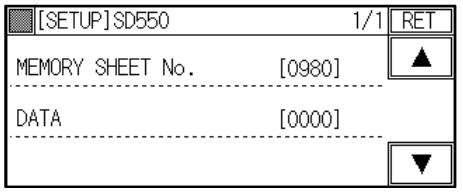
When the SD550 communication function is set to "ENABLE", 5.DRIVER MEMORY is displayed in the SETUP menu, enabling edition of the driver memory sheet through operation of the SD75 operation pendant.

	Operating procedure	Display/Status
1	Execute the operation of reading data from the memory sheet.	
2	After edition is completed, press the button at the left top of the screen.	
3	Press 2.CHANNEL READ in the displayed window.	
4	Press the area in [ ] (brackets) for [CH.] in the displayed window. Enter a desired driver channel No. by using the displayed numeric keys, and press ENT switch. Last, press the YES switch.	
5	Driver data on the selected channel is overwritten. The channel data can be copied through channel data writing operation.	

12.2.5 Reading single specified memory

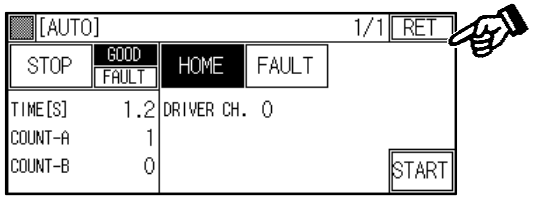
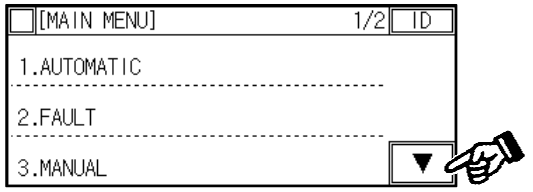
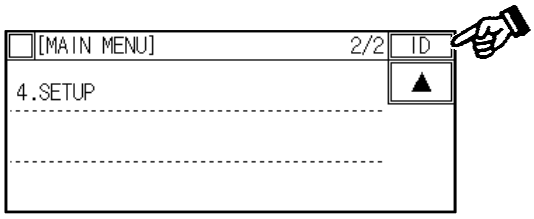
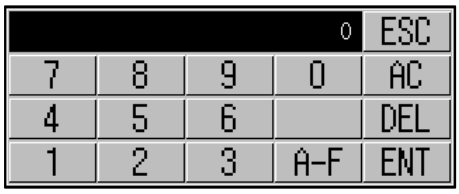
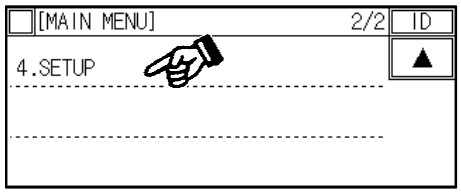
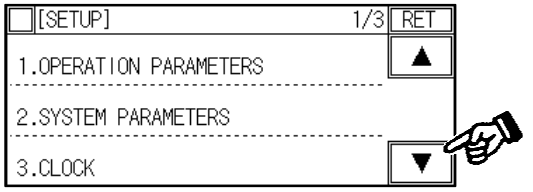
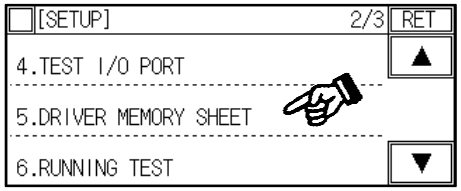
If you intend to change only a specified memory, or to change a memory other than the driver standard program (e.g. for edition of a user program memory sheet), you can use the single specified memory reading/writing function.

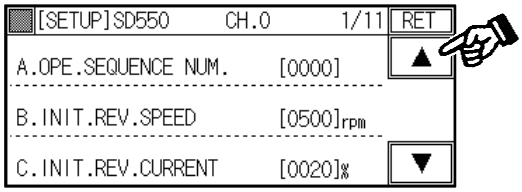
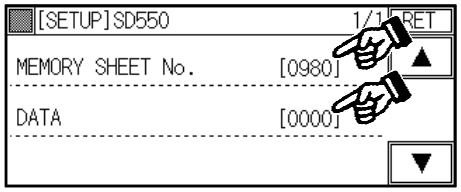
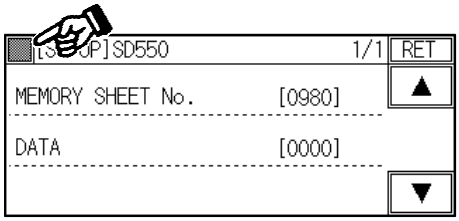
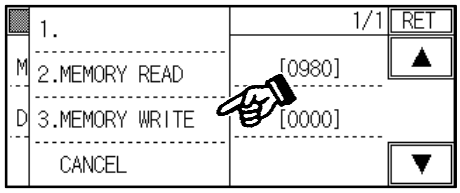
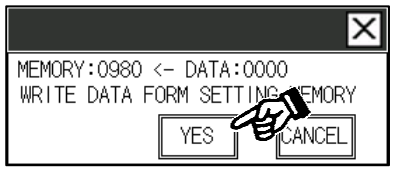
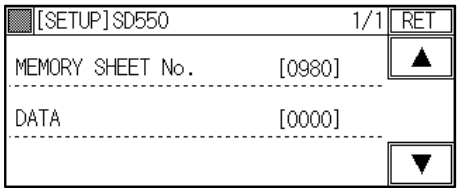
	Operating procedure	Display/Status
1	Press the RET switch.	
2	Press the ▼ switch.	
3	Press the ID switch. To execute teaching operation, the password for LEVEL 3 or higher authorized level is required.	
4	Enter the password for LEVEL 3 or higher authorized level with the displayed numeric keys, and press ENT switch.	
5	Press 4.SETUP . The screen changes to the SETUP mode.	
6	Press the ▼ switch.	
7	Press 5.DRIVER MEMORY SHEET . The display will change to the driver memory sheet edit screen.	

	Operating procedure	Display/Status
8	Press the ▲ switch.	
9	Set a value in the [ ] field for "MEMORY SHEET No." in the displayed window. For the memory sheet No., refer to the driver setting table.	
10	Press ▩ at the upper left corner of the screen.	
11	Press 2.MEMORY READ in the displayed window.	
12	Press the YES switch.	
13	The current setting for the read memory sheet No. is displayed.	

12.2.6 Writing single specified memory

If you intend to change only a specified memory, or to change a memory other than the driver standard program (e.g. for edition of a user program memory sheet), you can use the single specified memory reading/writing function.

	Operating procedure	Display/Status
1	Press the RET switch.	
2	Press the ▼ switch.	
3	Press the ID switch. To execute teaching operation, the password for LEVEL 3 or higher authorized level is required.	
4	Enter the password for LEVEL 3 or higher authorized level with the displayed numeric keys, and press ENT switch.	
5	Press 4.SETUP . The screen changes to the SETUP mode.	
6	Press the ▼ switch.	
7	Press 5.DRIVER MEMORY SHEET . The display will change to the driver memory sheet edit screen.	

	Operating procedure	Display/Status
8	Press the ▲ switch.	
9	Set a value in the [ ] field for "MEMORY SHEET No." in the displayed window. For the memory sheet No., refer to the driver setting table.	
10	Press ■ at the upper left corner of the screen.	
11	Press 3.MEMORY WRITE in the displayed window.	
12	Press the YES switch.	
13	The current setting for the write memory sheet No. is displayed.	

12.3 Pendant functions available when SD550 communication is enabled

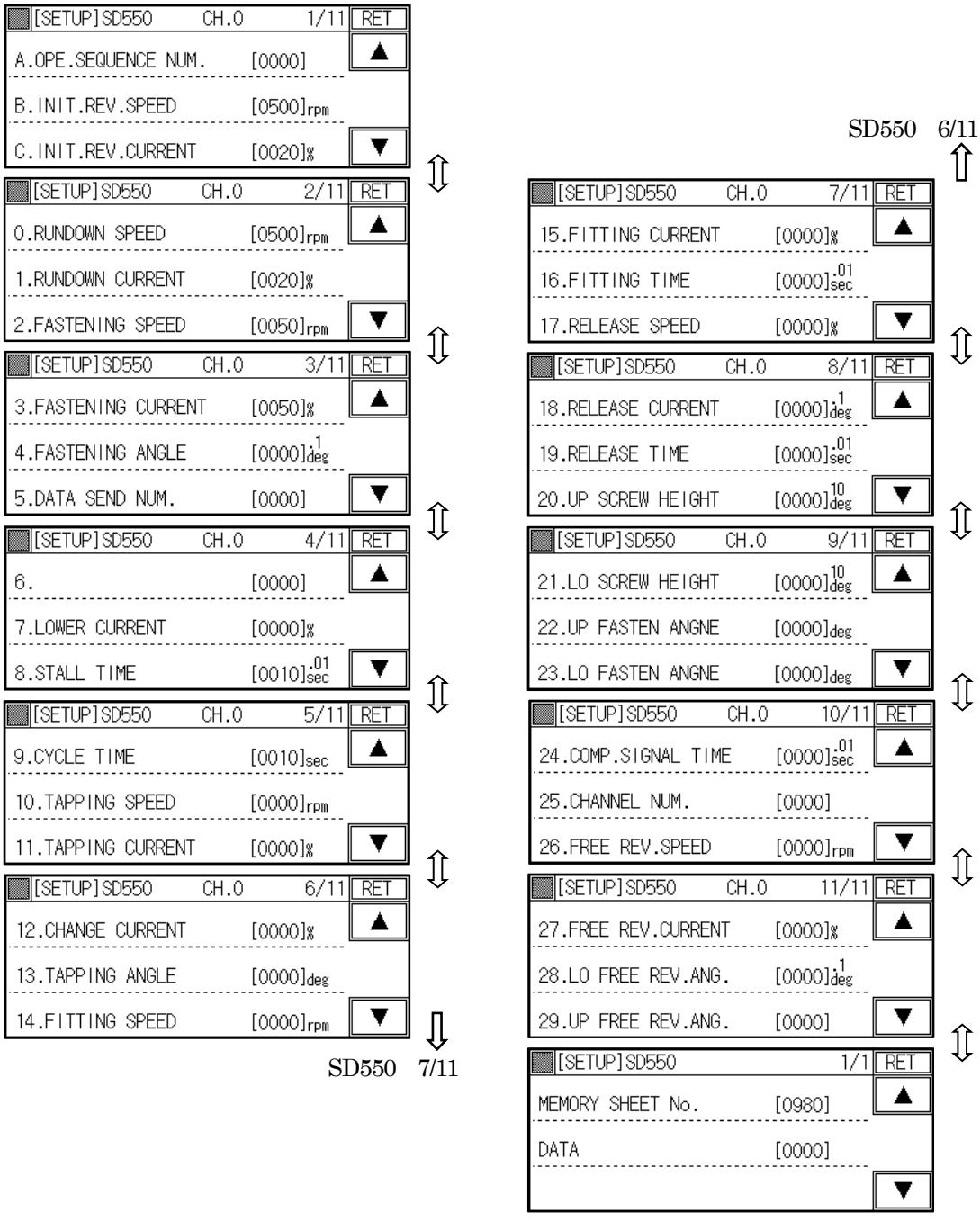
When the SD550 communication function is set to "ENABLE", the following functions can be used with the operation pendant.

12.3.1 Memory sheet

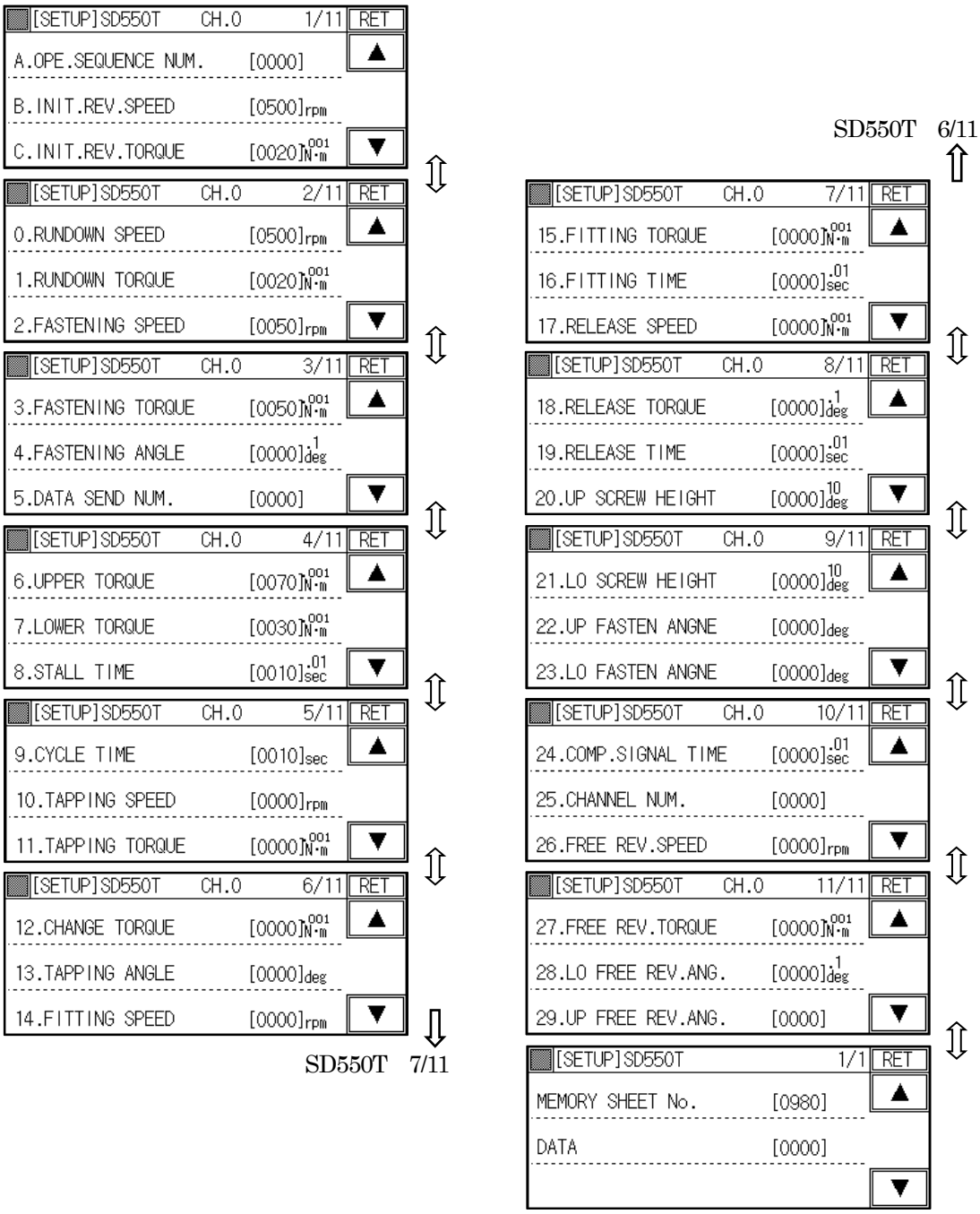
Edition of the SD550 controller memory sheet is enabled through operation of the SD75 operation pendant.

[Screen configuration]

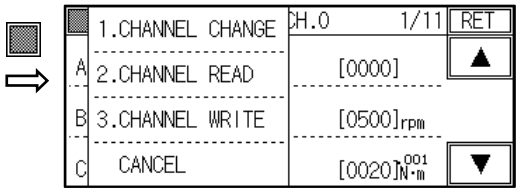
・Screen displayed when 550 is selected for system parameter "12. SD550 COMM"



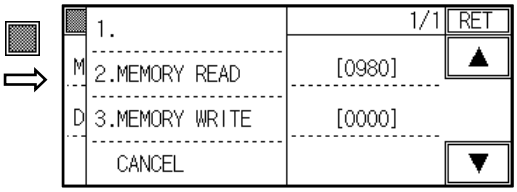
・Screen displayed when 550T is selected for system parameter "12. SD550 COMM"



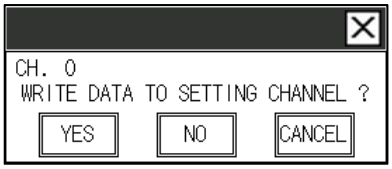
・When sub menu is displayed
(CH edition: 1/11～11/11)



・When sub menu is displayed
(Single memory edition)



[Description on screen]

×	A confirmation message for wiring data on the currently edited driver channel is displayed. To execute writing, press YES . To cancel writing, press NO . 
Setting item	Refer to the User's Manual for the driver.

[Description on sub menu]

・Screen displayed during channel edition 1/18～17/18

1.CH. CHANGE	Changes a driver channel subject to edition. Driver data on the channel selected with the [CH. CHANGE] operation will be automatically acquired.
2.CH. READ	Reads all data on an arbitrary channel.
3.CH. WRITE	Writes all data on the currently selected channel.
CANCEL	Closes sub menu display window.

・Single memory edition (setting item, memory sheet No. and set value)

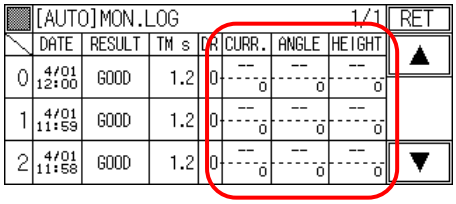
2.MEMORY READ	Reads a set value from a specified memory.
3.MEMORY WRITE	Writes a set value into a specified memory.
CANCEL	Closes sub menu display window.

12.3.2 Tightening result monitor

This function acquires tightening results from a driver during tightening operation and displays the results on the screen, and stores history of 40 cycles.

[Screen configuration]

・Automatic operation history monitor screen (Displaying history of 40 automatic cycles)



[Description on screen]

DRV CUR ・When the SD550 controller is used → Current value ・When the SD550T controller is used → Torque value	Displays driver's tightening torque judgment result and judgment value. Displayed data is as follows: [Judgment result] ・OK : Normal completion ・NG : Tightening torque fault ・—— : No judgment
DRV ANG	Displays driver's tightening angle judgment result and judgment value. Displayed data is as follows: [Judgment result] ・OK : Normal completion ・NG : Tightening angle fault ・—— : No judgment
DRV HEI	Displays driver's screw tightening height (loose fitting) judgment result and judgment value. Displayed data is as follows: [Judgment result] ・OK : Normal completion ・NG : Screw tightening height fault ・—— : No judgment

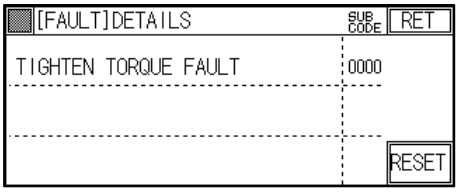
12.3.3 Fault monitor

If any of the following faults is indicated on the fault details screen and the fault log screen, a sub code is added. You can check detailed information on the fault with the sub code.

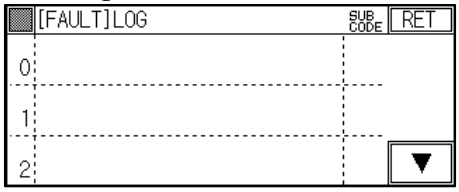
- TIGHTEN TORQUE FAULT …
  When the driver OUT2 (interruption/time-out) signal turns ON, the operation channel and stop step data is read, which is indicated in a sub code.
  2 digits in higher order: Channel No. 2 digits in lower order: Stop step No.
- DRIVER ALARM … When the driver OUT3 (system alarm) signal turns ON, the alarm No. is read, which is indicated in a sub code.
- DRIVER COMM. FAULT …
  When a communication fault occurs, the alarm code is read, which is indicated in a sub code.

[Screen configuration]

- Fault details screen



- Fault log screen



[Description on screen]

Details of sub codes are as follows:

- Codes for tightening torque faults

CODE	Fault contents	Info. sources
**13	Improper setting of "Tapping angle selection current value" Initial rundown torque is not reached within the set cycle time	SD550 [H***]
**16	The external sensor signal (IN5) has not been entered	
**19	Improper setting of "Tapping absolute revolving angle" Improper settings of "Tapping current value"	
**20	The synchronized fastening start signal (IN6) has not been entered	
**23	Final fastening torque is not reached within the set cycle time	
**34	The tightening current does not reach the specified value within the specified cycle time.	
**40	Broken bit spindle fit in the tool unit etc. Improper setting of "Revolving speed for initial revolution check" or "Current value for initial revolution check" Improper settings of "Independent revolving angle"	
**42	Improper settings of "Current value for independent revolution" The synchronized fastening start signal (IN6) has not been entered Improper settings of "Independent revolving angle"	
**44	Improper settings of "Current value for independent revolution"	
**53	Screw took the seat before initial rundown when tapping	
**58	The external sensor signal (IN5) has not been entered	
**59	Initial rundown torque is not reached within the set cycle time	
**60	The tightening current is not within the specified range of "Current judgment lower limit". Improper settings of "Independent revolving angle"	
**62	Improper settings of "Current value for independent revolution" Improper settings of "Independent revolving angle"	
**63	Improper settings of "Current value for independent revolution"	
**71	An invalid operation code number has been set Necessary setting is not entered.	
**82	A channel is selected in which no setting has been entered Improper settings of "Final fastening angle" Improper settings of "Final fastening current value"	

(Note) Two digits (**) in higher order of each code indicate driver channel No. (0 to 15)

・Codes for driver alarms

CODE	Fault contents	Info. sources
0001	Watchdog timer	SD550 [A***]
0002	Power source was shut off	
0003	NMI	
0004	Illegal exceptional processing	
0005	EEPROM writing error	
0006	Error in memory	
0009	EEPROM reading error	
0010	Electric motor was overloaded (current)	
0011	Electric motor was overloaded (voltage)	
0015	IPM FO	
0020	Motor position is unknown	
0021	Z phase is unknown	
0022	Count error in Z phase	
0023	Count error 1 in UVW phases	
0027	Position error	
0028	Encoder error	
0029	Encoder communication error	
0030	No current in U phase	
0031	No current in V phase	

・ Codes for driver communication faults

CODE	Fault contents	Info. sources
0001	Checksum	Driver receiving fault code
0002	Invalid command	
0003	No target data	
0004	Invalid data No.	
0005	Invalid data value	
0010	EEPROM writing error	
0011	EEPROM writing inhibit	
4001	Over run	
4002	FER	
4004	PER	
4020	Buffer overflow	
4040	Communication time-out	
6301	Receiving parity error, overrun error or framing error	Communication module error code
6302	Defective communication character	
6303	Communication data sum mismatch	
6304	Defective data format	
6305	Defective command	
6306	Monitoring timeout	
6307	Modem initialization error	
6308	N:N Network parameter error	
6312	Parallel link character error	
6313	Parallel link sum error	
6314	Parallel link format error	
6320	Error in communication with inverter	
9001	Communication time-over	PLC
9002	Data receiving time-out judgment	
9003	Data receiving checksum error	
9004	Data receiving ID mismatching	
9005	Data receiving D type mismatching	
9006	Data receiving data length mismatching	

13. Appendix

13.1 PLC address assignment list

1) List of devices used for PLC (FX3GC)

Device		Description	Application	Power failre backup	User setting
X	X000～X017	Input relay	IO increase is possible		
Y	Y000～Y017	Output relay	IO increase is possible		
M	M0～M383	For general	For system		
	M384～M1535	For keeping of EEPROM	For system	○	
	M1536～M7679	For general	M1536～M2499 : For system		
			M2500～M7679 : (Reserve)		
	M8000～M8511	For special		—	—
S	S0～S9	Initial state			
	S10～S899	For keeping of EEPROM	For system	○	
	S900～S999	For annunciator	For system	○	
	S1000～S4095	For general	S1000～S1099 : For system		
			S1100～S4095 : (Reserve)		○
T	T0～T191	100ms	T0～T99 : For system		
			T100～T191 : (Reserve)		○
	T192～T199	100ms (Routine)			○
	T200～T245	10ms	T200～T219 : For system		
			T220～T245 : (Reserve)		○
	T246～T249	1ms accumulating type		○	○
	T250～T255	100ms accumulating type		○	○
	T256～T319	1ms			○
C	C0～C15 99	For general 16 bits			○
	C16～C199	For keeping 16 bits		○	○
	C200～C219	For general 32 bits			○
	C220～C234	For keeping 32 bits		○	○
	C235～C255	High-speed counter		○	○
D	D0～D199	For general	D0～D199 : For system		
	D200～D511	For keeping (battery)	D200～D399 : For system	○	
			D400～D499 : For fault log	○	
			D500～D511 : For Operation log	○	
	D512～D7999	For keeping (battery)	D512～D1099 : For Operation log	○	
			D1100～D4999 : (Reserve)	○	○
			D5000～D7999 : For system	○	
	D8000～D8511	For special		—	—
R	R0～R32767	For keeping of battery		○	○
Z	Z0～Z7	For index	Z0～Z2 : For system		
			Z3～Z7 : (Reserve)		
P	P0～P4095	For branching of call	P0～P39 : For system		
			P40～P4095 : (Reserve)		○
I	I0□□～I5□□	Input interruption and input delay interruption			
	I6□□～I8□□	Timer interruption interruption			
	I010～I060	Counter interruption			

13.2 Standard setting list

13.2.1 SD75（FM513V）setting infomation

1）Operation parameters (Standard settings)

No.	Setting item	Set value
1	TIGHTEN TIMEOVER [sec]	8.0
2	CYCLE TIMEOVER [sec]	10.0
3	SCREW SHORTAGE [sec]	10.0
4	SCREW FEED [sec]	1.0
5	DELAY TIME [sec]	0.0
6		
7		
8	COUNT-A	OK
9	COUNT-B	NG
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

2）System parameters (Standard settings)

No.	Setting item	Set value
1	SCREW FEED DETECT	DISABLE
2	FEED TIMMING	AFTER
3		
4		
5		
6		
7	TORQUE CHECK	ENABLE
8	HEIGHT CHECK	ENABLE
9		
10		
11	CC-LINK	DISABLE
12	SD550 COMM.	DISABLE
13		
14		
15		
16		
17		
18		
19		
20	LANGUAGE	ENGLISH

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February 2018, Revision　SD75 User's Manual Ver1.13　SD75-SP0004OA

Controller for Single spindle screw driving unit

SD75

User's Manual

Ver1.13

SD75-SP0004OA Prepared in February 2018

NITTO SEIKO

Single-spindle Automatic Screw driving unit

FM513V

USER'S MANUAL Ver1.02

NITTO SEIKO CO.,LTD.

Notes】

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For safe use

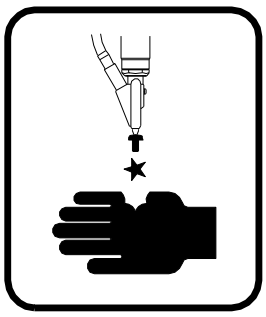
1. Safety precautions

Fully read and understand the safety precautions shown below before using this machine, and appropriately handle it with care.
To indicate critically hazardous points, the following warning labels are affixed to the body of the screw driving unit and other peripheral equipment.
Note that it is very difficult to cover all the detailed precautions for safety in this manual only, and proper judgment on safety by operators is very important for the prevention of possible hazards.

WARNING	Inappropriate handling will lead to serious accidents (deaths or serious injuries).

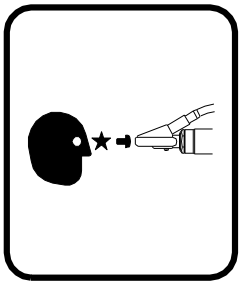
CAUTION	Inappropriate handling may lead to injuries, physical damages, or troubles to the operation of the machine.

WARNING Thread tightening



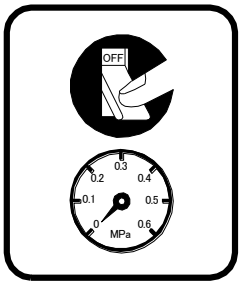
DO NOT put your hands in the screw driving unit during operation. Otherwise, you will hurt your hands.

WARNING Screw feeding



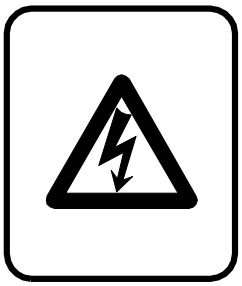
DO NOT look at the screw holding unit directly, nor turn it to anyone. Otherwise, loss of sight or injuries will be caused.

WARNING Cutoff of power and air supply



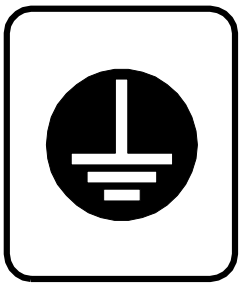
Be sure to cut the power and air supply off before adjusting or maintaining the machine.
Otherwise, you may suffer electric shocks or may be entangled in the machine.

WARNING Electric shock



Be sure to cut the power off before maintenance or inspection.
Otherwise, you may suffer electric shocks.

CAUTION Grounding



Ground the machine during installation.
Otherwise, electric shocks or malfunctions may occur.

WARNING Wiring

Always completely cut off the power for all the phases from the outside before installation and wiring. Otherwise, you may suffer electric shocks, or the work may be damaged.

WARNING Startup and maintenance

DO NOT touch terminals while the machine is alive. Otherwise, electric shocks or malfunctions may occur.

WARNING After maintenance, inspection, and adjustment

Be sure to return all the tools used for maintenance, inspection, and adjustment to the toolbox. Working with them left on the machine or close to your feet may cause serious accidents.

WARNING Precautions for centering adjustment

If you need to access the machine to adjust a driver bit centering condition relative to a screw tightening hole, use thorough caution about motion of the machine. When working by two or more persons is required, be sure to discuss safety measures including oral signals during working, in advance. Otherwise, serious accidents may occur.

CAUTION After operation

Be sure to shut the power and air supply off after operation.

CAUTION Restarting after long-term shutdown

Before restarting the machine that it has been shut down for a long period, completely clean and inspect it, and carry out a trial run to check for faults.

Preparations for use

1. Environmental conditions for installation

To operate this machine correctly, install it in the environment satisfying the conditions shown below.

Ambient temperature	**0°C to +40°C**
Ambient humidity	**From 30 to 80% RH**
Vibration	**Location free from vibration**
Outside air	**Place with less dusts and soot**

If this machine is installed in a harsh environment that does not meet the above conditions, an error occurs with the control circuit. This results in malfunction of the machine, and causes an accident and fault of the machine. When installation in inferior environment is absolutely necessary, fully provide protective measures for the machine.

2. Securing installation space

WARNING Secure the space enough to install the machine.

Secure the installation space enough to inspect and adjust the screw driving unit, as well as fully understand the operation of the machine, specify the hazardous areas, and provide the safety guardrail.

3. Installation of safety guardrail

CAUTION Install the safety guardrail to prevent anyone from easily entering hazardous areas.

Provide covers and fences around hazardous areas of the screw driving unit, to prevent a person from accidentally **entering** hazardous areas while the screw driving unit is in automatic operation or standby status. Be sure to observe this instruction, because the Ministry of Health, Labour and Welfare **defines installation of covers and fences as compulsory requirements** under the Labor and Sanitation Regulation (Article 101). The above-mentioned covers and fences mean the covers and fences that cannot be easily moved, and those hardly damaged or deformed by external force.

4. Installation of screw driving unit

WARNING Install the screw driving unit onto the frame with enough strength.

Fasten the body of the screw driving unit securely on a place with enough strength relative to the tightening thrust (for downward tightening: 60 to 250 N) with hexagon socket head bolts or hexagon bolts with a nominal diameter of 6 mm. Failure to meet this condition disables required installation work, and also causes a fault of the machine or an unexpected trouble.

5. Utilities

(1) The power supply voltage required for this machine is indicated on the controller or electric drawing included in the machine. Prepare a compatible outlet.
(2) Supply clean air at 0.4 to 0.5MPa air pressure.

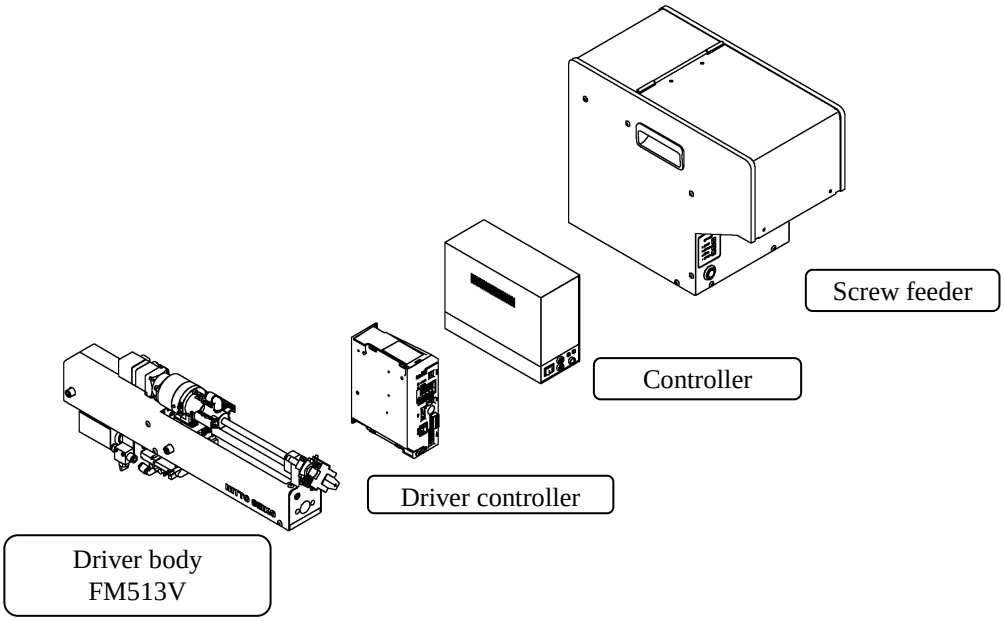
6. Installation of controller and screw feeder

CAUTION Be sure to connect the grounding cable to the grounding terminal in the factory.

If the dedicated controller and screw feeder are provided, install them at a distance from moving parts of the screw driving unit, within a range of the specified cable length. To prevent any malfunction, use a receptacle with the specified capacity located apart from the source of humidity, oil, and dusts. (For the capacity of the power supply, refer to the operation manual of the controller.)
To install the screw feeder, make sure that routing of the screw feed hose is secured.

Configuration of system

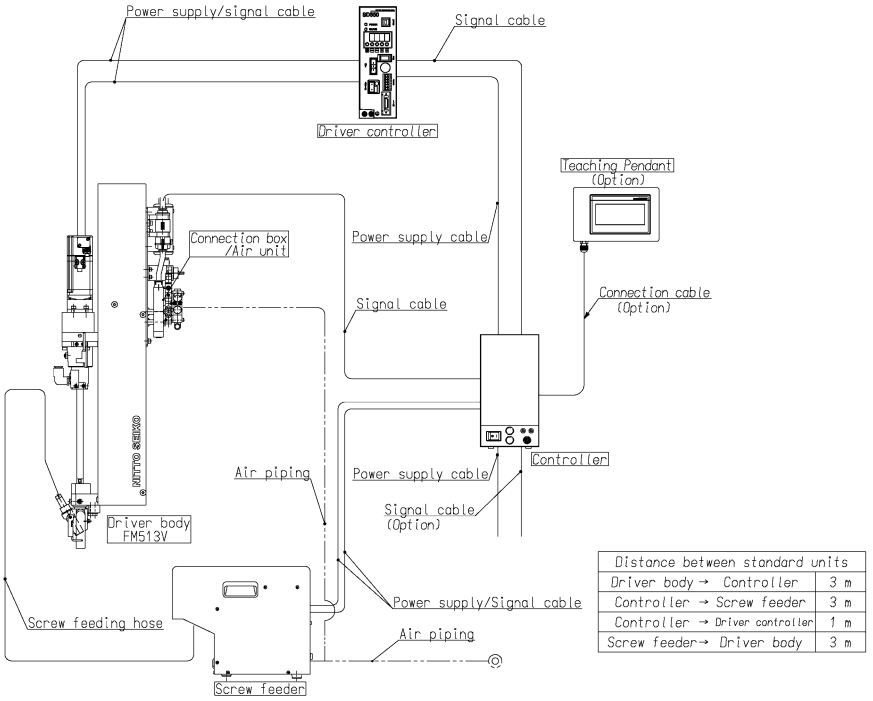
Screw driving unit **FM513V** is comprised of the following units:



* The controller and the screw feeder may not be included, or their models are different from the above, depending on specifications.
* For details of the controller and the screw feeder, refer to operation manuals for individual equipment in separate volumes.

1. Connections of equipment

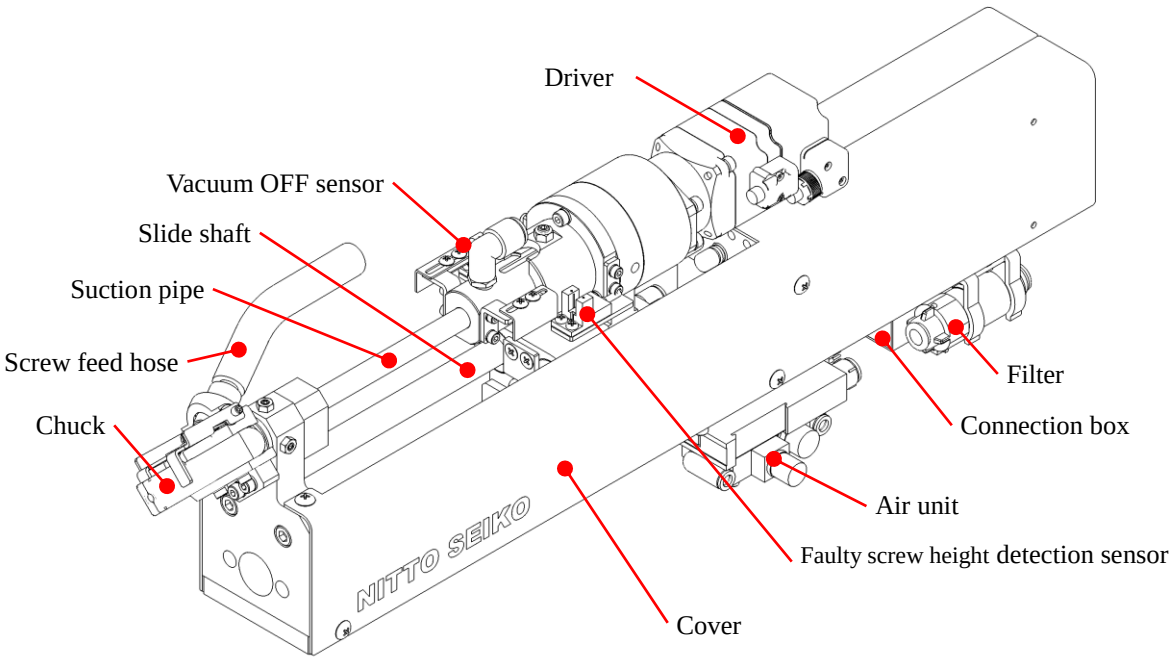
During installation, connect the equipment according to the figure below.
(Improper connection of a connector may disable operation. Securely connect each connector.)



Distance between standard units	
Driver body → Controller	3 m
Controller → Screw feeder	3 m
Controller → Driver controller	1 m
Screw feeder→ Driver body	3 m

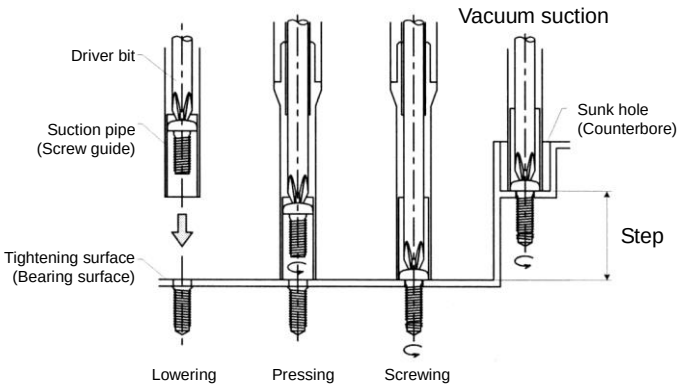
* The above cable lengths apply to the standard cables. For a customer-specified cable, the cable length may be different from the above.

2. Part names of screw driving unit



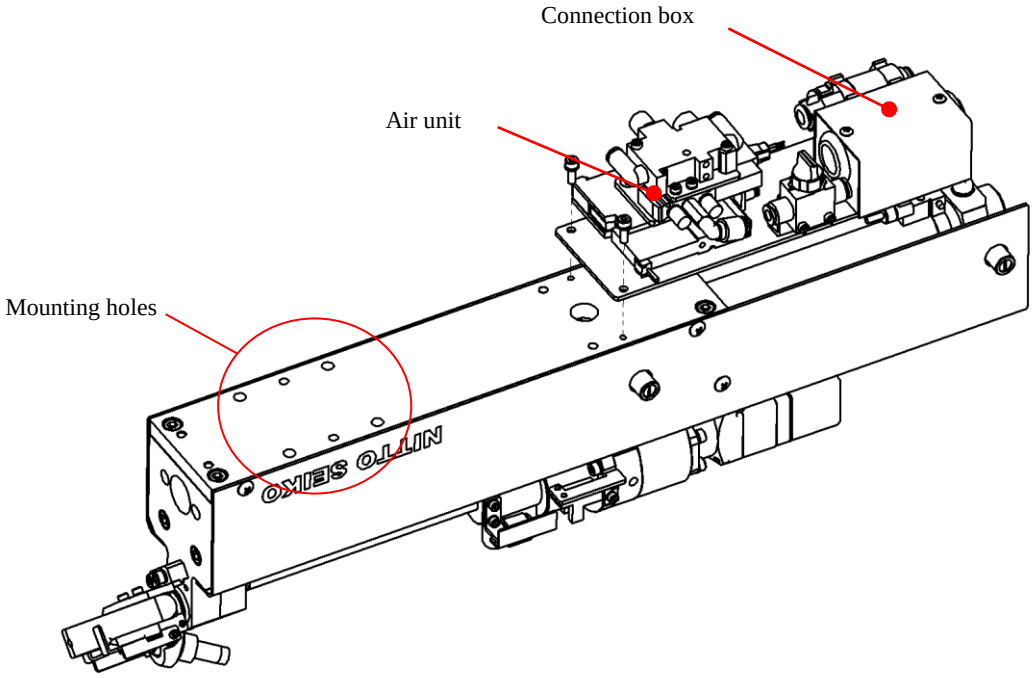
3. Structure of screw driving unit

The suction pipe (screw guide and holder) contains the driver bit with the bit shaft connected to the driver motor. When a screw is fed and the driver bit is lowered by the pneumatic cylinder type unit with the vacuum unit actuated, the screw is sucked and raised by the chuck unit. Then, the pipe is lowered to the bearing surface while the claws are being opened.
The suction pipe is stopped when it comes into contact with a work, and the rotated internal bit keeps to be further lowered for thread tightening.
When the screw is tightened and the reaction load applied to the driver bit reaches the specified setting (torque), the driver motor detects it, and raising is restarted to return the driver bit.



The suction pipe (screw guide) is designed to be stopped after it comes into contact with the top face of a work (screw tightening face). **The pipe presses the work with a force of approximately 30 N (approximately 3 kgf)** when a screw is tightened. Thus, if the top face (screw tightening bearing face) of a work does not have enough strength and it is liable to be damaged easily, it is possible to prevent the pipe from coming into contact with the work by installing the optional screw guide stopper. In this case, however, the machine is not applicable to tightening operation in a “stepped” position, as shown on the left.

4. Installation of screw driving unit



To mount the screw driving unit, fasten it on a plane by using the mounting holes in the above figure. If mounting work is hindered by the air unit and the intermediate connection box, remove the mounting plate that fastens the air unit and the intermediate connection box, and mount it near the screw driving unit.
For screw driving unit mounting dimensions, refer to the machine outline drawing on a separate page.

Specifications and outer dimensions

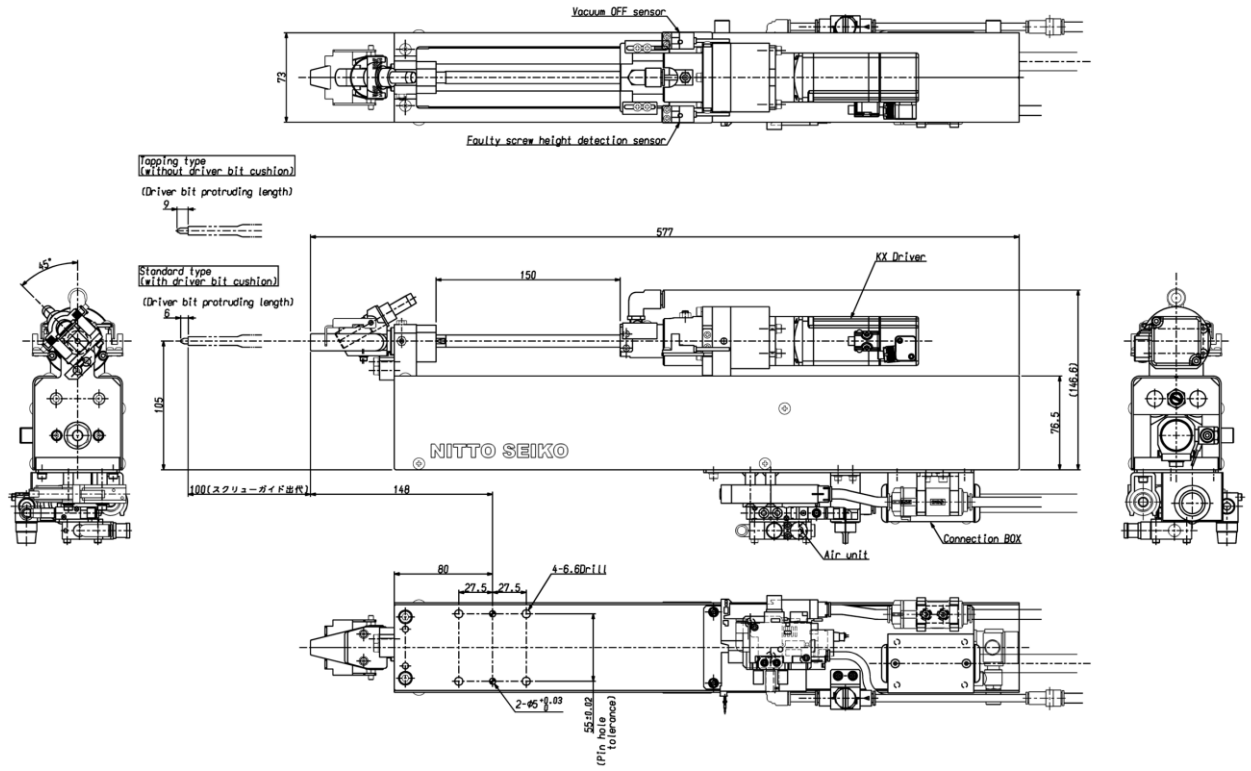
1. Specifications

Applicable screw	Type	Machine screw, tapping screw, etc.
	Nominal diameter	2 to 5 mm
	Length under neck	18 mm max.
Allowable torque range		0.3 to 3.0 Nm
Driver motor		KX driver, NX driver
Tightening stroke		50, 100 [150, 200, 250] mm [ ] indicates options.
Screw holding method		Vacuum chuck
Fault detecting function		Torque fault
		Screw shortage (feeder)
		Faulty screw height
Operating air pressure		0.4 to 0.5MPa
Tool/machine weight		Approx. 6 kg
Screw feeder		FF503H, FF311DR
Power supply voltage		200 VAC, single-phase
Controller		SD75

* The above table apply to the standard specifications. Depend on customer specifications may be different from above table.

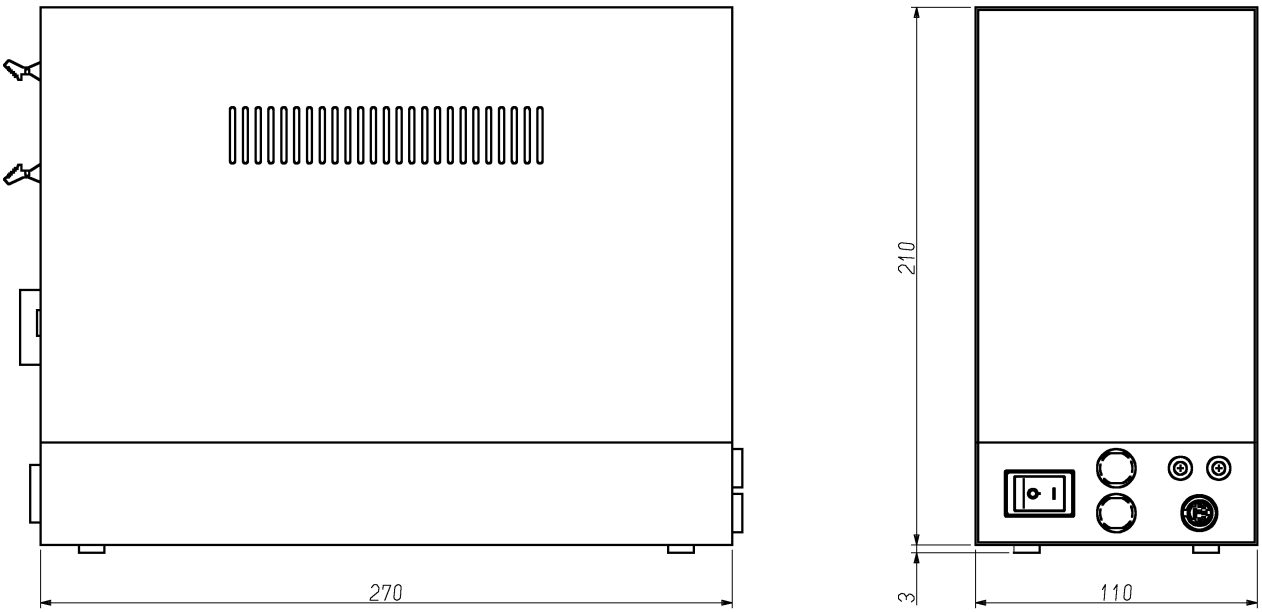
2. Outer dimensions

Screw driving unit body (FM513V)



*Appearance and a size change with specifications.

Controller for Single spindle screw driving unit (SD75)



* For outer dimensions of the screw feeder, refer to the operation manual in a separate volume.

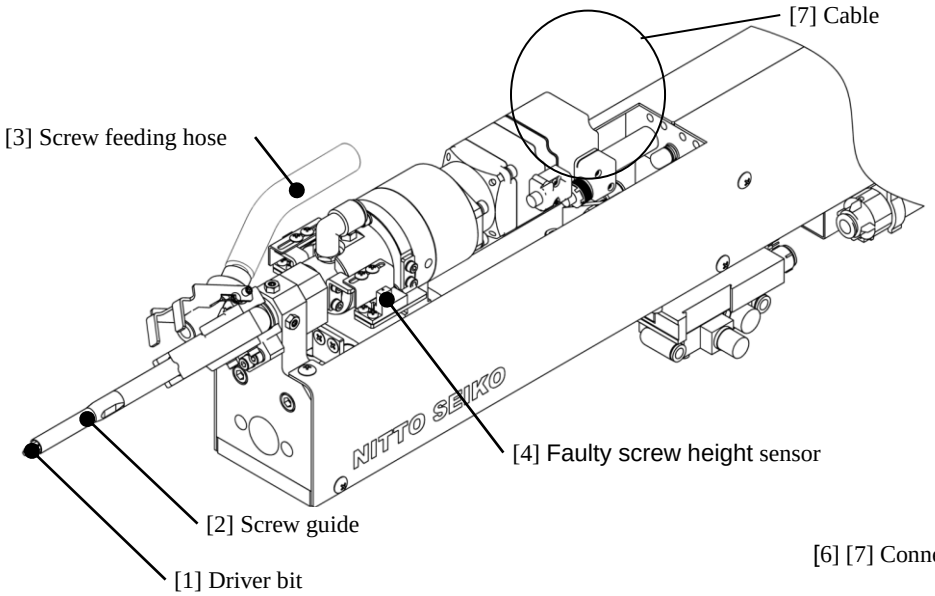
Maintenance and check

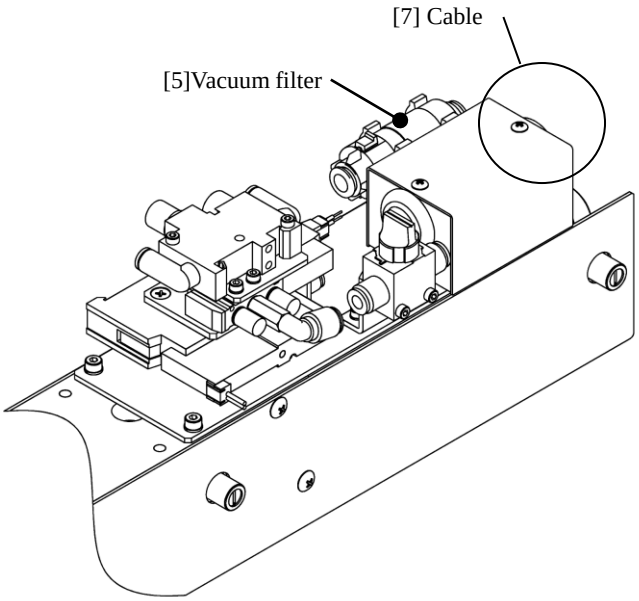
Always shut the power off before maintenance and inspection unless otherwise specified.

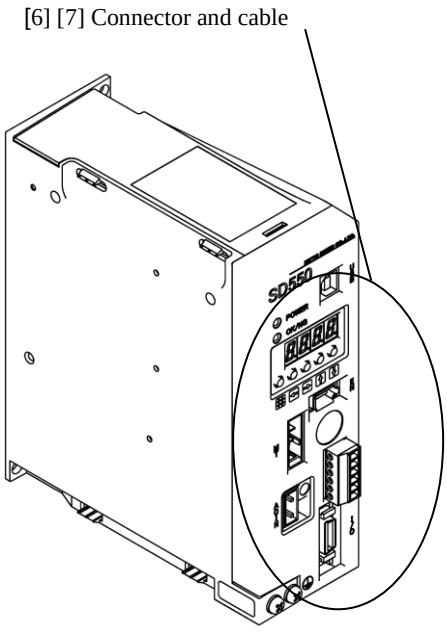
1. Daily check

Daily check the points shown in the table below before starting operation.

No.	Checkpoints	Checking methods	Criteria	Measures
1	Driver bit	Visually	Free from wear/breakage	Replace
2	Screw guide	Visually	Free from breakage	Replace
3	Screw feeding hose	Visually	Free from wear/fracture	Replace
4	Faulty screw height sensor	Visually	Normal detection	Adjust
5	Vacuum filter	Visually	No stain/much dust	Clean with air gun, or replace
6	Connector	Visually	Free from looseness, failure in connection, and dusts	Securely connect and clean
7	Cable	Visually	Free from damage and tear	Repair or replace



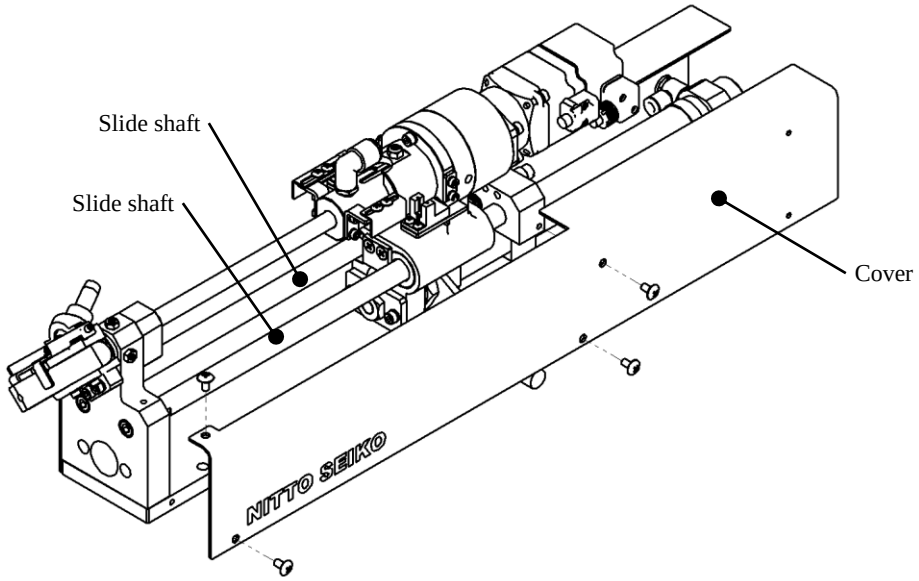




2. Lubrication and cleaning

2-1. Lubrication

Lubrication allows the machine operate smoothly, as well as influences the service life of the machine. Periodically lubricate it according to the instructions shown below.



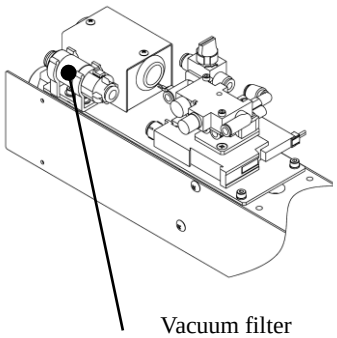
Procedure

[1] Remove the cover. (The cover is fastened with four screws on one side.)
[2] Wipe off old grease and dust adhering to the slide shaft with a cloth.
[3] Apply new grease to the slide shaft evenly with a brush.

Lubricated part ……Slide shaft
Initial operation……From 2 to 3 months
Refill interval ……Every 6 months
Recommended grease ……Lithium base grease
(Lithium soap base)

2-2. Cleaning

The vacuum filter prevents dust and swarf from entering the vacuum generator when a screw is held with the vacuum chuck in the screw guide.
If much dust accumulates in the filter, it causes reduction in vacuum pressure and flow rate, resulting in a trouble such as screw fall. To prevent this, clean the filter periodically.
Particularly, in an environment where dust or powder is generated by tapping or drilling in screw tightening process, the amount of dust accumulating in the filter increases. Shorten the inspection interval depending on operating environments.



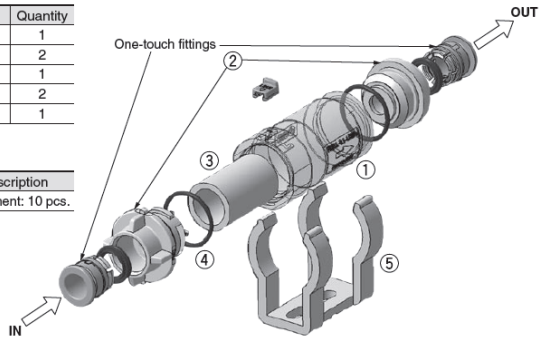
Construction

Component Parts

No.	Description	Material	Quantity
1	Case	PC	1
2	Cover	Resin PBT	2
3	Element	Sintered resin	1
4	Seal	HNBR	2
5	Bracket	Resin PBT	1

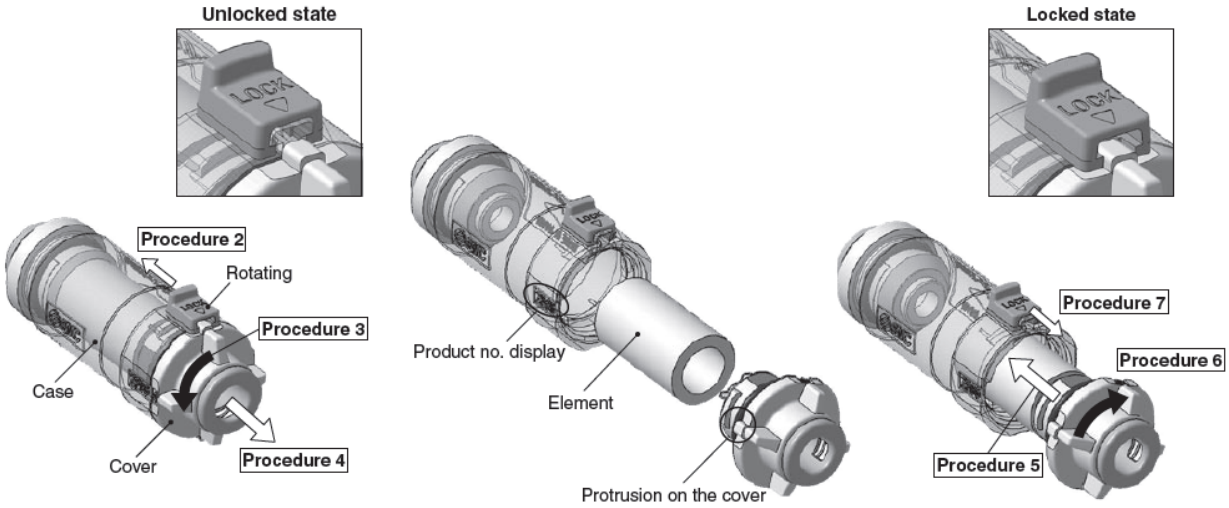
Replacement Element Part No.

Part no.	Applicable filter model	Element size	Set description
ZFC-EL-4	ZFC7	ø16 x ø12 x L25	Spare element: 10 pcs.



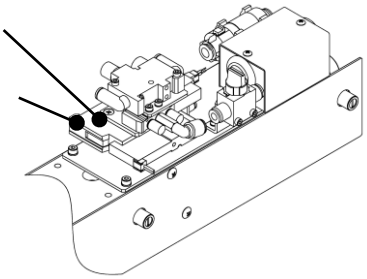
Procedure

1. Stop operation and reduce the filter's internal pressure to atmosphere.
2. Slide the lock mechanism in the direction of the arrow to release the lock.
3. Rotate the cover counterclockwise at least 90 degrees.
4. Pull the cover out of the case to remove the element. Remove dust and other debris remaining inside the case by blowing it out with air, etc. (Also, confirm that the O-ring is not damaged.)
5. Install a new element on cover and insert it into the case.
6. Align the raised part of the cover with the model no. display of the body, and push the cover to the end of the body and rotate it clockwise until it stops.
7. Set the lock mechanism and check that the cover is locked completely.



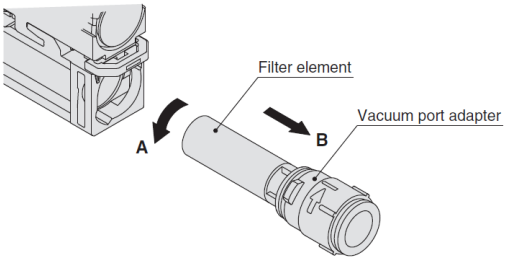
The vacuum generator (ejector) is also equipped with a filter, to catch dust that the filter described on the previous page cannot remove. This filter will not have so much dust as the filter described on the previous page. However, conduct periodic inspection, and clean the filter if it has dirt or dust.

Vacuum generator (ejector)
Vacuum filter element
(Manufactured by smc)
Model: ZK2A12J5NL2-08

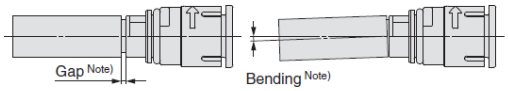


Replacement procedure for filter element

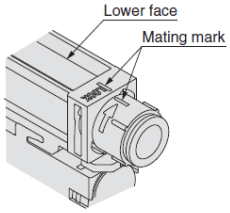
- To pull out the vacuum port adapter, rotate the adapter by about 90 degrees in direction A and pull in direction B. The adapter can be removed with the suction filter from the filter case.
- Remove the suction filter from the vacuum port adapter and replace it with a new suction filter.



- When installing the filter, insert the filter to the end so that there is no gap or bending between the filter and the vacuum port adapter. The gap or bending will cause the element to deform inside the case.



- Put the filter back into the filter case following this procedure in reverse.
- To mount the vacuum port adapter into the filter case, turn the adapter so that the mating mark of the adapter and the case are aligned. (Rotation stops there.)



Adjustment

Functions of this screw driving unit can be classified as listed below:
For adjustment procedures, refer to the operation manual of respective devices.

Functions		Items to be adjusted	Parts to be adjusted	Adjustment procedures
Screw driving	Tightening	Tightening torque Tightening (rotating) speed	Driver controller	Refer to “Operation Manual for Driver controller”
	Moving	Moving speed	Speed controller	Described in this manual.
		Driver bit thrust	Regulator	
		Driver bit centering		
		Faulty screw height	Sensor dog	
		Vacuum OFF	Encoder	
Screw feeding	Alignment	Configuration	Kick plate	Refer to “Operation Manual for Vibratory Track Screw Feeder” or “Operation Manual for Compact Drum Type Screw Feeder”.
		Speed	Vibrator	
	Escape	Speed	Speed controller	
	Feeding	Speed	Restrictor	

⚠ CAUTION

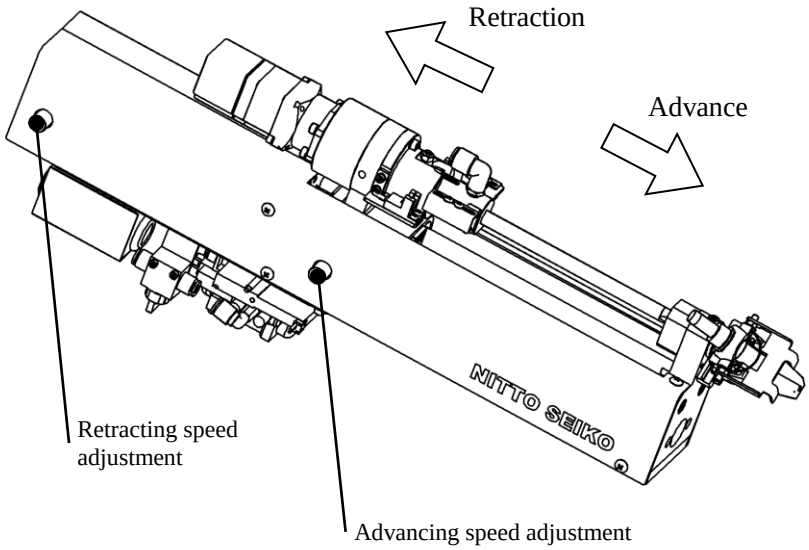
Items shown above have been adjusted before the machine is delivered to customers. If you need to alter any of them after delivery, fully read the operation manuals for the device, and modify it carefully.
Especially, whenever any of the torque or rotating speed of the driver motor is required to be altered, be sure to record the initial data (factory set values) by way of precaution.

1. Moving speed

To adjust the moving speed of the suction pipe (including the driver bit), follow the procedure below.
The suction pipe moving speed has been factory-set at the optimum value. If it is changed for any purpose other than the following, it may cause a tightening failure, and breakage of the equipment and workpieces.

[1] Dent or flaw occurs with a workpiece: Reduce the advancing speed.
[2] Internal threads are damaged at start of tightening process: Reduce the advancing speed.
[3] A screw falls when it is vacuum chucked: Reduce the advancing speed.

*Do not use over 250mm/sec with advance and return speed.



Adjusting procedure

Adjust the above speed controller with a flat-blade screwdriver.

Turning clockwise: Reduces the speed.

Turning counterclockwise: Increases the speed.

It is dangerous to conduct speed adjustment during automatic operation. Never attempt to do it.

2. Driver bit thrust

For driver bit adjustment, follow the procedure below.
If the customer has supplied screws and workpieces for adjustment in our manufacturing stage, the driver bit thrust has been factory-set at the optimum value according to actual tightening work. If it is changed for any purpose other than the following, it may cause a tightening failure, and breakage of the equipment and workpieces.

[1] Internal threads are damaged at start of tightening process: Reduce the thrust.
[2] Come-out in tightening process (The driver bit is disengaged from a screw.): Increase the thrust.
[3] A workpiece is deformed in tightening process: Reduce the thrust.

Adjusting procedure

Adjust the driver bit thrust by turning the above adjusting knob by hand.

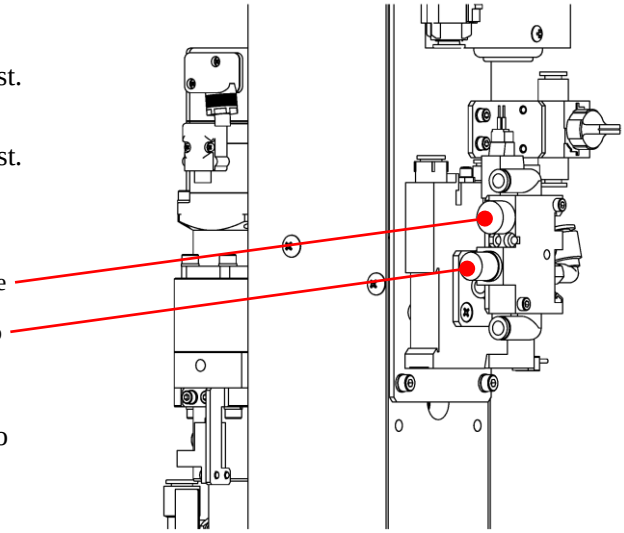
Turning clockwise:

Increases the thrust.

Turning counterclockwise:

Reduces the thrust.

*Do not use below 0.2MPa air pressure.



It is dangerous to conduct speed adjustment during automatic operation. Never attempt to do it.

3. Driver bit centering

Adjust the driver bit centering condition relative to a screw tightening position by following the procedure below. This machine does not provide a centering adjustment function. Provide an adjustment function for a workpiece jig, or a part to mount this machine.

If any of the following problems occurs, check if the driver bit position is set at with a screw tightening position.

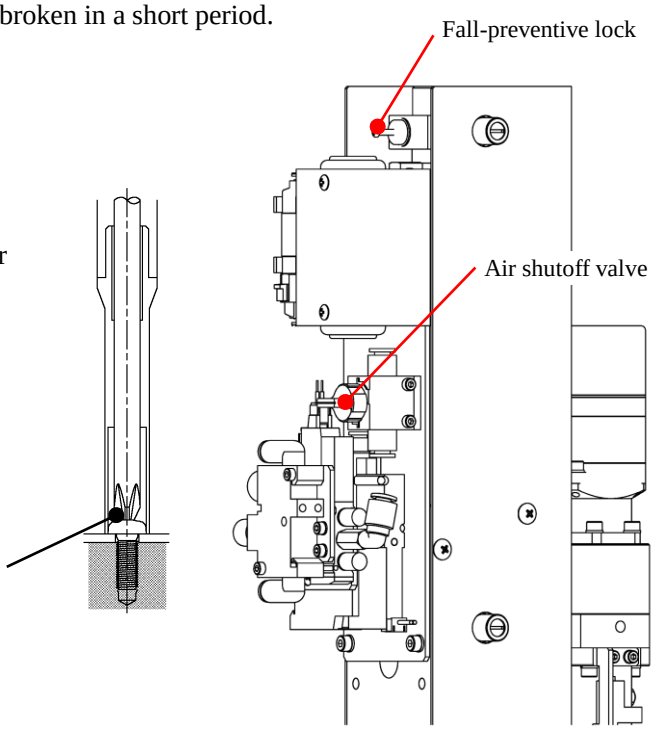
[1] A screw comes out of a screw hole.

[2] A screw is obliquely tightened.

[3] The driver bit and the screw guide will be broken in a short period.

Adjusting procedure

Turn the handle of the air shutoff valve by 90°, to shut off the air for advancing/retracting the screw driving unit drive unit. Then, the drive unit can be moved by hand. Adjust the driver bit position by fitting the driver bit in a screw that has been normally tightened.



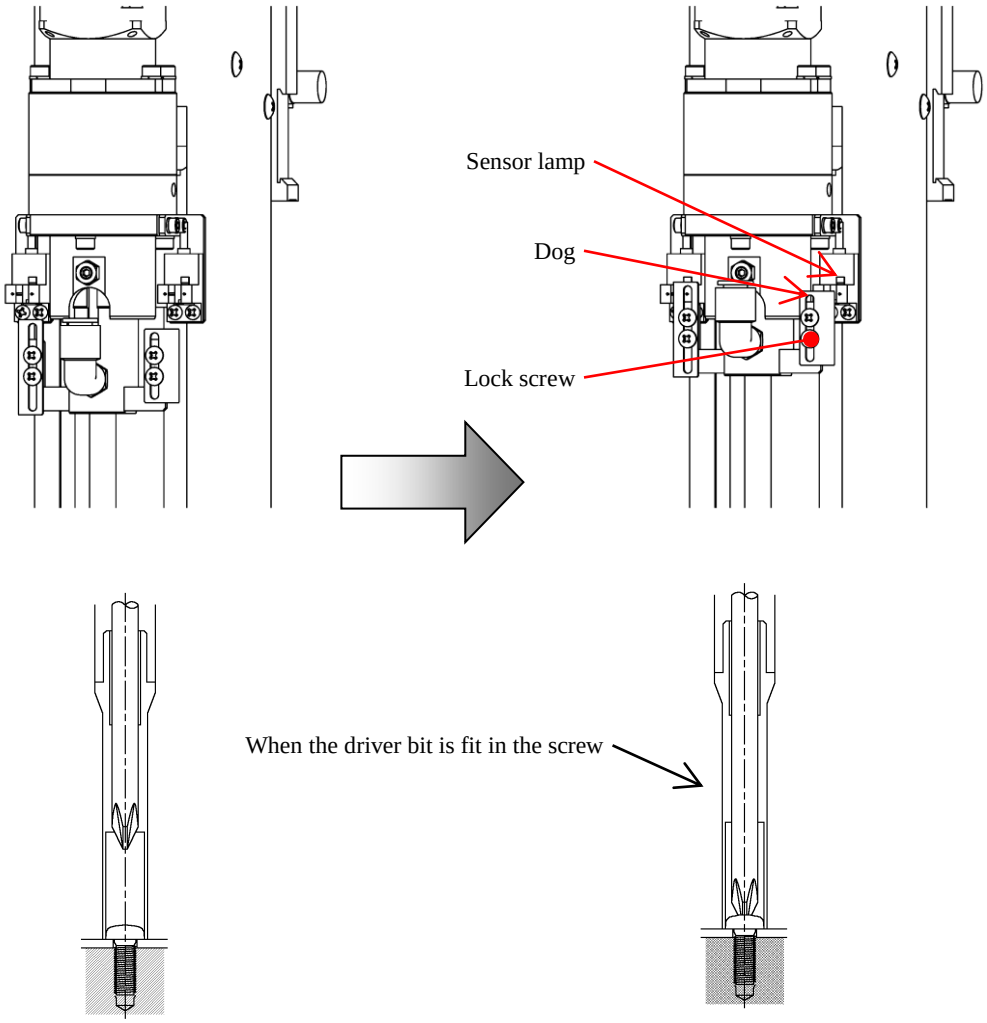
Adjust the driver bit so that it is securely fit in the screw.

*CAUTION

For downward tightening, pull the fall-preventive lock while raising the screw driving unit drive unit by hand after air is shut off. After unlocking the fall-preventive lock, the screw driving unit drive unit will fall under its own weight. Be sure to hold the drive unit securely by hand when you unlock it. The weight of the drive unit is approx. 4 kgf.

4. Faulty screw height detection sensor

“Faulty screw height ” means a condition that a screw head is raised from a tightening plane without being seated on the plane, which is caused by improper positioning or tapping failure.
In this condition, the screw is incompletely tightened, which affects assembling accuracy of target products.
If the customer has supplied screws and workpieces for adjustment in our manufacturing stage, the sensor has been factory-set to optimum adjustment conditions. However, the detecting position may change as the driver bit or screw guide is worn out.
To prevent this, conduct periodic inspection, and replace the bit or screw guide that has been worn out as soon as possible.
For adjustment of the screw loose fitting detection sensor, follow the procedure below:

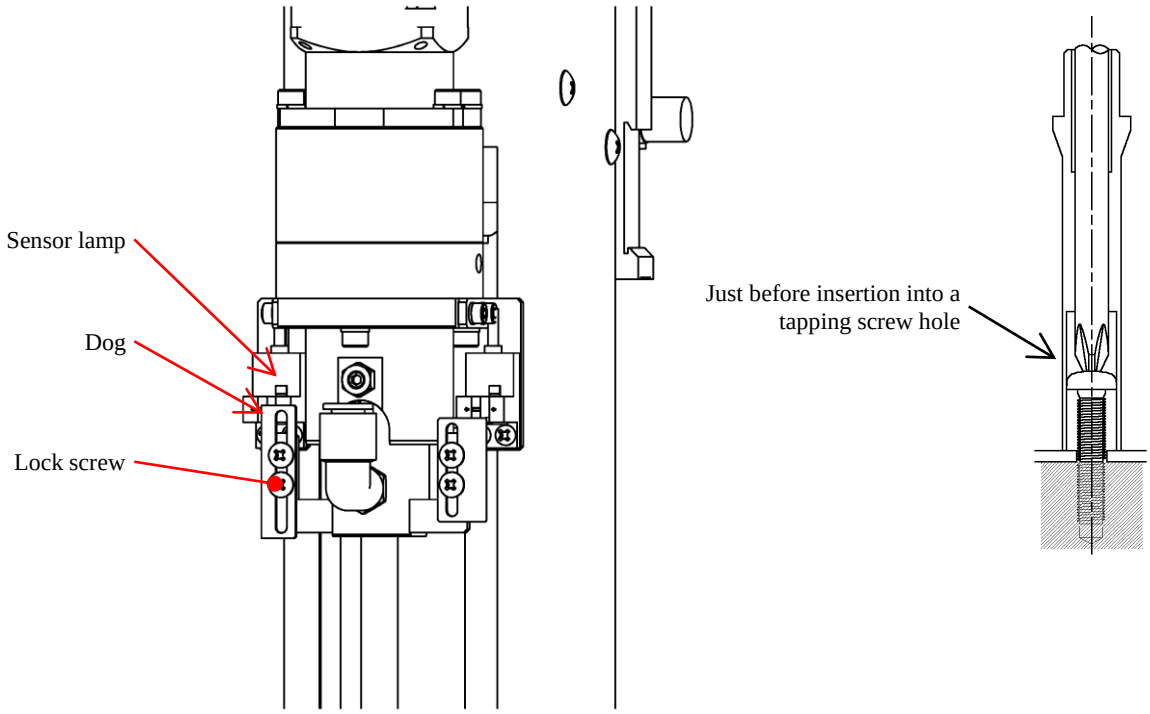


Adjusting procedure

[1] Tighten a screw in a workpiece in advance.
[2] According to the driver bit centering procedure described on the previous page, shut off the air, and advance the screw guide.
[3] Fit the driver bit into the screw as shown above, and hold it by hand.
(With some models, a cushion spring is incorporated in the bit. Push the spring until it is fully compressed.)
[4] Loosen the above lock screw in the status of [3], adjust the sensor dog at the exact position where the sensor lamp lights up, and tighten the lock screw.

5. Vacuum OFF

The vacuum OFF sensor is a sensor to turn OFF vacuum for screw chuck.
If the customer has supplied screws and workpieces for adjustment in our manufacturing stage, the sensor has been factory-set to optimum detecting conditions. However, the detecting position may change as the driver bit or screw guide is worn out.
To prevent this, conduct periodic inspection, and replace the driver bit or screw guide that has been worn out as soon as possible.
For adjustment of the vacuum OFF sensor, follow the procedure below:



Adjusting procedure

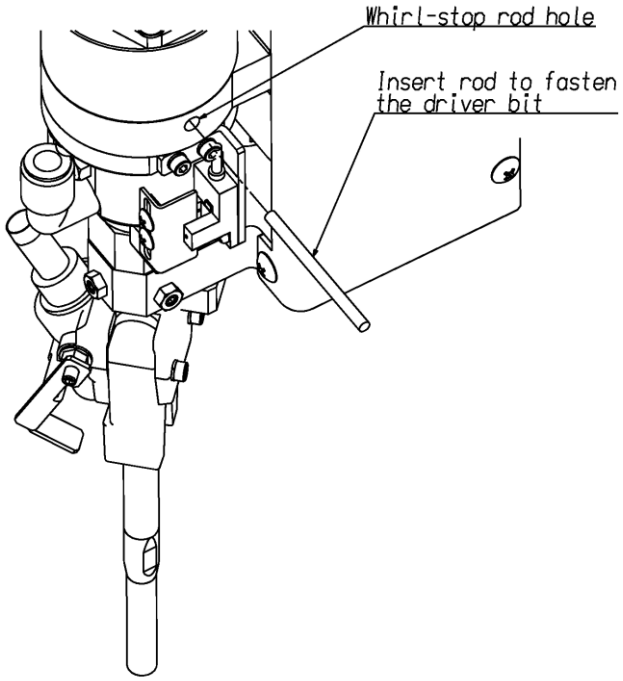
[1] According to the driver bit centering procedure described in Section 3, shut off the air, and advance the screw guide.
[2] Bring the screw into the status just before insertion into a tapping screw hole.
[3] In the status of [2], loosen the above lock screw, adjust the sensor dog at the exact position where the sensor lamp lights up, and tighten the lock screw.

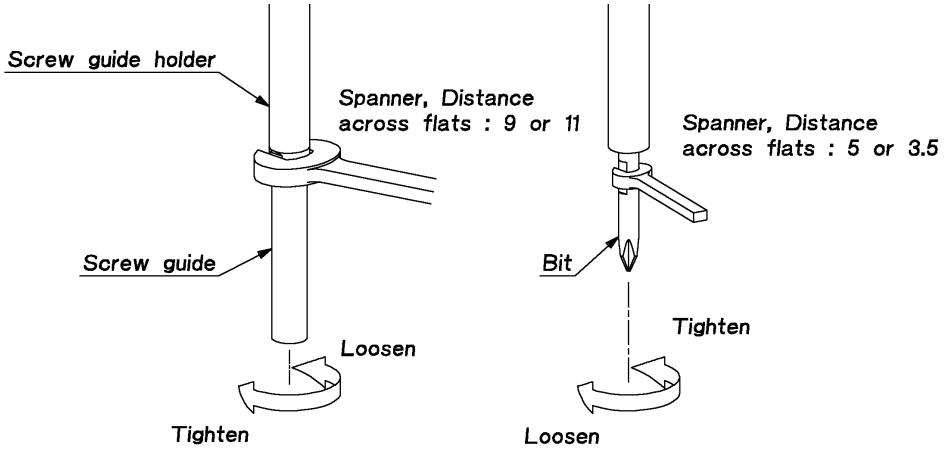
Parts replacement

Replacement of suction pipe (screw guide) and driver bit

A suction pipe (screw guide) and a driver bit are consumables. **When faulty suction or tightening (come-out) occurs, check the parts, and replace them immediately, if necessary.**

(a) Disengage the brake for the screw driving unit up/down servo motor, and lower the screw driving unit.
(b) With the screw guide holder held by hand, loosen the screw guide, and remove it.
(Note: The screw guide uses a left-hand thread.)
(c) After removing the screw guide, you can access the driver bit. Insert a rod with ϕ4 or smaller diameter (wrench, etc.), and loosen the driver bit. (The driver bit uses a right-hand thread.)
(d) To re-mount the driver bit, follow the above steps in the reverse order (c → b → a).





Troubleshooting

Causes of and remedies for typical troubles are shown in the table below.
For electrical troubles including faults in the connection of power supply or the controller, refer to the operation manual of the controller.

Symptoms	Possible causes	Checkpoints	Remedies
1. Driver (bit) is not rotated.	Faulty cable connection	Connectors between driver and controller	Disconnect connectors, and reconnect them.
	Cable disconnection	Cables (near connectors)	Replace cables.
	Breakage of drive motor	Appearance of driver motor	Replace (repair).
	Breakage of controller PCB	Indicator of Driver controller	Replace (repair).
	Failure in input of start signal	Sequence circuit	Change sequence.
2. Driver cannot be raised and lowered.	Insufficient air pressure	Supply pressure (regulator pressure gauge)	Adjust.
3. Screws cannot be fed (1).	Clogs in hose	Screw feeding hose	Replace.
	Insufficient compressed air volume	Feeder (Air volume adjuster nozzle)	Adjust.
	Clogs in alignment unit	Alignment section (should be free from foreign matters)	Remove foreign matters and dusts.
		Presser plate (Dimensions of presser plate for screw head)	Adjust.
	Faulty escape	Escape operation	Adjust operating speed.
4. Screws cannot be fed (2).	Excessive pressure feed force (Screws are popped out from chuck claws.)	Feeder (Air volume adjuster nozzle)	Adjust.
5. Screw drops during operation.	Insufficient suction force	Vacuum filter (accumulated dusts)	Remove dusts (clean). Replace elements.
6. Faulty tightening occurs frequently.			
(1) Wrong screw height	Faulty adjustment of detecting dog	Detecting dog	Adjust.
	Lower setting torque	Appropriate work tightening torque	Reset the torque.
(2) Wrong (insufficient) torque	Higher setting torque	Appropriate work tightening torque	Reset the torque.

Guarantee

In case of any malfunction of our FM513V, our guarantee is applicable as shown below. Note that repairs must be carried out by yourselves if any malfunction occurs to your machine out of Japan.

1. Guaranteed coverage

If any malfunction occurs to the parts of this machine due to faults in materials or workmanship responsible for us, we will repair free of charge.
However, malfunctions due to causes shown below will not be covered by the guarantee.

(1) Natural disasters such as earthquakes, thunderbolts, typhoons, and floods, fires, or other accidents
(2) Modifications not authorized by us
(3) Use of lubricating oils and greases not specified by us
(4) Inappropriate maintenance and check
(5) Inappropriate or wrong adjustment
(6) Wrong operation
(7) Maintenance by someone other than authorized factories or us

2. Guarantee period

We guarantee our FM513V from the date of acceptance for the periods shown in the table below.

Object parts	Guarantee period
Machinery parts except for consumables	1 year or 2,500 hours of operation
Trade items	6 months or 1,300 hours of operation
Consumables	Out of guarantee
Special parts (such as fasters and wiring and piping parts)	Out of guarantee

(Operating period in a day should be 8 hours.)

3. Limitations

Note that faults shown below are out of our guarantee.

(1) Damage caused by aging and use, and malfunctions due to wear (such as natural discoloring of paint and plating, and degradation of consumables)

(2) Slight sensory phenomena that do not affect the quality and function of the machine (Equipment operating noise, operating speed, etc.)

[Revision records]

- Apr 2013, first edition , FM513V Ver1.00
- May 2013, second edition , FM513V Ver1.01
- Apr 2017,third edition , FM513V Ver1.02